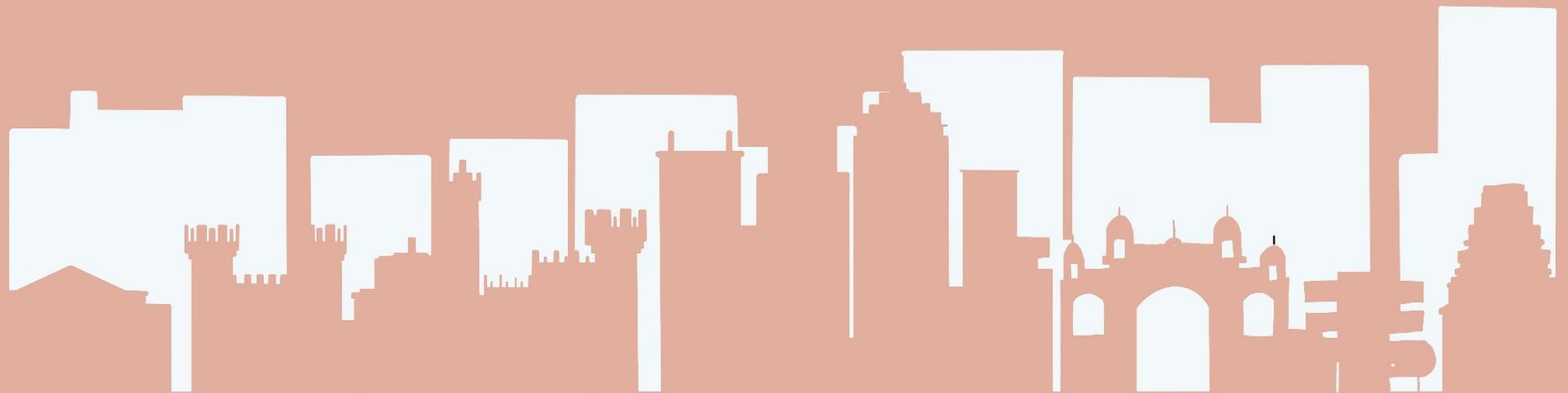


LIVING IN THE IN BETWEEN

MASTER THESIS | ANUSHA MURALIDHAR



LIVING IN THE IN BETWEEN
TRANSFORMING THE URBAN FRINGE IN BETTAHALSURU, BANGALORE, INDIA



LUND UNIVERSITY

MASTER THESIS
SUSTAINABLE URBAN DESIGN

Anusha Muralidhar
Department of Architecture and Built Environment

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III ABSTRACT

INTRODUCTION

The following thesis project has been a passion project of mine for several years. My interest in this issue was piqued when I visited the Bettahalsuru quarry as part of a project during my bachelors.

This thesis recognizes the problems that exist in the urban development process in India and its outcomes. The thesis aims to discuss and find solutions to problems that arise from the large-scale migration of population from rural to urban regions

The site chosen for this thesis is Bettahalsuru, as mentioned above. The thesis examines the existing conditions in Bettahalsuru and the surrounding areas in the urban fringe of Bangalore, and proposes sustainable solutions to better the conditions in these areas.

WHY IT MATTERS

India is and has always been an agricultural country. The country's Agri-exports touched Rs 2.52 lakh crores (about USD 35 billion) in the financial year 2019-20 (Sally, 2021), out of a total income from exports of around USD 300 billion (Sally, 2021). This makes rural regions and agricultural lands incredibly important to the country.

The urban regions in India are valued for their urban infrastructure. Indian cities are homes to the largest urban transformation in the twenty-first century. More populations are predicted to be living in Indian cities in the near future.

With the rural regions and urban areas both playing integral roles in India's urban development, the areas in between are being neglected. These areas mainly house low-income groups with very little urban infrastructure and vast open lands that are being wasted. In order to ensure sustainable urban development in India, it is a matter of urgency and relevance to improve these areas, and strengthen these communities.

1 BACKGROUND

1.1 THE INDIAN URBAN CONTEXT

India forms 17.70% of the world's population (Worldometer, 2021) with approximately 1.39 billion citizens (macrotrends, 2021). The country has an area of 3,287,240 sq. km and 455 inhabitants per square kilometre.

About 66% of the country's population is rural (The World Bank, 2021), while the remaining 34%, consisting of the population in cities and smaller towns, is under rapid urban development (Dasgupta & Mohan, 2004). The country also did not undergo urban expansion until it gained independence from British rule in 1947, much later than the rest of the world. The Indian urban context is thus exceedingly different from the rest of the world.

1.2 URBANIZATION IN INDIA

Until the early twenty-first century, India experienced a measured yet steady urbanization (Dasgupta & Mohan, 2004). A rapid and unprecedented urbanization later followed, succeeded by changes in attitudes, values, and beliefs and brought about the significant transformation of cities, people, and societies.

In the Indian context, urbanization is as much a social process as it is an economic and specialized process. Cities often act as the commencement grounds for social change that offer financial and

cultural possibilities and directly affect rural societies (Dasgupta & Mohan, 2004).

The most notable by-product of India's rapid urbanization is urban sprawl. As the country's population increased and the cities underwent urban development, a large percentage of the rural population began to migrate to the urban regions in search of better opportunities and a better lifestyle (Jayaswal & Saha, 2014).



Fig 1.1: India in the world

1.3 MIGRATION AND URBAN SPRAWL

Mass migration, over the years, caused overcrowding in cities, which led to unplanned horizontal development of these cities, finally resulting in the current urban sprawl situation in India.

Urban sprawl led to a change in land use in cities. It hindered proper urban development outside the city's inner core leading to the development of informal settlements and, in some cases, the development of vast slums surrounding the city (Dasgupta & Mohan, 2004). The main impact of this horizontal development is the loss of agricultural land, open land, and economically sensitive areas around the city.

Since cities play such a significant role in influencing societies, rapid urbanization in these areas brings about more critical problems that affect all strata of society. Hence, there is a need to inspect the possibility of changing societies by changing how we look at cities, function, and planning.

1.4 INCREASING URBAN POPULATION

India's present urban system includes about 7900 cities and towns of varying population sizes. Many of these cities and towns are included in the massive expansion of urban growth registered over the 2001- 2011 decade (Das, 2013). The United Nations estimates that by 2030, 165 million additional people are expected to be living in urban areas in India.

The increase in urban population will lead to a rise in urban poverty. The cities, having limited resources, will become grounds for

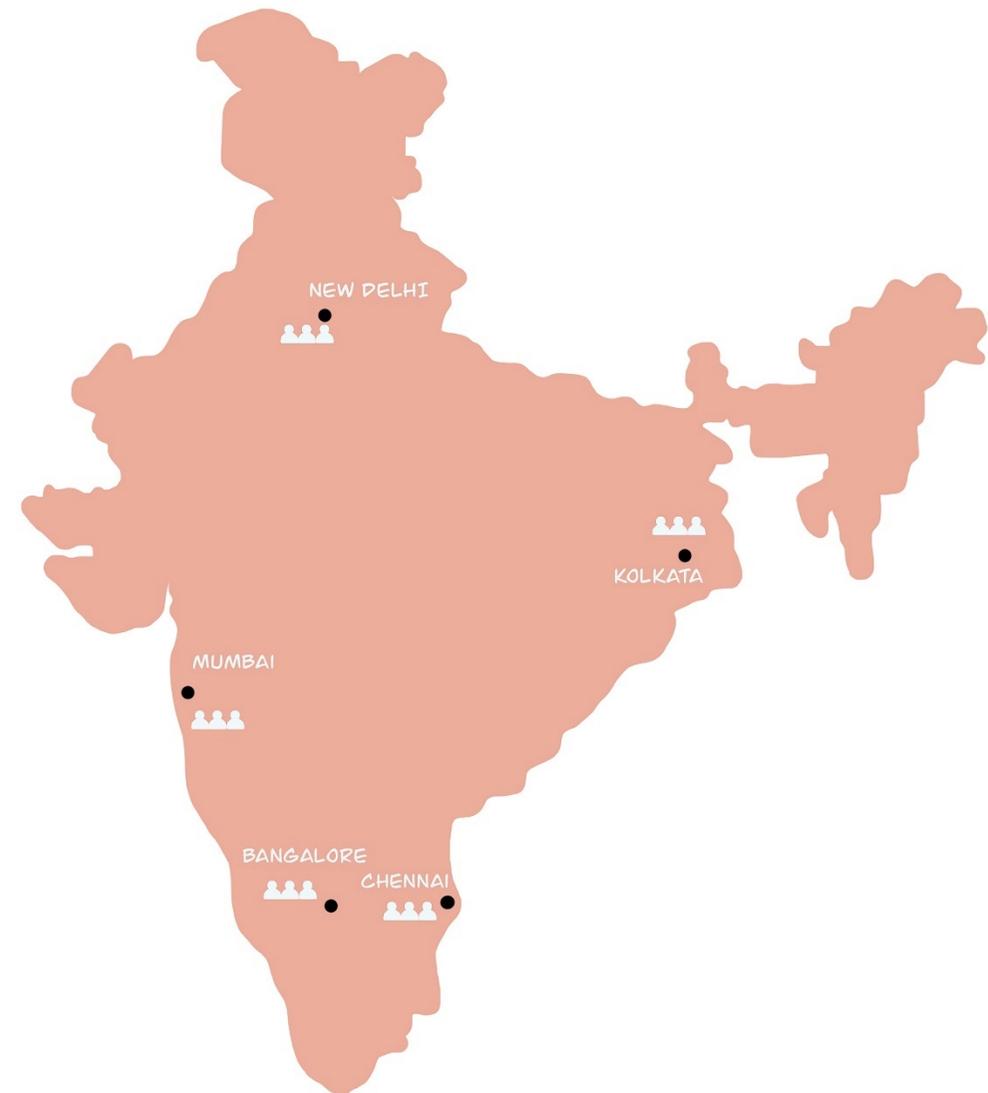


Fig 1.4: Metropolitan areas in India with high migration rates

increased informal settlements in and around the city. The urban poor often travel to cities and benefit from work opportunities the city offers but are restricted to the fringes to find residence due to lack of affordable housing options within the city. The rise in the number of residents affects the character of the city and leads to social issues like segregation. As more people interact in a given setting, their likeliness of being from different backgrounds, economically and socially, is much higher. This leads to stigmatization and a feeling of not belonging (Mukherjee, 2003)

2 THE RURAL-URBAN DICHOTOMY

The increase in the number and size of cities also creates many push-pull factors hastening people's migration from rural areas to urban regions and their surroundings (Purushotham, Patil, & Lodha, 2016). The areas in between two comparatively uniform landscapes are mostly neglected, despite their immense presence. The concept of people moving from rural areas to urban regions presents as a rural-urban dichotomy. In contrast, the connection these people establish between the places they migrate to and the places they emigrate from forms a rural-urban continuum.

Whereas today, the concept of "rural" is often generalized as a village economy based on agriculture, and the idea of "urban" is translated into infrastructure investments (Mukherjee, 2003). This intellectual response to urbanization leads to ignorance and neglect in understanding India's urban context, hence preventing the introduction of effective development policies. Moreover, simplification of the nuances each of these concepts holds results in

a primarily underperforming political rural economy, and an unplanned, unsystematic urban scenario (Mukherjee, 2003)

Urban scenarios are surprisingly neglected and often misunderstood in the broader development context. Rural and urban life and economies are often seen as entirely separate, but they are more intimately linked and interdependent than many realize (Tannerfeldt & Ljung, 2006).

In separating urban and rural regions, 'urban islands' are created among surrounding rural areas. These islands become cores for urban development, attracting more people into the fringes.

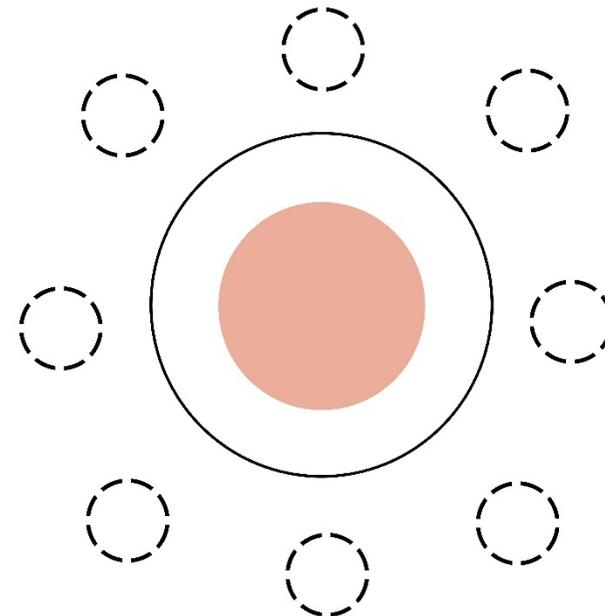


Fig 2: Urban islands surrounded by rural regions

The urban fringes are dynamically transforming social, economic and ecological backyards of the emerging 'urban cores' of power, policies and money (Purushotham, Patil, & Lodha, 2016). In visualizing the surrounding communities where new socioeconomic and ecological interactions merge, the conventional thinking of the rural and urban as independent of each other has to be set aside. There is a need to see the rural to urban as a continuum, with the peri-urban concept in between.

2.1 CHARACTERISTICS OF A PERI-URBAN INTERFACE

Peri-Urban Interfaces (PUIs) are transition spaces between the urban and rural, with the conjunction of residential, industrial and agricultural land uses and residence of mixed groups of poor and rich. PUIs are also the meeting point of issues from rural and urban areas, with diverse communities and varied land use. The geographic proximity of these zones to the urban cores is the only general defining factor.

Borders of metro cities and towns differ in terms of their distinct urban connect, such as

- expansion of residential areas of the poor, the middle-class or the elite, and of industries characterized by suburbs or satellites, where centralized economies exist with secondary and tertiary sectors emerge
- production areas of perishable food products for the city like vegetables and dairy
- dumping sites for the waste generated in the urban core

- and extraction areas of raw materials for construction like bricks, sand, and granite (Purushotham, Patil, & Lodha, 2016)

In the surroundings of larger cities, the rich often move in search of more extensive, greener pastures. PUIs, therefore, divide into two, separating the rich PUI from that of the poor. Small towns' core often holds housing projects for the low and middle-income groups and islands of more impoverished slums (Purushotham, Patil, & Lodha, 2016).

2.2 THE CONCEPT OF AN URBAN FRINGE

The Rural-Urban fringe (R-U fringe) is defined as the built-up area just outside the corporate limits of the city (Purushotham, Patil, & Lodha, 2016). Generally, the urban fringe means those areas beyond the built-up part of a city subjected to intense development pressures.

The fringe is not a line on the map; it is a radially diminishing urban-style activity zone. It is the existence of a fringe that prevents one from being able to distinguish the urban from the rural since the fringe has features of both (Purushotham, Patil, & Lodha, 2016).

The R-U fringe is a region of transition in land use, social and demographic characteristics. It lies between the continuously built-up urban and suburban areas of the central city and the rural hinterland, characterized by the almost complete absence of non-farm dwellings, occupations and land use (Purushotham, Patil, & Lodha, 2016). The fringe also has an incomplete range and availability of urban utility services. It has uncoordinated zoning or

planning regulations and an extension beyond the political boundary of the central city. The R-U fringe has an increase in population density, above that of surrounding rural districts but lower than the main city.

3 BANGALORE

Bangalore, officially called *Bengaluru*, is the capital city of the state of Karnataka in the South of India, located on the Deccan Plateau. The city is the fifth most populous urban agglomeration and the third most populous city (Government of Karnataka, 2021) in the country, with a population of over 12.3 million (macrorends, 2021).

3.1 HISTORY OF DEVELOPMENT

A progression of South Indian dynasties like the *Cholas*, the *Hoysalas*, and the *Western Gangas* ruled the area Bangalore is currently situated in. In 1537 CE, *Kempe Gowda* of the *Vijayanagara Empire* established a mud fort, which is now considered the foundation of modern Bangalore (Government of Karnataka, 2021).

The *Marathas*, in 1638, conquered and ruled Bangalore for almost fifty years until the *Mughals* sold the city to the *Mysore Kingdom* of the *Wadiyar dynasty* after they captured it. It later became a part of the British colonial rule in South India after the *Fourth Anglo-Mysore War* in 1799 (Government of Karnataka, 2021).

While the old city was being developed and made the capital of the Princely State of Mysore under the Maharaja of Mysore, the British

shifted their cantonment to Bangalore in 1809, outside the old city, and a town emerged around it and was governed by the British. After India gained independence from British rule in 1947, Bangalore remained the capital of the *State of Mysore* until the state of Karnataka was formed in 1956. The two urban settlements of Bangalore, the old city and the cantonment, merged into a single urban centre in 1949. The Government of Karnataka later changed the city's name officially to *Bengaluru* (Government of Karnataka, 2021).

3.2 BANGALORE TODAY

In the current scenario, Bangalore houses the country's leading information technology (IT) sector. The city is hence referred to as the *Silicon Valley of India* or the *IT Capital of India*. Major technological organizations in India like ISRO, Wipro, Infosys and HAL have headquarters in Bangalore.

Bangalore is also the *Educational Capital of India*, housing major educational and research institutions in India like the *Indian Institute of Science (IISc)*, *Indian Institute of Management Bangalore (IIMB)*, *National Institute of Fashion Technology (NIFT)*, *National Institute of Design (NID)*, *National Law School of India University (NLSIU)*, and *National Institute of Mental Health and Neurosciences (NIMHANS)* (Government of Karnataka, 2021).

Bangalore is also the home of various state-owned defence and aerospace organizations, such as *Bharath Electronics*, *Hindustan Aeronautics*, and *National Aerospace Laboratories*. The *Kannada Film Industry* also operates from Bangalore.

All of the above resources are enormous pull factors for the migration of people from all over the state and from all over the country. It is estimated that about 42% of Bangalore's population is the migrant population (Rao, 2021). This migration, apart from making Bangalore a demographically diverse city, has led to substantial urban sprawl. The city has been expanding at an unprecedented rate, creating a Peri-Urban interface all around the city.

The migration into the city from the surrounding areas reduces populations in the rural communities and causes overpopulation within the city. Overpopulation brings problems of lack of resources, unemployment and poverty. As a result, most migrants move to the outskirts of the city for affordable living. This forms the city's urban fringe, which separates it from the surrounding rural areas, creating an *urban island*.

3.3 URBAN STRUCTURE

The cantonment and the city surrounding it is within the jurisdiction of the *Bruhat Bengaluru Mahanagara Paalike (BBMP)*, the administrative body for civic amenities in the city. However, the *Bangalore Municipal Corporation (BMC)* governs the metropolitan area, including the city and the city's surroundings. The city within the BBMP constitutes the major city, and the area around it comprises the PUI of the city.

Within the central city, there are two zones. The first one is the central core with historical elements like the cantonment, administrative buildings like the Legislative Assembly, the High Court, the central business district, and the older residential

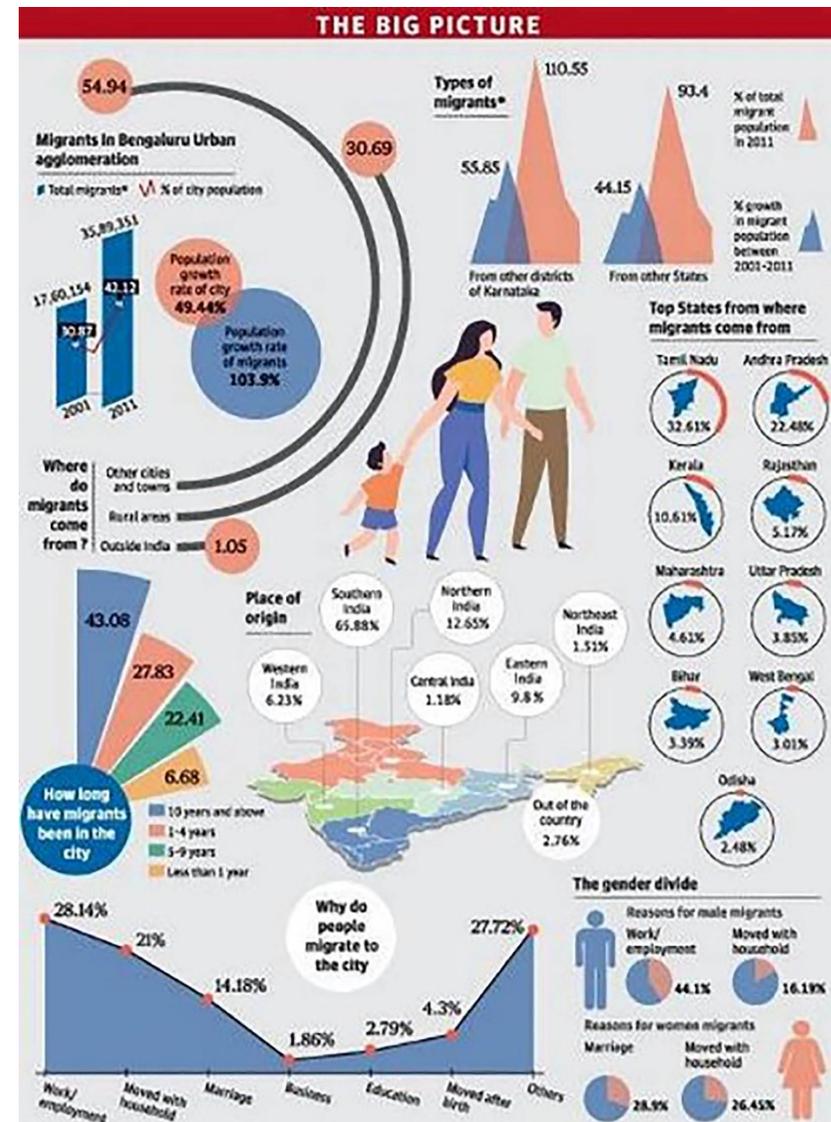


Fig 2.3: Population of Bangalore (Rao, 2021)

neighbourhoods. Surrounding the core are the institutional functions, the industries, the educational institutions, and newer residential neighbourhoods. Bangalore's PUI includes the city's urban fringe, with smaller neighbourhoods connected to the core using the major road and railway networks.

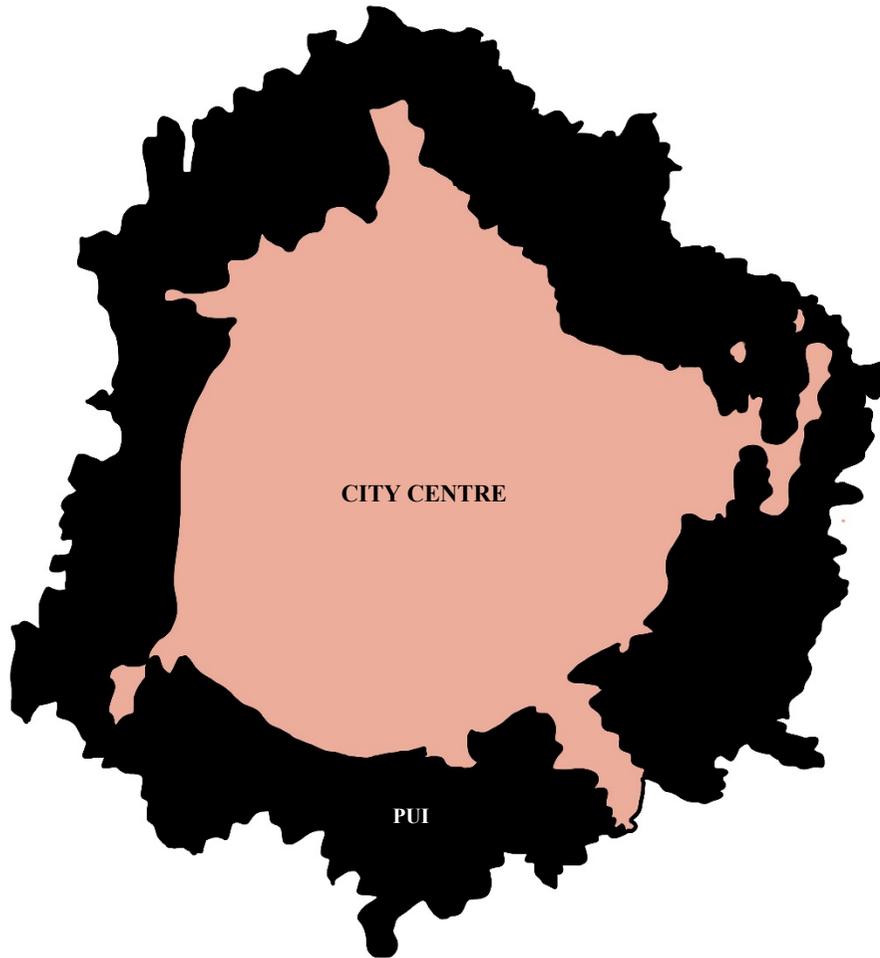


Fig 2.3.1: PUI of Bangalore

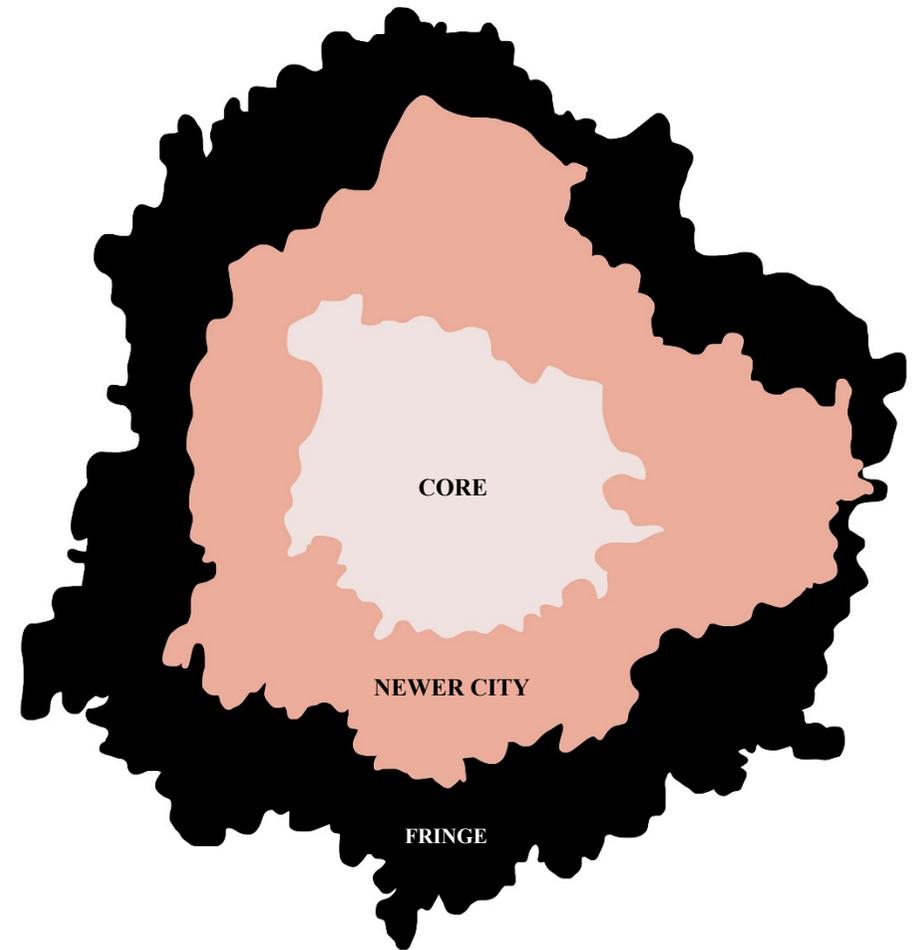


Fig 2.3.2: Zones in Bangalore

3.4 FOOD (IN)SECURITY IN BANGALORE

The state of Karnataka has a long history in horticulture, beginning with the establishment of *Lalbagh* in Bangalore, which was commissioned by the ruler *Hyder Ali* in 1760. Lalbagh is one of the most diverse botanical gardens in South Asia. The garden was later maintained by the British during their rule in India. After independence from British rule, the government controlled the botanical garden, which is the headquarters of the *Horticultural Producers Co-operative Marketing and Processing Society (HOPCOMS)* (Surie & Sami, 2017).

Bangalore gets its supply of fresh fruit and vegetables from the fields and villages in the city's hinterland. But with Bangalore becoming more of an urban island, the city has become more isolated from these rural regions than ever before. Hence, long-distance transportation has become more common. Yet, the city demands a year-round supply of the most popular fresh food products.

While rural Karnataka is still the main supply area of this food, the city's demand has increased over the years with rising populations, reducing resources and a growing urban fringe. At present, fresh produce is supplied to the city through various organizations like HOPCOMS, the *Agricultural Products Marketing Committee (APMC)* and farmers' networks (Surie & Sami, 2017). HOPCOMS even have their own shops that sell this produce across the city.

Corporations that run supermarkets like *Future Group*, *Reliance*, and *Mega Mart* are prominent players in the food supply market and make enormous profits from mass transportation of food and cater to a more extensive consumer base. There are other informal avenues for the retail of produce from the outskirts of the city. Markets in the

old city are integral parts of Bangalore's history. *KR Market*, *Johnson Market* and *Russell Market* are relics of British rule and are heritage sites protected by UNESCO (Surie & Sami, 2017). As Bangalore is expanding and the urban fringe is growing bigger, the supply of fresh produce is suffering due to increased transportation distances and costs. While the significant retail organizations can still procure some produce to maintain their business, the smaller informal retailers cannot afford these costs. The direct effect of this is the limited availability of fresh produce, including vegetables, fruits, dairy and meat.

4 THESIS PROPOSAL

Expansion of cities often leads to encroachment on the surrounding agricultural land. Along with the formation of fringes and PUIs, the rural surroundings of these cities reach their 'band of influence' (Lintelo, Marshall, & Bhupal, 2021).

Agricultural policies in India have mainly focused on rural areas. Their main aim is to achieve self-sufficiency in food production and reduce rural poverty (Lintelo, Marshall, & Bhupal, 2021). This brings about the expectation of urban food needs to be met by production only in rural areas.

Meanwhile, urban food security in larger cities in the global south is a reality. For instance, the proportion of children between 6 and 23 months old with an inadequate diet is 16.1% in urban Bangalore (Menon, Hong Nguyen, Avula, & Sarswat, 2021). Households in large cities in low-income countries spend 50-80 per cent of their incomes on food, and nutritional deficits in macronutrients and

essential micronutrients are common (Menon, Hong Nguyen, Avula, & Sarswat, 2021).

Urban food needs are expected to solely be met by production in rural areas surrounding these urban areas. With so much emphasis on food production in rural areas, the potential for peri-urban food production is wholly neglected. The proposal for this thesis is that peri-urban agriculture can be a means to strengthen communities in urban fringes while increasing food security within urban areas.

5 STRATEGY

The strategy is to formulate and maintain an urban-rural continuum in terms of food dependency and public utilities. The rural areas would still produce food as they do now, but the peri-urban areas would take up more of a food production role closer to the city. The city would then expand its civic amenities and urban utilities to the peri-urban areas making neighbourhoods more permanent.

The "green ribbon" strategy at the peri-urban level is to strengthen the communities by introducing agriculture and food production into their daily lives, bringing in economic stability and livelihood, while respecting the context of the urban fringe, bringing in essential facilities from the city, providing affordable housing, and creating a feeling of belonging and identity.

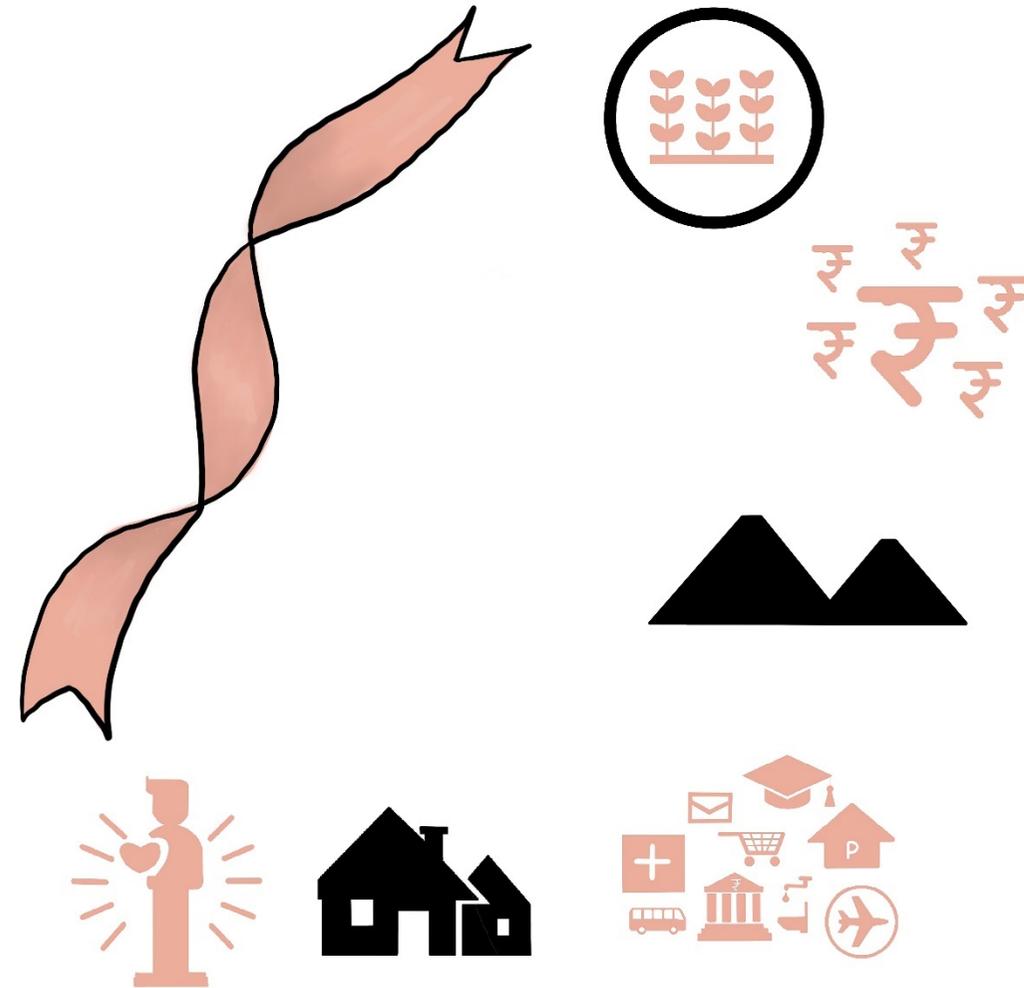


Fig 4: Green ribbon strategy

6 DESIGN SITE

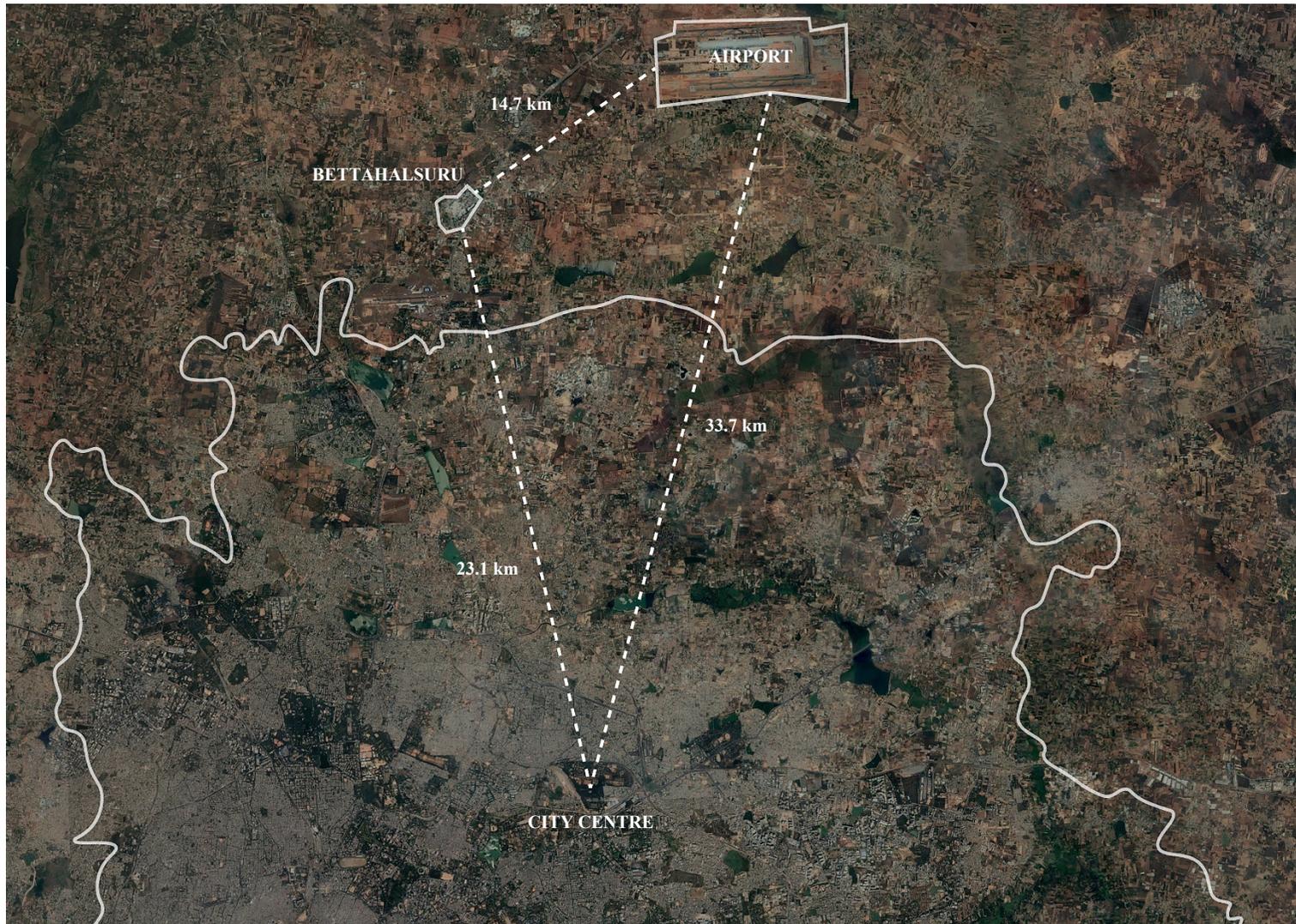


Fig 6.1: Bettahalsuru distance map

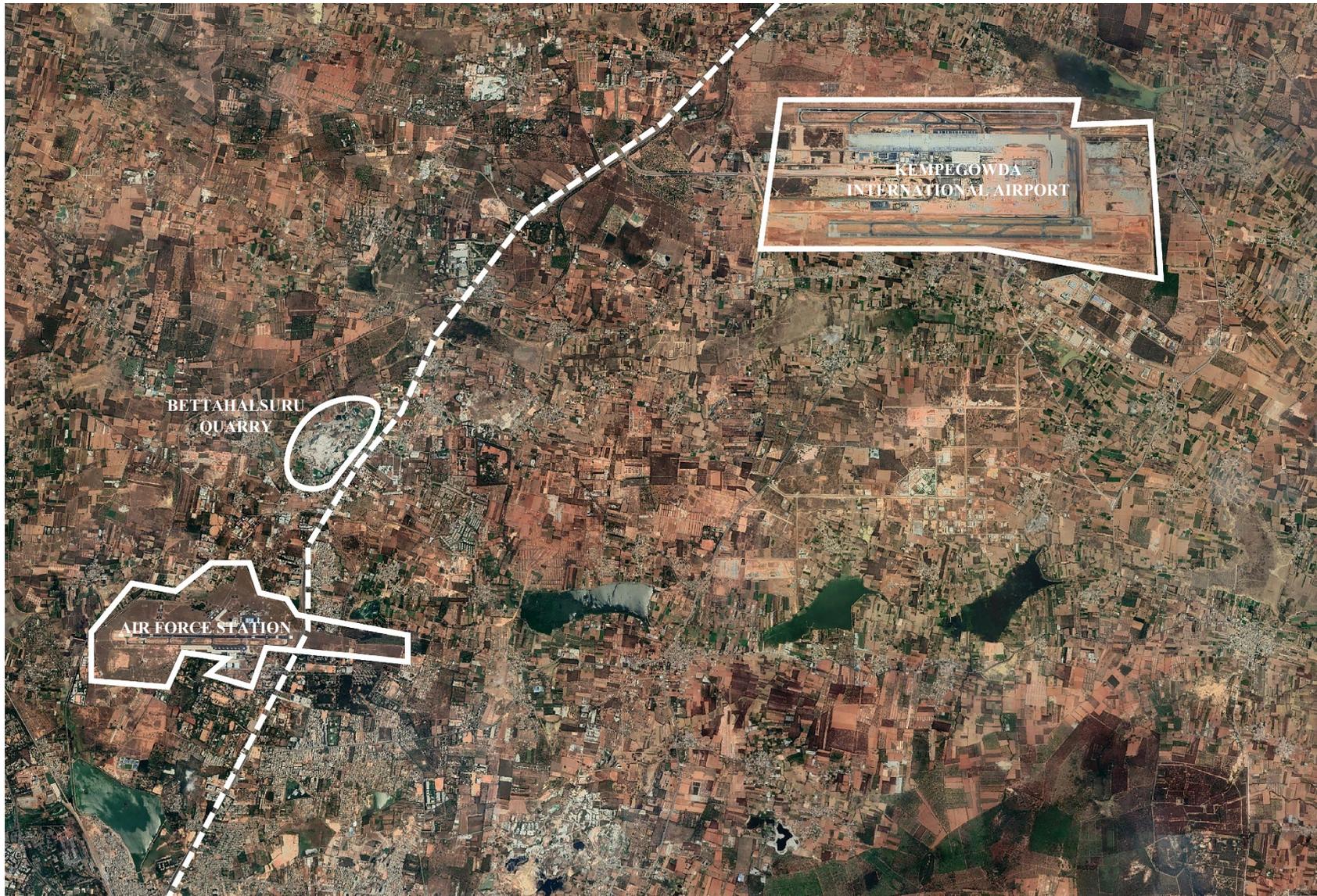


Fig 6.2: Bettahalsuru context



Fig 6.3: Settlements around Bettahalsuru



Fig 6.4: Agricultural lands around settlements

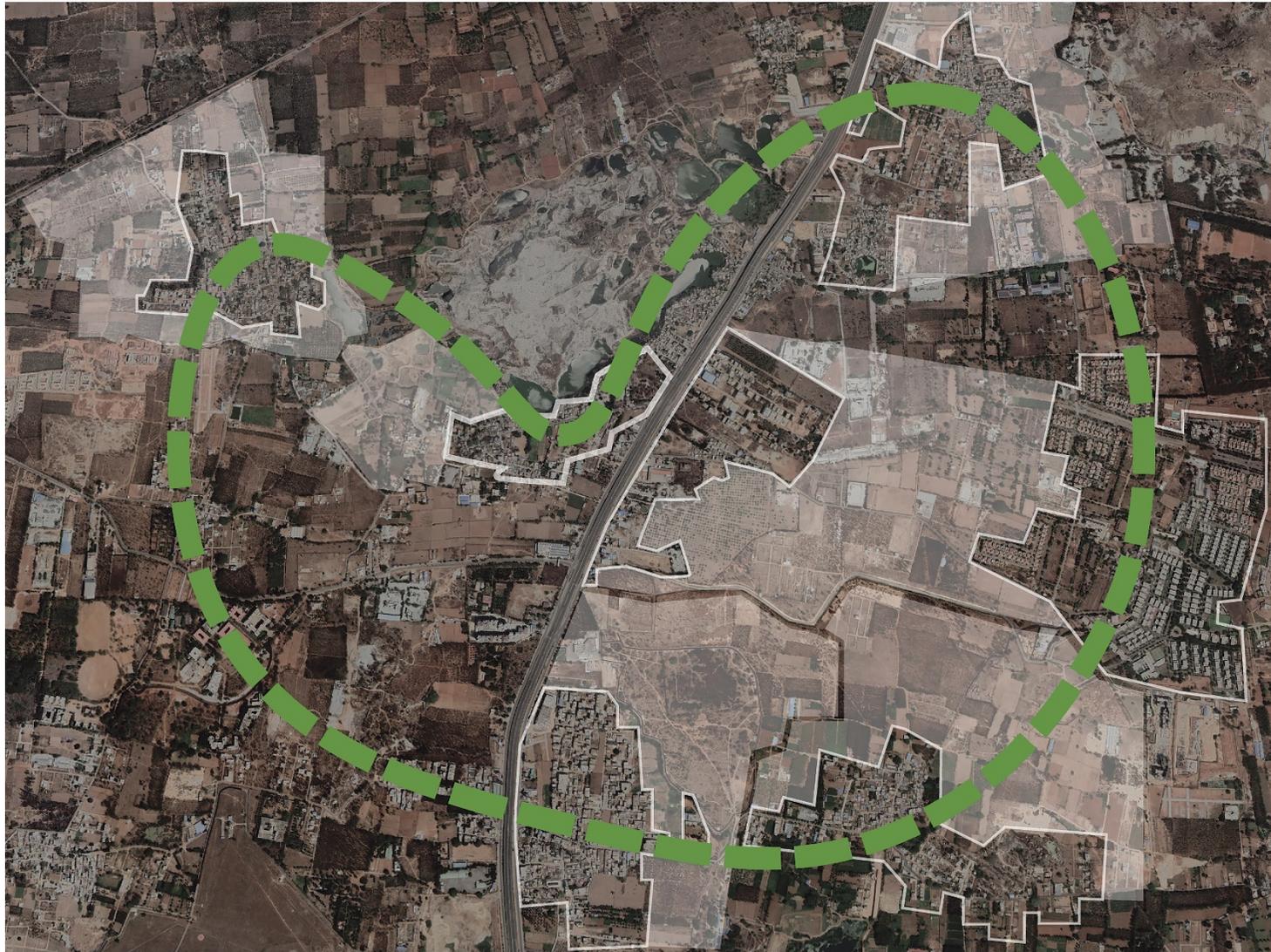


Fig 6.5: Green ribbon at context level

The design site chosen, Bettahalsuru, is a settlement around an abandoned granite quarry located in the urban fringe of Bangalore. Bettahalsuru is located 23.1 km from the city centre and 14.7 km from the *Kempegowda International Airport*. The site lies on National Highway 44 (NH 44) and is situated close to the *Yelahanka Air Force Station*.

Bettahalsuru is surrounded by communities and settlements of low-income groups, mainly consisting of migrants. The quarry and the surrounding areas are well-connected to the city via NH 44, State Highway 104 (SH 104), a good road network, and a railway line. Each of these communities has access to agricultural land owned by the Bangalore Municipal Corporation (BMC).

The municipality (BMC), on the other hand, is overlooking a project that is underway called the *Green Zone Project*. The project is to expand green lands and agricultural lands in Bangalore's urban fringe. The R-U fringe is the said "green zone". The municipality also plans an irrigation channel that runs through the green zone, divided into two phases.

At the context level, the "green ribbon" is to connect these communities through agriculture and strengthen them using the green ribbon strategy.

The food production will occur in two parts: on agricultural fields and in backyards. Yearly cash crops like sugarcane and coconuts would be permanent crops on the agricultural lands. Other cash crops like maize, oilseeds, and chillies will rotate with main food crops like root vegetables. The backyard food produce will mainly

entail the growth of root vegetables and green leafy vegetables. These rotations do not need a lot of space, are easy to grow, and constitute this area's staple food.

7 BETTAHALSURU

Bettahalsuru is the name that has been adopted to the quarry from a small village adjacent. Today, the entire region surrounding the quarry on the left side of NH 44 is called Bettahalsuru.

The quarry can be accessed from the city via NH 44. A service road runs next to NH 44 that turns left onto the *Bettahalsuru Cross Road*, the primary access to the quarry settlements from NH 44. The road further continues to connect to the Bettahalsuru village, west of the quarry. The quarry also has access ramps used to carry quarried stone by trucks, no longer in use.

7.1 THE QUARRY

The Bettahalsuru quarry was a grey granite quarry. The granite, famously called "*sadarahalli granite*", has been used as flooring in buildings for years. The material was in great demand for many years. As a result, illegal mining was conducted in the middle of the night until 2015. The illegal mining has since stopped but has left the rock formation in a degraded state.



Fig 7: Bettahalsuru acces



Fig 7.1.1: Water run-off and hydrology in and around the quarry

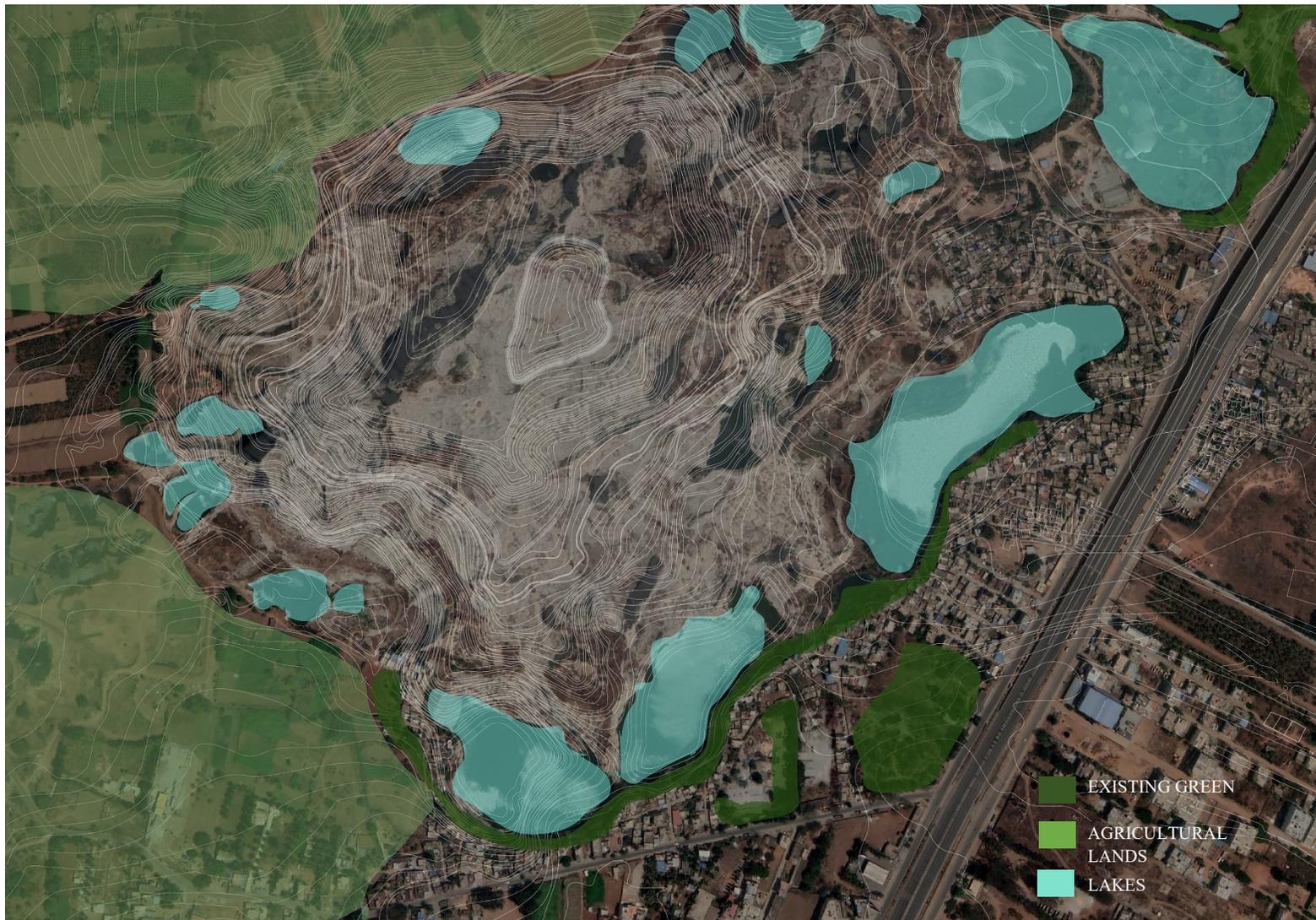


Fig 7.1.2: Existing blue-green structure



Fig 7.1.3: Site boundary

The lakes surrounding the quarry are a result of mining and water collection due to rainfall. The quarry, being made of rock, causes run-off of rainwater that directly spills into and collects in the lakes. Bangalore has a primary rainy season from June to October and a secondary rainy season in November and December. Due to the entire seven months of rain every year, the lakes around the quarry are full all year round. The run-off from the quarry has led to flourishing green around the lakes.

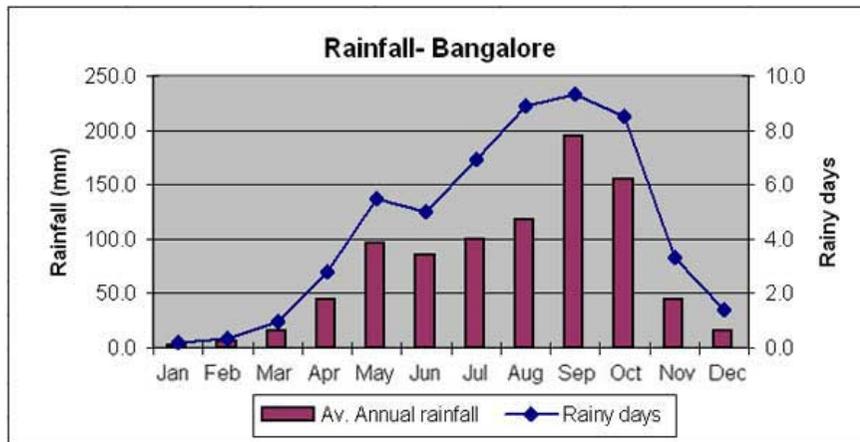


Fig 7.1.4: Bangalore rainfall data (Rainwater Harvesting, 2021)

7.2 THE SETTLEMENTS

Bettahalsuru carries remnants of a community that thrived while the quarry was still in use. The settlements around the granite quarry are mostly temporary or unfinished housing used by residents who are former workers of the quarry.

The area also has permanent buildings owned by private entities from the city that are rented out for housing and commercial functions. Most of these privately owned buildings are located along *Bettahalsuru Cross Road*. The informal housing in the area is located closer to the lakes and the quarry.

A few religious functions exist, along with institutional functions like schools, small scale factories and clinics. Commercial operations mainly include small grocery stores, restaurants, and a few street foods stalls.

The scale of the buildings is small, and the density of the settlements is high. The streetscape plays an essential role in the community and contributes to life. The major characteristic to maintain in the design of this area is the low-rise, high-density aspect of the existing settlement, along with the importance to pause spaces within the streetscape.



Fig 7.2.1 (a): Site sections with existing street characteristics



Fig 7.2.2: Existing functions on site



Photos: Community in Bettahalsuru



Photos: Quarry and lakes

7.3 LAND USE AND ROAD NETWORK

According to the *Bangalore Masterplan 2031*, the *Bangalore Municipal Corporation* allotted the communities in the urban fringe of Bangalore agricultural lands. Most of the land currently occupied by the settlements around the quarry has been allocated for residential development.

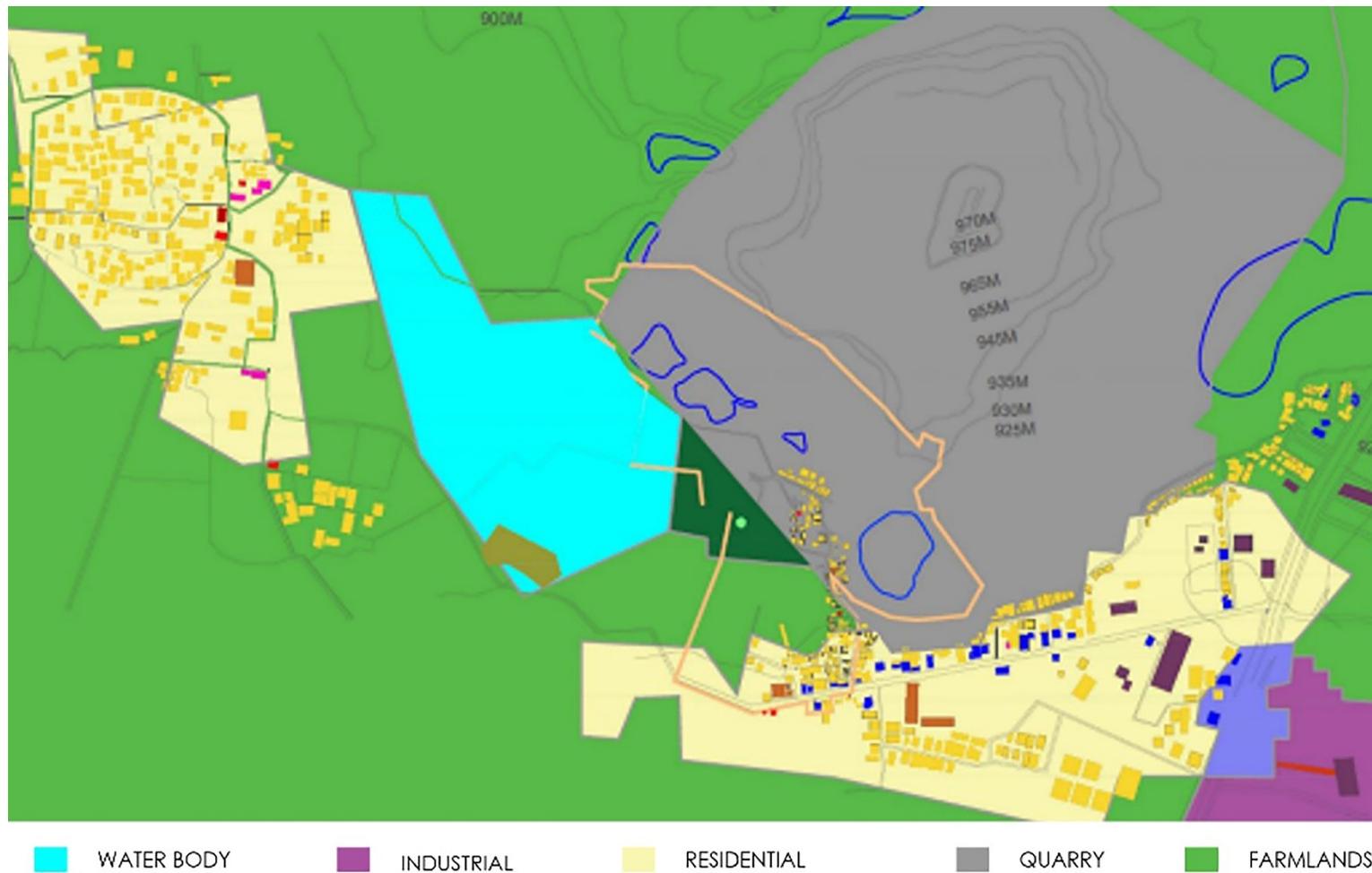


Fig 7.3.1: BMC land use map (Open City - Urban Data Portal, 2021)

Adding to the topography, the existing road network is disparate and not well-designed. The key is to complete the network while providing access to the critical points mentioned above.



Fig 7.3.2: Disparate Road network

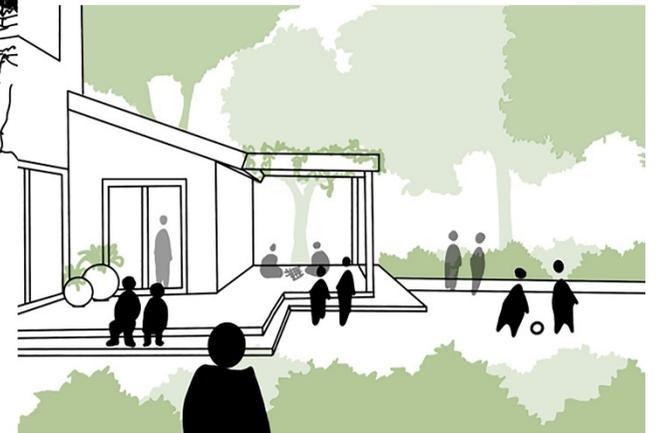
8 DESIGN STRATEGY



Creating quality public spaces with minimal intrusion



Making food production and retail part of daily life

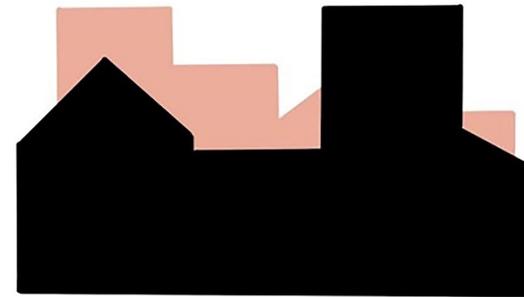


Retaining valuable existing characteristics

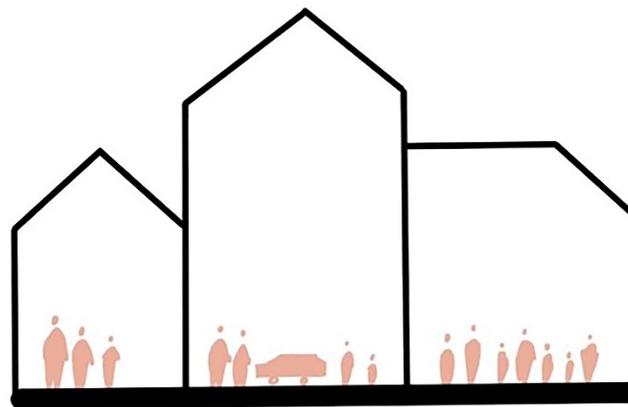
Fig 8 (a): Vision for Bettahalsuru



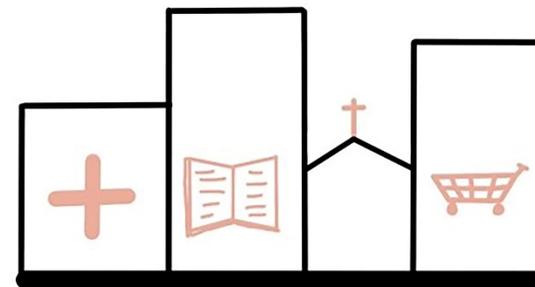
Perception of safety



Socio-economic diversity



Heterogeneous design for varied residents



Availability of services

Fig 8 (b): Design considerations



Fig 8 (c): Unintrusive recreation in the quarry

The quarry is a protected landscape. The quarry is, at present, just a figment of the community's past. Hence, connecting the quarry to the design of the settlement is of utmost importance. The quarry can be a great recreational spot in Bangalore with minimal interference in terms of design. The idea is to form a small pathway around the quarry that would attract tourists and visitors alike. This would

provide alternative employment opportunities for members of the community.

Two access points by public transportation on-site are bus stops on *Bettahalsuru Cross Road*. Access to the quarry by foot from these bus stops is vital for a richer recreational experience.



Fig 8 (d): Bus stops that are the main access via public transport to the site

8.1 COMPLETE ROAD NETWORK

Completing the road network gives access to the key points on site. The smaller pedestrian streets across the thick green closer to the lakes provide a break in the barrier and also the perception of safety. The vehicular streets are important to ensure a complete access network to and from the agricultural fields.



Fig 8.1: Completed Road network

8.2 KEY POINTS ON SITE

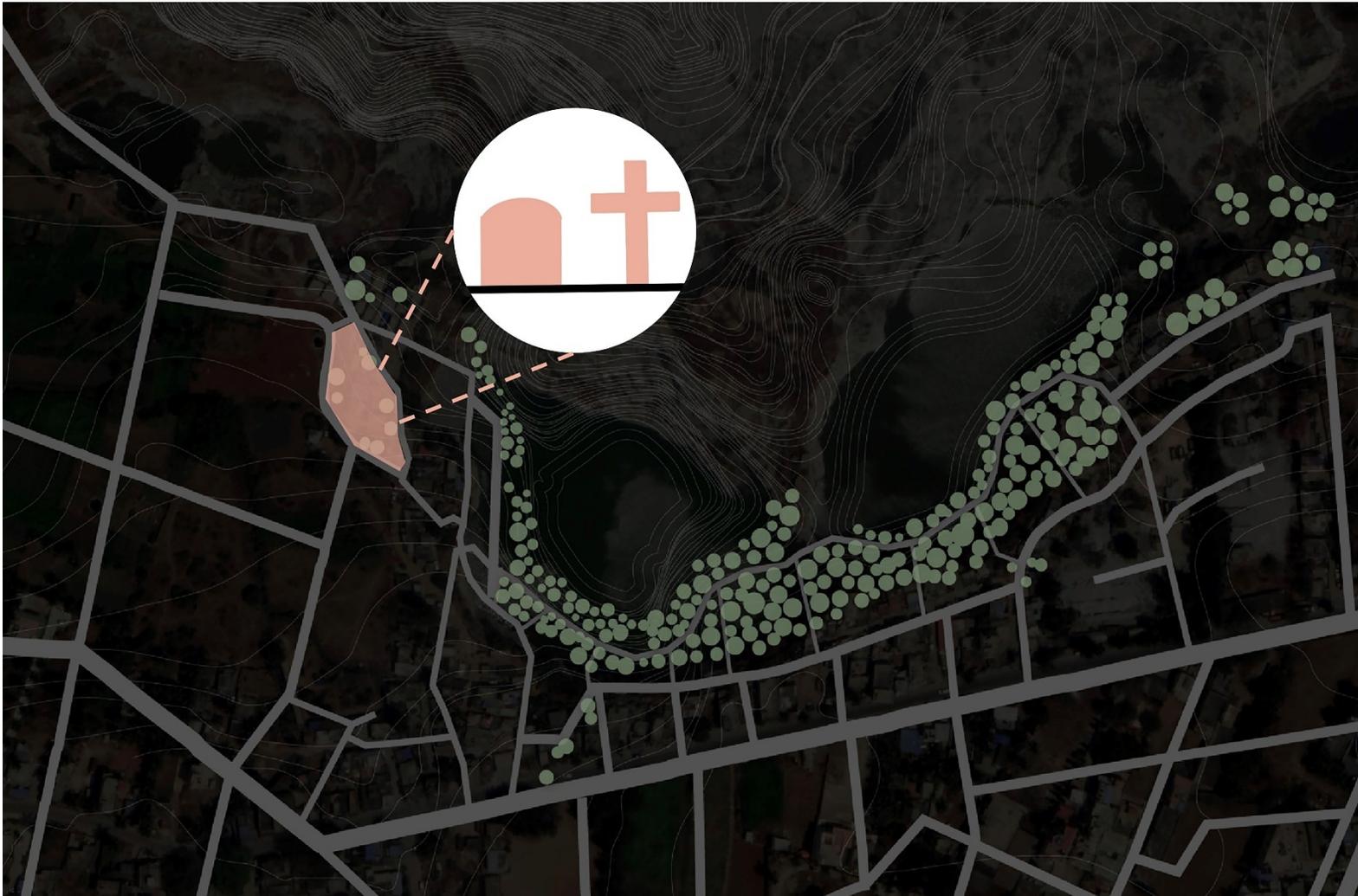


Fig 8.2.1: The graveyard on site is an important religious function that cannot be touched, it is of high sentimental value to the residents. The graveyard also has the potential to act as a generator for design.



Fig 8.2.2: The second key point on site is this space that exists between the intersection of main connecting roads, and between the agricultural lands and the existing green on site. This space can be a transitional space, but also a “breather” between the two large green spaces on either side.



Fig 8.2.3: The third key point is close to the bus stops that are the site's main access to the city. This space can be used for retail functions that could be the primary supply of produced food from this area to the city.



Fig 8.2.4: The cliff along the lakes is an important part of the site. Due to the varying topography of the site, the access to the water bodies have different characteristics at different points. There is potential to use this topography to design diverse public spaces.



Fig 8.2.5: This point is the nearest point of access to the quarry from the site. This point has a potential to carry recreational functions from the site to the quarry.

8.3 GREEN RIBBON AT SITE LEVEL



Fig 8.3: Green ribbon strategy on site level

The *green ribbon strategy* on the site level connects the agricultural lands with the existing green with backyard gardens and public

green spaces acting as connections. The various kinds of green would form a ribbon along the cliff line next to the lakes.

8.4 DISTRIBUTION OF FUNCTIONS



Fig 8.4.1: Commercial function along the main road



Fig 8.4.2: Recreational along cliff overlooking lakes



Fig 8.4.3: backyard gardens within blocks



Fig 8.4.4: retail functions and transport routes along the roads

8.5 PHASING AND TIMELINE

The project will be completed in three phases. Phase 1 will deal with agriculture and backyard farming. In this phase, the main focus will be making food production a part of the community's lives and help with economic stability. Phase 1 is the most important phase, without which the project would not be successful.

Phase 2 will be to rebuild the block and add new buildings. The building typology will vary in size to accommodate different socioeconomic groups. Phase 3 is the recreational aspect of the design, along with the proposed walkway along the quarry. This will provide an alternative livelihood.



Fig 8.5.1: Phase 1



Fig 8.5.2: Phase 2



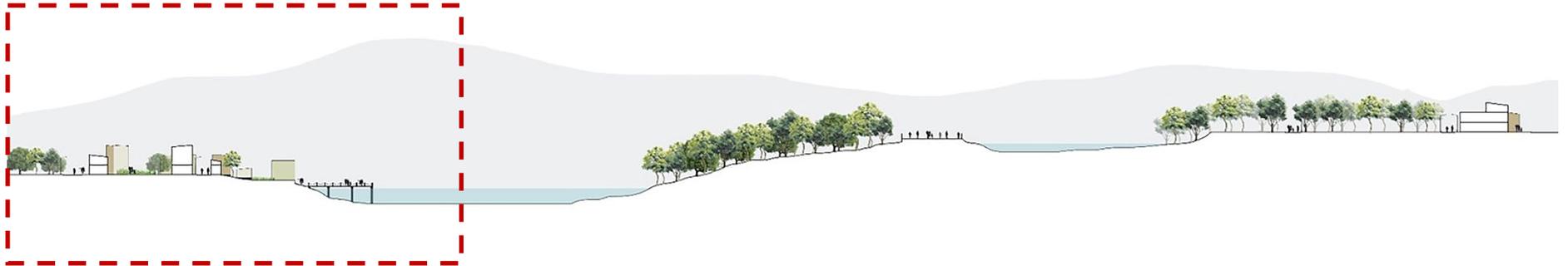
Fig 8.5.3: Phase 3

9 MASTERPLAN



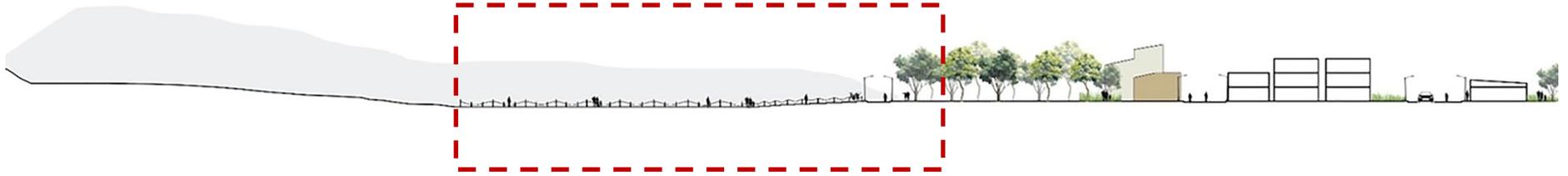
1 – Agricultural land, 2 – graveyard, 3 – deck on water, 4 – backyard farming, 5 – farmers’ market, 6 – viewing platform, 7 – access to quarry, 8 – public staircase, 9 – newer block around rock formation, 10 – school and playground

9.1 SECTIONS AND SKETCHES



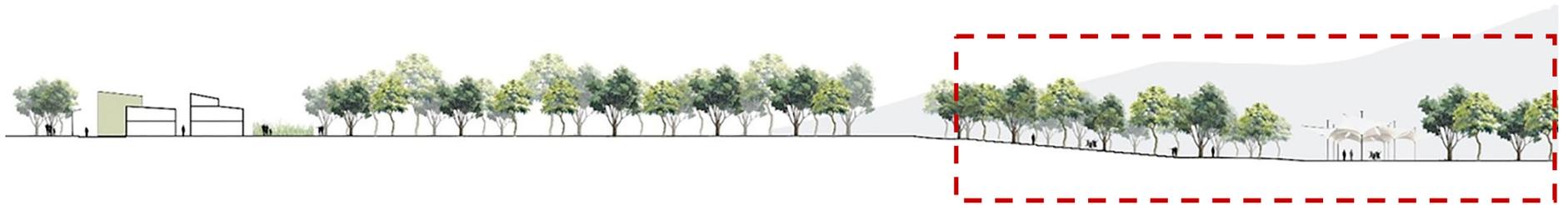


Sketch of deck on water (no 3 on plan)





Sketch of view from bridge (no 7 on plan)





Sketch of public staircase (no 8 on plan

10 AREA OF INTEREST

The area of interest chosen for further design consists of the blocks between the graveyard and the deck on the lake.

Movement through the area is taken into consideration while designing the main walkways through the backyards. These walkways also act as connections between interest points like the temple, graveyard, deck, etc. The recreational functions are placed along the street, closer to the lake.

There is a community gathering space that acts as a pause between the two green spaces. This area would be used during festivals, weddings and so on.



Fig 10 (a): Area of interest



Fig 10 (b): Primary pedestrian circulation



Fig 10 (c): Recreational functions along the lake

10.1 BACKYARD DESIGN STRATEGY

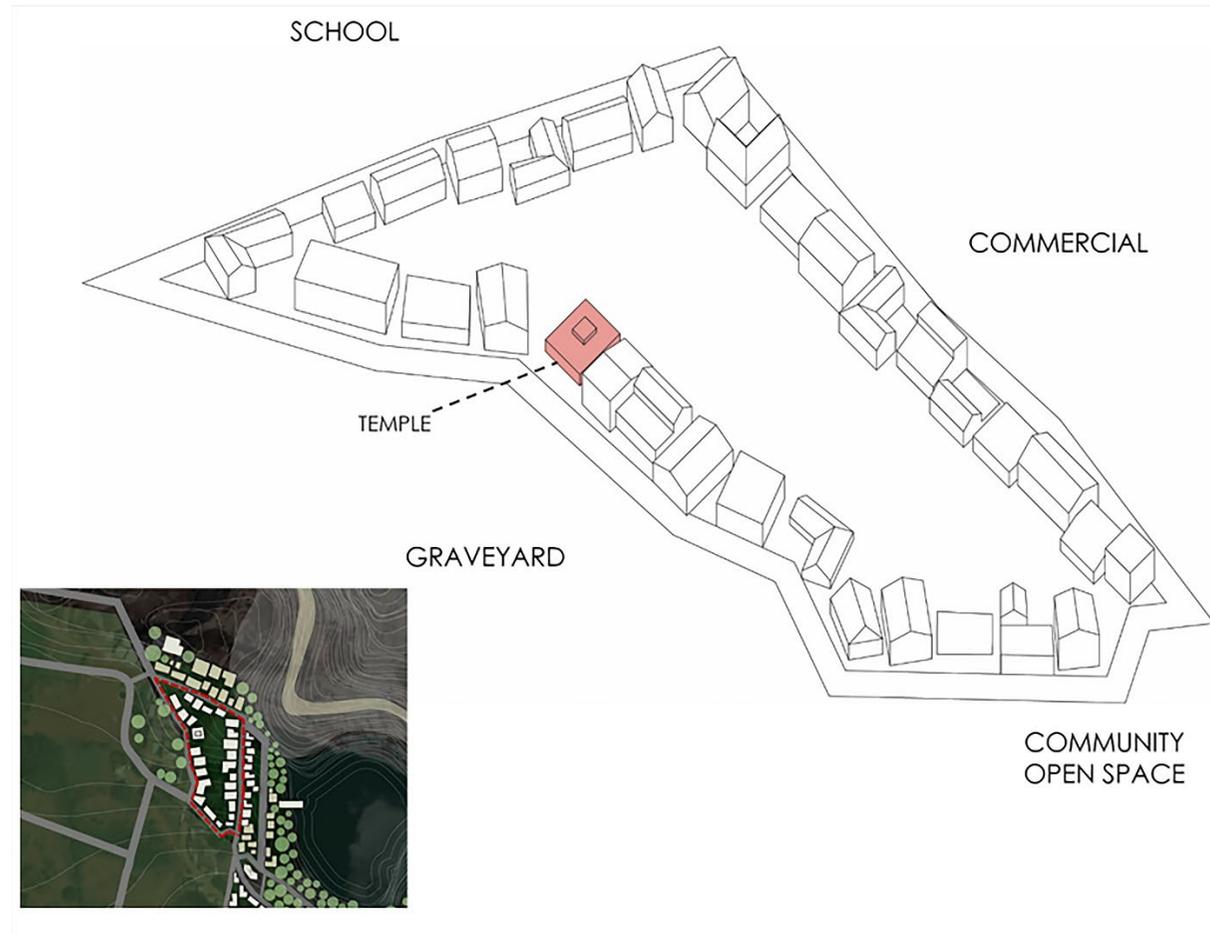


Fig 10.1.1: Generators around block

The temple is an important religious function that acts as a space for social interactions. It is very common to have a small temple within residential blocks in India. The temple can range from just a small

stone under a tree, to a building. The temple, school, graveyard, commercial functions, and the community open space act as generators around this block.

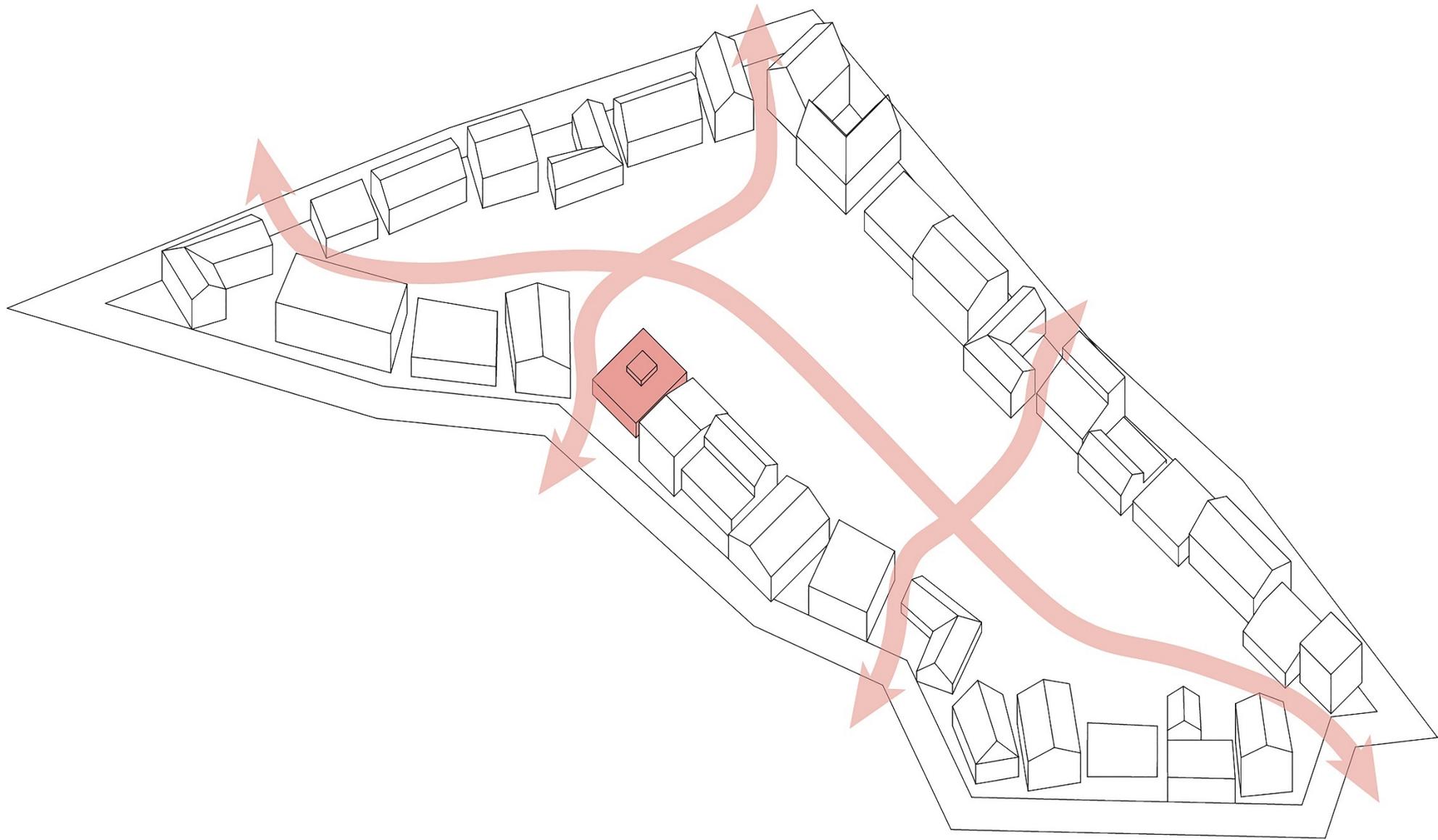


Fig 10.1.2: Primary walkways connect generators



Fig 10.1.3: Secondary walkways divide the backyard into shared community gardens and private backyard

10.2 PART PLAN

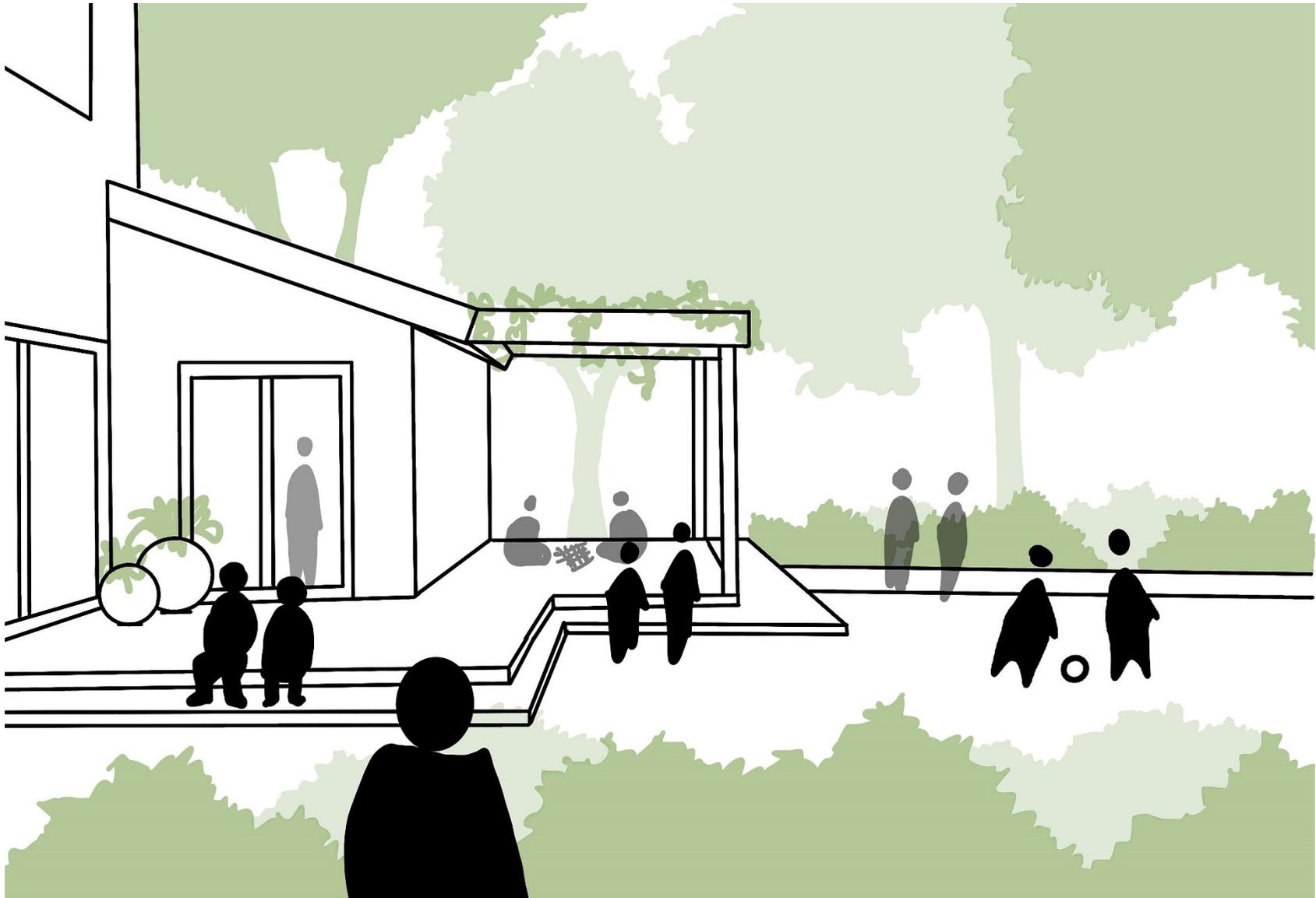


10.3 SECTIONS AND SKETCHES



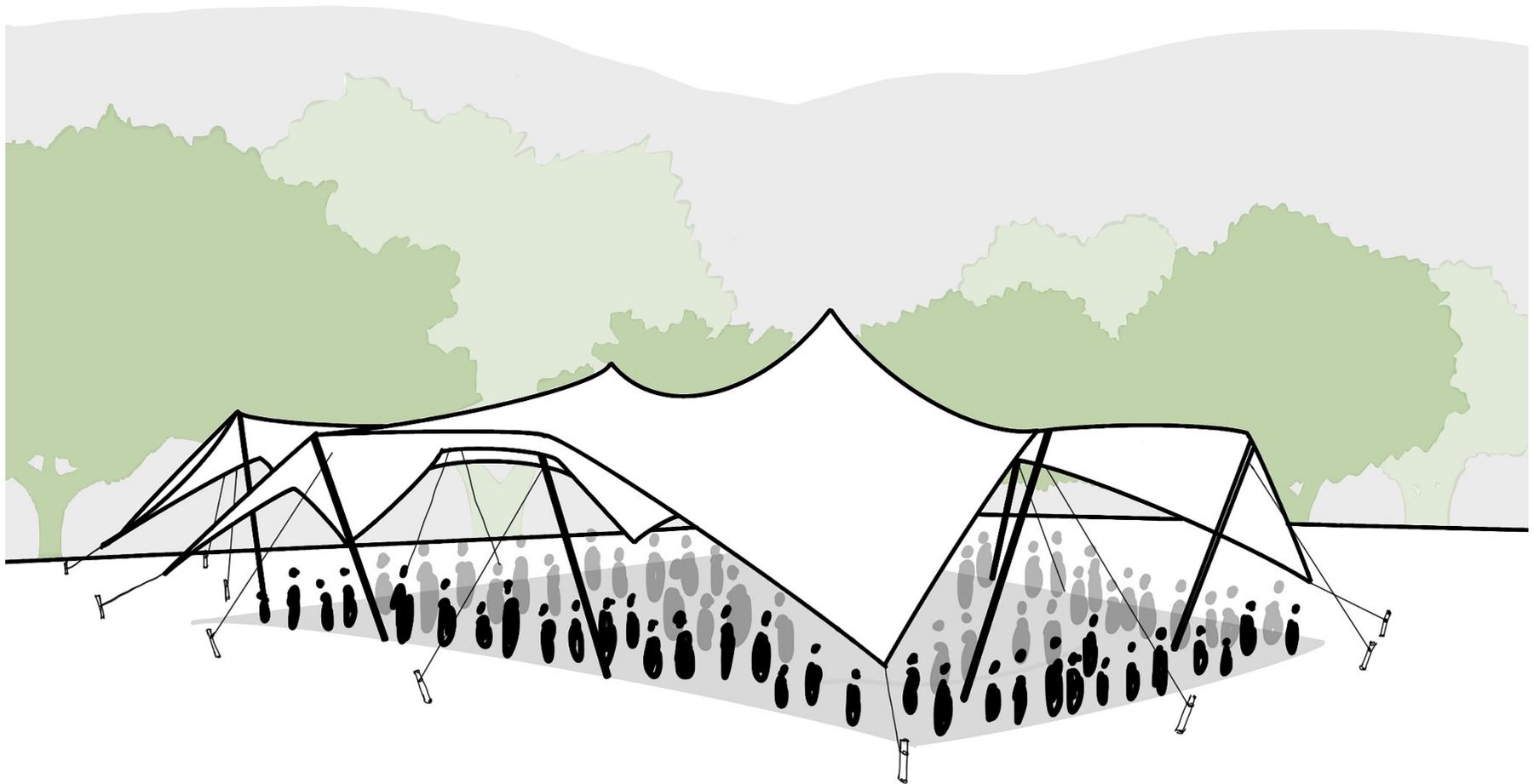


Sketch of shared community gardens (no 4 on plan)



Sketch of private backyards (no 5 on plan)





Sketch of community open space as a wedding venue (no 6 on plan)

11 DETAIL DESIGN

The area chosen is for further detail design at the street level. Streetscape is a vital part of the community character in India. The perception of safety and outdoor access and visual surveillance is vital in areas like this where the children of the household play on streets and backyards. The adults also require shared spaces as the neighbourhood is very social.

The detailed design will show the use of shading devices and offer a deeper look into the microclimate design.



Fig 11 (a): Area for detail design

The detailed design will showcase the daily life of the residents with the quarry as a background. The high density is maintained, with the street life being the most important part of this design. The presence of hoardings, wires and telephone poles is commonplace in India, and an attempt to keep these elements and make them a part of the design is made.

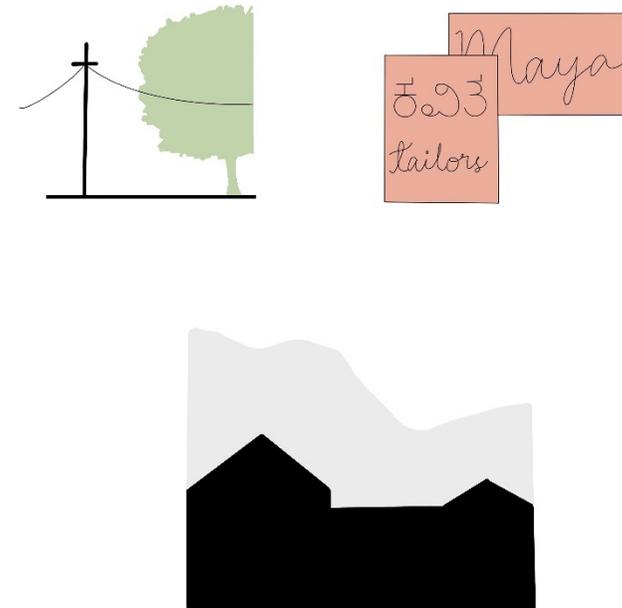


Fig 11 (b): Characteristics of design

11.2 MICROCLIMATE

Bangalore has a tropical climate with a wet and dry season. Bangalore has a moderate climate throughout the year due to its elevation. Summers sometimes come with heat waves that can make the environment uncomfortable. However, summer showers break the heat waves and offer some relief and result in flooding and power outages.

The solar elevation in Bangalore ranges from 118.67° in the summer to 64.99° in the winter. The sun is overhead at noon for most of the year, and shading is a crucial design element here.

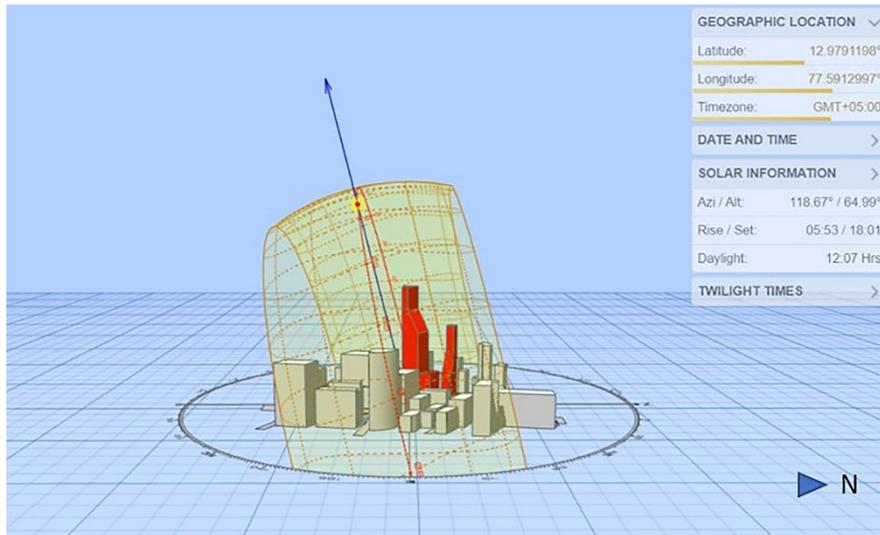


Fig 11.2.1: solar elevation in Bangalore (Sun Path 3D, 2021)

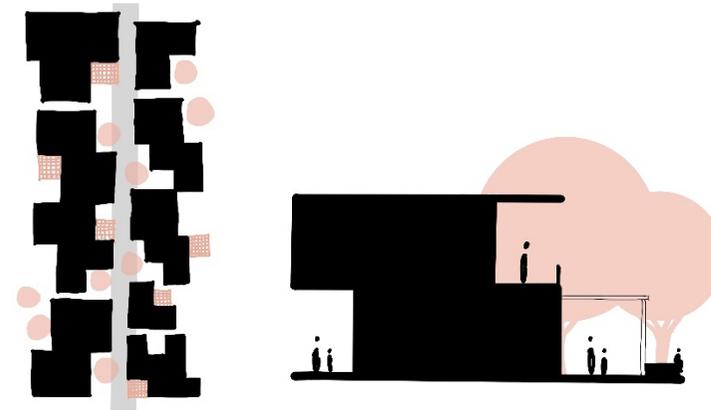


Fig 8.2.2 (a): Shading devices and landscaping used as part of the design

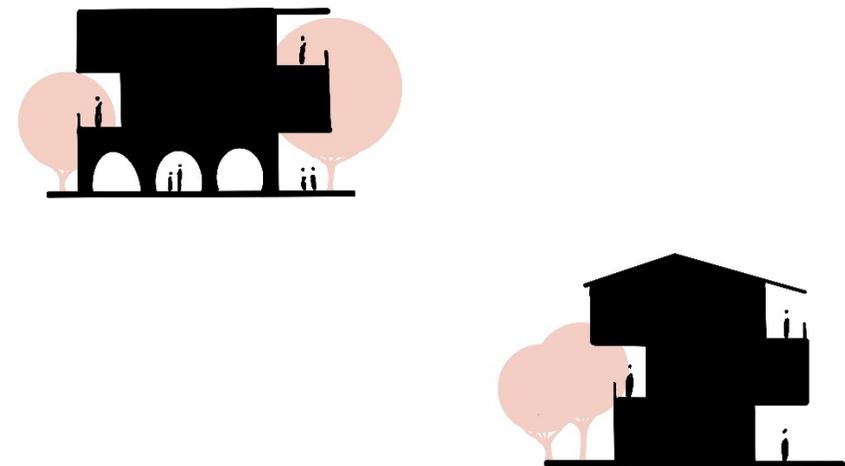


Fig 8.2.2 (b) Projecting and receding surfaces to create shade, using arcades for shading in public ground floors

11.3 RAINWATER

Production of food in the backyards of the blocks could be made easier using directed rainwater. The roof structures of each building in these blocks are designed to be sloping towards the backyards wherever possible. Since the weather in Bangalore is considerably hot most of the year, flat roofs are recommended for indoor cooling. Flat roofs also allow for terraces that have important cultural usage in the summer and to dry clothes. Hence, where it is possible, roofs are a combination of flat and sloping, the slope always towards the backyards.

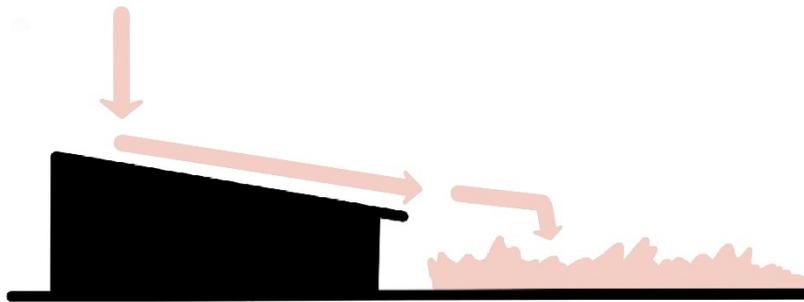


Fig 11.3: Using roofs to direct rainwater onto backyards

11.4 STREETSCAPE

The design of the streetscape mainly focuses on making interactions on different levels possible. This is ensured by designing spaces like balconies and storefronts facing each other.

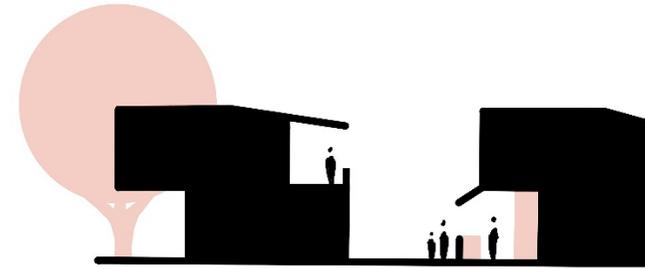


Fig 11.4: Interaction at different levels

11.5 BUILDING FOOTPRINTS

The buildings are placed in such a way that there is a possibility to create front and backyard spaces. These spaces are of immense value in Indian streets as they are used by the residents as social places. These places are active interaction zones, that add character to the streetscape as well.

The buildings are staggered in order to ensure good cross-ventilation. The shadows cast by the buildings can be used to partially shade the front and backyards.

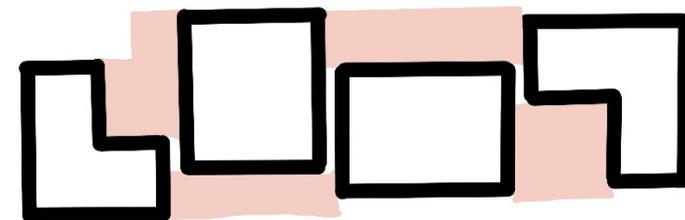


Fig 11.5.1: Formation of front and backyards

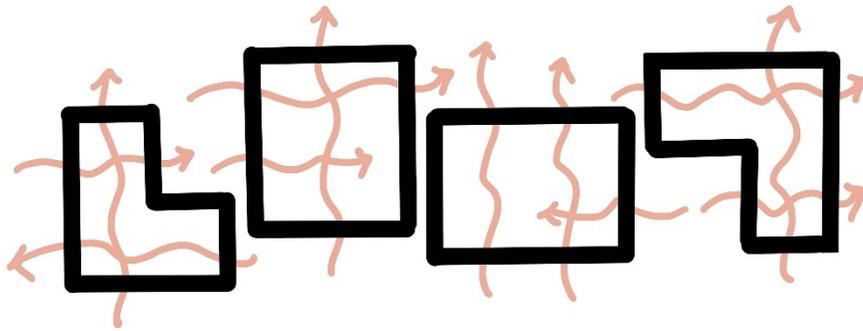


Fig 11.5.2: Cross-ventilation for each building

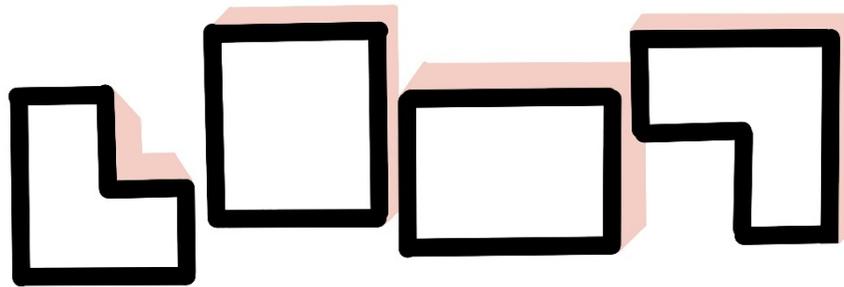


Fig 11.5.3: Shading by shadows cast by buildings

11.6 ROOF STRUCTURES

The roofs of buildings are designed to direct and collect rainwater. Keeping this in mind, there are four different types of roofs used for this purpose.

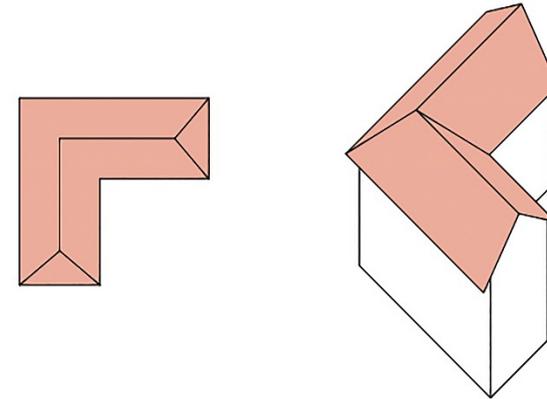


Fig 11.6.1: Pitched roofs for direction of water on both sides of the building

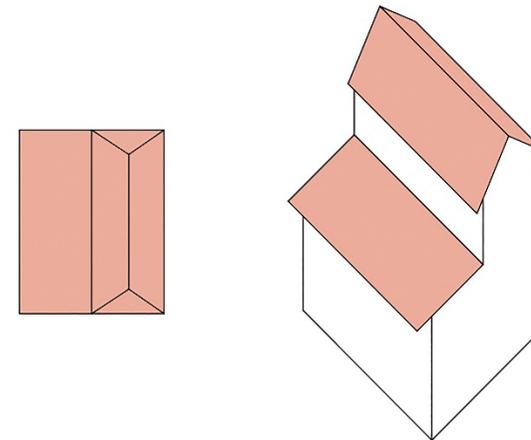


Fig 11.6.2: Pitched roof in combination with a flat roof

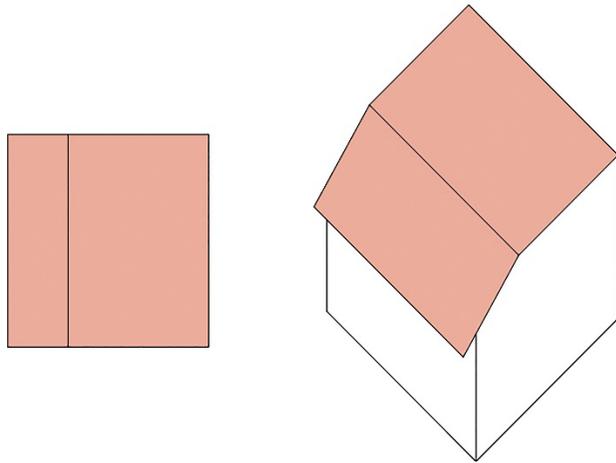


Fig 11.6.3: Flat roof in combination with a sloping roof on one side

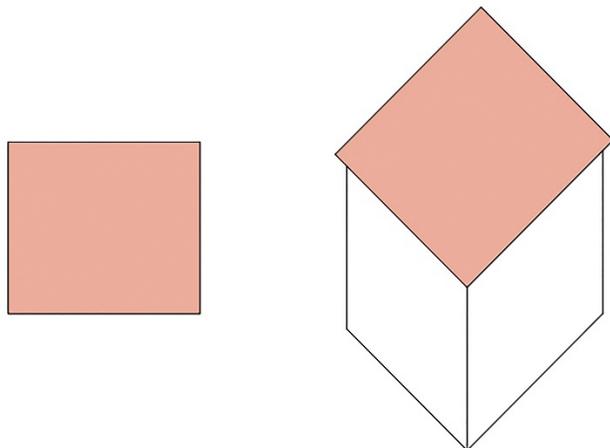


Fig 11.6.4: Flat roof where there is no need for direction of water

11.7 BUILDING AREAS AND DESIGN

The building guidelines in Bangalore do not allow for buildings to be built by planners or urban designers. There is only a possibility for the plot lines and areas for buildings to be indicated in the design. The plots are then sold to buyers that build on their own.

In case of social housing, the building must be 60 sq. m for a residence of four people, 90 sq. m for a building with 6-8 residents, and 120 sq. m for a building with 10 residents.

The guidelines also indicate that the height of each building is restricted due to the proximity to the airport. This restriction is for 16m.

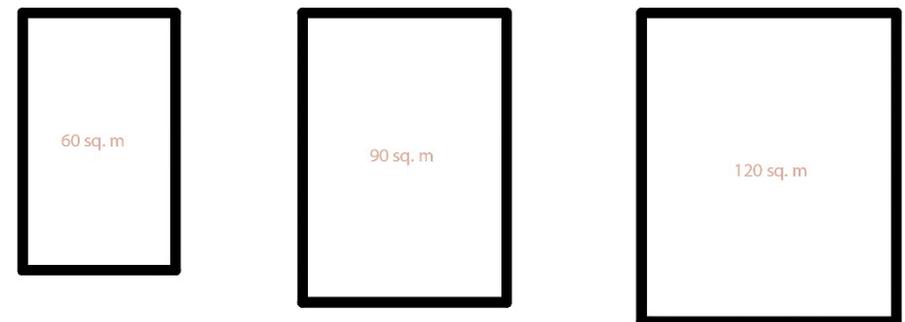
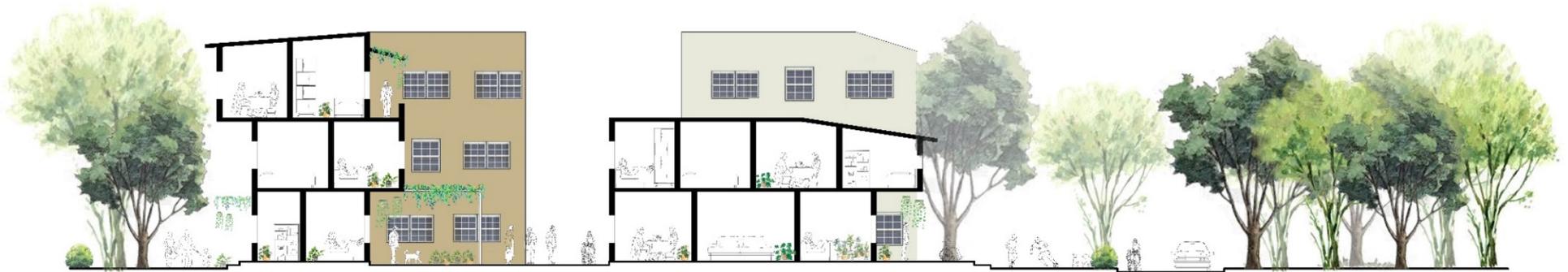


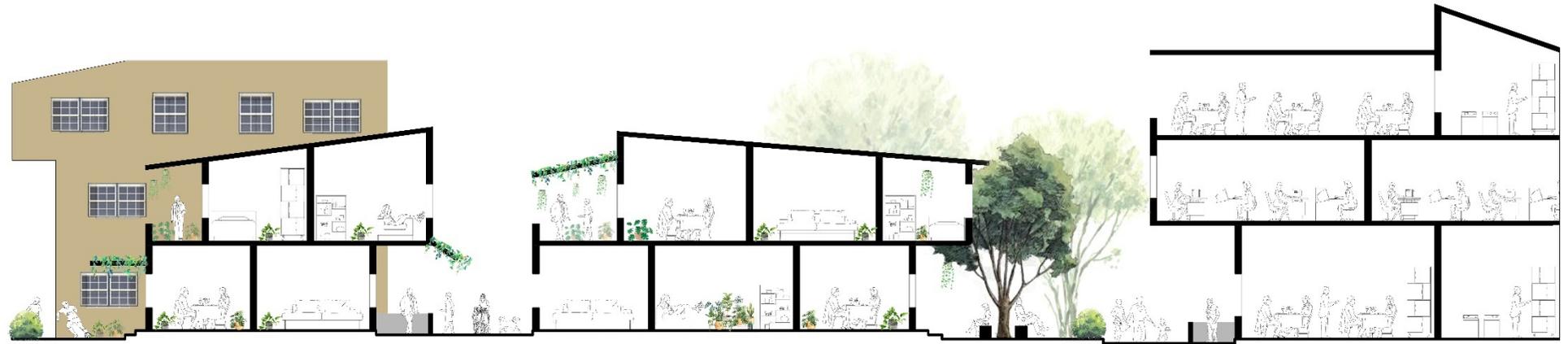
Fig 11.7: Areas of buildings for social housing

12 DETAIL PLAN



12.1 SECTIONS AND SKETCHES







Sketch of streetscape



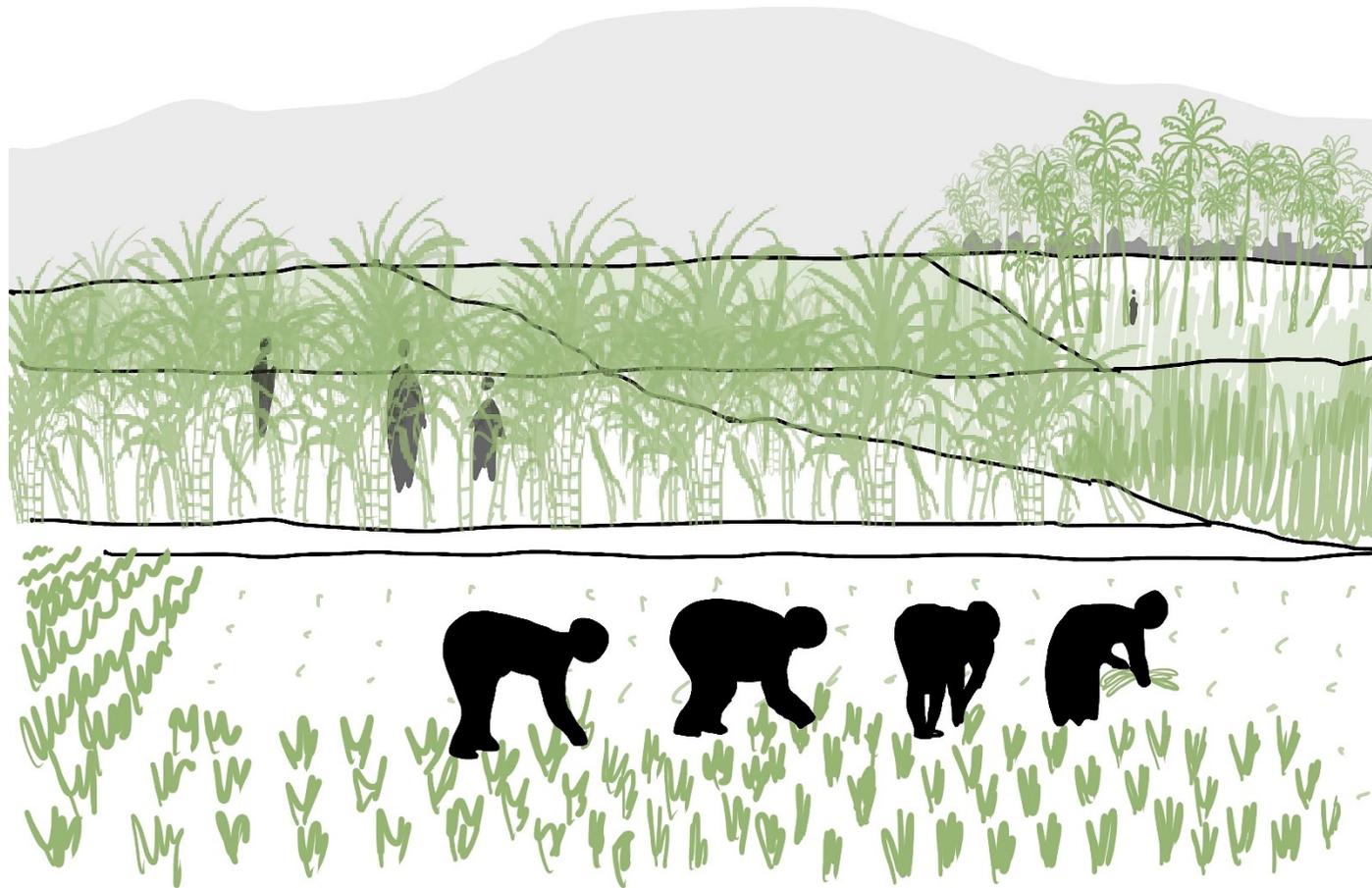
Sketch of a street food store in the ground floor of a residence

12.2 ELEVATIONS





12.3 SKETCHES



Agricultural fields (no 1 on masterplan)



Agricultural fields (no 1 on masterplan)



Temple as a community gathering space (no 3 on part plan)



Farmers' market (no 5 on masterplan)



Viewing platform (no 6 on masterplan)

13 OPPORTUNITIES FOR FUTURE DEVELOPMENT

The quarry is currently protected by the government. Hence, the design is unintrusive, and sensitive to the existing conditions. However, there is a potential for further development in the future. The new Bettahalsuru quarry community would attract a large

There is potential for newer blocks to be designed with their own backyard gardens within the site. There is also potential for the lakes to be cleaned and used for fishing along with seasonal recreation.

number of people, both as residents and as tourists. The design already allows for increasing the number of residents and to accommodate tourists. However, there is a potential for further development in these areas as well.

This would also bring in more employment and revenue to the area. The commercial activities along the lakes would also evolve over time to accommodate more incoming tourists and residents.



Fig 13: Potential for future development

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