Influence of Urban Forms on Social Sustainability:

A case of Guwahati, Assam

Thesis submitted in partial fulfilment

of the requirements for the degree of

Doctor of Philosophy

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July, 2015

Dedicated to my family, friends and neighbours.....



DECLARATION

"I, Shruti Hemani, declare that the PhD thesis titled **"Influence of Urban Forms on Social Sustainability: A case of Guwahati, Assam**" contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work".

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CERTIFICATE OF AUTHENTICITY:

This thesis entitled **"Influence of Urban Forms on Social Sustainability: A case of Guwahati, Assam**" submitted in partial fulfilment of the requirements for the Degree of Doctor of Philosophy at Indian Institute of Technology Guwahati has been carried out under my supervision and is a bonafide work of Ms. **Shruti Hemani**.

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I also confirm that Ms. **Shruti Hemani** has fulfilled all the mandatory requirements as per the rules and regulations necessary for the award of the degree of Doctor of Philosophy at the Indian Institute of Technology, Guwahati.

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ABSTRACT

*The social dimension of sustainability and the extent to which the physical form of cities may foster it, is gaining importance in the international sustainable urban development context, however in India, the concept remains poorly conceived. New approaches and tools at policy, design and implementation levels are highly biased towards environmental and economic sustainability, ignoring the social dimension which is fundamental to the character of Indian cities. This narrow focus coupled with massive and inequitable urban growth has resulted in social crises often evident in the cities physical forms posing critical challenges to sustainable urban future. Past investigations in the western context have also remained less satisfactory, further raising concerns about their applicability to the developing world cities which face essentially different urbanisation challenges and socio-cultural shifts. As India prepares itself to become an urban majority in 2050 by giving shape to its futuristic smart cities, there is clearly a pressing need to develop stronger empirical evidence about the influence of urban forms on social sustainability that links to sustainable designs, policies and practices. This research therefore, tests the influence of urban form components (open spatial-network, land-use, density, blocks and built-components) on six aspects of social sustainability using both, qualitative and quantitative strategies, which are calibrated and validated for Guwahati, the dominant city of North-East region of India. It asks: Do urban forms (at neighbourhood and block-segments scales) significantly affect various aspects of social sustainability? If yes, to what extent and in what ways? The quantitative findings for two urban form types using six case studies show that neighbourhood forms with connected and integrated street network, higher proportion of accessible open recreational spaces, higher mix of uses, higher densities and smaller compact urban blocks display higher levels of social sustainability amongst its residents, after controlling for intervening variables. Qualitative findings for four urban form types using twelve case studies further illuminate this complex relationship at the scale of block-segments. It highlights five key theories: 1) Intervening Variables (high number of intervening external variables), 2) Spatial Proximity (relative closeness based on physical distance), 3) Favourable Spatiality (spaces for social opportunities) 4) Complementing Synergies (integration of urban form components to produce a combined positive effect) and 5) Tipping Point (point after which urban form components starts to show negative effects). The research findings are finally translated into social sustainability framework focusing on 1. Robust and achievable **Social Policies** (topdown); 2. Incremental and flexible **Social Design** principles (linking top-down & bottom-up); 3. Participatory and empowering **Social Actions** (bottom-up). Based on this framework the thesis further provides urban form design guidance specific to the city of Guwahati.*

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LIST OF ABBREVIATIONS

ATCP	Assam Town and Country Planning
BSUP	Basic Services to the Urban Poor
ea-NDP	environmentally adjusted Net Domestic Product
GMC	Guwahati Municipal Corporation
GMDA	Guwahati Metropolitan Development Authority
GDA	Guwahati Development Authority
GDP	Gross Domestic Product
GOI	Government Of India
HDI	Human Development Index
ICT	Information and Communications Technology
IHSDP	Integrated Housing & Slum Development Programme
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
MDG	Millenium Development Goal
NEFR	North-East Frontier Railway
NMSH	National Mission on Sustainable Habitat
OISD	Oxford Institute of Sustainable Development
ODPM	Office of Deputy Prime Minister
OECD	Organisation for Economic Cooperation and Development.
RAY	Rajiv Awas Yojana
TERI	TATA Energy Research Institute
UDPFI	Urban development plans formulation and implementation
UN	United Nations
UNCED	United Nations Commission on Environment and Development
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNFPA	United Nations Population Fund
UN-HABITAT	United Nations Human Settlements Programme
WCED	World Commission of Environment and Development

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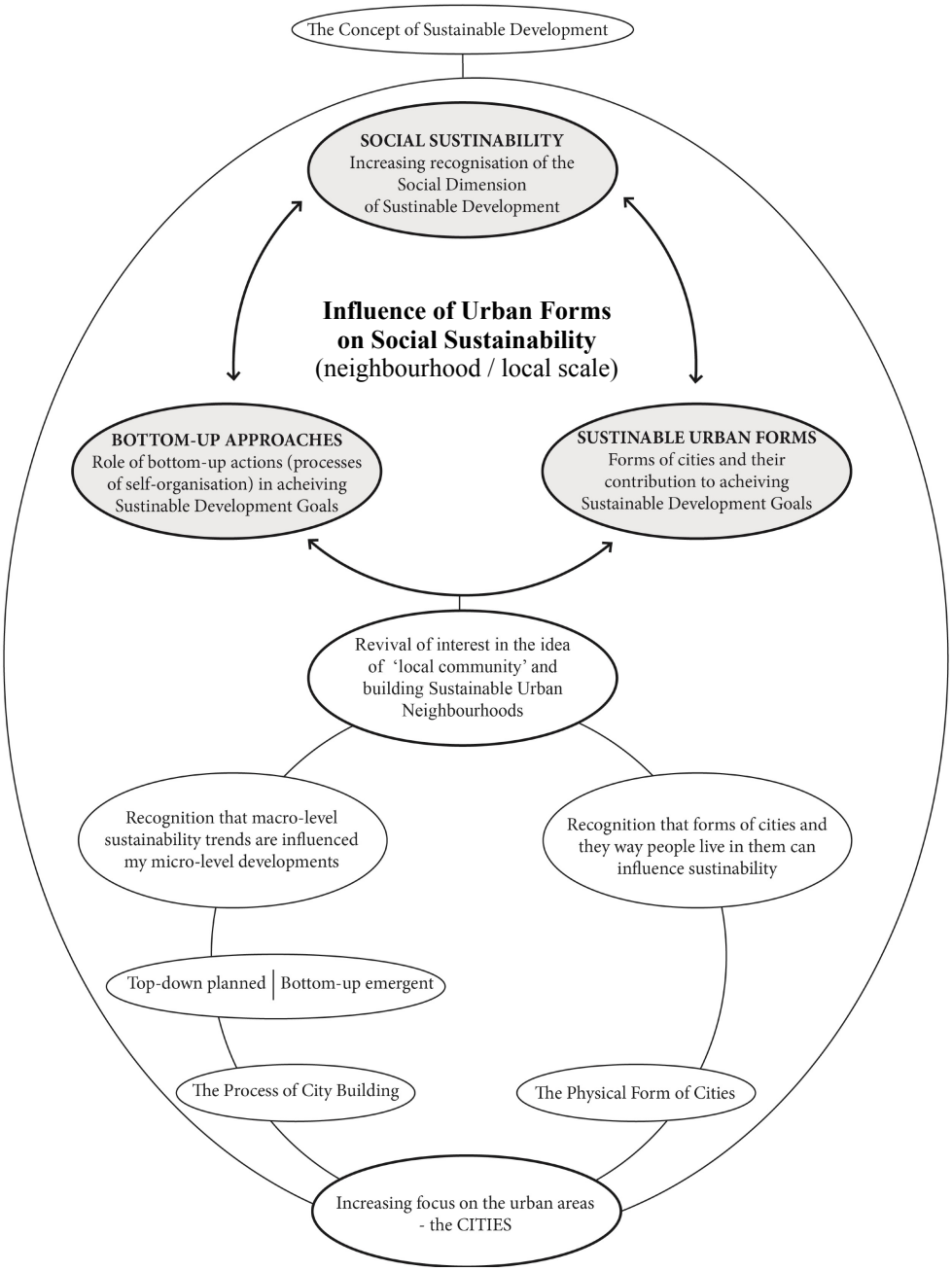
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Chapter 1
PREFACE

1.1 Research context

With the shift towards an urban world and increasing concentration of environmental and social problems, three concepts at present, are gaining immense attention from academicians and practitioners in their efforts towards building sustainable cities. This research stands at the convergence of these three inter-related concepts.

Figure 1: Convergence of three inter-related concepts



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i. *The Social Dimension of Sustainability:* Increasing recognition that the so far neglected social dimension of sustainability is indispensable has led to recent efforts in understanding the concept and developing theoretical frameworks to operationalise as well as to empirically investigate it in relation to sustainable cities. The concept, however, still remains vague. So far, it has no agreed definition, its measurement is problematic, and is highly context-dependent.

ii. *The Forms of Cities and their contribution to Sustainability*: Increasing recognition that the physical forms of the cities worldwide are altering rapidly has led to a great deal of inquiry on the extent to which they can contribute towards achieving a just and sustainable future. The results however, are not satisfactory often leading to contradictory results.

iii. *Bottom-up approaches to Sustainable City Building*: Increasing recognition that macro-level sustainability trends are influenced by micro-level developments has led to a renewed interest in spatially based urban communities as an important unit of social organisation and locus of action that can provide the basis for situating larger sustainability decisions.

1.2 Research justification

Cities play a vital role in the realisation of a sustainable future. This is particularly relevant to the developing nations like India facing severe sustainability challenges due to lack of resources, increasing poverty, inequity and susceptibility to climate change. With an influx of another 350 million people, the country will witness its cities becoming home to more than half of its total population by 2050 (more than 875 million people). Such vast scale and speed of urban growth will put tremendous pressure on the existing infrastructure, land and other natural resources as well as traditional socio-cultural settings that support a particular quality of life of its citizens, hence making Indian cities more vulnerable to non-sustainable design and development practices.

Sustainable urban development, now widely accepted as achieving a balance between the social, economic and environmental dimensions is therefore, forming the basis of India's new development guidelines. Yet, environmental performance and technological innovations have come to dominate the thinking on sustainable cities in India [For example, the Indian Green Building Council's rating systems (Leeds India, 2011) or the Government of India's more recent National Mission on Sustainable Habitat (NMSH, 2010)]. Much thinking, effort and investment is focused on reducing energy consumption, developing sustainable transport and greening buildings to address the challenges of climate change through a combination of modern planning, technological infrastructure and smart designs. The social dimension is highly under-represented,

focussing narrowly on infrastructural development and poverty alleviation through slum up-gradation programmes (see for example, JNNURM, RAY and other GOI's social development policies in urban areas). This narrow focus is at best ignoring and, at worst, destroying the social infrastructure that makes Indian cities work and is indeed fundamental to their character.

The present massive and inequitable urban growth in India, is resulting in social crisis such as poverty, increasing crime, weakening social ties, as well as deteriorating quality of life, often evident in the cities splintered spatial forms (at one end of the scale is the defensive luxury living while at the other, is the impoverished informal living) that not only poses danger to the country's stability but also represents some of the fundamental challenges to sustained urban growth. Despite it being the fastest growing economies of the world, India's Human Development Index ranks 136th amongst a total of 187 countries (Human Development Report 2013, UNDP). These facts re-emphasise that design for social sustainability in cities is not just an add-on to the environmental dimension or a technical matter of solving hard social issues through infrastructure provision, but is also about enabling urban environments to build and nurture strong communities for a cohesive society and sustained urban growth. A comprehensive approach to social sustainability that looks at all its elements in an integrated manner is, therefore, the need of the hour.

One of the key challenges in making a case for the neglected social dimension of sustainability in design of cities is, the multiplicity of gaps and fragmentation in understanding the relationship between urban form and social sustainability, especially in the Indian context. There has been extensive research and intense debates in last few decades on sustainable cities and the extent to which their physical forms can contribute towards achieving a sustainable future yet, the outcomes are less satisfactory, contradictory & non-transferable to developing countries facing different challenges to urbanisation and socio-spatial shifts. This causes difficulties when attempting to balance the social sustainability not only at urban policy, design and implementation levels but, also in amalgamating it across different disciplines and spatial scales.

The lack of evidence-based research at all these echelons is felt with great magnitude in rapidly urbanising India whose splintered city forms have forced rethinking of not only the basic urban design concepts but, also methods of governance and development guidelines. The top-down interventions so far, have not remained sufficient in addressing social sustainability at local or community level, a renewed focus on this relationship at neighbourhood scale can therefore, make wider policies that has so far remained elusive, more legitimate. The extent to which existing urban areas are expanding and new ones are being developed in India, empirical evidences about influence of urban forms on social sustainability at local level, that not only informs the design practices through

micro-level interventions but also becomes integral to development policies can be seen as utmost essential to make the country's urban growth and transition more sustainable and inclusive.

1.3 Research questions

The key question for research is:

Do urban forms (at different spatial scales) influence social sustainability?

If yes, to what extent and in what ways?

Further questions under investigation are:

i. What is social sustainability in Indian urban context and what are its core dimensions, components and measures?
ii. What are the key components of urban form and how can they be measured?

Questions that the quantitative research investigates into are:

Do urban forms at the scale of neighbourhood[1] influence social sustainability?

If yes, to what extent and in what ways?

iii. Do urban forms with higher levels of 1) street connectivity and integration 2) amount of accessible open recreational spaces 3) mix of uses 4) densities 5) small compact blocks display significantly higher levels of social sustainability amongst its residents?
iv. Are traditional neighbourhood forms of cities (characterised by compaction) more sustainable than the modern neighbourhoods (characterised by dispersion), when different aspects of social sustainability are considered in the Indian context?

Questions that the qualitative research investigates into are:

Do urban forms at the scale of block-segment[2] influence social sustainability?

If yes, to what extent and in what ways?

v. Which type of urban forms components, at the level of block-segments, significantly foster social sustainability and, why?
vi. With different dominant process trajectories – bottom-up emergent and top-down planned - do the traditional and informal forms within cities, at the level of

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[1] Neighbourhood in physical terms is defined as "key living space through which people get access to material and social resources, across which they pass to reach other opportunities …" (Meegan & Mitchell, 2001, p.2172). It is also understood as a social space around one's place of residence (Bruin & Cook, 1997).

No set method for defining a neighbourhood's spatial boundary was obtained from the literature review therefore, for the purpose of this research, heuristic approach was adopted. Geographically based immediate neighbourhoods within accepted walking distance of 10 minutes or 800m radius (Ferguson and Woods, 2010; Advani and Tiwari, 2005; Urban Design Compendium, 2000) were demarcated within approximate localities.

[2] A block segment represents a section of an urban block comprising of a geographically based immediate community defined within a physical commune, street or gated enclave.

block-segments, show significantly varying levels of social sustainability compared to their modern counterparts?

vii. If both, social sustainability and urban forms are dynamic concepts, can we obtain a socially sustainable equilibrium state for urban communities?

1.4 Research hypothesis

1.4.1 Primary hypothesis

"Urban forms (at spatial scales of neighbourhood and block-segment) significantly affect various aspects of Social Sustainability"

Definition of concepts:

Urban form is defined as 'a spatial pattern of human activities at a certain point in time' (Anderson , 1996). It is viewed at various spatial scales (city, neighbourhood, block, and component) as an integration of physical attributes (geometric shape, size, typical physical configuration) and non-physical aspects (uses, activities, impressions) (Dempsey et. al., 2010). This research identifies the five key elements of urban forms - open spatial-network, land-use, density, blocks and built-components - that are theoretically relevant, are claimed to influence various aspects of social sustainability and for which data measurements would be available.

Social sustainability in built environment is defined as '*a combined top-down & bottom-up process for creating urban spatial forms that nurtures the 4'S', social capital, social cohesion, social inclusion and social equity, whilst appreciating people's diverse needs and desires from the places they use'*. Although there is little information specifically on social sustainability, there exists broader literature on these four dimensions (4'S'); social capital and social cohesion which relate more directly to the concept as a set of social conditions that 'enable' reaching collective goals while social equity and social inclusion 'represent' the actual end-goals.

Controlled variables include measures of tenure and socio-demographic aspects as age, gender, education and occupation.

1.4.2 Working hypotheses

- *Quantitative Study - Spatial scale of neighbourhood, broad-based urban form variations*

Working hypothesis (WH) 1: OPEN SPATIAL NETWORK

a) It is assumed that urban forms with connected and integrated street network will show significantly higher-levels of social sustainability amongst its residents, after controlling for intervening variables.

Definition of concepts: Connected and integrated network of streets is defined based on the selected indicators of urban form as follows: Higher syntactic values for connectivity, global integration [HH] and local integration [HH]R3 (using Space Syntax Analysis Technique).

b) It is assumed that urban forms that provide accessible and higher proportion of open recreational spaces will display higher levels of social sustainability amongst its residents, after controlling for intervening variables.

Definition of concepts: Higher amount of accessible open spaces are defined based on the selected indicators of urban form as follows: Higher proportion (unit areas) under use of open recreation spaces and syntactic values for access routes.

Working hypothesis (WH) 2: LAND-USE

It is assumed that urban forms with higher proportion mix of uses will display significantly higher levels of social sustainability amongst its residents, after controlling for intervening variables.

Definition of concepts: Higher proportion of mix of uses is defined based on the selected urban form indicators as follows:

i. Landuse Ratio (Higher proportion of area consisting of mixed-use): The ratio of total residential land-use to all other uses.
ii. Landuse Diversity (Variety and density of different uses): Simpson's Index of diversity for land-use mix.

Working hypothesis (WH) 3: DENSITY

It is assumed that urban forms with higher densities will display significantly higher levels of social sustainability amongst its residents, after controlling for intervening variables.

Definition of concepts: Higher density is defined based on the selected indicators of urban form as follows:

i. Population density: the number of people per hectare in a particular area.
ii. Figure ground ratio: the ratio of total building footprint to total ground coverage.

Working hypothesis (WH) 4: BLOCK

It is assumed that urban forms with smaller compact urban blocks will display higher levels of social sustainability amongst its residents, after controlling for intervening variables.

Definition of concepts: Smaller compact urban blocks are defined based on the selected indicators of urban form as follows-

i. Size of the Blocks: Block Area - =< or equal to 20,000m2, M=20,001-40,000m2; L=40001-60000, XL = 60001-80000, XXL= >80000m2
ii. Shape of the Blocks: Compactness ratio or 'circulatory ratio' (Selkirk, 1982).

• *Qualitative Study - Spatial Scale of Block-Segment, detailed urban form variations*

The aim of the qualitative research is two folded 1) to provide in-depth understanding of the relationship between urban form and social sustainability 2) to study the effects of more detailed urban form variations including human-scaled components (orientation, frontage, coverage, enclosure and generic typology). Owing its inductive nature, the research does not begin with a set hypothesis but research questions set out in the previous section.

Definition of concepts: The built-components are measured qualitatively through non-participant observation and descriptive mapping within selected block-segments.

The human-scale is defined based on the selected of urban form observations as follows:

i. Orientation: The extent to which the built-components to respond to the adjacent streetscape.
ii. Frontage: The extent to which the built-components creates active frontages (i.e. the degree of animation) and encourage residents to interact/use to the adjacent streetscape.
iii. Enclosure: The sense of enclosure as determined by the relationship between the height or the continuity of the built-components and the width of the adjacent street.
iv. Typology: The generic typology of built-components that forms the general whole.

1.5 Research aims and objectives

Wider aim of the research: To explore the role of urban design and planning (in concurrence with bottom up approaches) at the scale of 'neighbourhood' or 'local community' as a tool to nurture and enhance social aspects of sustainability in India's urban development context.

Principal aim of the research: To establish a relationship[3] *between Urban Form and Social Sustainability (in the Indian context using Guwahati as a study city) and explore its nature.*

Case study aim: While conducting the study of the city of Guwahati, Assam two-folded aim was established.

i. to identify and document key urban forms of Guwahati through visual cartography.
ii. to test the relationship (type and extent) of identified urban forms with social sustainability at the neighbourhood scale.

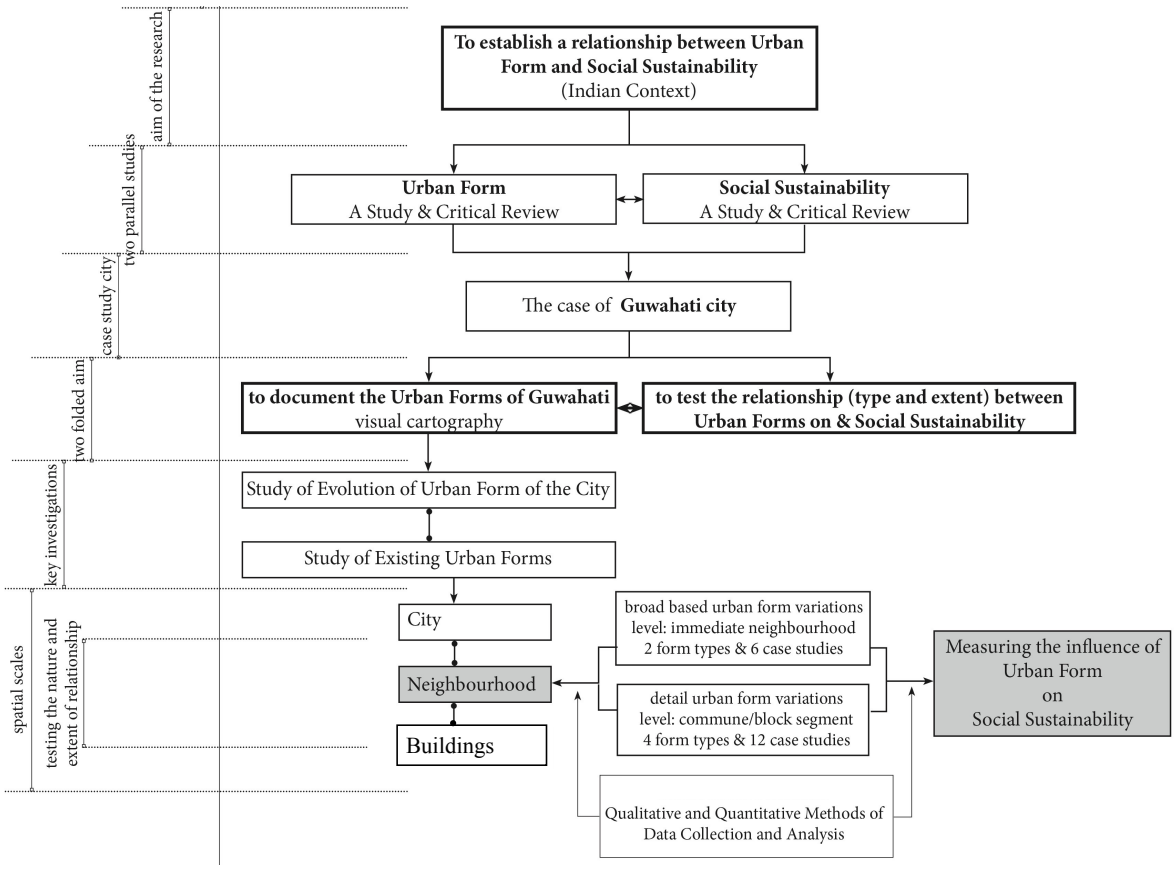
To achieve the above aim the research seeks to adopt the following objectives:

1. to establish the importance of the social dimension of sustainability and the role of urban form in the Indian urban development context.

[3]Note: Only one-way relationship i.e. influence of urban forms on social sustainability is studied.

2. to review the sustainable development policies in the Indian context with particular focus on the 'social' and the 'urban' issues.
3. to understand the meaning of social sustainability in the Indian context and identify its core dimensions that are claimed to be influenced by urban form.
4. to identify key components of urban form through detailed literature review and determine its measures.
5. to establish assessment frameworks for a. social sustainability, b. urban form, c. the relationship between the two.
6. to study the growth dynamics and morphological transformation of Guwahati and identify the existing key urban form types.
7. to document and develop an atlas or visual cartography for identified urban forms of Guwahati using various mapping techniques.
8. to explore the relationship between urban form and social sustainability through empirical research in Guwahati using both qualitative and quantitative methods.
9. to develop an integrated social sustainability framework that may aid designers and policy makers in their efforts towards achieving sustainable urban future.

Figure 1.2 : Aim and structure of the research



1.6 Research strategy

Table 1.1. Research strategy

1	2	3	4
Preliminary Study	**Selection of Case Studies**	**Data Collection & Analysis**	**Findings & Interpretations**
i. Defining the research problem ii. Reviewing the existing literature on Urban Form (UF), Social Sustainability (SS) and the Relationship between the two iii. Developing preliminary analytical and conceptual frameworks for UF & SS iv. Developing theoretical framework for analysing the relationship between UF and SS v. Developing parameters for the study of urban form and social sustainability given the limitations and scope of the research vi. Setting up preliminary indicators for both the parameters of study and pilot testing	i. Conducting archive study (morphological transformations and evolution of urban forms) for Guwahati city ii. Conducting an overview study of present urban forms of Guwahati at the scale of city iii. Conducting a study of socio-demographic context and overall structure of the city to identify current issues and opportunities iv. Selecting spatial scales at which the relationship between UF and SS is studied v. Identifying case study areas at the selected spatial scales -neighbourhood scale (quantitative study) -block-segment scale (qualitative study)	i. Collecting Data *SS data* Quantitative: Self-administered questionnaire Qualitative Semi-structured open-ended personal interviews and focussed group interviews, non-participant observation *UF data* Quantitative: Mapping, measurement, verification, photo/video documentation; Transect walks and participatory mapping; Digital footprints and configurations for morphological analysis mapped using base mapping and overlay mapping Qualitative: UF observation ii. Analysing Data Quantitative: Morphological Analysis Techniques (quantitative measures, space-syntax analysis) Co-relational Technique (Multivariate Analysis of Variance MANOVA) Qualitative: Morphological Analysis Techniques (qualitative measures, descriptive) Grounded Theory iii. Triangulating Outcomes Triangulating findings of quantitative and qualitative research methods in case of nested case studies	i. Translating the findings into an integrated Social Sustainability Framework for urban policy, design and action to aid urban design practices and develop evidence-based sustainable development policies ii. Recommendations and Guidelines (general and city specific)

The importance of using a range of methods to assess a given phenomena is widely acknowledged. In practice, however, due to the distinctive skill sets required for each approach and a limited amount of time and resources, often leads to adoption of only one

approach for a specific study. The issues associated with social sustainability and its relationship with urban forms are typically very complex and can benefit from the use of quantitative and qualitative approaches and thus, both methods are employed. Each quantitative and qualitative research is conducted rigorously, independent and complete in itself. Priority between the two methods is equal and results of the two methods are integrated during the interpretation phase (Creswell, 2003).

An in-depth description of data collection and analysis techniques are explained in Chapter 5 however, an overview of the research strategy is discussed in the Table 1.1.

1.7 Validation strategy

i. To validate the quantitative outcomes showing the influence of broad-based urban form variations on selected six aspects social sustainability at the scale of neighbourhood, multivariate analysis of variance using MANOVA in SPSS 20 are conducted twice, first between two urban form types and then between all the six case studies under investigation. The results from both the assessments were compared for establishing the validity of the outcomes.

ii. To validate the qualitative outcomes the following two methods are used: member checking (data, analytic categories, interpretations and conclusions are tested with members of those groups from whom the data are originally obtained) and reflexivity (self-awareness and critical disclosure of researcher biases and their impact the study).

iii. The method triangulation, also known as 'inter-method mixing strategy' (Johnson and Turner, 2003, p.298) between quantitative and qualitative research outcomes is conducted to further validate the outcomes for the neighbourhood level study.

1.8 Scope and limitations

1.8.1 Limitations to this research

i. Sustainable development which calls for the trade-offs among social, economic and ecological objectives may be essential to maintain sustainability of overall system. A reductionist approach, as adopted in this research, which assesses and measures social sustainability as a separate dimension of sustainability may be more applicable and functional in real life policies and practices but is less efficient in capturing the complex nature of sustainability.

ii. Social sustainability is a dynamic concept and will change over time in a place. The components of social sustainability under investigation are identified based on their relevance to the current social context. These components may evolve or change in

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tandem with the transformations in the society and their relevance may vary with time and context.

iii. The unpredictable and elusive nature of social sustainability must be considered. Any sustainability claims made, refer to predictions about the sustained future which can only be validated after sufficient period of time.

iv. Data collection in the form of questionnaires, personal and focussed group interviews concerns with the community aspects of social sustainability however, individual biases and personal preferences of the respondents may affect the outcomes of this research.

1.8.2 Future scope of study

v. Unsustainable behaviour patterns are 'embedded' and 'deep-rooted' in the normal living of individuals that is not so easy to change. Further research therefore, may be conducted in this field to test the extent to which urban forms may influence sustainable behaviour patterns among individuals.

vi. There is also great scope to further harness some of the identified aspects of social sustainability in order to deal with the issues of humanising urban development in India by nurturing social capital, social cohesion, social equity and social inclusion in the country's urban development model and sustainability goals.

1.9 Research contributions and expected outcomes

Below are the key contributions and expected outcomes of this research:

1.9.1 Research contributions

i. enables design for different urban forms and their impacts on social sustainability in the Indian context, to be assessed both qualitatively and quantitatively at two spatial scales, supported by empirical and experiential evidence drawn from local stakeholders in Guwahati.

ii. forms a significant knowledge base for urban designers, planners and policy makers engaged in design of sustainable cities in India.

iii. provides significant contribution in the field of sustainable urban form debate in the developing world context, especially India whose urban areas are undergoing profound socio-spatial transformations.

iv. provides evidence about influence of urban forms on social sustainability at neighbourhood scale which can not only inform the design processes through micro-level interventions but can also be integrated into wider planning policy and urban design practices. The top-down design and planning interventions alone, so far, have

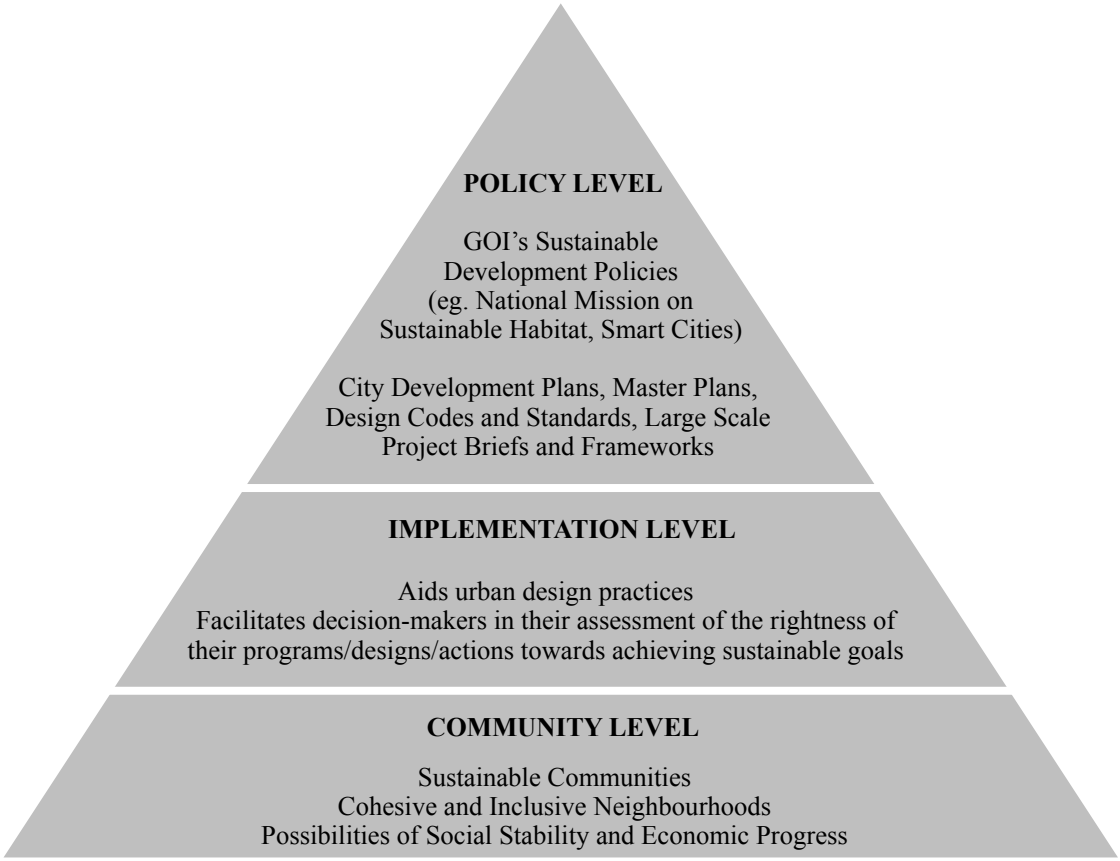
not remained sufficient in addressing the issues of social sustainability local level, a renewed focus on this relationship at neighbourhood scale can thus, make wider policies on social sustainability more legitimate.

v. proposes a flexible and adaptable social design framework for cities in India to ensure its implementation and adoption at the levels of social policy, design and action.

1.9.2 Utility pyramid

The utility pyramid as shown in the figure 1.3 indicates the expected outcomes and their potential intervention in sustainable urban development.

Figure 1.3: Utility pyramid



1.10 Outline of the thesis report

The thesis report is laid out into chapters as described below:

Chapter 1, '***Preface***' is the engine that drives the rest of the thesis report. It clearly states the purpose of the study and explains its significance by discussing how the study adds to the theoretical body of knowledge and practical contribution in the field being examined. It therefore, forms the conceptual basis for what the study will investigate and discusses ten specific points 1. research context, 2. research justification, 3. research

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questions, 4. research hypothesis, 5. research aims and objectives, 6. research methodology, 7. validation strategy, 8. future scope and limitation to the study, 9. research contributions and expected outcomes and 10. outline of the thesis report.

Chapter 2, '***Social Sustainability: A Critical Review****'*, places the arguments set in the research problem in the urbanisation and planning backdrop in its first Section 2.1, 'An Urbanising World' before building a theoretical foundation for social sustainability in the following sections. Section 2.2, '*The social dimension of Sustainability'*, explores the social nature of sustainability and reviews it in the global and national urban development policy context. Here it focuses on two aspects 'social' and 'urban' policies. Section 2.3, '*Building the social pillar'*, discusses the meaning of social sustainability and conducts an exhaustive review of its themes presented so far by various authors. Based on this, key dimensions and components of social sustainability are identified which builds a strong social pillar for the research. In Section 2.4, '*(Re)Constructing the community*', the significance of the neighbourhood and bottom-up approaches to achieving sustainable development are discussed. After reviewing the literature on importance of neighbourhoods and the potential role that the local sphere in wider societal goals, this section explores the concept of neighbourhood in the Indian context. Section 2.5, *Strengthening the 4'S',* further reviews the key accredited dimensions of social sustainability, their components and their relationship to the built environment, leading to identification of measures. The Section 2.6, '*Social sustainability assessment'* assesses the issues related to operationalisation of the social dimension of sustainability and conducts a review on the nature of indicators. Finally, it builds the blocks for social sustainability assessment framework for conducting the research.

Chapter 3, '***Urban Form: A Critical Review****'* conducts an intensive review on urban form, its key components and sustainable form debate. Section 3.1, '*Achieving sustainable urban form for cities*' discusses the sustainable urban form debate in light of compact city orthodoxy and relates it to the developing world context. Based on a review of history of urban form-making, this section firstly studies the evolution of urban form theories, from cosmic, traditional, modern and more recent sustainable reforms, to understand how and why different urban forms took the shape they did. Secondly, it puts forth existing limitations to urban compaction and intensification to achieve sustainable urban forms in developing nation context, discusses claims and reviews existing evidences for their influence on social sustainability. In Section 3.2, '*Comprehending urban form*', meanings and socio-spatial attributes of urban form are discussed. An intensive review of five key components of urban forms, open spatial-network, land-use, density, blocks and built-components, in terms of their meaning and associated social sustainability benefits is conducted. Based on this, relationship diagrams between selected urban form components and social sustainability claims are developed. Finally

in Section 3.3, '*Theoretical frameworks*', sets out a framework for assessing the relationship between urban forms and social sustainability which relates to the philosophical basis discussed in Chapter 2 and early part of Chapter 3.

Chapter 4, '***A City Profile Of Guwahati: Investigations into Morphological Transformations and Present Urban Form***' showcases the detailed profile of Guwahati, the aim of which is not only to comprehensively narrate the story of the city's urban form evolution but also depicting both, historic planning paradigms and modern urban visioning. Sections 4.1, '*Urban Guwahati: an introduction*' and 4.2, '*Guwahati in the context of its unique physiographic setting*' provides an introduction to the city and discusses it in the context of its unique physiographic setting respectively. Section 4.3, '*Guwahati as it was: growth dynamics and morphological transformations*' studies Guwahati through all the five stages of its history from mythology to modern period describing the evolution of Guwahati from the point of view of urban growth and the resultant morphological transformations. Section 4.4, '*Guwahati today: urban form analysis*' examines the city's urban form in its present context. To do so this section critically analyses the city's 1) Built form and density, 2) Street network and open spaces, 3) Land-use and activities. Section 4.5, '*Social profile*' studies the socio-cultural pattern of different localities or neighbourhoods in Guwahati depending on the nature of population concentration. Finally, Section 4.6, '*Guwahati a multi-layered evolving city?*' evaluates the city's urban form as it stands today – a multi-layered, evolving urban agglomeration reflecting Guwahati's ongoing planning paradigms and future prospects. The study is supported with strong visual atlases which provides an empirical strength to this profile.

Chapter 5, '***Influence Of Urban Forms on Social Sustainability: An Empirical Evaluation***' is laid out in three parts. Part-1 gives an overview of the research design, methods and experiments used for data collection and analysis while Part-2 and Part-3, presents the empirical evaluation of the relationship between urban form and social sustainability using quantitative and qualitative research methods respectively at two spatial scales. In Part-One '*Research design: overview'* , Section 5a.1 describes the choice of research methods and procedures while Section 5a.2 discusses the selection of spatial scales, at which the urban form variables potentially relate to different resident experiences and subsequently social sustainability outcomes. In Part-2, '*Quantitative Research*', describes the sampling design, data collection, data analysis and hypothesis testing for the influence of urban forms on social sustainability using 6 case studies for 2 urban form typologies at neighbourhood level. Quantitative data collected through household questionnaires are tested using multivariate analysis (MANOVA) in SPSS 20. Part-3 'Qualitative Research' describes the grounded theory approach to qualitative research. It provides the descriptive account of 12 case studies for four urban form

typologies at community level are identified to examine more detailed urban form variations. Data collected through qualitative methods including focussed-groups discussions, semi-structured interviews and non-participant observation are used to seek an in-depth understanding of the process mechanisms of social sustainability. The data based on theoretical sampling is coded, categorised and analysed followed by establishment of relationships. Conclusions are then drawn and authenticated finally leading to theory development. The outcomes from quantitative and qualitative research, in case of nested case studies are then triangulated.

Chapter 6, '***Conclusions and Recommendations***' the final chapter, comprises of concluding remarks on the hypotheses assumed (quantitative research) and theory established (qualitative research) for this research and the confirmations of the findings made. The research questions are also answered. Further, drawing on key conclusions, recommendations both generic (in the form of social sustainability design framework) and specific to Guwahati are provided.

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Chapter 2
SOCIAL SUSTAINABILITY: A CRITICAL REVIEW

This chapter, begins with an overview of the current process of urbanisation and discusses its challenges particularly in reference to India. It critically reviews the literature on social sustainability (based on secondary data sources) including evolution of the concept in the sustainable development context. The chapter further explores the meaning of social sustainability, identifies what characterises it, sets outs its components and therefore, builds blocks to develop a framework for analysis of the concept in relation to urban forms.

2.1 An urbanising world

Figure 2.1: An Urban World 2050 (Source: SOWC 2012, UNICEF)



As cities become our primary habitat, it becomes crucial to achieve sustainability at the urban level in order to address the issue of sustainable development. As the writer, filmmaker and the UN Global 500 award recipient, Girardet (2007, p.9) mentions, "*the cities of the 21st century are where human destiny will be played out and where the future of the biosphere will be determined, there will be no sustainable world without sustainable cities*".

2.1.1 Cities, a compelling issue: the global perspectives

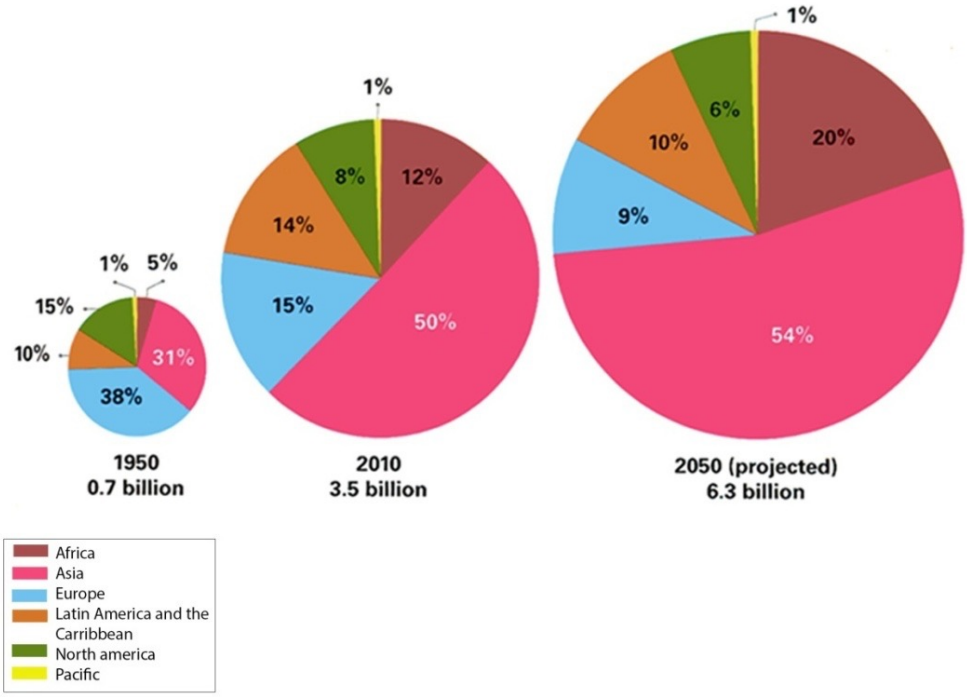
Cities, since the beginning of the Industrial Revolution, have grown rapidly in both, size and power. The twentieth century, however, saw a new and more striking era of global

urbanisation. Presently, over half of the world's 6 billion population lives in cities as compared to 10 percent of 1.6 billion in 1900 and about 3 percent of the 900 million in 1800. By 2050, over 70 percent (6.3billion) of the projected 9 billion world population is expected to be urbanised (UNFPA, 2007). A closer look not just at the scale but at the nature of contemporary trends in urbanisation reveals that these demographic forecasting do not simply imply that most of the world population will be living in cities, but that intense urbanisation does and will continue to have a significant impact on global sustainability as cities today, not only concentrate majority of the earth's environmental problems but, also compound intense social issues such as poverty, inequity, water and food insecurity, increasing crime, weakening social ties and deteriorating quality of life, to name a few.

This shift towards an urban world is also primarily driven by urbanisation in developing countries whose population will be more than double, increasing from 3.5 billion in 2009 to almost 6.3 billion, by 2050 (UNDESA, Figure 2.2). With a projected gain of 70 million new urban residents each year, this massive urbanisation will bring about even greater challenges. On one hand, these cities command an increasingly dominant role in the global economy as centres of both, production and consumption while on the other, rapid growth and transition gravely outstrips their capacity to provide adequate and affordable basic services and infrastructure for their citizens, also altering their physical forms which further contributes to unsustainable urban living (eg. travel behaviour and accessibility, social patterns and equity, economic viability and resource efficiency, etc).

From such a perspective, intense urbanisation may be seen as a negative phenomenon challenging global sustainability. Yet, paradoxically it is also anticipated to create solutions for a sustainable future. Cities are seen not only as engines of economic acceleration, with greater opportunities for growth and development, but also physical manifestations of diverse cultures, centres of innovation, industry, creativity, knowledge as well as materialisations of peoples' ideas, ambitions and dreams (UN Habitat, 2008). The growth of cities concentrates resource consumption and pollution into a small area making it more visible but not necessarily increasing it on a per-capita basis. They can, instead, be highly efficient because of the advantages of scale and proximity, making sustainable infrastructure and services affordable and more widely available. They are also huge engines to improve the standard of living of their citizens and are thus, seen as major force behind poverty reduction and progress towards other MDGs. For a given standard of living, opportunities for advancement and multiplicity of choices, cities may be seen as the most benign form of human settlement environmentally, socially and economically. Urban experts and policy makers worldwide are increasingly viewing cities optimistically thus, inquiring into ways of harnessing the benefits of urbanisation and pathways towards achieving a sustainable urban future.

Figure 2.2: Urban populations are growing fastest in Asia and Africa. World Urban Population 1950, 2010, 2050 (projected)



(Source: UNDESA, Population Division)

2.1.2 Towards an urban majority: the Smart City concept in India

India had been a very reluctant 'urbaniser'. At around 377 million people in towns and cities, represents less than a third of its total population (Census 2011). Yet, it is the sheer size of the country's population that puts it on the global urbanisation map. India's large rural population means that it is likely to experience a huge process of urbanisation in the coming decades. It is estimated that by 2050, the country's urban population will represent more than half (around 54.2 percent) its entire population, constituting more than 875 million people. This will be one of the largest rural-urban migrations the world has seen, creating not only huge economic opportunities but also great sustainable development challenges.

According to a McKinsey Global Institute 2010 report, India's rapid urbanisation over the next three decades, cannot be contained within the existing stock of cities. As a response, India is building new urban centres, some even larger than 350 square kilometres, with the introduction of 'smart' concepts that leverage information and communications technology (ICT) to greatly improve the productivity, lifestyle and prosperity of its citizens. The Government of India has allocated a budget of USD 1.2 billion to revolutionise the country's urban landscape with the development of two smart cities in each of India's 29 states including seven along the 1,500 km industrial corridor

attracting foreign investments. The key features of a Smart City[1], as per the vision of the Ministry of Urban Development "Smart Cities - Transforming Life, Transforming India" lie at the intersect between competitiveness, capital and sustainability. It states: "*The smart cities should be able to provide good infrastructure such as water, sanitation, reliable utility services, health care; attract investments; transparent processes….. and various citizen-centric services to make citizens feel safe and happy*". In addition, several other new generation large and small greenfield cities are being created across many Indian states to deal with overcrowding and to largely cater to India's growing middle class.

Figure 2.3: Positioning India within wider geographical context



Location: 28 36.8′N 77 12.5′E
Area: 3,287,590 km2 (7th largest)
Population: 1.21 billion (2nd highest)
Population Density: 377.9 ppl/km2
Human Development Index: 136 among 186 countries UNDP 2013
World's Third Largest Economy (2011 round of ICP) World Bank 2014



As clearly evident from the three case studies (Table 2.1), despite the fact that the proposed new cities concentrate a great deal on smart governance, smart energy, smart environment, smart IT and communication, smart transportation and smart buildings, there is little or no focus on aspects of social sustainability such as fostering social capital, cohesion, equity or inclusion through design and policy implementation. Smart cities are not just technologically-renovated eco-cities but also people-oriented human-scale cities that acknowledge the importance of different voices, reduce social

[1]There's no simple definition for smart cities. The term encompasses a vision of an urban space that is ecologically friendly, technologically integrated and meticulously planned, with a particular reliance on the use of information technology to improve efficiency.
The Smart Cities Council, an industry-backed setup that advocates the concept in India, describes them as cities that leverage data gathered from smart sensors through a smart grid to create a city that is liveable, workable and sustainable.

inequalities by ensuring equal opportunities in all spheres of social and collective life as well as improve overall well-being of all its citizens.

Table 2.1 : Case examples of future Liveable and Smart Cities in India

No.	Case Example 1	Case Example 2	Case Example 3
Name	Gujarat International Finance Tec-City (http://giftgujarat.in/)	The Dholera Special Investment Region http://dholerasir.com/	Palva City (http:// www.palava.in/)
Area	3.6 sq km	567.39 sq. km	16 sq km
Developer	Public-Private Partnership; Gujarat International Finance Tec-City Company Limited	Joint Indian and Japanese Government Initiative; Delhi Mumbai Industrial Corridor Development Corporation	Private; The Lodha Group, real estate developers.
Location	Gujarat	Gujarat	Maharashtra
Vision	"To design a CBD that will serve as a paradigm for Next Class city in terms of quality of life, infrastructure and ambience aiming to be high-density and high-rise, treating land as a precious resource.	To develop Dholera Special Investment Region (SIR) as "The engine for economic resurgence of the country" which is supported by world class infrastructure. Project goals are to double the employment potential, triple industrial output and quadruple exports from the region in next five years.	"Designed to be amongst the world's top 50 places to live. And grow."
Salient Features	Fulfilment of human needs for safe and clean environment, food & shelter, education, arts, culture, and useful and satisfying employment. Maintenance of ecological integrity through low energy consumption, careful stewardship, reduction in wastes and protection of diverse and important natural species and systems.	World-class infrastructure & connectivity: within & outside; Premium civic amenities including city centre, industrial, logistic, knowledge & IT, recreation & sports, entertainment, benefit of sea coast, nature park, golf course; Creation of a compact city, polycentric structure; Integration of land uses; Conservation of better agricultural land; Integration of existing villages into city.	5 Ps – planned (every part of the city thoroughly planned), potential (business friendly), place (located at the heart of state's business region), pulse (filled with culture, retail, sports, leisure and entertainment), prudent (ecological sustainable, safe and secure environment).
Artist Impression	 	 	 

No.	Case Example 1	Case Example 2	Case Example 3
Description	"GIFT" is conceptualized as a hub for the global financial services sector offering global firms a world-class infrastructure and facilities. It aims to attract the top talent in the country by providing the finest quality of life. It is envisaged as an Eco-City that will serve as the vibrant hub of western India and as a habitat showcasing business oriented, environmentally-sensitive growth. The project claims to be a high-quality, mixed-use district that optimize land and real estate values.	The Dholera SIR is a part of the 1,483-km-long Delhi-Mumbai Industrial Corridor (DMIC) project. Designed to provide technology-supported civic infrastructure. It seeks to create world-class infrastructure using ICT (information and communications technology) for management of urban amenities like drainage, traffic, water supplies among others. The Greenfield city is envisaged to be an economic hub with residential facilities. Spread over 920 sq km, Dholera will be double the size of Ahmedabad and house two million people	"Palava"- Mumbai's sister city and the 'City of Opportunity' is designed to be amongst the world's top 50 most liveable cities, with every aspect of it being benchmarked against global criteria. The privately developed city will be home to a world-class multi-disciplinary university, Olympic Sports Complex, Centre for Arts and Culture, lakefront and river-front plazas, high street retail, 500000 sqft mall with a multiplex, multispecialty healthcare and a 100-acre Central Park. Palava incorporates intelligent technologies, smart infrastructure and global best practices in urban planning.

Mr. Antoni Vives (2014), Deputy Mayor for the Urban Habitat, Barcelona City Council mentions, "*a smart city is formed by productive & self-sufficient neighbourhoods, at human speed, inside a high-speed, hyper-connected eco-efficient metropolis. Many slow cities inside a smart city*".

The development of 100 smart cities and the new urban renewal mission for 500 cities as two most ambitious schemes of the new government may be seen as a positive way forward to engulf the massive urban growth. However urban growth in India, geared to the needs of global capital, so far, has been an unbalanced process. The unbridled economic growth coupled with (economic, social and spatial) inequalities in cities relate not only to income and consumption expenditures, but reflect entrenched patterns of urban development and ownership of physical space. This limits certain segments of the society from gaining the full benefits of city life (Feitosa, et al., 2007) also evidenced and reinforced by the phenomenon of urban sprawl. Such social crises in cities are also associated with other grave issues including isolation and stigmatisation; social disorder, crime and fear of crime; cultural and religious tensions; lack of community/civic participation and volunteering; poor health, mortality and education; low social capital and poverty as well as social exclusion - all of which are inter-related and may be formed as a function of spatial design. The country's growing urban areas in competition for 'world-class' and 'global' tags, further fail to accommodate Indian traditional socio-cultural structures that are constantly being reframed, giving new meaning to urban communities that are becoming more individualistic and fragmented. Thus, inequality, along with other social conditions manifested in the urban environments today, and

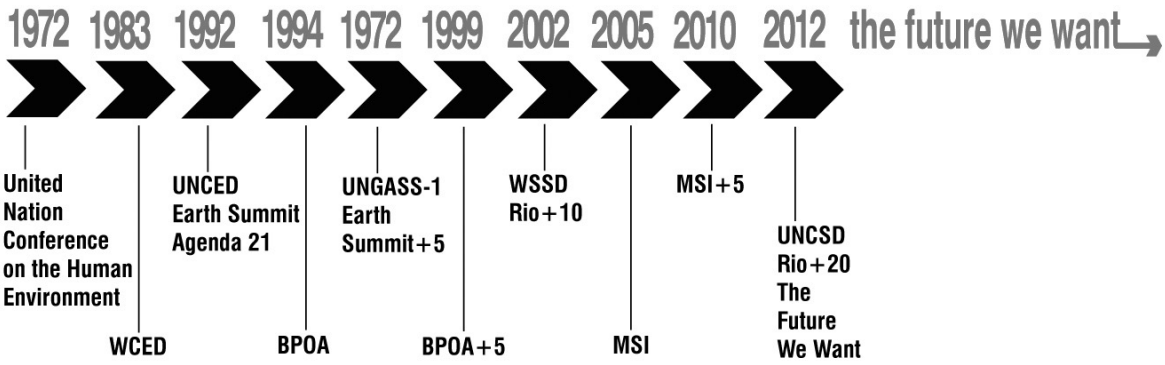
perhaps even more importantly in the years to come, remain one of the greatest challenges facing the country today and are indispensable requirements for sustainable development. And as India prepares itself to become an urban majority by 2050 and gives shape to its futuristic smart cities, there is clearly a pressing need to develop a stronger conceptual understanding of the social dimension of sustainability and empirical evidence about the way physical forms of cities may nurture or hinder it, just as the recognition of physical, environmental and economic challenges in building these new cities.

2.2 The social dimension of sustainability

2.2.1 Exploring the social nature of sustainability

The concept of 'Sustainable Development' has emerged over an extended period of international discourse since the 1960s (Carson, 1962; United Nations Environment Programme, 1972; International Union for Conservation of Nature, 1980) as a result of the environmental disquiet that slowly became a broader movement which recognised the inter-connected ecological, social and economic consequences of development (McKenzie, 2004; Littig and Griessler, 2005; Cuthill, 2010).

Figure 2.4: United Nations declarations



It entered the global political arena in 1987 following the Brundtland report by the United Nations Commission on Environment and Development (UNCED). In this report, the concept appeared as a balance between social, economic and environmental dimensions and was defined as the "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED, 1987). Although there was much criticism about the Brundtland definition, mainly in relation to the vagueness and lack of clarity associated with it's meaning, there was a general agreement that all the three dimensions of sustainability should be incorporated into the development context on an equal footing. The programmes outlined in Agenda 21, an action plan adopted at the UN Conference on

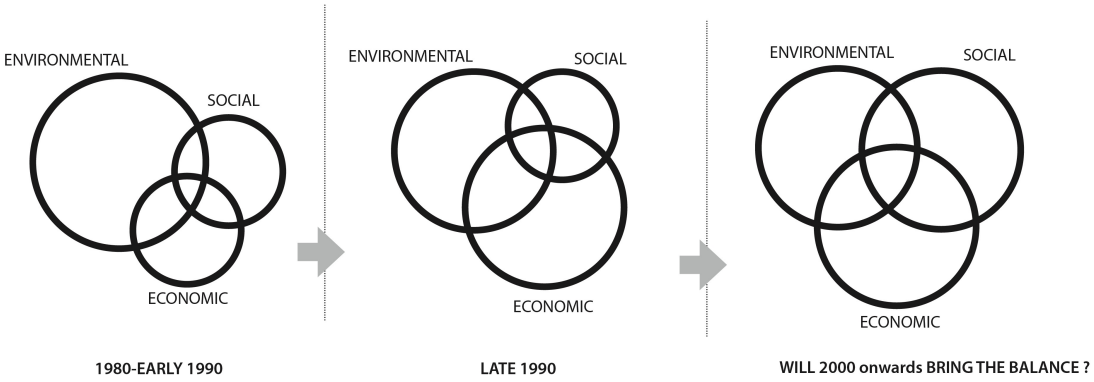
Environment and Development (also known as 'Earth Summit') held at Rio-de Janeiro in 1992 also went beyond ecological sustainability to include other dimensions of sustainable development, such as equity, economic growth and participation. Following this, the concept of social sustainability further evolved through international discourses such as the Kyoto Climate Change Conference (1997) and the more recent World Summit on Sustainable Development at Johannesburg (2002), Rio+20 (2012) and others.

During the 1990s, sustainable development became interlinked with the term 'sustainable cities'. While initial interpretations in this context concentrated on a narrower 'ecological perspective' (Blowers and Pain, 1999) focussing on the minimising of pollution, resource depletion and condition of living environment (Weingaertner and Moberg, 2014), early 'sustainable cities' debate were also simply associated with limiting the ecological footprint through efficient infrastructure such as waste management and recycling and greater use of alternative modes of transport (Bromley et al., 2005). The social issues in urban built-environments were taken into account when contemporary approaches to development led to inequitable outcomes (Colantonio, 2007) and, in some cases, even 'breakdown' of community (Greider, 1997; Saul, 1997). This further emphasised the fact that social sustainability cannot be merely seen as social tolerability of environmental policy measures.

Hence, the term 'brown agenda', (besides the 'green agenda'), was coined to deal with issues relating to environmental conditions in which the urban population, especially the urban poor, were living. Further discussions revolving around issues of equity and environmental justice (Haughton, 1999; Polese and Stren, 2000) and topics such as 'people-centric development' or 'sustainable human development' and more recently 'social design' strengthened the relevance of social aspects in this debate and has gained increasing acceptance especially over the last ten years. Issues such as social cohesion, cultural values, economic stability, equal opportunities, accessibility, health and well-being are increasingly becoming more relevant (ODPM, 2003) to deal with sustainability crises. Similarly, within companies, social sustainability goals have been mandated through the corporate social responsibility (CSR) programmes. Sustainable development is thus, slowly gaining recognition in global and local sustainability agendas, development goals and planning policies as a complex social process rather than a straight forward technical or technological issue. Omann and Spangenberg (2002) have argued that emphasis on the social dimension is essential for two reasons; firstly, it is a constitutive dimension of sustainable development (based on the definition of Brundtland Commission, WCED, 1987) and hence, important in its own right; secondly, it is a necessary precondition to achieve the environmental and economic sustainability objectives since, a) urban environmental challenges are primarily social issues and

largely a function of human behaviour and, b) economics is meant to serve people, rather than the view that people serve economic interests.

Figure 2.5: Evolution of social pillar in sustainable development context



(Source: Developed from Marghescu (2005) in Colantonio, 2007, p.4).

2.2.2 Situating social sustainability in the Indian policy context

For India, the idea of sustainability is not new and existed long before its formal adoption as a political and ethical concept. It was embedded in many age-old religious philosophies and indigenous practices that promoted a culture of social justice and environmental consciousness. Even Gandhian thought, although criticised for being romantic idealist like those of Schumacher (in his book 'Small is Beautiful', 1973), emphasised human-scale development as an ethical response to the stewardship of the environment and humanity. The modern concept of sustainability was later adopted in 1970's out of a politically organised assertion of environmental protection and establishment of sustainable development theories.

India has consistently played an important role in the evolution of an international consensus to tackle major global environmental issues. In 1972, the then Prime Minister of India, Mrs. Indira Gandhi emphasised, at the UN Conference on Human Environment at Stockholm, that concepts of a shared plane and of global citizenship cannot be restricted to environmental issues alone, but apply equally to the shared and inter-linked responsibilities of environmental protection and human development. The country was also an active participant in the process leading up to, and culminating in the convening of the UNCED (1992) and the Earth Summit (2002). India has worked for securing a renewed political commitment for sustainable development, in particular the Rio principles, and to situate Green Economy in the context of sustainable development, poverty eradication and inclusive growth during the RIO+20 Summit (2012).

The Indian government's commitment to sustainable development is also reflected in specific and monitor-able targets for human development and conservation of natural resources which became part of the country's Five-Year Plans since the 1990s. Building

upon the platform created by the Eleventh Plan (2007-12), the Twelfth Plan (2012-17) aimed at faster, sustainable and more inclusive growth. Sustainable development concerns in the sense of enhancement of human well-being therefore, have been a recurring theme in India's development philosophy where policies and programmes aimed at achieving sustainable development efforts to fulfil its commitment towards social progress, accelerated economic growth and increased environmental conservation. Yet, an in-depth and critical review of various existing policy documents (Table 2.2) suggest that there exists various parallel but ad-hoc, slow moving and fragmented social, urban and sustainable development policies that barely keep pace with the rapid pace of growth of Indian cities. As a result of this, there is no synergy between these various efforts and the lack of convergence in thinking and in action has reduced the cumulative impact of 'social' 'urban' and 'sustainable' policies and development initiatives.

Table 2.2 List of key sustainable development 'urban' and 'social' policies reviewed (in 2012) for this research

NO	POLICY / INITIATIVES
1	Jawaharlal Nehru National Urban Renewal Mission JNNURM [2005]
2	National Urban Transport Policy [2006]
3	National Mission of Sustainable Habitat (NMSH) [2010]
4	Parameters for the National Mission on Sustainable Habitat – Report of the Sub-Committee on Urban Transport [2011]
5	National Urban Housing and Habitat Policy [2007]
6	GOI's Social Development policies in urban areas
a	Eradicating Poverty
i	The National Urban Poverty Reduction Strategy [2009]
ii	Swarn Jayanti Shakari Rojgar Yojana
iii	Basic Services to the Urban Poor (BSUP) and Integrated Housing & Slum Development Programme (IHSDP)
iv	Rajiv Awas Yojana (RAY)
b	Enabling Human Development
i	Education, Training and Youth mobilisation
ii	Health Services
c	Social Inclusion
i	Empowerment of Women
ii	Promotion of Rights and Well-being of Child
iii	Welfare and development of weaker sections
	Urban development plans formulation and implementation (UDPFI) - Ministry of Urban Affairs and Employment (1996)

2.3 Building the social pillar

2.3.1 Meaning and interpretations

While there is now a general consensus that all the three dimensions, or pillars, of sustainability are equally important and need to be integrated into sustainable urban development initiatives right from conception, the meaning and associated objectives of the social pillar still remain vague (Dempsey et al., 2011). It is conceptually most elusive (Thin, 2002; McKenzie 2004; Littig and Grießler, 2005), and not given the same treatment as the other two pillars (Cuthill, 2009; Vavik & Keitsch, 2010). Colantonio (2007) argues that social sustainability has been under-theorised or often over-simplified in existing theoretical constructs and there has been very few attempts to define social sustainability as an independent dimension of sustainable development. It is a complex and multifaceted concept which has often been studied through the lenses of various disciplines and theoretical perspectives (Dixon & Colantonio, 2008). Chiu (2003, p. 66-67) provides an important analysis of various interpretations of social sustainability and argues that it is usually interpreted from three perspectives; 1) the development-oriented interpretation which emphasises that development is socially sustainable when it keeps to social relations, customs, structures and values; 2) the environment-oriented perspective which suggests that development is sustainable when it meets social conditions, norms and preferences required for people to support ecologically sustainable and just actions; and finally, 3) the people-oriented interpretation which emphasises maintaining levels of social cohesion and preventing social polarisation and exclusion.

Defining the social pillar presents a number of challenges as there are various meanings associated with the term 'social' itself. Littig and Griessler (2005) argue that the difficulties in conceptualising social sustainability are due to the fact that there is no clear differentiation between analytical, normative and political aspects thereof and hence people may prioritise one over the other. There are several definitions put forth by different authors from various perspectives; however, there is no single agreed definition which may cause difficulties in interpreting its core elements. One of the widely accepted definitions of social sustainability is one by Polese & Stren (2000, p.15-16) which discusses the concept in terms of both the collective functioning of society as well as individual quality-of-life issues: ``*development (and/or growth) that is compatible with harmonious evolution of civil society, fostering an environment conducive to the compatible cohabitation of culturally and socially diverse groups while at the same time encouraging social integration, with improvements in the quality of life for all segments of the population.''*. While Yiftachel & Hedgcock (1993, p.140) have defined urban social sustainability in terms of a city's ability to function as "a *long-term, viable setting for human interaction, communication and cultural development"*. In the current

sustainable urban development context, Colantonio (2007) recognised that social sustainability is becoming increasingly associated with sustainable community discourse. For example Davidson and Wilson (2009) identify social sustainability as a life-enhancing condition within communities, and a process within communities that can achieve that condition. The Bristol Accord, 2005, defines sustainable communities as: *"places where people want to live and work, now and in the future. They meet the diverse needs of existing and future residents, are sensitive to their environment, and contribute to a high quality of life. They are safe and inclusive, well planned, built and run, and offer equality of opportunity and good services for all"* (ODPM, 2006, p.12).

Such a definition highlights the physical context in which communities exist and reinstates the importance of physical design for social sustainability. Two other common definitions of social sustainability within the context of urban built-environment are put forth by Oxford Institute of Sustainable Development (OISD) and Young Foundation. Based on their work at OISD, Colantonio and Dixon (2009, p.4) argue that at a more operational level, *".....social sustainability blends traditional social policy areas and principles, such as equity and health, with emerging issues concerning participation, needs, social capital, the economy, the environment, and more recently, with the notions of happiness, well being and quality of life."* The Young Foundation (2011, p.16) define social sustainability as, *"A process for creating sustainable, successful places that promote wellbeing, by understanding what people need from the places they live and work. Social sustainability combines design of the physical realm with design of the social world – infrastructure to support social and cultural life, social amenities, systems for citizen engagement and space for people and places to evolve."*

Thus, recent years have seen notable efforts from academicians and practitioners in various sectors to address the often neglected social dimension of sustainability in terms of defining the concept, developing theoretical frameworks to operationalise it and to empirically investigate it in relation to sustainability projects. The concept, however, still remains vague. So far, it has no agreed definition, its measurement is problematic, and is highly context-dependent; yet, it is gaining increasing recognition as an indispensable pillar of sustainability and thus cannot be ignored or dismissed.

2.3.2 Key themes and components

Despite the lack of a common definition, numerous key themes or components that constitute the concept of social sustainability have been identified by many authors. For example, Barbier (1987) states that social sustainability must rest on social values such as culture, equity and social justice; Bramley *et al.* (2010) focus on equity & community, while Torjman (2000) suggests poverty reduction, social investment and building of safe and caring communities as three priority directions. Colantonio (2008) puts forward a

comprehensive list of key themes for the operationalisation of social sustainability and argues that more intangible and less measurable emerging concepts such as sense of place, identity, quality of life and benefits of social networks are gaining importance as opposed to traditional themes, such as equity, poverty reduction and livelihood. In the past few years the concept of social sustainability in urban settings has shifted towards being seen as dependant on social networks, community contribution, stability and security, as well as a sense of place (Glasson and Wood, 2009).

Based on a comprehensive literature review, the building blocks of the dimensions of social sustainability, which later provide the basis upon which the core components are elaborated upon, have been tabulated in Table 2.3.

Table 2.3: Building blocks for dimensions of social sustainability

Social Sustainability classifications	**Description**
1. **Chambers and Conway (1992)**	
Livelihood	
Equity	
Capability to withstand external pressures	
Safety nets	
2. **DFID (1999)**	
Inclusion	
Equity	
Poverty	
Livelihood	
3. **Sachs (1999)**	
Equity	
Democracy	
Human rights	
Social homogeneity	
Equitable income distribution	
Employment	
Equitable access to resources and social services	
4. **Empacher, Wehling (1999)**	
Basic needs	*General life satisfaction*
Social resources	*Share of population who 1) frequently feel lonely 2)believes things have become too complicated*
Equal opportunities	*Satisfaction with participation*
Participation	*Satisfaction with political participation*
Cultural diversity	*Sustaining oneself*
5. **Torjman, S (2000)**	
The Social Dimension of Sustainable Development	

Poverty reduction	*Equal opportunities, employment, skills*
Poverty reduction is a primary objective of sustainable development. It is the greatest threat to political stability, social cohesion and the environmental health of the planet.	
Social investment	*Health, education and skills development*
Social investment is a prerequisite to economic development; a vibrant economy requires a healthy and educated workforce.	
Safe and caring communities	
The concept of sustainable development implies that all individuals and sectors have a responsibility to promote human well-being.	
6. **Littig (2001), modified.**	
Social security	*Basic material security, meeting of needs, social security*
Health	*Physical and psychological safety*
Social integration	*Innovation in social activities*
Participation	*Political participation and empowerment*
Gender equity	*Gender mainstreaming*
Justice and welfare orientation	*Solidarity*
Personal freedom concerning the way of	*Freedom to choose different models for way of life*
7. **Hans-Boeckler-Foundation (2001)**	
Paid and voluntary work	*Self-determined lifestyle including a mix of paid and informal work,*
Basic needs	*Satisfaction of basic needs,*
Social security	*A reliable and sufficient social security system,*
Equal opportunities to participate in a democratic society	*Equal opportunities to participate in a democratic society,*
Enabling of social innovation	*Enabling of social innovation and structuring of work types.*
8. **Thin et al (2002)**	
DIFD	
Social justice	
Solidarity	
Participation	
Security	
9. **Omann and Spangenberg (2002)**	
Education	*Self-determined life and mixed work*
Skills	*Satisfaction of basic needs*
Experience	*Reliable and sufficient security system*
Consumption	*Equal opportunities, participation, democracy*
Income & Employment	*Social innovation*
Participation	*Intergenerational equity*
10. **Barron and Gauntlett (2002)**	
Goals of social Sustainability	
Equity	*Equitable opportunities and outcomes*

Diversity	*Promotion and encouragement of diversity and value of difference*
Interconnectedness	*Community processors, systems and structures that promote connectedness within and outside the community*
Quality of life	*Insurance that the communities basics needs are*
Democracy and governance	*Democratic processors, open and accountable governance structures*
11. **Konning (2002)**	
Culture	
Equity	
Social justice	
12. **McKenzie (2004)**	
Accessibility	
Intergenerational equity	
Continuation of culture	
13. **Baines and Morgan (2004) and (Sinner et al, 2004)**	
Components of Social Sustainability	
Basic needs	*Meeting basic needs;*
Personal disability	*Overcoming disadvantage attributable to personal disability;*
Needs of future generations	*Fostering personal responsibility, including social responsibility and regard for the needs of future generations;*
Social capital	*Maintaining and developing the stock of social capital, in order to foster trusting, harmonious and co-operative behaviour needed to underpin civil society;*
Equity	*Attention to the equitable distribution of opportunities in development, in the present and in*
Cultural and community diversity	*Acknowledging cultural and community diversity, and fostering tolerance;*
Empowerment and participation	*Empowering people to participate on mutually agreeable terms in influencing choices for development and in decision-making.*
14. **Framework for social sustainability assessment in Vancouver (2005)**	
Equity	*Living, working, sense of place, engaging, learning, moving*
Inclusion	
Adaptability	
Security	
15. **Littig & Griessler (2005)**	
"Social dimensions of sustainability"	
Basic Needs and Quality of Life	*Satisfaction of basic material needs and self-fulfillment*
Social Justice	*Equality of opportunity*
Social Coherence	*Harmony among different social groups*

16. **Bramley et al (2006)**	
Interactions in the community/social networks	
Community participation	
Pride and sense of place	
Community stability and security (crime)	
17. **Chan & Lee (2008)**	
"Factors of social sustainability"	
Social Infrastructure	*Physical infrastructure which delivers locally based services and opportunities for social*
Availability of Job Opportunities	*Employment*
Accessibility	*Essential work and leisure activities should not entail too much travel*
Townscape Design	*Aesthetically pleasing, functional, and promotes social interaction*
Preservation of Local Characteristics	*Conserving physical and social/community characteristics particular to the locality*
Ability to Fulfill Psychological Needs	*Fulfilling the need to feel secure and participate in neighborhood design.*
18. **Colantonio, A (2008)**	
Social Sustainability Themes	
Traditional	**Emerging**
Basic needs, including housing and environmental health	Demographic change (aging, migration and mobility)
Education and skills	Social mixing and cohesion
Employment	Identity, sense of place and culture
Equity	Empowerment, participation and access
Human rights and gender	Health and Safety
Poverty	Social capital
Social justice	Well being, Happiness and Quality of Life
19. **Cuthill (2009)**	
"Key factors of social sustainability"	
Social Capital	*Social networks and a sense of social responsibility*
Social Infrastructure	*Facilities which address need and capacity for participation*
Social Justice + Equity	*Equitable access to essential welfare services and employment, especially for vulnerable groups*
Engaged Governance	*Bottom-up, participatory democracy*
20. **Vavik & Keitsch (2010)**	
"Three goals of social sustainable development"	
Poverty	
Illiteracy	
Access	
21. **Dempsey et al. (2011)**	
"Dimensions of social sustainability"	
Social Equity	*Access to facilities and services*

Sustainability of Community	*Social interaction/social networks in the*
	Participation in collective groups and networks in the community
	Community stability
	Pride/sense of place
	Safety and security.
22. **Dempsey, et al. (2011)**	
Urban social sustainability: contributory factors. The factors that underpin local quality of	
Non-physical factors	**Predominantly physical factors**
Education and training	Urbanity
Social justice: inter- and intra-generational	Attractive public realm
Participation and local democracy	Decent housing
Health, quality of life and well-being	Local environmental quality and amenity
Social inclusion (and eradication of social exclusion)	Accessibility (e.g. to local services and facilities/ employment/green space)
Social capital	Sustainable urban design
Community	Neighbourhood
Safety	Walkable neighbourhood: pedestrian-friendly
Mixed tenure	
Fair distribution of income	
Social order	
Social cohesion	
Community cohesion	
Social networks	
Social interaction	
Sense of community and belonging	
Employment	
Residential stability (vs turnover)	
Active community	
Organisations	
Cultural traditions	
23. **Woodcraft, S. et al. (2011)**	
Amenities and Infrastructure	
New communities need services and support, not just buildings	*Provision of community space*
	Transport links
	Place with distinctive character
	Integration with wider neighbourhood
	Accessible street layout
	Physical space on development that is adaptable in the future
Voice and Influence	
residents need to have a say in shaping their surroundings	*Perceptions of ability to influence local area*
	Willingness to act to improve area

Social and Cultural Life	
New communities need shared spaces, shared rituals & support to build social networks	*Positive local identity*
	Relationships with neighbours
	Well-being, Feeling of Safety & Community
	Feelings of safety & Community facilities
	Community facilities
Space to Grow	
Flexible use of land and buildings is essential	*flexible infrastructure, masterplans, land / building use*
	scope to change as per change in age, new patterns of work and social life

From this, it is evident that while the literature highlights the relatively limited treatment to the social pillar, wide ranging social objectives, strategies and measurement instruments have been developed, but with little regard to the physical reality and sustainability perspective (Metzner, 2000) except for a few recent studies. This results in difficulties to present the available knowledge in a way suitable for integration into sustainable design and development policies. Social sustainability aspects are also generally 'added-on' to promote the message of other disciplines (i.e. economics, ecology) (McKenzie, 2004) or, in some cases, dismissed altogether, not only because sustainable development originated out of the synergy between 1960's environmental movement and 1970's 'basic needs', but also because they are difficult to define more so to quantify (Burton, 2000; Colantonio, 2007). Dempsey et al. (2011) have argued that social sustainability is neither absolute nor a constant. It is a dynamic concept that will change over time in a place. All these ambiguities associated with the meanings and interpretations of the concept, despite the extensive body of literature therefore, suggest that a greater understanding of the social dimension of sustainable development is indispensable.

2.4 (Re)Constructing the community

2.4.1 Significance of the neighbourhood and bottom-up approaches

In recent years, neighbourhoods, as an important unit of social organisation and locus of action, have gained attention as a setting for citizens' experience of urban life. It is seen as an arena for social change where local communities can effectively participate in meeting objectives of sustainability through formulation of collective goals, action and communal support (Young, 1990) on which larger decisions may be based. The increased research and place-based development policies on neighbourhoods and local communities can be ascribed to several reasons.

i. Rising concerns regarding change in the social fabric of cities such as decline in traditional social bonds, solidarity (Giddens, 2009) and a gradual loss of cultural identities (Zetter & Watson, 2012) under the influence of globalisation and rapid urbanisation.

ii. Increasing concerns about the quality of life in rapidly transforming cities leading to growing interest in the measurement of different aspects of neighbourhood social sustainability as they provide a useful scale for studying the social relations of 'everyday life-worlds' (Meegan & Mitchell, 2001).

iii. Overall reassertion that neighbourhoods or local arena can influence both individual and collective well-being as well as achieve wider societal goals.

iv. Increasing significance of sustainable 'local communities' as means to deal with spatially manifested deprivation, inequity and social exclusion (Forrest & Kearns, 2001) which threaten the social stability and economic competitiveness of cities.

v. Increasing interest in the processes of self-organisation (Young Foundation, 2011) and bottom up approaches and recognition that macro-level sustainability actions are influenced by micro-level efforts.

The significance of neighbourhoods is well established in the literature. Kearns & Parkinson (2001) view of the concept of neighbourhood is one which acts at several spatial scales and serves various functions to individuals, from "*landscapes of opportunity*" to "*relaxation, re-creation and socialising, fostering attachment and belonging; and demonstrating or reflecting one's values*" (Kearns & Parkinson, 2001, p. 2103). The authors state that residentially based networks acts as basic building blocks of social cohesion through which people learn "*tolerance, co-operation and acquire a sense of social order and belonging"* (ibid, p.2103). Sustainable development actions at neighbourhood scale are therefore, seen as the most effective means for achieving long term improvement on a larger scale thus, increasing the likelihood for the concept of sustainability to acquire the widespread legitimacy that has so far proved elusive[2].

The extent to which ideal tight-knit harmonious neighbourhoods ever existed is a matter of some debate, and although there are continuing trends associated with the decline of the conventional role and meaning of neighbourhood as a focal point of everyday lives or arena for extended domestic activities, there are several contemporary factors that reinforce as well as reshape the role of neighbourhoods as communally-experienced geographical space (Arundel, 2011); for eg. neighbourhoods in the western context are

[2] Whilst acknowledging the importance of neighbourhoods and the potential role that the local sphere can play in wider societal goals, it is also important to realise that positive social attributes are not necessarily the typical attributes of neighbourhoods and the their intensity varies between people and places.

gaining importance as an arena for recreation and leisure. Moreover, different elements of neighbourhoods may be important to people for different reasons at different life stages and their significance may vary for some people than for others, most often for people with limited incomes, limited mobility, age groups and those who rely more on their local arena as a source of social networking and use services close to where they live. Neighbourhoods are also places through which people gain access to resources and where they encounter the institutions such as schools, hospitals, religious centres, local government and political parties, unions and above all they constitute the locale where both, individual and social identity, are produced through shared rituals, activities, economic cooperation and political mobilisation (Tarlo, 2003).

Counterarguments to the significance of the neighbourhood too, have been made with respect to increasing virtual social networks and modern lifestyles largely influenced by telecommunications and social media (Wheeler *et al.*, 2000) that certainly have an impact on people's perception of the neighbourhood. However, despite this, there has been a continued emphasis on the importance of a resident's local settings (Forrest and Kearns, 2001) even in case of highly individualistic suburbs where the neighbourhood remains a crucial mode of social organisation and classification facilitating the states intervention in the life of its citizens (Chakrabarti, 2006; Simpson, 2006). In the face of global capital, information flows and lifestyles, there has been a contradictory re-emphasis of local space or neighbourhood based on its importance in the social and psychological well-being of individuals (Bridger & Luloff, 2001; Kearns & Parkinson, 2001) as well as technology-led reintegration of work and home space for the future generation (Fukuyama, 1999). This clearly points to the need to think in terms of 'neighbourhood re-defined' rather than 'neighbourhood lost'.

2.4.2 Interpreting the neighbourhood - towards some definitions

The concept of neighbourhood refers to people's association both, physical and social, in their immediate living space. They are often seen as a physical setting as well as a social community. In more physical terms neighbourhood can be seen as a "*key living space through which people get access to material and social resources, across which they pass to reach other opportunities and which symbolises aspects of the identity of those living there, to themselves and to outsiders*" (Meegan & Mitchell, 2001, p.2172). On the other hand, the neighbourhood can be understood as a social space around one's place of residence which consists of the social interactions, relationships and social activities in which a person participates (Bruin & Cook, 1997; Sirgy & Cornwell, 2002). This further comprises of behavioural as well as psychological aspects. Behavioural aspects relate to the neighbourhood activities and interactions that have an obvious consequence on the social environment of a locality while the psychological dimensions of the

neighbourhood refers to the residents' understanding, appreciation and attachment to their locality which gives a place it's meaning. Byrne in 1999 put forth the notion of neighbourhood as 'community' based on Glass's definition in 1944 where she distinguished neighbourhoods which were simply people living in an area and experiencing the same things, from 'communities' which were conscious of the communality derived from common spatial experience and were willing to act communally (Byrne 1999, p.119). Donner (2006, p.141-158) argues that neighbourhoods have a distinctively communal quality to them and therefore the residents often define them in terms of relatedness, interdependence, co-operation and conflict based on spatial proximity. As a result, even with porous boundaries, ambivalent membership and contested legal status, the neighbourhood is for most urban dwellers a social reality that has far-reaching effects on their lives.

Forrest and Kearns (2001) identify four different perspectives on neighbourhood seen as a community, as a context, as commodity, or as a consumption niche. Power and Wilson (2000) and Lupton (2003) use the onion analogy to describe the levels at which 'neighbourhood' exists. The authors state, *"the layers of neighbourhood life are like an onion with a tight core and a loose outer skin"* (Power and Wilson, 2000, p.1). They maintain that neighbourhoods give people a sense of familiarity and security which break down when all the three layers – home, services, environment – are significantly 'disrupted' (ibid, p.2). What Lupton (2003) draws from the analogy is that different boundaries make sense to meet different needs and therefore when asked what a neighbourhood is, the residents' may refer to any or all of the aspects or levels – the home area, the locality, the neighbourhood environment, the wider urban district or region. There is also considerable overlap in the use of terms such as 'neighbourhood', 'community', 'local', 'area', 'place'.

Researchers have acknowledged that defining neighbourhoods in any given case is problematic (Chaskin, 1998) because neighbourhood does not mean the same thing to people. Barton (2000, p.3) has also stated neighbourhood as a "*loaded concept*" which, to some, appears to be a self-evident reality serving to their daily needs and a community of shared experience and mutual support while to others, it is a concept that is no longer relevant in contemporary times. Therefore, different professions and discrete literatures describe neighbourhoods differently and their boundaries further vary as 1. Political Neighbourhood: defined by "*endogenous organisations…to clarify their constituencies, gain legitimation within the neighbourhood, [and] make connections with the broader resources in the cities*." [Taub et al. (1977), Florin (1989), and Combs (1984) in Chaskin (1998, p.4)], 2. Social Neighbourhood: defined by "*aggregate perceptions of local residents and those of agency heads and leaders of community organisations into composite maps*" [Taub et al. (1977) in Chaskin (1998, p.4)], 3. Physical

Neighbourhood: defined by government agencies for administrative purposes or pre-defined boundaries which came into existence at the time of subdivision or established by forces endogenous or exogenous to the neighbourhood. According to Taub et al. (1982), although these entities put forward definitive boundaries, they rarely match when any two are put forward for the same neighbourhood. Planners have also tried to define neighbourhood boundaries by using resident perceptions which may vary among different groups within a residential population and therefore, the level of consensus that can be reached about any particular set of boundaries becomes questionable (Chaskin, 1998, p.4). The very concept of neighbourhood is difficult to concretely delineate, although it is likely that most people would concede that there is such a thing as a geographic entity that they would consider 'their neighbourhood' even if its boundaries might be hazy and its significance might vary.

2.4.3 Exploring the concept of neighbourhood in India

In India, urban social relations came to be the focus of investigation when modernisation and industrialisation of urban spaces gained a new centrality in political and social sciences arena as part of country's post independence visioning. While Gandhian version focussed on imagery of 'village India', the then contemporary Nehruvian vision highlighted 'cities as places of progress and modernity', to be achieved through planned urbanisation and industrialisation (Parry, 2003; Prakash, 2002). In their early approaches to the city and city life in India, scholars viewed and studied the city as a whole which represented a distinct social form associated with heterogeneity, anonymity and deteriorating social relations in contrast to rural spheres of social life. Followed by a period of certain romanticism for rural India post the country's independence, particularly after the second phase of extensive urbanisation in 1960s and 1970s, that towns and cities attracted the attention from urban planners and geographers who investigated the nature of social change in urban localities in relation to urban governance, infrastructure and livelihoods. Other social sciences became interested in metropolitan areas and growing provincial towns to gain insight to changing patterns of inequity, morality and social relationships. Much of this research in urban spaces focused on the transformation of traditional patterns of social organisation and relationships of caste, gender and family within the context of community, locality or neighbourhoods. The form and meaning of neighbourhoods as socially constructed places and fundamental to the understanding of urban life was rarely explored in the literature on urban India (Ramachandran, 1989). As urbanisation began to take new forms with the rise of satellite towns, new industries, IT hubs and sites of desired consumption practices and indeed modernity, throughout 1970s and 80s planners and development theorists analysed such satellite towns as well as their potential to remedy urban housing crises

and infrastructure problems (Mitra 2002 in Donner and de Neve, 2006). Centrality of urban spaces in the lives of ordinary Indians and the role of neighbourhoods as socially constructed places across the subcontinent has in general been ignored.

The concept of neighbourhoods in India may not be as established and defined as in the western world context yet, there does exists the concept of communities defined within physical spaces and the notion of localities, often termed locally as '*pados*', '*maholla*', '*para*' or even territorial '*ilaka*', to which almost every resident of a city somehow apprehends a sense of neighbourhood and ascribes some meaning to it or draw intense emotions than any other space in the city. Indian neighbourhoods where once traditional ties, close kinship, shared religious and moral values represented a cohesive structure in a physically bound space, are seen as being gradually replaced by anonymity, individualism and virtuality. Social and spatial exclusion is also on the increase as the new high security luxury apartments and exclusive residential areas are being reshaped to create less public space and are sold as new neighbourhood type. Therefore, despite the fact that neighbourhoods in India have remained less of a focus for the study of socio-spatial structures, they continue to play an important role in the construction of social relations against the background of changing global-local connections (Donner and de Neve, 2006).

2.5 Strengthening the 4 'S'

In the early part of this chapter, we have seen that regardless of its anthropocentric focus and general conformity that social sustainability is significant, there has been little investigation on what it exactly means in theory and more so in practice. The ongoing problems of lack of confirmed definition of the construct, its relation to other variables, and how best to measure it continue to impede the application of the social sustainability. It is also clear from the literature that despite this, different authors have brought forth several social aspects or components in order to operationalise the concept. And, even with the fact that the concept is complex, because it includes a multitude of contributory facets, one can identify at least four broadly accepted and overlapping social sustainability dimensions (the 4S's) within which these social components can be grouped. Building on the review of social sustainability literature so far, it can be argued that: Social Sustainability in built environment is "***a combined top-down & bottom-up process for creating urban spatial forms that nurtures the 4'S', social capital, social cohesion, social inclusion and social equity, whilst appreciating people's diverse needs and desires from the places they use***" Although there is little information specifically on social sustainability, there exists broader literature on these four dimensions; social capital and social cohesion which relate more directly to the concept as a set of social

conditions that 'enable' reaching collective goals while social equity and social inclusion represent actual end-goals.

2.5.1 Social capital and social cohesion

The role of social capital and social cohesion in promoting sustainable development has received increased attention in both theory and practice in recent years. Social capital is referred to as "*features of social organisation such as networks, norms and trust that facilitate co-ordination/co-operation for mutual benefit"* (Putnam, 1993, p.67). Viewed "*not just as the sum of the institutions which underpin a society; but glue that holds them together*" (The World Bank, 1998, p.8), it has at-least two dimensions, trust and co-operative ability (Paldam, 2000). Social capital has also been defined as the ability of people to work together for common purposes in groups and organisations (Coleman, 1988). It is, therefore, a fundamental component of many social institutions – the sets of rules, processes and norms that guide human behaviour and is a contributor to community strength and wellbeing, which can be accumulated when people interact with one another formally and informally. Advances in research also imply that social capital is a multi-dimensional construct (Putnam, 2000; Woolcock, 1998), with bonding (associations among homogeneous group of people), bridging (associations among heterogeneous group of people), and linking (vertical associations) social capital being most commonly discussed in the literature. As a contested concept in itself, social capital, on one hand has been linked to increased community cohesion (Putnam, 2000), better psychological health (Carlson, 1999; Ziersch et al., 2005) and lower crime (Salmi and Kivivuori, 2006) while on the other, it is also claimed to have negative outcomes such as exclusion and social isolation (Harper and Kelly, 2003) especially in relation to very high bonding capital.

The overlapping concept of social cohesion has also become a key concept in social policy discourse and debates. It has been promoted by organisations such as United Nations (1995), World Bank (2005) and has become central to EU Sustainable Development policy (in particular Eurostat, 2005; 2007; ODPM, 2005). In absence of a commonly accepted definition, social cohesion is variously described as "*affective bonds between citizens*" (Chipkin and Ngqulunga, 2008, p.61), "*local patterns of cooperation*" (Fearon et al., 2009, p.287), and "*quantity and quality of interactions among people in a community*" (Cochrun 1994). Recently, Chan (et al. 2006, p.290) defined social cohesion as "*a state of affairs concerning both vertical and horizontal interactions among members of society as characterised by a set of attitudes and norms that includes trust, sense of belongingness, willingness to participate and help as well as their behavioural manifestations"*. The term social cohesion is often used interchangeably with social capital where conflicting notions of inter-personal and inter-group social cohesion bear similarity to the notions of 'bonding' and 'bridging' social

capital (King et al., 2010). Yet, it is central to the concept of social sustainability and is linked to the need to promote tolerance (Cuthill, 2009), solidarity, and integration (Jörissen et al., 1999), harmony and a sense of community (Colletta et al., 2001), to foster a shared sense of social purpose (Baker, 2006) and civic / community participation (Omann & Spangenberg, 2002), to reduce conflicts (Munasinghe, 2007) as well as promote stability, safety and place attachment (Dempsey et al., 2011).

The concepts of social capital and social cohesion are vast concepts and include several components amongst them however, based on literature review, five were found fundamental and sensitive to (claimed to be influenced by) the built-environment and hence considered for this research. The five key components of the overlapping concepts of social capital and social cohesion, their meaning, significance and claimed relationship with the urban built-environment are discussed in Table 2.4. Other important components in addition to the five core components include 'place satisfaction', 'social mixing' and 'tolerance (to diversity)'.

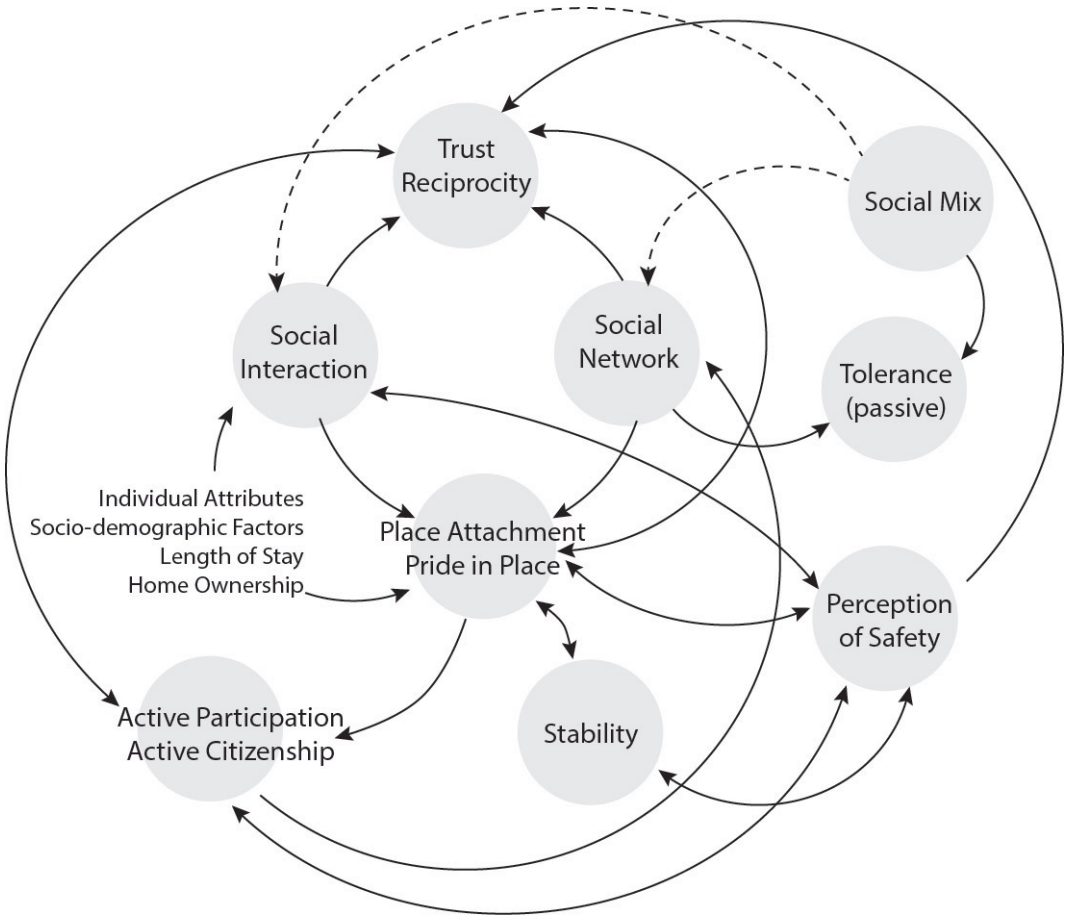
Table 2.4: Key components of social capital and social cohesion

1. **Social Interactions / Social Networks** *Intensity and type of contacts or exchanges between people.*
Significance: Considered integral to people's values and identities as well as to civic society as they influence important aspects of life such as the extent of social support, reciprocal actions and spontaneous cooperation necessary for developing shared identities (Putnam, 1993), feeling of safety and sense of well being (Fischer, 1982; Pierson, 2002). *Relationship:* Associated with negative consequences of the sprawling neighbourhoods, characterised by low population density, segregation of land-uses, automobile-dependency, lack of public spaces (Calthorpe, 1993; Leyden, 2003) as opposed to neighbourhoods that have mixed land uses, higher population densities and pedestrian-friendly streets (Jacobs, 1961). Poor social interaction has been associated with very high densities and crowding in an area (Keane, 1991).
2. **Trust / Reciprocity** *People's general readiness to form associations outside the obligations of family or the compulsion of the state (Fukuyama, 1995) and their continuing relationship of*
Significance: Considered indispensable in mediating the dynamics of social lives, they are central in building cohesive communities as its presence is seen to have a positive impact on collective social actions allowing people to live with and tolerate uncertainty (Putnam, 1993) while its absence is evident in the breakdown of social and institutional relationships. *Relationship:* Observed to be higher in walkable, mixed-use neighbourhoods as compared to automobile-dependent suburbs (Leyden, 2003). Transit Oriented Developments (TODs) are seen to have a significantly higher levels of trust, reciprocity and connections among residents as compared to non-TODs (Kamruzzaman et al, 2014).
3. **Place Attachment / Pride** *Affective bond between people and place or settings (Tuan, 1974) that can take place in two forms: 1) functional (place dependency), and 2) emotional (place identity).*
Significance: Considered as an integral component of people's enjoyment of their built environment (Nash and Christie, 2003), relates to social order, common norms and civic culture in an area (Kearns and Forrest, 2000), and benefits the community, by facilitating involvement in local affairs, as well as individuals, by contributing to their mental health and well-being (Giuliani, 2003).

Relationship: The qualities of housing, property ownership as well as proximity to local landmarks have been associated with greater place attachment (Guest & Lee, 1983). Higher densities (Parkes et al., 2002), fear of crime and dissatisfaction with the quality of neighbourhood environment are also seen to reduce attachment (Sampson, 1988) while satisfaction with neighbourhood safety, walkability, streets quality and density of traffic are found to induce the feeling of attachment in a neighbourhood (Oktay, et al., 2009).
4. **Social Participation / Community Engagement** *Participation in local celebrations and activities aimed at solving community local issues and improving the well-being of its members.*
Significance: Considered crucial to building residents' stock of social capital (Forrest and Kearns, 2001) which result from spontaneous sociability (Fukuyama, 1995) and allowing them to express their shared sense of needs and aspirations and assume responsibilities for general well-being of the local community (Colantonio & Dixon, 2011). *Relationship:* Higher densities, mixed land-use neighbourhoods are associated with higher levels of social participation and community engagement as it provides residents greater amount, variety and intensity of activities in which to participate (Talen, 2001).
5. **Fear of Crime / Perception of Safety** *Fear of crime and perceived safety among the residents of an area or neighbourhood.*
Significance: Considered to have significant consequences affecting quality of life, reducing social activities and increasing distrust amongst the residents. Feeling of safety in a neighbourhood is closely related to other dimensions of community sustainability and their effects on the quality of life (Tennyson-Mason 2002) and health and wellbeing of individuals (Wilkinson et al. 1998; Dempsey et al., 2011). *Relationship:* Maintaining a high level of activity by encouraging higher density, mixed land-use walkable neighbourhoods is argued to reduce opportunities for crime and improve safety in the community. The design of individual buildings such as orientation and active frontages are also associated with the overall safety and vitality of the adjacent public spaces by fostering natural surveillance and reducing opportunities for crime (Jacobs, 1969).
Other important components not included in this study *Place Satisfaction, Social Mixing and Tolerance to diversity*
Place Satisfaction: A cognitive component associated with specific neighbourhood attributes, relative to ones expectations (Connerly & Marans, 1985) and a positive indicator for how happy, content and secure people are within their environment, place satisfaction is considered as an aid for analysis rather than a dimension and can influence on a person's psychological wellbeing and quality of life (Sirgy & Cornwell, 2002).
Social-mixing and Tolerance (to diversity): Social tolerance in terms of social acceptance of difference is considered important for understanding and promoting neighbourhood unit. Mixed communities create conditions for mutual understanding and shared norms among different social classes and incomes (more egalitarian or socially cohesive society), encourage racial or religious integration (stable society); and is expected to lead to a range of positive outcomes, like social cohesion, social mobility opportunities, more social capital, better services, less crime, an improved neighbourhood reputation, and more residential stability (see e.g., Bolt and van Kempen 2008; Tunstall, 2003) thus, creating 'workable' or 'sustainable' communities (progressive society) (LSE, 2010). However, this argument on 'goodness' of social mix has been confronted by many authors on the grounds that a large degree of heterogeneity at a low scale may have unwanted consequences, such as tensions between neighbours (Gans, 1961; Kleinhans et al., 2007).

Studies on the significance and association with the neighbourhood built-environment further suggest that all the selected components of social capital and social cohesion are interrelated in very complex and often mutually reinforcing ways (Figure 2.6). Operationally however, thesy may be treated as distinct and conceptually valid.

Figure 2.6: Inter-relationship between components of social capital and social cohesion

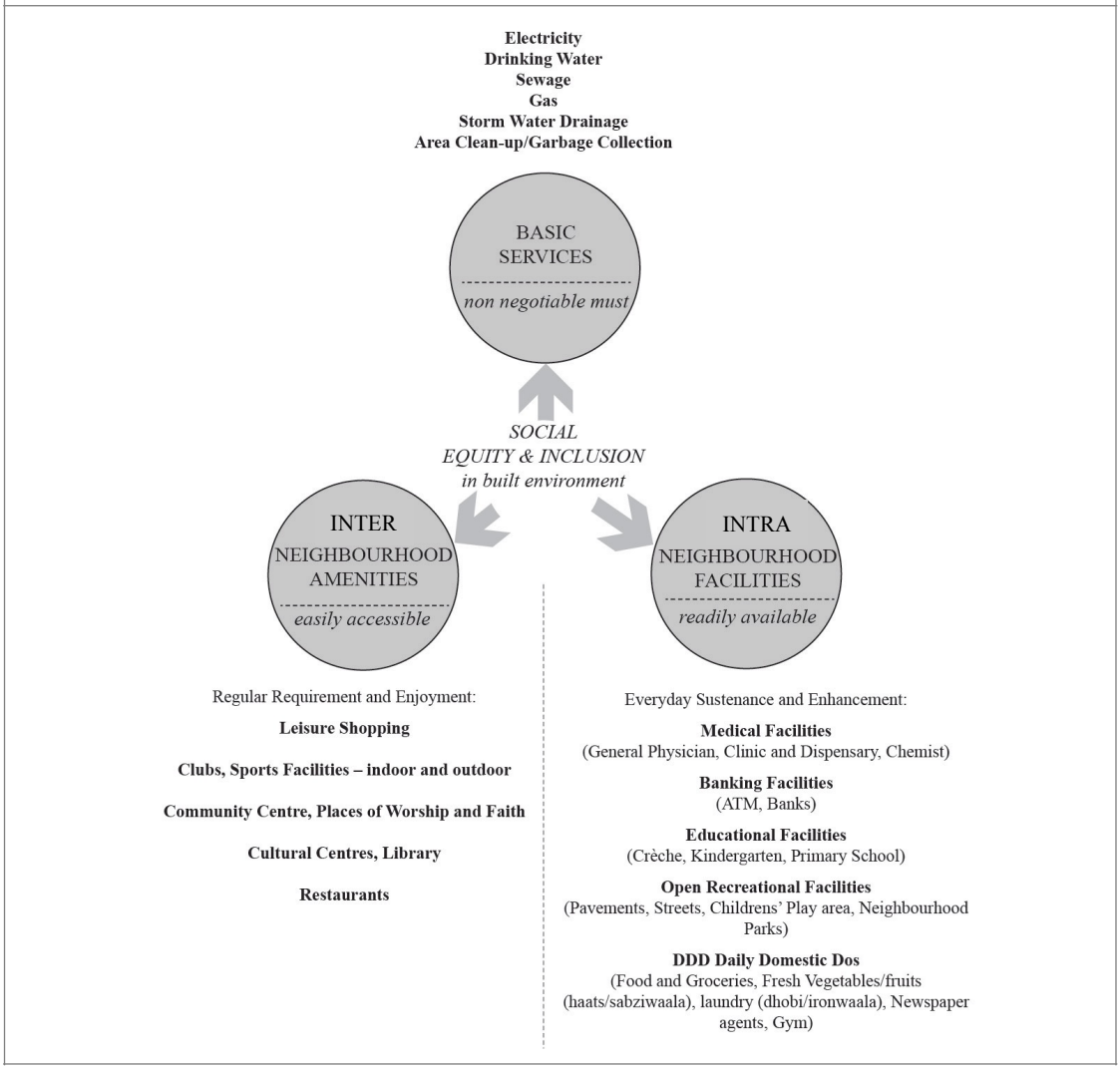


Although social capital and social cohesion, and many of their corresponding components, are contested concepts in terms of their importance in the achievement of wider social goals, there is consensus, in theory and policy, that both concepts are positive and desirable social goods (Forrest and Kearns, 2001; Bramely & Power 2009). They knit communities together, laying down the negotiated basis of social life, in which people support and work together, which in turn, provide the grounding for general economic productivity and growth, good governance, health and social security (Stanley, 2003). They provide both direct and indirect benefits and have therefore, gained significant theoretical ground and are becoming central to public policy making. Yet there are no empirical studies that would relate the levels of social capital /cohesion and development in India, a country whose vast geographical area, huge ethnic and cultural diversity and immense economic and social inequality calls for the utmost need to consider these concepts in policy making (Mukherjee and Saraswati, 2011). Nowhere are the questions about social capital /cohesion more compelling than in highly heterogeneous and rapidly developing economies such as India, where the keys to development are often sought in the informal and institutional relationships necessary for modern social life.

2.5.2 Social equity and social inclusion

The concepts, social equity and inclusion are strongly associated with the notion of justice and imply enabling people to share in economic, environmental and social benefits, damages and costs as well as to participate in governance. They are described as 'powerful political and policy concerns' (Jenks & Jones eds., 2010 p.108) as growing inequalities and exclusion are identified as structurally threatening costs to the governments including social security, health, education, law and order and housing and environment outlays.

Table 2.5: Selected key components of social inclusion and social equity

6. **Availability and Access to basic services, facilities and amenities:** *The extent to which a neighbourhood provides accessible services, facilities and amenities to all its*
Significance and relationship: Described as 'powerful political and policy concerns' (Jenks & Jones, eds., 2010 p.108), inequalities and exclusion have serious spatial consequences that get manifested into areas of deprivation and poverty, restricting certain segments of the society not only from access to choices and participation but more importantly opportunities to "urban advantage". Increasing inequalities and exclusion are thus, identified as major and structurally threatening costs to the governments. At local scale, they relate to one's everyday experience of the built environment (Dempsey et al., 2011) relating to availability and access to basic services (non-negotiable must), facilities (for meeting everyday sustenance & enhancement) and amenities (for fulfilling regular obligation and enjoyment).


An equitable society rejects any 'exclusionary' or 'discriminatory' practices that may hinder individuals from participating economically, socially and politically in the society (Pierson, 2002; Ratcliffe, 2000). In an urban context, exclusion and inequalities are seen to have grave spatial consequences that get manifested into areas of deprivation and poverty, excluding certain segments of the society from access to resources and opportunities offered by the city (Chalmers and Colvin, 2005) to both survive and fulfil their development potentials. Dempsey et al. (2011) argues that within an urban context, social equity and inclusion are also critical at local scale where it relates to everyday experience of the built environment. This refers to a wide spectrum of policy areas ranging from the provision for and availability as well as accessibility (Burton, 2000) of basic services, facilities, opportunities. Barriers for movement can occur in different forms, physical and mental leading to social injustices and socio-spatial inequities especially in relation to specific areas, classes, and people with special needs (Boschmann & Kwan, 2008; Stjernborg, 2014).

In India, while the growing urban areas are showcased by the increasing power of the 'middle class' and the emergence of a new urban political economy, the exclusion of certain segments of the people from enjoying the urban advantage to the fullest remains less in focus from a development imagination. The ever-widening urban gap in the era of 'World Class Cities' is symbolised by the stark disparity in the quality of the living environment as reflected in the patchwork of contrasting urban forms[3] seen today as seen as one of the most visual expressions of the inequalities and deteriorating social conditions. A closer assessment of the urban space in many cities indicate that this urban spatial segregation is not just a physical expression of income inequalities among households but a social, cultural and economic divide that poses a danger to social stability and sustained economic (UN HABITAT, 2008; 2010; Beall and Fox, 2007). Several international studies have claimed that the increasing number of defensive urban forms are not merely a response to growing concerns with security or even the desire for privacy, but represent more innate social conditions such as the intensity of prevalent social inequality, patterns of segregation and exclusion and access to participation and more importantly the availability of choices and opportunities to 'urban advantage' (UN HABITAT, 2008, 2010; Bagaeen and Uduku. eds., 2010; Soja, 2000). Such 'urban divide' further threatens the social stability of the city thus, increasing insecurity, and fear among the citizens that shape the sprawling city through the growth of defensive communities leading to a so-called 'spiral of decline' (van Ham and Clark, 2009), which

[3] For example: The formal *'Defensive City'* (new wealth enclaves linked by motorways and with privatised public spaces, fortress-like hotels, malls and office complexes in response to fear of crime and a desire for exclusiveness), the traditional *'Forgotten City'* (dense, mixed-use urban quarters, perceived as lacking in modern amenities and infrastructure but on the whole socially thriving places) and the informal *'Slum City'* (informal settlements lacking services and infrastructure and, characterised by extreme poverty, ill-health and deprivation) (Hemani and Das, 2012 p.784).

is a combination of both physical and social problems that reinforce one another. Thus, growth itself can be destabilising if it is not inclusive.

The facts discussed so far in this section emphasis the need to design inclusive cities in order to ensure their sustainability by incorporating a long-term social dimension into urban policy. Although, exclusionary processes operate along and interact across several dimensions (economic, political, social, cultural and physical) and work at different levels, in the Indian urban context, social equity and inclusion may refer to availability of and access to the following three aspects within built environment:

i. Basic Services: They are the 'non-negotiable musts' that refer to the provision of basic infrastructure and services such as water, sanitation and decent shelter for all.
ii. Basic Facilities: They are the intra-neighbourhood facilities such as medical, banking, educational and open recreational facilities as well as 'daily domestic-do' that must be readily available to all for everyday their sustenance and enhancement. Such facilities should be provided within a person's immediate neighbourhood.
iii. Basic Amenities: They are the inter-neighbourhood amenities such as leisure shopping, clubs, sports facilities, community centres, places of worship and faith, cultural centres, library, restaurants that must be easily accessible to all. Such amenities should be provided within the wider neighbourhood or city scales.

2.6 Social sustainability assessment

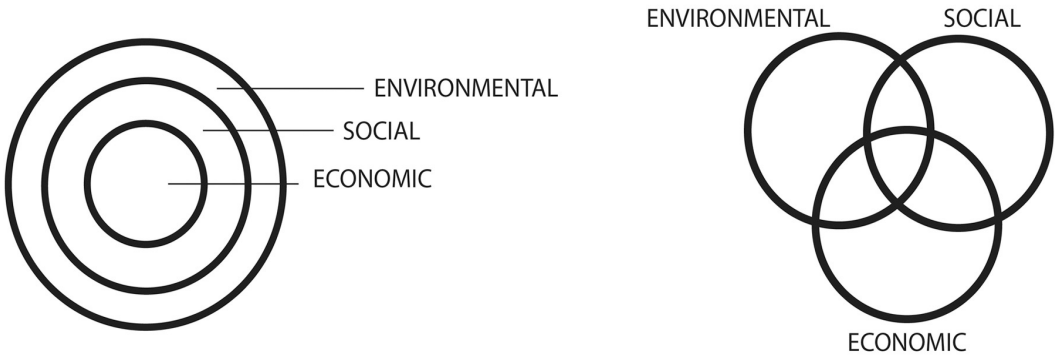
2.6.1 Linking theories to design and development policies

Sustainability measures, frameworks and indicators are fundamental instruments to measure sustainable development. They help incorporate sustainability knowledge into decision-making as well as measure and calibrate progress toward sustainable development goals (UN, 2007). Historically 'development' was measured in the form of only economic growth narrowly defined as 'income' or 'wealth and prosperity' measured through the nation's Gross Domestic Product (GDP). As the traditional indicators such as GDP failed to address issues inherent in the concept of sustainability[4] (Chambers et al., 2000) whereby social justice, equality of opportunity and access, etc is a major concern, the development measures moved, from 'growth' to 'growth plus equity'. The concept of development expanded to stress on two key facts: firstly, development involves continuous growth and, secondly, it is also concerned with human and environmental well being (A few key multidimensional and composite development indicators are: UNDP's Human Development Index, Bhutan's National Gross Happiness and New Economics Foundation's Happy Planet Index).

[4] GDP only reflects the amount of economic activity and can raise even if the overall community health is being impaired

‘Sustainability’ and ‘Sustainable Development’ are now extensively used in development agendas for many countries worldwide. A number of models for conceptualising sustainable development and the association between its different dimensions have also been developed, amongst which the two most accepted models are 1) the intersection model represented by three interlocking circles correspond to the notion of achieving equilibrium between the three pillars of sustainable development; 2) the concentric model provides a representation of how we should understand the relationship between the environment, social and economic spheres, portraying the mutual independence and our ultimate reliance, as social and economic beings, on the physical environment. (Barron and Gauntlett, 2002) (Figure 2.7). However, each of the three ‘pillars’ has its own characteristics and logic, which are interdependent and quite often also likely to conflict with each other.

Figure 2.7: Different models representing interrelationship between the environmental, social and economic pillars of sustainability



The sustainability models do not suggest methods of mediation between the unavoidably conflicting objectives of economic rationality, social justice and ecological equilibrium. There are also difficulties regarding the identification of ‘purely’ economic, social, or environmental issues, as considerable overlaps exist across the three pillars. Such contingencies have prevented sustainability models from becoming widely adopted in the policy circles. However, the intersection model of sustainability do give the impression of the three pillars as independent elements that can be treated, at least analytically, separately from each other (Mak and Peacock, 2011).

The literature therefore, points to certain policy concerns that have been identified as ‘social’ within the overall sustainable development framework. And, despite the fact that the social dimension is least explored, it is becoming an established component of several policy guidelines for many nations in the global north to which Dempsey et al. (2011) argues as ‘policy agenda overtaking the research agenda’. Numerous policy frameworks, measures and indicators for measuring sustainability in planning and project evaluations have also been developed in the last few years which may not be

seen necessarily as a bad thing considering the fluidity and complexity of the concept. Boström (2012) argues that such 'pluralism is preferable to a single common approach' and can be more constructive. As also noted by Lehtonen (2004), different geographical and temporal scales as well as situational contexts require their own frameworks, which do not necessarily provide a coherent picture, but a mosaic of partly contradicting views of reality.

In relation to the theoretical methodologies for the study of social sustainability Colantonio (2007) argues that the holistic approach which calls for the equal amalgamation of the pillars of sustainable development into a new entity - the sustainability equilibrium state, is theoretically appealing but difficult to implement and may result in ineffective guidance for policy-making. In contrast, the reductionist approach which calls for the assessment and measurement of the separate dimensions of sustainability may fail to capture the complex nature of sustainability but is more applicable and help policy makers to implement policies. In India, at present there is no composite sustainability index in official use to inform India's progress on its path to sustainability. Currently used frameworks, such as UNDP's Human Development Index, though significantly more preferable to the GDP are still inadequate with regard to sustainability (OIWPS - XVI, 2011). One of the attempts towards a composite sustainability index was commissioned by the former Minister for Environment and Forests, Jairam Ramesh (CSTEP, 2011), followed by another attempt to take on board greater complexity and conducting a preliminary analysis of how various states in India are faring (Roy and Chatterjee 2009), however they overlooked a number of important parameters especially under the social pillar of sustainability (see for eg. Reddy and Balachandra, 2013). As discussed earlier and emphasised by many authors (Colantonio, 2007), such a single composite index may perhaps, be misleading and unable to represent the inherent complexities that are vital to the concept of sustainability.

2.6.2 Establishing framework for social sustainability assessment

The first major step towards the identification of sustainability indicators, although inclined towards its environmental dimension, was Agenda 21 (UNCED, 1992) which called for establishment of sustainable development indicators that can provide a solid basis for decision-making at all levels. Since this initial attempt, a plethora of sustainability indicators have been developed, however, only recently, these indicators have been enlarged to include social indicators (Colantonio, 2008). Early indicators were mainly based on national statistics and focused predominantly on basic needs and other traditional 'hard' social issues, such as equity, health and demographics while newer themes that focus on 'soft' social issues such as happiness, well-being, social capital, cohesion and equity are now becoming central to the social sustainability debate (Table

2.6). Colantonio's (2007) work in this context, has pointed out a few of the methodological and theoretical quandaries concerning sustainability indicators, including for example (i) the need to improve the neglected measurements of traditional social sustainability themes before addressing emerging concerns, and (ii) the choice of most suited metrics. Social sustainability indicators have thus, evolved with the evolution and recognition of the social dimension in the sustainable development agendas. Colantonio's (2007, 2008) comprehensive assessment for social sustainability points out the following issues: 1) "*the chronological evolution of indicators mirrors the re-emergence of the community as main spatial operational space for the pursuit of sustainability*", 2) "*there has been a shift from purely statistics-based indicators toward hybrid sets of indicators that mix quantitative data and qualitative information*".

Table 2.6: Characteristics of traditional and emerging social indicators

Traditional Social Indicators	Emerging Social Sustainability Indicators
Static	Intergenerational & incorporating uncertainty
Predominantly quantitative	Hybrid
Product	Process
Descriptive	Strategic
Mono-dimensional	Multidimensional
Target Oriented	Principles and objective driven
Top down selection	Deliberative and reiterative selection

Source: Colantonio, A. (2008:19)

In the context of sustainable urban development, several different sets of indicators are now being proposed internationally to assess the social dimension of sustainability and monitor urban development and growth. Many international organisations (UN-DPCSD 1996; OECD 1993 and 1998) as well as national governments (Environment Canada 1996; U.K. 1996) have developed their own set of social indicators for sustainable development. The UK, for example, has been a leader in developing metrics for sustainable urban development with current focus on 'sustainable communities' and 'social cohesion' that has moved to the heart of European urban policy through the development of several policy documents and agreements. Various innovative methods are now being introduced internationally to measure and ensure social sustainability be it Amsterdam's 'social consultants' for spatial planning, the City of Los Angeles 'health and social impact statements', Australian Unity's 'Well-being Index 2001' that measure personal and national well-being or the 'social sustainability framework' devised by the City of Vancouver in Canada which focuses on health and vitality of the communities. Despite this, Colantonio and Dixon (2009, p.3) stress that there is a clear need for further investigation not only on the theoretical concept but also its measurements as the available tools, instruments and metrics for sustainable urban development are still

highly biased toward environmental and economic sustainability (ibid, 2009) [eg. Environment Sustainability Index, Green GDP or ea-NDP (environmentally adjusted Net Domestic Product), Adjusted Net Savings, Carbon footprints, Ecological footprints, Environmental Accounting and Environment Vulnerability Index, which takes into account 50 indicators related to weather, geography, biodiversity, natural resources, and human activities]. And, social sustainability may seem to have a common-sense resonance, but it is complex to measure and achieve in practice.

India currently uses simple demographic indicators to measure social sustainability such as: population growth, average income, health and education statistics, gender equality, political stability, quality of life index, or a combination of multiple measures. The idea of social sustainability in the context of urban built-environment has remained ill-defined and largely focussing on hard social issues such as gender, education, human rights, etc or on improving the quality of life through infrastructural development, and poverty alleviation through slum upgradation programmes including provision of basic services. The new emerging softer components of social sustainability including local networks, trust, participation, perceptions of safety, and equity have been often overlooked in the context of the urban built-environment amidst more pressing social issues such as basic needs, provision of basic services and infrastructure and are thus, either ignored or least explored, measured and tested in the Indian urban context. It is clear from the review of literature that developing social sustainability indicators confronts several difficulties due to lack of an agreed definition of the concept, lack of clarity about what it constitutes, complexity of the concept and issues involved with qualitative / quantitative measurements - all of which calls for a new priority set of social sustainability indicators in response to its context.

Chapter 3
URBAN FORM: A CRITICAL REVIEW

This chapter discusses the sustainable urban form debate in light of compact city orthodoxy and relates it to the developing world context. It then critically reviews the literature on urban form, its meanings, attributes and constituent components before setting out the framework for assessing it in relation to social sustainability.

3.1 Achieving sustainable forms for cities

The concept of sustainable urban development has revived the interest in the forms of cities with a desire to achieve a better environment and quality of life for its residents. In the past decade there has been intense debates and inquiry into the extent to which the physical forms of cities and the associated human behaviour can contribute towards achieving a just and sustainable future (Jenks and Jones, eds. 2010).

3.1.1 Sustainable form utopia

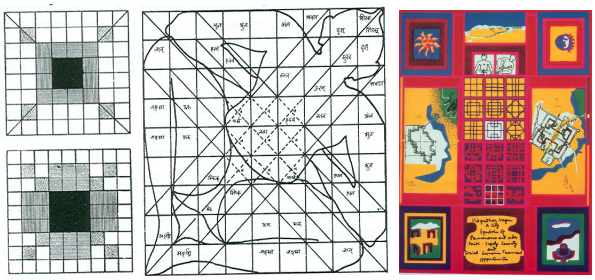
The interest in urban form-making has, for city designers, always remained a subject for idealistic desire and hope for an optimistic future. Throughout history, various attempts, to create the perfect environment for an ideal society; in other words—utopia, have been made. The utopian perspective, according David Pinder (2002, p.230), is one that involves *"the expression of desire for a better way of being and living through the imagining of a different city and a different urban life*". From the ancient cosmic ideologies to modern technological perfections, the notion of an 'ideal' city has remained embedded in urban planning through to the present day, where sustainable forms of cities address urban growth within the ideal of a balanced and sustained environmental, economic or social development. A study of different urban form utopias such as cosmic, traditional, machine and more recent sustainable models provides an overview to the evolution of the current sustainable form-making movements and provides an insight into how and why different urban forms took the shape they did.

i. **The Cosmic and Traditional forms**: The cosmic forms were metaphorical forms of the Universe and its Gods where the natural and the super-natural lived together in a social world (Correa, 1989) allowing development of reliable set of beliefs and practices. In early human civilisations[1], development of such cosmological framework and the social-political orders were closely intertwined, and often became manifested in their application to city building (Madanipur, 2007).

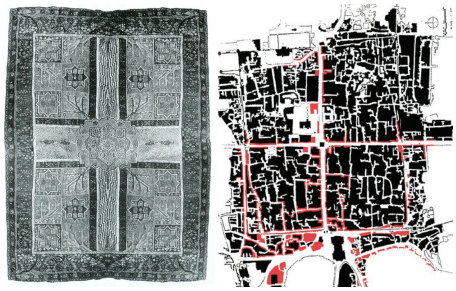
[1]Examples of the cosmic form can be observed in cases of Roman and Middle Eastern cities and in ancient cities of America (Tenochtitlan and the Mayan cities), China (Han and Ming dynasties), India (Moghul dynasties and other medieval cities), and Vaastu Purusha Mandala of the Vastu Shashtra, an ancient Indian doctrine on building human settlements.

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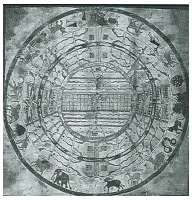
Figure 3.1: Examples of cosmic form archetypes



Purusha: The Cosmic Man; Vastu-Purusha-Mandala: 64, 81 squares
Jaipur City Plan, India, based on the cosmic model



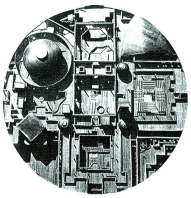
The Char Baugh: the mythic Garden of Paradise
Old City Vadodara, India, based on the cosmic model



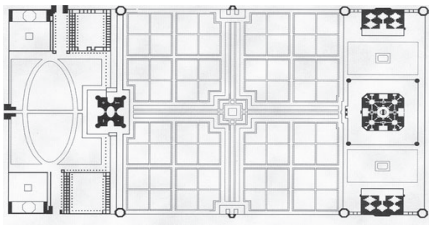
Jain Cosmograph



Sri Yantra

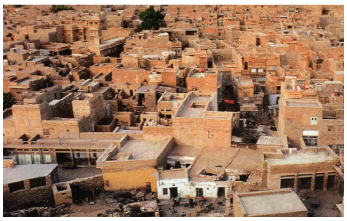


Vidhan Sabha, Bhopal, India
based on the cosmic model



The Taj Mahal, India, based on the cosmic model

Figure 3.2: Examples of traditional form archetypes







Traditional (Old) Cities of Rajasthan, India







Traditional (Old) Cities of Gujarat, India





Traditional (Old) City of Srinagar, India



Gangtok, India

The traditional forms, on the other hand, developed in response to the local context and conveyed harmony with regional lifestyle and socio-cultural or religious aspirations of the individual and community, serving both the physical and spiritual needs of people on all scales (Doshi, 1997). External influences were gradually accepted and assimilated to sustain local identities (ibid, 1997). Despite this, the

traditional forms[2] were later viewed as chaotic and disordered due to their obvious geometric irregularity (Karimi, 1997) and hence, in many cases replaced by modern forms. The traditional forms however, are now being revived back for their human scale and inherent sustainability (for example, the 'New Urbanism' which aims at revival of our lost art of place-making & building communities).

Figure 3.3: Informal settlements in Ahmedabad (above) and Guwahati (below) representing traditional form archetypes



Figure 3.4: Historic core of Ahmedabad, India representing Traditional Form archetypes



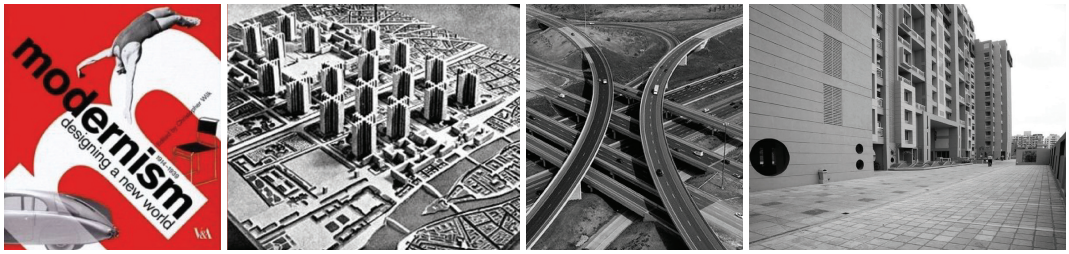
ii. **The Modern forms**: The modern forms[3] were majorly an outcome of the optimistic thinking of the great shapers of the (early to mid) 20th century who, as a response to the crises of industrial capitalism, believed that a rationally planned environment will lead to a more ordered and efficient society (Holston, 1996). Such a thinking, driven

[2] Examples of the traditional form is reflected in most historic cores (medieval cities of Europe and Asia) but also contemporary spontaneous slums found in most parts of the developing nations (Turner, 1976; Kellet and Naiper, 1995; Rapoport, 1988) (Appendix-4a).

[3] Sir Ebenezer Howard's Garden City (1902), Le Corbusier's Ville Radieuse (Radiant City—1927 and Frank Lloyd Wright's "Broadacre City" (1952)

by the notion of depopulating congested, polluted and crime-ridden industrial cities in need of the order and functionality of the formal planning for a better utopian living (Nickerson, 2010), was however, gradually suppressed in favour of designer's authorship and iconographic decision making. There slowly grew an assumption that cities are in equilibrium and can be realised as a blueprint of an idealised end-state through the top-down planning processes. The resultant forms, propagated by new technological innovations were based on the concept of the city as equivalent to a machine favouring efficient circulation of private automobiles which manifested as a 'universal' typology with little or not consideration to diverse regional, social or cultural contexts. This further led to the trend of suburbanisation[4] and urban sprawl and had a lasting effect on urban form making as it viewed separating structures by function (zoning) as the most rational way of ordering space.

Figure 3.5: Examples of modern form archetypes



Le Corbusier's vision for 20th Century modern housing



Developments based on Modern or Machine Model at different locations in India.

Machine or modern forms that saw their beginning in the 1920's, came to dominate urban development worldwide and since past few decades, have also become a common feature in developing nations such as India (see for example urban development trends in India). However, such forms have been criticised by contemporary thinkers as being mechanical and soul-less since the realisation that their attributes such as efficiency, functionality, uniformity and mass production have led to a process of uniformity, homogenisation and loss of sense of identity and belonging (Doshi, 1997; Correa 1989; Holston, 1989).

[4] Defensive or gated communities, as part of the trend of suburbanisation have been characterised with homogeneity in socio-economic class and based on the creation of self-contained, exclusive communities with privatised amenities, services and administration to which access is highly restricted. The age of modernity and individualism which encouraged the "pursuit of utopian aspirations through privatisations of public life" (McKenzie 2003, p.3) have transformed urban environment with their different characteristics in which social segregation and identity features have come to debate.

iii. **The New Sustainable forms**: From a contemporary urbanist perspective the above discussed modern or machine forms are claimed to have significant shortcomings. Such functionalist analogy is considered misleading as unlike machines; cities are rarely built to order or equilibrium end state but instead are outcomes of successive adaptations to differing functions (Mehrotra, 1990). Early commentators like Patrick Geddes (1915), Jane Jacobs (1961) and Christopher Alexander (1964) amongst others started questioning the modern forms of cities as proposed by the formal planning system and began to develop the idea of cities as evolving organisms.

The fact that real life complexity went far beyond the hierarchical and functional organisation of activities in cities was brilliantly explained in Alexander's work titled 'A city is not a tree' (1966) and later, in his seminal work 'A Pattern Language' (1977). American activist Jane Jacob's book 'The Death and Life of Great American Cities' (1961) was the first to criticise the principles and objectives of the modernist city planning and rebuilding the post war US that had spread in other continents. Her concepts of city density, diversity, walkability and 'eyes on street' along with the works of others discussed above, influenced a number of planning movements like the New Urbanism, Compact City, Sustainable Communities, etc (Table 3.1) that now form the basis for several planning theories promoting sustainable urban development.

Table 3.1: The active and pioneering reforms of sustainable urbanism

Congress of New Urbanism (1993)	**Design Principles**
CNU stands for the restoration of existing urban centres and towns within coherent metropolitan regions, the reconfiguration of sprawling suburbs into communities of real neighbourhoods and diverse districts, the conservation of natural environments, and the preservation of our built legacy.	Walkability
	Connectivity
	Mixed-Use & Diversity
	Mixed Housing
The CNU Charter advocates	Quality Architecture & Urban Design
neighborhoods should be diverse in use and population	Traditional Neighbourhood Structure
communities should be designed for the pedestrian and transit as well as the car	Increased Density
cities should be shaped by physically defined, universally accessible public spaces & community institutions	Green Transportation
urban places should be framed by architecture and landscape design that celebrate local history, climate, ecology, and building practice.	Sustainability

Compact City (1990s)	Design Principles
In late 1990s the concept of compact cities was created by the idea of sustainable urban planning in the European countries.	High residential and employment densities
	Contained growth, demarcated by legible limits
	Reduced car dependency & energy consumption
	Re-use of infrastructure & land
	Rejuvenation of existing urban areas & urban vitality
	High quality of life
	Preservation of green space
	A milieu for enhanced business and trading activities
	Mixed land-uses & population diversiity
	Contiguous development
	Multi-modal transportation, cycling, walking
	High degrees of accessibility & high open space ratio
	Unitary control of planning of land development, or closely coordinated control

Smart Growth Network (2002)	Design Principles
Smart growth is development that serves the economy, community, and the environment.	creating housing stock with choices,
	creating and promoting walkable neighbourhoods;
	encouraging stakeholder collaboration;
	fostering distinctive, attractive communities with a strong sense of place;
	making development decisions predictable, fair and cost effective;
	encouraging mixed land use;
	preserving open spaces, farmland and ecologically sensitive areas;
	strengthening and directing development towards existing communities;
	taking advantage of compact building design.

Jabareen	Design Concepts of Sustainable Urban Form
The thematic analysis has identified seven concepts—repeated and significant themes of urban form	His study identified seven design concepts that are related to sustainable urban forms. The literature analysis showed that different combinations of these concepts producea number of distinguished urban forms. Eventually, four models of sustainable urban forms were identified.
Compactness	neo-traditional development (new urbanism)
Sustainable Transport	urban containment
Density	compact city
Mixed land-uses and Diversity	eco-city
Passive Solar Design & Greening	

The quest for sustainable form utopias, represents a generational shift in how human settlements are designed and developed. It is a powerful but invisible reform movement based on a general agreement that urban forms can improve sustainability yet; there is a disagreement about the optimal way to modify them to gain sustainability benefits (Breheny, 1992; Haughton and Hunter, 1994; Williams et al., 2000). There is also a difference amongst authors about the preferred type of detailed city structure, viz. linear, centralised & poly-nuclated urban forms, or some variation of the grid. Newton (2000) summarised the key alternative urban forms or 'archetypal urban geometries': the dispersed city, the compact city, the edge city, the corridor city, and the fringe city. However, presently there is little hard evidence in terms of urban sustainability to unequivocally support one theoretical urban structure over another (Jenks and Burgess eds., 2000).

3.1.2 Compact City orthodoxy

Across the globe, there is a growing awareness of, and concern about, the development of urban form, especially sprawl, which is seen as the combined effect of growing affluence, changing lifestyles and the advance in personal automobile mobility that shaped the dispersed forms of the modern cities (Newman and Kenworthy, 1998). The sprawl has been associated with a variety of negative outcomes leading to further environmental, social and economic impacts such as issues related to health and social fragmentation, increased cost of city services as well as environmental degradation (Bertolini et al., 2008; Garling & Schuitema, 2007, Burchell *et al.*, 2002). Much research has therefore, been conducted on urban models (New Urbanism, Compact City, Urban Containment, Eco-City and Smart Growth) and their components (high density, diverse mix of uses, sustainable transport, etc) as design criterions for new forms that promote sustainable development in response to the negative effects of sprawl. The outcome of this has been the advocacy of urban 'compaction'[5] and 'intensification' as two of the most common recommended solutions to meeting several broad goals in areas of energy efficiency, environmental sustainability, as well as health and social outcomes (Howley *et al.*, 2009; Dieleman & Wegener, 2004). In the Western context, the compact city ideology is embodied in

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[5] Compaction can be described as densification and mixing of land uses so as to intensify the functions of existing urban areas in an effort to conserve the rural hinterland (Gopal and Nair, 2014).
According to Burgess, (in Jenks and Burgess, 2000) the compact city approach is "*to increase residential densities; to intensify urban economic, social and cultural activities and to manipulate urban size, form and structure and settlement systems in pursuit of the environmental, social and global sustainability benefits derived from the concentration of urban functions*".

planning policies and urban design theories as the 21st century utopia for sustainable cities. Such an approach is supported by several sustainable benefits described in table 3.2 & 3.3 however, at the same time, there has also been some conflicting arguments and research outcomes regarding the merits of compact cities. To this, Neuman (2005) refers as 'compact-city paradox' in which lower density areas are associated with higher-levels of liveability, whereas higher densities are seen necessary to meet sustainability goals (Wiersinga, 1997).

Table 3.2: Sustainable urbanism reforms and sustainability benefits

Various themes have been incorporated in SUSTAINABLE URBANISM REFORMS				
NEW URBANISM	SMART GROWTH	COMPACT CITY	ECO-CITY	SUSTAINABLE COMMUNITIES

Sustainability Benefits		
ENVIRONMENT	SOCIAL	ECONOMIC
resource efficiency by reducing travel, encouraging walking, cycling and use of public transport	better social cohesion, interaction and cultural development	economic viability by reducing infrastructural costs per capita
sustainable use of land by reducing sprawl & preserving countryside and recycling urban vacant sites for new developments.	greater equity due to good accessibility to services and facilities for all sections of the society	optimum population densities to support local services and businesses
reduced environmental impact by incorporating green building codes	better quality environment leading to pride in place, sense of belonging and stewardship	
overall benefits leading to better health and quality of life		

Table 3.3: Characteristics of compact urban forms[6]

Compact City Characteristics
High residential and employment densities
Mix of land uses
Fine grain land uses (proximity of varied uses and small relative size of land parcels)
Increased social and economic interaction
Contiguous development (some parcels or structures may be vacant or abandoned
Contained urban development, demarcated by legible limits
Urban Infrastructure, especially sewerage and water mains
Multimodal transportation
High degree of accessibility: local/regional

[6] Although both urban compaction and sprawl are defined by a variety of characteristics (such as high urban density, open space protection, mixed land uses, revitalising urban cores and high use of public transit system) most of the researchers tend to use density alone as the independent variable (Burton 2000).

High degrees of street connectivity, including sidewalks and bicycle lanes
High degree of improvised surface coverage
Low open space ratio
Unitary control of planning of land development, or closely co-ordinated control
Sufficient government fiscal capacity to finance urban facilities and infrastructure

(Source: Newman, 2005, p.14-15)

The 'compact city' ideology turned orthodoxy has been often criticised and debated on empirical grounds and its relevance in different world context as evident from the discussions for and against compact city form (Frey, 1999; Jenks & Dempsey, 2005; Kaido, 2005; Jenks and Jones eds., 2010). The major issues with the compact city orthodoxy are:

i. *Contextuality:* issue of transferability of compact city model in different cultural and urban contexts with varying patterns of urbanisation and governance as well as different physical, economic, social and demographic characteristics of cities globally (Williams et al. eds 2000).
ii. *Rigidity:* issue of rigid application of Compact City model in all contexts rather than being a new approach to achieving sustainable urban development through spatial design.
iii. *Scale*: issue of spatial scales at which an urban form is measured as it might increase one aspect of sustainability on one scale while decreasing it on another.
iv. *Spatiality:* issue of expressing compact forms in formless statistical numbers (Kärrholm,2011) or concentric circles indicating the need for greater emphasis on the design qualities of sustainable compact urban typologies.

Table 3.4: Positive / Negative claims for influence of compact forms on social sustainability

Positive	**Negative**
more social interaction	poorer access to green spaces
increased community spirit	increased congestion and pollution
cultural vitality	poorer health
better accessibility to facilities	reduced living space
increased social equity	less affordable housing
reduced crime	crime and fear of crime
reduced social segregation	decline of community
lively and attractive	withdrawal from social contact & stress
reduced travel, in terms of journey length particularly by private car; encourages walking, cycling and supports better public transport, health benefits	social tensions & weakening social ties

The art of form-making, in the Indian context is becoming synonymous with the process of westernisation and new forms symbolise the achievement of modernity where most development is market driven catering to the urban elite and their modern lifestyles. In the present era of creating 'World Class' or 'Global Cities' every international 'ism' is being mirrored in the urban form production as a 'style', while traditional sustainability principles and cultural expressions seems to be fighting a losing battle (Doshi, 1997). Stressed under international sustainability commitments and rapid urban change the compact city orthodoxy is also being enthusiastically adopted in India, without practical strategies for its application (Gopal and Nair, 2014) and ignoring the potentials of indigenous typologies and practices (see for example Parameters for NMSH, 2011 in India). Despite its perceived benefits, the compact urban form, in both discourse and practice, has been less satisfactory, contradictory and complex (Jenks and Burgess eds., 2000; Williams et al, 2000; Karrhlom, 2009), further raising concerns about the validity and applicability of it in an essential different developing world context. Perhaps more important is the fact that, given existing urbanisation trends, it seems clear that 'compaction' and 'densification' of urban areas will remain essential components for Indian cities which will continue to see population growth in the face of limited resources and available land as well as issues related to already high urban densities.

Figure 3.6: An example of inner traditional core characterised by compaction and outer modern suburbs characterised by relative dispersion (Ahmedabad, India)



At the time, when urban policy in many countries has emphasised compact-city and higher-density urban form as a means of reaching goals of sustainability (Dieleman & Wegener, 2004), environmental and economic aims have frequently been emphasised in urban densification however, there has been mixed conclusions on its social and

community impacts. The evidences about the influence of urban forms on social sustainability are complex and difficult to achieve (Jenks & Jones, 2010) and therefore, the link between urban form and social sustainability has been the subject of only a limited number of studies (Talen, 1999; Bramley *et al.*, 2009). Most research in this context has been in the comparison of neo-traditional (new urbanism) forms with typical suburban form (Brown & Cropper, 2001; Kim & Kaplan, 2004; Podobnik, 2002; Mason, 2010) or on the differences between low and high-density neighbourhoods (Leyden, 2003; Talen, 1999; Yang, 2008) set in the western context. There is also a vast body of literature and empirical evidences on connections between urban form and physical (Bauman et al., 2002; Owen et al., 2004), as well as urban form and mental health (Hessler *et al.*, 1971; Handy *et al.*, 2002). However, there is little evidence focusing on the relationship between different components of urban forms and various aspects of social sustainability in a comprehensive manner especially in the Indian urban context[7] (table 3.5) thus, indicating the need for further empirical research.

Table 3.5: Review of empirical evidences for influence of urban forms variables on some aspects of social sustainability

Authors	Relationship Study	Outcomes
Kim & Kaplan (2004)	new urbanist (nu) vs classic suburban (cs) neighbourhood location: Maryland, USA.	▪ (nu) showed significantly higher-levels of chance encounters between resident and participation in community activities, however there was no statistically significant difference between interactions with next-door neighbours ▪ natural features and open space along with building design, and overall layout were reported as important for sense of community ▪ survey measured perceived importance of urban form variables on the sense of community of residents ▪ control for socio-demographic factors was not observed.
Brown & Cropper (2001)	new urbanist (nu) vs cul-de-sac suburban (cs) neighbourhood location: Utah, USA.	▪ (nu) showed significantly higher-levels of social capital and willingness to improve the community although no significantly higher 'sense of community was observed ▪ smaller plot sizes, narrower streets, front porches, rear garages increased interaction among the neighbours ▪ control for tenure and pre-existing ties was observed but not for socio-demographic factors.
Leyden (2003)	characteristics that make the area more 'walkable' and social capital location: Galway, Ireland, UK.	▪ mixed-use rated as more 'walkable' and showed higher-levels of social capital, even after controlling for other variables ▪ survey based on respondents' walkability rating, raised issues of validity and problems of causality.

[7] Two studies key related studies in the Indian context at neighbourhood scale are by National Institute of Urban Affairs (NIUA, 2011) comparing low, medium and high density neighbourhoods as well as by Bahadure & Kotharkar (2012) comparing six neighbourhoods with varying land-use mix. Some comprehensive studies conducted in the western context are Baum & Palmer (2002), Jackson (2003), Bramley *et al.* (2009).

Podobnik (2002)	new urbanist (nu) vs inner-city neighbourhood (in) vs classic suburban (cs) neighbourhood Location: Oregon, USA.	▪ form correlation with stronger social capital and sense of community outcomes ▪ (in) showed lower-levels of sense of community and social capital than the (nu), but higher than (cs) ▪ control for socio-demographic factors was not observed.
Yang (2008)	urban form variables (density, land use mix, and housing type) vs resident satisfaction location: Portland and Charlotte, USA.	▪ inconclusive results; mixed land use and higher-density correlated to stronger resident satisfaction in Portland, but the reverse was true in Charlotte ▪ differences probably due to the 'quality' of the high-density neighbourhoods in the two cities ▪ control for socio-demographic was observed.
Baum & Palmer (2002)	urban from variable vs social capital location: Australia	▪ highlighted perceived importance of community centres, local shops and cafes (termed 'third places') as spaces for community interaction.
Pendola & Gen (2008)	high and low density neighbourhoods location: San Francisco, USA.	▪ neighbourhoods with a local main street (with local neighbourhood shops and amenities) displayed higher-levels of social capital ▪ other conclusions: ▪ one inner-city area had a density level that was *too* high to foster community ▪ the urban form of the neighbourhoods matters beyond simply the density level ▪ control for socio-demographic factors observed.
Jackson (2003)	detail urban form variables vs social capital and health	likely links between ▪ higher-floor living and social isolation (Lindheim & Syme, 1983), ▪ narrower streets, sidewalks, and smaller lots with increased opportunities for social interaction (Berman, 1996), ▪ human-scale urban design with sense of community and social capital (Kunstler, 1998), ▪ types of green space with community and health benefits (Jackson, 2003).
Mason (2010)	urban form variables (traditional street pattern, cul-de-sac streets, existence of sidewalks and local parks or open space) vs community-level trust (as an indicator of social capital) location: 34 neighbourhoods in Boise, Idaho, USA.	▪ higher social capital (and community trust) was associated with the existence of sidewalks and with nearby parks or open space, presumably giving more opportunity for social interactions ▪ contrary to claims for new urbanism, cul-de-sac streets were associated with the highest level of social capital, although traditional grid streets still displayed higher-levels than curvilinear ▪ control for socio-demographic factors but density aspects was not considered.
NIUA (2011)	low, medium and high density neighbourhoods location: Rajkot and Faridabad, India.	▪ qualitative analysis showed middle and lower density neighbourhoods demonstrate greater social sustainability than high density neighbourhoods ▪ may have been dependant on the socio-economic mix of residents ▪ poverty more usually than not had an overriding effect on tenets of urban form ▪ services like markets and religious buildings played a significant role in social and community life.

(Bramley *et al.*, 2009)	high-low density neighbourhoods vs sustainability of community & equity locations: neighbourhoods 5 cities in the UK.	▪ residential satisfaction, stability, and perceived quality of the neighbourhood environment negatively correlated with increased density ▪ social interaction and group participation improved at medium densities and declined again at the highest density levels ▪ beyond a certain density level, "the relationships are either different or not apparent at all" and differences in other factors, such as the 'building forms' may have impact (Bramley *et al.*, 2009, p.2139) ▪ existence of a garden associated with higher-levels of social interaction and neighbourhood attachment at all levels of density, whereas living on higher floors showed negative effect ▪ control for socio-demographic factors was observed.
Bahadure & Kotharkar (2012)	six neighbourhoods with varying land-use mix location: Nagpur, India.	▪ neighbourhoods with a balance of the amenities and infrastructure facility, mix of land uses and mix of housing typologies were preferred residential options.

3.2 Comprehending urban form

3.2.1 Meanings, scales and socio-spatial attributes

The concept of urban form is important to consider as it encompasses a number of critical issues relevant to sustainability of a city and therefore, can aid urban design and planning processes. Yet, it itself, urban form is a contested term (Landman, 2003) and its definitions varies to a great extent in the literature. The term, in general, is used to describe a city's physical characteristics. Kevin Lynch (1981, p.47) defines urban form as "*the spatial pattern of the large, inert, permanent physical objects in a city*". In reference to Lynch's definition, Jabareen (2006) argues that, the form is a result of aggregations of more or less repetitive elements (generating spatial patterns) that have strong similarities and can be grouped into concepts. Such elements of concepts might be overall shape and size, urban grains, street patterns, urban blocks, aesthetic design, typical spatial configuration, layout and more. They can also be seen as a composite of characteristics related to land-use patterns, transportation systems and design characteristics (Handy, 1996). Dempsey et al. (2010) however, asserts that the concept of urban form does not simply imply to physical features but also encompasses various non-physical aspects and can therefore, be viewed as an integration of urban physical attributes (geometric shape, size, materials) and content (uses, activities, impressions).

Anderson (et al., 1996) further identifies urban form as '**the spatial pattern of human activities at a certain point in time**'. Such a definition highlights the fact that it may be difficult to conceive of 'space' without human or social content and equally to conceive of human society without a spatial component (Carmona et al., 2003 p.106). Whilst the dynamics of urban spaces are a product of social interactions (between people, institutions etc.), spaces also create distinct social identities. This relationship therefore,

can be seen as reciprocal (spaces are formed to support the social activities at the same time spaces are appropriated by social activities) and dynamic (all these activities have temporal dimension and this relationship is continuously evolving and changing with time and context). On these bases, urban form may also be envisaged as the geometry of socio-spatial continuum in which, individual elements, with both physical and social dimensions, are combined progressively through their interrelationships shaping complex combinations (Madanipour, 1996).

Urban form has remained a subject of continuous debate as to what they may encompass, how they evolve under different context and to what extent can they influence sustainability aspects. Yet a wide range of scholars agree that it can influence patters of human behaviour and social life hence, changes in the urban form may be planned integrally with the changes we wish to see in our social environment (Evans, 1998). An urban form can also be viewed from different geographical scales[8] of regional, country, metropolitan, city or neighbourhood (Kashem et al., 2009). Jan Gehl, in his book Cities for People (2010) discusses design of cities at human scale by analysing urban forms against social field of vision, emotions, communication and perceptions (Gehl, 2010, p.2-59). Focusing on the contributory factors of urban social sustainability he highlights scale as an important issue. A number of factors can relate to multiple scales for example, social cohesion is often discussed at a national scale (Penninx *et al.*, 2004), employment at city or district scale, while others such as social interaction and local environmental quality relate to activity and places on a local scale (Bramley and Power, 2009). Urban form is thus, a distinctly complex concept to define and measure since it involves a variety of physical and socio-spatial dimensions across a multitude of scales.

3.2.2 Components of urban form

To understand urban form better and study its relationship with social sustainability, it is necessary to comprehend what constitutes its basic elements. Cozen (1960) considered land uses, building structures, plotted patterns and street patterns to be the most important elements while, Jenks and Jones (eds., 2010) in their book 'Dimensions of a Sustainable City' identified density, land-use, transport infrastructure, layout and housing/building as the five broad and inter-related elements that make up urban form in a given city and are claimed to influence sustainability and human behaviour. Amongst all, the most commonly used, researched and debated component of urban form against various aspects of sustainability, is density (Jenks and Burgess eds., 2000; Williams et al, 2000).

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[8] A scale has been defined as "*different level of complexity of the components internally arranged to construct a whole*" Caniggia & Maffei, 2001 (1979), p. 245

Table 3.6: Components of urban form

No.	Components	Description
1	**Open Spatial-Network**	**the network of public open spaces** (not just spaces for outdoor sports and recreation but also everyday spaces such as streets, community squares and open markets.)
2	**Land-Use**	**the total of arrangements, activities and inputs that people undertake in a certain land cover type** (different functions of the built environment, mix of uses)
3	**Density**	**the number of people living in a particular area** (number of people per hectare)
4	**Blocks**	**the smallest area defined by spatial network** (space for buildings surrounded by streets or other open spaces)
5	**Built-Components**	**built components within the urban blocks that form physical containers or 'street-walls' of spatial-network** (attributed by orientation, frontage, coverage, enclosure, typology)

While the urban form of a city can be measured through various aspects, this research identifies the five key elements of urban forms that are theoretically relevant, are claimed to influence various aspects of social sustainability and for which data measurements would be available. An attempt is made to reach a balance between an exploratory examination of a wide variety of urban form characteristics and a focus on the most relevant and accessible variables. It is important to note that all the variables identified in table 3.5 are inter-related, scale specific and context dependent; and therefore may vary in the way they are perceived.

- **Open Spatial-Network**

The open spatial-network is the connection between the places as well as being spaces themselves. It includes all publicly accessible open spaces, comprising of not just places for outdoor sports and recreation such as playing fields, parks, community gardens and inland water bodies but also, spaces for public life and social interaction such as streets, squares, community courts and open markets. Such non-green open spaces are critical in providing both, everyday interaction and civic life as well as connectivity with the open green spaces, altogether forming a spatial network of open public spaces.

The open spatial-network have become a subject of renewed concern among design professionals and researchers for more than two decades (Mitchell, 1996; Madanipour, 2000) and may be studied as two broad component parts 1) streets 2) open spaces

Streets:

Streets are an important part of open public space in the city. They not only allow for movement but also account for a majority of the public realm (Jacobs, 1961; Southworth and Ben-Joseph, 2003) where the life of the city takes place (Kostof, 1991; Jacobs, 1961; Lofland, 1998). People depend on streets for functional, social and leisure activities, for

example travel, shopping, play, meeting, and interaction with other people, and in some cases even relaxation (Jacobs, 1961; Gehl, 1996; Carr et al., 1992; Lofland, 1998; Carmona et al., 2003). Unlike western countries with large public squares and plazas, streets have been key spaces for public life, processions and demonstrations in India's traditional urban areas. This may be embedded in the history of Indian cities which were formally ruled by princes and his officers, when as Miao (2001) argues, large public squares were not collectively needed by residents to discuss political matters. The notion of public spaces often emerged through tension between various socio-spatial organisations of different communities (known as 'jati' or 'kula') resulting in streets narrow enough to allow passage but not wide enough to allow encroachment. The width of the street was not based on a set norm but space usage, except for wide roads created for the king's procession (raja-marga) (Pattanaik, 2014. www.theindiancities.com). At present however, the traditional concept of 'social' streets is being replaced by roads in favour of automobile transport in addition to increasing volume of vehicular traffic imposing tremendous pressure on existing urban form along with pedestrian safety issues, congestion, air and noise pollution, further discouraging walkability[9] by choice in India's urban areas.

Street connectivity (or permeability) and integration characterised by the depth, directness and density of links, is important for effective working of an urban form. It has a renewed interest especially in the western context over past decade following the concerns about urban sprawl, global warming and the negative health and social effects of an automobile-dominated transportation system. A highly connected and integrated street network improves accessibility and route choices which in turn provides easy and direct access to destinations, creates accessible and resilient transportation system (TDM Encyclopedia, 2009) and encourages walking and cycling at local level (Dill, 2003, Frumkin et al., 2004) making outdoor activities more feasible to take place. In contrast, segregated street network, hinders equity objectives as it decreases economic and social opportunities for non-drivers and other segments of the society e.g. people with disabilities, under poverty and elderly, by limiting their transport options (Litman, 2014) and increasing the walking distances between destinations (Southworth, 1997; Randall, 2001). Neighbourhoods with higher street connectivity and mix of land-use are expected to promote social capital and a greater sense of community and involvement (Leyden, 2003; Talen, 1999) as well as decrease real and perceived crime (Jacobs, 1961) which, in

[9] Neighbourhood walkability has been defined as "the extent to which walking is readily available as a safe, connected, accessible and pleasant mode of transport" (the Mayor of London and Transport for London). It is a topic gaining in importance in both the sustainable planning and health fields, extends beyond pedestrian concerns, as the ability to walk in a neighbourhood indicates not only a type of mobility and means of travel but also a type of sociability between neighbours.

turn, contributes positively to mental health (Whitelaw et al., 2008). Physical health is improved due to environments that enable physical activities (Ding and Gebel, 2012).

Open Spaces:

Public open spaces are not just empty voids but spaces that bring about a number of social benefits. There are many epidemiological studies linking proximity of open space and levels of physical activity which suggest that people with access to quality green space are healthier as open spaces can promote mental (Whitelaw et al., 2008; Sempik *et al*., 2005) and physical well-being (Booth et al., 2000; Humpel et al., 2004), overcome isolation and improve social cohesion (CABE, 2009; Bell et al., 2008). Another key benefit, in addition to recreation, health and fitness, is their potential as a venue for social events and festivals which are an extraordinary testimony to religion in Indian life, the liveliness of Indian communities and the strength of popular artistic traditions. Local markets 'bazaar' and fairs 'melas' are also important social hubs. These spaces are a part of a neighbourhood's unique character and thus, can also shape the cultural identity and provide a sense of place for local communities. Neighbourhood open spaces in the form of community play-fields or 'maidans' provide opportunities for less formal but equally beneficial sports (Dunnett, et al, 2002).

Figure 3.7: Public open spaces



Open Market Spaces



Market Streets

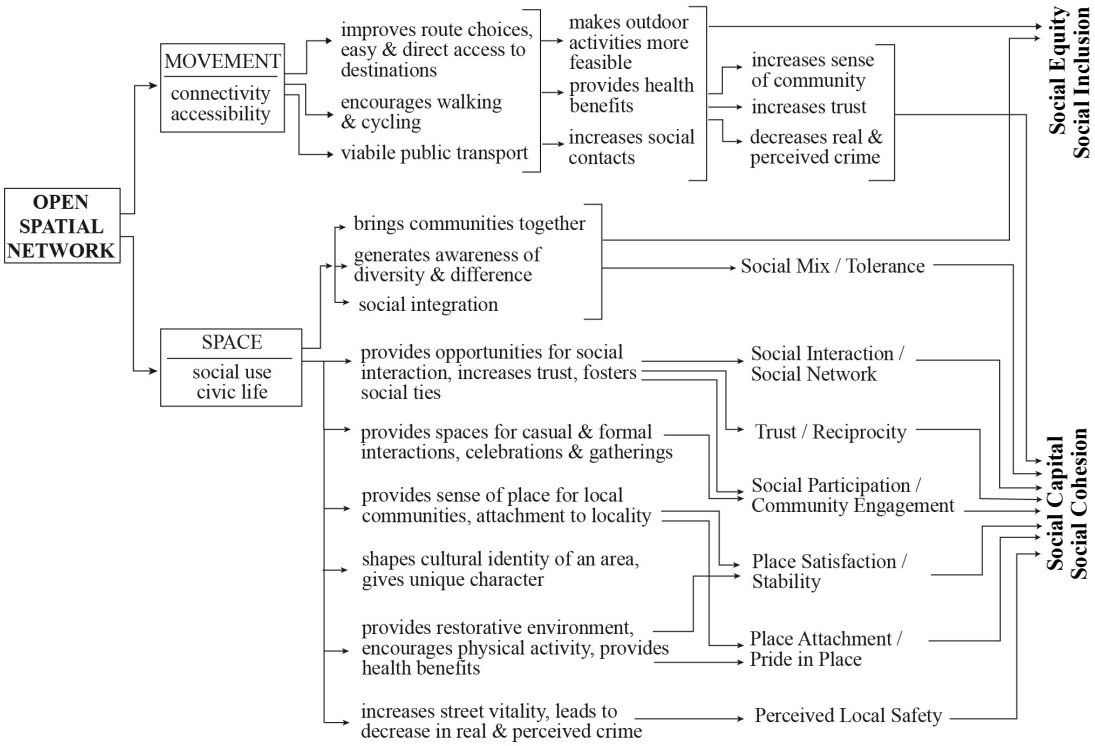


Street Festivals and Open Cultural Spaces

The social value of public open space, at neighbourhood scale, is wide ranging, as they can provide opportunities for outdoor social interaction, consequently building the residents' sense of community (Al-Hagla, 2008), contribute to people's attachment to their locality (Dines and Cattell et al., 2006) and foster social ties (Sullivan 2005, cited in Davies and Deaville, 2008) of a kind that have been disappearing in many urban

areas. Other benefits include learning awareness of diversity and difference thus generating social inclusion (Cohen et al., 2007, Kweon et al., 1998).

Figure 3.8: Relationship claims: Open Spatial-Network & Social Sustainability



With increased densities, the open spaces in India are becoming scarce[10], increasingly privatised and threatened under development pressures. The current development trends show construction of large residential enclaves with restricted access; self-sufficient environment with swimming pools, gymnasium, children's play area, parks, etc in addition to streets, sidewalks, and other amenities which are enclosed by barriers and high security entrance gates. The capitalist markets proclaim such residential urban forms to be safer and friendlier that tend 'improve the quality of life of its residents along with appreciation of their properties and status in the society' (Kakkar and Supriya, 2014). However, many issues including the privatisation of public space, social control, urban governance, social exclusion and social capital are of concern for those questioning this new phenomenon (Boyer, 1993; Crilley, 1993) and have impacts on society physically, politically and socially (Carvalho et al., 1997; Atkinson et al, 2004; Havermans & Smeets, 2010). The open spatial-network, may be influenced by quality standards which directly affect people's preference for outdoor activities (Gehl, 2010), however it is not empirically considered in this research. Lastly, open spatial-network, may be influenced by quality standards and other components of built environment which directly affect people's preference for outdoor activities like chatting with friends,

[10] Mumbai has 1.1 sq m of open space per person (Times of India, 2012)

walking, and other forms of interaction, users' perceptions about a space and their willingness to use it which decreases with decline in the quality of a space as it becomes perceived as neglected and unsafe (CABE Space, 2005). Although outdoor quality, gives a boost to optional activities claimed to invite substantial increase in social activities (Gehl, 2010), plays an important role, it is not empirically considered in this research.

- **Land-Use:**

Land-use has been defined as "*the total of arrangements, activities and inputs that people undertake in a certain land cover type*" (IPCC, 2000). Simply viewed as the different functions within the built environment, land-use plays at various spatial scales, and is crucial to the arguments about efficiency of a city as it determines the travel patterns, access to different functions and the activities it generates at different times of the day. This in turn, is perceived to have an overall impact on people's quality of life, vitality and safety in a particular neighbourhood as well as social equity dependent on the provision of accessible local and city facilities and services (Bahadure and Kotharkar, 2012).

The traditional pattern of mixed land-use[11](multiple compatible uses within a closed proximity) declined with the introduction of zoning regulations during the industrialisation in which land-uses that were deemed to be in conflict with the public's health, safety and general welfare were separated; thus, segregating urban areas on the basis of their uses. Despite the undeniable public health benefits that initially arose from the implementation of these land-use regulations, the rigidity of zoning ordinances essentially outlawed mixed-use developments and had far reaching implications on the structure of built environment and its urban forms (Grant, 2007).

Over the past several decades, mixed-use neighbourhoods have again taken a centre stage in the urban planning and real estate development worlds and have become a ubiquitous component of the underlying visions and ideals, be it 'Congress for the New Urbanism', 'Smart Growth', 'Compact City', or any other movement relating sustainable urban forms. According to Jane Jacobs (1961) dense, mixed-use environments are strong proponents for a safe and socio-economically active growth while strict zoning laws creates isolated environments.

The imperatives promoting mixed-use and high density neighbourhoods have thus, developed from core aspects of the urban sustainability agendas that also play a critical role in enhancing social aspects. Some of the claimed benefits of mixed land-use are:

i. *Promotes Social Inclusion*: makes every-day facilities and amenities more accessible to all, thus making the urban form more inclusive.

[11] for example, traditional medieval cities throughout the world contained a diversity of uses

ii. *Promotes Walkability/ Sustainable Transport*: provides life's daily needs within close proximity making them more accessible by foot and other alternative modes of transport (DCLG, 2006) which in turn increases social interaction and generates health benefits; mixed land-use also provides the critical market mass necessary to sustain a public investment in mass transit (Jones and McDonald, 2004).

iii. *Promotes Neighbourhood Safety / Vitality / Attractiveness:* provides a more secure environment by generating daytime/evening activities and increasing natural surveillance (Anastasia and Camille, 2009); also enhances vitality, perceived safety, attractiveness and quality of neighbourhoods (DoEn, 1995) and balance quality of life criteria with salary (E.A.Tombari, 2005); attracts pedestrians which helps to revitalise community life by making streets, public spaces and pedestrian-oriented retail become places where people meet.

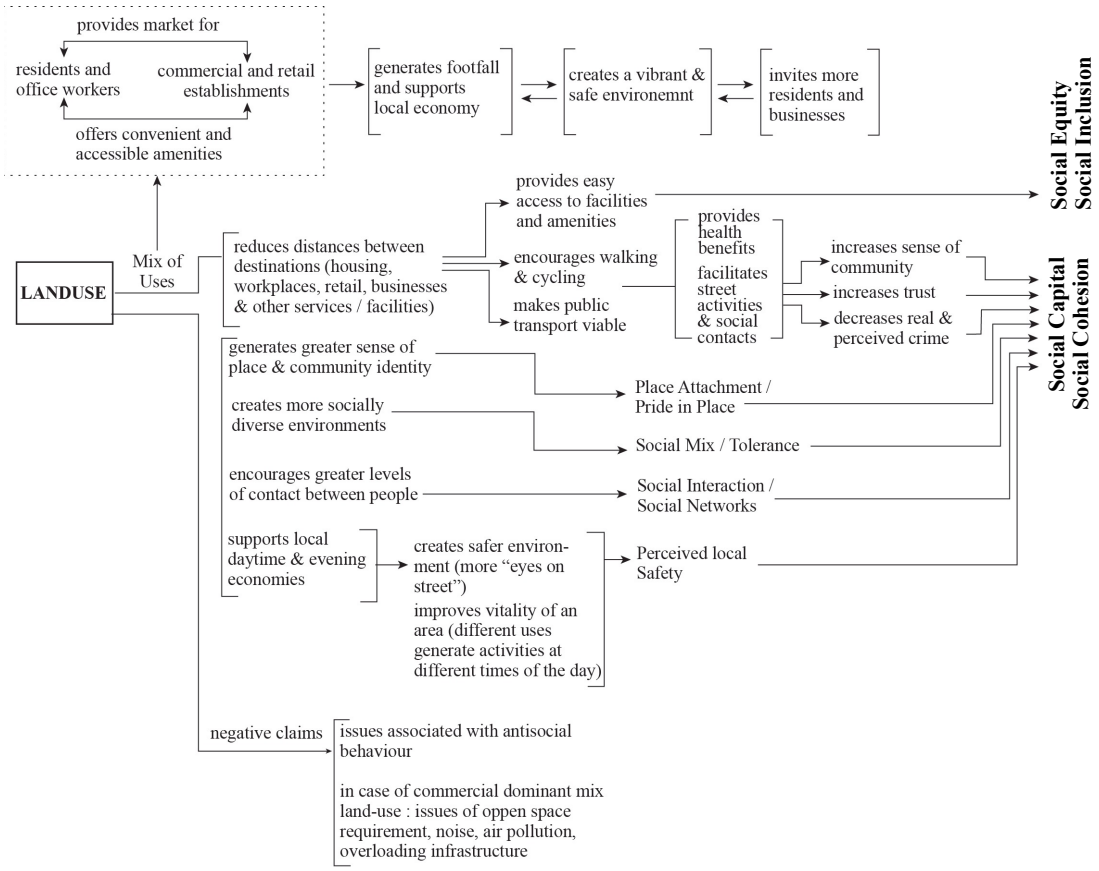
iv. *Promotes Sense of Place*: creates a greater sense of place and community identity, since people perform various activities (live, shop, play and/or work) in close proximity, increasing the probability "to meet, greet, smile & talk thus connecting the community" (Bahadure and Kotharkar, 2012).

Although mix of different land-use types may offer a number of benefits, conflicts of use often arise in practice for example, issues associated with antisocial behaviour (ODPM, 2003), open space requirements, noise, air pollution and overloading of infrastructure (Bahadure and Kotharkar, 2012). There are also concerns amongst theorists about what is considered as a good mix of uses for example, Foord (2010) argues that despite the widespread policy agenda there is insufficient evidence to establish conclusively the positive impact of mixed-use environments on urban vitality, utility or social cohesion. Such poor understanding often hinders the policy development and implementation plans (ibid, 2010:50). Despite the fact that mixed land-use now underpin sustainable neighbourhood agendas (eg. in the UK; ODPM, 2003), evidence based concepts are neither reflected in legislation, nor in guidance which can inform the design, location and impact assessment of mix of uses (Porta et al., 2007). So far there are no planning use-class and therefore, no detailed standards on what constitutes a sustainable mix, at what scale, and with what combination of activities (Evans et al., 2005).

In India, effective land use planning suffers from conflicting regulatory structures (NIUA, 2012) and lack of clarity on the type of services and facilities to be provided at different scales, this calls further investigations into this essential component of urban form. Several cities in India are now formally moving towards mixed land-use from zoning inclined planning norms and master-plans yet, their implications on sustainable urban form are still unknown. The new trends are of exclusive residential out of town living and SEZs further contradict the concept of mixed land-use. Most cities also fail to take into account the possibility of providing services and facilities to residents vertically

thus, leading to more horizontal sprawl (NIUA, 2012). The concept of mixed land-use therefore is being well accepted in theory but shows several limitations in policy and practice in India.

Figure 3.9: Relationship claims: Land-Use & Social Sustainability



- **Density**

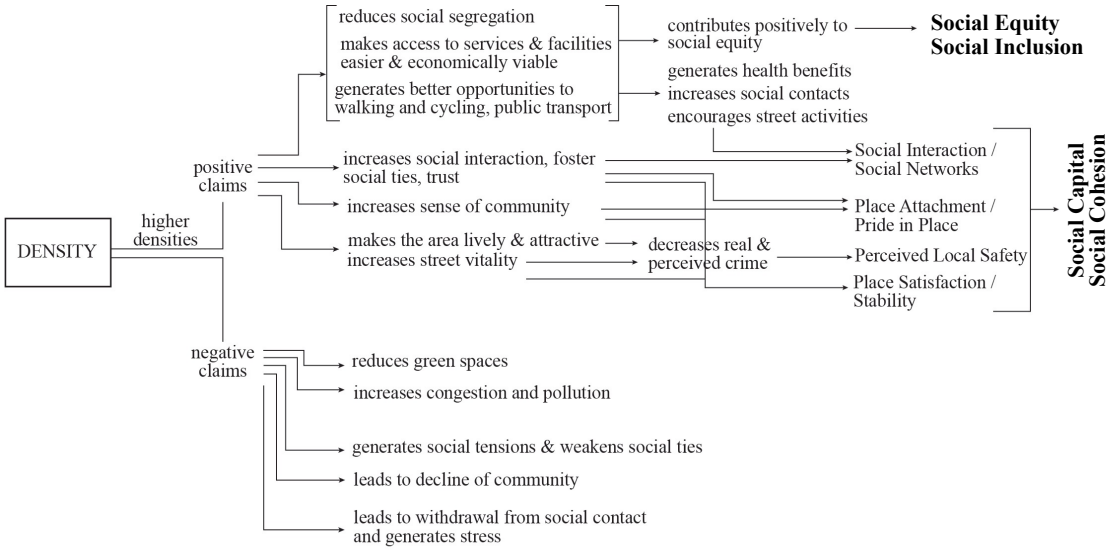
Density is a multi-faceted concept with a plethora of definitions that vary depending on the purpose. Most definitions are linked as they attempt to relationally identify low, medium and/or high density categories for planning purposes, however the precise meaning of such categories varies enormously both within and between countries (Williams, 2000; Jenks and Dempsey, 2005). Density is also assessed subjectively as socio-cultural associations depend on individual characteristics which may differ from resident to resident (Churchman, 1999 in NIUA, 2010).

In simple terms, density refers to the number of people (living) in a defined area and measured variously in different parts of the world as rooms per hectare, people or bed spaces per hectare and plot ratios at different scales such as (net/gross) plot density, block density, neighbourhood density and so on. In India it is usually calculated as

people per hectare or dwellings per hectare[12]. Khodabakhshi (2011) argues that a city's density is not just related to population per unit of area, but is also closely associated to integrity and uniformity of city structure and optimum usage of a city's potential.

The relation of density to sustainability or its role in sustainable urban form especially in debates about the 'compact' city' (e.g. Jenks et al. 1996) and literature on 'new urbanism' (e.g. Katz 1994; Calthorpe & Lerup, 2005) and other sustainable urban form ideologies have been researched the most as it has the potential to impact on all the dimensions of social sustainability (Bramley et al., 2009). While there is no consensus on what comprises the 'threshold limits' for density and densification, there is a general consensus that increase in average density of built environments (through efficient use the land or increase in the number of people or residences who inhabit a given area) leads to more sustainable outcomes. Claims have been made that higher densities make access to services & facilities easier and economically viable (Haughton & Hunter, 1994), contributes positively to social equity (Burton, 2000), social interaction and vitality (Talen, 1999, Jacobs, 1961), safety (Jacobs, 1961) sense of community (Nasar & Julian, 1995) as well as lowers the level of social segregation (Jenks et al., 1996, Burton, 2000, Williams et al. 2000). There are also many alternative arguments vis-à-vis very high densities leads to decline of community (Wirth, 1938) and weakening of social ties (Freeman, 2001).

Figure 3.10: Relationship claims: Density & Social Sustainability



Density has been an integral component of official urban planning policy in most nations and has an important role to play in terms of land-use planning (Srivastava Ray and Vaidya, 2011) and other benefits such as efficient use of land while curtailing sprawl,

[12] Note: Density is measured variously in different parts of the world as dwelling units per hectare, habitable rooms per hectare, people or bed spaces per hectare and plot ratios at different scales such as (net/gross) plot density, block density, neighbourhood density, etc.

reduction in private automobile transport, viability of mass transport and development of socially interactive environments with vibrancy of activities, economic viability, etc. However, in India post-independence urban planning, has either ignored density or intentionally discouraged it leading to either low-density sprawls or densification without the supporting infrastructure[13] (WWF, 2009 in NIUA, 2012). While most Indian city- planning norms do not incorporate density as an integral tool to promote sustainability, various national efforts such as JNNURM and new satellite development (for e.g. for metro cities such as Mumbai and Delhi) are promoting densification of both inner and outer-city limits, thus resulting in policy gaps (NIUA, 2012).

Cities in which compact city concept has been incorporated, incomplete implementation of policies and proposals have resulted in an inverted[14] compact city. For example, Delhi Development Authority's initiative to make Delhi a compact city has led to denser peripheries with gross residential densities of little above 123 persons per hectare (Kumar, 2000). Moreover, empirical research conducted in two cities of India conclude that for most aspects of social sustainability, medium-low density neighbourhoods appear best which is in contradiction to urban compactness or densification as socially sustainable (NIUA, 2010). It is also still debated whether the cities in developing countries like India, where higher density is already an integral component of urban form, will in practice benefit from further densification or compaction. Yet, there is a hope that cities with integral compact forms, but are likely to disperse further in the near future, may benefit from densification policies to retain its compact character in order to achieve sustainable urban development (Kotharkar et al., 2012).

- **Blocks and Built-Components:**

The 'block' and 'built-components' describe the spatial arrangement and configuration of urban forms at the human scale. The 'human' scale not the 'car' scale refers to the design of urban forms for human mobility and human senses (Gehl, 2010). The idea plays an important role within the theories of New Urbanism, which stress the importance of creating design that encourages an animated street life (Sander, 2002). Human-scale urban form has been associated with both psychological and behavioural impacts on resident experience. In their study on sense of community and the built environment, Kim & Kaplan (2004) argue that human-scale urban form encourages increased pedestrian activity as well as a stronger sense of community. Lindheim & Syme (1983) point to lower building heights as increasing residents' social capital,

[13] Note: for example to encourage the redevelopment of the low-rise, traditional dilapidated buildings in the city cores, the Government is providing additional floor-space index (FSI), as incentive.

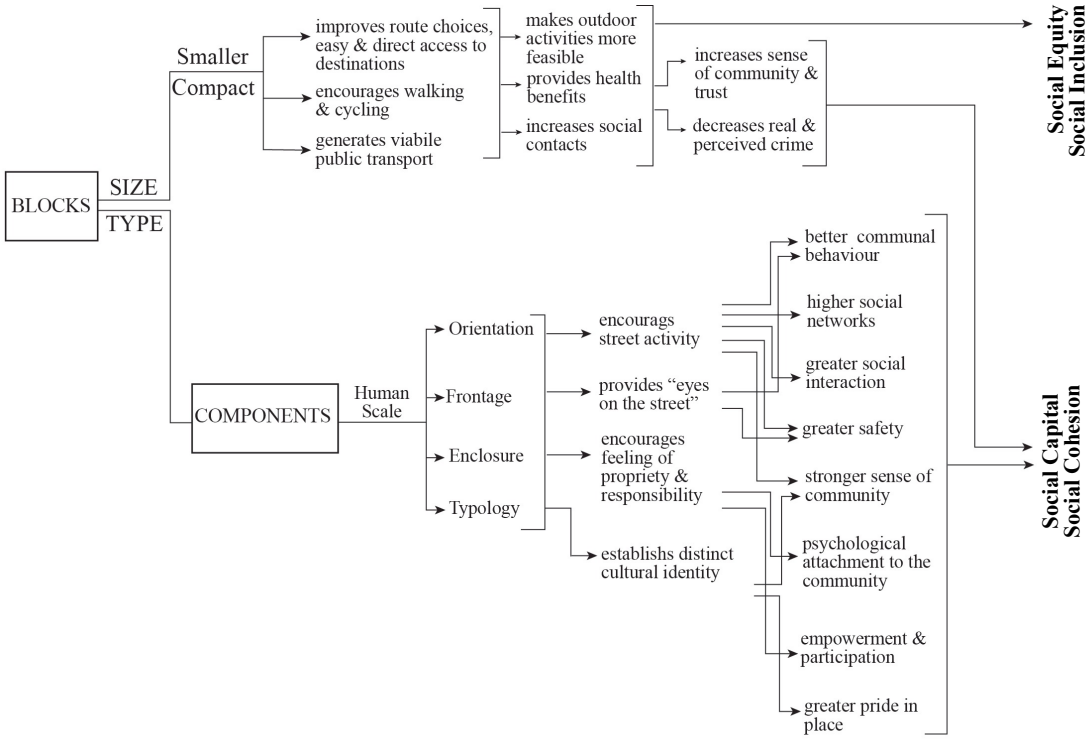
[14] Note: Urban densification policies are based on an assumption that densification will restrain development on the urban periphery and promote economic activity.

whereas Berman (1996) found that narrower streets and smaller land plots were significant in encouraging interaction. Variables in terms of street enclosure, types of building frontages and orientation as well as building heights and typologies have also been linked to both, social capital as mentioned above, and increased psychological attachment to the area (Lindheim & Syme, 1983; Gehl, 1996; Kim & Kaplan, 2004).

Blocks:

An urban block is the smallest area that is defined by open spatial-network. It can alternatively seen as a space for buildings surrounded by streets and/or other open public spaces. Krier (1978, p.44) defines an urban block as "primarily a plot of land defined all around by a multitude of planned and unplanned paths, roads and streets". He argues that it is either the instrument to form streets and squares or it results from a pattern of streets and squares. It is the most important typological element in the composition of urban spaces and a key element of an urban pattern (Krier, 1978). An urban block may be subdivided into any number of smaller plots of land which are usually built-up to varying degrees. Tuncer (2010) mentions that a city in which the building blocks are well developed bears a very high potential to become a well-developed city as well.

Figure 3.11: Relationship claims: Blocks & Social Sustainability



Neighbourhoods with smaller blocks and defined by building edges at all its sides as opposed to post industrial mono-functional super-blocks, offers greater choice of routes, creates a more permeable environment allowing high pedestrian movement. Smaller blocks also increase visual permeability improving people awareness of choices and

safety. Jacobs (1961) called for the "need for small blocks" and argued that long blocks make for "self-isolating streets" that restrict pedestrian choice and curtail economic activity throughout urban neighbourhoods. The size and type of an urban block therefore, affects the accessibility, legibility, walkability and activity of built environments which in turn affects the perception of safety, movement and social interactions and hence, the overall image of a neighbourhood. The Urban Design Compendium (2000) mentions that three things are critical in deciding an optimum size of the development blocks 1) ease of access; 2) ability to sustain a variety of building types and uses; 3) ability to change and adapt over time.

Built-Components:

The built-components or the building components form the physical containers or 'street-walls of the open spatial-network (streets and/or other open public spaces). The design, layout and siting of these built-components can increase the intensity of communal contact between the residents (Jacobs, 1961; MacDonald, 2005; Sander, 2002) which in turn is considered beneficial for social sustainability goals. The theory suggests that greater street orientation, active frontages, enclosure ratios and diversity in typology of buildings can facilitate social networks for the resident by encouraging more street activity, generally by other residents who perceive the area to be more friendly, communal or safe (MacDonald, 2005, p.13-37). Kazimee (2005) argues that dwellings that are strongly connected at street level allow the residents to extend their private sphere onto the street space. Such overlapping spaces encourage the social interaction as well as a psychological attachment to the community. The author further discusses the notion of the design of the 'dwelling margins' (or building setbacks) as being crucial to sustainability of community goals stating that, "*the defining qualities of these in-between spaces, and their character when spelled out correctly, can project a true extension of the inhabitant's personification where the primary communal/neighbouring contact can be initiated*" (ibid, 2005, p.3078).

The built-components creates zones of transition between the private (dwelling) and public (street) realms. This interaction between buildings and the street is important aspect of urban form that could relate to different aspects of social sustainability such as level of interaction, natural surveillance and sense of community (Kazimee, 2005, p. 3079). It often refers to the extent to which buildings or dwelling are directly connected to the street and implies the extent to which the private realm can interact with the public surroundings. Jacobs (1961) linked this to the idea of "eyes on the street" where neighbourhood design and street animation created an informal surveillance of the street and a sense of safety. She praised the benefits of more human-scaled, street-oriented urban form for its potential to increase social capital among residents as well as a stronger sense of community.

The four key aspects of built-components such as orientation, frontage, enclosure and typology are discussed below:

i. Orientation: The extent to which the built-components respond to the adjacent streetscape.
ii. Frontage: The extent to which the built-components creates active frontages (i.e. the degree of animation) and encourage residents to interact/use to the adjacent streetscape.
iii. Enclosure: The sense of enclosure as determined by the relationship between the height or the continuity of the built-components and the width of the adjacent street.
iv. Typology: The generic typology of built-components that forms the general whole.

Figure 3.12: Built-Components - case examples from "pols" of Ahmedabad in Gujarat



Building Line, Orientation and Frontage



Hierarchy of Spaces and Enclosure



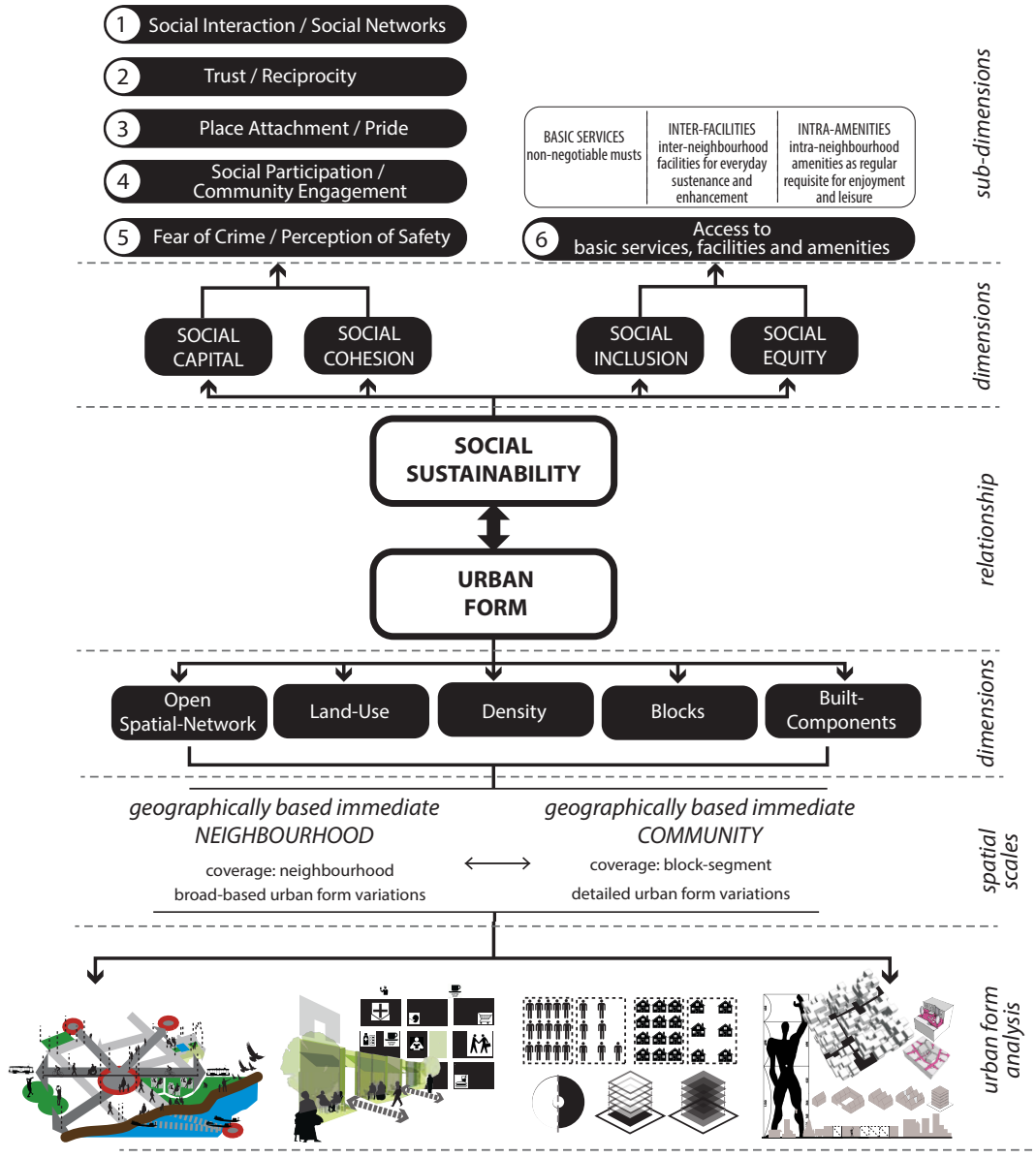
Overlooking Elements & Social Edges

It is important to note that all the identified components of urban form are inter-related and claimed to influence social sustainability to a certain extent; however literature review suggests there are only few studies where the claims are supported by empirical evidences. It has also been argued that urban forms cannot be considered sustainable if they are not acceptable to people as places to live, work, interact (Bramley et al . 2009).

3.3 Theoretical frameworks

The theoretical framework, defined as a network or a 'plane' of linked concepts (Jabareen, 2009), is a structure that identifies and describes the major elements, variables, or constructs that organise the study. Based on the detailed and critical review of literature, theoretical framework for assessing the relationship between selected urban form components and six social sustainability aspects has been established. This framework relates to the philosophical basis on which the research takes place, and forms the link between the theoretical aspects (reviewed in Chapter 2 and 3) and practical components of the investigation to be undertaken. The theoretical framework will therefore, have "implications for every decision made in the research process" (Mertens, 1998, p.3).

Figure 3.13: Theoretical framework assessing the relationship between urban forms and social sustainability (Also see, Appendix-1,2)



Chapter 4

CITY PROFILE OF GUWAHATI: Investigations into Morphological Transformations and Present Urban Forms

The city of Guwahati, with a long tradition of urbanisation, has seen its periods of growth and decline from being an important cultural, religious, economic and political centre to mere a war site. It was rebuilt during the colonial period and within a century, grew from a swampy settlement of mere 12,000 people (1911) into a vast urban agglomeration of nearly 1.26 million population (2011). Today, whilst this ancient "City of Eastern Light" has regained its importance as an urban centre, intense growth and alterations to the city form has led to several environmental and social threats. Despite the ancient existence and current vulnerability, Guwahati has remained the focus of little morphological research. This chapter therefore, presents a detailed profile of the city and sets the context for conducting empirical investigations on the influence of its urban forms on social sustainability discussed in Chapter 5. Based on the secondary data, it firstly, studies the growth and morphological evolution of the city. Secondly, it critically examines Guwahati in its present context as the city seeks to transform itself into one of the most admired, smart and sustainable cities in India. The study is supported with strong visual atlases which provides an empirical strength to this profile.

4.1 Urban Guwahati: an introduction

"Gohatti stands on the left bank of the Brahmaputra, on a plain elevated a few feet above the reach of the floods; the land gradually lowers as it retires from the river, till it becomes fit for rice cultivation, or sinks into jeels and marshes. This plain is bounded on the interior by a chain of pretty hills, stretching from N.E. to S.W. in form of a semi-circle; with its two promontories resting upon the river, while the river itself taking a bend concentric with the hills, cuts it out in the form of a crescent, and nearly at equal distances from its two horns, the town and station are situated. The town is of a very straggling irregular form, and almost every house is built of mats and bamboos…….During the splendour of the Assam Dynasty, Gohatti was one of the largest cities in the kingdom; its fortifications constituted the security of the State from the incursions of Moslems, and its Government was committed only to the sons of royalty. A small portion of its extent and grandeur now remains; its brick, its mortar and earthen-ware constitute a large portion of the soil, its numerous spacious tanks, are now choked up with weeds and jungle, or altogether affected by a false though luxuriant soil that floats on the stagnant water concealed beneath; the gateways of some are still standing; and the guns of others still lying upon the ramparts. Almost every hill around Gohatti is crowned with one or two little temples, all still well endowed, and in good repair; and inhabited by all the ministers and mercenaries of Hindoo religion. In the Zillah of Kamroop there are no less than 37 temples, all endowed"

(M'Cosh, 1837. Reprinted in 1975)

TH-1454_11610503

Guwahati, the capital city of the Indian State of Assam, is situated at 26°10′ North latitude and 92°49′ East longitude on the banks of the mighty River Brahmaputra. Positioned on an undulating plain with varying altitudes of 49.5 m to 55.5 m above Mean Sea Level (MSL) in the lower Assam Valley, the city is surrounded by hills on either side of the river and has large areas under water bodies. With a long tradition of urbanization, this ancient "City of Eastern Light" has seen its era of frequent rise and fall. Guwahati enjoyed an eminent position throughout history due to its geographical location serving not only as an important religious centre, but also as a vigorous port of trade and commerce, administrative headquarters and political hub. Its topography also made it ideally suited as a site of war especially during the period between the13th to 17th century AD and was completely destroyed during the Burmese War. The city was re-built when Assam came under British occupation beginning a formal planning history of Guwahati, whose growth triggered around newly laid transport and communication routes serving the Colonial industries. The city grew from a town of eight municipal wards within an area of 6.4 square kilometre in 1874 into a vast urban agglomeration covering an extended boundary of Guwahati Metropolitan Area (GMA) with 328 sq. km to accommodate 60 municipal wards.

Guwahati today, has not only regained its importance as a political and administrative centre but, is also a premiere city of the entire North−Eastern region of India in terms of its location, size, population, and transport connectivity, a major centre for industries, education and medical institutions as well as a potential gateway to South-East Asia. Despite its significance in the current context, intense and accelerated urban development is seen to unprecedentedly rise the city's environmental and social vulnerability. This phenomenon continues to occur undeterred by several planned efforts engaged in the post-independence city building including adoption of a number of City Master Plans since 1960's. As this process of rapid urban change in Guwahati continues to unfold, it gets critical to put the city's future developments on paths that are sustainable and human centric. However, in order to understand Guwahati as it is today and its future development pathways, it becomes important to understand the forces that shaped the city in the past. The study of history often yields clues to the future.

This chapter therefore, showcases a detailed profile of Guwahati. It investigates into the city's growth dynamics and characteristics of morphological transformations from mythology to modern periods. It then examines Guwahati as it stands today – a multi-layered, evolving urban agglomeration. The profile bears importance not only because the urban form histories of Guwahati have not been frequently researched despite its ancient existence, but also because at the time when the city faces greater challenges to make its rapid growth and transition sustainable, the exploration of modern day Guwahati is equally sparse. As the city prepares its revised Master Plan for the year

2025, seeks to transform itself into one of the most admired state capitals by 2025, competes for the Prime Minister's 100 Future Smart Cities by 2020 and hopes for a sustainable future; there is a clear need to understand the city's urban forms - past and present on which the future design and planning decisions may be made.

Figure 4.1: Positioning Guwahati in the geographical context of India

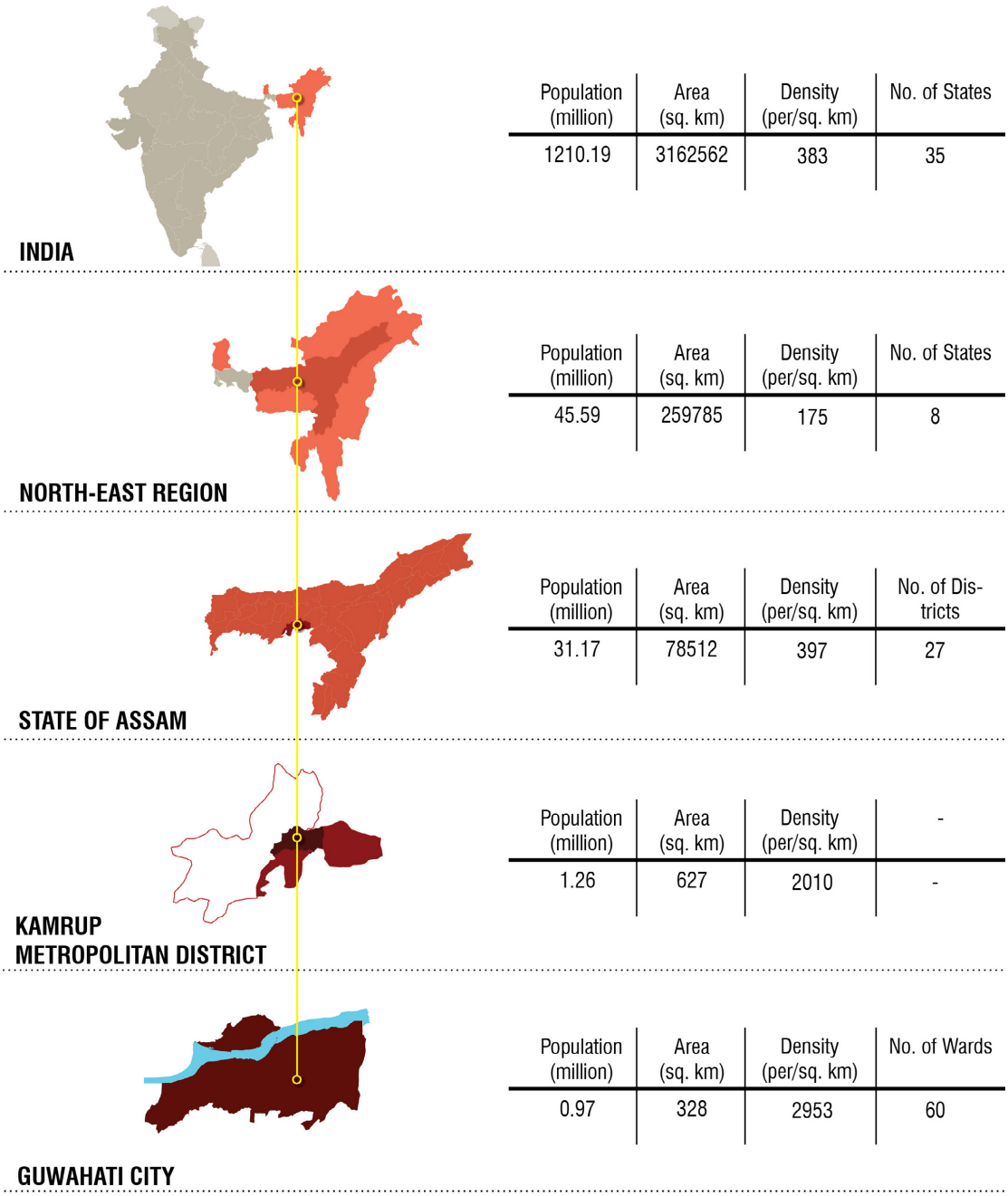
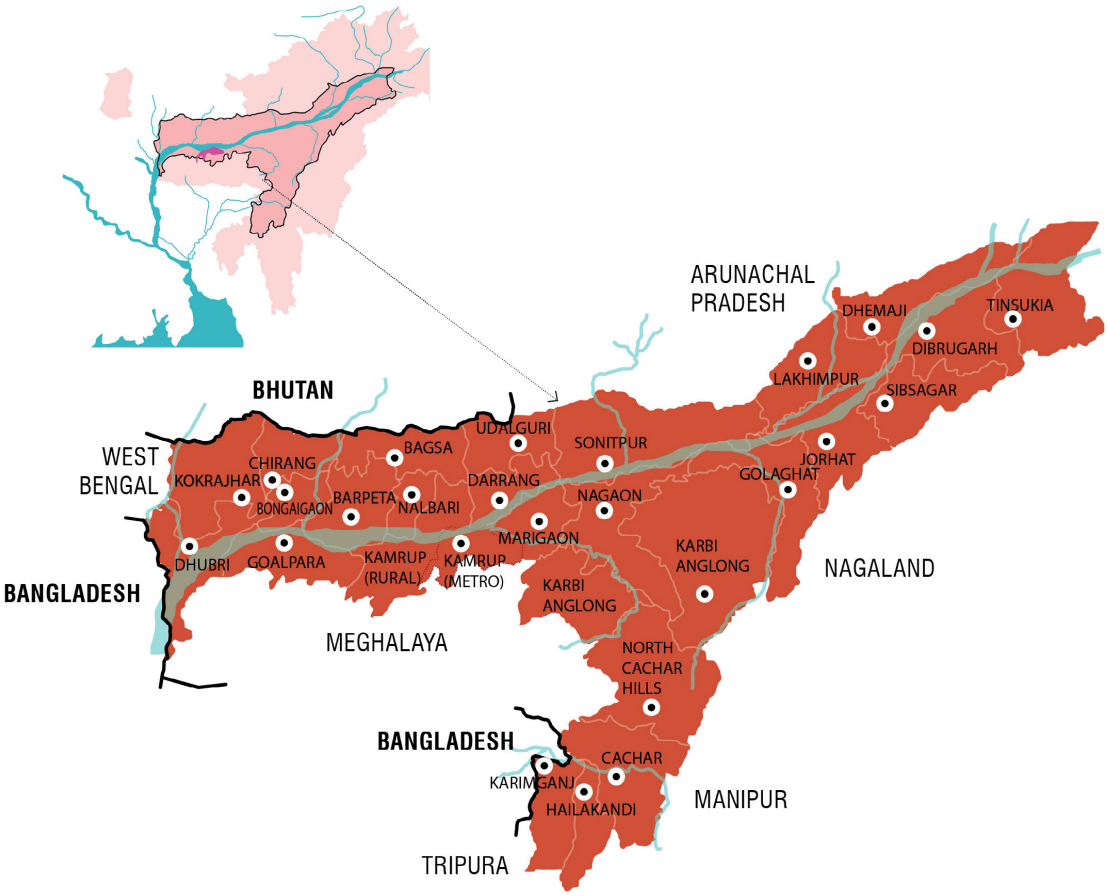


Figure 4.2: District map of Assam also showing neighbouring states and countries



This study covers a vast topic, and writing about it was not made any easier with a dearth of available literature and documentation on the city. It is based on exhaustive literature review of available secondary information in the form of valuable texts from Kamrup Anusandhan Samiti, District Library Guwahati, Assam State Museum, Guwahati University, Archaeological Survey of India (ASI) as well as primary sources such as interviews with historians, officials at Guwahati Municipal Corporation (GMC) & Guwahati Urban Development Authority (GUDA), Directorate of Town and Country Planning and collection of oral histories from a few selected original settlers of Guwahati. Review of existing policies, governance frameworks and Master Plans for the city also forms a key part of the city assessment in the present context. The study is supported with a series of maps depicting the city's morphology which gives an empirical strength to this profile.

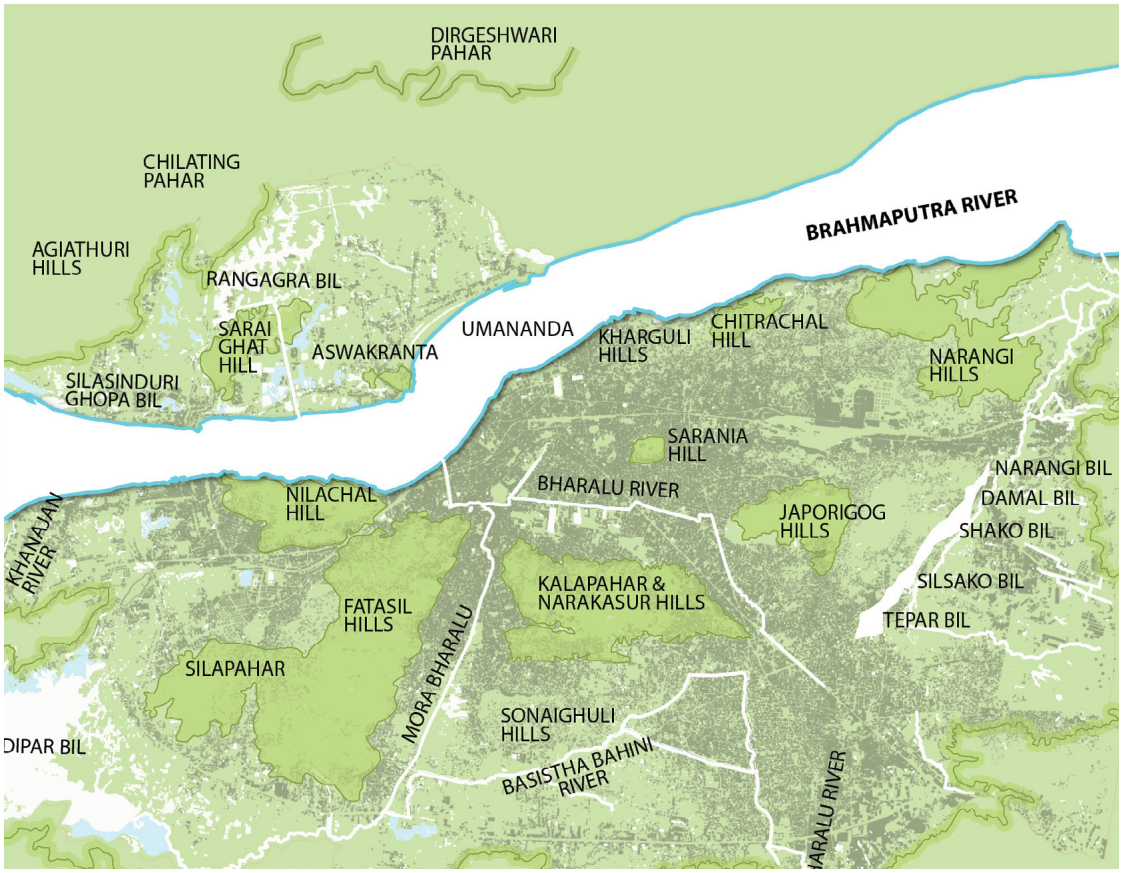
4.2 Guwahati in the context of its unique physiographic setting

The origin of the city of Guwahati dates back to ancient times when it was called Pragjyotishpura, the capital of Pragjyotisha. There are numerous interpretations associated with the origin and meaning of the name, and it is not easy to dismiss some of

them before we discuss the growth and morphological transformations of the place. It also seems critical to begin with an understanding of the unique physiographic setting of Guwahati which is a mix of plains, water bodies, marshes and hills. The evolution of the city has been commensurate with the evolution of these physiographic features and continues to impact the physical growth of the city making habitable land a highly contested entity.

According to Gait (1906), *Prag* means previous or eastern and *jyotisha* refers to a star, astrology or shining. The word *pura* refers to a city or an urban agglomeration. Hence the word Pragjyotishpura can mean 'the City of Eastern Astrology'. According to K.L. Baruah (2009), the Navagraha (nine planets) temple on the Chitrachala Hill, could have been the origin of the name Pragjyotishpura - the seat of astrology or astronomy in ancient India. Later it was also known as Kamrupnagara, the capital of Kamrupa. While the term Guwahati is also claimed to have derived from 'guva – hatta' which means a market place for areca nut (Das, 2007), it is also possible that Guwahati is a Sanskritised form of a pre-Aryan name meaning hill (goi) or mountain (go) and hatti (habitable place), i.e. a row of houses or dwelling place surrounded by hills and mountains (Chawdhury 1978 in Sharma, 2014). The various interpretations highlight the fact that Guwahati in the past had been a centre of urbanity and astrology with a unique physiography.

Figure 4.3: Map showing key physiographic features of Guwahati



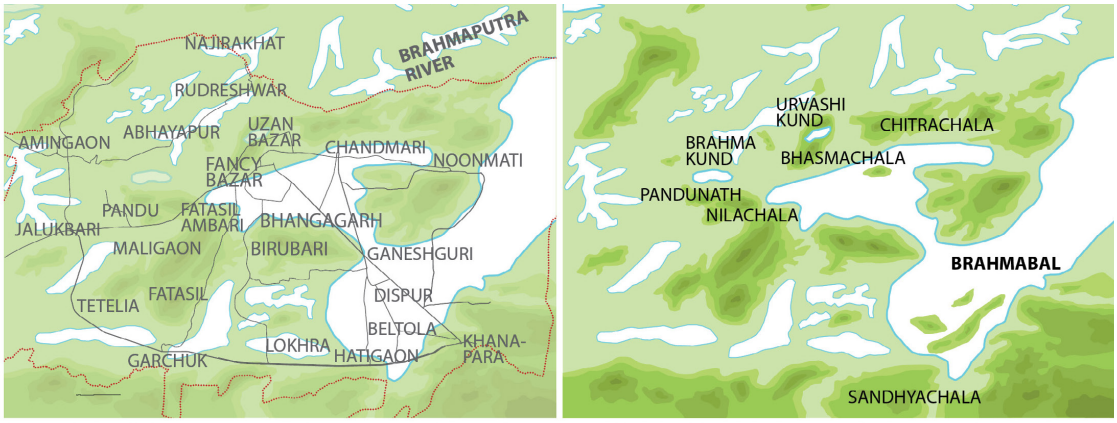
Guwahati lies on the banks of Brahmaputra River, which through centuries, has been the region's cultural and economic lifeline as well as a strategic channel of communication during the times of both peace and war. Today, the mighty river is narrowest at the point where the modern city of Guwahati is located. It bifurcates the city into two. The northern bank sits on the flat plain with vast open fields and swamps such as the Rangagara Beel and Phulung Beel. In contrast to the rural landscape of north Guwahati, the area to the south of the river consists of dense, vibrant, fast developing urban quarters. In addition to the river and its tributaties, Guwahati is dotted with a number of water bodies including tanks, wetlands or beels, of which Deepor[6], Bor-Sola, Sil-Sako, Bondajan are prominent. While detailing the physiographic evolution of the city is beyond the scope of this chapter, it is visually depicted in the maps (Figure 4.5) developed from the works of historian Pradip Sharma (2006, p.29-34).

Guwahati forms part of the Shillong Plateau and the isolated crop of hills that break the plains represent portions of this Plateau. There are three distinct plains, viz. North Guwahati, Beltola and Jalukbari-Azara plains. The city's earlier settlements developed within the crescent of the hills from the famous Nilanchal Hills in the West to the Fatasil, Kalapahar & Narakasur Hills, Sarnia Hills and Chitrachal to the East. The city further expanded to the South up to the edge of the Khasi and Jaintia Hills as well as the Japorigog & Narangi Hills to the East. North Guwahati too is bound by a semi-circular range of hills - Agiathuri Hills (W), Barkula Hill, Chilating Hill, Bhauni Hill (N-W) and the Dirgheshwari Pahar (N). On the southern part of North Guwahati town, on the bank of the Brahmaputra, are Manikarneshwara Hill and Asvaklanta Hill (Figure 4.4). Historically these hills on either sides of the river acted as a natural wall making the city eminently suited as defence capital.

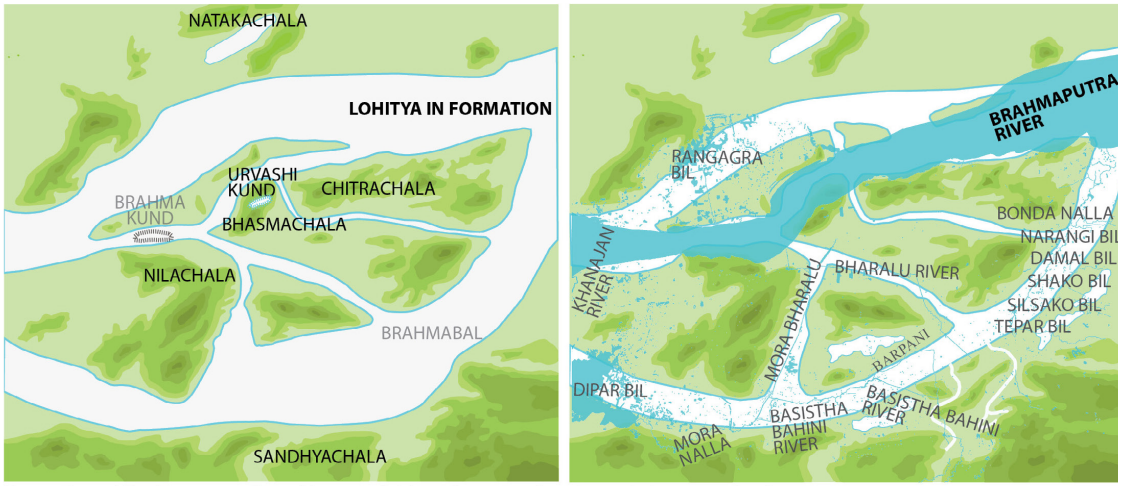
The urban landscape of Guwahati thus, displays several physiographic features such as hills and plains, river and riverine land, swamps, wetlands, tanks, forests and grasslands, which were once an integral part of ancient city but now seen as constraints to development. The complex and fragmented patterns of accelerated urbanisation in Guwahati has brought modification to natural land cover within the city. Despite clear demarcation in the present Master Plan for Guwahati, infringement of environmental sensitive areas and uncontrolled urban development, particularly construction activities on low-lying areas and steep hill slopes, outside the planning control, are seen as some of the major threats to the city, which is located in a high seismic activity zone (V) and prone to both floods and landslides (TERI, 2013)[1].

[1]With very high existing vulnerabilities as identified in the Climate Proof Cities- Synthesis Report for Guwahati by TERI, urban planning practices for the future may have major role to play in building resilience considering the present situation of construction on vulnerable sites in addition to the city's sprawl.

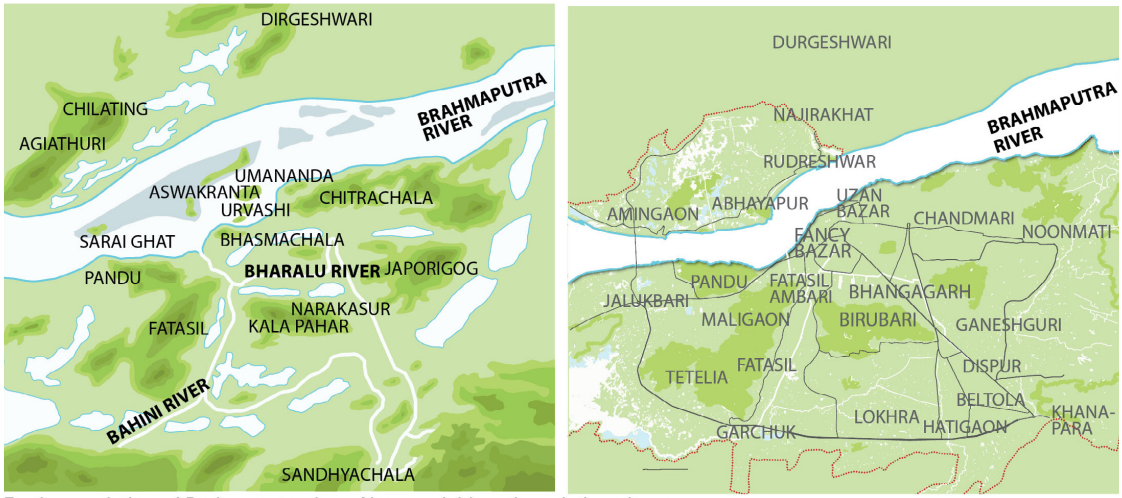
Figure 4.4: Evolution of Brahmaputra in the geographical context of Guwahati as depicted by Sharma (2006, p.29-34).



Brahmabal and its surrounding hills as described in Kalika Purana (51/89, 135-140). Also overlaid on the existing city map.



Formation of Brahmaputra river. Also overlaid on the map showing existing waterbodies.



Further evolution of Brahmaputra river. Also overlaid on the existing city map.

[Around 1st century AD, possibly the river Brahmaputra had a different channel or did not exist at all. The physiographic reference in the Kalika Purana (51/89, pp.135-140) describes about a big water body called Brahmabal which later evolved to become the river Brahmaputra. At the time of formation of the river, it flowed in two branches and Guwahati may have been in the form of a number of islands. The branches having dried off with time, the newly formed shallow stream of River Brahmaputra later became the key route of communication and international trade.]

4.3 Guwahati as it was: growth dynamics and morphological transformations

Contrary to the present day when urbanisation is more a socio-economic phenomenon, in ancient and medieval times it was generally a cultural phenomenon that often resulted from some political development. Guwahati, which was found particularly suitable to be the capital owing to its topography and location, had its fortunes closely associated to the states political significance (Figure 4.6) and the government in power, which in fact, reflected in its forms. This section describes the evolution of Guwahati from the point of view of urban growth and the resultant morphological transformations. It studies Guwahati through all the five stages of its history 1) Mythology, 2) Ancient Period (4th -12th century A.D.), 3) Medieval Period (13th to 18th century A.D.), 4) Colonial Period (19th to mid 20th century A.D.) and 5) Modern Period (mid 20th Century A.D. onwards).

4.3.1 Mythological (Epics and Puranas, 500BCE-500CE)

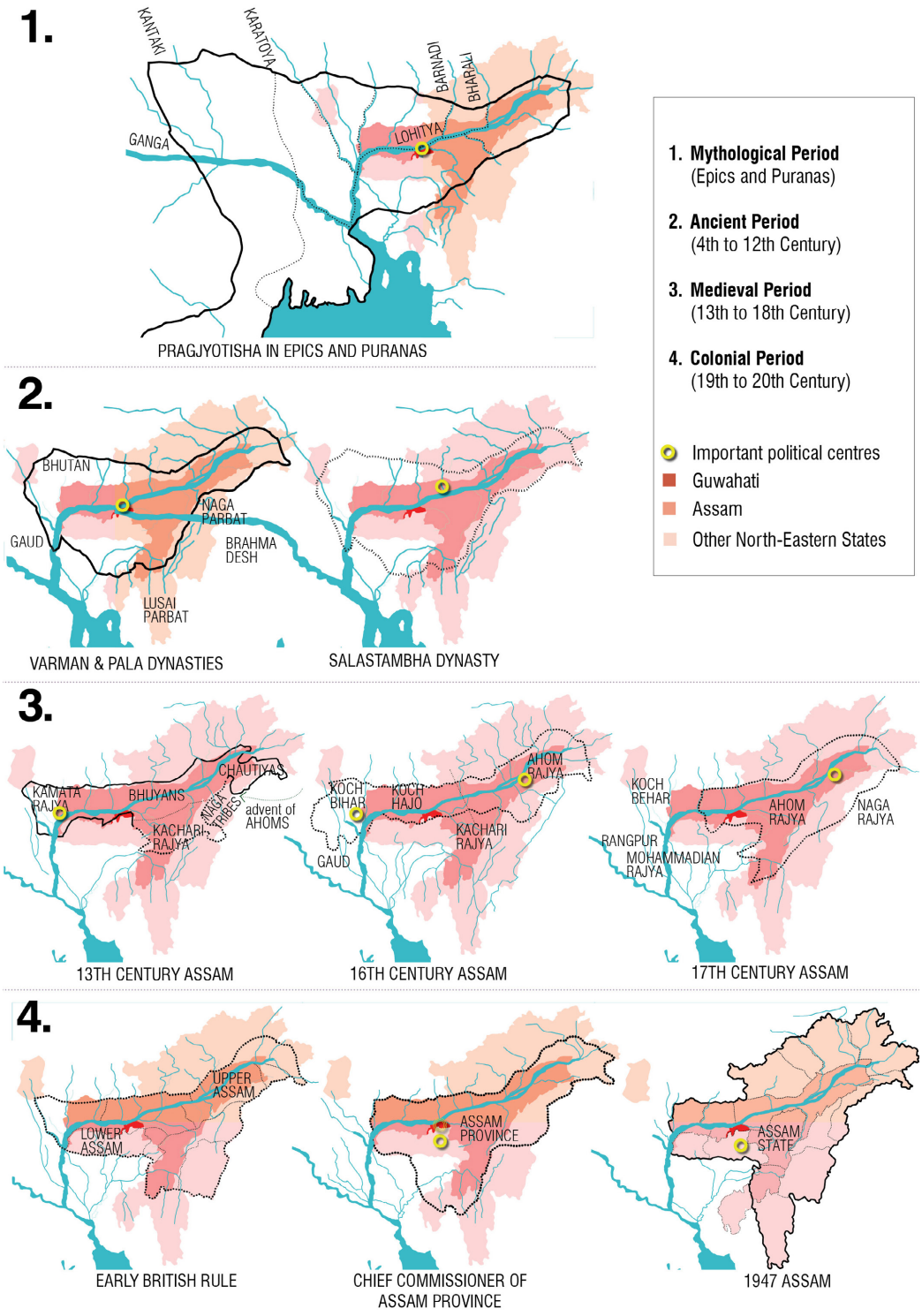
Pragjyotisha (Assam) and Pragjyotishpura (Guwahati) have been referred to in various Sanskrit texts such as the Ramayana, Mahabharata, Yogini Tantra and various ancient Puranas (Sarmah, 1992). The earliest mention of the king of Pragjyotisha is of Dravidian origin whose descendants were overthrown by the legendary Aryan King Narakasur establishing the first Aryan settlement in the region. King Narakasur built a citadel town '*giridurga*' &'*jaladurga*' which means surrounded by hills with a water body on one side, making it inaccessible even to the Gods [Kalika Purana, ca. 10th Century in Lehri (1991) and Sarmah (1996)]. There are several references of Narakasur's kingdom in the Epics and Puranas, whose historicity is signified by the existing physiographic features of Guwahati showing glimpses of ancient forms which were in resonance with nature serving the defensive and cultural needs of its people. The physiographic features were an integral part of the layout of the citadel city.

4.3.2 Ancient period (4th -12th Century A.D.)

Although the city claims a Dravidian origin based on mythology, the reliable history of Guwahati begins with the foundation of the Varman Dynasty (4th-7th Century AD) whose founder claimed his descent from king Narakasur. By the end of this dynasty, during the reign of Bhaskarvarman, the kingdom (as reflected in the writings of the Chinese pilgrim Hiuen-Tsang who visited the kingdom in 643 AD) included entire Assam, a large portion of Bengal, and parts of Bihar. Guwahati, as its capital, was probably the most important base for his powerful naval force and had flourishing trade relations with its neighbours, and witnessed vigorous economic activities[2].

[2]Economic activities included supplying jewelled ornaments, musk pods, cloves, nutmegs, woven silk cloth, sandal, camphor etc. The commodities sold in these markets mainly consisted of grain, beetle-leaves, areca-nuts and coconuts, along with produces from pepper creepers, cardamom plants and black aloe trees. (Lehri, 1991, pp.1-140 and Das, 2007, pp. 47-58).

Figure 4.5: Historic Atlas 1- Positioning Guwahati into the political history of Assam



The earliest settlements in Guwahati, during this period, were primarily confined to the area around Nilanchal and Ambari (5th-7th Century remains) (Baroowa, 1990) on the banks of River Brahmaputra (Figure 4.6:2). By the end of the 7th Century A.D., after the death of Bhaskarvarma, Guwahati lost its importance as a political centre when the

capital of new Salastambha Dynasty (7th-10th Century A.D.) was shifted to *Haruppeswara*, the modern day city of Tezpur in Assam. Despite this, Guwahati along the riverside continued to expand with the occupation of Sukresvar and Uzanbazar sites. The centre later expanded southwards (occupying riverside areas such as Judges Field, Pan Bazar, Fancy Bazar, Machkhowa), islands of Brahmaputra (Umananda) and towards the Northbank, while Nilanchala and Ambari continued to retain their importance (Figure 4.6:3). Based on archaeological findings Das (2007) argues that a road existed from at-least the 5th Century connecting these areas which went upto Pandu Hari temple to the West. Markets, along the river bank, existed at Kachari Bazar and Pandu, where surplus food from the villages or *grammas* was sold and later doubled as active ports. Although, Guwahati, in terms of its size, remained a small urban settlement, it earned the reputation of being a centre of learning (Hiuen Tsiang in Gait, 1906)[3].

The city witnessed a resurgence of its old glory when the first ruler of the following Pala Dynasty moved the capital back to the site of old Pragjyotishpura (Guwahati) and its neighbourhood on the banks of the River Brahmaputra. The capital was later fortified and named as *Durjaya* or the impregnable. Historical evidence showed that *Durjaya* was inhabited by learned men, religious preceptors and poets (Baruah, 2009) and remained the capital of Kamrupa (ancient name for Assam) from 10th Century until the end of 11th Century AD after which it was shifted to Kamrupnagara or the 'city of Kamrud' located at North Guwahati, and remained so until 1260 AD (Figure 4.6:4). The ancient temples, roads, bridges, fortifications and moats still survive today in Guwahati as a testimony to the city's form which was strongly influenced by religion and polity.

4.3.3 Medieval period (13th to 18th Century A.D.)

After the Pala Dynasty (10th – 12th Century AD) Kamrupa (Assam) entered into a new era of its political history which significantly affected the form of the city. The kingdom was split into small principalities occupied by Tai-Ahoms, Bodos, Chautiyas, Kacharis and Bhuyans thus hampering the political status of the city. Guwahati and it's surrounding areas became an arena of great battles during the Ahom-Mughal (1615-1682) conflict and were alternatively occupied by either of these dynasties several times, depending on their fortunes of war. The city experienced significant cultural contact with the Mughals during this period yet, this association, unlike the case with rest of North India under Mughal rule, did not conduce to the grandeur of Mughal architecture. The most well-known war of Assam history was fought at Saraighat near Guwahati in 1671. In the reign of the Siu-Pat-Pha (1681-1696 A.D.), Ahoms ousted the Mughals from Guwahati in a decisive battle at Itakhuli (1682 AD) and stability returned

[3]During the same period, the ancient city came in contact with Aryan culture, particularly Sanskritisation and, the cultural transformation (Aryanisation) of the ruling classes was completed by the early 5th Century A.D.

to the Ahom kingdom (Das, 2007). The period between 13th to 17th Century AD marked two important phases in the political history of Guwahati; first, the declining role of the city as the capital and second, its transformation into an important administrative and military seat with the introduction of a well-designed administrative system (Paike system[4]) by the Ahoms who emerged as a new authority. The Ahom period, during which the city turned into the seat of the Bar Pukhan or the Viceroy of Lower Assam, was quite noteworthy as unlike the ancient period, Guwahati during this period, did not flourish as a cultural centre but served primarily as a military base and an administrative headquarters (Bhattacharyya, 1972 in Alam, Das & Borah eds. 1989). While the economy was restricted to simple and less diversified trade and commerce, industry largely focused on armoury manufacturing (Baishya, 1989).

By the 13th century, the area under habitation had also grew farther on to both banks of the Brahmaputra River. The city extended upto Kalapahar in the South, Chandmari in the East bound by Rajgarh Road, while Nilanchala and Pandu marked the western boundary. North Guwahati was also encircled by the Agiathuri range in the West, Chilating and Momoikota Garh upto Durgeshwari in the East. In the succeeding centuries, the city did not expand much beyond these early boundaries (Figure 4.6:5). The paucity of evidences between the 13th – 16th Centuries makes it difficult to determine the extent of the city during this time however, Captain Welsh who occupied Guwahati in 1792 referred to it as a town (Das, 2007). Robinson (1975, p.286) in "Descriptive Account of Assam" wrote with reference to Guwahati: *"it occupied within its fortification a vast extent of country on both banks of the great stream; the hills on either side forming a spacious amphitheatre; equally fortified by nature and by art"*. According to Lehri (1991) *"the character of these urban centres was very closely intermeshed with nature..."* Little information is available regarding the inner structure of the city during the Ahom rule and scant traces of the historic built forms survives today.

Medieval Guwahati, by the turn of the 17th Century, transformed completely into a walled fortress accessed through gates called *duars* or *chowkies* (Figure 4.6:5). There was a well-established narrow but hierarchical network of streets connecting the ports or *ghats* with the key areas of the kingdom at the present day urban quarters of

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Under the *Paik* system every adult male between the age 16 to 50 was registered as a *paik* for State service. It enabled the king to have maximum utilisation of the man-power both in times of war and peace. The control of the state over the *paiks* was very rigid and hierarchical based on their administrative duties. Some *paiks* were also organised into professional khels, each rendering a particular kind of productive work like boat building and arrow-making for the state. The smallest unit of the *paik,* called got, consisted of four *paiks*. One *paik* in each got was always to be available for service, and in times of war, sometimes even three *paiks* from each got were recruited for military service (Nirmola,P. L. "Paik System: The Backbone of Ahom Administration", Galaxy: International Multidisciplinary Research Journal. Vol.1(IV). http://www.galaxyimrj.com/V1/n4/Lakhya.pdf. Accessed August, 20, 2014).

Bhalarumukh, Fancybazar, Panbazar, Uzanbazar, Athgaon and Lakhtokia. The primary routes were crossed by several smaller secondary routes, further connecting the areas southwards extending upto the hills. The residential pattern was based on segregation of population according to status and occupation. The *subas* (sectors) and *khels* were occupied by different officers and *Paiks* respectively, in hierarchical order, based on their administrative ranks. Bar Phukhan and his associates were among the elites who occupied the prime location between Sukreshwar to Uzanbazar. This fortified city, which was an important part of the Ahom kingdom was weakened by internal dissensions which invited a series of invasions from the East, and Assam came under Burmese Rule during 1819-1824, when the city was turned into ruins.

4.3.4 Colonial period (19th to 20th Century A.D.)

The year 1826 saw the emergence of a new Guwahati at the time when Assam came under British occupation after the first Anglo-Burmese War in 1824-26 and the treaty of Yandabo. With this began the history of public policy in the city and a new era of political and economic order. Guwahati served as a major military centre, and after establishing a foothold here, the British Empire gradually annexed entire Assam and her neighbouring states. Guwahati was the residence of the Chief Commissioner until 1873 AD when the seat of power was shifted to Shillong (now the capital of State of Meghalaya). The case for Guwahati becoming a seat of provincial headquarters was rejected for various reasons, key among them being the poor condition of the city after Burmese rule. Despite being the headquarters of the Commissioner of Assam from 1826 to 1871, the city was particularly dirty and unhygienic, with no laws regulating civic affairs, including sanitation (Goswami, 2005). As Robinson (1975, p.286) mentions: *"Its numerous spacious tanks, the pride of its princes, and the wonder of the present day, are now choked up with weeds and jungle altogether affected by a false, though luxuriant soil that floats on the stagnant water concealed beneath."* M'Cosh (1975) referred to Guwahati as the "*most unhealthy station of Assam*". A voluntary Town Improvement Committee was established in 1839 which paved the way for the introduction of the first statutory Municipal Board in accordance with the Municipal Act XXVI of 1850.

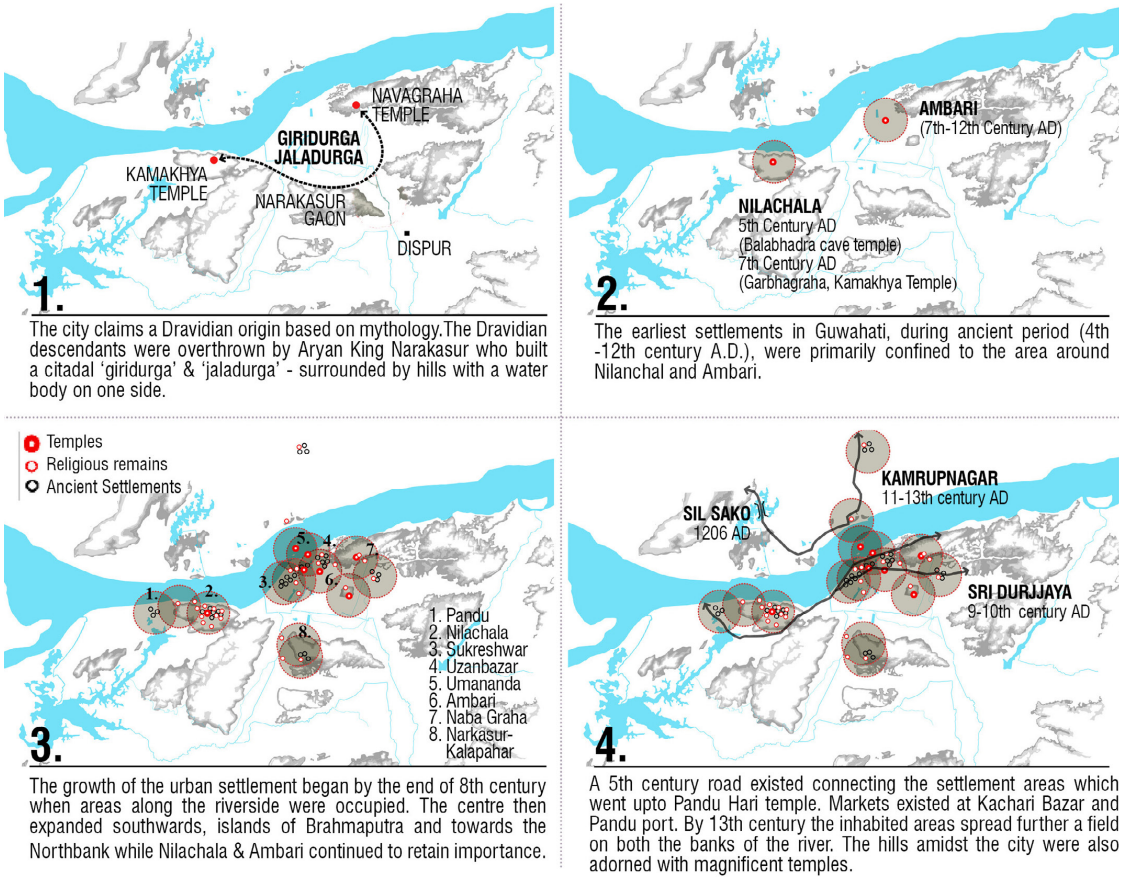
The British military interest in Assam soon turned into economic interest as trade grew with tea, coal and oil representing the new flourishing economy of the colonial period. The tea industry dominated the province and, being agro-based, was decentralised to the plantations resulting in the tea trade becoming more dispersed rather than being concentrated in urban centres. Assam's growth was, therefore, unusual in that early industrialisation did not lead to urbanisation (Goswami, 2005). Tea was produced on decentralised labour intensive tea estates, while coal and oil led to the emergence of small townships. When Guwahati did start to urbanise, it was more as a result of

commerce rather than industry which was spurred by new transport and communication links, with indigenous economic development not playing a major role. A significant development during this period was the planning and establishment of Civil Lines and Cantonment in the Uzanbazar and Paltanbazar areas, as well as the emergence of steamer services (1847), rail and road networks (1895) in order to connect the region with the rest of the India. The Civil Lines contained administrative offices, courts and official residences of the Commissioner. As a contrast to the traditional dense morphology, the Civil Lines with large open spaces, sprawling bungalows within huge compounds, and roads built according to plan, that stood apart from the rest of the town are still obviously visible today, and remain an example of a typical Colonial legacy. An important contribution of railways to the growth of an urban centre in Guwahati was the railway station, which soon became the core with the shift of markets and commercial activities to the same area.

Guwahati, as the headquarters of the Commissioner of Assam, covered an area of 24 sq.km, (6 km length x 4 km breadth) extending from the River Bharalu in the West to Latasil Chawki in the East, Chola Beel in the South and River Brahmaputra in the North (Sarma, 1982; Tamuli, 1992). It became a municipal town in 1865 with the establishment of a Municipal Board. In 1874, the town had eight municipal wards within an area of 6.4 sq km (Government of Assam, 1992) (Figure 4.7:6). With the advent of the British, the Ahom system of *Paik* and *Khel*, the segregated housing pattern, came to an end (Barpujari, 1992) and Guwahati was organised with specific schemes for residential and official use. Some of the major attractive buildings made in the vernacular (Ikra or Assam-type, Figure 4.8) that glorified the urban landscape of the town, were offices and residences of the Commissioner and other key officials, and institutions as well as clubs, sports grounds and other recreational facilities.

In 1891, the population of Guwahati was a mere 8,394 people within an area of 10.35 sq.km that included areas on both sides of the River Brahmaputra. North Guwahati, however, was later excluded from the jurisdiction of the Municipal Board reducing its size to 7.64 sq km (Deka in Alam, Das & Borah eds, 2001) (Figure 4.7:7). According to the 1931 Census Report many places in Assam which had been declared as municipalities were nothing but large villages and could hardly be recognised as towns. Hence, during the Colonial period, urbanisation in Assam took place at a very slow pace reflecting a general phenomenon in which development occurred in pockets oriented to the needs of Colonial rule.

Figure 4.6: Historic Atlas 2 - Evolution of Guwahati



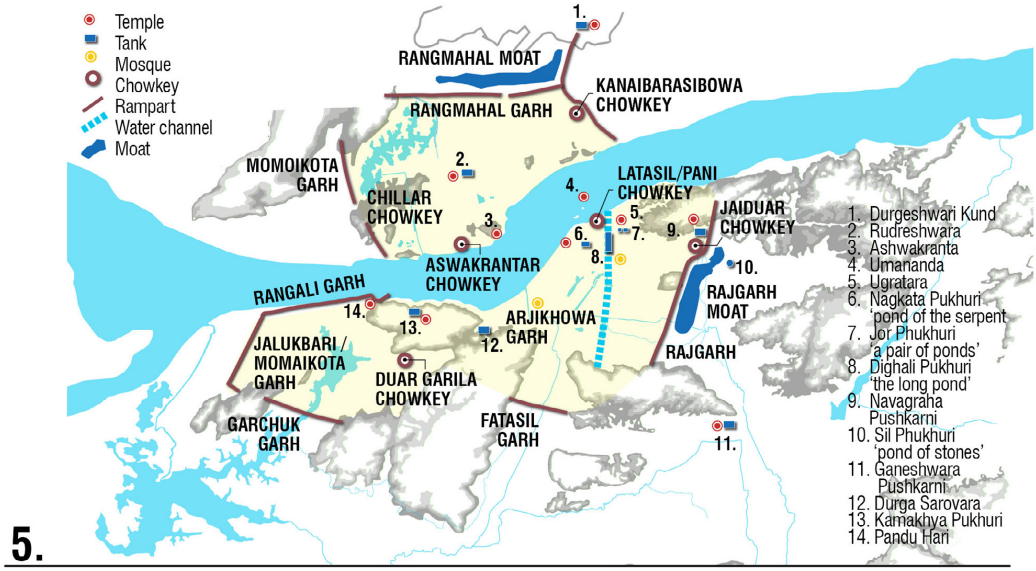


Figure 4.7: Historic Atlas 3 - Evolution of Guwahati

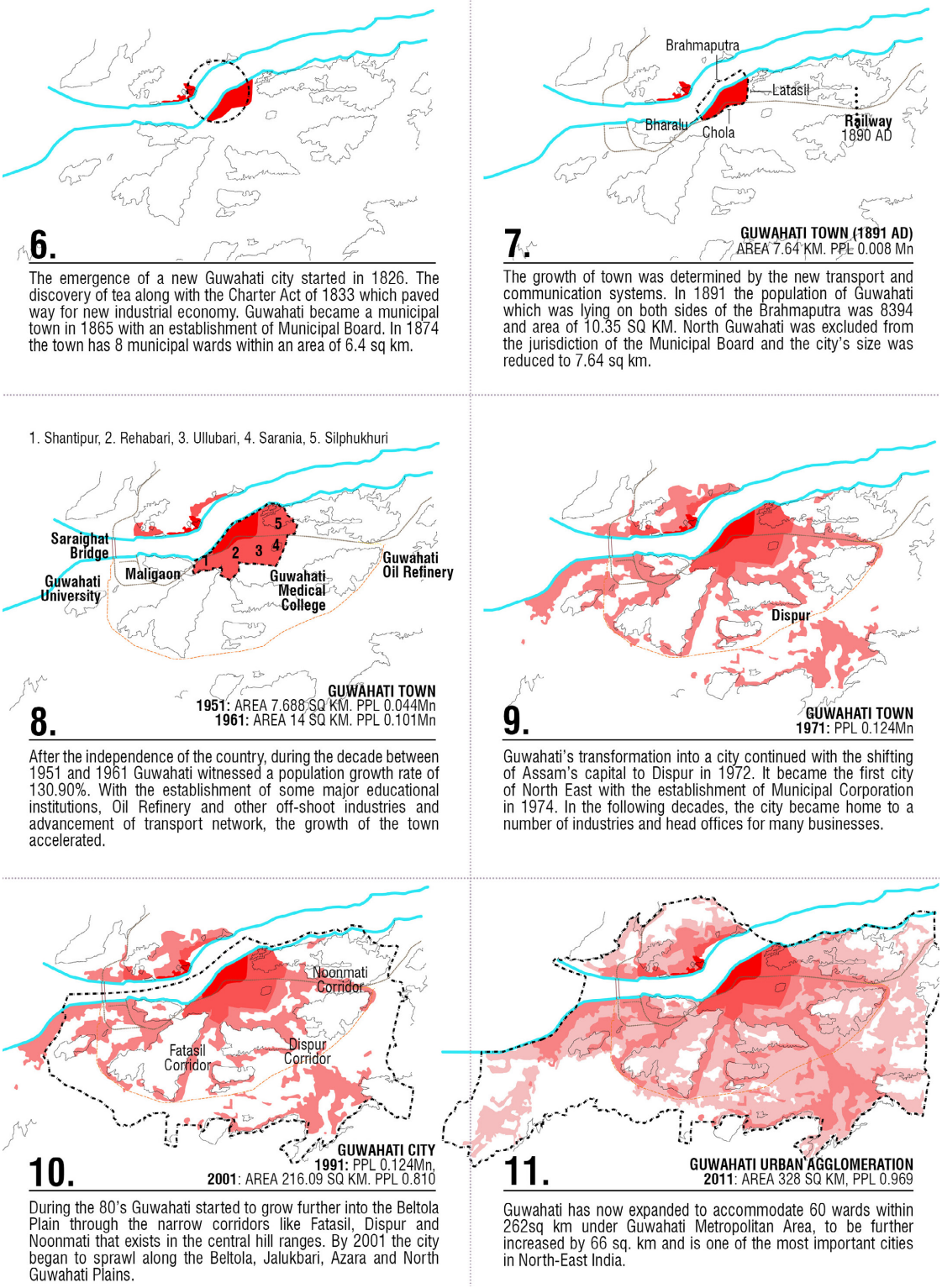


Figure 4.8: Traditional buildings of Assam built during the colonial period



4.3.5 Modern Period (20th Century onwards)

Guwahati experienced phenomenal growth after India's independence in 1947. During the decade 1951-1961, following India's partition, Guwahati witnessed a population growth rate of 130.90 percent due to influx of people from Bangladesh (erstwhile East Pakistan) and other areas of the state. During this period the municipal jurisdiction was increased from 7.86 sq km (1951) to 14.24 sq km (1961) to included areas such as Shantipur, Bhutnath, Ullubari, Silpukhuri, Rehabari and Sarania (Government of Assam, 1987) (Figure 4.7:8). Guwahati's position in the North-Eastern region of India meant that it became home to some major institutions and, with further improvements in the transport network, the growth of the town accelerated. The opening up of the Saraighat Bridge across the mighty Brahmaputra in the 1960s, led to an acceleration in the economic development of the town as outside capital flowed into Guwahati and the tea auction market grew. Guwahati became a tea auction centre, the second of its kind in India after Kolkata. The establishment of the Headquarters of the North-East Frontier Railway (NEFR) at Maligaon, coupled with broad-gauge conversion, the Oil Refinery at Narangi and other heavy and medium-sized petro-chemical industries as its offshoot, added industrial impetus. Guwahati thus witnessed a phase of rapid urbanisation during this decade. In addition to the Assam Municipal Act, 1956, and the Assam Slum Areas (Improvement and Clearance) Act 1959, the Assam Town and Country Plan Act, 1959 was established as the principal instrument for the preparation of urban development plans and their implementations.

Guwahati's transformation into a city continued with the shifting of the capital, in 1972, from Shillong (in Meghalaya) to Dispur in Guwahati, after the reorganisation of Assam State, the city once again gained political importance. Since then Guwahati, has grown exponentially in terms of its population and proliferation of commercial activities. The city became home to a number of industries and head offices for many businesses, thus acting as a magnet attracting migrants from both within and outside the state. Very few Indian cities have had the kind of population growth seen in Guwahati[5]. While the process of decadal duplication of population has diminished, Guwahati still continues to have a significant population growth rate to this day[6]. In 1974 Guwahati, which was a Class-I town, became a Municipal Corporation and the first city in North-Eastern India with a total jurisdiction area of 216.09 sq km with 34 urban wards (Figure 4.7:9). The rapid increase in population along with its importance as being the centre for social, commercial, educational, political, industrial transport and communication activities made Guwahati a key city in the India's North-east region. The shifting of Assam's capital from Shillong to Guwahati in 1972 thus, contributed to the expansion of the modern city in terms of both area and population.

Table 4.1: Decadal population growth trend of Guwahati (source: Census Reports of India)

Year	Population (in millions)	Decadal growth (%)		Year	Population (in millions)	Decadal growth (%)
1901	0.012			1961	0.101	130.9
1911	0.013	7.03		1971	0.124	22.9
1921	0.016	32.04		1981	0.269	117.27
1931	0.022	32.26		1991	0584	117.27
1941	0.030	35.79		2001	0.810	38.6
1951	0.044	47.36		2011	0.969	19.59

Unfortunately, this aggressive incorporation of vast areas adjoining the old city into the urban agglomeration was not accompanied by appropriate development of civic infrastructure including amenities and essential utilities such as water supply and sanitation facilities in most of the wards, except those in the core city area. During the 1970s, the city expanded further south to the Beltola Plain through the narrow corridors

[5]During the period of 1971-1981, many large Indian cities including Kolkata, Mumbai, Dehli and Chennai, registered an average decadal growth of 40% while in the same period Guwahati registered a growth of 182%

[6]The population of Guwahati city including the urban agglomeration has seen a decadal growth of 18.29% from 8, 18,809 in 2001 to 9, 68, 549 in 2011. Today, in terms of its population size Guwahati Urban Agglomeration (UA) with 0.96 million residents (Provisional Census Data, 2011) remains far ahead among the cities of Assam and the North-East, followed by Silchar UA (0.22 million) and Imphal UA (0.41 million) (Provisional Population Totals, Census of India 2011).

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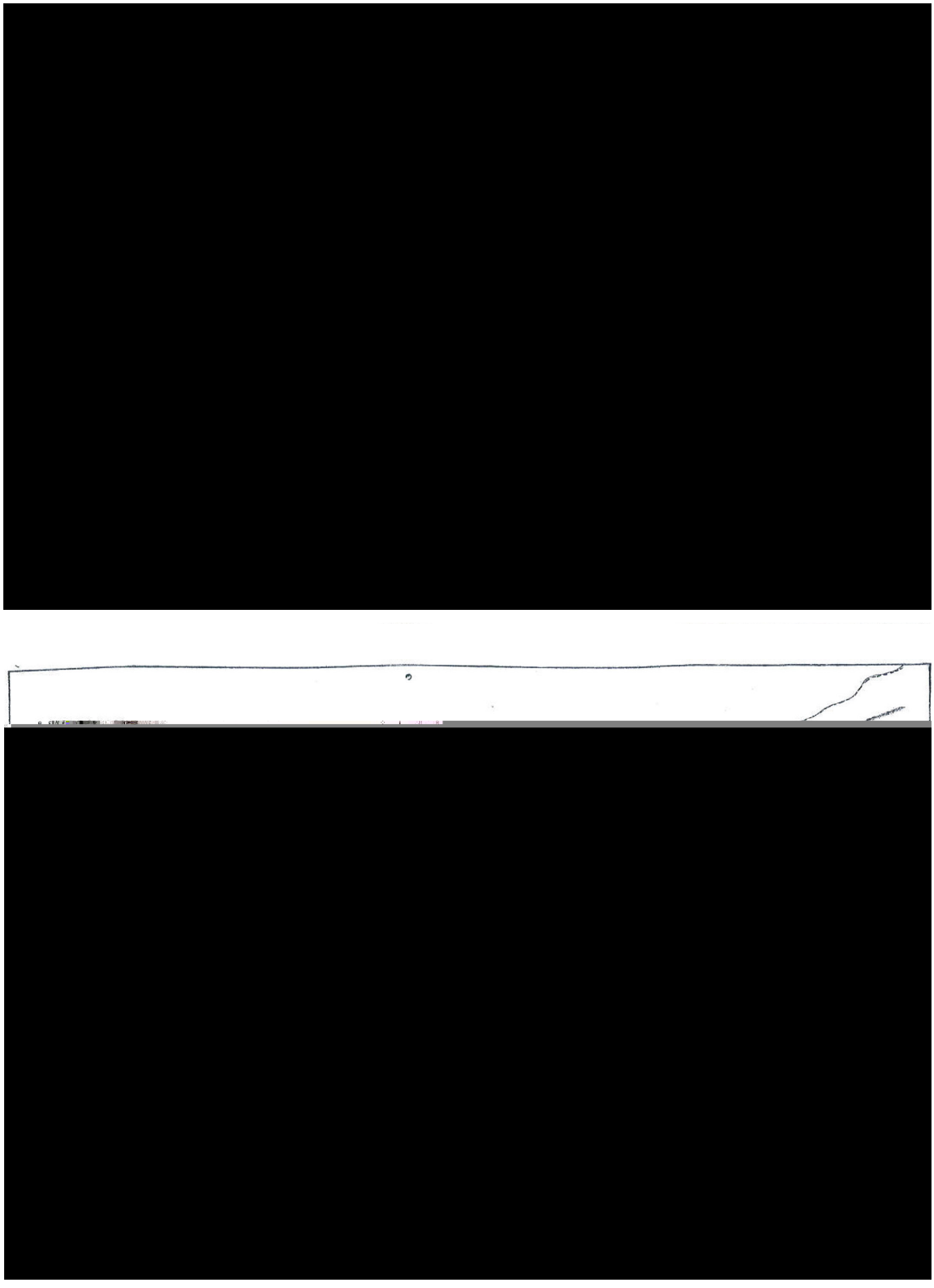
(valleys) such as Fatasil, Dispur and Noonmati in the central hill ranges, and new settlements emerged in the suburban areas (of Dispur, Khanapara, Basistha, Kalapahar, Kahlipara and Narangi). By 2001, the city started extending into the Beltola, Jalukbari, Azara and North Guwahati Plains with, development continuing to be concentrated along the valleys between the hills. The 2001-2011 decade witnessed major expansion of the Guwahati urban sprawl (Figure 4.7:10, and Figure 4.7:11).

To seize the unchecked growth of the city, a number of Master Plans have been prepared and adopted. In 1965, the State Government adopted the Master Plan for Greater Guwahati under Section 10 of the Assam Town and Country Planning Act 1959, and entrusted its execution to the Guwahati Development Authority [GDA established in 1961, replaced later by Guwahati Municipal Development Authority (GMDA) in 1992]. The plan which envisaged the broad framework for the town in terms of physical development and zoning regulation upto the year 2001 was not implemented due to lack of resources and considerable changes that took place in the city including establishment of the State's capital at Dispur. This necessitated the revision of the existing 'Master Plan and Zoning Regulations' to suit the changing circumstances and also to ensure the future development of the city and its suburbs in a planned way for the coming years.

Accordingly the State Government revised the Master Plan a draft of which was published in 1984 inviting suggestions from all concerned. It was adopted in 1985 giving the implementation responsibility to the Guwahati Municipal Corporation (GMC established in 1971). However, despite this administrative measure, Guwahati, just like many other Indian cities, struggled to provide and maintain basic infrastructure due to enormous population growth making it difficult to bridge the demand-supply gap which was further exacerbated with limited public resources, politicised decision-making, and lack of synergy between different public sector departments (Sharma, 2014). New localities emerged in an unorganised manner with overall lack of drainage, poor and partial drinking water supply, absence of solid waste management system[7] along with pollution of surface and ground water sources creating a vicious cycle that leads to flooding and water logging in Guwahati every year, and increasing public health hazards (TERI, 1950). The proposed master plan focussed majorly on zoning regulations and circulation patterns. Lack of sensitive and comprehensive planning strategies along with rapid unchecked growth not only led to adverse environmental and social effects but also destroyed the aesthetics of the spectacular and precious topography of the city.

[7]Developed in 1950, the present water supply network by GMC, that covers only 20 percent of the municipal area, faces both quality and maintenance issues. The city's sanitation is dependent on the septic tank system and presently lacks a well thought out sanitary drainage system. The high water table in most parts of the city has led to non-functional soakpits, causing the effluents to be released untreated into the nearby open drains and low-lying areas.

Figure 4.9: Master Plan for Guwahati 2001 (circulation pattern & proposed zoning plan)



[Source: Modified Final Master Plan and Zoning Regulations for Guwahati", Town and Country Planning Organisation, Government of Assam]

4.4 Guwahati today: urban form analysis

Today, the overall urban development in city is being planned by two main authorities viz. Guwahati Metropolitan Development Authority (GMDA) and the Guwahati Municipal Corporation (GMC). Guwahati has now expanded to accommodate 60 wards within 328sq km under the Guwahati Metropolitan Area. The Guwahati Metropolitan Development Authority (GMDA) is currently revising the Comprehensive Master Plan, 2025, adopted in 2009 and recommended it's monitoring and review at five-year interval (2011, 2016 and 2021), to expand the metropolitan region of the city proposing expansion of the present metropolitan region of Guwahati from 326 sq km up to 3214 sq km. According to the Comprehensive Master Plan 2025, the population of Guwahati is likely to increase to about 2.1 million by 2025 of which roughly only 1.8 million could be accommodate within the present urban boundary. The revision is therefore aimed at facilitating the process of expansion of the metropolitan area of Guwahati to accommodate the rapidly growing population by proposing three new satellite towns.

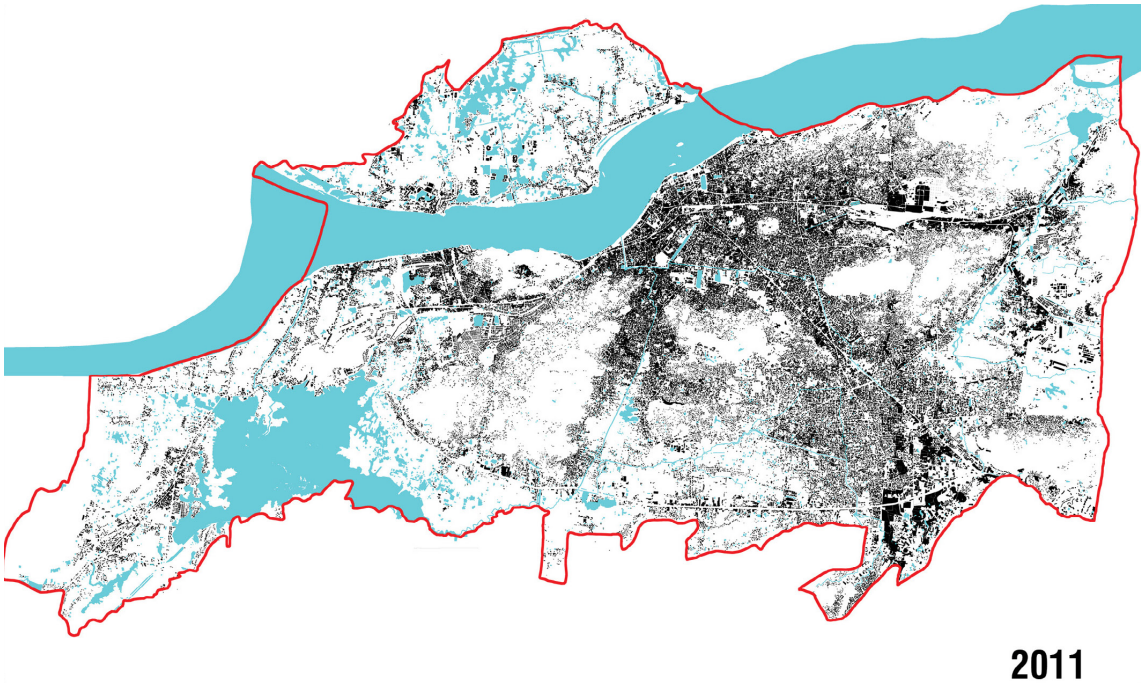
Several large scale urban infrastructure projects are also underway by the State Government under the Public-Private Partnership to accommodate the rapid growth and urbanisation of Guwahati such as Beautification of Guwahati City, Brahmaputra Riverfront Development, Development of Jail Land, Municipal Plots, Town Hall, Eco-tourism near Deepor Beel, Logistic Park and Six Lane Bridge over River Brahamaputra to name a few in addition to a number of Satellite Townships by extending the jurisdiction of the present metropolitan area. To overcome the pressure for developable land, the administrative boundaries of the city have continued to expand[8]. Such extensive growth reflects changes not just in the city's physical form which took place over a short period of time, but also in its urban condition such as the construction of experiences, territories as well as lifestyle of its citizens. As Purobi Sharma (2014, p.277) argues: *"It is a situation of purposeful expansion, and not purposeful growth"*.

To evaluate the city's urban form in its present context this section critically analyses its 1) Built form and density, 2) Street network and open spaces, 3) Land-use and activities. While doing so the current formal planning is also questioned and its significance in achieving a sustainable, smart future is deliberated.

[8]The new masterplan under consideration also claims to further extend the boundaries of Guwahati metropolitan area to include neighbouring revenue villages in addition the Guwahati Municipal Corporation area and the North Guwahati Town Committee area.

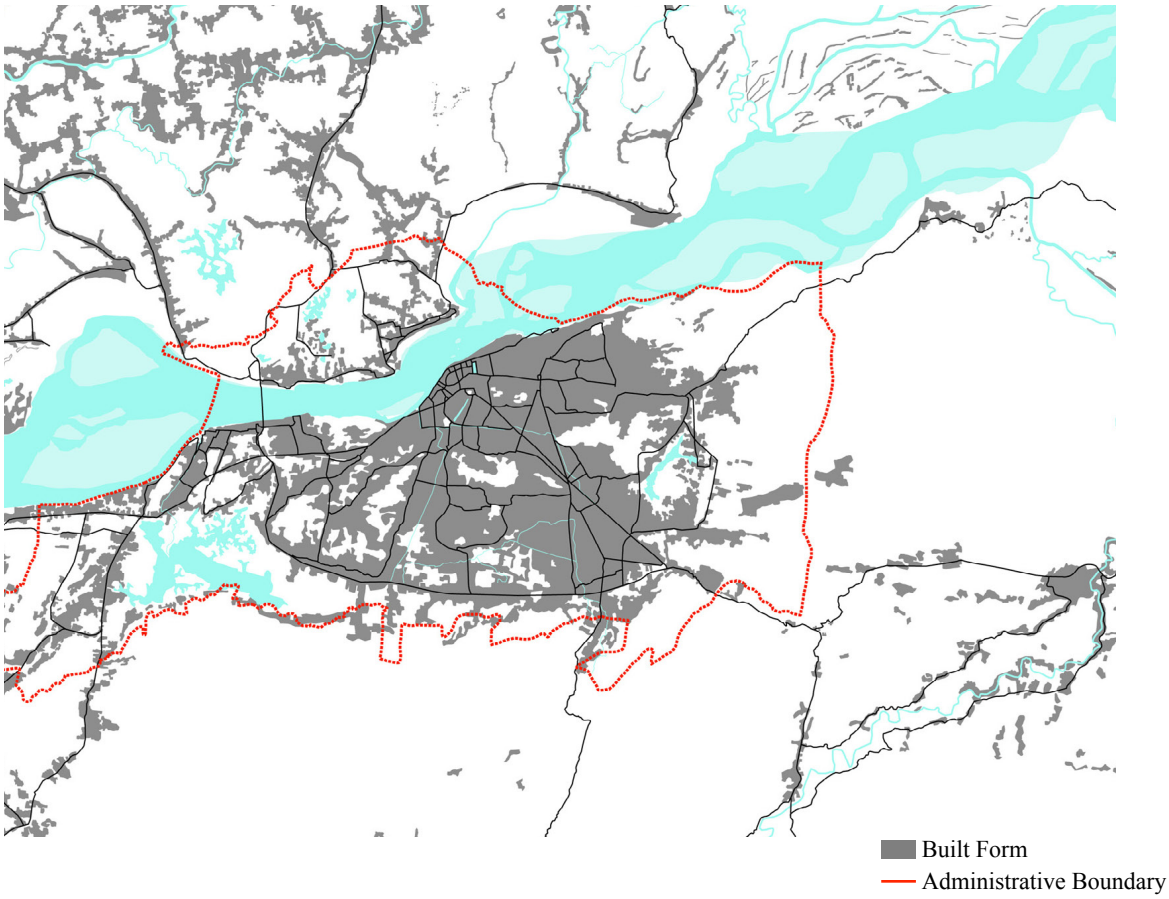
Figure 4.10: Comparative figure ground plans of Guwahati (years 1971 and 2011)





[When we compare the 1971 figure ground plan to that of 2011 we realise the extent to which the city has spread and grown in three decades]

Figure 4.11: Guwahati and its hinterland



4.4.1 Built form and density

Guwahati today, represents a composite form developed through ages and shows a spectrum of varied urban typologies and social patterns that developed in response to local combinations of dynamic forces of the past and present hence, no part of it can be seen as a purified form but rather multilayered to some extent. The city entered its phase of modernisation or westernisation rather late not only due to retarded urbanisation (Goswami, 2005) during the Colonial Period discussed earlier but perhaps also owing to the fact that the early 1990's was still difficult for the city with respect to its social stability. After the peace and stabilisation of the late 1990's, the property market saw a boom with many private players who significantly altered and diversified the city's form with exclusively large global structures especially around the key commercial and trade routes of the city. While these routes can easily be termed as 'the modern city', the residential suburbs, many of which may be still viewed as 'urban villages' that branch out from these key axises through narrow by-lanes, now begin to modernise (the 'rural - urban continuum, typologies and transitions' is discussed in Appendix-3).

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Figure 4.12: Comparative maps showing built forms for traditional and modern neighbourhoods of Guwahati



Traditional Built Forms - Uzanbazar and Fancybazar areas



Suburban Built Forms - Hengrabari and Beltola areas

The trend of increasing investment along the commercial routes over the past decade has also led to a concentration of iconographic projects at select localities spurring further investments catering to high income groups. The continued effect of process of distorted housing markets and skewed land prices have resulted in economic class distinction among different localities of the city by gradually shifting out the lower income groups to the periphery while exclusively gentrifying centrally located urban areas in favour of exclusive defensive forms of living for an increasing elite population. The traditional Assam-type structures, once an icon of high aesthetic, social and economic position in terms of property ownership, today as Kanungo (2014, p.60-61) argues, is more of a "*faded echo of earlier times, enduring either as symbol of dereliction in old commercial and depressed residential areas*", or redeveloping to resemble their conventional modern high-rise counterparts. The city is now a patchwork of fragmented 'informal slum', 'inner traditional', 'modern infill' and 'exclusive defensive' urban forms of which, former two suffer from multiple deprivations while the latter two represent a major share of urban growth. Such exclusionary developments have failed to accommodate the needs of the poor and widened social divisions[9]. The growing population and scarcity of

[9]The city's municipal corporation has identified 217 slum pockets scattered around the city fabric in which 15% of the population of Guwahati resides

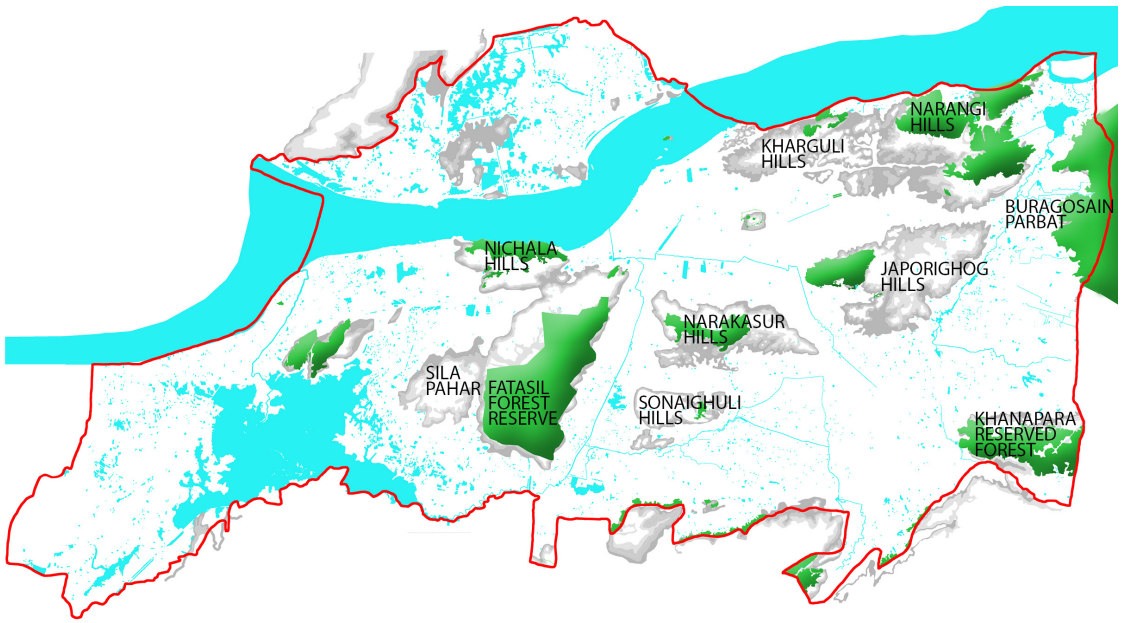
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habitable land due to its topography, has also increased the density[10] of the patchwork forms and stressed the open recreational spaces.

4.4.2 Street network and open spaces

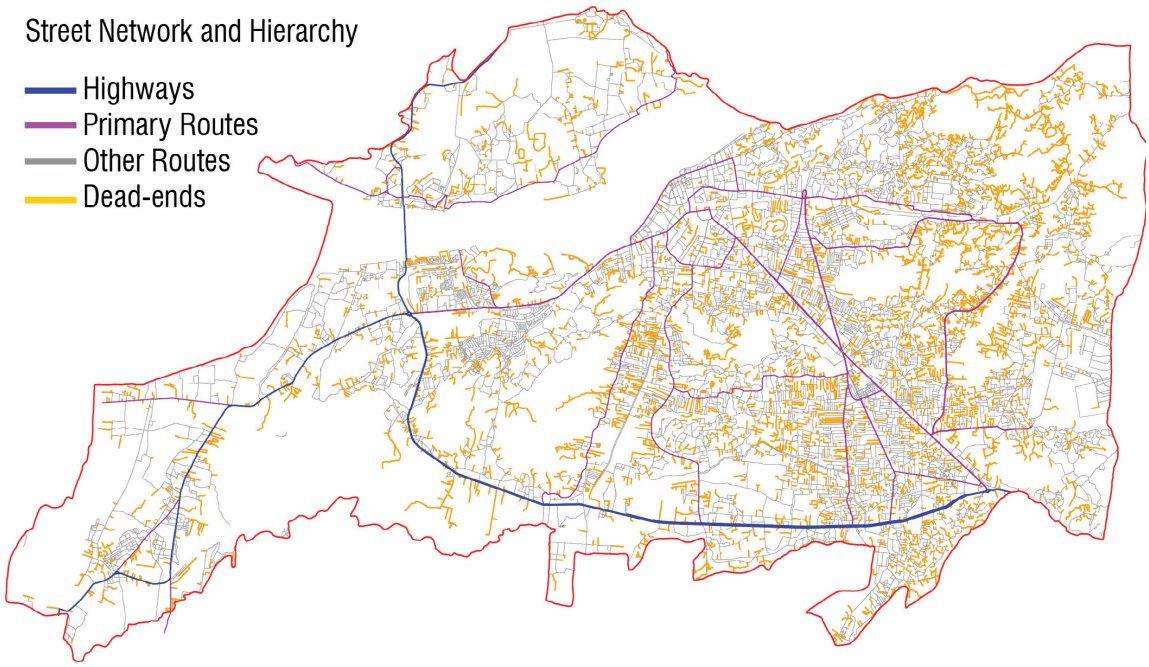
A critical evaluation of Guwahati's street network shows that the city is currently stands in need for an integrated and connected network of streets and open spaces which is an integral aspect of a sustainable urban form allowing not only for movement and alternative modes of transport but also providing a number of social benefits to the city's citizens. Presently Guwahati is served by only a few major roads[54] while a bulk of its residential or tertiary streets are dead-ends, largely owing to its topographical constraints thus, resulting in reduced permeability and increased stress on the major routes (Figure 4.14). Despite the abundant natural landscape, existence of culturally significant traditional open spaces (such as Bihu fields and open markets) and recent redevelopment of some of the city parks, well distributed and accessible open spaces, especially in an around newly developed neighbourhoods, are also meagre (Figure 4.15).

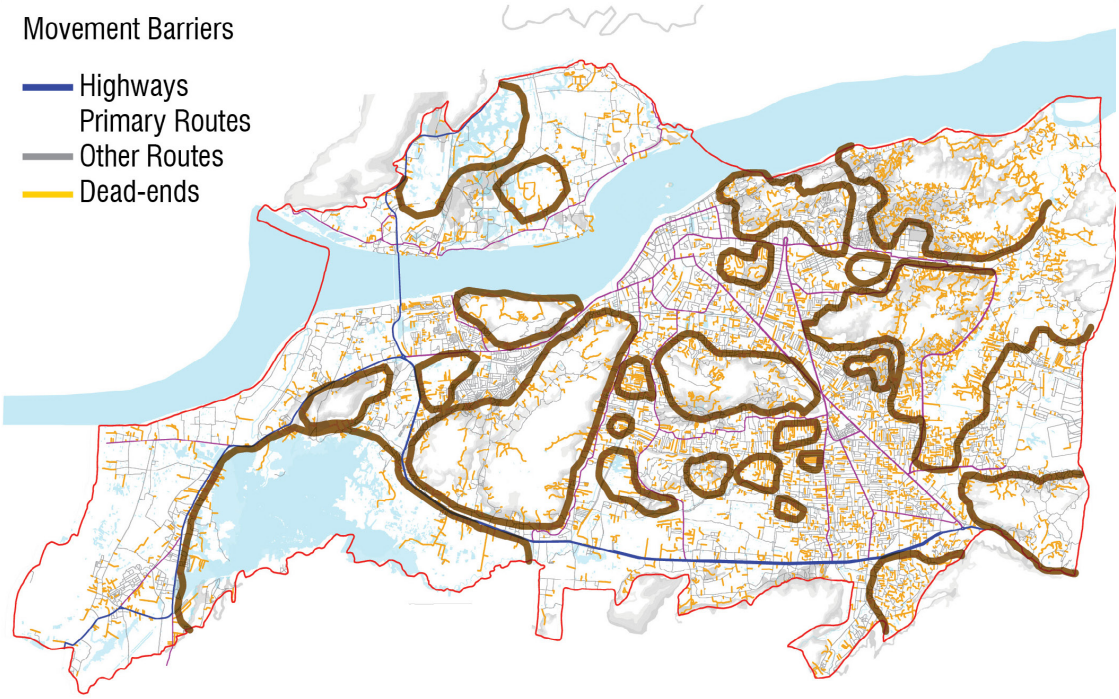
Figure 4.13: Map of Guwahati showing existing hills and protected forest



[10]The current density of the metropolitan city is approximately 37 people per hectare (3,677people/km2) with neighbourhood densities varying from as high as 179 people/hectare in traditional areas to lower densities of 72 people/hectare in the sprawling suburbs

Figure 4.14: Maps of Guwahati showing existing street network and street hierarchy



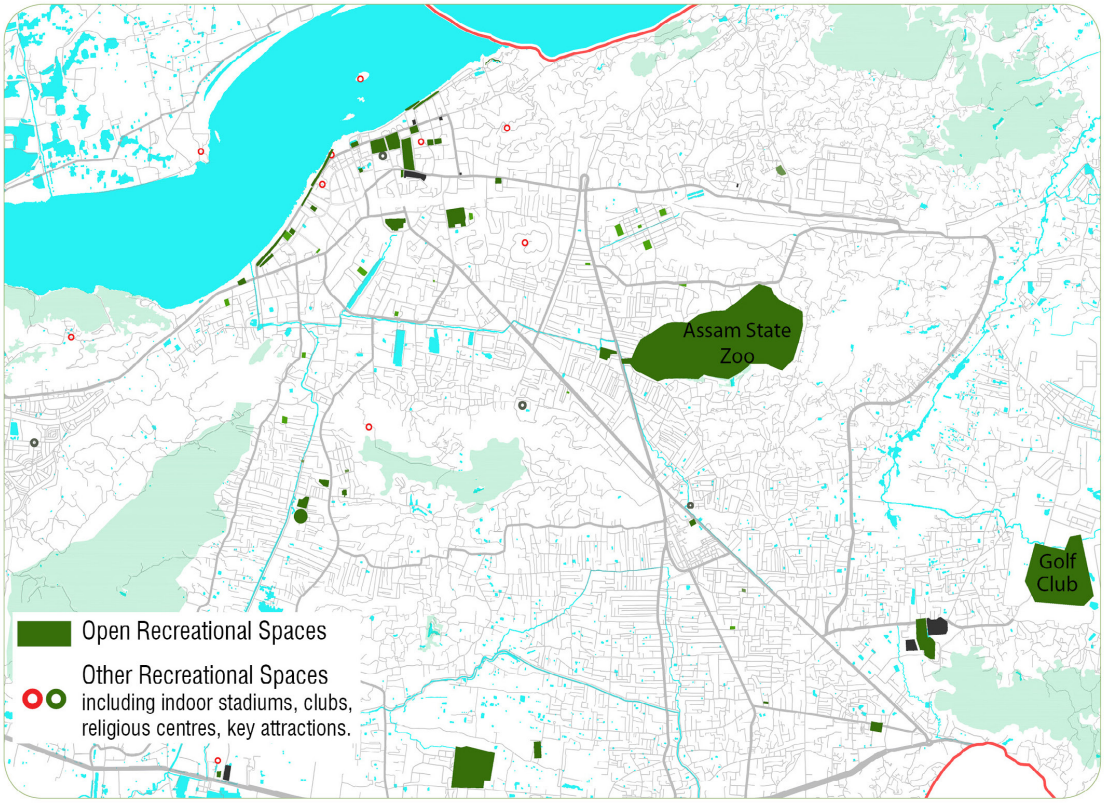


Increased pressure on land for residential and other development has also set aside the priority for planning open public spaces in Guwahati other than roads. As opposed to the 8.97 percentage of the total development area allocated for parks and playgrounds in the Master Plan for the year 2001, the land use survey by Department of Town and Country Planning revealed that there existed only 0.43 percentage. Substantial public investments

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have been made on expansion of the city's road networks and construction of flyovers (with spaces underneath planned for parking, parks, toilets) and pedestrian footbridges to facilitate smooth vehicle flow yet, of the 171.3km length of the major road network, presently 72% lack pavements, 40% lack drainage facilities and approximately 70% lack streetlights (TERI, 2013). The city planning so far has, therefore, lacked focus on connected network of routes and public spaces that favour pedestrian movement especially in residential neighbourhoods and retails hubs thus making the network of public open spaces more worthy as public realms for citizens.

Figure 4.15: Map of Guwahati showing existing open recreational spaces



Key Open Recreational Spaces



Shradhanjali Park, Zoo Road.



Pavements & Street Vendors, Zoo Road.

4.4.3 Land-use and activities

Mixing land uses, an essential component of all sustainable urban development theories, is an integral component of official urban planning policy in most developed nations. A review of Guwahati's planning norms and Master Plans indicate a steep inclination towards zoning. Yet, a majority of the neighbourhoods in the city can still be termed as mixed-use, although the intensity of mix varies from very high in the traditional areas to very low level of mix in the newly developed suburbs. It is nearly impossible to provide an accurate picture of the current land-use as rapid real estate development has always surpassed the surveys and land use policies as adopted in the Master Plan. Based on the available data (Department of Town and Country Planning), the analysis of land-use variation of Guwahati between 1956 to 1980 shows massive increase in residential use from 5.5 to 45.11 percent of total built-up area. While the industrial land-use during this period increased to 6.3 percent from just 0.6 per cent in 1956, there has been a steep reduction in open recreational spaces.

Table 4.2: Land-use distribution (Masterplan for Guwahati Metropolitan Area, 2025)

No.	Land-Use	Area in hectares (excluding new Towns)	Percentage of developed area	Area in hectares (including new Towns)	Percentage of developed area
1	Residential	8646	31.92	10383	31.65
2	Retail-Commercial	360	1.33	447	1.36
3	Wholesale- Commercial	81	0.30	417	1.27
4	Industrial	518	1.91	918	2.80
5	Public / Semi-Public	3270	12.07	3606	10.99
6	Composite Use-1	814	3.01	814	2.48
7	Composite Use -2	300	1.11	841	2.56
8	Recreational & Open Space	3324	12.3	3728	11
9	Transportation	2853	10.53	3407	10.39
10	Eco-Sensitive/Friendly Zone	6919	25.5	8245	26
	Total	27085	100	32806	100

In addition to the concentration of key recreational, leisure and retail hubs at the traditional core, various other commercial establishments as well as retail and recreational avenues[11] are emerging at different locations in the city thus, generating a

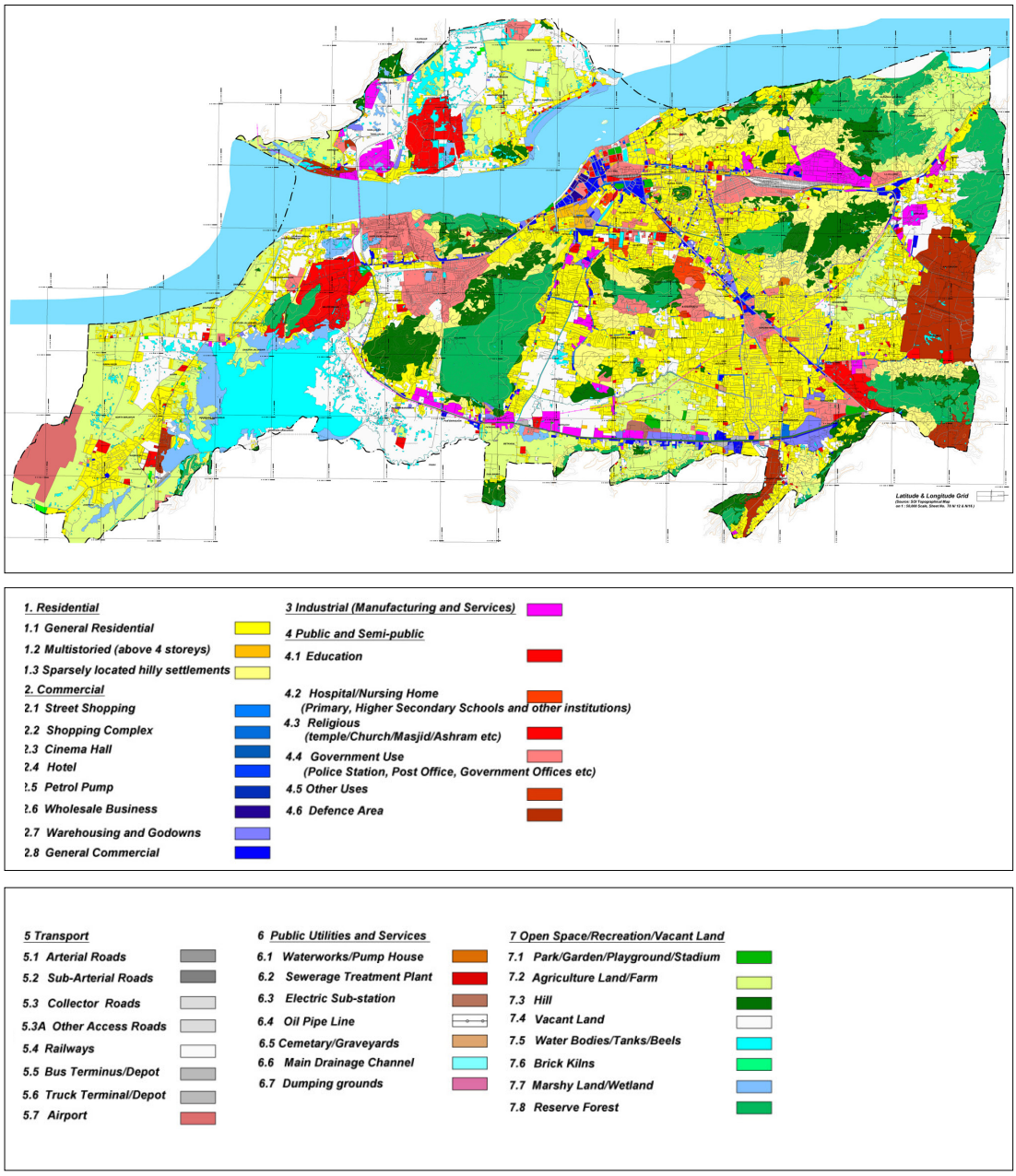
[11]As per the existing landuse in the 1985, out of the total 62 sq km area within the masterplan boundary only 61% was habitable the rest consisted of hills, waterbodies and low-lying areas. It showed 24.6% inhabitated land, 38.2% unusable land while 37.1% additional habitable land. The residential area covered maximum of 45.1% of the total inhabited land while the land under parks and recreational use was reduced to the 0.43% which was 1% in 1974 and 2% in 1956.

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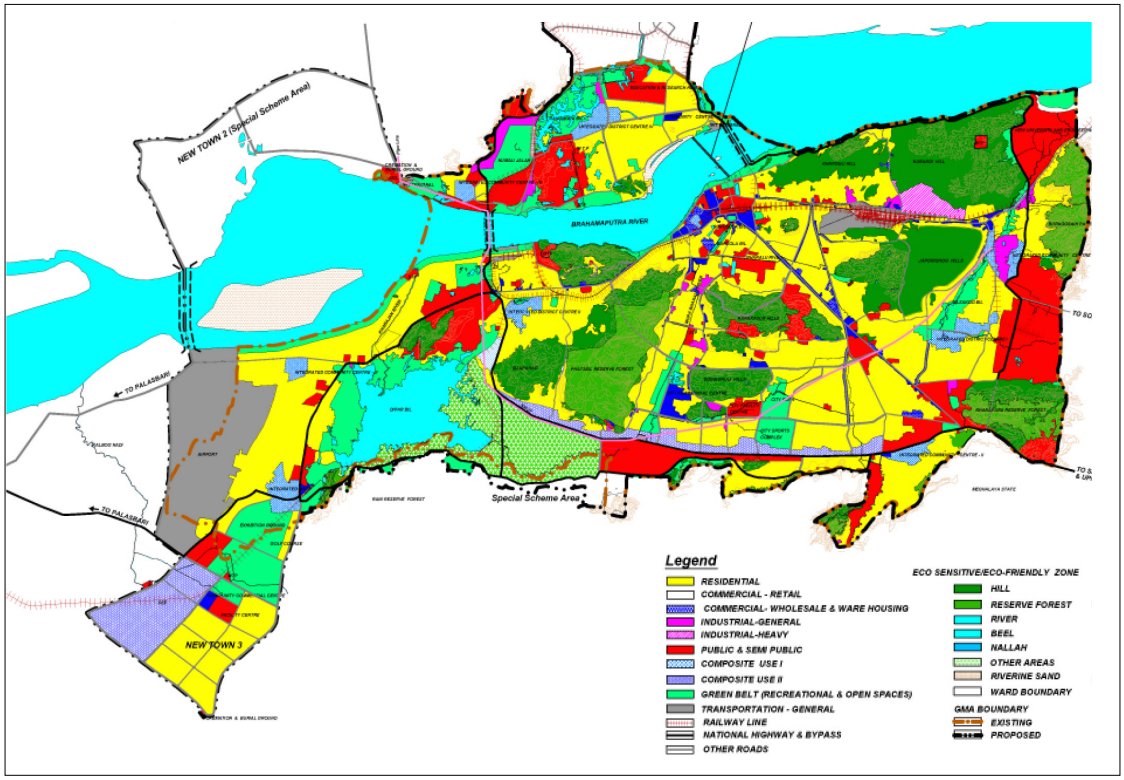
decentralised urban structure. New trends of "out of town living" and "Special Economic Zones (SEZ) however, are gradually leading to segregation of uses and sprawl in absence of an integrated land-use policy which is based not on the current principles of zoning, but one which encourages vitality in a place, based on density, diversity and activity.

Figure 4.16: Maps of Guwahati showing existing and proposed land-use

a) *Existing Land-use*



b) *Proposed Land-use - Masterplan 2025*



4.5 Social profile

The various localities of the city exhibit a socio-cultural pattern depending on the nature of population concentration. The city of Guwahati as a social unit is a broad-based centre of human interaction with diverse ethnic, linguistic and religious backgrounds. These groups have their distinct religious and socio-cultural life. However, breaking the confines of traditional localities is a noticeable phenomenon in recent years and the society showcases considerable cosmopolitan character in religious matters exhibiting collective social life. Urbanisation, increasing population densities and socio-cultural heterogeneity has resulted in new way of city life accommodating various socio-spatial expressions and behaviours (Sharma, 2014). Although neighbourhood communities in the city have their way of life and inter-locality relationship, what is becoming more obvious is the segregation of people based on different economic backgrounds. Distorted housing land markets and skewed land prices and rents have resulted in economic class distinction among different localities of the city especially since 1980 until which the mix of economic classes in old as well as then newly developed areas was evident (Kungo, 2014).

"As part of the society for long years, it can be easily felt that the social fabric has been highly disturbed due to rapid change of the city structure and its content. The act of mugging, road-bullying and gangsterism have reached unprecedented level. The present

state of affairs demands the growth of community centres. Close neighbourhood lifestyle can serve great purpose of breaking urban isolation" Purobi Sharma, (2014, p126).

This research recognises the connection between social conflict and urban space however, it goes beyond the politics of land occupation and briefly discusses the socio-cultural aspects of the people living in different localities of Guwahati that can aid the research.

Although the city is a home to several language groups, Assamese is the largest linguistic group of the city. People of different linguistic groups are distributed all over the city, yet it was observed from the field survey and interviews with local residents that in areas like Uzanbazar, Chenikuthi, greater Silpukhuri, Chandmari about a majority of the population has migrated from Upper Assam. Similarly places like Zoo Road, Zoo-Narengi Road, Narikalbasti are predominantly inhabited by people who had migrated from Lower Assam. Among other language groups, the Bengalis are the majority in Maligaon, Pandu, Shantipur, Rehabari, Udalbakra and Kalapahar. The Bengali speaking households involved in trade and commerce are found at Panbazar, Rehabari, Lachitnagar areas. The Fancy Bazar, Paltan Bazar, Athgaon, Kumarpara are traditionally inhabited by Rajasthani Business community. Although people belonging to this linguistic group are also scattered across the city, they continue to have business affinities with this part of the city. There are also higher concentrations of people belonging to similar religious groups. Besides Hindus, Muslims (higher concentrations in Machkhowa, Lakhtokia since the Ahom period), Sikhs, Christians (near Ganeshguri, Christian Basti, area between Fancy Bazar and Paltan Bazar) and Jains/Marwari Hindus (Fancy Bazar, Paltan Bazar, Kumarpara, Anthgaon) are among the other major religious groups.

As a river port, Guwahati has traditionally been an important administrative and trading centre. It is a major wholesale distribution centre and also a marketing and retail hub in the entire North-East region of India. The gross economic product (GDP) of Guwahati metro was estimated at dollar 1 billion in 2010.

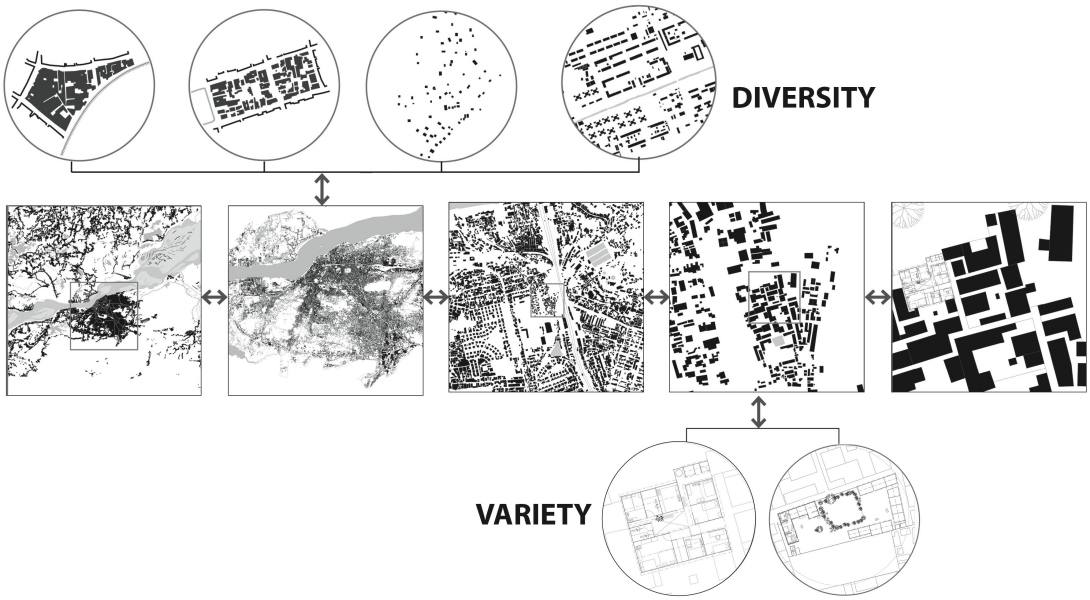
4.6 Guwahati a multi-layered evolving city?

The building of cities has a long and complex history and although city planing as an organised profession is relatively recent, all cities and their forms, whether formal-planned or evolved, display various degrees of forethought and conscious design decisions in their form and functioning. The legendary "Pragjyotishpur" or the "City of Eastern Light" has its own distinctive urban story to tell which, even today, is far from complete. The lens of the past allowed us to better understand long term societal processes including successes and failures of different urban forms and planning

interventions which are key to building an evidence-base for the future growth and development of the city. Ancient and pre-industrial urban planning in Guwahati showed a more general and common sense phenomenon of co-ordination among and between physical structures and natural environment, giving the city its overall shape and form. Nature was an integral part of the traditional settlement and the physiography was used in favour of defence acting as a natural citadel. The city also moved beyond the simplistic dichotomy of planned versus evolved. Since the society had sophisticated religious, political, and military hierarchies, precincts devoted to the activities of the elite were often planned and regular in form while rest of the residential areas often grew by a slow process of accretion that produced complex, irregular patterns. Guwahati rebuilt itself after the Burmese War during the Colonial Period, the ancient dense urban fabric was partly replaced by dispersed colonial bungalows built according to plan, that stood apart from the rest of the city. Its growth during this period was also unusual as compared to other colonial towns in India since the early industrialisation did not lead to urbanisation but decentralised growth. The city started to grow as an urban centre with the onset of transportation and communication links. Following the colonial rule, Guwahati's growth has not been constant and gradual but gathered pace in the years after India's independence in 1947 and also after 1972, when the state government moved to the Guwahati suburb of Dispur. Since then the city has been growing faster than anticipated, resulting in subsequent change of urban form and continual extension of the administrative boundaries to incorporate growth.

Today, the multilayered, evolving and even incomprehensible city of Guwahati, can neither be explained by a specific urban order nor through principles of rational and functional planning. However, hidden in its own complexities are various ways of inhabiting the city that are a result of different social, political and economic forces – working together formally or informally, planned and evolved - in response to the present day constraints of urbanisation. The analysis of the city in the modern context highlighted the fact that the focus on the overwhelming need for new housing, industry and infrastructure has led to an irreparable break in what should have been a gradual and well-thought evolution and growth of the city. Rushing into the modern age in a few short decades had left little time for Guwahati to restructure its social and physical forms causing some of the fundamental challenges to sustainable urban development. Regardless of the adoption of number of Master Plans post country's independence and several efforts from a controlled, top-down legal planning system engaged in city building, physical, social and environmental vulnerability of Guwahati is becoming unprecedented in both extent and significance, worsened by the intensity and complexities of urbanisation.

Figure 4.17: Urban form diversity and variations



[Diversity in form and variation within each component type play an important role in adaptability and robustness of complex urban systems]

Such a growth does not fit in easily with the city's efforts to becoming a global player and one of the future smart and most admired state capitals of the 21st Century India, thus calling for an acute need to revisit the (sustainable) planning practices adopted in the city. As the Chief Minister, Tarun Gogoi (The Times of India, 2014), stated: "*Guwahati, with well-established rail and road connectivity, has the potential to become a smart city. What is needed is sustainability."* Perhaps, it may be too simplistic and ambitious to assume that a smart and sustainable Guwahati can be entirely planned through top-down controlled paradigms. Throughout modern history, plans for Guwahati have been proposed as a top-down response to perceived problems and the realisation of utopian ideals however, control has been not been sufficiently strict to enable their complete implementation. Moreover, such a strict control is neither possible nor desirable. It may be argued that an exploration of a convergence between two processes, bottom-up emergence and top-down planning, seen as a renaissance of urban-planning, may be necessary to lead to a successful process of building sustainable and smart Guwahati of the future whose urban forms are rooted in the city's distinctive culture, antiquity, topography and location.

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Chapter 5

INFLUENCE OF URBAN FORMS ON SOCIAL SUSTAINABILITY: AN EMPIRICAL EVALUATION

This chapter presents the empirical part of the research. It is laid out in three parts. Part-1 gives an overview of the research design, methods and experiments used for data collection and analysis. Part-2 and Part-3, presents the empirical evaluation of the relationship between urban form and social sustainability using quantitative and qualitative research methods respectively at two different spatial scales.

Part-1 - Research design: an overview

5a.1 Choice of research methods and procedures

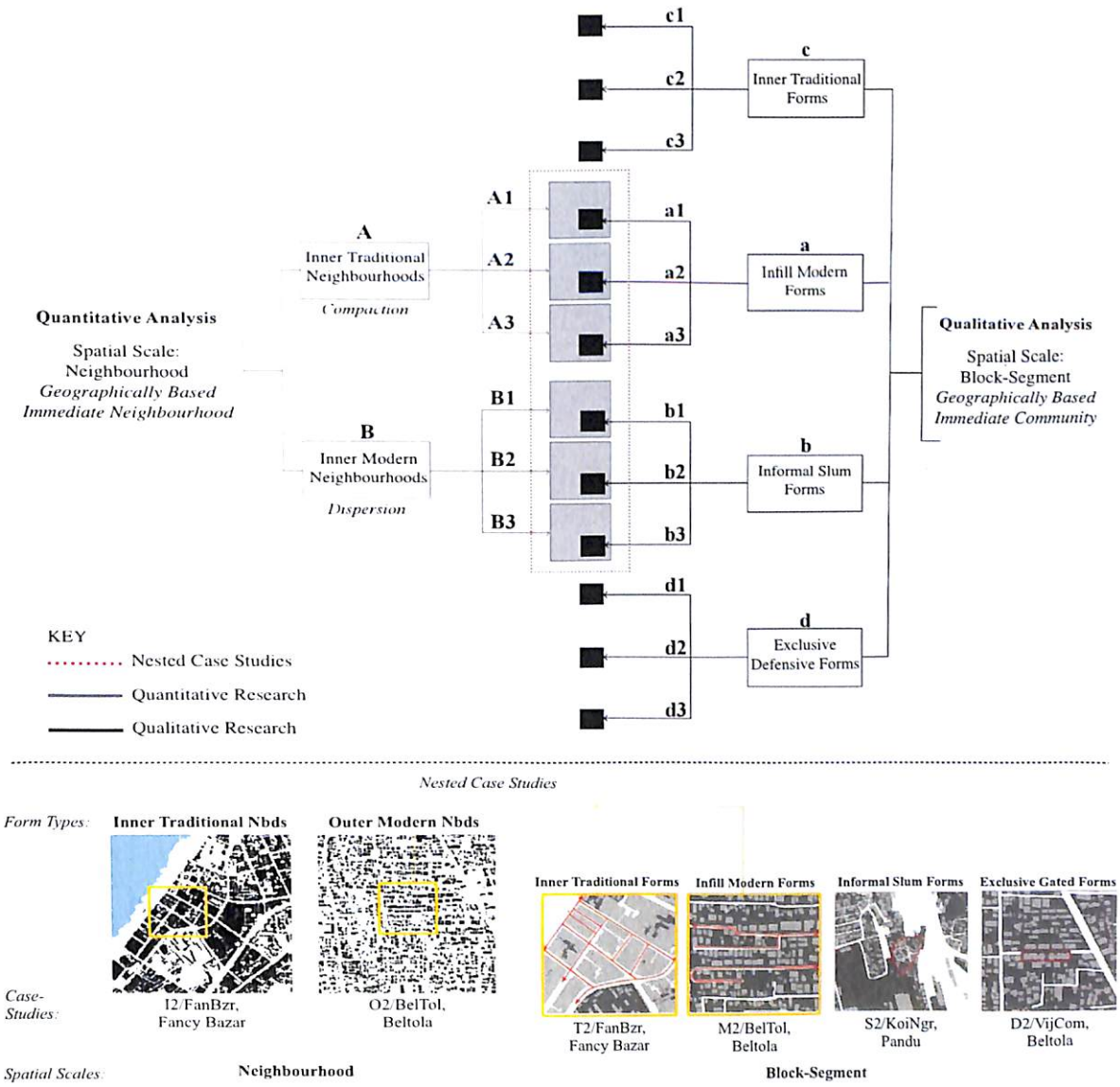
With their development and legitimacy, use of both - qualitative and quantitative research methods (Appendix-4) has been expanding especially in programs where "*a series of projects are interrelated within a broad topic and are designed to solve an overall research problem*" (Morse, 2003 p.196). Although much under debate (Oakley, 1999) and relatively new with a shortage of examples of its application (Mingers 2001), multi-method research strategies where "*more than one method or worldview is used*" (Tashakkori and Teddlie, 2003 p.11), were employed to inform the research questions in order to enhance dimensional insight and illuminate the complexity of the phenomenon under study (Bryman, 2006; Creswell, 2003). Such an approach to investigating the effects of urban form on social sustainability offered both, generalisable 'breadth' (usually obtained via quantitative methods) and context-specific 'depth' (usually obtained via qualitative methods) (Bamberger, 2000; Rao and Woolcock, 2003) which were essential in order to adequately understand social design and planning issues as well as establish a firm basis on which to draw policy recommendations.

Social sustainability depends upon the spatial scales at which the urban form has been studied and the relative strength of various forces operating at each scale. The research was therefore conducted at two levels or spatial scales - 'neighbourhood' and 'block-segment'. The quantitative research in form of a questionnaire provided numerical evidence at the neighbourhood scale and allowed for statistical analysis. Qualitative research was included for more in-depth understanding of the complex relationship and study of more detailed urban form variables at the level of a block-segment. Each, quantitative and qualitative research was conducted rigorously, independent and complete in itself. The priority between the two methods was equal and results of the two methods in case of nested case studies (Figure 5.1) were integrated during the interpretation phase (Creswell, 2003).

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Triangulation[1] of outcomes from two different methods strengthened the findings and increased robustness of the results. Cross-validation was also achieved when different kinds and sources of data converged and were found congruent (Kaplan and Duchon 1988). The limitations of both qualitative and quantitative methods were therefore, mitigated by triangulation in which 'unexpected results from any of the methods are explained through the findings generated by the other thus, offering a more complete understanding' (Bryman, 2006; Davies, 2003). Collecting different kinds of data by different methods from different sources provided a wider range of coverage that resulted in a fuller picture of social sustainability which would have been difficult to achieve otherwise (Bonoma,1985).

Figure 5.1: Nested case-studies



[1] Triangulation – seeking to validate data and results by combining a range of data sources, methods, or observers; creativity – discovering fresh or paradoxical factors that stimulate further work; and expansion – widening the scope of the study to take in contextual aspects of the situation (Tashakkori and Teddlie 1998).

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The appropriate methods and techniques both, quantitative and qualitative, employed to test the influence of urban forms on social sustainability are described in the Table 5.1.

Table 5.1: Research design and adoption of quantitative / qualitative research methods

***Quantitative and Qualitative* Research Methods**	
QUANTITATIVE	**QUALITATIVE**
Scale: Neighbourhood (geographically based immediate neighbourhood)	Scale: Block-Segment (geographically based immediate community - street or commune)
Data Collection	
Primary data collection engaged intensive fieldwork through questionnaire surveys, interviews, observations, mapping, measurement, verification, photo documentation.	
Social Sustainability	
(random sampling)	(purposive sampling)
Self-administered questionnaire surveys consisting of close-ended questions based on 5 point Likert Scale.	Semi-structured open-ended personal interviews and focussed group interviews, key-informant interviews, life histories, non-participant observation.
Urban Form	
Data for urban forms at different scales collected through field surveys and observation schedules.	
Quantitative data generation involved measuring and analysing urban form through morphological study. A comparative atlas for each case study is created using "Base Mapping' and 'Overlay mapping'.	Qualitative data generation included, urban form observations through schedules, field surveys and participatory mapping.
Data Analysis	
Quantitative data (neighbourhood scale) are tested through correlation technique. Relationship between the independent variables of urban form and the dependent variable of social sustainability are tested using multivariate analysis of variance (MANOVA) in SPSS 20.	Qualitative data (block-segment scale) are analysed using grounded theory involving 1) Research Questions 2) Theoretical Sampling and Data Collection; 3) Coding and Categorising; 4) Analysing and Examining Relationships; 5) Authenticating Conclusions; 6) Reflexivity and Theory Development.
Method Triangulation	
Qualitative and quantitative outcomes, in case of nested case studies (block-segment case studies nested within neighbourhood level case studies) are triangulated to bring salient points together.	

5a.2 Selection of spatial scales

From the detailed profile for the city of Guwahati as discussed in the previous chapter, it is clear that Guwahati represents a composite form developed through ages and shows a spectrum of varied urban typologies and social patterns that developed in response to local combinations of dynamic forces of the past and present. It is therefore a layered city and hence, no area can be seen as purified identities. Yet, based on the urban form variations, some distinct typologies emerged. This research focused on urban form

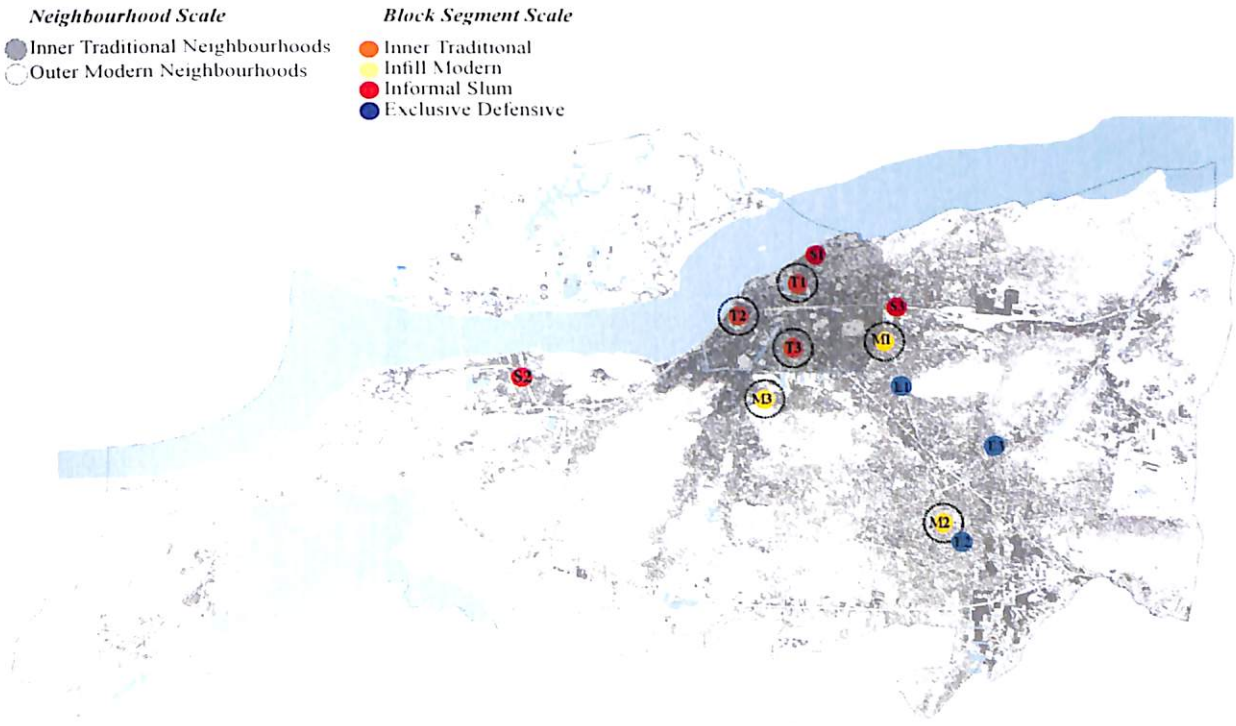
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variables at two scales (Table 5.2), both considered to potentially relate to different resident experiences and subsequently social sustainability outcomes.

Table 5.2: Spatial scales for empirical investigations

1	**Neighbourhood**	2	**Block Segment**
	Geographically based immediate neighbourhood		Geographically based immediate community
	Coverage: 1600m x 1600m		Coverage: block segment (street / commune)
	Examines broad-based urban form variations		Examines detailed urban form variations
	2 typologies, 6 case studies		4 typologies 12 case studies
	Associated quantitative data		Associated qualitative data

Figure 5.2: Location of case-studies



Since no set method or an ideal way of defining a neighbourhood and its spatial boundaries was obtained from the literature review, for the purpose of this research, heuristic approach was adopted. Initial observations about different localities in Guwahati were made and residents perceptions were noted. It became obvious that neighbourhoods or localities 1) were not self-contained entities 2) their spatial use and resources overlapped 3) they had ambiguous boundaries 4) they were perceived as a nested concept rather a mere unitary concept 5) their dual notional aspects, both spatial

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and perceptual, further added complexity 6) government defined administrative boundaries, wards were too weak and ill-defined to represent neighbourhood in reality. Geographically based immediate neighbourhoods or localities in the city (both 'inner traditional' and 'modern dispersed') with accepted walking distance of 10 minutes or 800m radius (Ferguson and Woods, 2010; Advani and Tiwari, 2005; Sustainable Neighbourhoods, 2005; Urban Design Compendium, 2000) were therefore, demarcated within approximate local area boundaries obtained using information collected from either previous attempt by endogenous or exogenous groups or existing local perceptions.

Part-2 Quantitative Research

The hypothesis for the quantitative research is: "**Urban Forms (at spatial scale of neighbourhood) significantly affect various aspects of Social Sustainability**"

The key question it investigates is: Do urban forms at the scale of neighbourhood influence social sustainability? If yes, to what extent and in what ways?

Further questions under investigation are: (1) Do urban forms with higher levels of i. street connectivity and integration, ii. amount of accessible open recreational spaces, iii. mix of uses, iv. densities and v. small compact blocks display significantly higher levels of social sustainability amongst its residents? (2) Are traditional neighbourhood forms of cities (characterised by compaction) more sustainable than the modern neighbourhoods (characterised by dispersion), when different aspects of social sustainability are considered in the Indian context?

5b.1: Neighbourhood scale: sampling design and data collection

At the scale of neighbourhood, Guwahati can be differentiated by two broad-based urban forms: 'Inner Traditional Neighbourhoods (ITN)' and 'Outer Modern Neighbourhoods (OMN)' for which three case-studies each were identified based on the profile study of Guwahati. Quantitative data for measuring the associated social sustainability outcomes were collected using self-administered close-ended questionnaires which included standard questions used for measuring social capital, cohesion, equity and/or inclusion by a variety of major government and non-government surveys (Social Capital Question Bank based on the ONS survey matrix, November 2001; Social Capital Assessment Tool (World Bank); Woodcraft et al., 2013; Dempsey, 2011; Jenks and Jones eds., 2010).

A pilot study was conducted to test the questionnaire for potential misunderstandings or problems and consequently correct possible weaknesses and inadequacies before the actual data collection commences (Sarantakos, 2005). The questionnaire was pilot-tested

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with a minimum of 10 respondents in two case-study neighbourhoods (pilot study, n=21) with a total of 31 questions for 7 social sustainability components. However, due to issues associated with resident's sensitivity with respect to sharing their true views on social diversity of the place they live, the social sustainability component focussing on residents perception on 'Social Mix /Tolerance (towards diversity)' was eliminated and the research proceeded with a total of six components (discussed later in this chapter). The original items for some components were also altered to capture concepts arising from the initial survey that were deemed relevant. Finally, while most questions remained as close as possible to their original wording, some changes found necessary for consistency with the larger social sustainability questionnaire were made. The final pool of questions was then circulated to a panel of experts from related disciplines in the institute and was also disseminated to a sample of colleagues for feedback on the appropriateness and clarity of items.

The final questionnaire consisted of 28 questions in total including 16 questions based on 5 point Likert Scale and 12 questions of which 8 were controlled variables such as personal, house and neighbourhood profiles and 4 multiple choice questions. The items or measures for six components of social sustainability used for self-administered questionnaire surveys are listed in Table 5.3.

Table 5.3: Items or quantitative measures for social sustainability

CODE	MEASURE
1. Social Interaction / Social Networks	
IntNet1	Number of neighbours interacted with (seen socially, greet or chat)
IntNet2	Frequency of interaction with neighbours
IntNet3	Number of close friends and relatives in the neighbourhood
2. Trust / Reciprocity	
TruRci1	Number of neighbours trusted for social support
TruRci2	Frequency of exchanging small favours with neighbours
TruRci3	Neighbourhood as 'a place where neighbours look out for each other'
3. Place Attachment / Pride	
SatAth1	Residents' views 'likes and dislikes' about the neighbourhood
SatAth2	Neighbourhood as 'a place to live'
SatAth3	Attachment to the neighbourhood
PriPlc4	Pride in the neighbourhood
4. Social Participation / Community Engagement	
ParEng1	Frequency at which local activities, gatherings and celebrations are organised
ParEng2	Frequency of participation in local activities, gatherings and celebrations
ParEng3	Extent to which residents pull together to improve the neighbourhood
ParEng4	Extent to which residents can influence decisions that affect their neighbourhood
5. Fear of Crime / Perception of Safety	
PcvSaf1	Perceived problems in the neighbourhood
PcvSaf2	Neighbourhood as a 'safe place to live'

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6. Basic Services and Local Facilities (availability and accessibility)	
LocFac1 LocFac2 LocFac3 LocFac4	Perceived issues with respect to basic service provision (3 most imp.) Perceived issues with respect to local facilities/amenities provision (3 most imp.) Rating for provision of different local facilities and amenities Rating for physical accessibility to different local facilities and amenities
Controlled Variables	
	House Profile
HsPrf1 HsPrf2	House Ownership House Type
	Neighbourhood Stability
NbStb1 NbStb2	Length of Stay Expected to move in the future
	Personal Profile
PerAge PerGen PerEdu PerOcc	Age in years Gender Education Occupation

The complete questionnaire is attached in Appendix -5.

Self-administered questionnaires require respondents to read and answer the questions themselves which has the advantages of being quicker to administer and being more convenient for respondents. Questionnaires were therefore, handed to neighbourhood leaders, secretaries or influential residents for distribution and were also handed directly (door-to-door) to the residents of each case study areas. Incomplete questioners were followed up at the time of collection of the questionnaire. Prior to the analysis each questionnaire was carefully edited and coded. The total number of responses for each case study area is given in Table 5.4.

Table 5.4: Sample and responses for quantitative research

No	UF Type	UF Description	No. of Case Studies	Responses for each Case Studies	Total Responses
1	Inner Traditional Neighbourhoods	Characterised by compaction. Urban form variables typified by higher densities, highly connected and integrated network of streets (permeability and walkability), higher land-use mix and smaller urban blocks	3	UznBzr = 52 FanBzr = 44 RehBri = 46	142
2	Outer Modern Neighbourhoods	Characterised by dispersion. Urban form variables typified by lower densities, slightly connected and integrated network of streets (lower permeability and automobile dominance), single or lower land-use mix and larger urban blocks	3	ZooRod = 57 BelTol = 48 KalPhr = 64	169
Total Responses					**311**

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5b.2 Neighbourhood scale: data analysis and hypothesis testing

5b.2.1 Measuring urban form

The urban form was measured and analysed using morphological study.

A comparative atlas for 6 case-studies at neighbourhood scale covering a geographical area of 1600x1600 meters (800m r) were first created using: 1) 'Base Mapping' which involved generating base maps for each case-study neighbourhoods in AutoCad using high resolution satellite imaginary. 2) 'Overlay mapping' which involved creating analysis maps with different mapping layers or rendering in AutoCad and/or Photoshop softwares allowing addition or subtraction of layers of information to reveal patterns and relationships that would not otherwise be obvious. Quantitative information or measurements are extracted using area calculations in AutoCad or Measurement Logs in Photoshop software.

The selected urban form components were measured using following methods. The detailed values for each urban form components are tabulated in Appendix-6.

- ***Measuring Open Spatial Network:***

-Streets: Syntactic values (for global integration [HH] and local integration [HH]R3 using DepthMap in Space Syntax[2]).

-Open Spaces: Syntactic values (for global integration [HH] and local integration [HH]R3 of key access routes to open spaces using Space Syntax analysis) and numerical values for area under open recreational use calculated from open space map using AutoCad.

- ***Measuring Landuse:***

-Land-use Ratio: Ratio of total residential land-use to all other uses. Numerical values calculated from 'land-use' map using Adobe Photoshop, Measurement Log.

-Land-use Diversity (variety and density of different uses): Scores on the Simpson's Index of diversity for land-use mix. Numerical values calculated from land-use map using Adobe Photoshop, Measurement Log.

$$D = \frac{\sum n_i(n_i - 1)}{N(N-1)}$$

Simpson's Diversity Index

N = the total of all land uses

ni = the individual land uses

- ***Measuring Density***

-Population Density: Number of people per hectare. Numerical values for approximate average densities calculated using ward wise population information (Census 2011).

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[2] Space Syntax Analysis Technique is discussed in section 5b.2.2

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-*Figure Ground Ratio*: Ratio of total building footprint to total ground coverage. Numerical values calculated from 'figure-ground' map using Adobe Photoshop, Measurement Log.

- ***Measuring Blocks***

-*Block Area* (Size of the Blocks): S=< or equal to 20,000m2, M=20,001-40,000m2; L=40001-60000, XL=60001-80000, XXL=>80000m2

-*Compactness Ratio* (Shape of the Blocks): The compactness ratio indicates the geometric properties of the block. Also quoted in Selkirk (1982) as the "circularity ratio is calculated as [4π A/p2] where A=area of the block and p= perimeter of the block.

-Block measures are calculated by assuming street blocks as enclosed entities and obtaining the numerical values for their area and perimeter using AutoCad software. The size measures are represented in the form of colour coded block maps.

5b.2.2 Selection of analysis techniques

Different data analysis techniques used for this research have been briefly discussed below in order to gain a general understanding of their strengths, limitations and relevance to the subject under investigation prior to the analysis of the quantitative data.

- ***Morphological Technique:***

Urban Morphology is the study of the city as human habitat (Moudon 1997). The term morphology was originally coined by Johann Wolfgang von Goethe (1749-1832), the famous German writer and polymath whose interests covered poetry, drama, literature, philosophy, and biology. While commonly known as a branch of biology, in the context of the built environment, urban morphology is defined variously as "*the study of urban form*" (Cowan, 2005), "*the science of form, or of various factors that govern and influence form*" (Lozano, 1990, p.209), "*the study of the physical (or built) fabric of urban form and the people and processes shaping it*" (Urban Morphology Research Group, 1990) and "*... an approach to conceptualising the complexity of physical form. Understanding the physical complexities of various scales, from individual buildings, plots, street-blocks, and the street patterns that make up the structure of towns helps us to understand the ways in which towns have grown and developed*" (Larkham, 2005). Urban morphology, deals with the structure and character of an urban area by examining the patterns and process of its development giving clues about the spatial configurations embedded in social relations. It covers a wide area of spatial research including both qualitative techniques such as the use of the figure-ground or tissue analysis (Caniggia and Maffei, 1979; Moudon, 1986; Oswald and Baccini, 2003) as well as quantitative techniques for capturing the structural properties of urban form (Hillier, 1996; Batty and Longley, 1996; Batty, 2001; Marshall,2005).

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- ***Space Syntax Technique:***

Originally conceived by Bill Hillier and colleagues at University College London in the late 1970s as a tool to help architects simulate the likely social effects of their designs, Space Syntax is a set of techniques for the analysis of spatial configurations. It has been used to determine the degree of integration or segregation of streets and other spaces within a neighbourhood, town or city, by studying the 'axial lines' and 'convex spaces'. 'Axial lines' indicate primary movement routes, while 'convex spaces' indicate gathering points and places where concentrations of axial lines come together. Space syntax measures distance between spaces topologically called depth which is the number of intervening lines that must be crossed to get from space to another. The minimum number of steps means integration (shallow) whereas the maximum number of steps means segregation (deep). Syntactic measures used in quantitative representations of building and urban layouts are:

i. Integration is a static global measure. It describes the average depth of a space to all other spaces in the system. The type of integration vary according to radius-n , the spaces of a system can be ranked from the most integrated to the most segregated. 1) Global Integration [HH]: how deep or shallow each line in is from all other lines. 2) Local Integration [HH]R3: how deep or shallow each line in is from all lines up to three levels away (radius- 3 integration)

ii. Connectivity measures the number of immediate neighbours that are directly connected to a space. This is a static local measure.

iii. Control value is 'the degree of choice that each space represents for its immediate neighbours as a pace to move to' (Hillier and Hanson, 1984).

iv. Intelligibility, the correlation between Connectivity and Global Integration values, is a key property of the spatial structure of any area. It is a synonym of legibility and measures the relationship between the overall urban space and local features. An intelligible system is one in which well-connected spaces also tend to be well-integrated ones and vice versa.

v. Synergy, is simply the correlation between local (R=3) and global (R=n) integrations. It asks whether the routes which connect the whole pass through the same spaces as those which form the heart of the neighbourhood?

vi. The scattergrams shows positive correlation between global integration / local integration and connectivity, controllability and intelligibility.

The open spatial-network is measured using syntactic values gathered through Space Syntax analysis (Hiller, 1983). The results of connectivity, global case studies spatial configuration analysis with each others are compared. The axial map of Heliopolis was

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drawn by AutoCAD program and exported as dxf. CAD file to UCL Depthmap software in order to get values of integration (with different radii), connectivity, mean depth, and intelligibility. The axial lines are represented from red to dark blue, red means the highest value of the parameter while dark blue means the lowest.

- ***Co-Relation Technique***

Correlation is a statistical technique used to measure the relation between two or more variables and to understand if they are related and if so, how? The scale of measurements used is interval based in which co-relation coefficients range between -1 and +1. The value of -1.00 shows a perfect negative correlation and value of +1.00 shows a perfect positive correlation. A value of 0.00 shows a lack of correlation[3]. While working with rating scales, correlations provide general indications or trends, as numbers in the rating scales have meaning, but that meaning isn't a precise quantity. Yet, many researchers continue to use it because the results reflect the real world scenarios.

- ***Relation Technique***

Relation technique is a statistical test, which measures the frequency of an answer. It is a form of assessment in which respondents are asked to select the best possible or closest answer (or answers) out of the multiple choices from a list. Multiple choice tests are seen as strongest predictors of respondents' opinion compared to interviews whose reliability improves with larger numbers of items on a test, and with good sampling.

- ***Multivariate Technique***

The major purpose of multivariate analysis of variance MANOVA is to determine the effects of one or more independent variables upon more than one correlated dependent variables. It is used when 1) There are more than one dependent variable, 2) Dependent variables are correlated, 3) Probability of any type I errors is high (which increases with number of variables). Multivariate analysis helps control the error rate, or the chance of getting something significant when in actuality it is not 4) A joint test for any significant effects among a set of variables at 1 legitimate α is required, 5) A direct test of the null hypothesis with respect to 'all' of the analysis' dependent variables is desired.

5b.2.3 Analysing urban form

The urban forms for different case studies were analysed using 'morphological analysis techniques'. The tools in the analyses of urban morphology for this research were based on three theories:

1) Trellis (system of connections or structure for ordering spaces): showing street network (Rudlin and Falk, 2001; Alaxender, 1966; Hiller, 1996).

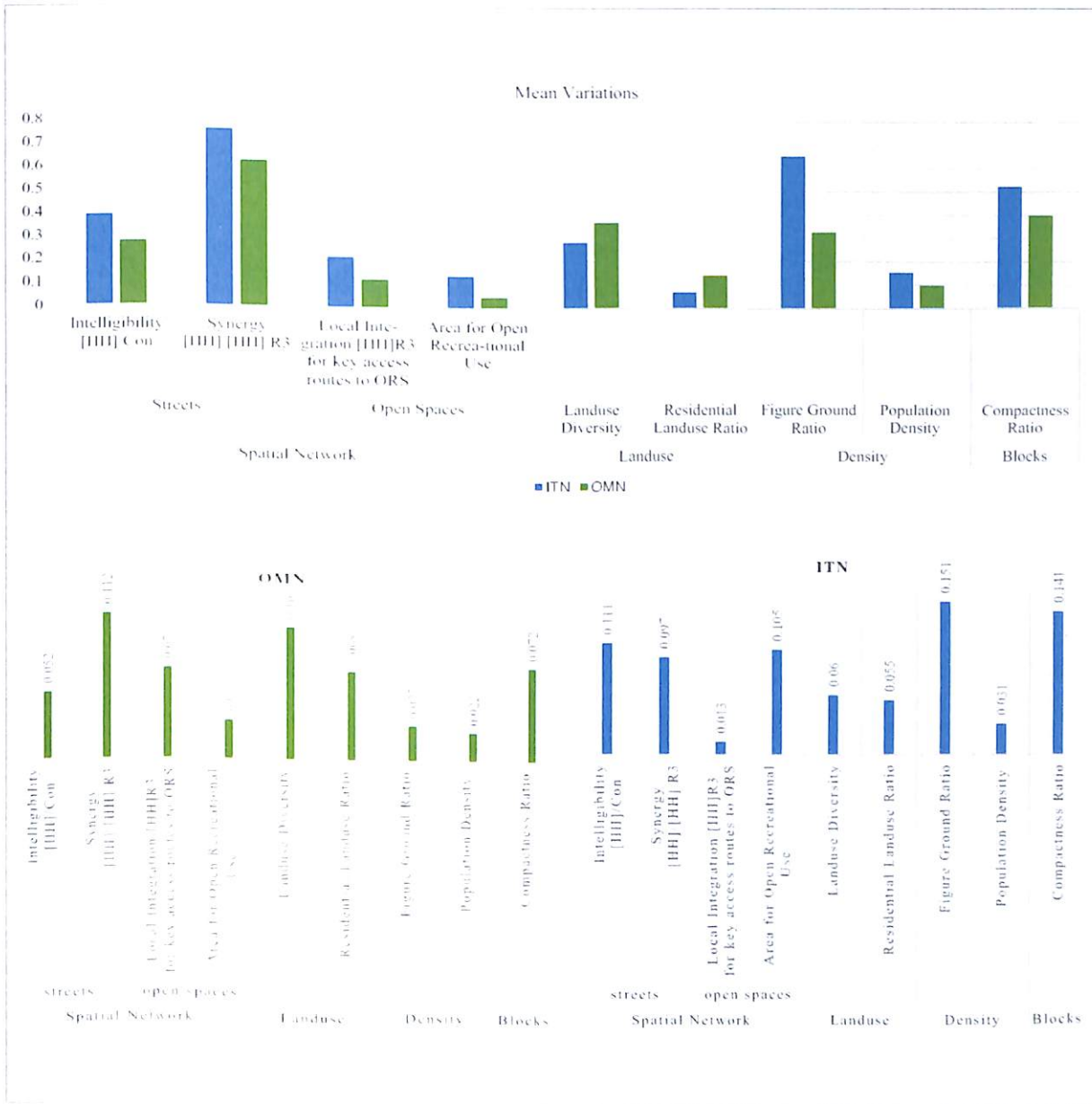
[3] http://www.statsoft.com/textbook/basic-statistics/ accessed in May 2011

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2) Built Form (ground patterns of mass and void, and activity distribution) showing the figure ground and land-use patterns (Caniggia and Maffei, 1979, Moudon, 1986; Oswald and Baccini, 2003).
3) Tissue (spatial anatomy in response to human needs): showing block and component characteristics (Tolentino, 2011; Ahmadi et al, 2012; Marshall and Çalişkan, 2011).

The comparative atlas and morphology of each of the 6 case studies are shown in Figures 5.4 and 5.5. Numerical values for the different urban form components are also given in Table 5.5. A detail analysis of each of the urban form variables are given in Appendix-7 and Appendix-8.

Figure 5.3: Mean variations and standard deviation of urban form variables for ITN and OMN



Inner Traditional Neighbourhood (ITN), Outer Modern Neighbourhood (OMN)

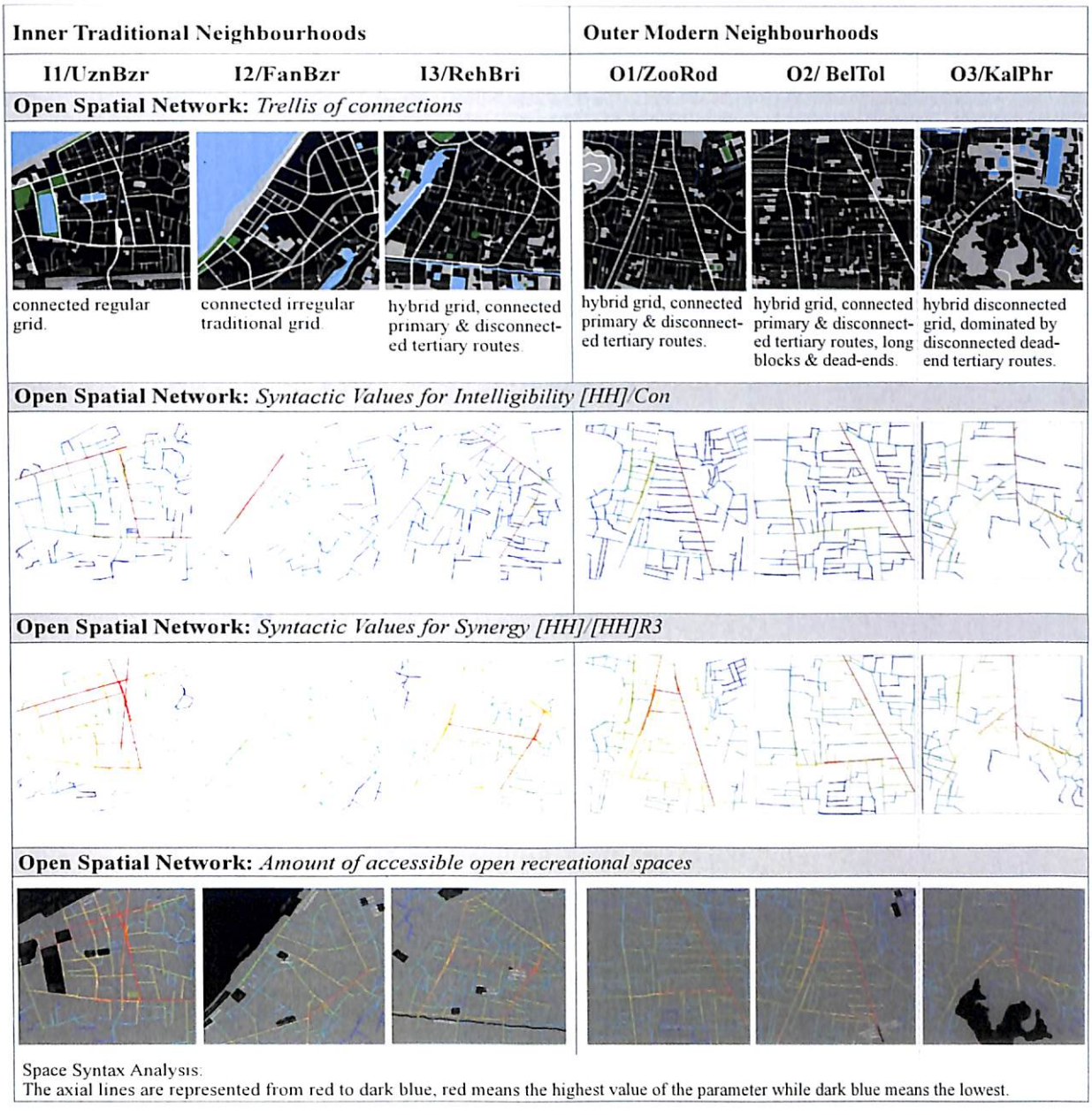
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Table 5.5: Measured numeric values for different urban form variable

No.	Form Typology	Urban Form Variables								
		Open Spatial-Network				Land-use		Density		Blocks
		Street		Open Spaces						
	Spatial Scale: Immediate Neighbour-hood	Intelligibility [HH]/ Con	Synergy [HH]/ [HH]R3	Local Integration [HH]R3 for key access routes to ORS	Area for Open Recreational Use	Land use Diver-sity	Residential Landuse Ratio	Figure Ground Ratio	Popula-tion Density*	Comp-actness Ratio
		Space Synta x	Space Syntax	Space Syntax (adjusted value, x/10)	Space Syntax (adjusted value, x/10)	Simpson's Index	Residential/ Other uses (adjusted value, x/10)	Built/ Open	People/ Hectare	Selkirk's Circulatory ratio
A	**Inner Traditional Neighbourhoods (ITN)**									
1	I1/UznBzr	0.510	0.832	0.214	0.257	0.347	0.120	0.592	0.119	0.561
2	I2/FanBzr	0.291	0.647	0.228	0.082	0.232	0.011	0.824	0.179	0.643
3	I3/RehBri	0.367	0.792	0.202	0.068	0.257	0.078	0.54	0.161	0.368
	Mean	**0.389**	**0.757**	0.215	0.1.36	**0.279**	**0.070**	**0.652**	**0.153**	**0.524**
	Median	0.367	0.792	0.214	0.0.82	0.257	0.078	0.592	0.161	0.561
	Standard Deviation	0.111	0.097	0.013	0.1.05	0.060	0.055	0.151	0.031	0.141
B	**Outer Modern Neighbourhoods(OMN)**									
4	O1/ZooRod	0.235	0.650	0.138	0.042	0.368	0.128	0.348	0.114	0.468
5	O2/ BelTol	0.332	0.721	0.179	0.019	0.467	0.214	0.337	0.073	0.407
6	O3/KalPhr	0.251	0.502	0.043	0.079	0.263	0.079	0.296	0.108	0.324
	Mean	**0.273**	**0.624**	0.120	0.047	**0.366**	**0.141**	**0.327**	**0.098**	**0.400**
	Median	0.251	0.650	0.138	0.042	0.368	0.128	0.337	0.108	0.407
	Standard Deviation	0.052	0.112	0.070	0.030	0.102	0.068	0.027	0.022	0.072
	*Numerical values for approximate average densities calculated using ward wise population information (Census 2011) ORS = Open Recreational Spaces									

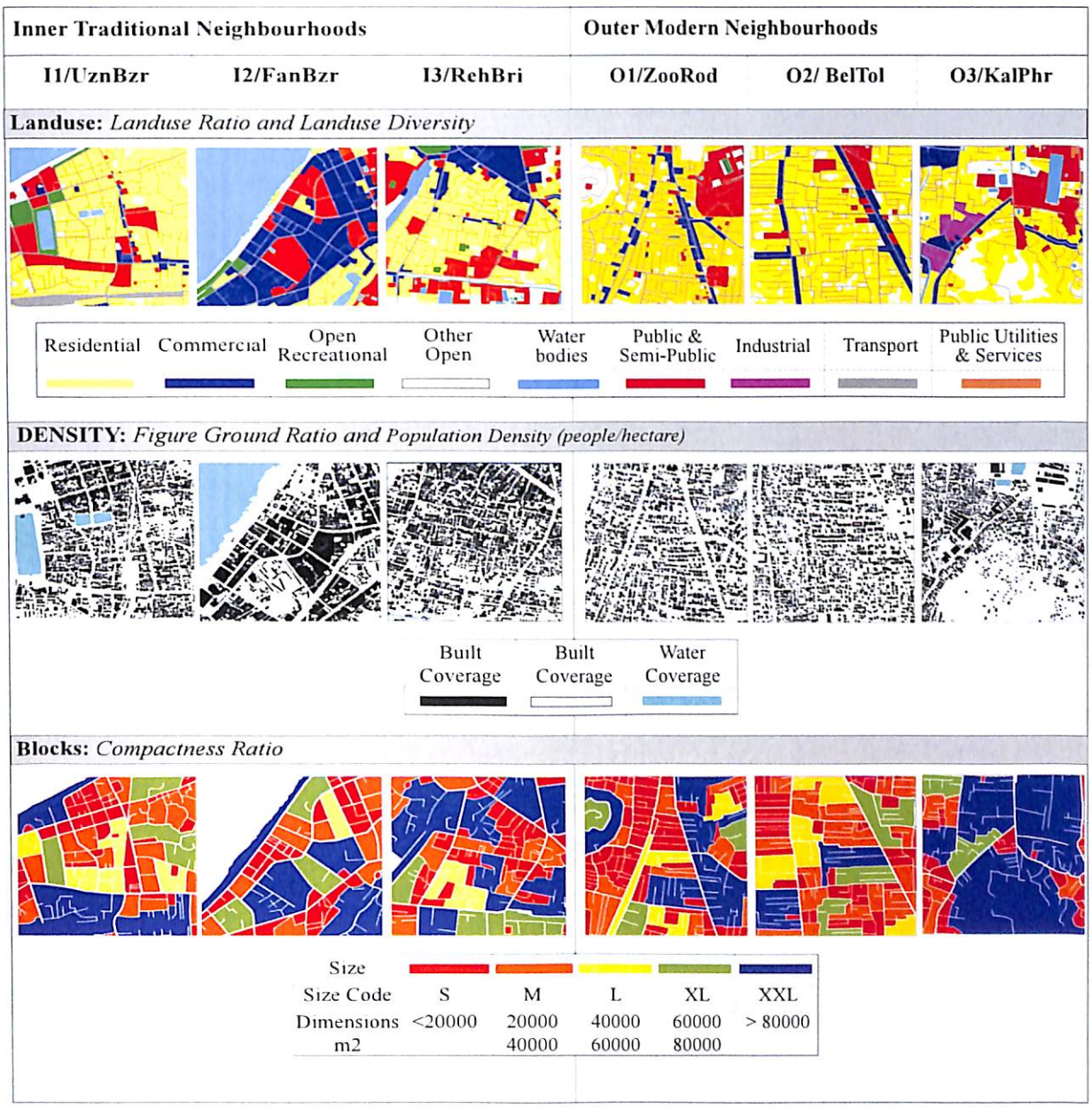
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Figure 5.4: Comparative Atlas (a) - Morphological analysis showing Open Spatial-Network for Inner Traditional Neighbourhoods and Outer Modern Neighbourhoods



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Figure 5.5: Comparative Atlas (b) - Morphological analysis showing Land-Use, Density and Blocks for Inner Traditional Neighbourhoods and Outer Modern Neighbourhoods



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5b.2.4 Analysing effects of broad based urban form variations on social sustainability: 2 typologies, 6 case studies (quantitative assessment)

The quantitative data to assess the influence of urban form on social sustainability was tested using multivariate analysis technique. The first step in the analysis was to examine the reliability of the scales used to measure the components of social sustainability.

- ***Reliability Test***

Table 5.6: Reliability statistics

Reliability Statistics				**Descriptive Statistics**			
Items	***Cronbach's Alpha***	***Cronbach's Alpha based on Standardized Items***	***No. of Items***			Std. Deviation	N
IntNet	0.804	0.805	3	LocFac3	3.79	0.848	311
TruRci	0.825	0.830	3	LocFac4	3.86	0.895	311
AthPri	0.812	0.816	3				
ParEng	0.731	0.736	4				

Correlations			
		LocFac3	**LocFac4**
LocFac3	**Pearson Correlation**	1	.669**
	Sig. (2-tailed)		0
	Sum of Squares and Cross-products	222.83	157.357
	Covariance	0.719	0.508
	N	311	311
LocFac4	**Pearson Correlation**	.669**	1
	Sig. (2-tailed)	0	
	Sum of Squares and Cross-products	157.357	248.328
	Covariance	0.508	0.801
	N	311	311
**. Correlation is significant at the 0.01 level (2-tailed)			

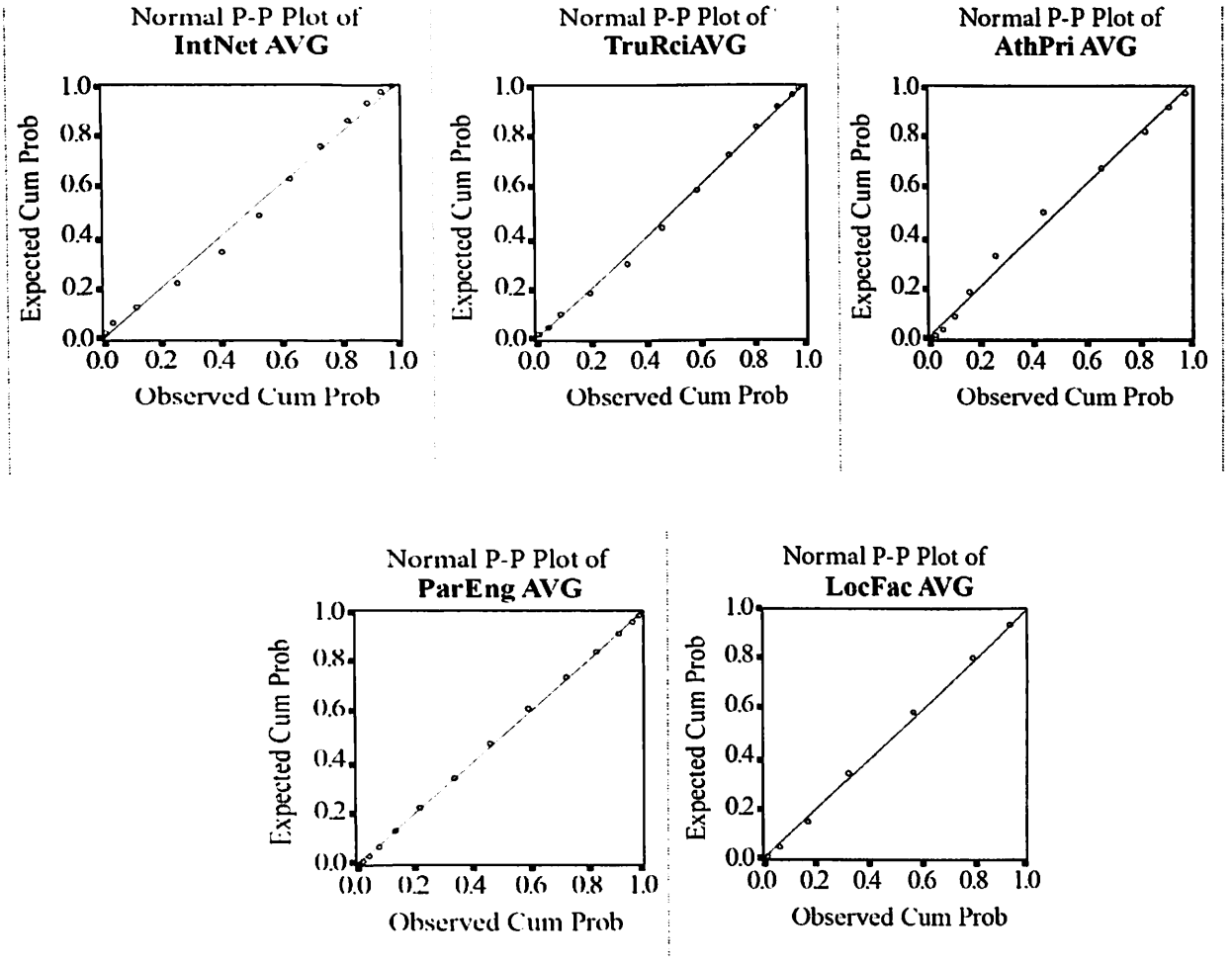
Cronbach's alpha was used to test the internal consistency or average correlation of items for components with three or more items in survey to gauge their reliability. The value of alpha for all component measures (IntNet, TruRci, AthPri, ParEng) was >0.7 and between 0.8-0.9 thus, indicating 'good' internal consistency of the items in the scale (George and Mallery, 2003). Standard single but most important variable employed in various researchers [for example Rainwater (1974), Woodcraft et al. (2013), Jenks and Jones eds. (2010), Dempsey et al. (2011)] was used to measure the perceived sense of safety (PcvSaf) in one's own neighbourhood. In case of components (LocFac) with less

than three items under survey, Pearson Correlation, in which the coefficient (Product-moment correlation coefficient), r, describes the strength and direction of a linear relationship between two variables, was used to test the scale reliability. The value r was found greater than 0.5 and between 0.6-0.8 indicating 'strong' correlation between two variables.

- ***Normality Test***

The Normality test was conducted using graphical method. Graphical methods visualized the distribution of a random variable and compare the distribution to a theoretical one using plots. The P-P Plots created using SPSS 20 software are shown in Figure 5.6.

Figure 5.6: P-P Plots



- ***Hypothesis Testing***

The hypothesis is tested using Multivariate Analysis of Variance (MANOVA) in SPSS 20 software which allowed to determine the effects of one or more independent variables (urban form) upon more than one correlated dependent variables (social sustainability).

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First, multivariate analysis of variance was conducted for urban form variables for two typologies 'Inner Traditional' and 'Outer Modern' Neighbourhoods (Appendix-9). The tests showed that there was a significant effect of different form types on all the aspects of social sustainability and this correlation is positive. (Figure 5.7). The significance values of the F-ratios which confirm that urban form variations for IntNet, TruRci, AthPri, ParEng, LocFac, PcvSaf have significance value less than 0.05 are described in Table 5.7.

Table 5.7: Multivariate test of Variance - for 2 form types

Descriptive Statistics				
	UF_TYPE	Mean	Std. Deviation	N
IntNet AVG	1	3.37	0.88	142
	2	2.76	0.87	169
	Total	3.04	0.93	311
TruRci AVG	1	3.07	0.82	142
	2	2.59	0.91	169
	Total	2.81	0.90	311
AthPri AVG	1	3.86	0.67	142
	2	3.53	0.78	169
	Total	3.68	0.75	311
ParEng AVG	1	3.24	0.64	142
	2	2.89	0.74	169
	Total	3.05	0.72	311
LocFac AVG	1	4.20	0.66	142
	2	3.52	0.76	169
	Total	3.83	0.80	311
PcvSaf2	1	3.65	1.17	142
	2	3.24	1.12	169
	Total	3.43	1.16	311

Tests of Between-Subjects Effects									
Source	**Dependent**	**Type III**	**df**	**Mean**	**F**	**Sig.**	**Partial**	**Noncent.**	**Ob.**
NbStb1	AthPri AVG	4.391	1	4.391	10.277	0.001	0.033	10.277	0.892
NbStb2	AthPri AVG	6.687*	1	6.687	15.652	.000*	0.049	15.652	0.976
PerAge	AthPri AVG	1.595	1	1.595	3.733	0.054	0.012	3.733	0.486
PerGen	PcvSaf2	75.871	1	75.871	72.413	0.000	0.194	72.413	1
PerEdu	IntNet AVG	14.741	1	14.741	22	0.000	0.068	22	0.997
	ParEng AVG	9.841	1	9.841	22.301	0.000	0.069	22.301	0.997
UF Type	IntNet AVG	12.347*	1	12.347	18.428	0.000*	0.058	18.428	0.99
	TruRci AVG	11.411	1	11.411	15.41	0.000	0.049	15.41	0.975
	AthPri AVG	3.338	1	3.338	7.814	0.006	0.025	7.814	0.796
	ParEng AVG	4.76	1	4.76	10.787	0.001	0.035	10.787	0.906
	LocFac AVG	26.115	1	26.115	52.541	0.000	0.149	52.541	1
	PcvSaf 2	6.311	1	6.311	6.023	0.015	0.02	6.023	0.687
*Adjusted R Squared									

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Later, the multivariate test was again conducted but for all the six case study areas and it showed the same results (Table 5.8). Details of the controlled variables and outcomes for basic services and local facilities are given in Appendix-9.

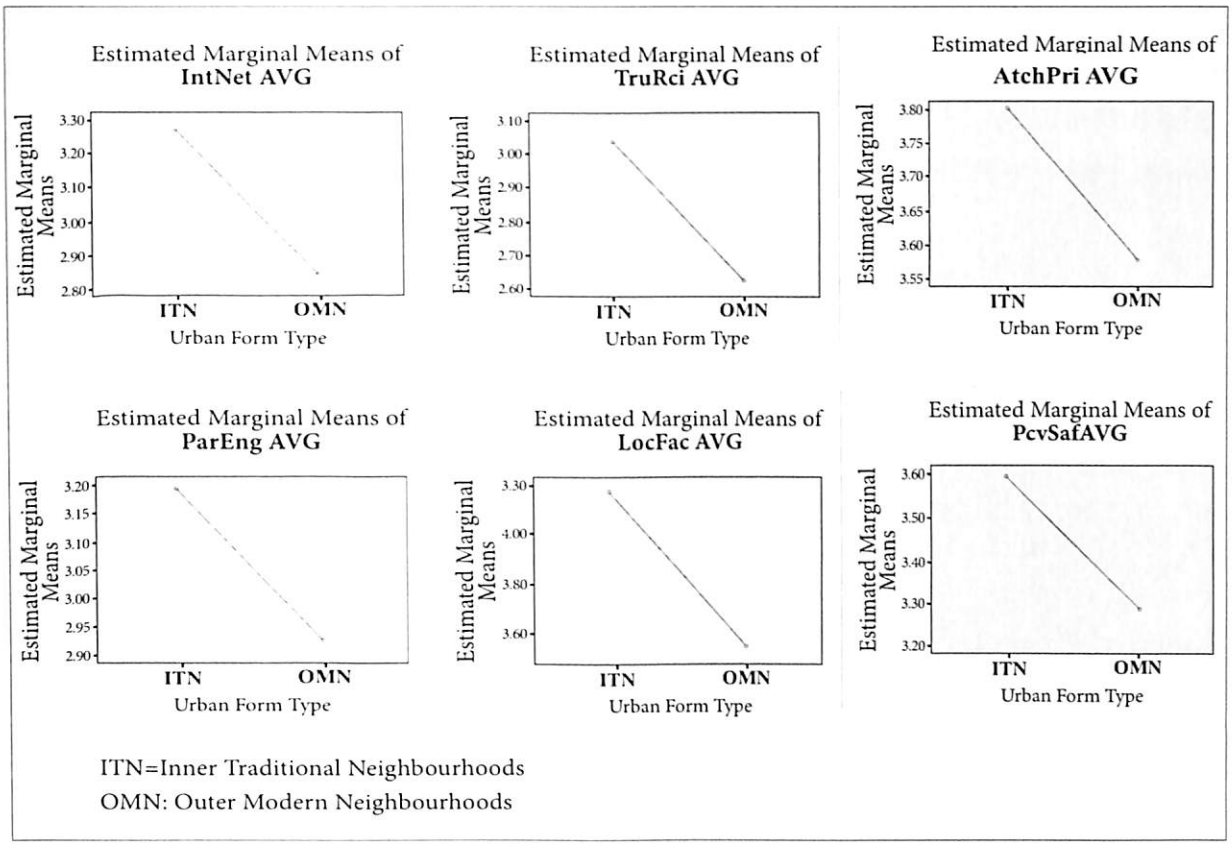
Table 5.8: Multivariate test of Variance - for 6 case studies

Descriptive Statistics					Descriptive Statistics				
	Case	Mean	Std.	N		Case	Mean	Std.	N
IntNet AVG	1	3.07	0.76	52	TruRci AVG	1	2.79	0.73	52
	2	4.05	0.72	44		2	3.37	0.77	44
	3	3.05	0.79	46		3	3.10	0.86	46
	4	2.95	1.02	57		4	2.78	1.03	57
	5	2.4	0.74	48		5	2.43	0.96	48
	6	2.79	0.77	64		6	2.54	0.71	64
	Total	3.03	0.92	311		Total	2.81	0.90	311
AthPri AVG	1	4.02	0.59	52	ParEng AVG	1	3.00	0.65	52
	2	3.65	0.78	44		2	3.57	0.55	44
	3	3.86	0.57	46		3	3.17	0.56	46
	4	3.84	0.83	57		4	3.03	0.87	57
	5	3.28	0.79	48		5	2.79	0.72	48
	6	3.42	0.62	64		6	2.82	0.61	64
	Total	3.67	0.74	311		Total	3.04	0.71	311
LocFac AVG	1	4.24	0.67	52	PcvSaf2	1	3.67	1.11	52
	2	4.44	0.63	44		2	4.09	0.96	44
	3	3.93	0.59	46		3	3.2	1.27	46
	4	3.88	0.72	57		4	3.14	1.24	57
	5	3.19	0.75	48		5	3.33	0.95	48
	6	3.42	0.66	64		6	3.27	1.11	64
	Total	3.83	0.79	311		Total	3.43	1.15	311

Tests of Between-Subjects Effects									
Source	**Dependent Variable**	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**	**Noncent. Parameter**	**Observed Power**
NbStb1	IntNet AVG	9.19	1	9.19	15.23	0.000	0.04	15.23	0.97
NbStb2	AthPri AVG	5.59*	1	5.59	13.55	.000*	0.04	13.55	0.95
PerGen2	PcvSaf2	68.41	1	68.41	66.77	0.000	0.18	66.77	1.00
PerEdu3	ParEng AVG	6.54	1	6.54	15.35	0.000	0.04	15.35	0.97
Case Study	IntNet AVG	34.68*	5	6.93	11.49	.000*	0.16	57.44	1.00
	TruRci AVG	20.32	5	4.06	5.64	0.000	0.08	28.20	0.99
	AthPri AVG	9.28	5	1.85	4.49	0.001	0.07	22.49	0.97
	ParEng AVG	10.93	5	2.18	5.12	0.000	0.07	25.63	0.98
	LocFac AVG	41.85	5	8.37	18.57	0.000	0.23	92.85	1.00
	PcvSaf2	17.37	5	3.47	3.39	0.005	0.05	16.95	0.90
*Adjusted R Squared									

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Figure 5.7: Graph showing positive co-relation between two urban form typologies at neighbourhood scale and different components of social sustainability



Part-3 Qualitative Research

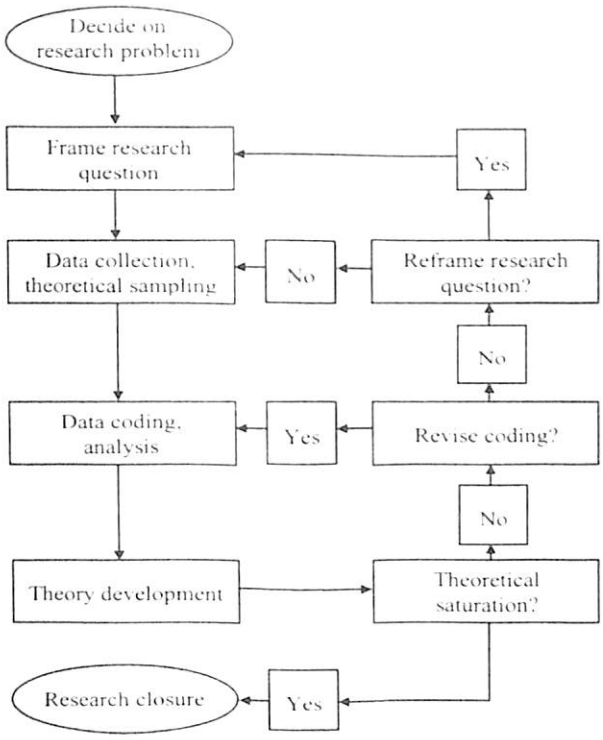
Qualitative research, described as an inductive process, in which theories or hypotheses, explanations, relationships and conceptualisations are constructed from details provided by the participants, were used to gain further understanding of the influence of urban forms on social sustainability at the scale of block-segment. The aim of the qualitative research was two folded 1) to provide in-depth understanding of the relationship 2) to study the effects of more detailed urban form variations on social sustainability which was not possible to assess through the quantitative research conducted at the neighbourhood scale. Qualitative and quantitative research were thus, not seen in contraposition to each other but to generate richness of understanding and interpretations.

Qualitative research is also described as an unfolding model that occurs in a natural setting that enables the researcher to develop a level of detail from high involvement in the actual experiences (Creswell, 1994). There are several categorisation of research designs in qualitative research however, none has been universally agreed. The number of research strategies summarised under the qualitative umbrella has increased

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significantly in the past two decades, and is still increasing. Each additional field that works more intensely with these methods gives them a new twist, adds ideas, and develops its own techniques (Denzin and Lincoln, 2000). Creswell (et al., 2003) has listed five strategies of inquiry in qualitative research - narratives, phenomenological studies, grounded theories, ethnographic and case studies. Other types of qualitative research strategies include hermeneutic research, naturalistic inquiry, ethnomethodology, qualitative case study, participatory action research, and grounded theory. This research employed the method of grounded theory.

Figure 5.8: Grounded theory flow chart (Source: Bitsch, 2005, p.78)



Founded on the seminal 1967 book 'The Discovery of Grounded Theory' (Glaser and Strauss, 1967), the grounded theory tradition has now become diverse and somewhat fractured[4] (Sbaraini et al., 2011). The data can be obtained from several sources such as interviewing participants or witnesses, reviewing historical videotapes or records, observations while on-site. The process of building grounded theory in which the "*researcher's attempts to derive a general, abstract theory of a process, action, or interaction grounded in the views of participants in a study*" (Creswell, 2003, p. 14), consists of different phases including i. Research Problem and Research Questions,

[4] There are four existing types of key grounded theory, with a fifth emerging. Types one and two are the work of the original authors: Barney Glaser's 'Classic Grounded Theory' (Glaser, 1992) and Anselm Strauss and Juliet Corbin's 'Basics of Qualitative Research' (Corbin and Strauss, 2008). Types three and four are Kathy Charmaz's 'Constructivist Grounded Theory' (Charmaz, 2006) and Adele Clarke's postmodern Situational Analysis (Clarke, 2005). The fifth, emerging variant is 'Dimensional Analysis' (Bowers and Schatzman, 2009). (Sbaraini et al., 2011)

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ii.Theoretical Sampling and Data Collection; iii. Coding and Categorising; iv. Analysing and Examining Relationships; v. Authenticating Conclusions; vi. Reflexivity and Theory Development (Bitsch, 2005). Data in grounded theory can be obtained from several sources such as interviewing participants or witnesses, reviewing historical video tapes or records and/or observations while on-site while it can be analysed using open coding, axial coding, selective coding, and developing a theory (Creswell, 1998; Leedy and Ormrods, 2001). Sbaraini (et al., 2011) describes the fundamental components of a grounded theory (Table 5.9) which may appear in different combinations but a grounded theory study should have all of these.

Table 5.9: Fundamental components of a Grounded Theory

Component	Stage	Description
Inductive nature	All	Very open approach to the process being studied. Emphasis may evolve as it becomes apparent to the researchers what is important to the study participants
Immediate Analysis	Data Analysis and Data Collection	Analysis must commence as soon as possible, and continue in parallel with data collection, to allow theoretical sampling
Coding and Comparing	Data Analysis	Data analysis relies on coding (a process of breaking data down into much smaller components and labelling those components) and comparing (comparing different data to understand and explain variations)
Memo-writing and/ or Diagrams	Data Analysis	Memos about events, cases, categories, or relationships between categories, are used to stimulate and record the researcher's developing thoughts, theories and comparisons.
Theoretical sampling	Sampling and data collection	Theoretical sampling, informed by coding, comparison and memo-writing, is central to grounded theory design and designed to serve the developing theory. By carefully selecting participants and by modifying the questions asked in data collection, the researchers fill gaps, clarify uncertainties, test their interpretations, and build their emerging theory.
Theoretical saturation	Sampling, Data Collection and Data Analysis	Point of saturation from where no new information is obtained from the participants
Production of a substantive theory	Data Analysis and Interpretation	The results are expressed as a substantive theory, that is, as a set of concepts that are related to one another in a cohesive whole.

5c.1: Formulation of research questions

The key question for the research using qualitative methods is:

Do urban forms at the scale of block-segment influence social sustainability?

If yes, to what extent and in what ways?

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A block segment represents a section of an urban block comprising of a geographically based immediate community defined within a physical commune, street or gated enclave.

Other questions under investigation are:

i. Which type of urban forms components, at the level of block-segments, significantly foster social sustainability and, why?
ii. With different dominant process trajectories – bottom-up emergent and top-down planned - do the traditional and informal forms within cities, at the level of block-segments, show significantly varying levels of social sustainability compared to their modern counterparts?
iii. If both, social sustainability and urban forms are dynamic concepts, can we obtain a socially sustainable equilibrium state for urban communities?

5c.2: Block-segment scale: sampling and data collection

As evident from the profile study of Guwahati (in chapter 4), the city, at the scale of block-segments can be seen as a patchwork of four distinct urban form typologies 'Inner Traditional (IT)', 'Modern Infill (MI)', 'Informal Slum (IS)' and 'Exclusive Defensive (ED)' forms for which three case-studies each were identified (Table 5.10). Qualitative data for measuring the associated social sustainability outcomes for each identified case study, were collected primarily using semi-structured in-depth personal interviews. The interviewees were chosen with purposive sampling, followed by snow-ball sampling, trying to speak to all possible representative groups of the population. An initial point of contact was established for each case-study through prior investigation or random walk-in to a resident's house. A list of key informants was prepared with the help of the first co-operative resident. This included original settlers, leaders and area secretaries, local business owners, representative of particular segments of a community and other residents who were assumed to have first-hand knowledge about their geographically based local community and from whom a chain of probable future interviews may be constructed. Each key informant, at the completion of the interview, was asked to suggest the names of two other residents who may further suggest names of other residents willing to participate in the interview. The snowballing technique allowed resources to be concentrated on in-depth interviewing of respondents rather than on screening the entire population to find suitable respondents. In order to avoid biases and skewed opinion, diversification of the sample was ensured by including cases of short term as well as long-term residents, diverse social backgrounds and age-groups in the final sample.

A total of 128 (F=66, M=62) interviews were conducted. The size of the sample for each case study area was determined by redundancy, or when no new information was

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forthcoming from the residents (Guba and Lincon, 1981). However, a minimum of 10 respondents were aimed for interview. More than 10 interviews conducted only where the need for further inquiry was found necessary. Although, only formal interviews are registered here, additional random on-street informal discussions were made during the fieldwork and notes were taken and evaluated. Additional focused group discussions were conducted depending on the residents willingness and based on field conditions. A minimum of two focused group interviews were conducted in four case study areas, three from informal slum form and one from exclusive defensive form types. The individual in-depth interview allowed the interviewer to delve deeply into social and personal matters whereas focus groups with multiple participant where possible enabled to gather immediate knowledge or experience sharing about the research study. Recording life histories where possible and non-participant observation also formed important aspects of social sustainability data collection.

Table 5.10: Case-studies at block-segment scale

Urban Form Type 1	**Inner 'Traditional'**	1. T1/UznBzr, Lamb Road Area, Uzanbazar 2. T2/FanBzr, Aloo Patti Area, Fancybazar 3. T3/RehBri, P.P Road Area, Rehabari
• located in the historic core • compact, diverse urban structure • often worn-out infrastructure • fine-grain, traditional building typologies		
Urban Form Type 2	**Infill 'Modern'**	1. I1/ZooRod, Pinaki Path Area, Zoo Road 2. I2/ BelTol, Basisthapur By-lanes, Beltola 3. I3/KalPhr, Rehabari Road Area, Kalapahar
• located beyond historic core • dispersed, residential urban structure • regular, with modern amenities • coarse grain, modern building typologies		
Urban Form Type 3	**Informal 'Slum'**	1. S1/AriBst, Aarikati Basti, Jahajghat 2. S2/KoiNgr, Koilash Nagar, Pandu 3. S3/HafNgr, Hafiznagar, Chandmari
• pockets, scattered across the city fabric • highly compact, diverse, spontaneous • informal, lacking most basic infrastructure/ services • very fine grain, rural resemblance • self-built building typologies		
Urban Form Type 4	**Exclusive 'Defensive'**	1. E1/SpnGdn, Spanish Gardens, Zoo Road 2. E2/VijCom, Vijaya Complex, Beltola 3. E3/ProPrk, Protech Park, Hengrabari
• located on periphery or within, large developable plots • regular, with privatised amenities/services • desire for exclusiveness, fear of crime, improved QOL • coarse grains, high-rise apartments • large enclaves, restricted access, high		

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Figure 5.9: Images showing field work activities - different methods of data collection including focussed group interviews, personal interviews, on-site mapping.



The topics covered in the in-depth interview (a sample of the semi-structured interview questionnaire can be found in Appendix-10) were based on the six aspects of social sustainability identified earlier in the literature review in order to gain a comprehensive understanding in relation to the urban form components and to reinforce, contradict or expand on the findings from the quantitative study for the nested case-studies. All the interviews were transcribed and manually coded. Observations in the form of field notes were also collected. Each personal interview was conducted in quite settings inside the respondent's residence and lasted for between 30 to 50 minutes. During the interview, along with interview responses, impressions, ideas and thoughts of the interviewer were also noted. Prior to the interview respondents were informed about the purpose of the research, the need to the interview and the confidentiality and anonymity of the information given.

5c.3: Block-segment scale: data analysis and theory development

5c.3.1: Analysing urban forms

Urban form variables at the scale of the block-segment are measured through observation and field surveys. Information gathered is plotted on the base maps developed from high resolution aerial images. Urban form description including form

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observation and comparative maps showing built-form, street networks, land-use &urban blocks for all the 12 case-studies within the wider context are given in Appendix -11.

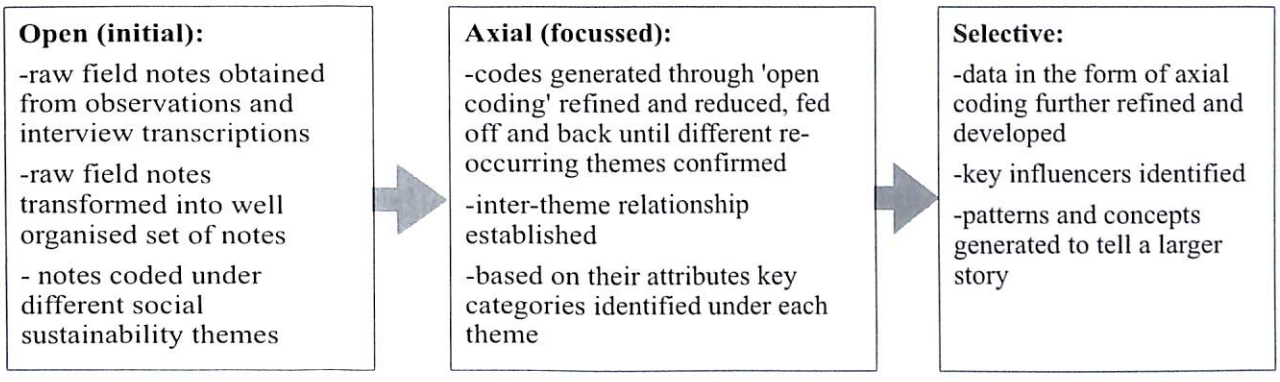
Figure 5.10: Maps showing case study areas for four urban form types at the block-segment scale



5c.3.2: Analysing effects of detailed urban form variations on social sustainability: 4 typologies, 12 case studies (qualitative assessment)

- ***Coding and categorising***

Figure 5.11: Open, axial and selective coding



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A code in qualitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data. The coding was done two phases, initial and focussed (Glaser, 1978). The initial coding looked for what can be defined and discovered in the data. All the raw field notes obtained from observations and interview transcriptions were transformed into well organised set of notes which were further coded until different reoccurring social sustainability themes seemed to emerge, and their inter-relationship may be established. The data in the form of initial coding was further refined and developed (Appendix-12) into focussed coding to modify and understand the codes in more detail in order to generate patterns or concepts. In focussed coding, which is a selective as well as conceptual process, limited set of codes that were developed in the initial phase were applied to large amount of data (A summary derived from focussed coding is tabulated in Appendix-13).

- ***Examining relationships and triangulating data***

Each major focussed code was examined based on the situations in which they appeared, when they changed and the relationship among them. The use of the constant comparative method enabled the analysis to produce not just a description but a model, in which more abstract concepts were related and a social process was explained.

The following relationships for each of the six components of social sustainability can be established.

- *Social Interaction / Social Networks:*

Social Interactions / Social Networks seen as amount, intensity and type of contacts or exchanges between people, were based on the amount of strong and weak ties[5]. Strong ties were generally made up of family, relatives, work mates, close friends living in the neighbourhood or same block-segment while, weak ties consisted of non-intimate, convivial relations between neighbours who knew each other to nod and wave to, or engage in limited conversation with and who were available to call in emergency situations. The level of social interaction and network, trust and reciprocity was found higher among residents with many strong and many weak ties or, few strong but many weak ties. It was found lower in case of urban forms where residents had few strong as well as few weak ties.

The IT (Inner Traditional) and IS (Informal Slum) forms showed high amount of both strong and weak ties while it varied in case of IM (Infill Modern) and ED (Exclusive Defensive) forms. IT forms showed higher amount of strong ties due to (i) high number

[5] The strength of a tie (assumed positive), strong or weak, is a combination of the amount of time, the emotional intensity, the intimacy and reciprocal services which characterises it (Granovetter, 1973: 1360-1380)

of cognate neighbours and, (ii) long established local friendships due to high place stability or length of stay. In case of IS forms, strong ties were based largely on shared goals among residents due to limited incomes and limited mobility (with need to establish closer ties to deal with common problems and benefits) and thus seek for local social support. Religious, regional or ethnic affinities were also seen as an influencing factors. The ED forms, unified the residents in terms of common norms, code of conduct and responsibilities and therefore, felt shared sense of purpose leading to interaction but without the feeling the need to establish closer ties. The 'common goods (amenities)' in ED forms provided opportunities for establishing social contacts (organised and spontaneous) leading to weak ties which, as the form matures, may or may not lead to development of strong ties.

Thus, the strength of local social ties, in any urban form was greatly influenced by a number of external variables key among them being the length of stay. However, the strength of ties was also found to be influenced by the 'spatial proximity' (based on physical distance) of the residents. This was clearly evident from intra-form variations in which intensity and type of social interaction and networks varied between the three case studies of the same urban form type. For example, for any urban form social ties were stronger and interactions more frequent among residents living in immediate spatial proximity such as same floor, same apartment block or adjacent residential plots. Such residents met frequently, looked out for each other on regular basis, visited each other socially and organised small gatherings among themselves.

Weak ties among local communities as discussed earlier can be seen crucial as urban forms with many weak ties showed higher levels of social interaction / social network amongst its residents. The amount or density of such weak ties was largely based on frequency and intensity of organised and spontaneous sociability which, in turn, was influenced by '*favourable spatiality*' i.e. presence of social infrastructure or spaces for social opportunities in an urban form. It was clear from the case studies that land-use mix (presence of local open spaces, play area for children, religious or community centres, local grocery shops, etc) along with other urban form components such as higher density (presence of critical mass of people), integrated open spatial-network (easy access to the above mentioned spaces for social opportunities) and human scale built-components (elements such as windows or balconies overlooking streets and community spaces, street orientation, active building frontages, visually permeable fencing) contributed positively to the residents' level of social interaction and networks. Such *'complementing synergies'* between the components of urban forms (interdependence and their combined positive effect) played a key role for spontaneous sociability to take place. For organised sociability to occur, especially in the absence of *'favourable spatiality'*, social actions such as active leadership, community groups, local institutions

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were seen necessary to develop social contacts (eg. all IM forms). Organised contacts did not necessarily translate into stronger interpersonal connections. Frequent sociability with (all) neighbours in all urban forms was neither so desired (eg. all ED forms and T1/ UznBzr) nor always seen as a pleasure since intense sociability came with more interdependencies, higher degree of social control & more frequent intrusions into ones privacy, further indicating personal and cultural preferences of the residents. Finally amount and intensity of social contacts was found higher and seemed to played more important role for certain groups of people such as age-groups/life-stage (children, elderly), occupation/income groups (limited incomes, limited mobility, time for socialising).

- *Trust / Reciprocity:*

Trust in terms of 'general readiness to form associations outside the obligations of family or the compulsion of the state' and reciprocity 'seen as continuing relationship of exchange' were also based on the amount of strong and weak local ties. Trust was found to be higher among residents with few/many strong ties and many weak ties. Large number of weak ties led to general trust among residents for social support. Reciprocal relationships and day-to-day co-existence were found only among strong ties while in case of weak ties, reciprocity was observed generally during urgent situations.

In any form, residents formed few strong ties usually in close proximities within which trust was high, exchange of small social favours was common and people looked out for each other. Factors such as number of cognate neighbours, stability or length of stay as well as religious, regional or ethnic affinities influenced the strength of ties and thus, trust and reciprocity. Urban form components with complementing synergies and favourable spatiality provided opportunities for social interaction (organised and spontaneous) and increased the size and intensity of social networks and integrations. This in turn increased general trust among residents. Interactions that developed into stronger ties led to stronger trust and reciprocal living.

- *Place Attachment / Pride*

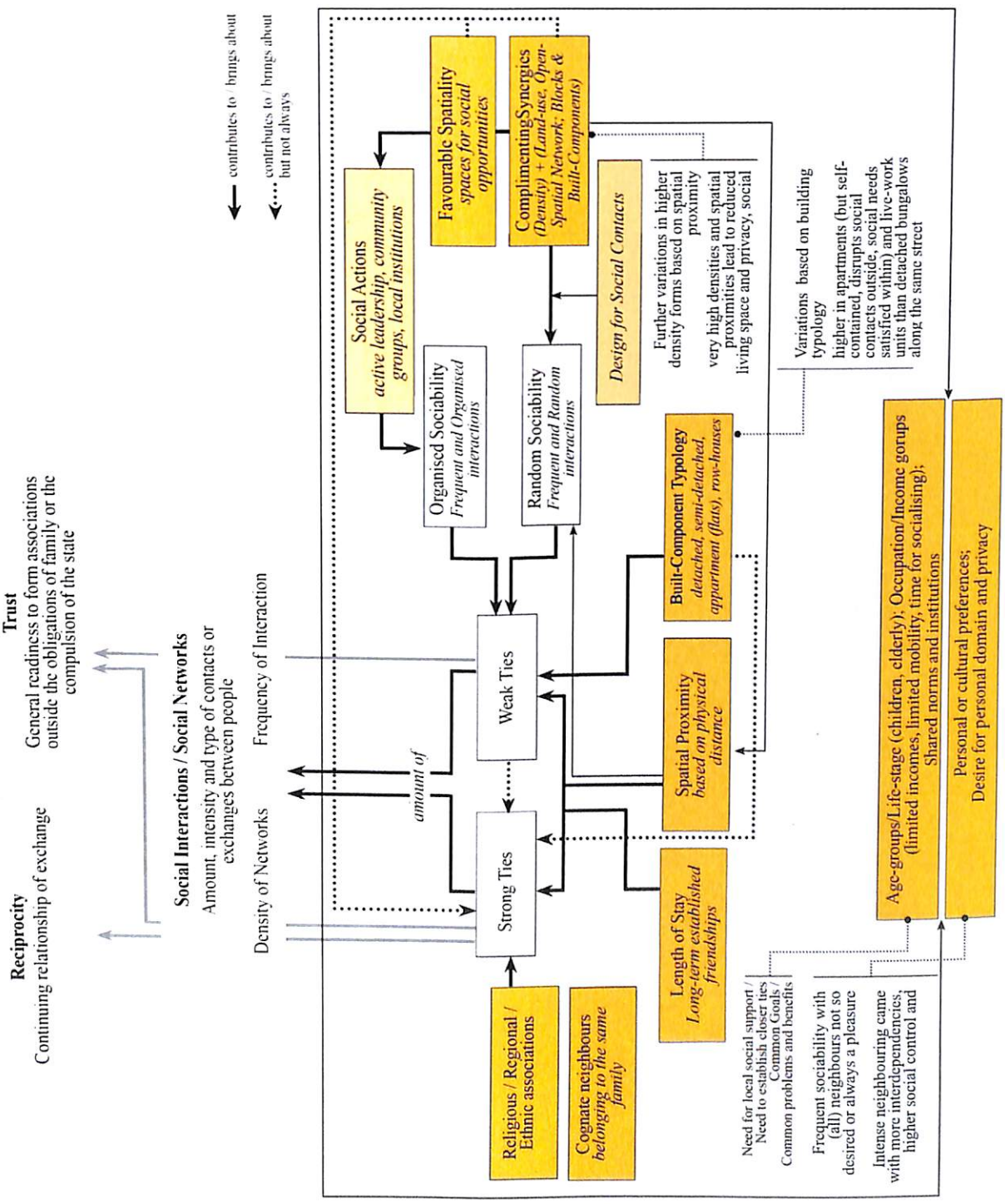
Place Attachment seen as an 'affective bond between people and place or settings' was both, influenced by and contributed to the residents' length of stay (place stability) in a particular area. Other factors that contributed positively to residents feeling of attachment were:

1. Functional Attachment : (i) Locational advantage (access to amenities, local facilities and services, access to transport facilities, proximity to work, provision of basic services, no flooding in the area); (ii) Residential character.

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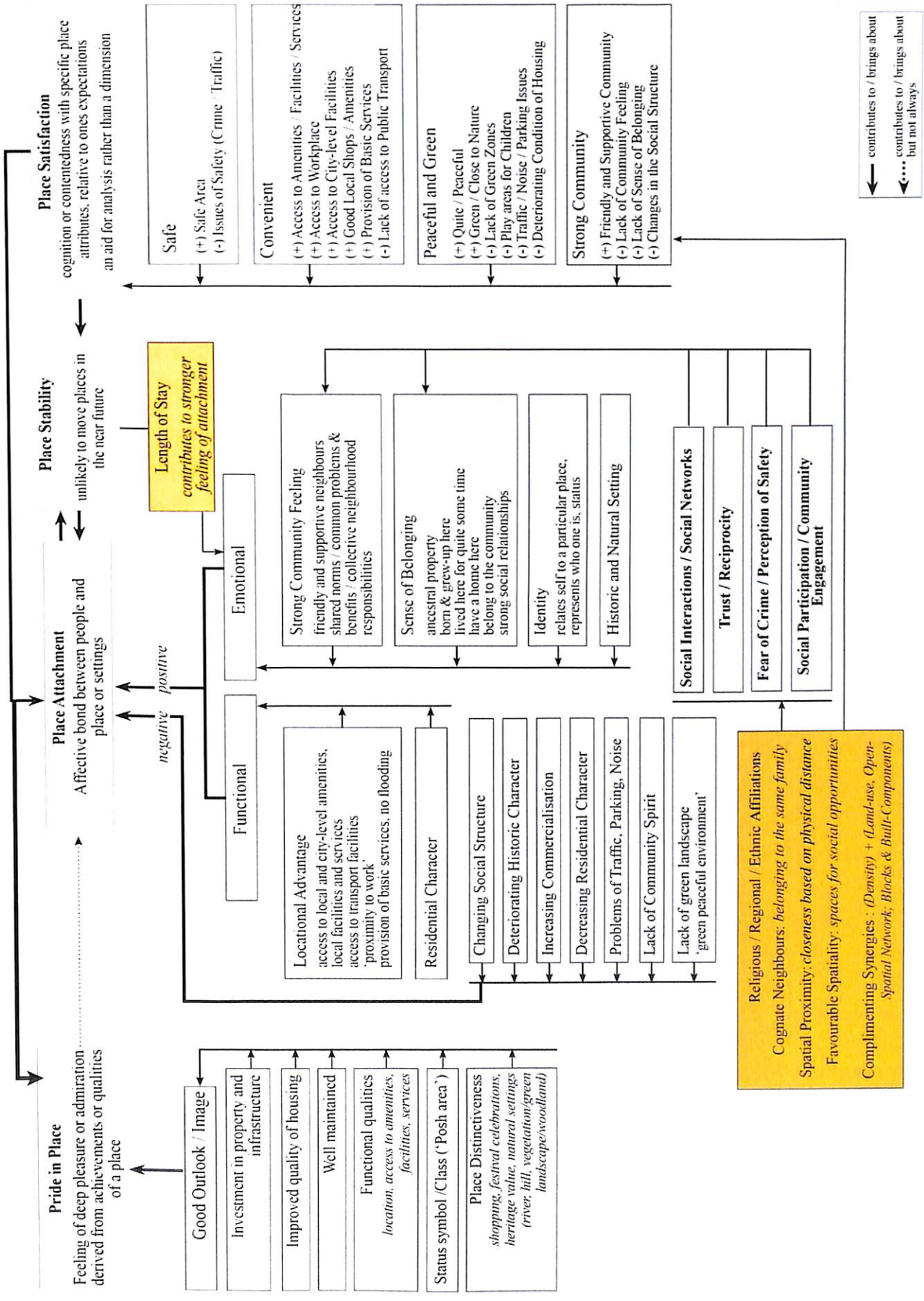
2. Emotional Attachment: (i) Strong community feeling (friendly and supportive neighbours, shared norms, common problems & benefits, collective responsibilities); (ii) Sense of belonging ('ancestral property', 'born & grew-up here', 'lived here for quite some time', 'have a home here', 'belong to the community', strong social relationships); (iii) Identity (relate oneself to a particular place, represents who one is, indicates ones social status or class); (iv) Historic and natural setting.

Figure 5.12: Relationship chart for Social Interaction / Social Network and Trust / Reciprocity



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Figure 5.13: Relationship chart for Place Attachment /Pride and Place Satisfaction / Stability



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Urban form was found to be a key influencer to the residents' positive feeling of functional attachment to place. Residents with ease of access amenities, local facilities and services felt more attached to their locale than those without. In case of emotional attachment to place, residents' strong feeling of and belonging to the local community was affected by the residents length of stay (long term residents felt more emotionally attached to their locale than short-term residents with high place mobility). In addition, it was also greatly affected by other aspects of social sustainability such as amount and intensity of local ties and thus interactions, trust and reciprocal relationships, level of community engagement and social participation well as residents feeling of safety; all of which, in turn, were influenced by the '*complementing synergies*' between different urban form components. Changing social structure, deteriorating historic character, increasing commercialisation, decreasing residential character, problems with traffic, parking issues and noise, lack of community spirit and lack of green and peaceful environment contributed negatively (reduced) to the residents' feeling of attachment.

Residents' 'Pride in Place' seen 'as the feeling of deep pleasure or admiration derived from achievements or qualities of a place' was affected by two key aspects (i) Good outlook or image and (ii) Place distinctiveness. High pride in place did not always contribute positively to residents feeling of attachment to their local area while satisfaction in place significantly affected residents stability in and attachment to a place.

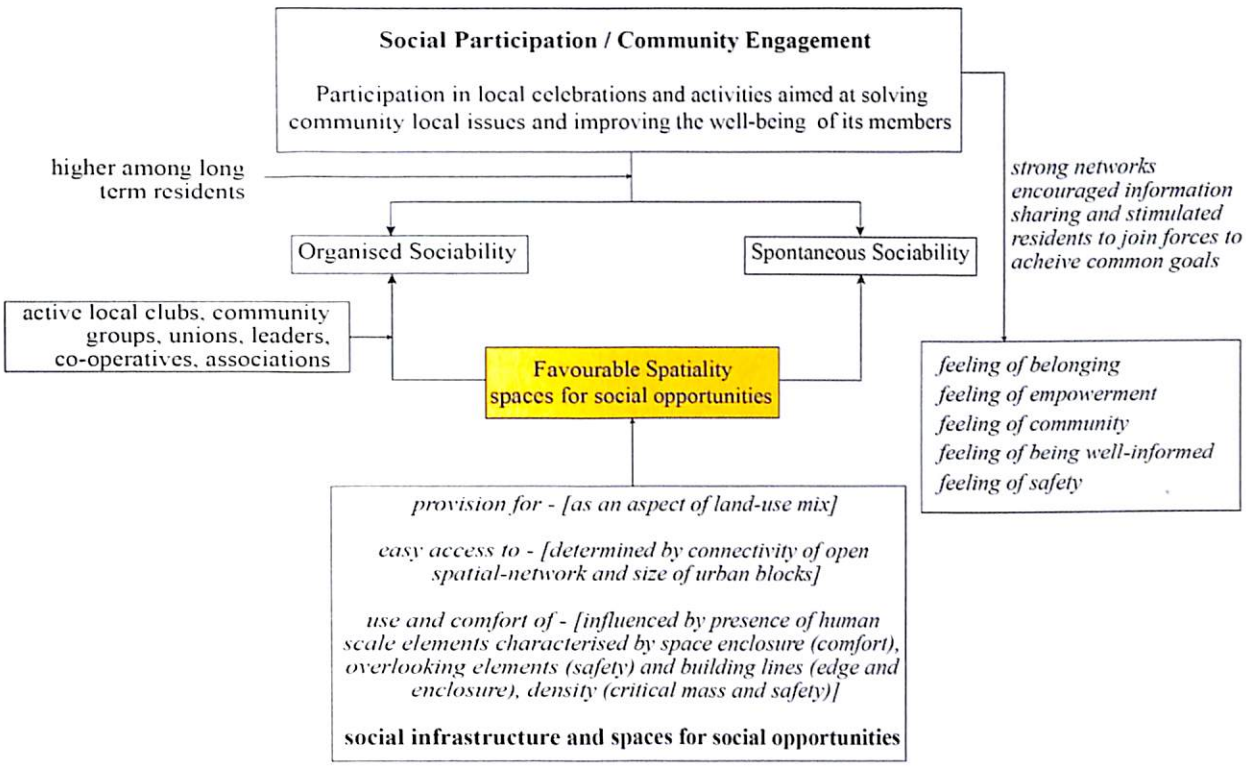
- *Social Participation / Community Engagement*

Participation in community issues, gatherings and social events generated opportunities for organised as well as spontaneous sociability which benefited from *'favourable spatiality'* i.e. presence of social infrastructure or spaces for social opportunities (space for holding the social events such as community centre, centres of faith, local open spaces, etc.) in an urban form. Provision of *'favourable spatiality'* as an aspect of land-use mix worked in synergy with other components of urban form such as, their easy access determined by connectivity of open-spatial network and size of urban blocks as well as their use and comfort influenced by presence of human scale built-components [such as enclosure (comfort), overlooking elements (safety) and building lines (edge and enclosure)] and density (critical mass and safety).

Presence of active community groups, neighbourhood associations, active local leadership, etc; was essential for organised sociability to occur. Urban forms that had a number of active local groups (including ladies club, cultural club, yoga and sports club, neighbourhood co-operatives and community banking) showed higher levels of residents' participation in local activities and events (e.g: T2/FanBzr, T3/RehBri, S2/ KoiNgr, S3/HafNgr). ED forms benefited from both, availability of spaces for social participation and active groups. Residents of IS forms, showed great willingness to

participate and co-operate in the welfare of the community. Residents of IM forms whose immediate locality lacked spaces for recreation, play, events may therefore, benefit from presence of such active local groups and early provision of social infrastructure. Social participation did not necessarily lead to close contacts but developed familiarity among residents and established high number of weak ties which in turn fostered generalised trust and feeling of safety in the locale. Such participation also led to greater feeling of empowerment and of being well-informed about local issues.

Figure 5.14: Relationship chart for Social Participation / Community Engagement



- *Fear of Crime / Perception of Safety*

Three key observations associated with residents' perception of safety are:

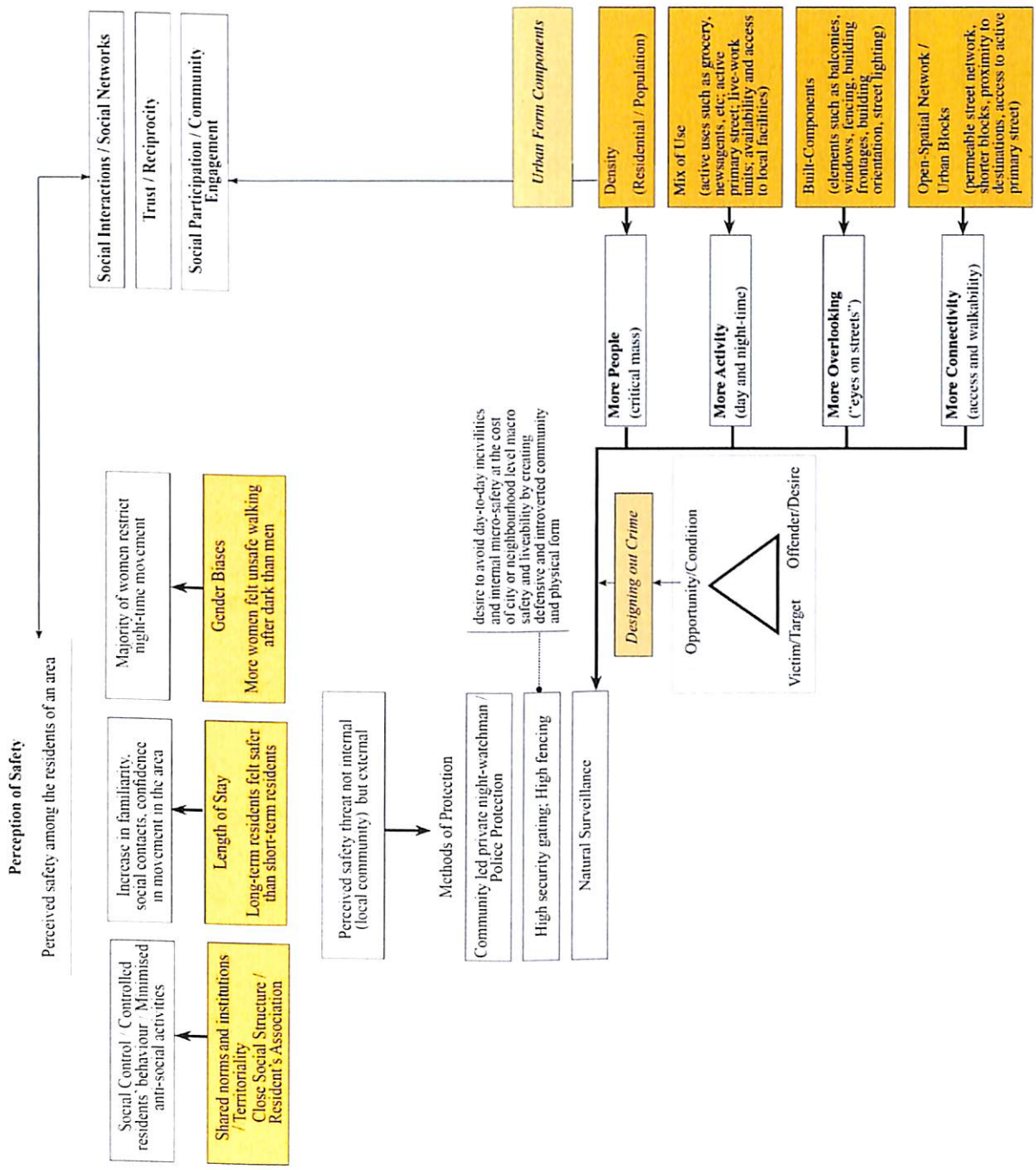
(i) *Shared norms and institutions, territoriality, close social structures as well as resident's associations* (governing common code of conduct) led to controlled residents' behaviour and minimal the risk of anti-social activities within the community.

(ii) *The length of stay of residents* in a particular locality or block-segment had positive association with residents' feeling of safety. Long term residents developed deep familiarity in their physical environment, moved about more confidently (increased knowledge of their local environment) and developed large number of social contacts in their locale.

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(iii) *Women were strongly affected by the safety implications of isolation.* Women in general feared crime and felt less safe walking alone after dark than men and hence restricted their movement to certain areas after dark.

Figure 5.15: Relationship chart for Fear of Crime / Perception of Safety



Need to feel safe may differed between residents of any same urban form type as feelings were dependant on experience, attitude, desire and expectations. It was also found that residents' safety concerns were not rooted internally within local community, but externally (issues with external gangs and their anti-social behaviour). Two most common crime prevention tactics for adopted by residents' of different urban forms

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were: (i) Community led private night-watchman and (ii) High security gating and impermeable / high fencing (including installing guard booths and surveillance cameras, creating territorial spaces, closing or gating streets, building fences and walls). The later however, lead to creation of defensive and introvert communities and physical forms that may have avoided day-to-day incivilities and internal micro-safety but questioned the city or neighbourhood level macro safety and liveability.

Feeling of safety in a neighbourhood was found to be influenced by different urban form components and was also closely related (contributes to and influenced by) to the other aspects of social sustainability. Residents had higher perceived safety within physical forms that encouraged walking and neighbouring activity generally through the provision of local shops and community facilities (mix land-use) and higher densities thus, enabling informal surveillance and 'safety in numbers'.

Associations between safety and the physical form of local area included the benefits of natural surveillance caused by: (i) More People (critical mass): Density; (ii) More Activity (day and night-time): Mix of Use (active uses such as grocery, newsagents, etc; active primary street; live-work units; availability and access to local facilities); (iii) More Overlooking ("eyes on streets"): Built-Components (elements such as balconies, windows, fencing, building frontages, building orientation, street lighting); (iv) More Connectivity (access and pedestrian movement): Open-Spatial Network / Urban Blocks (permeable street network, shorter blocks, proximity to destinations, quick and easy access to active primary street).

- *Basic Services and Local Facilities (availability and accessibility)*

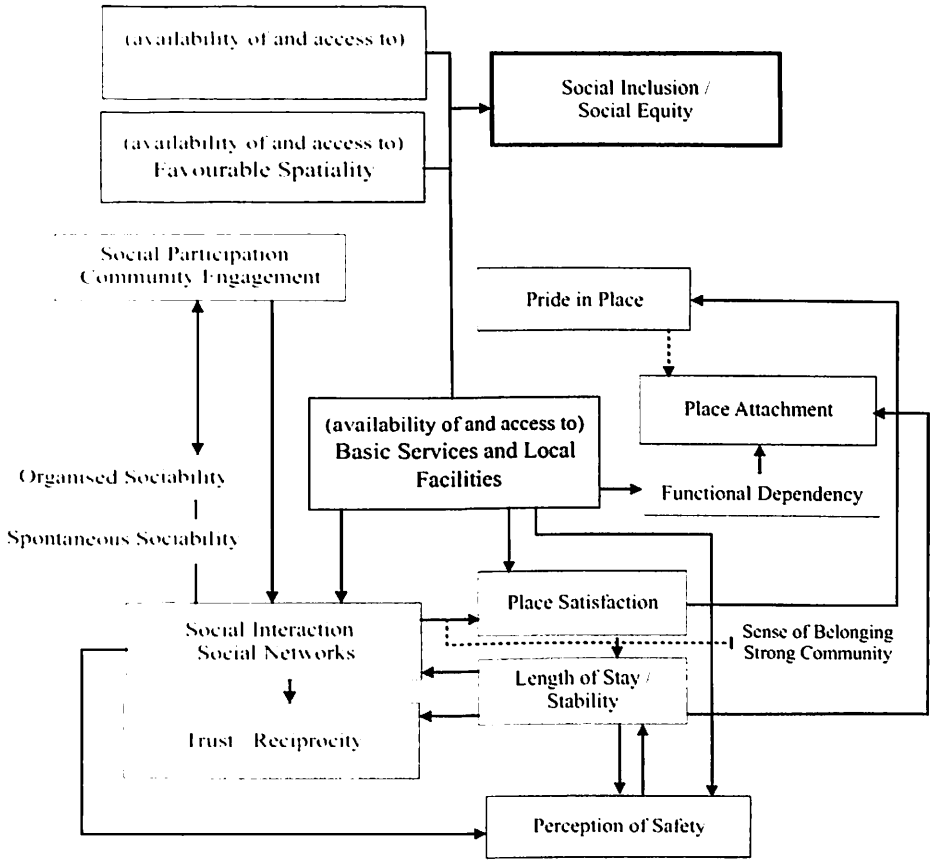
The geographic characteristics of communities can have a significant effect on the level of inclusion in a society. Availability and access to basic services and local facilities was found to be the most critical component of social sustainability which not only concerned the issues of inclusion and equity in an urban form but also influenced all the selected aspects of social cohesion and capital. Availability and access to local services and facilities highly influenced residents' attachment to place (functional dependency) which affected their length of stay in a particular locality or block-segment. Length of stay, in turn, had the potential to influence the level of all other social sustainability components such as residents level of interaction and networks, trust and reciprocity, social participation, feeling of safety and satisfaction in an area. Locational advantage of people's place of residence was perceived of high importance which included not only convenient access to local facilities but also availability of choices and access to city level attractions.

Most of the IS forms lacked majority of basic services (lack of drinking water and sanitation facilities were given highest priority) and although, state provided basic

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facilities were in general within accessible walking distance, these forms were disconnected from the city transport grid, which might be intentional (while selecting a site of occupation) to minimise the risk of eviction. There was a stark disparity in their use of wider city amenities and therefore, local and public open recreational spaces in the vicinity seemed to provide integration and inclusion of people from diverse socio-economic backgrounds. In contrast, ED forms, created physical barriers to access, privatise civic responsibilities and services like police protection, street maintenance, recreation and entertainment.

Figure 5.16: Relationship chart for availability & access to basic services & local facilities



Despite intra-form variations in their degrees of exclusivity, the amount and type of amenities they provide, and the forms of security devices; the residents of ED forms greatly benefited internally from common goods (gardens, children's play areas, gym and swimming pool, etc) however, this was self-contained. The fact that the social and recreational needs were satisfied within the gates, separated residents of ED forms from those in the wider neighbourhood reducing the community's potential to understand each other and commit to any common or collective civic purpose (as seen in D1/SpnGdn). Large number of such forms may thus, be seen as both a symptom, and a contributing

cause of loss of public life at the scale of wider neighbourhood reducing the residents' civic involvement and interaction, disrupting the social contracts that cities and towns are built on. IT forms were best placed in terms of provision and availability of basic services, facilities and amenities however, they were also perceived as lacking modern infrastructure with deteriorating quality of traditional housing. IM forms, in the city we found to slightly suffer in terms of access to different facilities in addition to lack available options to choose from and distance to the city core and hence, such forms may benefit from early provision of social infrastructure and local facilities.

- ***Reflectivity and theory development***

From the above analysis and outcomes, the following key theories emerge:

i. **Spatial Proximity** (closeness based on physical distance): In any given urban form, since the occupation of their place of residence (or workplace), people tend to establish their own local social ties based on their personal or cultural preferences. Although not a sole driver, it was found that *spatial proximity* had direct proportional effect on the strength of local ties, intensity of interactions and consequently the level of trust and reciprocal relationships amongst the residents, as evident from the intra-form variations of any urban form typology.

ii. **Favourable Spatiality** (spaces for social opportunities): *Favourable spatiality* was found to foster social sustainability by encouraging everyday (or regular) interaction for pleasure as well as for work. A sense of community or the feeling of being involved, was fostered by social relationships that transpired from such day-to-day interactions. Relationships in these shared spaces may be in the form of official gatherings, a casual run in with a neighbour or random social encounter, or even greeting and a simple recognition of a familiar face; all of which provided immediate and long-lasting benefit to the participant. The local ties were likely to grow in width and depth with the provision of *favourable spatiality* (spaces for social opportunities for example, streets, community and faith centres, open recreational spaces, local play areas, local shops) generating opportunities for random and organised sociability to occur, holding celebratory events and bridging community activities. This further facilitated the level of social interaction, trust, social participation, place attachment, place satisfaction and residents' feeling of safety. For organised sociability to occur in a space, presence of active local groups were seen essential, while spontaneous sociability was encouraged by *complementing synergies* between different components of urban form [such as critical mass (density), easy access (open-spatial network & blocks) and comfort and safety (human-scale built-components-orientation, frontage, enclosure, typology)].

iii. **Diversity Biases**: Measuring social mix provided a number of challenges. Firstly, diversity had a number of parameters or composition such as ethnicity, race, religion, immigrant status, income, class, caste, regional, housing tenure, etc thus making it difficult to specify to define it for measurement. Secondly, although intuitively most people supported the idea of social diversity as an intrinsic social good that brings wider benefits, residents were in general unwilling to share their true opinion or views on the social diversity as it included wider concerns about immigrations and rights, control and conflict, national identities and inequalities, social justice and welfare provision. The challenge therefore lies in finding ways to dissociate the concept of social mix from the utopian realm of a 'perfect mix' to redefining it as a practical tool or realistic set of policy measures geared towards a 'society for all'.

iv. **Passive Tolerance:** Social mixing in urban forms may encourage greater interaction among diverse groups of people based on their spatial proximity however; it was observed such integrations did not necessarily lead to stronger trust or strength of ties among them. Residents preferred to live or interact among people with common characteristics, common norms and goals as well as similar backgrounds, groups or territories such as education, occupation, class status, age and ethnicity and regional affinities (also proved by Fischer, 1977). Moreover, people also tend to keep ghettoise out of 'fear of dilution' of their culture or religion (as observed in many case study areas). Although there was no proof to suggest that socially diverse urban forms encouraged higher interaction and trust among the residents with diverse backgrounds, most people showed a general level of 'passive' tolerance towards the mix.

v. **Attachment Drivers:** Locational advantage (in terms of access to amenities, local facilities and services, proximity to work and transport facilities) was seen as the key attachment driver in terms of residents functional dependency to a place. Residents desired for peaceful residential character of the place they live but at the same time preferred to be close to the key transport route providing easy access to local and city level destinations. Drivers for emotional attachment include strong community feeling, strong sense of belonging, place identity and finally emotional attachment to some specific historic and natural local setting. Residents' attachment to place contributed to the residents' stability and was strengthened by their length of stay. Similarly, the four key satisfaction drivers - safety, convenience, peaceful and green environment and strong community, contributed strongly towards residents feeling of attachment and their length of stay in a place.

vi. **Complementing Synergies:** As evident from the study, different urban form components were interdependent. Each urban form component required integration

of other components to produce a combined positive effect than the sum of their separate effects on various aspects of social sustainability. For example, density as a component of urban form was found to be one of the key influencers for social sustainability. It not only had (positive or negative) influence on all the selected aspects of social sustainability but was also dependent on other components of urban forms. For example, higher density forms (in case of IT and IS forms), were seen to promote higher social sustainability but benefited from or even necessitated complementing synergies of other components such as easy access to facilities and human scale components more so provision of mix of uses.

vii. **Tipping Point:** Urban forms constantly evolve till its components or variables (densities, land-uses, open spatial-networks, blocks and built-components) reach a *"climax state"* for social sustainability (the city can be assumed more as a poly-climax state with multiple steady-state end-points as within each form typology be it inner traditional, infill modern, informal slum and exclusive defensive, there exists a huge level of diversity and embedded variety). At this state of climax, the urban forms are in balance and the socio-spatial ecosystem is appropriately suited to its local conditions as it may ever do. It is difficult to measure or rule down this state of climax as both the concepts 'urban form' and 'social sustainability' are dynamic in nature and are context dependant. Moreover, even this climax state is temporal and the components of urban form traverse a *"tipping point"* where it crosses a threshold, tips, and bends down steeply reach the *"rupture point"*. From this point the components of urban form starts showing negative effects (for example, in case of T2/FanBzr, very high densities led to reduced living space and very high mix-use led to reduction in residential character perceived as a negative factor for place attachment and place satisfaction by the residents. Highly increased densities, in case of informal slum forms caused everyday living stresses and tensions as well as occasional conflicts although they acted as unified homogeneous social units when facing wider or long-term political and socio-economic issues). Thus, over-dominant land-use, density and/or activity whether residential, commercial, retail or office, exhibited greater social problems and may thus be seen as less sustainable.

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Chapter 6
FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This research set out to examine the influence of urban forms on social sustainability. It has traversed and covered ground through detailed review of literature on both, social sustainability and urban form thus, building blocks for the analysis of the relationship between the two. It explored their meanings, constituent dimensions and methods of measurement. It then conducted empirical tests which were calibrated and validated for Guwahati, the dominant city of North-East region of India using both, qualitative and quantitative research strategies. Based on detailed profile study Guwahati, 6 case studies for 2 typologies at neighbourhood spatial scale and 12 case studies for 4 typologies at the spatial scale of block-segment were selected to examine urban form variations that were found to potentially relate to different resident experiences and subsequently social sustainability outcomes. Urban forms at these scales were measured and documented using various morphological analysis and mapping techniques.

Quantitative methods of data collection included self-administered questionnaire surveys while qualitative methods including semi-structured open-ended personal interviews, focussed group discussions and non-participant observation were used to seek an in-depth understanding of the process mechanisms of social sustainability. Quantitative data were tested using multivariate analysis (MANOVA) in SPSS 20 while qualitative data were analysed using grounded theory. The triangulation of outcomes further illuminated this complex relationship between different components of urban forms on six aspects of social sustainability.

This chapter, presents the findings of the empirical tests, draws some key conclusions which, whilst retaining the flexibility and plurality of various urban forms, are further translated into social sustainability framework focusing on 1. Robust and achievable **Social Policies** (topdown); 2. Incremental and flexible **Social Design** principles (linking top-down & bottom-up); 3. Participatory and empowering **Social Actions** (bottom-up). Complementing the proposed framework, finally, this chapter also provides some recommendations specific to the city of Guwahati.

6.1 Findings

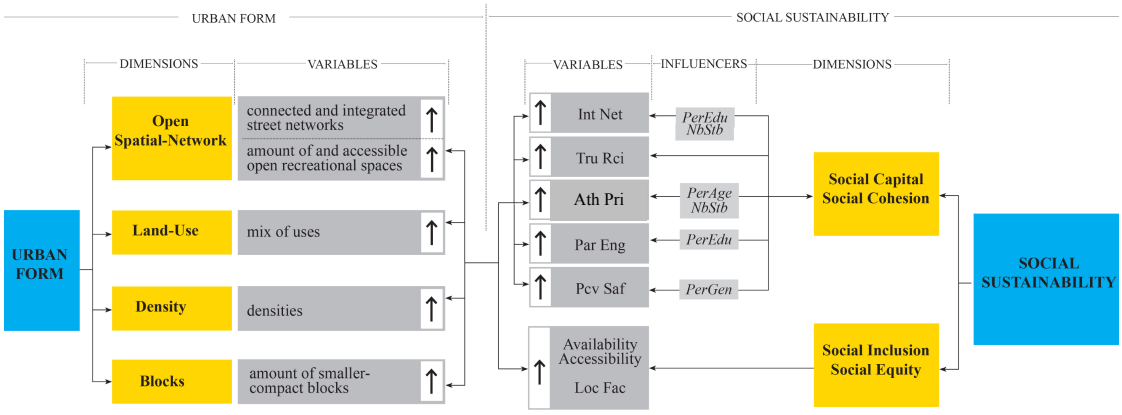
6.1.1 Influence of urban form on social sustainability: quantitative assessment - 2 typologies and 6 case studies at neighbourhood scale

The quantitative testing of the urban form variables (Open-Spatial Network, Land-sue, Density, Blocks) of two form types ‘Inner Traditional Neighbourhoods’ and ‘Outer Modern Neighbourhoods’ using a total six case studies showed that urban forms at the

spatial scale of neighbourhood significantly affects different aspects of social sustainability (urban form variations for IntNet, TurReci, AthPri, ParEng, LocFac, PcvSaf have significance value less than 0.05), after controlling for intervening variables and they have a positive co-relation. The Inner Traditional Neighbourhoods with higher values for 1) connected and integrated street network 2) accessible and amount of open recreational spaces 3) mix of uses 4) densities 5) small compact blocks than the Outer Modern Neighbourhoods displayed significantly higher levels of social sustainability amongst its residents. Quantitative data for social sustainability, collected through household questionnaires are tested using multivariate analysis (MANOVA) in SPSS 20.

The results further showed that neighbourhood stability or length of stay of the residents in a neighbourhood affects outcomes for social interaction / social networks and 'place attachment / pride'. There also existed correlation between 'gender' and 'fear of crime / perception of safety' in a neighbourhood, residents 'education' and the level of 'social interaction / social networks' and 'social participation / community engagement' in a neighbourhood as well as residents age and 'place attachment / pride' (Figure 6.1).

Figure 6.1: Influence of urban form on social sustainability (quantitative outcomes)



6.1.2 Influence of urban form on social sustainability: qualitative assessment - 4 typologies and 12 case studies at block-segment scale

Key outcomes for the influence the urban form variables on different aspects of social sustainability for four form types 'Inner Traditional Forms', 'Infill Modern forms', 'Informal Slum Forms' and 'Exclusive Defensive Forms' using a total of twelve case studies are described below. The Qualitative data, for social sustainability were collected using semi-structured open-ended personal interviews and focussed group interviews, key-informant interviews, life histories, non-participant observation.

The qualitative outcomes also proved that urban forms at the spatial scale of block-segments affects all selected aspects of social sustainability. However, intra-form variations within each of the four typologies brought forth a number of intervening

variables and the extent of the relationship (Figure 6.2: Qualitative outcomes, Figure 6.3: Method triangulation).

i. **Intervening Variables** (very high number of intervening external variables): Components of social sustainability, dependent on type of social contacts (strong & weak ties) were greatly influenced by a number of intervening variables such as residents' length of stay, number of cognate neighbours and close friends in the locality, intensity of regional/ethnic affinities. Presence of active local groups, clubs, co-operatives, etc also played an important intervening role in mobilising community towards achieving positive social aspects.

ii. **Spatial Proximity** (closeness based on physical distance): Although not a sole driver, it was found that spatial proximity had direct proportional effect on the strength of local ties, intensity of interactions and consequently the level of trust and reciprocal relationships, amongst the residents of different urban forms as evident through inter/ intra-form variations.

iii. **Favourable Spatiality** (spaces for social opportunities): The local ties, interaction and trust were likely to grow in width and depth with the provision of favourable spatiality (that are everyday spaces for social opportunities; for example: streets, community/faith centres, open recreational spaces, local play areas, local shops). The level of trust, social participation, place attachment, place satisfaction and residents' feeling of safety were also facilitated through favourable spatiality that provide opportunities for random and organised sociability to occur as well as holding celebratory events and thus, bridging community together.

iv. **Complementing Synergies** (integration among urban form components required to produce combined positive effect): Different urban form components were interdependent and benefited from or even necessitated complementing synergies among them. Each urban form component required integration of other components to produce a combined positive effect than the sum of their separate effects on various aspects of social sustainability.

v. **Tipping Point** (point after which urban form components start to show negative effect): Urban forms constantly evolve, and reach a climax state where the complementing synergies between different urban form components is most optimum and its relationship with social sustainability is most balanced. However, since both urban form and social sustainability are dynamic concepts, this state of climax is temporal, and the components of urban form traverse a "tipping point" where it crosses a threshold, tips, and bends down steeply reach the "rupture point". From this point the components of urban form starts showing negative effects. As a result, over

vi. dominant land-use, density and/or activity whether residential, commercial, retail or office, exhibited greater social problems and therefore, found as less sustainable.

6.2 Conclusions and Recommendations

Urbanisation, coupled with technological advancements and globalisation over the last century, has highlighted the economic potential but also, the social and environmental cost of growth. And as more and more countries in the developing world enter into the high-growth and rapid-transition phase of the urbanisation process, their impact will bring major global and local change, not only due to their huge population size with increasing levels of consumption, production and waste but also because they are particularly vulnerable to lack of resources and climate change in the foreseeable future. As a result, a majority of the developing world cities are advocating planning mechanisms and growth management approaches that emphasise on sustainable urban development.

India, despite playing a consistent role in the evolution of an international consensus to deal with the planet's sustainability crisis, environmental concerns have come to dominate the design and planning policies for cities. Investigations in the field have shown that the social dimension, so far, has remained the weakest pillar and has received the least attention in sustainable development research, policy and practice. As a result, amidst the rapid growth and urbanisation Indian cities face, coupled with deep spatial segregation, grave social issues such as acute poverty, crime, inequity and deteriorating quality of life, which are some of the fundamental challenges to sustainable development. As the country becomes an urban majority by 2050 and prepares for the influx of another 350 million people by developing a number of new greenfield cities whilst improving the condition of it's existing urban population, there is clearly a pressing need to develop a stronger conceptual understanding of the indispensable social pillar of sustainable development - one that cannot be ignored or dismissed.

The indispensable concept of social sustainability may be easy to sympathise but difficult to comprehend. The theoretical investigations enabled us to come very close to the understanding of the concept and its constituent dimensions - the 4 S's, social capital, social cohesion, social equity and social inclusion. However, the next level of the understanding concerning the social sustainability outputs - 'what a socially sustainable neighbourhood would look like' was found to be non-existent in both, the social and sustainable urban development theories. The question of 'how social sustainability can be incorporated into the planning of Indian cities' remained unanswered despite several efforts towards understanding the concept and developing theoretical frameworks to

operationalise it, in addition to some recent attempts of empirically investigating it in relation to sustainable cities.

To this void, the concept currently suffers in practice, where it becomes just a meaningless label attached to sustainable development which is not substantiated by ground research. The intangible and context-dependent nature makes it difficult to define and measure social sustainability. Even when a definition is agreed, this is seen to be framed in terms of self-fulfilling outputs without clear understanding of what types of urban environments do this. As a result Indian urban development and planning policies are in the process of replacing established communities with new developments, claimed smart and sustainable, which face the threat of further damaging social sustainability. Since the effects of 'social' climate change are becoming more obvious today, any discourse on 'smart' city planning and urban design which does not address the entire complexity of social sustainability issues in an integrated manner, combined with environmental and ecological concerns, has little meaning at a time when India's urban areas are rapidly growing and altering in complex and unsustainable ways.

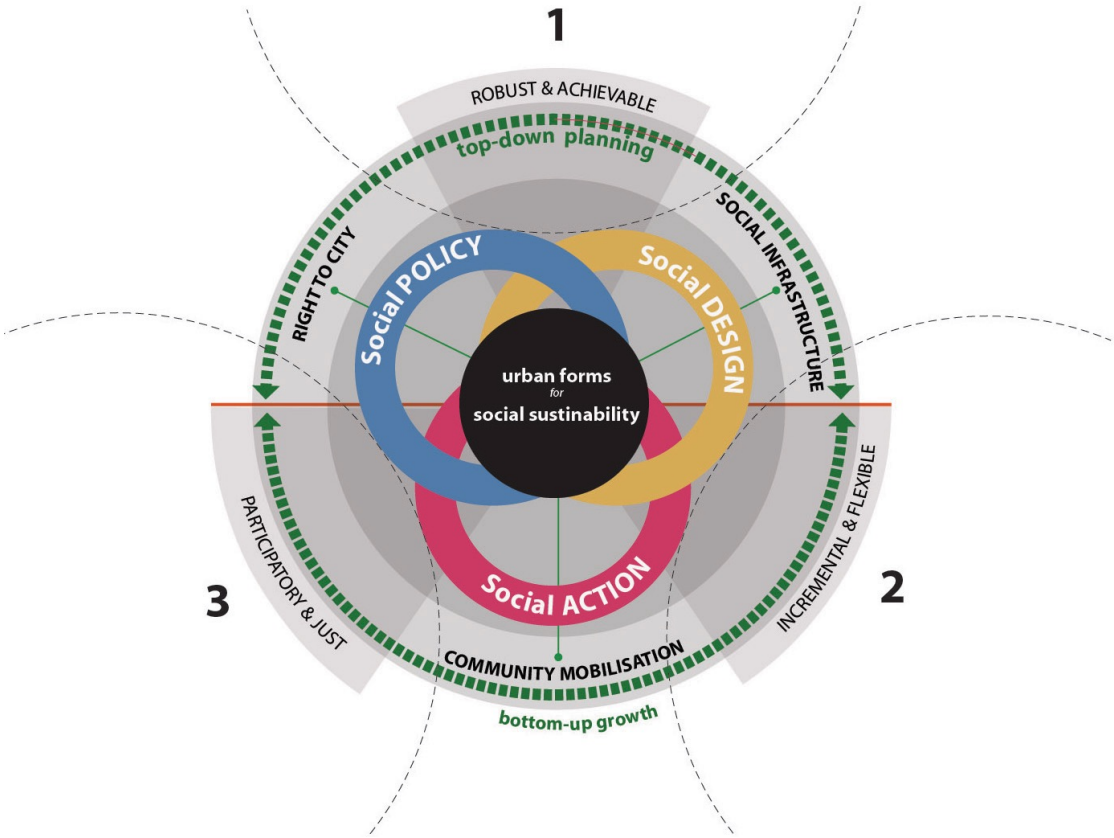
This research therefore, empirically investigated the influence of urban form on social sustainability in the Indian context using case studies from Guwahati, Assam. Through the empirical tests it can be concluded that urban forms at different spatial scales (neighbourhood and block-segment) significantly influence social sustainability. This relationship is however, influenced by a number of external intervening variables, key among them being the residents' length of stay. The relationship also flourishes with the presence of 'favourable spatiality' (spaces for social opportunities) and through 'complementing synergies' between the different components of urban form. Despite the fact that urban form components and social sustainability have a 'positive' correlation [i.e. urban forms with higher values for (i) connected and integrated street network, (ii) accessible and amount of open recreational spaces, (iii) mix of uses, (iv) densities, (v) small compact blocks and (vi) human scale built-components display significantly higher levels of social sustainability amongst its residents than those with lower values], each component has a threshold value after which it begins to show 'negative' effects. It is however, very difficult to measure or rule down such threshold value for any urban form component due to the presence of various external intervening variables, combined effect of other urban form components and dynamic nature of the society.

6.2.1 A framework for social sustainability

Growth and change are an in-built mechanism of any system. Changes may be in the form of growth or decay, a simple redistribution or an alteration. The consequence of the change depends on the capacity of the urban form, society or individual to adapt or

withstand it. Forms of cities and their neighbourhoods are therefore not objects frozen in time and space, but rather very much living and evolving. They are constantly in flux with what is spontaneous and planned, natural and imposed, top-down and bottom-up thus, making them multi-layered. People tend to self-organise and start building communities through bottom-up processes right from the occupation of an urban form. There is no straight interpretation about how to encourage social sustainability as cities are complex environments acting as laboratories for governing social sustainability. This perhaps leads to the argument that in the absence of a clear and agreed theory and/or planning amidst rapid urbanisation, a social sustainability framework may be a necessary intervention for Indian cities, which acts as a trellis[1] upon which the concept grows and allows sustainable communities to emerge. With gradual time and careful nurturing through design and policy frameworks, which allows for both top-down and bottom-up approaches, can make these communities vibrant and their neighbourhoods a thriving place to live.

Figure 6.4: Social sustainability framework for policy, design and action



[1]The word trellis which coined in the book, the Sustainable Urban Neighbourhood (Rudlin & Falk, 2009:268), which described a master-plan as 'a trellis on which the vine of the city can grow'

Based on this conclusion and empirical findings, the research develops an integrated Social Sustainability Framework for urban built-environment focusing on social *policy*, *design* and *action* (Figure 6.4). The framework combines both (micro-level variables of) bottom-up and (macro-level variables of) top-down approaches in the research implementation in order to benefit from the strengths of both approaches. This enable different levels to interact regularly depending on the status of conflict in an area and the strength of implementation of strategies.

The framework systematically defines and translates the characteristics of social sustainability into sets of:

1. Robust and achievable **Social Policies** (topdown);

The Social Policies intend potential change for challenges related to the social dimension of sustainability through top-down regulatory frameworks. Although criticised for its statutory approach as an initiation for social change, such an approach involves immense strength to plan large scale development programmes and develop generalisable policy advice as well as monitor consistent behaviour patterns across those policies. However, imposed top-down policies without consultation of various stakeholders can result in conflict and question its long term effects. This framework therefore proposes development of participatory social planning policies which are robust and achievable. It focuses on four aspects: 1. Right to 'SHELTER'; 2. Right to 'ACCESS'; 3. Right to 'SPACE'; 4. Right to 'DECISION'.

Table 6.1: Social policies

No	POLICY	PLANNING
1	**Right to 'SHELTER'**	***Adequate shelter for all*** (including basic services and facilities) Decent housing, sites, services that are affordable & integrated within cities
2	**Right to 'ACCESS'**	***Urban advantage for all*** Availability and accessibility to urban facilities and amenities
3	**Right to 'SPACE'**	***Spaces for social opportunities for all*** Early provision of social infrastructure, Integrated and efficient network of purposeful and maintained public spaces at various scales
4	**Right to 'DECISION'**	***Voices of all*** Participatory governance, Inclusive planning, Just initiatives that caters to the needs of all

ii. Incremental and flexible **Social Design** principles (linking top-down & bottom-up)

The combination of bottom-up and top-down approaches constitute a long-standing challenge in the sustainable development application however, a mixed complimentary framework such as this provides a unifying structure for combining the broader planning policies with more specific and contextual local actions. Synergies are created between

the two using social design principles. It is significant that design principles are incremental and flexible so that they can adapt to local difficulties and contextual factors.

Table 6.2: Social design principles

No	Design	Description
1	**Availability**	Presence of non-negotiable basic services, neighbourhood facilities and amenities that support the residents every-day needs and encourage outdoor spontaneous sociability.
2	**Accessibility**	Safe and easy access to destinations that encourages walking, cycling and use of public transport, suggesting not only type of mobility but also type of sociability with other neighbours.
3	**Connectivity**	Connected and integrated network of streets that provide many routes for movement thus, reducing congestion and journey distances encouraging walking and use of alternative modes of transport. Residential streets designed to reduce traffic and focus on community spaces.
4	**Density**	Culturally accepted levels of higher residential densities that provide critical mass to support different uses, sustain mass transit and increase the safety in a neighbourhood
5	**Diversity**	Diversity in housing, land-use & socio-economic mix that make urban form more inclusive and communities more tolerant. Diverse built forms that give interest and richness to a neighbourhood and increase place attachment
6	**Legibility**	Legible design (more variety less monotony) and smaller blocks that makes it easier for the people to find their way around and understand the neighbourhood
7	**Safety**	Appropriate higher densities that provide critical mass (more people), mix of uses that supports day and night time activities (more activity), network of streets that encourages walking and provides easy access to destinations (more connectivity), building-components that interact with the public realm fostering natural surveillance (more eyes on the streets)
8	**Spatiality**	Early provision of favourable spatiality (spaces for social opportunities such as walkable streets, community/faith centres, open recreational spaces, local play areas, local shops) to encourage organised and random sociability
9	**Detailing**	Human scale designs with attention to details. Orientation: siting (higher proportion of narrow frontages), placing (lower setbacks and in-between distance) and overlooking (higher proportion of street-interacting elements), of the built-components Frontage: higher proportion of active and pleasant neutral frontages along the streets Enclosure: street enclosure ratio responding to the use and hierarchy
10	**Participatory**	Residents as active participants in the design of neighbourhoods and its spaces reflecting their functional needs, desires and socio-cultural aspects.
Note: Urban form components are interdependent and each component requires some level of integration with other components to produce a combined positive effect on social sustainability. The design principles should therefore, allow complementing synergies between the different urban form components		

iii. Inclusive and empowering **Social Actions** (bottom-up)

Local actors and their needs and desires should to be understood for effective implementation and long term success of social sustainability framework. Bottom-up

social actions do not present prescriptive advice, but rather describe what factors that enable reaching larger social goals. Local level resources and actions such as community groups and assets, activities and celebrations, neighbourhood parliament and leadership as well as community institutions, forums and websites (formal/ informal) play a key role in community mobilisation, empowerment and participation. Bottom-up social actions not only increase efficiency of the framework but enables communities to transform their choices into desired actions and outcomes. It is important that the social actions are inclusive and are led by elected representatives.

Table 6.3: Social actions

No.	SOCIAL ACTIONS (local level)
1	Community groups and assets
2	Community activities and celebrations
3	Community leadership and parliament
4	Community institutions, forums and websites (formal/informal)

The research emphases that such a framework should not be taken as a blue print for social sustainability in all cities. It should rather act as a trellis upon which the social change is enabled; one which secures flexibility, adaptability and liveability of a constantly evolving society. The social sustainability framework is not a rigid set of rules but principles that aims to humanise the current urban development in India. Pluralism and formlessness that secures flexibility, adaptability and liveability of a constantly evolving society are most important characteristics of any urban form-making mould.

6.2.2 Urban form design guidance for social sustainability: Guwahati, Assam

Planning for development is an envisioning process which requires a sound assessment of the ground issues allowing sustainable growth of a city within the bound constraints of its demographic, physical, socio-economic, jurisdictional and financial aspects. A detailed profile study of Guwahati, as discussed in Chapter 3 which examined the city's growth dynamics and morphological transformations, gave an insight into the indigenous characteristics and evolutionary trends in the urban forms of the city. The lens of the past allowed us to better understand long-term societal processes including successes and failures of different planning interventions and consequent urban forms which are key to building an evidence-base for the future growth and development of the city.

Through the analysis of the present forms, it also became clear that Guwahati is complex, multi-layered and dynamic city, facing several social threats along with obvious environmental vulnerabilities that needs to be addressed in the future development plans. The present splintered forms and socio-spatial shifts does not fit in easily with the city's efforts to becoming a global player and one of the smart and most

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admired state capitals of the 21st Century India. This calls for an acute need to revisit the urban design and planning practices adopted in the city with an equal emphasis on the social dimension of sustainable development. New development approaches need to respond better to contextual realities and allow for bottom-up processes thus, fostering real change which benefits the community over time. The following urban form design guidance (UFDG) for social sustainability can help define the future directions and development opportunities for nurturing social sustainability in Guwahati

Aim: The primary aim of these guidelines is to promote and nurture the concept of social sustainability in Guwahati through design of its urban forms.

Scope: The UFDG deals with design elements that fall within the scope of this research and are discussed earlier in Chapter 3 and 4. It intends to provide a series of general design guidelines that apply to different neighbourhoods in Guwahati and therefore, does not cover detailed treatment of the urban forms of specific neighbourhoods. The guidance responds to the present socio-spatial context of Guwahati which may evolve or change in tandem with the transformations in the society and its relevance may therefore, vary with time and context. This guidance which may act as a supplementary planning document in connection with the proposals for City Master Plan must thus, incorporate a regular evaluation of its implementation. It should:

(i) Accommodate flexibility (to allow adaptation and innovation)
(ii) Encourage dynamism (to embrace change and pluralism)
(iii) Embrace robustness (to ensure quality and endurance)

Purpose: The main purpose is to provide a practical tool to

(i) promote social sustainability in the urban built-environment context of Guwahati
(ii) guide the process of urban form design and design evaluation for social sustainability
(iii) aid designers and decision-makers in their actions towards achieving sustainable urban development
(iv) guide public sector commissioning bodies when new sustainable development strategies are being formulated for the city

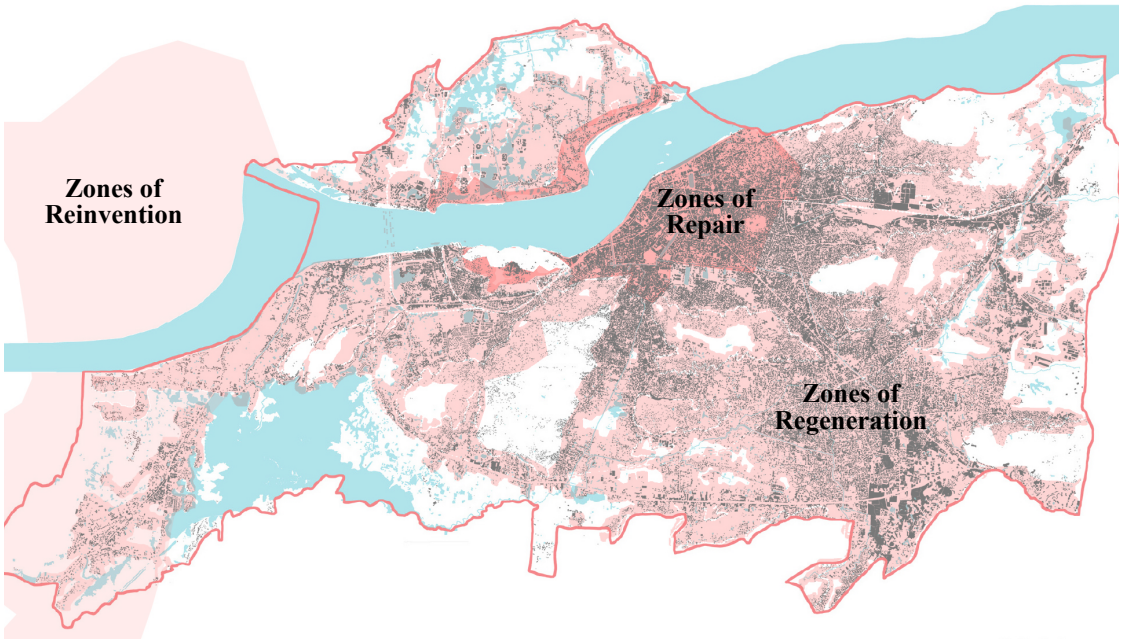
Based on the profile study of Guwahati and the analysis of its past and present urban forms, different zones for design intervention can be identified as zones of ‘repair’, ‘regeneration’ and ‘re-invention’.

In these areas the purpose of the guidance will be:

(i) Zones of Repair (traditional historic neighbourhoods): proposals should fit-in and repair the character of traditional neighbourhoods
(ii) Zones of Regeneration (existing modern neighbourhoods): proposals should gradually enhance the character of existing modern neighbourhoods

(iii) Zones of Re-invention (proposed new neighbourhoods): proposals should create new forms that are rooted in the city's distinctive culture, physiography and social settings.

Figure 6.5: Zones of Repair, Regeneration and Reinvention



The UFDG for promoting social sustainability in Guwahati is based on the components of urban form considered in this research. The justifications for the guidance are based on the research outcomes. These are: Open Spatial-Network, Land-Use and Activity, Density & Built Form and, Blocks and Built-Components. These urban form components should respect the characteristics of the identified zones as guidance.

(i) Open Spatial-Network

-streets:

a. Street Hierarchy: (determines the use and importance of different streets)

Rule: *All neighbourhoods should have at-least three levels of street hierarchy.*

1-Primary (take thorough traffic with very high activity - tend to be where key shops are located), 2-Secondary (carry traffic to different neighbourhoods with some activity) and 3-Tertiary (residential streets). Well established street hierarchy (determining the purpose and enclosure of different streets to be incorporated in the Comprehensive Masterplan 2025) and new development proposals should respond to the nature of the street.

Justification: At present the city is served by only a few primary and secondary routes with a large proportion of residential or tertiary streets which are dead-ends, resulting in reduced connectivity, movement difficulties and increased stress on major routes.

Hierarchy based on the use and function of the street contributes towards legibility and accessibility in a neighbourhood.

b. Permeability: (determines the extent to which urban forms permit (or restrict) movement in different directions)

Rule: *All new streets will end in other streets and integrate with the existing city's street grid.*

Where there are topographical constraints, rule no. (i)c should be followed.

Justification: A connected and integrated network of streets contributes positively to all aspects of social sustainability. It is an integral component of a sustainable urban form which not only allows for ease of movement and support alternative modes of transport and give character and personality to an area but also provide a number of social benefits.

c. Accessibility: (determines connections to other localities of the cities and access to destinations)

Rule: *Any dwelling on a residential street should have direct access to at-least one active neighbourhood street within 400-800m distance.*

Justification: Accessibility to basic services, local facilities and amenities is a key component affecting all aspects of social sustainability. Residents' prefer peaceful, residential character but desire easy access to destinations. The distance to either a primary or key active street in the neighbourhood determines a resident's level of place satisfaction, place attachment and perception of safety.

-open spaces

a. Hierarchy of Open Spaces: (determines the purpose and importance if different opens-paces)

Rule*: Accessible and integrated network of hierarchical open spaces (type and size: city level - approx. 1600m radius; neighbourhood level*[2] *- approximate 800m radius, local 400m radius) should be provided* [as part of he Comprehensive Masterplan 2025 based on survey for total public open-space provision per 1,000 population].

Justification: Hierarchy of opens spaces serves different needs of people at different spatial scales. A network of open spaces improves connectivity and avoids fragmentation.

b. Natural Landscape: (integrates the dramatic and varied natural landscape of Guwahati)

Neighbourhood open spaces should have access from least two streets and should be well defined by the human-scale built-components.

Rule b1: *All new developments should integrate with the natural landscape of the city and protect important natural landmarks, key long range views and vistas to and from the city.*

A visual assessment of different areas of the city should be conducted [as part of he Comprehensive Masterplan 2025].

Justification: The haphazard developments and alterations to the city's form have not only had an adverse effect on the environment but also destroyed the aesthetics of the spectacular and precious topography and natural landscape that needs to be preserved and nurtured. Valued natural landscape contributes to resident's feeling of attachment and pride in place.

Rule b2: *Access to nature parks, wild life sanctuaries (e.g Pabitora & Amchang Wildlife Sanctuary), river front, local wetlands, ponds and historic tanks should be improved and enhanced for visitors.*

Justification: Nature has been an integral part of traditional settlements and ancient planning in Guwahati. The city's unique physiography and abundant natural landscape when used in co-ordination with the physical structures enhances the city's overall form and social sustainability.

c. Cultural Landscape: (preserves culturally and historically significant natural landscape)

Rule c1: Culturally significant traditional open spaces such as Bihu fields and traditional open markets (e.g. Beltola bi-weekly matket, Kachari Bazar) should be protected and enhanced.

Justification: Culturally significant open spaces are a part of Guwahati's unique character and provide a sense of place for local communities. Such spaces shape the cultural identity of the neighbourhood and it's residents in addition to providing a number of social benefits. At present several culturally significant open spaces are in neglect and threatened under development pressures.

Rule c2: *A movement route and visitor circuit for religious destinations and natural heritage in and around the city should be developed.*

Justification: Guwahati is dotted with a number of religious destinations and natural heritage including legendary temples Such destinations still serve the spiritual, recreational, social and religious needs of the people.

(ii) Land-Use and Activity (determines different uses & the level of activity in an area)

a. Land-use

Rule a1: *All new developments along primary routes should be mixed-use.*

Justification: Mixing different uses together and not zoning them apart contributes positively to all aspects of social sustainability.
Culturally accepted levels of land-use mix should be determined through surveys before any new proposals for the neighbourhood. Over dominant land-use and/or activity whether residential, commercial, retail or office, exhibits greater social problems and is found to be less sustainable.

Rule a2: *'Daily Domestic Do' or day-to day essentials [such as grocery shop, vegetable store or market, launderette (hot-press), tea stalls or cafes, sweet shops or eating joints] should be provided within 400m distance.*
Justification: Availability of and accessibility to basic services and facilities in the neighbourhood is a key component affecting all aspects of social sustainability.

b: Activity

Rule b1: *Primary Active Frontage: Primary streets should include active frontages at ground floor level. At least 75% of these frontages should be active.*

Rule b2: *Secondary Active Frontage: Secondary and/or tertiary streets should include at least 20% of active uses, to include 'daily domestic do', live/work space, etc.*
Where these uses are not currently viable, provision should be made for their introduction in the future. Residential character of tertiary streets should be preserved.

Justification: Different daytime and evening activities promotes vitality and safety in an area, encourages greater social contacts between residents and encourages walking.

(iii) Density and Built-Form: (determines critical mass of people)

Rule 1: The densification and compactness of neighbourhoods is subject to an acceptable level of residential amenity being achieved.
Justification: At present neighbourhood densities varying from as high as 179 ppl/hec in traditional areas to lower densities of 72 ppl/hec in modern suburbs. Higher densities provide critical mass of people necessary for sustaining different uses, public transport and safety in a neighbourhood and, have positive impact on all aspects of social sustainability. However, over-determined density exhibits greater social problems and is found to be less sustainable.

Rule 2: *The spatial proximity of dwellings in a neighbourhood is subject to an acceptable level of privacy and overlooking distance being achieved.*
Justification: Spatial proximity has direct proportional effect on the strength of local ties, intensity of interactions and consequently the level of trust and reciprocal relationships, amongst the residents in a neighbourhood. However, this is culturally

defined and is dependant on acceptable level of privacy or overlooking distance to the private space or habitable room window of adjacent dwelling.

(iv) Blocks and Built-Components: (determines the size of the developable blocks and human-scale elements of built-components)

a: Urban blocks

Rule a1: *Urban blocks should be maximum 150m in its longest dimension.*

Justification: 125m distance enable a reasonable level of permeability for pedestrians. Shorter urban blocks allow for greater connectivity, accessibility, legibility, safety in an area.

Rule a2: *Blocks in the zones of repair should be in line with the existing traditional block sizes or a relaxed length upto maximum 100m in case of traditional residential pockets.*

Justification: 1000m distance is optimum for pedestrian movement and sustains a variety of building types. Existing length of short blocks in Fancy Bazar vary between 45m-65m while in Uzan Bazar area lie between 95m-125m approximately).

b. Built-Components:

Building orientation (determines the extent to which the built-components respond to the adjacent streetscape)

Rule b1: *All buildings should face onto the street and take their main access from it.*

Rule b2: *All buildings should allow for minimum setback from the main access street. The setback distance is subject to an acceptable level of residential comfort being achieved based on standard building regulations and type of street.*

Frontage [determines the extent to which the built-components creates active frontages (i.e. the degree of animation) and encourage residents to interact/use to the adjacent streetscape]

Rule b3: *(Rule b1 and b2 of Landuse and Activity)*

Rule b4: *Buildings along the active neighbourhood street or high street should encourage vertical mix of uses.*

Rule b5: *No ground floor building should present blank facades to the street. All elevations fronting onto streets and public spaces should include overlooking elements and visually permeable fencing.*

Enclosure (determines the relationship between the height or the continuity of the built-components and the width of the adjacent street)

Rule b6: *All buildings should create a continuous edge or building line along the street.* Setbacks in terms of porches, terraces, balconies, etc are accepted provided the main street wall clearly follows the existing building line. In case of detached dwellings or buildings with front-garden, the fencing (compound-wall) should allow for visual permeability onto the adjacent street.

Rule b7: *All buildings should create enclosure ratio between a minimum of 1:0.75 to maximum 1:1.25 which is subject to an acceptable level of residential comfort being achieved.* The extent to which the building enclose the streets depends upon the type and use of the street, for example the enclosure ratios for primary or active neighbourhood street may extend upto 1:1.5 to 1:2.

Typology (determines the typology of built-components that forms the general whole)
Rule b7: *Neighbourhoods should encourage a variety of building typology to create interest, legibility and greater sense of place among its residents.*
Diverse building typologies encouraging socio-economic mix makes the neighbourhood more inclusive and its residents more tolerant.
Justification: Human scale elements of the built components facilities different aspects of social sustainability such strength of local social ties, level of interaction and trust, perception of safety and sense of community.

Figure 6.2: Influence of urban form on social sustainability (qualitative outcomes)

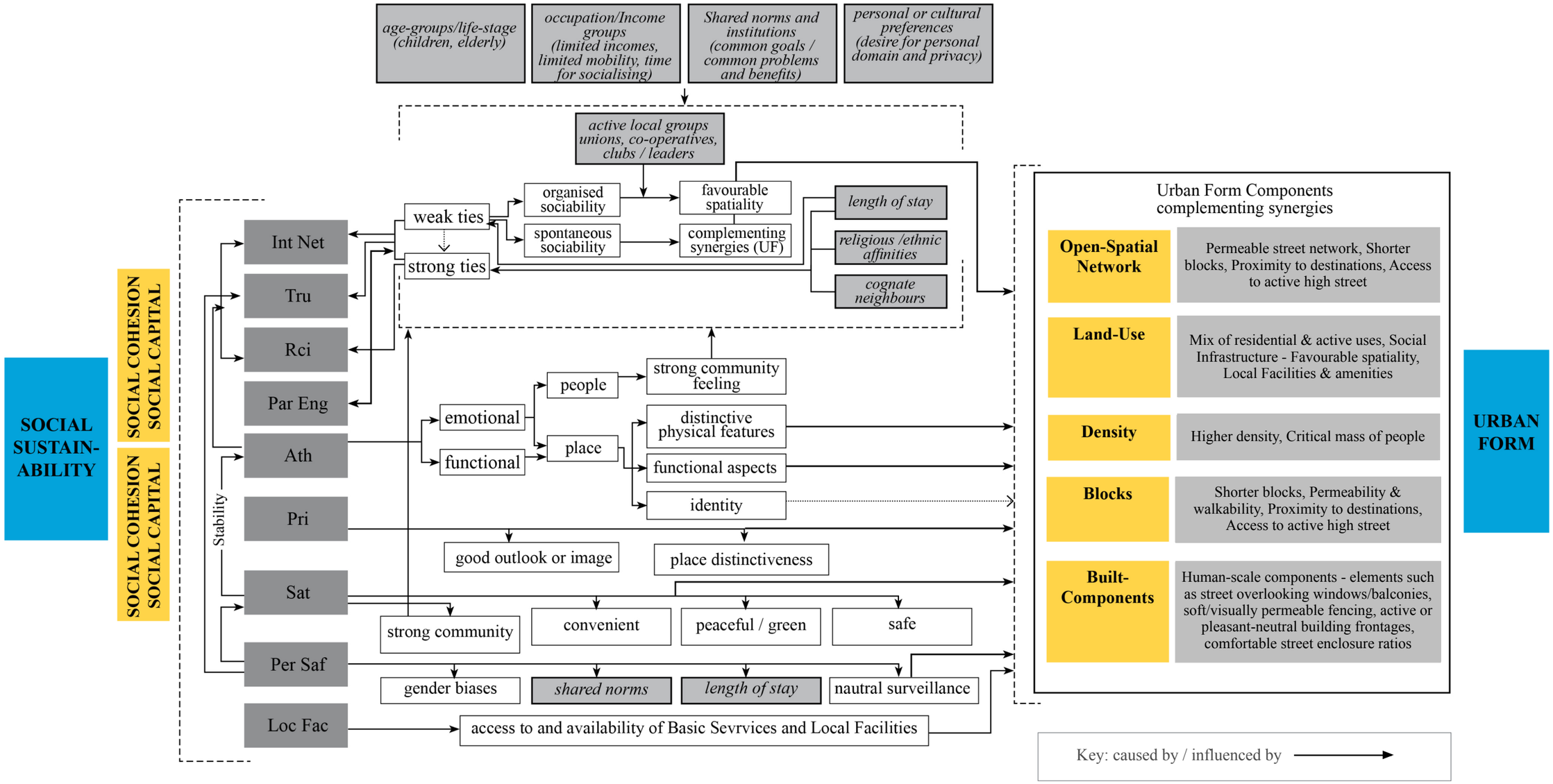
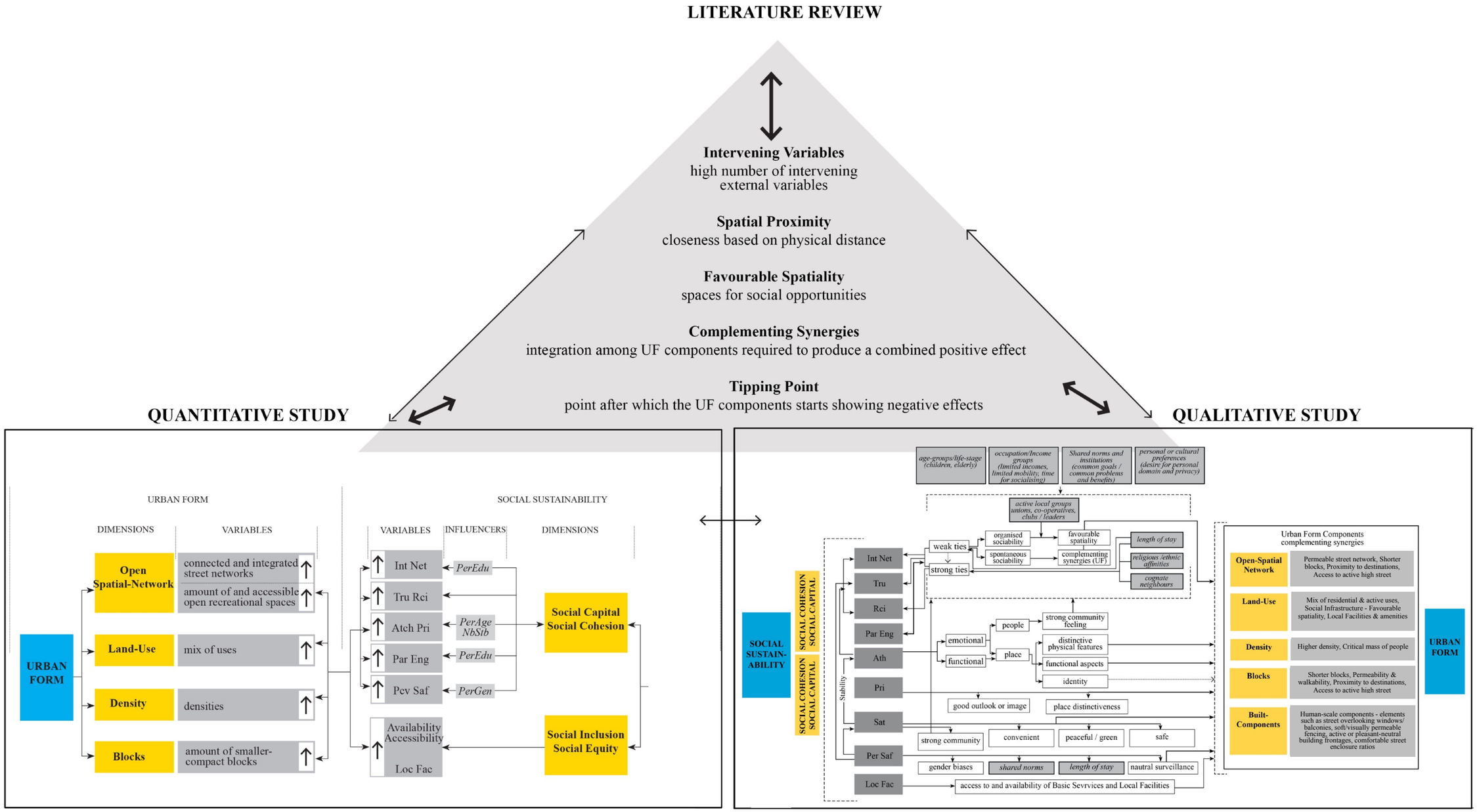


Figure 6.3: Method triangulation



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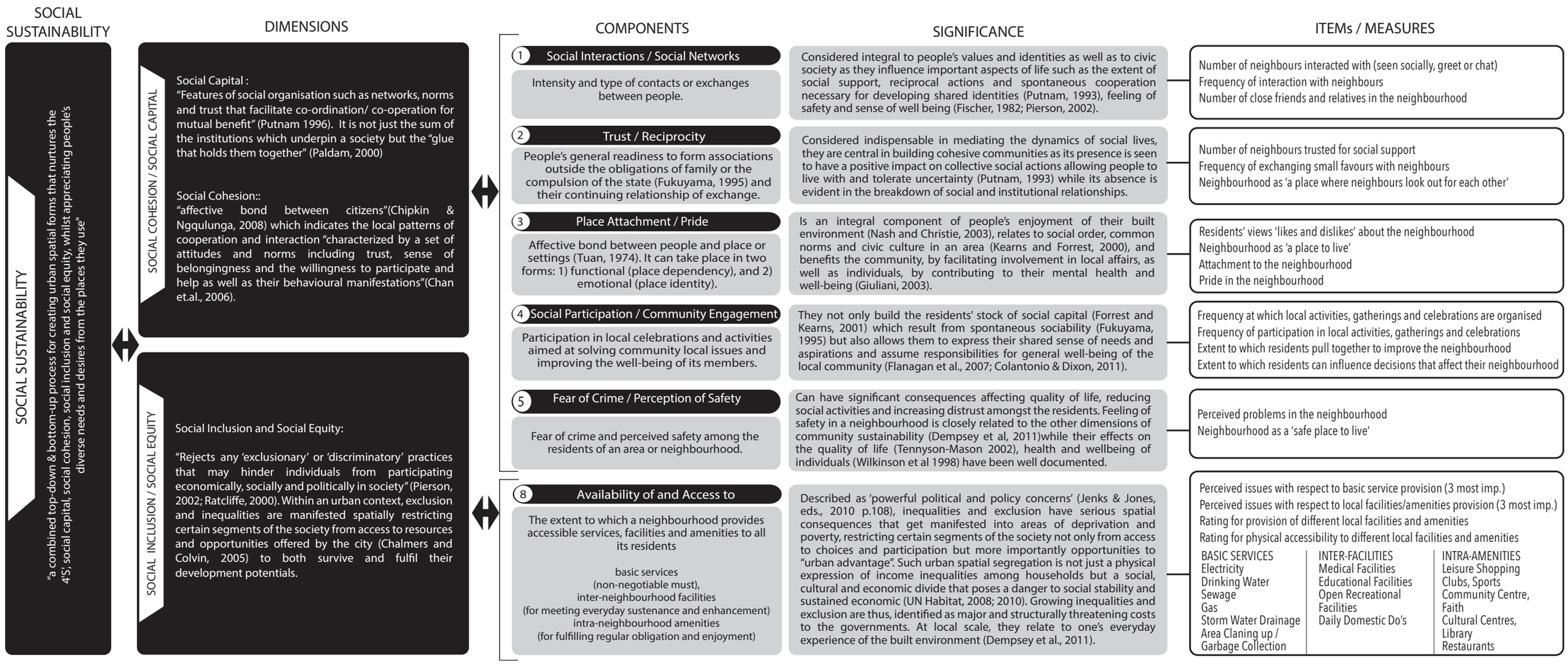
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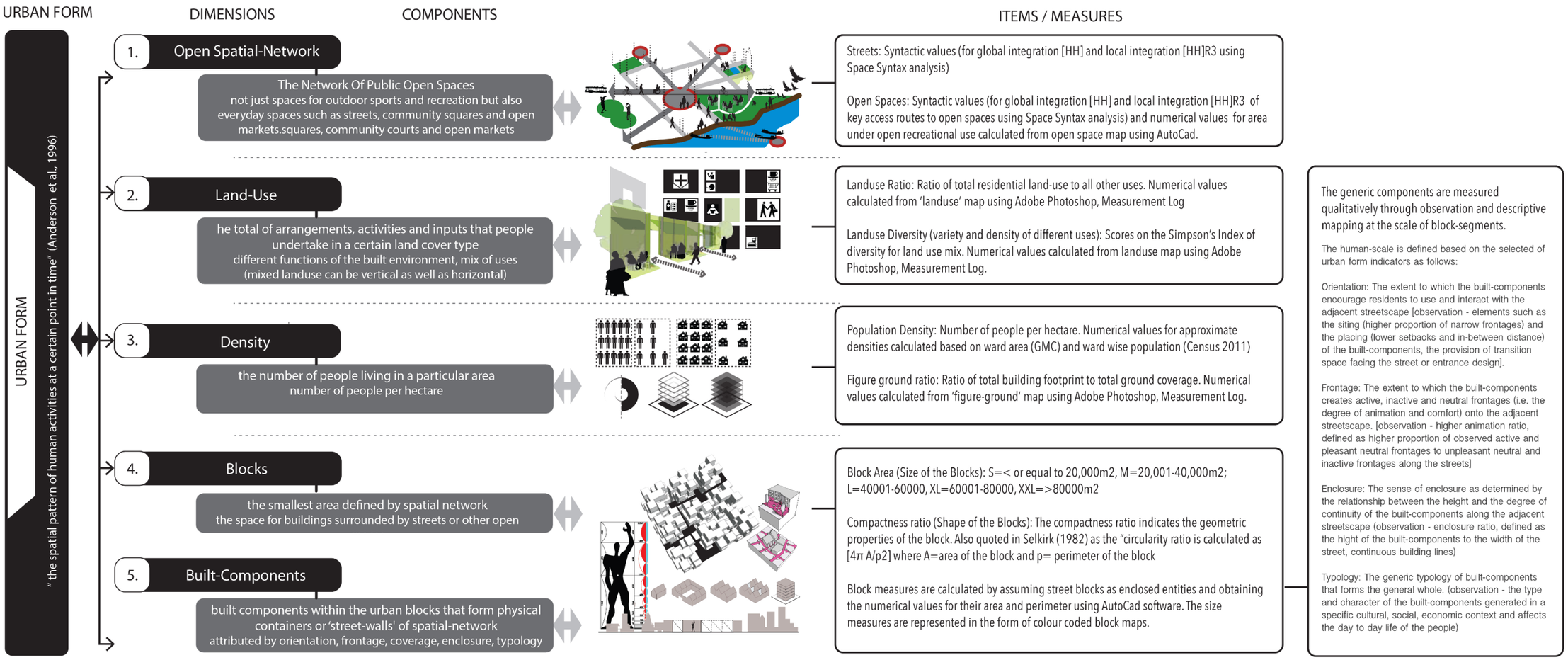
APPENDICES

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Appendix-1: Theoretical framework for assessing social sustainability



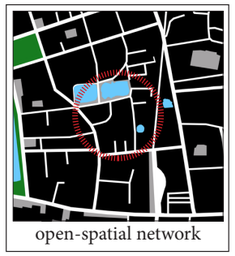
Appendix-2: Theoretical framework for assessing urban form



Appendix 11 - Urban form description

Urban Form Type -1: Inner Traditional [T1/UznBzr, Lamb Road Area, Uzanbazar]





Typical urban morphology consists of a regular grid (planned during Colonial Period); squarish urban blocks 100-150m wide

High level of street activity & connectivity, very high activity along commercial streets, residential streets with low pedestrian movement, a number of quiet residential pockets

Very good access to water-front; well-connected by public transport

Good access to amenities, facilities and provision of basic municipal services

Very diverse area including museum, art gallery, district library and university campuses

A number of well-defined central parks and other open spaces as well as key amenities like clubs, district library, cultural and religious centres, planetarium etc

Dominated by S and M size urban blocks; improved connectivity

Fine and coarse grained urban form with compactly arranged building footprints

One of the oldest residential block-segments of Guwahati, located in the historic core

Dominated by large traditional houses with unevenly spread apartment blocks

Age of the traditional built components >95-120 yrs

A number of traditional built-components in the vicinity remain vacant or in need of repair

Oldest residing communities with predominant Assamese speaking population - a number of elite local residents

Generic residential built-components comprise of detached footprint set within its low compound along plot boundary

Front porches, residence doors placed in-front of compound gates, windows overlooking the streets through very low and/or porous compound walls; increased visual permeability, pleasant and safe feeling onto the adjacent streetscape

High frequency of observed open gates; indicated trust and sense of safety in the immediate locality

New developments favouring high and non-porous compound wall, reduced visual permeability and connection to street activities

Higher proportion of active and pleasant neutral frontages

Setbacks created medium enclosure ratio, overlooking elements and active frontages along with continuous building lines; lead to comfortable streetscape

Predominantly one to three storey residential built-components, apartments higher than 6 storeys also exists





SUMMARY

Very diverse area

Very active commercial street, pleasant neutral residential streets

Dominated by small and medium size urban blocks

Approx. width of the urban blocks 100-150m

Good access to amenities and facilities including city level recreation

Good connectivity, public transport facilities (road and water), a number of well-defined parks and other open public spaces

Dominated by fine grain, small building foot-print

One of the traditional neighbourhoods and early resident communities

Dominated by large traditional houses 95-120 years old, unevenly spread modern apartment blocks

Some of the traditional 'Assam Type' vernacular urban houses in despair, require maintenance or are in the process of being replaced by modern day structures

Generic built-components with detached footprints set within its low porous compound

Presence of transitional elements such as porches and low and porous compound wall, etc between private (residence) and public (street) realms

Large setbacks, enclosure ratio along residential streets approximate 1:2 but varies, continuous building lines

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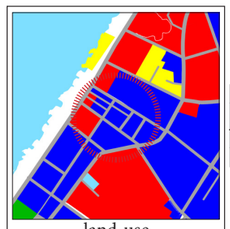
Urban Form Type -1: Inner Traditional [T2/FanBzr, Aloo Patti Area, Fancy Bazar]




open-spatial network

Typical urban morphology consists of irregular grid; Well-enclosed winding streets, represented intuitive growth pattern

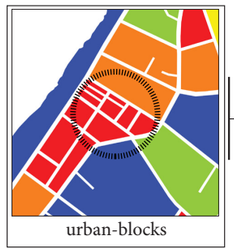
Very high level of street activity and connectivity. Very high street-enclosure, pedestrian and vehicular movement


land-use

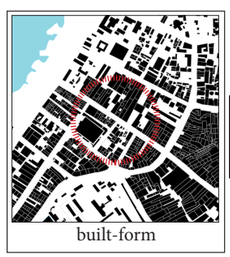
Easy access to water-front and public parks, well-connected by public transport

Easy access to all amenities, facilities and provision of basic municipal services

Vertical and horizontal mix of uses, high mix of uses supported daytime and evening economy, lead to all day active streets


urban-blocks

Immensely stressed infrastructure, lack of residential character (where streets are extension of the house), problems of traffic, congestion, pollution, cleanliness, movement of heavy vehicles and loading/unloading through the day


built-form

Compact form with densely built structures, open spaces in the form of streets and courtyards seem to be carved out from the solid mass

Dominated by S and M size urban blocks; improved connectivity

Tight link between places of live and work manifested in a common spatial identity of commercial and private functions as seen in their predominant or generic built-component typology.

Row houses with very deep floor plans to maximise the number of shop frontage, Desire to optimise the number of commercial frontages onto the street for trading and business may have given rise to deep courtyard type built-components, covering their plots entirely except for the central court used for light and ventilation

The built-components are continuous, sharing common party walls along their major axis, Ratio of width to depth of the built-components in some cases as high as 1:10 (8m:80m)

The deep plots and compact urban-blocks lead to poor, dark and narrow access to a number of later built shopping arcades and residences

Presence of front building porches and colonnades; active ground floor uses and shop fronts windows, contribution to street vibrancy

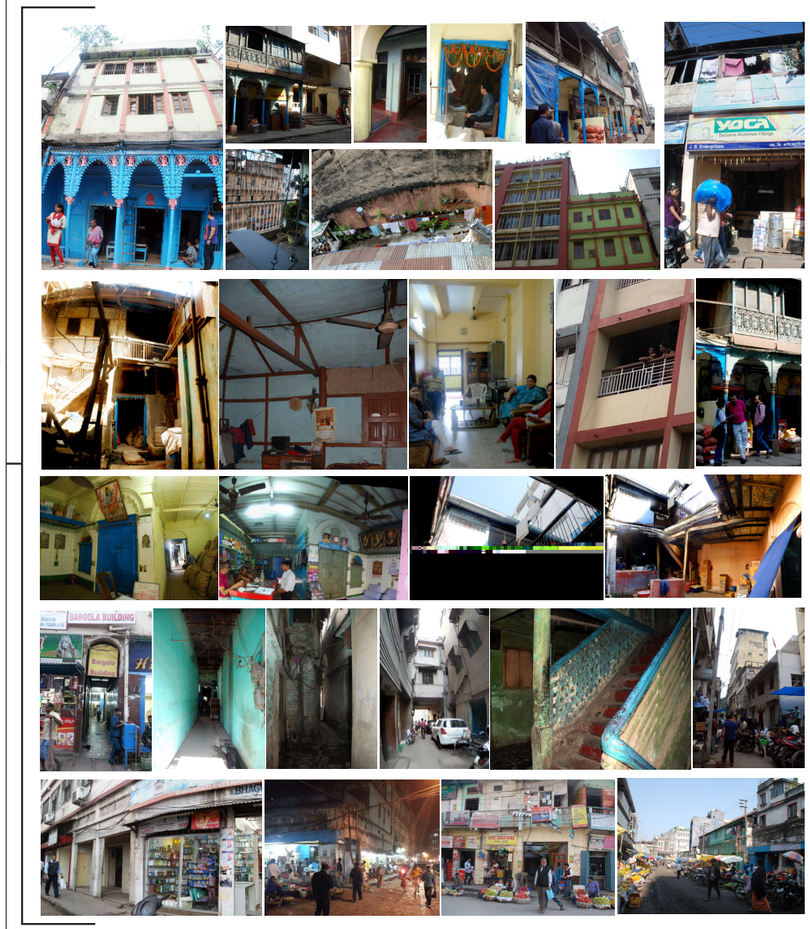
High number of windows/balconies overlooking directly onto the streets encouraging “eyes on streets”

The major spatial components constituting all the traditional dwelling typologies of this area constitute of:

- The veranda: it is a raised porch which acts as a transition space as well as communication zone fronting the street.
- The business front: It is the room where the trading and dealing takes place. This space was traditionally aristocratic and symbolised the status of the merchant.
- The courtyard: The courtyard had dual purpose firstly to bring in light and ventilation into the narrow deep plan with no openings on the shared side walls. Secondly, to act as a transition space into the private areas such as godown /store or residences at the rear and/or access to the residences on the upper floor.
- The residences: The upper floors on either sides of the courtyard are occupied for living by the family members where joint family structure usually prevails. Sometimes the residences are at the rear of the shop separated by the courtyard.

The lack of usable private open spaces are satisfied through intensive use of balconies, terrace space and terrace gardens. building lines leading to comfortable streetscape

Traditional built-components consists of 2.5 stores, ground floor shop, (double height or with a mezzanine) and upper floor residence; Age of the traditional built-components 75->100 years





SUMMARY

Located in the historic core of the city

Commercial,retail and wholesale hub of the city

Vertical and horizontal mix of uses

Active ground floor uses

Highly active streets, daytime and evening economy, all day activity

Dominated by fine grain, small building foot-prints

Small urban block sizes

A mix of traditional and modern building types, continuous building lines

Deteriorating condition of traditional buildings

Very high enclosure ratio of 1:0.75, varies between 1:0.5 to 1:1.5

Average height of traditional buildings 2.5 to 3.5 storeys, new constructions 5.5 to 7.5 storeys

Very high pedestrian and vehicular movement

Problems of traffic, congestion, pollution, cleanliness, movement of heavy vehicles and loading/unloading throughout the day

Generic built-components with courtyard typology, row houses with very deep floor plans

Live-work units; ground floor front - retail/shop and rear - store/godown; first floor or rear of the shop are residences

Presence of porches & arcades, Shop-fronts

Use of terrace gardens, balconies as means of outdoor space

High number of windows overlooking directly onto the streets, contribution to natural surveillance - “eyes on streets”

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Urban Form Type -1: Inner Traditional [T3/RehBri, P.P.Road Area, Rehabari]







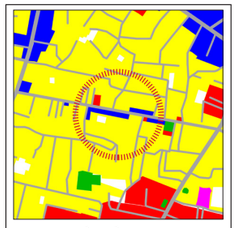



open-spatial network

Hybrid grid, connected primary and secondary but disconnected tertiary routes

Enjoys central location in the city and has easy access all key services and facilities

Moderate vehicular traffic and good pedestrian flow


land-use

Presence of open spaces in the form of local cultural and committee grounds and religious spaces

A balanced mix of use, Level of active frontage is related to the importance of the street and its function; Very active high street; moderately active secondary street and quiet tertiary or residential streets with occasional corner shops


urban-blocks

Located in the second tier historic core, Relatively compact urban form

Dominated by S and M to XXL size urban blocks


built-form

Mix of fine and coarse grain urban form with compactly arranged small and large building footprints

Rich mix if traditional and low/high-rise modern built-components.

Traditional built-components in a dilapidated condition, years of neglect, perceived as lacking modernity

Age of the traditional built-components 60-80 years

Number of traditional vernacular built-components demolished and replaced by RCC buildings, few restored/well-maintained where the residents continue to live with pride of heritage.

Typical layout consists of detached building footprint set within its private compound

High width to depth plot ratio varying from 1:3 to greater than 1:6, leading to relatively deep sites

No transitional elements between public and private realms observed in modern built-components, commercial fronts with strong building line, residences with setbacks

Traditional built-components with porches, low porous compound walls and good visibility and connection with the street

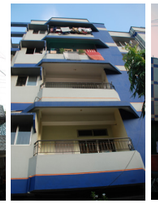
Private open spaces in the deep rectangular plots built-up with modern structures, division of inherited land and property among heirs, private open space developed to meet functional and socio-cultural needs of increasing family

Overlapping street activities as observed - walking, chatting along the street-sides and at local shops, playing carrom, children playing, active use of festival ground

Average building height 3 to 4 storeys in addition to single storey traditional buildings and high rise apartments (6+

High enclosure ratio varying between approximately 1:0.75 to 1:1.25 and more






























SUMMARY

Located in the second tier of historic core of the city

Central location, easy access all key services and facilities, both local and city level

A good mix of uses, Overlapping street activities

Pleasant neutral residential streets with active primary and secondary streets

Overlap of a number of street activities

Moderate vehicular traffic and good pedestrian flow observed

Moderately compact urban form

Fine and coarse grain urban form

Mix of building types traditional (age 60-80 years) as well as low and high-rise modern built-components

Majority of traditional built-components in derelict state or out of use, a few restored by residents.

Typical layout consists of detached building footprint set within its private compound

Partially continuous building lines

No specific transitional elements between public and private realms

Deep plots, Plot ratio varying from 1:3 to greater than 1:6

Enclosure ratio varying from 1:0.75 to 1:1.25 and greater

Private open spaces now built up with modern structures with growing need of the occupants

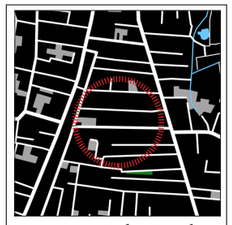
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Urban Form Type -2: Infill Modern [I1/ZooRod, Pinaki Path Area, Zoo Road]







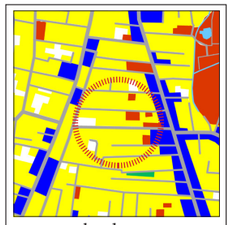
open-spatial network

Hybrid grid, well connected primary & secondary routes but partially disconnected tertiary routes

Very high level of activity along the commercial streets
Low pedestrian movement along residential streets

Primary street well-connected by public transport

Good access to amenities, facilities; primary street as shopping hub



land-use

Characterised by lower density, lower ground coverage, higher automobile dependency, low to medium permeability



urban-blocks

Well-defined public park, state zoo and other recreational spaces located in the vicinity

Mono-functional residential area but quick access to well-connected and active primary street



built-form

Horizontal elongated blocks dominated by S and M sizes

Mix of fine and coarse but scattered urban grains

balanced land-use mix and level of active frontage; highly active primary or high street is key communication as well as shopping route where the urban form is relatively dense and compact; rarely active and quiet tertiary or residential streets

built-components comprises predominantly of modern RCC detached houses, 1-3 storey high, set within its private compound

a mix of low-rise and high-rise built-components, dominated by a large stock of defensive and detached built-components

modern developments favouring high and non-porous compound wall with solid large gates, very little or no visual permeability, allows very poor connection to the street life and activity, affects the level of natural surveillance and perceived safety; continuous building line dominated by a mix of pleasant- to dead-neutral facade

shallow plots, width to depth ratio as low as 1:1.1 to 1:1.5

plots have longer width and shorter depth, single building per large plot gave much freedom for random placement hence the setbacks, orientation and enclosure did not always respect the human scale characteristics.

enjoys green and peaceful residential streets offsetting from the busy commercial and shopping hub of the city

good access to public open spaces such as Shradhanjali Kanan and Assam State Zoo, private open spaces within individual compound

no specific transitional elements between public private realm except front-yard or private garden, defensive separation between public-private realm

residents belonging to Assamese and Rajasthani speaking communities - a number of elite local residents










SUMMARY

Well connected primary but partially connected residential streets

Low pedestrian footfall on residential streets, car-dependant but well-connected to primary street, medium permeability level

Characterised by lower densities and lower ground coverage

Horizontal elongated blocks (width approx. 350-250m, depth 55-60m) dominated by small and medium to large sizes (block-segment S & L)

Balanced land-use mix; highly active primary or high street (key communication / shopping route) with relatively dense and compact urban form; rarely active and quiet tertiary or residential streets with dispersed small and course urban grains

Predominantly of modern RCC detached houses, 1-3 storey high, set within its private compound

A mix of low-rise and high-rise built-components, dominated by a large stock of defensive and detached built-components

Modern developments favouring high and non-porous compound wall with solid large gates, very little or no visual permeability, poor connection to the street life and activity, lower natural surveillance

Continuous building line dominated by a mix of pleasant- to dead-neutral facade

Shallow plots, width to depth approx. 1:1.1 to 1:1.5), single building per large plot, random placement, setback, orientation of built-components and street enclosure does not always respect the human scale characteristics

Enjoys green and peaceful residential streets offsetting from the busy commercial and shopping hub of the city

Good access to public open spaces such as Shradhanjali Kanan and Assam State Zoo, private open spaces within individual compound

No specific transitional elements; defensive separation between public-private realm

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Urban Form Type -2: Infill Modern [I2/BelTol, Basisthapur By-lanes, Beltola]



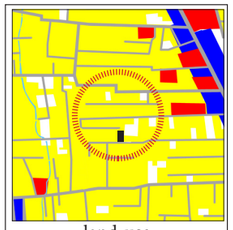






open-spatial network

Hybrid grid, connected primary & disconnected tertiary routes with dead-ends


land-use

High level of activity along the commercial primary street, Low pedestrian movement along residential streets

Primary street well-connected by public transport

Poor access to city level amenities and facilities, located distantly from the city core


urban-blocks

Characterised by lower density, lower ground coverage, higher automobile dependency, low to medium level permeability

Lack of well-defined public park and local recreational spaces

Mono-functional residential streets with easy access to well-connected and active primary street


built-form

Horizontal elongated blocks dominated by S and XXL sizes

Mix of fine and coarse grains but scattered building footprints

active primary or high street (key communication / commercial route, currently dominated by small retailers but upcoming area) with relatively dense and compact urban form

quiet tertiary or residential streets with occasional corner shops or third-places (laundry, tea stalls, newspaper and grocers, etc)

poor access to city level amenities and facilities; lack of and poor access to city parks or local open recreational spaces

dominated by modern RCC apartments (4 and above storeys) and detached bungalows (1-3 storeys) high, set within its private compound

mix of low-rise and high-rise built-components, dominated by a large stock of defensive and detached built-components

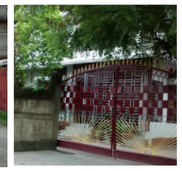
modern developments favouring high and non-porous compound wall with solid large gates, very little or no visual permeability, poor connection to the street life and activity, low to medium natural surveillance

building line dominated by a mix of pleasant- to dead-neutral facade broken by poorly maintained vacant plots, weak relationship with the residential street activities

broader width and shorter depth of plots, greater natural surveillance on street in case of apartment typology than detached single residential bungalow

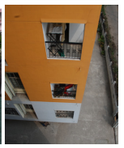
no specific transitional elements between public and private realm except front-yard or private garden (in case of detached single residential bungalow), defensive separation between public-private realm


























SUMMARY

Fast developing suburb

Vacant plots and lower-height lower-density structures being replaced by higher compact structures

Current built-form is dispersed; Characterised by lower densities and lower ground coverage, high automobile dependency

Connected primary & disconnected tertiary (residential) routes; fewer secondary routes

Horizontal elongated blocks (Approx. 550-580 m' depth approx. 70-75m); a number of dead-end tertiary streets; mix of small to very large size blocks (block-segment XXL)

Active primary or high street (key communication / commercial route) with relatively dense and compact urban form; rarely active and quiet tertiary or residential streets with dispersed small and course urban grains

Poor access to city level amenities and facilities, dearth of open recreational spaces

Predominantly of modern RCC apartment blocks (4 and above storeys) and detached bungalows (1-3 storeys) high, set within its private compound

Mix of low-rise and high-rise built-components, dominated by a large stock of defensive and detached built-components

Modern developments favouring high and non-porous compound wall with solid large gates, very little or no visual permeability, poor connection to the street life and activity, poor natural surveillance

Building line dominated by a mix of pleasant- to dead-neutral facade broken by poorly maintained vacant plots

Broader width and shorter depth of plots, high street enclosure in case of selected block segment

No specific transitional elements; defensive separation between public-private realm

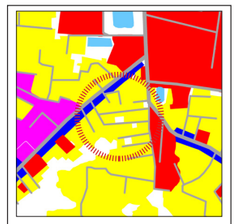
Urban Form Type -2: Infill Modern [I3/KalPhr, Rehabari Road Area, Kalapahar]




open-spatial network

Hybrid disconnected grid, dominated by disconnected dead-end tertiary routes

Active primary or high street (key communication / commercial route); rarely active and quiet tertiary or residential streets, with highly dispersed urban form


land-use

Enjoys both, easy access active, busy commercial route and peaceful, natural hilly ambience

Diverse mix of uses including institutions, industries and health services


urban-blocks

Characterised by lower densities, lower ground coverage, higher automobile dependency, lower permeability

Access to amenities and facilities varies depending on the location of the residence which reduces from foot to top of the hill


built-form

Dominated by very large XXL irregular urban blocks

Mix of fine and coarse but highly scattered urban grains

hill settlement, landslide-prone, characterised by rugged hills with steep slope associated with loose unconsolidated soil, which lead to frequent slope failure, especially during the monsoon season

associated with the mythological king Narkasur, also known as Narkasur pahar (hill)

industrial job opportunities have led to construction of a number of illegal settlements on the steep hill slopes majorly by the factory workers increasing vulnerability to landslides

generic residential built-component comprises of detached footprint set within its solid compound

predominantly of modern RCC detached houses, 1-3 storey high

mix of low-rise and high-rise built-components, dominated by a large stock of defensive and detached built-components

broader width and shorter depth of plots, building line dominated by dead-neutral facade broken by poorly maintained vacant plots

varying street enclosure; very poorly enclosed primary street, high level of street enclosure of residential streets at the foot of the hill building lines leading to comfortable streetscape

no specific transitional elements between public private realm except front-yard or private garden (in case of detached single residential unit), defensive separation between public-private realm

modern developments favouring high and non-porous compound wall with solid large gates, a number of continuous blank street walls creating an inward orientation, very little or no visual permeability

fewer eyes on streets essential for natural surveillance, poor connection to the street life and activity, larger plot width : depth ratio





SUMMARY

Hill settlement, associated with the mythological king Narkasur, also known as Narkasur pahar (hill)

Hybrid disconnected grid, dominated by disconnected dead-end tertiary routes

Active primary or high street (key communication / commercial route); rarely active and quiet tertiary or residential streets, with highly dispersed urban form

Enjoys both, easy access active, busy commercial route and peaceful, natural hilly ambience

Diverse mix of uses including institutions, industries and health services

Access to amenities and facilities varies depending on the location of the residence which decreases from foot to top of the hill

Lacks local play areas or neighbourhood open recreational spaces and other leisure facilities

Lower densities, lower ground coverage, poor permeability and automobile dependency

Industrial work opportunities in the vicinity, led to construction of a number of illegal settlements on the hill slope, increasing vulnerability to landslides

Generic residential built-component comprises of detached footprint set within its solid compound

Mix of low-rise and high-rise built-components, dominated by a large stock of defensive and detached built-components; predominantly of modern RCC 1-3 storey high

Building line dominated by dead-neutral facade; broken by vacant plots; sometimes by hill slopes, gives a softer natural edge

Varying street enclosure; very low enclosure of primary street and residential streets located up-hill; high level of street enclosure of residential streets at the foot of the hill building lines; comfortable enclosure

No specific transitional elements, defensive separation between public-private realm

Modern developments favouring high barriers with solid large gates, a number of continuous blank street walls, very little or no visual permeability; poor connection to the street life and activity, lower natural surveillance

Urban Form Type -3: Informal Slum [S1/AriBst, Aarikati Basti, Jahajghat]









open-spatial network

A complex network of movement formed by a narrow labyrinthine of routes developed spontaneously in response to the residents movement needs and the topographic features of the terrain

Spatial hierarchy in the street network reflected in the width and use of the routes or pathways


land-use

Set within a very large urban block, the primary access route disconnected from the main city grid

Highly compact and dense urban morphology, Predominantly residential with corner-shops


urban-blocks

Access to water-front, well-connected by public transport

Good access to amenities, facilities, partial provision of municipal services (settlements has metered electricity but no reliable water and lack of sanitation facilities)

High level of street activities, Flexible, multiple use of street (social and functional)


built-form

Highly dense urban form with very fine urban grain, small building footprint Approximate density 1552 people/hectare

age of the settlement: 150 years, no. of households:198, Informally built on hill slope, land-ownership: Inland Waterways Authority of India

developed spontaneously by people who migrated to work with the ship companies and IWAI (Inland Waterways Authority of India)

built on the underutilized or difficult sites with little value, and minimum risk of evacuation; livelihood opportunities and neighbourhood composition including ethnic, regional and religious ties as other key influencing factors

residents from heterogeneous regional background; spatial clustering based on ethnic or regional ties

key occupation of male residents - daily wage labourers (others into carpentry, petty trading, etc) and of females residents - domestic workers

highly consolidated settlement with a majority of the built-components made up of RCC frame structures

built-components are mainly single storey structures with only a few two storey structures

self-organisation, great spatial hierarchy and order evident from the use and size of streets and open spaces. very high enclosure ratio upto 1:0.3

highly territorial, control of territory and risk minimisation to ensure their permanence in place

smallest built-component - the dwelling - in its simplest form consists of a complex arrangement of activities in a single flexible space

spatial and functional alterations made incrementally to meet the increasing privacy requirements and/or overcome the problem of scarcity of living space; average living space/family: 18.5m2

transformations in built-components include replacing inferior with superior building materials, simple spatial division, modifications or extension to meet the socio-cultural demands for privacy, growing needs and family size, conversion of rooms for rent or shop/workshop,

a number of single room dwellings belonging to the same family often arranged around a small courtyard making it the most usable outdoor semi-private family space

flexibility and resourcefulness in the use of open spaces and, constant trade-offs between public - private spaces partly due to scarce indoor living spaces but largely due to the overlap of several social and domestic activities such as meeting, chatting, resting, playing, washing, sometimes cooking

no specific transitional elements between public-private realm, the spatial proximity and high density leading to active use of outdoor spaces

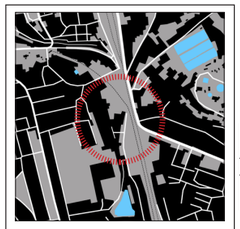


Urban Form Type -3: Informal Slum [S2/KoiNgr, Koilashnagar, Pandu]



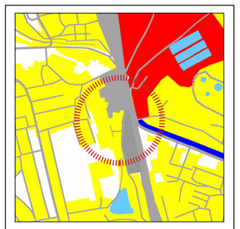





open-spatial network

A complex network for movement routes, great spatial hierarchy as seen in the size and use of street

Primary routes (access route, community centre, shops); secondary routes (communal hand-pump and occasional shops), tertiary routes (narrow residential leading to family courtyards)


land-use

Set within a very large urban block, the primary access route disconnected from the main city grid

Highly compact, dense and introvert urban morphology, Predominantly residential with corner-shops

Access to the commune through redundant railway lines, very loosely enclosed


urban-blocks

Access to few amenities and facilities, partial provision of municipal services

Active primary and secondary streets within the commune, very narrow tertiary streets like alleyways providing access to the family courtyards


built-form

Highly dense urban form with very fine urban grain, small building footprint Approximate density1673.7 people/hectare

age of the settlement: 25-30 years; no. of households:220; informally built; developed spontaneously on a swamp (marsh land) owned by Indian Railways; site which may be under-utilised or difficult to develop or with little value

minimum risk of evacuation, livelihood opportunities and neighbourhood composition including ethnic, and religious ties as key influencing factors for site selection; residents from heterogeneous regional background

key occupation of male residents - daily wage labourers and of females residents - domestic workers

single storey built-components with stilted bamboo structures

smallest built-component - the dwelling - in its simplest form consists a single flexible space arranged around an open space forming a residential cluster belonging to a single large family

family courtyards (shared by the members of the large joint family or tenants) are most animated; a place for interaction, play area of children and spill-out of domestic and livelihood activities such as weaving, carpentry, etc

narrow labyrinth of tertiary streets, for movement and access, that leads to different family courts; blank facades with no overlooking windows, very high enclosure ratio upto 1:0.3

highly reduced living space - average living space/family: 16.5 m2 / family; however, the internal community courtyard increases the living space upto 25m2/family

constant spatial and functional alterations made incrementally to meet the increasing privacy requirements and/or overcome the problem of scarcity of living space

a community open space used as play field; located at the rear of the commune; younger children play within the open family courtyards

access to the commune through redundant railway lines, very loosely enclosed with rear blank walls of the residences

highly territorial, control of territory and risk minimisation to ensure their permanence in a place

flexibility and resourcefulness in the use of open spaces; clear separation between public - private spaces





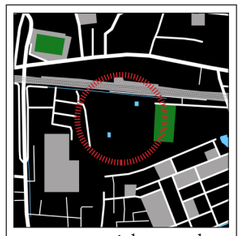






Urban Form Type -3: Informal Slum [S3/HafNgr, Hafiznagar, Chandmari]

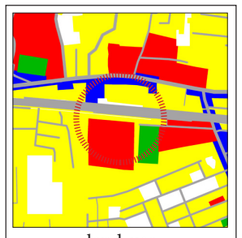




open-spatial network

Linear development parallel to the rail tracks; narrow service lane along the drain at the rare of the house

Spatial hierarchy in the street network reflected in the width and use of the routes or pathways



land-use

Set within a very large urban block, the primary access route disconnected from the main city grid

Compact and dense urban morphology, Predominantly residential with occasional grocer-shop

Accessible basic amenities, facilities, lack of municipal services



urban-blocks

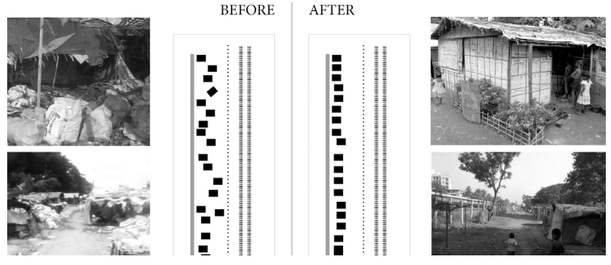
High level of street activities, Flexible, multiple use of street (social and functional)



built-form

Highly dense urban form with very fine urban grain, small building footprint Approximate density 790 people/hectare

Space as resource
- flexibility and resourcefulness in the use of all types of spaces, both indoor and outdoor



age of the settlement: 35-40 years; no. of households:71; informally built on difficult site parallel to the rail tracks which may have little value, hard to develop and/or minimum risk of evacuation; land-ownership: Indian Railways

Residents from two different religious backgrounds; Spatial clustering based on religious ties

key occupation of male and of females residents - rag picking, waste recycling, and daily wage labour or as domestic workers

poor living conditions; temporary, precarious isolated residential units running parallel to the railway tracks; causes health and safety hazards

built-components, single storey temporary structures, built with basic available materials (bamboo, metal sheets, cardboard, plastic sheets, etc) based on the economic condition of the resident

despite existence since past 35-40 years, the commune (unlike other informal slum settlements) did not show progressive improvements and lacked socio-spatial organisation; High crime and anti-social activities were prevalent before external institutional intervention (NGO) with an inclusive slum-development programme leading to physical structuring and social reorganisation of the settlement

dwellings were realigned to face the key movement path parallel to the railway line, thus making space for socialising and putting the public front on constant natural surveillance; areas for washing and sanitation demarcated towards the rear of the house, informal sanitation and community waste management systems, recycled waste collection points were positioned to improve visibility along the movement path.

informal law and order brought in along with establishment of a youth centre, women's association and children's education centre. Condition of the slum improved considerably in two years since the social and physical reorganisation

highly territorial, control of territory and risk minimisation to ensure their permanence in a certain place

smallest built-component - the dwelling - in its simplest form consists of a complex arrangement of activities in a single flexible space

spatial and functional alterations made incrementally to meet the increasing privacy requirements and/or overcome the problem of scarcity of living space, Average living space/family: 11.8m2

transformations in built-components include replacing inferior with superior building materials, simple spatial division, modifications or extension to meet the socio-cultural demands for privacy, growing needs and family size, conversion of rooms for rent or shop/workshop,

constant trade-offs between public - private spaces partly due to scarce indoor living spaces but largely due to the overlap of several social and domestic activities such as meeting, chatting, resting, playing, washing, sometimes cooking

personalisation of the immediate outdoor space and intricacy in the construction work to communicate economic and social empowerment; gradual increase in sense of ownership and community

No specific transitional elements between public-private realm, the spatial proximity and high density leading to active use of outdoor spaces



before



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Urban Form Type -4: Exclusive Defensive [E1/SpnGdn, Spanish Gardens, Zoo Road]

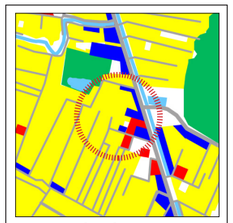








open-spatial network


land-use


urban-blocks


built-form

Located along one of the key (commercial-retail and communication) and highly active primary street

Primary street well-connected by public transport and other neighbourhood amenities and facilities including city park, state zoo, restaurants, shops, etc; locational benefit within wider city

Higher density forms along primary street; wider residential neighbourhood characterised by lower density, lower ground coverage, higher automobile dependency

Residential dominated mixed use development, active front on primary street

Located adjacent to city park ‘Shradhanjali Kanan’

Located within a large urban block; avoids relationship with wider neighbourhood except active front facade of the development

Coarse urban grains with large building footprints; little resemblance to the surrounding fine-grained urban form

located on main commercial and communication route; Prime locality of Guwahati.

plot Population Density – 636 ppl/hec; Ratio: Built to Open – 0.6

access controlled by high security, high gates with guards

a mixed use development commercial complex along primary street and gated luxury residential apartment towers at the rear

creates an active front onto the primary street instead defensive solid wall, however avoids relationship with the wider neighbouring context

five towers of G+11 storeys each, comprising a total of 188 apartments, apartment types -3 , 4, 5 bedroom residential apartments, duplex & penthouse

designed to provide fully developed infrastructure with privatised amenities, offering leisure and luxury living to its residents

creates large inaccessible pockets, cuts permeability and continuity in the overall city fabric thus, physically excluding adjacent areas and segregating each other from the overall connected spatial network of the city

exclusive use of common services and collective goods such as Central garden and pool area, Club with gym, swimming pool and indoor games facilities, Shopping Mall, Jogging track, Round-the-clock security backed by CCTV surveillance, Earthquake-resistant structures as per Seismic Zone V specifications, 100 per cent power backup, 24-hour water supply, State-of-the-art fire fighting equipment, Apartments are equipped with Telephone, Internet cabling, DTH cabling and intercom facility, High-speed elevators, Ample Parking Space managed and regulated by a self- governing organisation formed by the residents

developer Marketing Device’: “ the project has been built with a sing’le minded objective to create a new benchmark in residential luxury in Guwahati. An ultimate home, that’s beyond all expectations in every aspect, designed to match the tastes and mindset of a select few.”

large number of overlooking windows onto the central open garden and swimming pool, very high enclosure ratio

predominantly affluent business class with 70% homogeneous socio-ethnic background



















SUMMARY

Located along key communication and commercial route

Very well connected to neighbourhood amenities, facilities

High-rise, high-density development; Five towers of G+11 storeys each

Coarse dispersed urban grains with large building footprints

Mixed use; commercial complex forming active front along primary route; exclusive residential living with high security access

Avoids relationship with the wider neighbouring context

Fully developed infrastructure with privatised amenities, offering leisure and luxury living to its residents

Exclusive luxury living [exclusivity with names (developer / architect) and prestige with stylised designs and imagery] and protection from perceived crime [outcome of the need of protection against the real and imagined (unrelated to actual crime trends and locations] dangers of daily life

Access controlled by high security, high gates with guards

Privatisation is guaranteed by legal agreements which tie the residents to a common code of conduct, common goods and services and (usually) collective responsibility

Collective goods in terms of exclusive community spaces for the residents include club with gym, swimming pool and indoor games facilities, shopping mall, jogging track, round-the-clock security backed by CCTV surveillance, water supply and other services

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Urban Form Type -4: Exclusive Defensive [E2/VijCom, Vijaya Complex, Beltola]



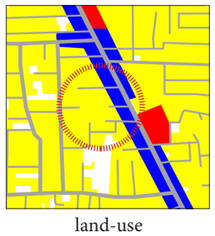






open-spatial network

Located along one of the key communication and commercial route; does not enjoy frontage to the primary street; accessed through a service lane


land-use

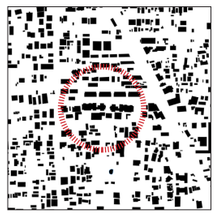
Primary street well-connected by public transport and other amenities and facilities in the wider neighbourhood

Higher density forms along primary street; wider residential neighbourhood characterised by lower density, lower ground coverage, higher automobile dependency


urban-blocks

Mono-functional, residential development, outcome of security concerns and fear of crime

Located within a XL urban block


built-form

Coarse urban grains with large building footprints; compact dense development

oldest of the three case studies; early residents residing since 6 years

there are 4 tower blocks, 6 storeys in height; a total of 88 flats; Ground floor used for parking

plot is linear, deep and accessed through a service road from the key commercial as well as communication route

plot population density – 779 ppl/hec; ratio: Built to Open - 1.2

controlled access, security guards, gated but lacks fortified look

development is more of a regular gated enclave, a common typology since mid 20th century in Guwahati

outcome of the need of protection against the real and imagined dangers of daily life than status/ luxuty living/exclusivity

exclusive common goods include walkway along the length of the plot and a small central play area for childrn; now used for parking broken play equipments; this space is used for religious festivals and celebrations

larger building footprints, resembles immediate developments, lower walls and barriers, contact with the neighbourhood but recessed from the key active primary street


















SUMMARY

Oldest of the three case studies; occupation since 6 years

Located along one of the key communication and commercial route; does not enjoy frontage to the primary street

linear, deep plot; accessed through service road from the key commercial as well as communication route

4 tower blocks, 6 storeys in height; a total of 88 flats; Ground floor used for parking

Plot population density – 779 ppl/hec; Ratio: Built to Open - 1.2

Controlled access, security guards, gated but lacks fortified look

Not different from regular gated enclave, a common typology since mid 20th century in Guwahati, lacking common goods but maintains common services

Outcome of the need of protection against the real and imagined dangers of daily life than status/ luxury living/ exclusivity

Mono-functional, residential development

Located within a large urban block; Coarse urban grains with large building footprints; compact dense development

Exclusive common goods include walkway along the length of the plot and a small central play area for children; now used for parking broken play equipments; this space is used for religious festivals and celebrations

Larger building footprints, resembles immediate developments, lower walls and barriers, contact with the neighbourhood but recessed from the key active primary street

Urban Form Type -4: Exclusive Defensive [E32/ProPrk, Protech Park, Hengrabari]



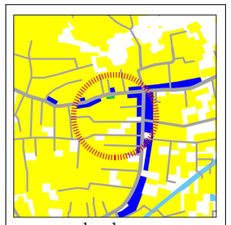






open-spatial network

located along a key neighbourhood route, 1.25 km from the major commercial hub of the city

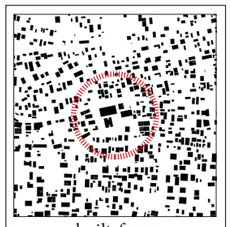

land-use

Poor amenities and facilities in the wider neighbourhood, privatised amenities and services prvides for residents recreation and other needs


urban-blocks

Higher density forms along major street; wider residential neighbourhood characterised by lower density, lower ground coverage, higher automobile dependency

Mono-functional, residential development, outcome of security concerns and need for amenities for improved quality of life


built-form

Surrounded by XXL size urban blocks but located within M size block

High-rise; Coarse urban grains with large building footprints

coarse urban grains with large building footprints; adjacent fine-grained but dispersed neighbourhood form; partial inward orientation.

controlled access, security guards, large gated development

development comprises of three blocks with total of 124 flats; in occupation since since 2009/10

total area of 1.38 acres with 0.25 acres of garden space.; plot population density – 955 ppl/hec
ratio:Built to Open – 0.7

development is high security gated community; avoids contact with the wider physical and social fabric of the city

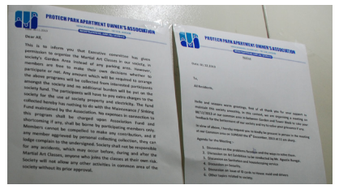
single residential use with privatised amenities; exclusive common goods include Swimming Pool, Community Hall, Children's Play Zone, 15000sq. ft Garden, Indoor Games, Fully Equipped Gymnasium, Club House

tries to strike a balance between desired privacy and security with externality; common garden opened to wider public during religious/cultural festival and celebrations, front flats overlook the main route and the walls allow visual permeability














SUMMARY

Located along a key neighbourhood route

1.25 km from the major commercial hub of the city

Higher density forms along major street; wider residential neighbourhood characterised by lower density, lower ground coverage, higher automobile dependency

Coarse urban grains with large building footprints; Wider neighbourhood comprises fine-grained but; dispersed urban form; partial inward orientation.

Mono-functional, residential development, outcome of security concerns and fear of crime and amenities for improved quality of life

Controlled access, formal security, guarded gates

Development comprises of three blocks with total of 124 flats; in occupation since since 2009/10

Total area of 1.38 acres with 0.25 acres of garden space.; plot population density – 955 ppl/hec
ratio:Built to Open – 0.7

High security gated community; avoids contact with the wider physical and social fabric of the city in day-to-day living

Flats overlook the main route and the defensive walls allow certain level of visual permeability

Located within medium size urban block;single residential use with privatised amenities; exclusive common goods include Swimming Pool, Community Hall, Children's Play Zone, 15000sq.ft Garden, Indoor Games, Fully Equipped Gymnasium, Club House

Tries to strike a balance between desired privacy and security with externality; common garden opened to wider public during religious/cultural festival and celebrations

Appendix-12: Revised coding of field notes from non-participant observation and semi-structured open ended personal interviews with the residents

Urban Form Type -1: Inner Traditional [T1/UznBzr, Lamb Road Area, Uzanbazar]						(n=10; f=6, m=4)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability /Satisfaction*	*Social Participation / Community Engagement*	*Fear of Crime / Perception of Safety*	*Basic Services and Local Facilities*
• one of the oldest residing communities of the city, long term residents, strong ties amongst the neighbours • *"we know each other for generations"* • *"My mother lives on the same street and I visit her frequently.....atleast twice daily"* • *"We have many relatives around this locality"* • a number of relatives residing in the same locality • frequent and regular interaction with cognate neighbours • less frequent day-to-day interaction with other neighbours except greeting and occasional chats which is spontaneous usually while moving in or out of their residential premises • visiting neighbours house who are not related is very rare • residents are content with the level of interaction and strength of ties among other non-cognate residents indicating personal and cultural preferences	• residents trust each other but rely for social support mostly on the cognate neighbours • general trust exists among the residents since the families are known to each other for generations	• residents take great pride in place as the area is perceived as one of the best localities in the city with high concentration of traditional (*Assam type*) residences bearing heritage value • residents enjoy a good outlook to the place and, feel attached to the locality and their ancestral homes • *"it is one of the best localities in Guwahati – it never floods, has historic significance, and we have been born and brought up here"* • The block-segment has remained more or less unchanged in past few years. The density has increased in the wider neighbourhood as traditional houses are being replaced by apartment blocks • residents lament about changing traditional character of their area • most residents feel rooted to the built environment (local historic setting, their neighbourhood, location within the city) and neighbours. Rootedness is also based on emotion (sense of belonging, ancestral property), and identity (area as an extension of their personality and status); a few long term residents describe their attachment as an intangible sensation and a strong emotion and cognition	• residents have a very high satisfaction level about residing in the area. • "Very happy with the location. No major issues as such." • residents show satisfaction towards the following aspects of the locality 1) quiet, peaceful and green 2) access to all major city attractions, amenities and facilities 3) strong community 4) good outlook to the area • residents are less satisfied with the following aspects of their immediate neighbourhood 1) antisocial behaviour/ outside gangs creating trouble sometimes • residents feel that there has been improvement in the physical infrastructure in terms of roads and street lights however, some of the residents feel that the traditional houses require more maintenance • "The area has not changed much in the past few years except many high rise apartments have come up and new people have moved in" • they are unhappy with change in the traditional character of the area; long term established residents feel that this is being disrupted by new residents from different socio-ethnic backgrounds • predominantly Assamese speaking community • most people show a general level of 'passive' tolerance towards the mix • residents consider the current changes in the social structure, issues of external gangs, school and office time traffic and joy riding as hindrance • very few prefer to move to quieter and greener locality due to these issues	• there exists a cultural group, ladies club, athletic group, etc. among the residents of the block-segment; however, local community/cultural/ religious celebrations are not very frequent and pompous • residents feel well informed about their area and can influence the decision about their area. • residents pull together to works towards community welfare which was also evident in community initiative to provide street lights in their block segment • social gathering is only for social functions like weddings and funerals. • majority of the children in the neighbourhood had grown-up, rest play within private outdoor spaces within their compound • *"Until 1995 there were two local play fields (vacant plots) in our area where we as children used to play and a pond where we took frequent dips, however the fields no longer exist. Now its all built up".* • residents use of clubs, play institutions for recreation; they showed preference for use of common / public open space or parks	• residents feel fairly safe in their locality • security is provided by the police and is trusted for its service • some residents complain about issues of alcoholism, gangs, substance abuse and chain pulling incidents caused by people from outside their locality. *"this is the case since past 6-7 years due to a number of outsiders that have come into the neighbouring localities causing issues in our area"*	*availability of basic sServices* • the area has all the basic service provision including municipal piped water, sanitation facilities - electricity:(household meter, ASEB); dinking water:(tap water, GMC); sewage:(GMC);Gas: (LPG); Storm water drainage: The area is located on a higher plain and do not face issues of flooding; waste management / Area cleaning: garbage collection is an issue and the rubbish is dumped in the nearby grounds or dumping places. The traditional residences have huge built up area and are difficult to maintain *availability and access to local facilities* • public transport: (very good); public open/green space:(the locality enjoys good access to open green private and public open spaces S.S Park, Nehru Park, Digholi Pukhuri Children's Park and water recreation, Latasil Field, Cricket Field, etc); the area also has all the Intra and Inter neighbourhood facilities in the vicinity • enjoys one of the best locations in the city in terms of access to services, facilities, amenities including city level attractions and a number of recreational water-bodies and parks. • good pedestrian connectivity, access to public transport and enjoys proximity to all local and city level facilities and services.

Urban Form Type -1: Inner Traditional [T2/FanBzr, Aloo Patti Area, Fancybazar]			(n=12; f=3, m=9)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability /Satisfaction*
• residents share a close co-existence with each other • they see friends and interact with neighbours in their free time; regularly participate in local community gathering and religious activities • residents have many relatives / extended family in the same locality, with whom interaction is most frequent • social ties and interaction with other (non-related) neighbours is also common; frequent random social interaction among neighbours - often more than once daily • social visits to neighbours house who are not related is occasional • most of the interaction is on the street and the shop fronts which are key ares for day-to-day interaction • very frequent random social encounters on the street • frequency of the interaction amongst male residents is higher than the female residents; which may be due to generic built typology (live-work units i.e. house on the top/rear of the shops) making business the front of their dwelling run majorly by the male members of the community • common community perceptions and attitudes, neighbourly interaction, and the high density of local ties observed	• residents trust each other in their locality for social support • since most of the residents have extended families and relatives in the area asking for small social favours is less common with other non-cognate neighbours • there exists a general trust among the residents which seem to be strengthened due to the proximity of living and frequent interactions • there exists a stronger trust among the long term established residents families who are known to each other since generations than the new residents	• mix response about the residents pride in the place they live • many residents take pride in the place because their locality is known for the festival celebrations (mega affair) and good shopping precinct • many feel the deteriorating quality of built environment (including changing social structure of the area and high number of immigrants, increased traffic and congestion) as a major drawback about the locality • environmental quality and reduced living space is a concern for the residents yet it is the strong community feeling that attaches them to the place • building typology (live-work units) • many residences are more than 100 years old and hence residents have strong attachment to their ancestral property and the locality • even after moving out of this locality, many residents still continue to have commercial links and family ties in this area • residents continue to live in the area, despite the congestion and traffic issues, as they feel strong attachment and belonging to the place . • *"We live here for more than 100 years. Our house is at the back and shop in front. The house is 500 sq ft in area with three rooms. I live with my mother and sister. We have 7-8 close friends and relatives on the lane. The place is no longer liveable. It is good for business but not good for residential purposes due to the traffic, congestion, noise, dirt and change in the social setup. The immigrant fruit vendors and tenants who come on temporary basis are slowly settling here and they do not care much for the area. The housing and infrastructure quality has also deteriorated."* • *"We want to give back our streets to our children"* • *"We live here since last two years. We are workers in the godown and have come from a different state. We are 15 male workers who stay here without family. The owner had built a new RCC building and has one floor to himself the rest are rooms given to the workers. The owner has a house elsewhere in Guwahati where he lives but visits this place frequently"* • Attachment is more towards the social than physical environment; sense of belonging to the community is also highly rooted to social relationships (friends, family, local groups and organisations	• a mix response about the stability of the population in the area • many early residents have moved out of the locality; many of which still continue to have business ties; majority of commercial premises are either rented out or still owned by the original residents for trading and businesses, a number of residential premises are also given to the immigrant workers who work in their godowns • some resident families are in the process of moving out due to the deteriorating condition of the housing and infrastructure that needs repair. These residents perceive that the areas is no more liveable due to extreme commercialisation, influx of people with different socio-economic background that is changing the traditional neighbourhood structure as well as increasing percentage of immigrants and tenants who seem to have no ownership or concern for the area • in contrast there were many families who showed no intentions for moving out of the area and have invested well in their house and business premises to suit the modern requirements; • one of the interviewed family had moved out but returned back to the same locality to live close to their business. They find the live-work house typology as the best suited to their lifestyles and the convenience of living close to all day-to-day amenities available at their door-step • *"It is a 24 hr neighbourhood with some issues but great convenience"* • *"There is no need for open space because Uzan Bazaar facilities and other city parks are easily accessible".* • *"Our area never faces problem of water logging. Drinking water and sewage connection is also provided by GMC"* • *"Best thing about this area is all basic amenities and facilities are available within walking distance".* • Business very much part of the community, being close to work is the highest priority; business is an important aspect of resident's day-to-day living and therefore despite of many drawbacks like lack of parking facilities, traffic, congestion, deteriorating infrastructure the residents continue living in the area with their close association to business • the hussle-bussle, the vibes is part of residents living • residents report to have built houses elsewhere but would still continue living here due to proximity to workplace, many feel attached to the locality because it's their ancestral property and because they have lived in the locality for many years • original residents who continue to live in the locality have invested in the housing infrastructure however replacing the traditional vernacular typology into modern concrete apartments while the residence of people who have migrated out are usually dilapidated and in a state of despair usually given out to the worker and business staff • residents show liking towards the following aspects of their immediate neighbourhood: *good connectivity, very safe area, good neighbours and very friendly people, convenient and good local shops and amenities, easy access to city parks (open spaces)* while dislike the following aspects of their immediate neighbourhood: *the area is poorly maintained with poor hygiene, cleanliness is a problem, noise and pollution, parking problems, nowhere for children to play in immediate vicinity* • to most interviewed residents, traffic, noise, crowd and parking is an issue for the liveability of the area, some however feel: "*we have to live with it otherwise our business will suffer". "Despite the problems we would not want to leave this locality due to the convenience and business opportunities". "We have lived here for long now and are used to this lifestyle".* • *t*Taking everything into account the residents feel that their commune and immediate neighbourhood is neither good nor bad place to live. Good because convenience in terms of location, access and business is located here. Bad due to poorly maintained roads, increased commercialisation, traffic and congestion.

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Urban Form Type -1: Inner Traditional [T2/FanBzr, Aloo Patti Area, Fancybazar] (cont.)		(n=12; f=3, m=9)
Social Participation / Community Engagement	*Fear of Crime / Perception of Safety*	*Basic Services and Local Facilities*
• Religious festivals are celebrated with great enthusiasm and pomp which are also city level attractions. • residents feel they are well-informed about the local affairs in the area and can locally influence decision that affect the area • presence of a number of active community, religious and support groups as well as friends clubs; residents take active participation in community gatherings, celebrations and social functions • well knit community; people often pull together to work for the benefit of the area. • the road cleanliness, street lights and security are provided through localised community level associations (self-maintained) • consists of predominantly trading community from Rajasthan; gaining new migrant workers from Bihar and Rajasthan. • people belonging to other linguistic groups and socio-ethnic background also reside in close proximity • residents highly tolerant towards each other and there is a strong community feeling • social interaction largely within the homogeneous community groups but show passive tolerance towards the different social groups	• perception of safety in the locality amongst the residents including women is very high; occasional incidences of small crimes, about once in two months. • *"We feel safe going out in the area even at midnight"* female respondents. • Some residents felt that traffic and congestion are a major problem to movement as well as health and safety of the residents especially children. • complaints about violent disputes and alcohol abuse, problems with truck drivers sleeping on the footpath during the night. • security service during night is community led; most of the streets have private night watchman for security. • street lights provided by the community	*availability of basic services* electricity:(household meter, ASEB); drinking water: (tap water, GMC); Sewage: (GMC); gas:(LPG); storm water drainage: (No); area cleaning up / waste management: (Community led, privately paid for) *Availability and access to local facilities* Public Transport: (very well connected, convenient); Public open/green space:(people use the open spaces at Uzan Bazaar, Nehru Park, Pukhan park which is easily accessible; people go for morning walks); Other basic facilities and amenities are also available and easily accessible. • built form is highly mixed use in nature; people who live there have their business/shops in the same premises hence there are no issues with access to work; • due to high traffic, parking problems, loading-unloading activities throughout the day and street vending, movement along the streets is difficult; vehicle parking, private and otherwise, is an issue; connectivity and permeability of the area to other places is very high local movement is an issue to the residents. • while all the respondents unanimously agree on the ease of access to various facilities and services in the city and are generally happy with the location of their neighbourhood, there is a mixed response with regards to resident's parking, as some residents perceived lack of parking as an issue, while the others do not find the need to own a vehicle, due to better walkability aspect of the neighbourhood, access to bus and ferry services and option of hiring a taxi when needed • *"We want our streets back. I am concerned with the safety and security of our women and children, due to the traffic and constant loading/unloading on the road as well as footpaths which are occupied by street hawkers during the day time and truck drivers in the nights for sleeping. The wholesale vegetable auction market that takes place on the street in the morning between 4 to 8 am, causes movement difficult for children especially while going to the schools. Our children can't play outdoors on the street or even walk properly".* • *"My wife and children stay at home on a daily basis. I don't own car due to parking problems, but hire a taxi and take them out on the weekend"*

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Urban Form Type -1: Inner Traditional [T3/RehBri, PP Raod Area, Rehabari]						(n=10; f=5, m=5)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability / Satisfaction*	*Social Participation / Community Engagement*	*Fear of Crime / Perception of Safety*	*Basic Services and Local Facilities*
• good social interaction amongst the residents and day-to-day co-existence exists among neighbours usually within immediate spatial proximity • participation in community activities and local clubs seem to strengthen the social interaction, trust among the residents • in case of single gated tower blocks social interactions and networks are self-contained, social ties outside their residential commune is less or rather reduced due to the fact that the social needs are satisfied among the residents within their commune • frequent and regular interaction among residents who are related to each other, less day-to-day co-existence and integration with other neighbours except greeting and occasional chats which happen randomly on street or at community/religious gatherings; • random social encounters on the streets and meetings at social functions • social visits to neighbours house is rare, frequency of such visits is higher among long-term established neighbours who have developed strong ties / friendship over the years of stay and among group of elderly residents or people actively participating or leading community activities	• residents trust most people along their block segment. • in case of residents living in detached houses, level of trust and social interaction among the residents within close spatial proximity is higher (they rely on each other for social support, occasionally exchange small social favours and look out for each other on day-to-day basis). • level of trust and frequency of interaction is found to reduce with the increase in spatial location or distance among the residents. • high general trust among all residents but reciprocal relationships varied based on level of local ties largely affected by spatial proximity, length of stay, participation in local activities • people help each other during emergency situation.	• residents take great pride in place, enjoy good outlook to the place and feel attached to the locality and their ancestral homes. • While most residents feel attachment to both the place and the community "*We know each other here, we also visit friends in our neighbourhood every day. All are good people here";* a few felt the lack of attachment to the community - "As the place is quite commercial, people seem to be self-centred". *"We do greet each other when we happen to bump into each there but 'shakkar ki katori walla relationship nahin hai' (asking for favours and borrowing from neighbours does not exist) ".* • *"Since all the main places in the city are located nearby, people prefer to stay in this neighbourhood", "Central place in the city".* • "Its our ancestral property". • *"Have been here for long", "I have been born and brought-up here…so of course I feel closely attached to this place….Plus, it has great advantage of being centrally located in the city".* • *"Have been here for a long time and have a sense of ownership about the place"* • *"Its a very friendly neighbourhood". "People are very friendly and supportive". "Helpful and supportive neighbours". "Attached to the community here". "Good people".* • *"Good accessibility to transport facilities, medical facilities and educational facilities"* • *"Nothing to be proud of except that the people are good and the area does not flood"* • *"Many residents have renovated their traditional houses while many new apartments with modern amenities have come up. This adds value to the overall outlook to the place"*	• residents like the following aspects about their locality: Easy accessibility to railway station and other transport facilities, Good Public Transport, Friendly people and supportive neighbours, Good local and leisure shops, Good connection/ accessibility to facilities, Does not get flooded like other places in Guwahati. • residents dislike the following aspects of their locality: Antisocial behaviour/ outside gangs creating trouble, Parking problems on the street, Garbage • residents have a very high satisfaction level about residing in the area. The key aspects are access to facilities and good local shops, conveniently located. • residents perceive car parking on the street an issue contributing to congestion and movement difficulties, garbage disposal seen as a major problem; perceived issues of theft and safety along the major road.	• many residents feel they have a say about influencing the decision about their area;very few residents feel - not much can be done to influence the decision regarding the area mainly due to *"lack of support from local politicians or because everybody here is busy with their personal life".* • residents have a great deal of participation in various community functions and religious celebrations. • presence of a number of groups like religious groups, community groups, cricket and sports club, Rehabari co-operative which are actively run and managed by the residents • Residents belong to predominantly Assamese speaking community • There exists great deal of cultural unity and tolerance amongst people of other backgrounds • All different cultural and religious festivals are celebrated with equal enthusiasm and good interaction prevails amongst residents with different socio-cultural mix. • High level of interaction and strong ties existed among residents of the same community, especially older generation with an increased level of trust amongst them. • interaction amongs different social mix of people seem to lead to passive tolerance towards people with diverse socio-cultural backgrounds	• residents feel their area (particularly street on which they live) is a fairly safe place to live • although many female residents fear walking alone after dark • residents show concerns about antisocial behaviour along the street as it is a thorough road • "our street being the main thorough fare there are issues of gangs, joy riding, chain snatching, etc." • two residents mentioned about incidents of attempts to dacoit few years back	*availability of basic services* electricity: (household meter, ASEB); drinking water:(tap water, GMC); sewage:(GMC); gas:(LPG); storm water drainage: the area is located on a higher plain and does not face issues of flooding; Area cleaning up / waste management: (is an issue). some of them have privately employed people for garbage disposal. *availability and access to local facilities* • residents are very happy and satisfied with the availability and location of their locality in terms of access to leisure and other amenities, transport, medical and educational facilities. • although there are a number of large formal sports grounds like Nehru Stadium and Sports Authority India Complex, the residents feel that there is no place for children to play or exercise in the immediate locality • *"There is a small field where religious celebrations take place but no place for talking morning/evening walks".* • "*people are demolishing old houses and constructing new ones with improved basic amenities, appraising the outlook of the area"*

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Urban Form Type -2: Infill Modern [I1/ZooRod, Pinaki Path Area, Zoo Road]						(n=13; f=7, m=6)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability / Satisfaction*	*Social Participation / Community Engagement*	*Fear of Crime / Perception of Safety*	*Basic Services and Local Facilities*
• Intensity of social interaction and level of social ties vary as each street has few tightly knit group of people/households that meet regularly, look out for each other on a day-to-day basis and organise gatherings as well as celebrate functions amongst themselves • higher social interaction between residents of higher density apartments than among those living in detached houses along the street; spatial proximity and increased densities along with shared responsibilities and institutions as in case of apartments seem to increase social interaction/networks amongst the fellow residents but is self contained. • number of weak ties are higher than strong ties; weak ties seem beneficial as despite of lack of frequent interaction amongst all the residents, a good level of perceived trust and respect for other members in the block segment /street • long term established residents have developed stronger ties while the new residents feel the lack of social network within the community. This may be because there are no formal social institutions that existed in the selected case study block segments • the residents of large detaches houses in the locality lack the benefits from provision of spaces that are socially conducive and allows random social encounters to occur and; formal or informal institutions (such as community groups, assets, leadership, initiatives) that establishes contacts among the neighbours	• good level trust among the neighbours as most people know each other despite of lack of interaction amongst them on regular basis • long-term established families also look out for each other on day-to-day basis • general trust among all residents for conduct and social support in emergency situations. stronger trust among residents with stronger social ties (specially among groups of long-term residents and owners with strong friendship developed with length of stay). reciprocity among these groups of residents is also higher	• great pride in the place considering the good outlook to the area *"best residential locality and shopping precinct of Guwahati"*. • very high attachment and bonding with the place as evident from a number of long term interviewed residents and others new residents willing to continue living in this area • most residents feel that their locality is a good place to live • very few residents show low levels of emotional attachment to the place due to their feeling of lack of community spirit in the locality	• Like the following aspects : proximity to various amenities, benefit of both – quiet residential streets and vibrant commercial high street • very high satisfaction regarding their locality as a place to live in comparison to other places in Guwahati • few issues raised by the residents are traffic, noise, lack of neighbourhood park or play area for children in the immediate proximity, no walking environment, the problem of garbage collection and cleanliness issue along the Zoo Road high street.	• low community engagement; lack of active committees to organise such events and lack of available shared (formal and informal) spaces to hold them may be seen as contributors • informal social participation and celebrations are found higher among the residents living in apartment blocks while in case of the dispersed street forms it is found to be fragmented and limited to only small groups of residents who have developed strong ties or friendship in the locality (generally long-term residents) • high number of owners or long term tenants who take keen interest in the up-keep, maintenance and quality of the street environment • social mix- predominantly Assamese and Rajasthani speaking population • Residents happy with the social mix, show general passive tolerance towards people from different social and cultural backgrounds • some of the residents spoke appreciatively of social gatherings and neighbourliness, while others complained about lack of community sprit among all	• Residents felt that they lived in a safe locality; no major safety threats; rarely complained of any criminal incidences in their area • Women felt a bit unsafe or did not go out after dark while men in general felt safe walking alone after dark • Level of perceived safety in general was higher; partly due to easy and immediate access to vibrant and thriving commercial street and familiarity of the area developed due to stability and length of stay	*availability of basic services* • Availability of all basic services except issues with solid waste collection (worker privately employed by communities along different streets or apartments) • Services: Electricity: Available with household meters (ASEB); Drinking water: The residents have piped drinking water or have underground source of water or both; Sewage: Septic tanks; Gas: Available (LPG); Storm Water Drainage: The area gets flooded during monsoon; Area cleaning up / Garbage Collection: Municipal services not available. *Availability and access to local facilities* • The residents are in general satisfied with availability and access to all services and facilities except for some people who feel the lack of good medical facilities in the immediate vicinity an issue • (Public Transport: Y (Zoo Tiniali); Public open/green space: Y (ShradhanjaliKanan); Playground and other facilities for children: N; School / Kindergarten: Y (Many colleges like NIID, Law College, Guwahati Commerce College, BhaskarVidhyapeth, TERIM, Rajgarh Girl's School, Eurokids, etc); Medical services: Y; Community centre: N; Market/shops: Y; Restaurant/Food joint: Y; Cultural/sport infrastructure: Rajgarh club; Club/ Leisure Facilities: Y

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Urban Form Type -2: Infill Modern [I2/ BelTol, Basisthapur By-lanes, Beltola]						(n=10; f=6, m=4)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability / Satisfaction*	*Social Participation / Community Engagement*	*Fear of Crime / Perception of Safety*	*Basic Services and Local Facilities*
• very few strong and weak ties in the area however within each by-lane or gated apartments there did exist a few tightly-knit groups of people/households that met regularly, looked out for each other and visited socially. However this was not frequent. • residents did not know everyone along the street; high number of floating population including tenants and students which may be seen as contributors • "the area is developing and hence new residents are moving into the area, new apartments, shops and hostel / PG are being built attracting new tenants and owners" • residents of apartments along the by-lanes (streets) show higher levels of social interaction/networks amongst the fellow residents but this is self contained. • long term established residents, children and elderly seem to have developed stronger ties and they interact regularly	• general trust among the residents is low; familiarity among all neighbours or informal social contacts is low or slowly building up. • residents do not always look out for each other or pull together to solve key issues in their locality however, this slightly varied between different by-lanes depending on presence of active groups, number of long term residents, personal preferences	• Residents seem indecisive whether they take pride in the place they live or not; show some pride in terms of image of the area as new developing suburb, improvement in local infrastructure and services as well as housing with modern amenities; new shops, food joints, high street chains coming up • residents agree to have developed some sort of attachment to the place because: a) - closer to workplace, good facilities, access to facilities, good quality of apartments to live in, *"It is a purely residential area and has a suburban character"; b) "I have a home here", "lived here for some time now", "….friendly and well behaved neighbours"*	• most residents like the following aspects of their area : Safe; Friendly neighbours; Good connections to public transport and Good local shops • most residents dislike the fact there are poor leisure facilities and nowhere for children to play. • most residents show a general level of satisfaction towards the place they live; • they are dissatisfied with the lack of open spaces, parks and gardens, and playgrounds for children, quality of drinking water, poorly maintained public realm.	• low participation in social functions and community engagement; lack of active committees to organise such events and lack of available shared (formal and informal) spaces to hold them may be seen as contributors • informal gathering and celebrations among small group of residents is found to be higher among the residents living in apartments • while in case of the detached housing it is found to be fragmented and limited to only a small groups of residents who have developed strong ties or friendship in the locality (generally long-term residents) • residents show willingness to pull to gather to solve the matters concerning their local area however, they seem to lack institutional backup and leadership • residents from different regional, socio-economic and religious backgrounds living in the locality show general passive tolerance towards each other	• residents feel that they live in a safe locality; no major safety threats; • residents refer to occasional incidences of robbery but show more concern about chain-snatchers • Women in the locality feel a bit unsafe, some do not go out after dark	*availability of basic services:* Issues with basic service provision particularly quality of drinking water, electricity, waste collection and area clean-up electricity: available with household meters (ASEB) but frequent power-cuts; drinking water: (Bore-wells, issues with quality of drinking water) sewage: Septic tanks; Gas: (LPG); storm water drainage: no; area cleaning up / waste collection: (private, community led) *availability and access to local facilities* the residents are in general satisfied with availability and access to all services and facilities. key issues with local facilities are lack of 1) green zones 2) playgrounds and other facilities for children, 3) community centre. some people also feel the lack of good medical and leisure facilities in the immediate vicinity

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Urban Form Type -2: Infill Modern [I3/KalPhr, Rehabari Road Area, Kalapahar]						(n=10; f=5, m=5)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability /Satisfaction*	*Social Participation / Community Engagement*	*Fear of Crime / Perception of Safety*	*Basic Services and Local Facilities*
• varied levels of social contacts and frequency of interaction among the residents; higher along certain streets and lower in other; no specific trend for variation; variables such as length of stay, age and occupation groups, active community groups or leaders as well as spatial proximity and availability of community spaces enabling random and formal social interaction may be seen as influencers • low strong ties, good level of weak ties despite of high number of tenants and short term residents • although people know everyone along their street, regular socialising is not common • residents pay formal social visits to neighbours on occasions • residents from different socio-economic backgrounds interact well with each other, attend religious celebrations and functions of a different communities • social interaction between the residents residing at the base of the hill was very less with those living on hiill slopes and hill top	• level of trust among the residents varied; • variation in levels of trust, amount and intensity of social contacts • residents do not always look out for each other or frequently pull together to solve key issues in the area however impersonal convivial contacts (or weak ties) seem to have developed a certain level of trust among the residents and passive tolerance towards residents of different socio-economic backgrounds • reciprocal relations such as dropping neighbour's children's to school when necessary, helping during emergency situations, etc exists among residents of certain streets • varied levels of trust may be phrased as 'spatially fragmented trust'	• people show strong sense of attachment due to a) easily available amenities and transportation; b) feel rooted to the natural environment (hills and nature), feeling of home, friendly community/ no issue neighbours; ancestral land; feeling of attachment became stronger with the length of stay (Some residents would want to move to an affordable place with better amenities but feel attached to the place since their family have lived here for years)	• good level of satisfaction about living in the area; key reasons - natural environment, convenience of all amenities and for some friendly neighbours and good community spirit. • most of the owners have rented out part of their premises and there is an equally high number of floating population, this does not affect the overall community feeling in the neighbourhood. • tenants who willingness to continue living in the same locality and aspire to buy a property around the same place. • *"If we had a chance to move to a place where there are better amenities, we would move. But it's our ancestral property and we feel a bit attached here".* • *"I am a singer, our community lives close to the nature and hills. That is what keeps us rooted here".* • *"Peaceful, no pollution and we have the best of both – nature and easy access to the city main road/ high street"* • *"The area has many benefits of living here from different uses such as institutions, medical facilities, industries but the residents strongly felt the lack of leisure facilities like restaurants and good shopping, formal parks and kids play area".*	• each street a different community; issues faced by people residing at the base of the hill are different from those residing on slopes and hill top • *"There is an active Mohila Committee (women group), Naamghar Temple Committee. People actively participate in it and share their troubles. But this is mainly among the people on the hill top".* • celebrations, gatherings and participation again varies as per the street or the location of the residence on the hill, however, social participation among residents at the base of the hill is found to be lower • residents show willingness to pull to gather to solve the matters concerning the area • diverse mix of people from different linguistic and socio-economic background. • *"Everyone here is renting out here. So there are people from all different socio-economic background here. The tenants prefer living here because they either work in the Glass Factory or use the nearby medical facilities. Sometimes also because of the kids schooling"* • *"People from different socio-economic backgrounds live together here and are friendly with each other"*	• residents with immediate access to the key route or main road feel safer than residents on the slops or top of the hill as access route to the main road lacks enough building frontages, is not direct and has no street lights. • *"People generally own a car here so access and crime safety is not much of an issue. Others work and have business within the vicinity. We feel quite safe here"*	• *availability of basic services:* • the residents felt that drinking water and garbage collection were priority issues. [electricity: available with household meters (ASEB); drinking water: underground source.; sewage: septic tanks; gas: available (LPG); storm water drainage: no major issues; Area cleaning up / garbage collection: The garbage collection is a big issue here. The municipal collection is not daily but twice or thrice a week and that too irregular] *availability and access to local facilities* • access to facilities varies as per the location on the hill; residents along the base of the hill have easy and direct access to one of the key routes of the city; while the others on the slope or the rear felt the access to the main route and thus the different transport modes was not convenient. However, many residents own a car and are therefore dependent on their private vehicles for communication. Being close to the main road also brought forth issues of noise and pollution for some residents • factory workers living in informal settlements on the top of the hill generally walk to the nearby Glass Factory.

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Urban Form Type -3: Informal Slum [S1/AriBst, Aarikati Basti, Jahajghat]						(n=10; f=4, m=6)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability /Satisfaction*	*Social Participation / Community Engagement*	*Fear of Crime / Perception of Safety*	*Basic Services and Local Facilities*
• residents share a very close co-existence even on day-to-day basis. • social networks in the form of informal associations are based on regional affinities • strong horizontal networks at community level as valued by the residents (provide support in difficult times, allow people to save through informal banking), encourage information sharing, and also found to stimulate people to join forces to achieve a common goal • some of the houses are highly consolidated; high bonding capital and close ties means that residents continue to live in the commune even after climbing the economic ladder. • very friendly commune, with dense social networks and frequent social interaction, reduced indoor living space leading to extensive use of outdoor (public) spaces increasing opportunities for spontaneous or random sociability. • leaving of the doors open, the free accessibility of households to nearly all residents in their commune is a common feature	• trust each other for social support as well as in matters of lending/ borrowing • taking care of neighbours' children, looking out for each other and support during unfortunate happenings and difficult times like death, economic loss is common among the residents • residents show keen interest and concern about the welfare of not just their family but the commune as whole	• residents show very high attachment to the locality as the settlement is 150 years old; number of residents have increased in past few years because of the low rent as well as opportunities for and access to work. • there exists strong community feeling among the residents who are keenly interested in the benefit of the community and take pride in the upkeep of the commune	• highly consolidated settlement with a majority of the dwellings built in RCC frame structures; major dissatisfaction regarding inefficient and non-reliable water supply • settlement is 150 years old, early residents have rented part of their premises to short-term tenants • there exists a strong community feeling amongst the residents • access to public transport, job opportunities (work), strong community and safe environment perceived as the strength of place • taking everything into account the residents feel that their commune and immediate neighbourhood is a very good place to live if basic services especially drinking water is sorted out by the government	• residents show a propensity to participate and co-operate in community matters and work for their commune, forming close-knit networks through their daily interactions. • transformations made include community led infrastructural works like roads, street lights etc. • residents show great willingness to work together for the benefit of the commune which was evident in the spatial transformation that lead to consolidation • consists of people from heterogeneous regional background who migrated several years back majorly from the states of Uttar Pradesh and West Bengal to work with the ship companies and IWAI (Inland Waterways Authority of India). • residents are in general tolerant towards each other and have a very strong community feeling however, occasional disputes arise amongst the residents which are settled internally; (very high density living, scarcity of indoor personal space and very high spatial proximity can be seen as contributors to petty internal day-to-day disputes and living tensions)	• alcoholism is a common problem • residents are highly territorial about their commune and outsiders are immediately and internal social control is immediately apparent noticed • residents feel very safe within their commune.	• *availability and access to basic facilities / amenities* • residents are happy with the availability and access to basic local facilities in the vicinity; mainly walk to work / school; • while many houses have consolidated toRCC structures, some houses are made up of temporary vernacular materials like bamboo • highly reduced living space, however additions and alterations to the house are constant based on the residents requirements and economic capacity; residents are very progressive. • some consolidated residents have built "pucca" houses (made of permanent building materials) with sanitation facilities using septic tanks. • hilly settlement partly disconnected from the main road,not perceived as a movement barrier by the residents who enjoy access to all basic facilities such as public transport, open green spaces, medical, educational, banking and other facilities. • children play in the residential courts and/ or on streets; residents meet informally on the streets/shop fronts and for more formal interactions at the community centre

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Urban Form Type -3: Informal Slum [S2/KoiNgr, Koilash Nagar, Pandu]						(n=10; f=7, m=3)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability / Satisfaction*	*Social Participation / Community Engagement*	*Fear of Crime / Perception of Safety*	*Basic Services and Local Facilities*
• residents share a very close co-existence on a day-to-day basis. • social structure (joint family system) has given rise to courtyard typology as evident in built form; a number of single room residences (occupied by different households within the larger family, a few also rented out) enclose family courts. • continuous social interaction (including children play, domestic activities, worship, etc) between the members of the joint family occurs throughout the day within the family courtyards • main access streets, shops and hand-pump as key places of interaction with the residents outside their family • leaving of the doors open, the free accessibility of households and family courts to all residents in the commune is a common feature • local community gatherings are frequent (Community centre/ Aanganwadi centre) • frequent religious activities (active religious group that meet weekly to organise religious activities) • informal and random interaction on the street, formal meeting and discussion of issues in community centre • residents of the commune strongly feel they live in a friendly neighbourhood	• residents trust each other for social support and in matters of lending / borrowing as well as • taking care of neighbours' children, looking out for each other and support during unfortunate happenings and difficult times like death, economic loss is common among the residents • residents not only look out for the welfare of their own families but are also much concerned with the welfare of the commune as whole • *" I am fine if we are evicted as we have already bought a land elsewhere. But we are concerned about the other people here who have no place to go. We would like to continue to stay here because of the strong attachment with the community and access to jobs" said* one of the first settlers • residents show trust in health institutions and local leaders but express their concern for lack of support from the police and local politicians	• residents feel that the quality of houses have increased due to improvement in their economic status from jobs and additional income through renting out of rooms • population density of the commune has increased due to low rent and opportunities for and access to work • residents show indecisiveness about their view on whether they take pride in the place they live but simultaneously agree on having a strong attachment to the place • proximity to opportunities and strong community are key drivers to attachment • residents show less attachment to the locality but more so towards the strong community that exists within their commune	most residents like the following aspects of their immediate neighbourhood 1) peaceful area, 2) tight-knit community 3) access to work opportunities most residents disliked the following aspects of their immediate neighbourhood 1) lack of basic services 2) issue of gangs is not sorted out by police 3) access to bus services is not very convenient taking everything into account the residents feel that their commune and immediate neighbourhood is a fairly good place to live. If they have to move to a different locality they prefer a place where basic services are provided	• high women participation • a number of active groups like women's group, religious group, informal community leaders (usually the original occupiers of the land) etc. exists in the commune. • residents' requently organised social functions and religious festivals especially Durga Puja is celebrated with great pomp • residents feel well-informed about the local affairs in the area and can influence decision that affect the area • residents pull out together for the benefit of their community as evident in progressive actions like achieving metered electricity, building community centre, etc. • residents belonging to homogeneous ethnic group, show general tolerant towards each other however, occasional disputes arise amongst the residents due very high densities, very close proximity of living, reduced living spaces and stressed common infrastructure which are settled internally	• issues of external gangs at street corners and commune entrance, substance abuse as well as a case of kidnapping of a girl child (August 2013); [lack of natural surveillance and highly introverted morphology with very few openings overlooking the streets can be seen as key contributors] • female residents felt very unsafe to walk alone after dark outside their commune (especially the loosely defined area at the entrance) • informal resident's associations and close social structures controlled residents' behaviour among the residents of the commune and therefore minimised perceived anti-social activities within	• residents are happy with the availability and access to local facilities in the vicinity; mainly walk to work / school; excess to bus-stop is not very convenient to the resident-out of the two bus stops in the vicinity, one is distantly located while the second has low frequency of bus service; houses are made up of temporary vernacular materials like bamboo. • Highly reduced living space • Residents are very progressive; some consolidated residents have built "pucca" houses with sanitation facilities using septic tanks • The commune has LPG gas and metered electric connection but lack sanitation facilities and has only one community hand pump for the entire commune. • the area is low lying and is completely flooded during monsoon

Urban Form Type -3: Informal Slum [S3/HafNgr, Hafiznagar, Chandmari]						(n=10; f=6, m=4)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability / Satisfaction*	*Social Participation / Community Engagement*	*Fear of Crime / Perception of Safety*	*Basic Services and Local Facilities*
• residents share a very close co-existence on a day-to-day basis • social networks in the form of informal associations are based on regional affinities • leaving of the doors open, the free accessibility of households to all residents is a common feature; very friendly community • lacked social and spatial organisation and was victim of antisocial behaviour; external institutional (NGO) reorganisation required for social stability	• residents trust each other in matters of lending/borrowing as well as for social support; community banking system. • taking care of neighbours kids, look-out for each other and support during unfortunate happenings and difficult times like death, economic loss is strong among the residents • residents knew most people in the commune	• in the past two years the number of people residing in the commune have decreased due to emergence of an organised structure within the community and bringing in formal/informal law-order by the NGO, about ten families have returned back to their villages (at present there are 74 households). • residents pride in place has increased . they do not want their commune to be called a slum but a village • although community attachment is gradually building up, the place attachment is low due to the close proximity to the rail tracks which is considered a major threat to the children's safety and the disturbance from the noise of the passing trains; considered as a major issue. • Gradual attachment to place is evident in personalisation of spaces; improvement in the quality of dwelling with neat construction, better building materials and kitchen gardens	• most residents like the following aspects about their commune: friendly and tight-knit community; access to work opportunities • residents dislike the following aspects about their commune: issue of immediate proximity to open rail tracks raising problems of safety and noise; lack of safe play area for children; lack of sanitation facilities • Taking everything into account the residents feel that their commune is neither bad (urban opportunities) nor a good (poor living condtion) place to live. • Many residents hope to be relocated to state provided mass social housing	• there exists a number of active groups like women's committee, men's committee, youth group, child protection and welfare group, informal community leaders. • the settlement consists of a homogeneous ethnic group of people with majority population involved in rag picking. • residents are in general tolerant towards each other however; occasional disputes arise amongst the residents belonging to different religious groups, also spatially fragmented, which are settled internally	• residents faced major safety issues a couple of years back; huge amount of crime and anti-social activities (like child abuse, drug abuse among children and men, alcoholism, issues of women safety) were prevalent prior to integrated development schemes incorporated by an NGO. • open access from the rail tracks is perceived as threat; immediate proximity to the rail track is a major concern for safety of children living in the commune • feeling of safety currently low but is slowly building up; commune still perceived vulnerable to crime and issues to external gangs due to its open linear layout towards the rail tracks	• Lack almost all basic services: Lack electricity as well as cooking gas (used wood for cooking); Water for drinking and washing was provided through one supply point from the railways which was considered sufficient by the residents; Sewage: Open defecation. Some of the residents have made makeshift toilets attached to the rear of the houses, effluent is discharged into the open drain; Storm Water Drainage: Open drain runs parallel to the site. The commune does not suffer from water logging issues during monsoon; Area cleaning up / Waste Collection: Combined community led and municipal collection point • Satisfied with the availability and access to local facilities and amenities: Police station, Government Dispensary, Market, Play-field, Schools all basic local facilities are available within proximity of 0.35kms. The residents go to cinema together every two months. • Single multipurpose space residence provides sparse indoor living area. • Basic services like water and sanitation is a key priority, the residents also aspire to own a "pucca" dwelling with alteast two rooms to meet their privacy requirements. • Every space is a resource; most common places of interaction are spaces between the dwellings and the street, residents usually gather around the Child Protection and Youth Centre set up by the NGO as well as at the open space at the entrance of their commune which contains a water point

Urban Form Type -4: Exclusive Defensive [E1/SpnGdn, Spanish Gardens, Zoo Road]				ED (Exclusive Defensive)		(n=10; f=3, m=7)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability /Satisfaction*	*Social Participation / Community Engagement*	*Fear of Crime Perception of Safety*	*Basic Services and Local Facilities*
•frequency of interaction varies (depending on age, time available for socialising and individual preferences); personal domain and privacy is also accorded high consideration •common facilities and amenities like club house and a garden with children's play area provide sufficient community spaces for organised and spontaneous sociability; however, frequent sociability with (all) neighbours is not so desired; as it means more time investment and interdependencies, higher degree of social control and more frequent intrusions into resident's privacy •residents less likely to know all the people living in the EDF but encounter more regular contacts with those living in immediate spatial proximity such as residents living on the same floor or building block. Frequent informal contacts by choice often translated into stronger interpersonal connections but not always. •*"We just had a party last night at our next-door neighbours. We get along very well with few neighbours and have no issues with the rest. All seem to be friendly".* •*"We intentionally bought the flat which faced the city park, there are too many windows overlooking the central private courtyard (garden), we wanted to maintain our privacy."* •the ED form seemed to unify residents in terms of common problems and benefits and hence, felt a shared sense of purpose (in events organisation , management, and maintenance of their premise) leading to interaction with people without feeling the need to establish closer ties; more organised contacts did not necessarily translate into stronger interpersonal connections which may not be desirable, such contacts however lead to more number of weak ties which further translated into high level of trust among the residents •residents have very little contact or even concern with the adjacent communities or wider neighbourhood; High security impenetrable borders, fear of trespassing for outsiders and car oriented development, lead to a complete lack of informal encounter with people (strangers) outside their gated premise •it is a recent development with 3 years of maximum duration of stay; so far the interaction and community spirit is seen to slowly build-up as the ED form matures •immediate environment seen to play an important role for certain group of people as non-working females and elderly interact more frequently than others and look for local support	•the ED form provides both shared spaces for informal interaction; networks available to residents with knowledge about their fellow residents and social structure; socio-legal agreements tie the residents to a common code of conduct and collective responsibility for management; regular meetings, discussing management issues, organising festival and other celebrations, etc allow opportunities for interaction. This in turn is seen to help build trust between residents as the ED form gradually matured, allowing for some exchanges to take place •*"We trust most people living here. We know all belong to good family and class".* •trust for social support and in emergency situation is high among the residents, regular reciprocity was very low; neighbours do not prefer to look out for each other on day-to-day basis	•weak place attachment as most of the residents do not see their current home as a permanent place of residence; show willingness to move out if a better alternative for luxury living is available in the future. "*We can move elsewhere where there are even better amenities or facilities". "I don't think I am too much attached to this place. I would like to move to a more greener and peaceful area."* •"One starts connecting to the place as one starts living in". •*"Would like to move into a bungalow in a green hilly and peaceful area".* •Very high pride in place; class, similar lifestyle choices and economic status. "status symbol to live her", *"We moved here for prestige – status". "I take pride in living in Spanish Gardens but not Zoo Road area" (wider neighbourhood). "It is build by one of the most renowned architects and builders, provides very high quality of construction and amenities". "It has best amenities, equipments, generator, club and swimming pool". "It provides better management and maintenance as compared to living in other places".* •*High place satisfaction but lower levels of place and community attachment*	•many residents feel that the noise from the main road is very disturbing and would prefer moving to a more peaceful locality in the future. *"Since the premise is abutting the main shopping and communication route noise is a big problem. We can hear the noise of moving traffic till late in the night. It is very disturbing."* •residents show very high satisfaction about the ED form they live in due to quality of construction, amenities, classification as elite, luxury living and prestigious development. •Property ownership is found to be high; Roughly 20% are rented 80% owner; Out of 180 flats 106 were occupied. •The place provides amenities, convenience and safety which were the key reasons for satisfaction; *"Residents used driveway for morning walks and cycling; central garden not used much because it's too small and feels claustrophobic but largely used by younger children. The pool was initially big hit among the kids". "My elderly mother meets her friends at a fixed time every evening at the club house where my teenage son plays sports".* •residents feel satisfied about the central location of their ED form*"It is centrally located". "Located in one of the good areas of the city". "My office is near-by. I bought the office space first and then the flat. We both are working parents, hence having home and office close by has drastically improved our quality of life".*	•Most residents feel they have a voice or say in what happens within their ED form and can raise issues; feel empowered. •*"We have a president association. We organise 6 functions a year and a flower show which is a big event".* •residents feel well-informed about the local affairs in the area and can influence decision that affect the area •good level of participation in celebrations, social participation; some residents play an active role in management of ED form however not all pull out together for the benefit of the community •predominantly affluent business class with 70% homogeneous socio-ethnic background •general tolerance towards each other; concerning issues may be raised and put to management for resolution •Since there is poor interaction and low level of concern with the surrounding community, there is a danger of a 'them and us' attitude developing	•very high perceived safety within the ED form •security obsessed; interviewer denied entry twice; entrance allowed only after prior contact with a resident established •*"people no longer feel safe living in isolated houses with increasing insecurity and urban violence and think that developments such as this with high security measures will protect them"* •existence of resident's associations control residents' behaviour and therefore minimise perceived anti-social activities	•issues with Basic Services: issue of drinking water; additional water is bought on daily bases; frequent power cuts and poorly maintained areas outside their gated premises in terms of garbage collection and wider area upkeep. •*"Water logging outside the estate and drinking eater is a big issue"* •most residents feel the need for day-to-day grocery within their compound. some also feel the lack of good medical facilities within the vicinity. •residents prefer to use the shared amenities and recreational facilities within their enclosed ED form than using the city amenities; despite of abutting city park residents prefer to keep within their premise and use the privatised communal facilities over public ones*"The club house is small but it's shared amongst only people living here. It is convenient and readily accessible. Hence, we prefer it".* •Common Goods and Services: Central garden and pool area, Club with gym, swimming pool and indoor games facilities, Shopping Mall, Jogging track, Round-the-clock security backed by CCTV surveillance.

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Urban Form Type -4: Exclusive Defensive [E2/VijCom, Vijaya Complex, Beltola]						(n=11; f=7, m=4)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability /Satisfaction*	*Social Participation / Community Engagement*	*Fear of Crime / Perception of Safety*	*Basic Services and Local Facilities*
• level of social contacts n general low and varying, long term residents and home owners show stronger ties and higher levels of interaction than the short term residents (high mobility of tenants, lack of shared spaces for random social interaction seen as contributors to fewer weak ties) • residents less likely to know all the people living in their ED form but encounter more regular contact with those living in immediate spatial proximity (such as residents living on the same floor or building block); 'more' contact among these residents often seen to translate into stronger interpersonal connections (stronger ties) but not always • social contacts with residents living in the same ED form denser and stronger than those outside but no intention to avoid contacts outside their gated EDF seen; residents show concerns about the wider neighbourhood as it affects their convenience and quality of life	• the level of trust among long term established residents is high. These residents have small network of strong ties which have developed into high level of trust; exchange of social favours and reciprocity among these groups of residents is high while among the rest of the residents especially short term floating residents was low	• residents do not take much pride in the place • place attachment (both functional and emotional)varies depending upon their social ties and networks as well as the length of stay in the ED form • varying responses from residents (both male and female respondents) - *"Its a rented apartment, I am also not from this place, I have rented this place only for the safety of my family and because it is close to my workplace, hence my attachment and pride for the place is also less. I finally want to move back to where my larger family is."; "I stay here only because it is closer to my workplace. We made a choice from what was available in this area. Nothing attractive about this place."; "I feel attached to this place as I have friends here."; "I feel somewhat attached because I have lived here for some time now. But this attachment is not very strong."; "I feel attached because there are good families living here."*	• residents prefer to live in their ED form for two key reason 1) safety and security which is given the highest priority 2) shared responsibility for maintenance and management of facilities • ratio of home-owners to tenants is approximately equal • long term residents and owners show dissatisfaction with the high resident mobility who did not take much ownership of the place and lack interest in matters of the upkeep and maintenance of the premises, do not regularly participate in the celebrations and gatherings • medium to low level of satisfaction among the residents, both owners and tenants as the residents feel that the community was not as strong and the area lacked major amenities and facilities that would enhance the quality of life of the residents. • heterogeneous group of people from different cultural and socio-economic backgrounds • interaction takes place among people of different socio-economic background however, such interactions do not seem to always build strong ties but it did develop a general level of "passive" tolerance towards the mix.	• socio-legal agreements tied the residents to a common code of conduct and (usually) collective responsibility for management. • *"If there is any problem with respect to power failure, issue with iron removal plant, generator etc. it gets solved by all people together, the responsibility gets shared and we don't have to worry or struggle on our own. There is a collective effort and people pull together to solve the problems and issues related to the EDF." religious/cultural functions like Durga Puja and Bihu is celebrated in the gated premises, however the participation is not full.*	• residents feel very safe in their gated secured enclave • seen as one of the key priorities for the residents for living in this ED form	• provision of basic services: a majority of the residents showed dissatisfaction with electricity, drinking water, sewage and area clean-up. • ED form not dissimilar to other secured apartments without privatised amenities found commonly in the city, the residents use the facilities in the wider neighbourhood; key issues raised by the residents is lack of green zones/parks, playground for children, community centre/clubs and restaurants in the vicinity.

Urban Form Type -4: Exclusive Defensive [E3/ProPrk, Protech Park, Hengrabari]						(n=12; f=7, m=5)
Social Interaction / Social Networks	*Trust / Reciprocity*	*Place Attachment / Pride*	*Place Stability / Satisfaction*	*Social Participation / Community Engagement*	*Fear of Crime / Perception of Safety*	*Basic Services and Local Facilities*
• very high level of social contacts and networks among the residents of this ED form; extensively used communal areas and active groups such as culture, religion, politics, sports/exercise, youth/women/ elderly, hobbies/recreation/ arts/social clubs, etc. • in their free time the residents met friends and family socially, interact with neighbours, play sports or exercise in their premises; participate in community or religious activities. • common facilities and amenities like entrance lobby, walkways, gym and club house, community hall, swimming pool and a garden with children's play area provide sufficient community spaces for formal and informal networks. • Stronger ties are observed in this ED form and the frequency of interaction varies from very high to moderate; strength of ties based on spatial proximity (to some extent the) • residents have little contact with the residents in the wider neighbourhood outside their EDF however, since it is still a developing area residents do show concern and interest in the external matters although this was less as compared to the street communities, interaction with wider neighbourhood community occurs at the time of local festivals	• residents trust most people in the commune for social support and 80% of the interviewed residents look-out for their immediate neighbours on day-to-day basis and vice-versa. *"I trust most people here, especially in my block. We get along very well and have free access to each other's flat anytime. It's a friendly informal relationship".* • *ED form* provide shared spaces for informal interactions; networks made available to the residents with knowledge about their fellow residents and social structure • random social encounters in the shared spaces and regular meetings, discussing management issues, organising festival, events and other celebrations, etc allow opportunities for ample interaction. this in turn is seen to have gradually build trust between residents allowing for exchanges to take place	• higher levels of attachment as compared to the other two ED forms; emotional attachment due to good, friendly and active community than just attachment to mere physical environment and amenities. • *"The best thing about this area is peaceful, kids play areas and amenities and a number of cultural programmes organised by the community."* • *"The kids love in here and hence feel attached"* • *"I take pride in living in here because its a big project. There are not many like this in the city with so many amenities".* • *"I take pride because of the good quality construction and a good residential development project. I feel attached due to the community here".* • *"I can't say whether I take pride in the wider neighbourhood as the development in the area is not significant yet".* • *"I feel attached to the Protect Park as we get enough entertainment and attachment".*	• residents are satisfied with the 1) quality of environment, 2) peaceful environment, 3) in-house facilities including community hall, club, gym, swimming pool, garden and play area, 4) very good community feeling • surrounding area being less developed, residents feel lack of vitality in the wider neighbourhood. • *"I would like to move to a place where there are more leisure facilities and better developed area".*	• common community garden of EDF is opened up to general public during Bihu celebrations to include participation of the wider neighbourhood • residents feeel that they have a say in the matters concerning the ED form but not much in case of wider neighbourhood issues • the committees in EF form organise a number of cultural and religious functions and receive active participation from the residents • festivals and social functions are celebrated with great joy and pomp; for social functions like birthday parties the large community hall is used. *"We also have dance programmes and competitions during festivals. We meet every day to practice and is so much fun."* • privatised amenities and facilities provide micro social cohesion and capital but reduce the residents' social contacts with wider neighbourhood on regular basis; it reduces the number of public spaces that all can share, and thus the contacts that people from different socio-economic groups might otherwise have with each other; this ED form however attempts to make connections with the wider neighbourhood during festivals and celebrations by opening up the common open space for all people; collective efficacy in the wider neighbourhood seemed difficult in this case with low population density and lack of active neighbourhood groups, the EDF acted as a focal point for gathering during festivals and celebrations. • security, amenities, but not so much lifestyle and class/status preferences. • heterogeneous mix of people from different socio-economic background. • approximately 40% rented • general tolerance towards each other; concerning issues may be raised and put to management for resolution	• residents feel very safe within their ED form *"My kid plays in the corridor and quite often I am not even aware whose house he has gone to play. I am least worried as the community is good and there is a security at the main gate".* • residents fear crime in the wider neighbourhood as they feel the area is not yet well developed, lacked street light, hear of alcohol/drug abuse in the immediate vicinity • existence of resident's associations controlled residents' behaviour in the ED form and therefore minimise perceived anti-social activities within	• the ED form is located on one of the key routes, in terms of wider neighbourhood facilities residents feel the need for a better public transport connection, better market and shops, medical facilities and better restaurants in the immediate vicinity. • residents have no major issues within the ED form in terms of basic services; however, for the wider neighbourhood they showed concern regarding poor sewage, storm water drainage and area clean-up • residents are very satisfied with the in-house amenities and facilities provided to them

Appendix-13: Focussed Coding - Summary

Social Sustainability	Inner "Traditional Forms"			Inner "Traditional Forms"			Informal "Slum Forms"			Exclusive "Defensive Forms"		
	T1/ UznBzr	**T2/ FanBzr**	**T3/ RehBri**	**I1/ ZooRod**	**I2/ BelTol**	**I3/ KalPhr**	**S1/ AriBst**	**S2/ KoiNgr**	**S3/ HafNgr**	**E1/ SpnGdn**	**E2/ VijCom**	**E3/ ProPrk**
Int/Net	HIGH	VERY HIGH	HIGH	VARYING	MEDIUM-LOW	VARYING	VERY HIGH	VERY HIGH	VERY HIGH	HIGH-MEDIUM	VARYING	VERY HIGH - HIGH
attributes	frequent interaction with cognate neighbours/close friends interaction and social visits to non-cognate neighbours rare, except occasional chats and greeting satisfied with the level of neighbourly interaction, cultural/ personal preferences	high density and intensity of local ties highly frequent interaction (organised / spontaneous) with most neighbours, occasional social visits day-to-day co-existence among cognate neighbours/ close local friendships highly frequent random interaction (shop-front / religious places, street), often more than once daily organised interaction due to regular religious/ cultural celebrations higher frequency of interaction among male residents (business/local ties) than female, among residents with common ethnic/regional background reduced living space	frequent interaction with cognate neighbours/close friends; residents of apartment typology (self-contained); residents in spatial proximity good level of spontaneous interaction (local shops, key route, street-side) among most residents regular organised interaction (active clubs, religious/ cultural celebrations) among most residents rare social visits, except cognate neighbours and close friends	varied frequency of interaction and intensity of local ties where higher, among long-term residents, in spatial proximity, apartment typology (self-contained) few close resident families that met regularly, organised small gatherings, visited socially lack of frequent interaction but good level of general trust and respect for most neighbours feeling of lack of community spirit, active groups for all and social network (usually medium-short term residents detached typology)	residents did not know everyone along the street medium-low frequency of interaction (spontaneous / organised) slightly higher interaction among residents in spatial proximity, apartment typology (self-contained), certain age-groups of people (children, elderly) many common work and residence ties found local ties being established	varied frequency of interaction and intensity of local ties no specific trend in variation found, except higher among the base than hill slopes high number of owners and tenants residents knew most people along the street/ area lack of frequent interaction but good level of general trust and cooperation knew most neighbours, occasional socialising during functions and celebrations	very high density and intensity of local ties informal associations based on regional affinities tight-knit horizontal networks very high frequency of (spontaneous and organised) interactions visiting neighbours socially common, leaving of doors open free accessibility to households occasional disputes, reduced living space, social stress overcome internally	very high density and intensity of local ties informal associations based on ethnic/religious affinities tight-knit horizontal networks large family living, continuous interaction among cognate members in the open family courts very high frequency of (spontaneous - street, shops,shared resources; and organised - community centre, active groups, religious activities) interactions visiting neighbours socially common, leaving of doors open free accessibility to households occasional disputes, reduced living space, social stress overcome internally	very high density and intensity of local ties informal associations based on regional affinities tight-knit horizontal networks very high frequency of (spontaneous and organised) interactions visiting neighbours socially common, leaving of doors open free accessibility to households occasional disputes, reduced living space, social stress overcome internally	high density of local ties, self-sustained, social needs satisfied within gates variations in frequency based on age groups, available time and desire for socialising frequent sociability with (all) neighbours not desired, personal domain and privacy accorded high consideration more regular contact with residents in spatial proximity shared sense of purpose leading to interaction without need to establish closer ties opportunities for spontaneous / organised sociability, large number of weak ties little contact or concern with residents outside their gates internal local ties are developing as estate matures	varied frequency of interaction and intensity of local ties few close resident families that met regularly, organised small gatherings, visited socially random social encounters feeling of lack of community spirit, active groups for all and social network (usually medium-short term residents) more regular contact with residents in spatial proximity shared sense of purpose leading to interaction without need to establish closer ties concern for the wider area beyond gates, as it affected resident's convenience and quality of life	very high frequency of (spontaneous/ organised) interaction and intensity of local ties, partially self-contained higher among residents in spatial proximity, among which social support and reciprocal living is higher fewer contact outside the gates, but showed concern in external matters common garden opened to wider neighbourhood during festival celebrations, attempts to overcome the issue of internal cohesiveness at the cost of external shared sense of purpose leading to interaction without need to establish closer ties high opportunities for spontaneous / organised sociability, organised sociability did not always led to stronger ties, developed a number of weak ties
influencers	cognate neighbours long term residents cultural/regional affiliations high density balanced mix-use easy access to local facilities/amenities human-scale elements large stock of traditional built-components	cognate neighbours long term residents regional/ethnic affiliations very high density very high mix-use (live-work units) easy access to local facilities/amenities human scale elements spatial proximity favourable spatiality	long-established local ties long-short term residents high density balanced mix-use easy access to facilities / amenities central location large stock of traditional built-components partial human-scale elements favourable spatiality	varying social ties very strong long established friendships, regional affiliations high density primary street, shopping hub, lower density residential street balanced mix-use easy access to facilities / amenities poor human-scale elements partial favourable spatiality	upcoming area local ties yet to matured high resident mobility mix-use high street lower density / spatial proximity access to local facilities/amenities but distant from city level attractions poor human-scale elements low favourable spatiality	hill settlement; slope - base divide highly mix-use high street access to local facilities/ amenities difficult from hill slope variations in building type at hill top (lower density / spatial proximity, high fencing) and base poor human-scale elements partially favourable spatiality	very high density, spatial proximity balanced mix-use, poor access to primary street disconnected from city grid shared goals, norms, resources human scale elements scarce private living space, flexible use of outdoor spaces (social / functional) blurred public-private realm boundaries	very high density, spatial proximity balanced mix-use, poor access to primary street, disconnected from city grid shared goals, norms, resources highly introvert courtyard housing typology / mprphology scarce private living space, flexible use of outdoor spaces (social / functional) blurred public-private realm boundaries	very high density, spatial proximity balanced mix-use, poor access to primary street disconnected from city grid shared goals, norms, resources human scale elements scarce private living space, flexible use of outdoor spaces (social / functional) blurred public-private realm boundaries	common goods - shared amenities and services, responsibilities and management unified in terms of common benefits and problems, common code of conduct mix-use, active front onto the primary street introvert morphology highly defensive public-private realm boundaries highly favourable spatiality overlooking human-scale elements	high resident mobility unified in terms of common benefits and problems, common code of conduct mono-functional, single use access to local facilities/ amenities but distant from city level attractions poor human-scale elements poor favourable spatiality defensive public-private realm boundaries	common goods and services - shared amenities and services, responsibilities and management extensive use of community / shared spaces, amenities unified in terms of common benefits and problems, common code of conduct active groups cultural, religious, sports, women, hobbies, etc defensive front onto the primary street defensive public-private realm boundaries highly favourable spatiality overlooking human-scale elements poor connectivity to public transport, developing outskirts of the city
Tru/Rci	VERY HIGH	VERY HIGH	VERY HIGH -HIGH	HIGH	MEDIUM-LOW	MEDIUM	VERY HIGH	VERY HIGH	VERY HIGH - HIGH	HIGH	MEDIUM	VERY HIGH - HIGH
attributes	trust all, generalised know most residents along their street reciprocity among cognate neighbours /close friends only	trust all, generalised reciprocity among cognate/ close-friends but very few non-cognate neighbours asking for social favours rare among non-cognate neighbours close co-existence	trust all, generalised very high trust & reciprocity among cognate neighbours / long established friendships only improved trust & reciprocity based on built-component typologies (apartment, compact huts), but self-contained, semi-legal agreements, common benefits/ problems, shared need for social support	trust all, generalised varied level of trust and reciprocal relationship, higher among long-term residents most residents knew each other along their street	medium-low level of trust, generalised very low reciprocity improved trust & reciprocity based on built-component typologies (apartment, compact huts), but self-contained, semi-legal agreements, common benefits/ problems, shared need for social support	Varied levels of trust and reciprocity based on geographical location, nature of ties, built-component typology passive tolerance and generalised trust among most reciprocal relations (lift to school when necessary, support during emergency situation or social celebration, among some streets at the hill base	very high level of trust and constant reciprocal relationship taking care of neighbour's children, lending/ burrowing money, look-out foreach other, high support during unfortunate happenings leaving doors open, constant access to all households common goals, shared norms, highly territorial concern with the welfare of the commune as whole close day-to-day co-existence	very high level of trust and constant reciprocal relationship taking care of neighbour's children, lending/burrowing money, look-out foreach other, high support during unfortunate happenings leaving doors open, constant access to all households common goals, shared norms, highly territorial concern with the welfare of the commune as whole close day-to-day co-existence	high level of trust and constant reciprocal relationship taking care of neighbour's children, lending/ burrowing money, look-out foreach other, high support during unfortunate happenings open access to all households common goals, shared norms, highly territorial gradually being established concern with the welfare of the commune as whole close day-to-day co-existence	high generalised trust, very high trust and some reciprocity between few close neighbours socio-legal agreements tied residents to common conduct and collective responsibility, regular meetings, discussing management issues, organising events allowed opportunities for interaction, build trust and allowed exchanges as the trust matured	medium trust both, generalised and local higher among close friends based on spatial proximity, regional/ethnic affinities, combined work ties and few long term residents trust for social support during emergency situation among many but very rare reciprocal relations socio-legal agreements tied residents to common conduct and collective responsibility, not may events organised, management issues, low feeling of ownership	trust most, generalised most neighbours in close spatial proximity looked out for each other on daily basis socio-legal agreements tied residents to common conduct and collective responsibility, regular meetings, discussing management issues, organising events allowed opportunities for interaction, build trust and allowed exchanges as the trust matured high frequency of spontaneous and organised socialising
influencers	some strong, many weak ties Influencers for Int/ Net	many strong, many weak ties Influencers for Int/Net	some strong, many weak ties Influencers for Int/Net	few strong, many weak ties Influencers for Int/Net	few strong, few weak ties Influencers for Int/Net	few strong, some weak ties Influencers for Int/Net	many strong, many weak ties Influencers for Int/Net	many strong, many weak ties Influencers for Int/Net	many strong, many weak ties Influencers for Int/Net	few strong, many weak ties Influencers for Int/Net	few strong, some weak ties Influencers for Int/Net	some strong, many weak ties Influencers for Int/Net

Social Sustainability	Inner "Traditional Forms"			Inner "Traditional Forms"			Informal "Slum Forms"			Exclusive "Defensive Forms"		
	T1/ UznBzr	**T2/ FanBzr**	**T3/ RehBri**	**I1/ ZooRod**	**I2/ BelTol**	**I3/ KalPhr**	**S1/ AriBst**	**S2/ KoiNgr**	**S3/ HafNgr**	**E1/ SpnGdn**	**E2/ VijCom**	**E3/ ProPrk**
Atch	VERY HIGH	VARYING	VERY HIGH - HIGH	VERY HIGH	HIGH-MEDIUM	VERY HIGH -	VERY HIGH	VERY HIGH - HIGH	HIGH-MEDIUM	HIGH-MEDIUM	VARYING	HIGH
Pri	VERY HIGH	VARYING	VERY HIGH - HIGH	VERY HIGH	MEDIUM-INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	VERY HIGH	MEDIUM-LOW	VERY HIGH
attributes	*positive contributors* functional: locational advantage; major city attractions; easy access to local & city-level amenities and facilities; provision of all basic-services; no flooding during rains emotional: ancestral home; heritage value; historic setting; good outlook; longitivtiy of stay; good community; represents status & identity; rootedness pride: good outlook; status; heritage; access	mixed response *positive contributors* functional: place distinctiveness; known for festival celebrations; shopping precinct; locational advantage; access to all facilities & services emotional: strong community, ancestral property; commercial links & family ties; longitivtiy of stay *negative contributors* functional: deteriorating physical environment; reduced living space; increasing commercialising (leading to traffic, congestion, stressed infrastructure), reduced residential character emotional: changing social structure pride: key shopping destination; festivals as mega affairs	*positive contributors* functional: central location; easy access to all major amenities & facilities emotional: ancestral property; longitivtiy of stay; strong community feeling (friendly, supportive and helpful neighbours) *negative contributors:* functional: 'quite commercial'; 'people are self-centred' pride: improved outlook with investment in property & infrastructure, no flooding	*positive contributors* functional: locational advantage; residential character emotional: longitivtiy of stay; good community *negative contributors:* emotional: low community sprit pride: good outlook (best residential area in the city), shopping precinct	*positive contributors* functional: closer to workplace; good local facilities; quality housing; residential character; access to basic facilities & public transport emotional: attachment developed with length of stay and feeling of home; good neighbours *negative contributors:* emotional: low community sprit (communities still establishing, many hostel accommodations, floating population) pride: inconclusive, some pride in image of the area (upcoming suburb, new infrastructure, housing, amenities)	*positive contributors* functional: easy access to facilities & public transport, emotional: natural environment (hills and nature), feeling of home, friendly community / no issues with neighbours; stronger attachment with length of stay pride: inconclusive, neutral	*positive contributors* functional: proximity to work; livelihood opportunities, easy access to facilities emotional: length of stay (150years old settlement), strong community feeling *negative contributors* functional: lack of basic services like drinking water & sanitation consolidated settlement (investment in their property & community spaces) leading to increase in sense of ownership & belonging pride: indecisive about pride in place, pride in community	*positive contributors* functional: proximity to work; livelihood opportunities emotional: length of stay, strong community investment in their housing & community spaces leading to increase in sense of ownership & belonging to the place *negative contributors* functional: lack of basic services like drinking water & sanitation; issues of external gangs pride: indecisive about pride in place, pride in community	*positive contributors* functional: livelihood opportunities emotional: gradual improvement in housing, personalisation of outdoor spaces, etc leading to sense of ownership and belonging to place; strong community *negative contributors* functional: close proximity to rail tracks; lack of sanitation facilities; issues of personal safety and crime threat pride: indecisive, gradual increase in pride in place 'call it village not a slum'	*positive contributors* functional: good amenities, locational advantage feel connected but not attached; willing to move if better amenities & market value is available, willing to move to a more peaceful enclave pride: prestigious development, quality of construction & amenities, classified as elite, luxury living	*positive contributors* functional: safe environment; proximity to work; access to basic facilities emotional: varied; depends upon residents' strength of social ties & length of stay / ownership *negative contributors* functional: lack of amenities, deteriorating maintenance of premise emotional: poor community feeling pride: 'nothing attractive about the place'; 'average, basics sorted!'	*positive contributors* functional: good quality physical environment; good amenities emotional: good, friendly & active community pride: very good quality construction, prestigious residential development projects, large community spaces
Sat	VERY HIGH	VARYING	VERY HIGH	VERY HIGH	MEDIUM-LOW	HIGH	VARYING	HIGH	LOW	VERY HIGH	MEDIUM-LOW	VERY HIGH
attributes	likes: 1. quite, peaceful, green; 2. access to all major city attractions; 3. friendly & known community; good outlook to area dislikes: 1. changes in the social & historic character, 2. occasional issues with external gangs; 3. traffic & joyriding as hinderance	likes: 1. very safe; 2. good neighbours & very friendly community; 3. excellent local shops & amenities; 4. easy access to city parks & major attractions; 5. convenience in terms of location, access & business dislikes: 1. poorly maintained roads; 2. poorly maintained; 3. noise pollution, congestion; 4. parking issues; 5. lack of local play area & streets for children; 6. increased commercialisation; 7. changing social structure	likes: 1. conveniently locates; 2. easy access to facilities & public transport 3. friendly & supportive neighbours; 4. good local shops & leisure facilities; 5. no flooding in the locality dislikes: 1. parking problems & movement barriers; 2. issue of garbage disposal; 3. issue of theft, anti-social behaviour along the major thorough road	likes: 1. proximity to various amenities; 2. benefits of both - quite residential streets & vibrant commercial high street; 3. good place to live dislikes: 1. traffic, noise; 2. lack of children's park or play area, walking environment; 3. issues with garbage collection	likes: 1. safe; 2. friendly neighbours; 3. good connections to public transport, 4. good basic facilities dislikes: 1.poor leisure facilities; 2. nowhere for children to play; 3. lack of parks, gardens & playgrounds; 4. poor quality of drinking water, poorly maintained public realm	likes: 1. natural environment; 2. convenience of all facilities (education, medical, industries/ jobs); 3. (for some) friendly neighbours & community spirit dislikes: 1.lack of leisure facilities like good restaurants, good shopping, formal parks and kids play area	likes: 1.access to public transport; 2. work opportunities; 3. strong community; 4. safe environment; 5. consolidated RCC structures; 6. strong community; 7. other locational advantage dislikes: 1.inefficient, non-reliable water supply; 2. lack of proper sanitation perceived as good place to live if basic services are provided	likes: 1.peaceful area; 2. tight-knit community; 3. access to work opportunities dislikes: 1. lack of basic services; 2. issues of external gangs not solved by the police; 3. access to bus stops not very convenient; 4. flooding problems perceived as very good place to live if basic services are provided	likes: 1.friendly & tight-knit community; 2. access to work opportunities dislikes: 1. proximity to & open access to rail tracks, associated health & safety issues; 2. noise from the trains; 3.lack of play area for children; 4. lack of sanitation facilities perceived as either bad nor good place to live; willing to relocate if the community is kept together	likes: 1. good in-house amenities; 2. good community; 3. convenience of location within the city; 4. very safe enclave; 5. good outlook dislikes: 1. issues of noise from main road, prefer moving to a more peaceful locality; 2. issues of garbage collection & cleanliness outside their gated enclave	likes: 1. safe and secured environment; 2. shared responsibility for maintenance & management of facilities dislikes: 1.long term residents show concerns for high ratio of mobile residents 2. both owners/ tenants, long/short term residents feel lack of community spirit; 3. lack of amenities and facilities within the enclave	likes: 1. quality of environment; 2. peaceful; 3. good in-house facilities; 4. very good community dislikes: 1. lack of vitality in the wider neighbourhood
Par Eng	MEDIUM	VERY HIGH	HIGH	VARYING	LOW-VARYING	VARYING	VERY HIGH	VERY HIGH	VERY HIGH	HIGH	MEDIUM	HIGH
attributes	community gathering only during social functions like weddings & funerals willingness to pull together for community welfare (evident in street lighting initiative) several active groups & clubs presence of city level cultural & sports sports grounds' lack of local level social spaces feel well informed about their area can influence the decision about the area local celebrations not very frequent	distinct impressions of residents' culture expressed through festivals & cultural activities religious festivals celebrated with great pomp, city level attraction feel well-informed about their area can locally influence decision that affect their area presence of a number of active community, religious, cultural groups; friends groups frequent participation in community gatherings & celebrations tight-knit community willingness to pull together for community welfare (street lights initiative, community run road cleanliness and security programmes)	active participation in various community functions & religious celebrations presence of number of active groups (religious & community groups, sports & cricket clubs, Rehabari co-operative) feel well informed about their area few feel lack of support from local politician & neighbours busy in their personal life willingness to pull together for community welfare	group celebrations & small community gatherings common among the residents of apartments while fragmented in case of detached housing forms, limited to only small groups of long term residents with strong friendships residents (especially owners & long term) take keen interest in up-keep, maintenance and quality of built-environment	lack of active committees to organise social events and community gatherings lack of community spaces for holding events, informal social gatherings & religious celebrations higher among residents of apartments while fragmented in case of detached housing forms, limited to only small groups of residents (in spatial proximity or long term resident friends) willing to pull together to solve matters concerning their area, lack formal institutional support or leadership	social participation & community engagement at the base of the hill varied from that on hill-slope or hilltop active groups & participation among hill top residents lower participation among residents at base of the hill, also varied along different residential streets willing to pull together to solve matters concerning their area, lack formal institutional support or leadership	propensity to participate & co-operate, forming close-knit networks through daily interactions willingness to work together for the welfare of the community (spatial transformations leading to gradual consolidation, construction of community & education centres, community led infrastructural works such as access road, street lighting, etc) a number of active community groups	a number of active groups (women's group, religious groups, community leaders) feel well informed about local affairs & can influence the decision about their commune work together for the benefit of the community (progressive actions like constructing community centre, metered electricity) very high women participation in the survey regular community welfare meetings, pompous celebration of festivals	a number of active groups (women's committee, men's association, youth group, children protection & welfare group, community leaders) progressive community supported by an NGO, willingness to work together for the benefit of their commune entertainment & leisure activities carried out together	feel have a voice or say in what happens within their secured enclave, can raise issues to the committee, feel empowered active resident association, organise 6 community functions and celebrations a year, yearly flower show few play an active role in the management of the enclave, not all take interest in community affairs, high participation	socio-legal agreements tie residents to collective responsibility for management feel well informed about local affairs but do not feel they can influence decision that affect their enclave religious functions celebrated, participation is not full poor participation & keen interest in management & upkeep of the premises	socio-legal agreements tie residents to collective responsibility for management feel empowered feel have a voice or say in what happens within their secured enclave but not much in case of wider neighbourhood organise a number of cultural & religious functions, receive active participation for residents festivals & social gatherings celebrated with great joy & pomp; shared garden opened up to wider neighbourhood during state festivals for larger participation
Per Saf	VERY HIGH - HIGH	VERY HIGH - HIGH	HIGH-MEDIUM	HIGH	HIGH-MEDIUM	HIGH-MEDIUM	VERY HIGH	MEDIUM	MEDIUM-LOW	VERY HIGH	VERY HIGH	VERY HIGH
attributes	very safe place to live feel fairly safe against crime security service provided by city police & trusted for occasional complains of alcoholism, gangs, substance abuse & chain pulling incidents caused by external gangs since past five years	feel very safe against crime, very high perceived safety among female residents alike, feel safe to walk alone after dark traffic & congestion a major problem to movement, health & safety of residents especially children occasional incidents of small criminal offences caused by non-residents, complaints bout violent disputes, alcohol abuse, problems with truck drivers sleeping on pavements community led private night-time security service for different streets	feel as a fairly safe place to live many female residents fear walking alone after dark concerns about anti-social behaviour, issues of gangs, joy-riders, chain-snatchers along the major thorough road, incidents of attempts to dacoit few years back	high perceived safety in general (quick & easy access to vibrant high street; familiarity of area developed due to length of stay) no major safety threats rare complains of criminal incidences women feel a bit unsafe walking alone after dark or did not go out alone after dark	feel as a fairly safe place to live no major safety threats occasional incidents of robbery concerns about chain-snatchers female residents felt a bit unsafe walking alone after dark (no street lights, large private fencing, lower densities, land-use mix & pedestrian movement, developing area) long term residents feel safer than short term residents	feel as a fairly safe place to live residents with quick and easy access to high street (hill base) feel safer than those without (hill slope, poor building frontages, no street lights, low pedestrian activity)	feel very safe within their commune high social control apparent outsiders immediately noticed alcoholism as common problem	issues of external gangs at street corners and commune entrance, substance abuse by non-residents (highly introvert morphology and very few overlooking built-components) female residents feel unsafe walking alone after dark especially around poorly defined corners outside their commune residents associations and close social structures control residents behaviour, minimised anti-social activities	feel fairly unsafe (feeling of safety slowly building up) faced major safety issues 2-3 years back (crime & antisocial activities like substance abuse, alcoholism, issues with women and children safety prevalent before intervention of external agency - NGO) open access to and from rail tracks perceived threat to women & children safety	feel very safe inside their gated and privately secured enclave closed off to the wider spatial and social fabric of the city internal safety at the cost of external city or neighbourhood-level safety & liveability (huge fencing, poor interaction with adjacent streets) assumed common code of conduct within	safety as key priority of the residents feel very safe inside their gated and privately secured enclave closed off to the wider spatial and social fabric of the city internal safety at the cost of external city or neighbourhood-level safety & liveability (huge fencing, poor interaction with adjacent streets)	safety as key priority of the residents feel very safe inside their gated and privately secured enclave closed off to the wider spatial and social fabric of the city fear crime in the wider neighbourhood (outside their enclave), feel the area is still developing and lacks street lights, occasional incidents of alcoholism & substance abuse

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