

Redevelopment Strategies to Promote Qualitative Aspects of Habitable Spaces: A Case of Navrang, Dharavi

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Abstract— Livability deals with the dimensions of habitable spaces, which includes safety, comfort, accessibility, and social well-being. In slum areas like Dharavi, these livability aspects are compromised. Dharavi, being a dense agglomeration of people and complex social fabric, which has come to be known a phenomenon, and being a site of significant economic activities, brings into sharp relief the challenges posed by urban poverty and housing inadequacy. Overcrowding, poor sanitation, lack of basic infrastructure, and structural dilapidation are some of the major problems the residents of Dharavi's face. These conditions make their life and well-being worse.

This research paper investigates the specific livability challenges that exist in a pocket of Dharavi, and explores redevelopment strategies aimed at improving the qualitative aspects of the habitable spaces. A detailed analysis of the present living conditions and socio-economic dynamics of the area shall help in identifying the key areas that need intervention. The research further puts forwards a comprehensive framework for redevelopment that takes into consideration the physical and social dimension of habitation, seeking to enhance the livability of a pocket of Dharavi

I. INTRODUCTION

Slums, squatter areas, and shanty towns are some of the informal settlements that are increasingly posing challenges in urban centers. Currently, more than one billion urban dwellers live in these makeshift communities, a number estimated to grow threefold by 2050, and to comprise 30% of the urban population. (Burdett, 2011) Contrary to public opinion, not all the dwellers are poor, as espoused by Mike Davis. (Davis, 2006) The nature of informal settlements is often stigmatized to portray them as unwanted, filthy, and dangerous; however, this portrayal is not accurate. The perception portrays these settlements as a burden to cities without giving anything in return for their sustainability. Dharavi is an informal settlement in Mumbai city that epitomizes the complexity surrounding these areas. Portrayed as filthy and dangerous, Dharavi is a beehive of activities and resilience. Stretching 525 acres and hosting an estimated 7,00,000 to one million people, it is among the densest population on Earth and is a world within a world in the city. (Joseph, 2013)

Dharavi is characterized by sturdy brick and concrete houses, adorned with decorative buildings in some areas. Economically, there are more than 20,000 industries, providing occupation to 80% of its residents. (Joseph, 2013) The major

industries are authentic leather, textile, and garment manufacture; global brands take their products directly from its workshops. Dharavi recycles 80% of Mumbai's plastic waste, and its recycling plant is the largest in India. Despite its cultural richness and economic activity, the residents of Dharavi live in terrible conditions. The government has several plans to relocate the community to Mulund, among other areas, in order to expand Mumbai's commercial zone, thus taking away the means of subsistence of thousands of people depending on the informal economy in Dharavi and putting 40% of the population on the street. (Gaventa, 2006) Therefore, Dharavi is the epitome of the complexity of an informal settlement. It is not a "slum" per se but a thriving urban ecosystem. It deserves redevelopment with consideration to the livelihoods and cultural fabric of its people.

II. SLUM REHABILITATION

Slum rehabilitation is a major phenomenon in contemporary urban planning, focused on improving the quality of life of people living in informal settlements. It entails the systematic rebuilding of slum areas by providing better housing and infrastructure. This process addresses the multi-faceted challenges of overcrowding, poor sanitation, and lack of basic amenities while attempting to upgrade these informal settlements into integrated, sustainable urban neighborhoods. Slum rehabilitation seeks to improve the quality of life among slum dwellers by providing secure and affordable housing, thus enhancing a healthier and more stable community environment. (Ahana Sarkar, 2020)

In the context of modern urbanization, there is ever-increasing applicability of slum rehabilitation. The cities of the world are growing at a rate never before seen, and 70% urbanization by 2050 will put more pressure on housing and infrastructure. (Skalicky, 2019) Affordable high-rise housing development became an imperative publicity in slum improvement. The built environment acts as a crucial role in shaping the socio-physical livability, which influences the social and physical well-being. Therefore, the understanding of the built environment on livability in low-income areas is of critical importance. This understanding can help develop better policies for slum rehabilitation and devise tools to evaluate socio-physical livability in extant low-income housing. (Nijman, 2008)

Mumbai stands as a grim example of the challenges and opportunities for slum rehabilitation. The city's perennial housing problems underline the complexity posed by rapid urbanization and socio-economic imbalances to the implementation of slum rehabilitation policies. The introduction of the Slum Rehabilitation Scheme in 1995 is a significant effort to meet such challenges. (Patel, 2005) However, the success of the scheme has been limited so far, with concerns running high that it can't rehabilitate slum dwellers. In addition, consideration must be given to the macro implications of neoliberal policies on the political and social climate of Mumbai. Such policies decentralize development by involving local agencies and communities; however, they are often short of inclusive and sustainable solutions. The needs of Mumbai's slum dwellers require an all-rounded approach that will balance rapid urban growth with the social distribution of resources and opportunities. (Patel, 2010)

A. Current Redevelopment Strategies

The role of Dharavi and its inhabitants in shaping Mumbai's urban history has been significant over time. From its origins as traditional fishing community, Dharavi slowly changed into a settlement with the help of makeshift dwellings constructed from waste and debris, progressively occupying the swampy area that came to be known as Dharavi. Frequently labelled "Asia's largest slum", (Banao, 2008) Dharavi's rich history is often overshadowed by the current government-led redevelopment vision, which perceives it as empty or wasted land, overlooking its vibrant informal uses, including settlements of clandestine immigrants, squats, illegal agriculture, and unplanned recreational activities. (Patel S. A., 2007)

Today, Dharavi comprises approximately 85 neighborhoods, each characteristic of the diversified ethnic and religious background. (Patel S. A., 2007) Due to its strategic location and Mumbai's demographic pressures, the government and private sectors have long sought to transform Dharavi into a world-class city through the Dharavi Redevelopment Project initiated in 2004. Spearheaded by the Maharashtra Housing and Area Development Authority and architect Mukesh Mehta, the DRP had radical changes, such as dividing the area into five sectors for private developers and replacing low-rise slum with the high-rise developments, without any consideration for the existing vibrant economy and the heterogeneous need of the community. (Zang, 2018)

In 2007, MHADA called for the DRP and invited high-caliber national and international developers with the promise of big profits. The inhabitants were informed that only those who had been living in Dharavi before 1995 will be entitled to rehabilitation under the DRP, thus excluding many from their legal rights. Furthermore, no detailed survey was conducted to ensure that the DRP grossly underestimated the number of households that needed to be resettled. (Caroline, 2013) DRP had the potential of modernizing Dharavi into a high-rise residential and commercial center. However, the approach was seen as top-down, non-inclusive and greatly displaced residents.

Core of DRP was in such a way that Dharavi is divided into five sectors for private developers; proposing to replace low-rise slums by high-rise, more inclusive strategies that rely on

community participation, affordable housing, and sustainable development, alternative models of cooperative housing aimed to balance the interests of the developers and the community towards creating an inclusive urban space. The debate between top-down and bottom-up approaches stresses the need for Dharavi's redevelopment to serve all stakeholders equitably and sustainably.

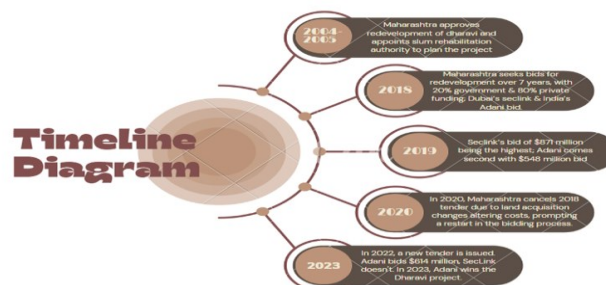


Figure 1: Redevelopment Strategies for Dharavi
Source: Author

B. Background

Livability, which is so essential for city living spaces, has simply meant the ability of living spaces to enable a better well-being and quality of life. This takes into consideration aspects such as sustainability, quality of life, and healthy at community level. Livability in the low-income neighborhood of the world remains a great challenge due to insecure exposure to different physical and social risks because of ill-constructed houses and a lack of basic services. The escalating rate of urbanization worsens the situation and requires effective policies in order to improve the living conditions. (Ahana Sarkar, 2020)

Urbanization is on the rise, such that in the year 2050, 70% of the world population would be residing in urban areas. (Skalicky, 2019) That is an indication of the urgency for slum improvement and affordable housing. The built environment critically influences socio-physical livability; therefore, the impact of the built environment on social and physical indicators is an area that has to be studied. The insights from such a study can influence the formulation of effective policies on slum rehabilitation and development of tools to evaluate livability in low-income houses. (Rao, 2015)

Global awareness of slum-related problems has resulted in policy shifts towards decentralized development which involves local agencies and communities. However, the implementation of such policies has always been troublesome, especially in a city like Mumbai. Success has been mixed with efforts such as the Slum Rehabilitation Scheme started in 1995. (Patel S. B., 2005) The political and socio-economic context of Mumbai means that the implementation of rehabilitation

programs is difficult and needs to be inclusive and sustainable in approach. There is a need to address the complexity of slum rehabilitation in Mumbai through a multifaceted strategy in light of the rapid process of urbanization and the necessity for distributive justice in allocating resources.

Therefore, slum rehabilitation is a multifaceted process of prime importance for leading a quality life in an urban setup. Understanding what it is and its impacts on livability, answering challenges that rapid urbanization and socio-economic disparities present, is essential in developing policies. The case of Mumbai indicated the difficulty associated with it and underlines the need for integrated and inclusive solutions. (Vaid, 2021)

III. RESEARCH OBJECTIVES

1. To study the demographical profiling, settlement pattern and morphology of Dharavi.
2. To promote the existing inhabitation, keeping in consideration the issue which got generated from the extreme densification and unplanned growth.
3. To propose the redevelopment strategy in a feasible manner for a delineated land parcel subjected to the demographic and infrastructural issues.
4. To assess their current living condition and determine the necessity of certain attributes of lifestyle.
5. To define the architectural scope of the project.
6. To delineate the site pertaining to comprehensive study of Dharavi as specified in objective 3, while examining the vulnerability of its pockets and considering the impact of redevelopment.

IV. LITERATURE REVIEW

Rapid urbanization in India has transformed the demographic and spatial landscape of the nation. What began as an 18% urban population in 1950 surged to 32% in 2013 and is projected to reach 55% by 2050. (Bank, 2013) Such explosive growth has led to the proliferation of informal housing settlements of slums that are more often than not uncovered by government regulation and basic services. For instance, in Mumbai, the financial capital of India, 42% of the urban population lives in slums—numbers that are rising. These unauthorized and illegal slums, constructed on encroached lands, are marked by squalid, overcrowded conditions with inadequate basic amenities. The quality of life being adversely affected by informal urbanization in India impacts development in the education, welfare, and formal job access sectors. (Habitat, 2016)

Low-income neighborhoods often comprise livability, which is basic component for urban well-being. Livability encompasses sustainability, quality of life, place character, community well-being and health. However, Livability in slums is compromised by insecure housing, unaffordability, and poor construction on contaminated or disaster-prone sites. They also expose their dwellers to greater physical and social risks. (Govender, 2011) Slum upgrading policies, therefore, entail in-situ upgrades and

creating hyperdense vertical towers so as to provide basic service and offer legal tenure. However, this effort has in most cases brought about the ‘rebound’ and ‘poverty recycling’ phenomena. (Debnath, 2019)

One billion people around the world dwell in urban slums, and the estimates are that in 30 years the number may double if no concrete and concerted action is taken. (Habitat, Challenges of the slum, 2003) Among the United Nations’ Sustainable Development goals is the target to halve the number of slum dwellers by 2030, though this is a challenging task to accomplish. In India, the housing for all policy advocates for adequate housing for all citizens by 2022, foregrounding in-situ slum redevelopment. This is in the form of private developers building apartment-type housing on existing slum sites, verticalizing sprawl, and utilizing freed-up land for profitable developments in order to subsidize public housing. There is no ignoring the neoliberal shift from government intervention to reliance on the market that considerably infuses slum rehabilitation strategies with the creation of urban land and real estate markets. As the privatization model, effective redevelopment requires a balance between state involvement and community participation in regard to the required sustainable and equitable development. (Mukhija, 2003)

A. Slums or Zopadpattis

Slums, popularly known as favelas or ghettos or Zopadpattis as they are called in Mumbai, are dilapidated, ill-planned shantytowns housing socially motivated groupings in developing countries. These slums, in effect, are a subsystem of the mega urban setup and are also termed as the ‘Kutcha’ or the unplanned, unwanted portions of the city. In Mumbai, 52.5% of the population resides in slums, but they occupy only 9% of the city’s land area. (Wilmsen, 2019) With mostly single or double story buildings and with limited public transport, the density of Mumbai slums is a nightmare for the residents. Inadequate access to clean water and proper sanitation and fragile material used for buildings and houses make squalid conditions with even higher risks of communicable diseases, mainly among children. However, site and service schemes and slum upgradation programs have bettered conditions since the post-liberalization era. (Ahana Sarkar, 2020)

Dharavi slum in Mumbai’s commercial business district is one of the 30 largest slums in the world and the biggest in Asia’s, covering approximately 535 acres with a population of over one million people. (Caroline, 2013) The housing units are either one or two storeys high. In two-storey units, the ground floor is divided into the kitchen and living room, and the sleeping quarters are on the first floor. In single-room tenements, the kitchen can be attached or open; bunk beds serve the dual purpose of storage and sleeping. These tenements share their outer walls and are dependent upon natural ventilation.

B. Chawls

Known as ‘chawls,’ these buildings generally range from four to five stories in height, with 8 to 16 tenements per floor. The tenements, known as ‘kholis,’ are small apartments of one or two rooms, each not larger than 20 square meters. A central staircase and a long corridor connect all the apartments and, on each floor, a few toilets are shared by all occupants of that floor. The architecture of chawls is similar to ‘Cortico’ in

Brazil and Portugal and 'Casa Di Ringhiera' in the northern part of Italy. People stay in long corridors with doors on one side and open balconies on the other side, creating easy social access to each other. These buildings were built during the colonial era for the industrial workers, which have now become degraded and developed into slum conditions. (Jana, 2016)

A majority of the chawls was built by the British-era Bombay Development Department in the central and south Mumbai. There are 206 buildings built by BDD, divided into four areas: Worli, NM, Joshi Marg, Sewri, and Naigam. A typical group of buildings in Worli are vertical buildings, 12 meters high and have four floors. A floor has 20 tenement units, all less than 20 square meters each, with community toilets placed at the end of double loaded corridors. With a number of 20 buildings in a group, the chawls are home to sizeable population, with 1,600 households in each group, thus a population of around 8,000. The group lie among wide 15-meter passages with open areas between the buildings. (Caroline, 2013)

C. Evolution of Slum Rehabilitation Housing

While early affordable housing policies in India focused mainly on in-situ slum improvement from the 1960s to 1980s, the housing strategy during the post-1990 period shifted towards house construction and redevelopment strategies. In the beginning, slum upgradation programs were undertaken to improve the lives of urban slum dwellers through provisions for improved housing and community toilet facilities. However, the unsatisfactory performance of these policies led to advocacy of more recent housing schemes like 'Housing for all 2022.' In this phase, neo-liberalization strategies like public-private partnership and market interventions have been used in formalizing the slums and providing subsidized, beneficiary-led individual housing units with basic amenities to low-income families. (Ahana Sarkar, 2020)

Despite a lot of policies concerning slum improvement or upgradation, slums have survived in Mumbai. This survival can be explained through the element of scarcity of land in Mumbai, which has rendered 95% of the population incapable of purchasing formal housing. Policies like 'Special Township Policy,' 'Cluster Development,' 'Inclusive housing in layouts,' and the 'Slum Rehabilitation Scheme,' were mooted to counter this. (J, 2015) Of these, the Slum Rehabilitation Scheme initiated in 1995 by the Maharashtra State Government and Mumbai-catered Slum Rehabilitation Agency emerged as one of the leading steps. (J, 2015) The scheme was projected to achieve not just legalization and protection of slums but also to give better housing through resettlement. This led to slum dwellers getting legal tenure and better housing, but private developers got incentives to build for high-income people. At the same time, the state government kept the important control over the land in hand. (S, 2012)

V. PROFILING OF DHARAVI

Mumbai is not just India's most populous city but an economic power center that offers a range of businesses and a host of job opportunities for all. Unabated economic growth attracts millions to the city. But owning a home in Mumbai is a far-fetched reality for many due to the colossal mismatch between demand and supply in housing market. Being a peninsula, Mumbai is surrounded by water on three sides, which restricts the horizontal sprawl. This spatial constraint, combined with

the soaring demand, raised the prices of properties and living spaces are relatively smaller. Although it is one of the most densely populated cities in the world, the Mumbai skyline does not depict the typical high-rise cityscape seen in other global metropolises including Shanghai or Manhattan, thereby complicating matters further in housing its ever-increasing populace. (Caroline, 2013)

Dharavi, often referred to as Asia's largest slum, epitomizes the density and complexity that the urban fabric of Mumbai is constituted of occupying only 3 sq.km, Dharavi is home to an estimated 8,00,000 to 1 million residents. Its central location within Mumbai—facing middle-class neighborhoods—adds to its dense and vibrant character. (Deepak, 2017) The main source of occupation in Dharavi was initially that of a fishing village, gradually moving into the core tanning industry. This meant the addition of an unsavory smell and informal economies that plague the living conditions. Even now, the shadow of the Mumbai mafia and the harsh industrial environment add further notoriety to this site. Dharavi represents resilience and cultural amalgamation: traditional craftsmanship interwoven into modern city influences, opening India's economy to western consumerism entering its narrow streets as the residents embrace modern technologies and amenities despite their merger surroundings. (Jain, 2020)

It is strategically surrounded by big transport links, sits next to the Bandra-Kurla Complex—an emerging business district. This position places Dharavi squarely at the epicenter of urban redevelopment debates for real estate investors and developers. (Caroline, 2013) The Dharavi Redevelopment Project, with complete overhauls of the area through rehabilitation and modernization, has been drawing debates on what the best approaches are toward slum redevelopment and urban poverty. Despite many challenges, the thriving informal economy of tanners and leather craftsmen is a resilient example of the economy beyond the conventional labor relations. Its flexibility and economic vibrancy also make it a potential model for innovative slum redevelopment, combining economic opportunity with social resilience. As Mumbai keeps growing, the transformation of Dharavi may very well be one valuable test of how to make urban space livable and sustainable.

A. Study Area

Navrang Compound or 13th compound is strategically accessible via the Mahim-Sion Link Road, a 60-foot road, and Dharavi Main Road. The connectivity allows smooth flow of goods and people, which is essential for the bustling industrial and commercial activities in this area. However, despite this accessibility, grave deficiencies are identifying in this compound that affect the quality of life of its residents. The total 900 dwelling units in this compound are deficient in physical infrastructure, spread over 15 acres, particularly in facilities for sanitation and hygiene, and this results in several health and social problems. Quality of life is lowered, with many inhabitants living in poverty-stricken conditions in slum and residential space is limited and many people are forced to live in workstations.

The predominant use of Navrang Compound is industrial, followed by commercial and finally, limited residential. The main industry is recycling. The textile and leather industries also play prominent roles. The area deals with approximately

80% of Mumbai's garbage waste. The compound itself incorporates about 900 units and 5000 workers. This positioning within the overall recycling structure of Mumbai is key to the city's ability to deal with such vast waste. The compound itself comprises various kinds of establishments: restaurants, food outlets, tea stalls, pan shops, packaging retail shops, electrical shops, clothing, general and two medical shops. The conditions of living, however, in Navrang Compound, are dilapidated. The majority of the houses are 20 to 100 square meters, and the temporary house have mezzanine floors made up of illegal aluminum-tin roofs. Permanent houses are mostly used for industrial purposes and are mostly along the railway lines where most of the houses were made of makeshift houses.

Other density aspects of Navrang Compound exacerbates its challenges. The area is approximately 900 units in a haphazardly planned manner. The highest population density is found along the periphery of the roads, whereas internally, there are unauthorized additional floors constructed. The tallest are G+3 with commercial spaces at ground floor level and habitable space above. This is a typical mixed-use pattern found in most high-density slums of the city. The residents seem to make use of whatever space is available, thus making such cases congested and unsafe at the same time. The life, however, is vibrant here with the community that braves all odds and significantly contributes to Mumbai's economy through its recycling, leather, and textile industries.

VI. RESEARCH METHODOLOGY

The research methodology begins with an analysis of secondary data to establish the demographic profile of Dharavi. This involves examining various administrative maps, including those of the MMRD Region, Ward Map, and Maharashtra District Map, Mumbai District Map, Mumbai Sub-Urban District Map. The study highlights the division between Mumbai Sub-urban and Mumbai District, with Dharavi being situated within the Mumbai District, as depicted in Figure 1. Furthermore, Dharavi's specific location in the G/N ward is illustrated in Figure 2. It is followed by the development of an overview of the existing physical and social infrastructure.

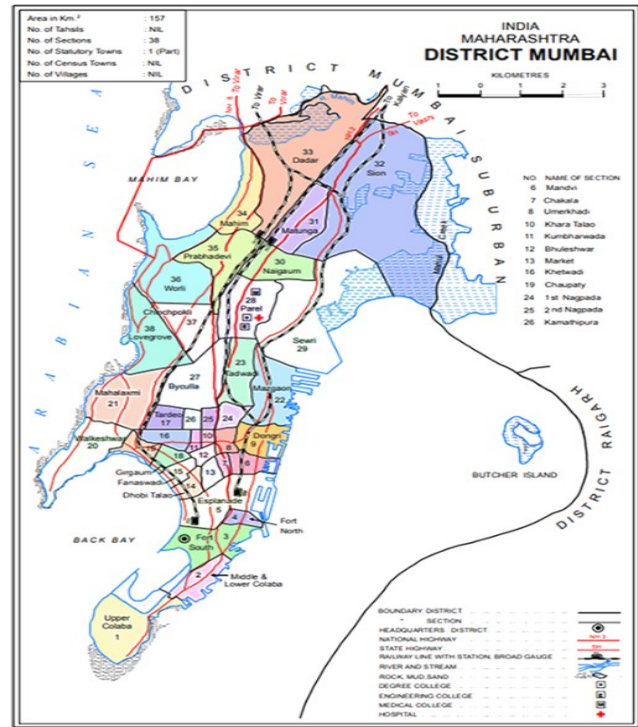


Figure 4: Maharashtra District Mumbai Map
Source: District Census Handbook

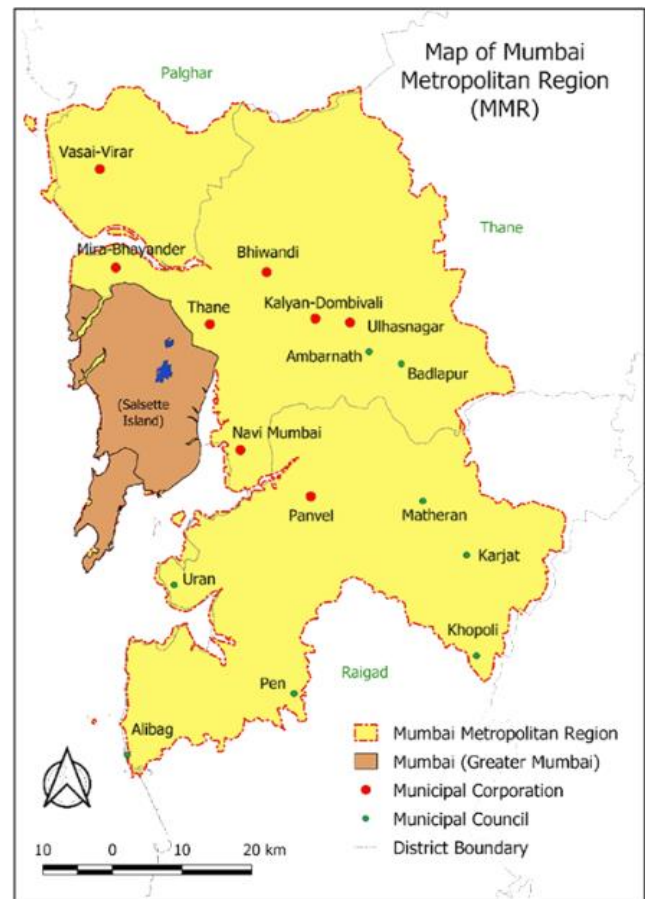


Figure 5: Map of Mumbai Metropolitan Region
Source: District Census Handbook

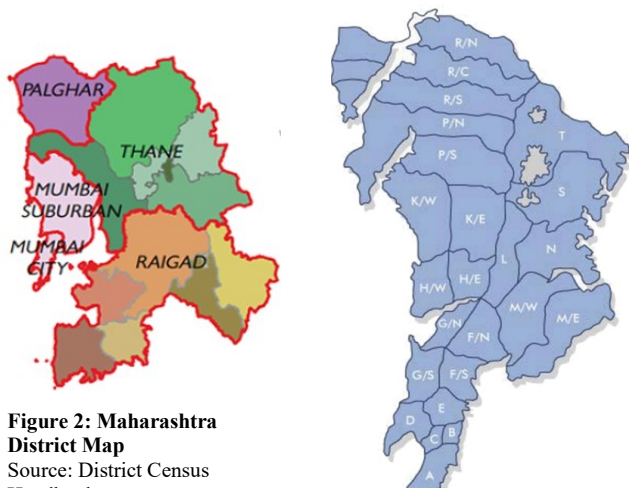


Figure 2: Maharashtra District Map
Source: District Census Handbook

Figure 3: BMC Ward Map
Source: BMC

The research compares three different sites within Dharavi: Navrang Compound, Koliwada and Khumbwara and selects one site based on the vulnerability of its inhabitants, with Navrang Compound emerging as the focus due to its high exposure to vulnerabilities.



Figure 6: Layout of Dharavi
 Source: Author

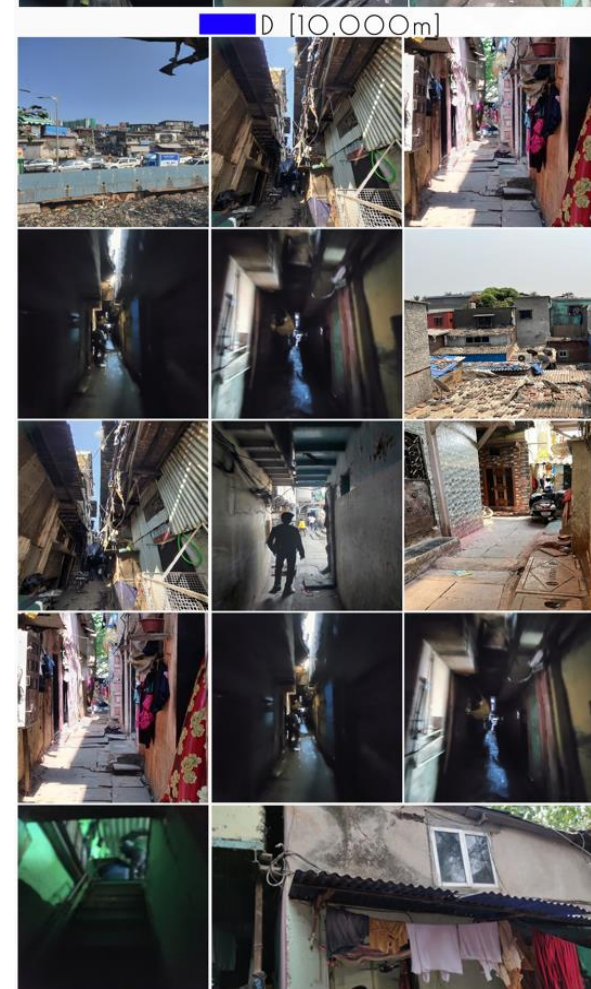


Figure 10: Current conditions of Dharavi
 Source: Author



Figure 7: Navrang Compound
 Source: Author

The Navrang Compound, covering 15 acres, is accessible via Mahim-Sion Link Road, a 60-foot road, and Dharavi Main Road. It has 900 dwelling units with poor infrastructure, including inadequate sanitation and hygiene. Primarily industrial, the area also has commercial and residential zones. Many residents live in slum conditions with limited housing, often staying at their workplaces.



Figure 8: Khumbwara
 Source: Author



Figure 9: Koliwada
 Source: Author

Cohort survey is then conducted in Navrang Compound to find out trends and changes in a group of individuals or families with similar characteristics over time. The spatial aspects are further approached based on the inferential attributes derived from the survey.

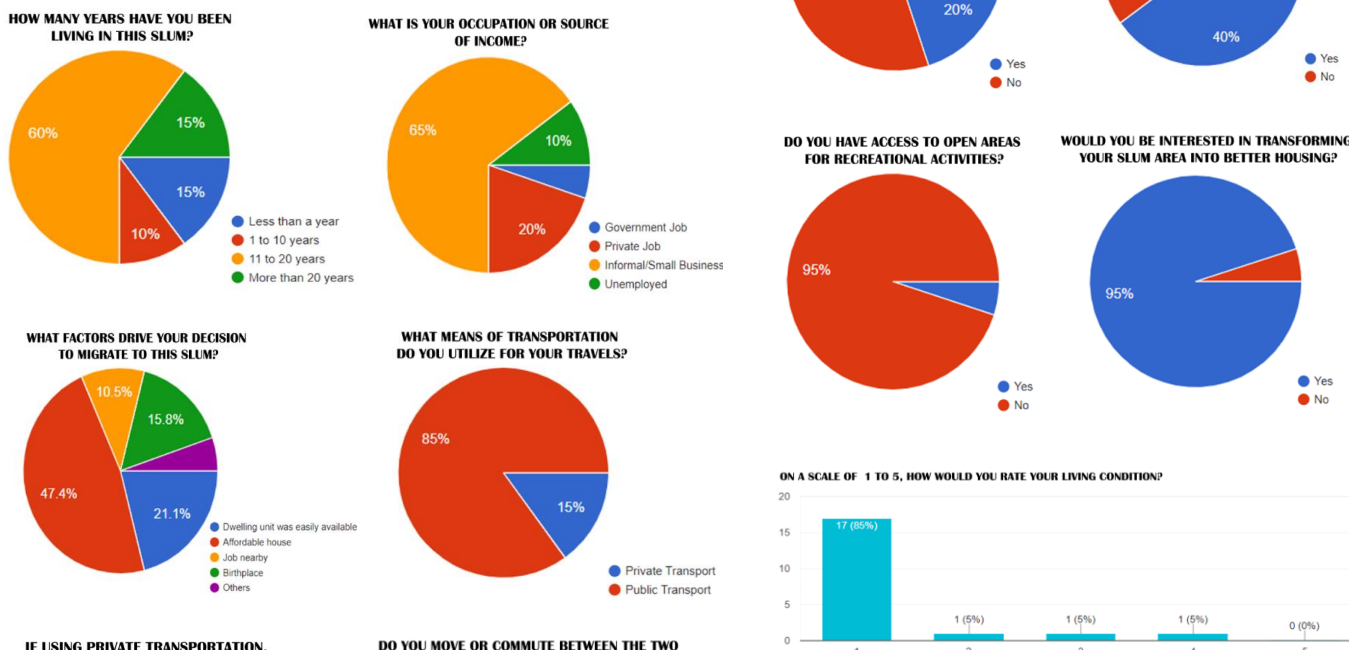


Figure 11: Cohort Survey
Source: Author

Considering the current development control regulations, the Floor Space Index (FSI) is divided between rehabilitation and remuneration and leveraging government strategies, more so PMAY Clause 1 for in-situ slum rehabilitation, the research proposal will redevelop a delineated site of Dharavi to promote and uplift the quality of habitable space.

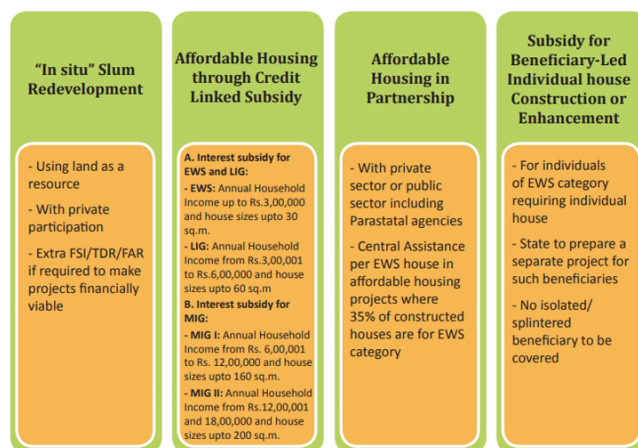
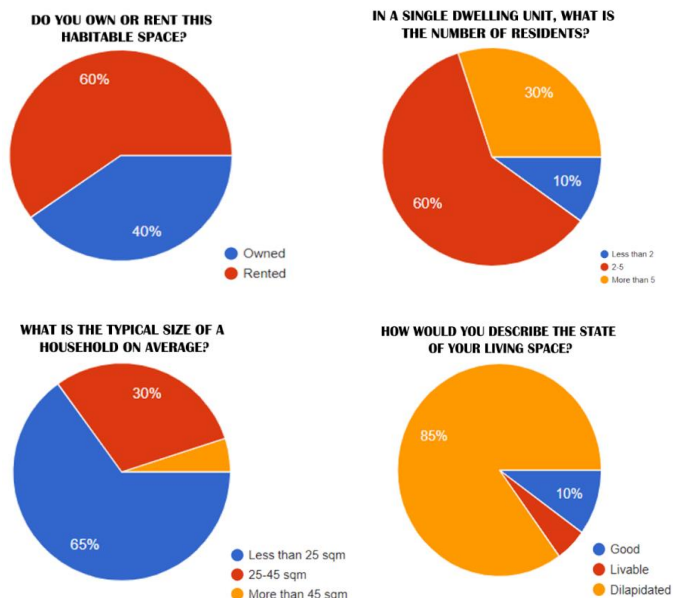


Figure 12: Clauses of PMAY
Source: Ministry of housing and urban affairs

TOTAL SITE AREA = 60302.96 sqm ; 15 acres ; 6 hectares
TOTAL NO. OF DWELLING UNITS = 900 units
PERMISSIBLE FAR = 4 ; 241211.84 sqm

AREA OF HABITABLE SPACES		
1. 30 sqm = 900 x 30 = 2700 sqm + 20% = 5400 sqm	2. 50 sqm = 900 x 50 = 45000 sqm + 20% = 9000 sqm	3. 75 sqm = 900 x 75 = 67000 sqm + 20% = 13500 sqm
TOTAL BUILT UP: 32400 sqm	TOTAL BUILT UP: 54000 sqm	TOTAL BUILT UP: 81000 sqm

APPROACHES FOR REHABILITATION & REMUNERATION COMPONENT	
CASE 1	CASE 2
Rehabilitation Component [RC1] = 40% Remuneration Component [RC2] = 60%	Rehabilitation Component [RC1] = 50% Remuneration Component [RC2] = 50%
RC1 & RC2 FOR AREA OF HABITABLE SPACES	
1. 30 sqm 32400 / 241211.84 = 13 %	
2. 50 sqm 54000 / 241211.84 = 22 %	
3. 75 sqm 81000 / 241211.84 = 33 %	
REMUNERATION FOR THEIR LIVELIHOOD	
1. 30 sqm = 27% (40% - 13%)	1. 30 sqm = 37% (50% - 13%)
2. 50 sqm = 18% (40% - 22%)	2. 50 sqm = 28% (50% - 22%)
3. 75 sqm = 7% (40% - 33%)	3. 75 sqm = 17% (50% - 33%)

Figure 13: Rehabilitation and Remuneration Component
Source: Author

A site layout is developed, incorporating these considerations into the architectural design. Finally, after the identification of built use and land use, and based on availability of unused open areas, the redevelopment strategy is chalked out in various phases.

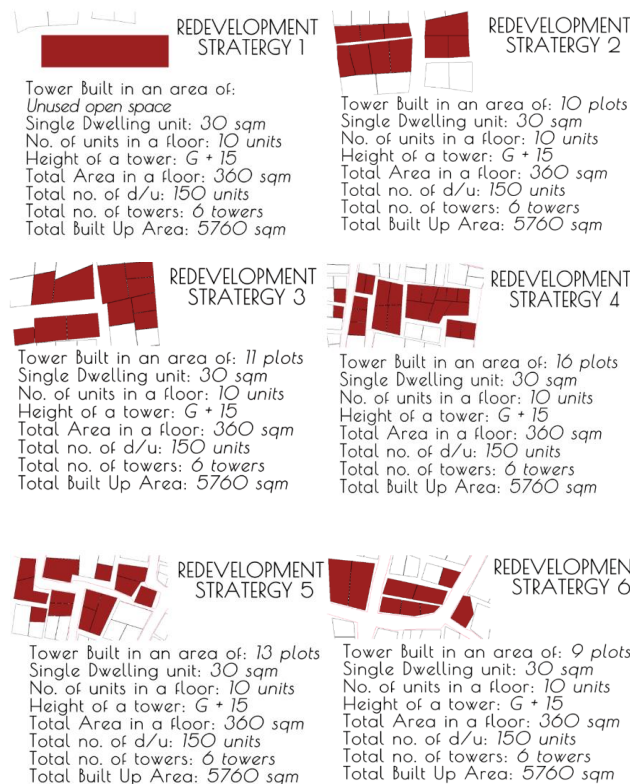


Figure 15: Redevelopment Strategies for Phasing 1
Source: Author

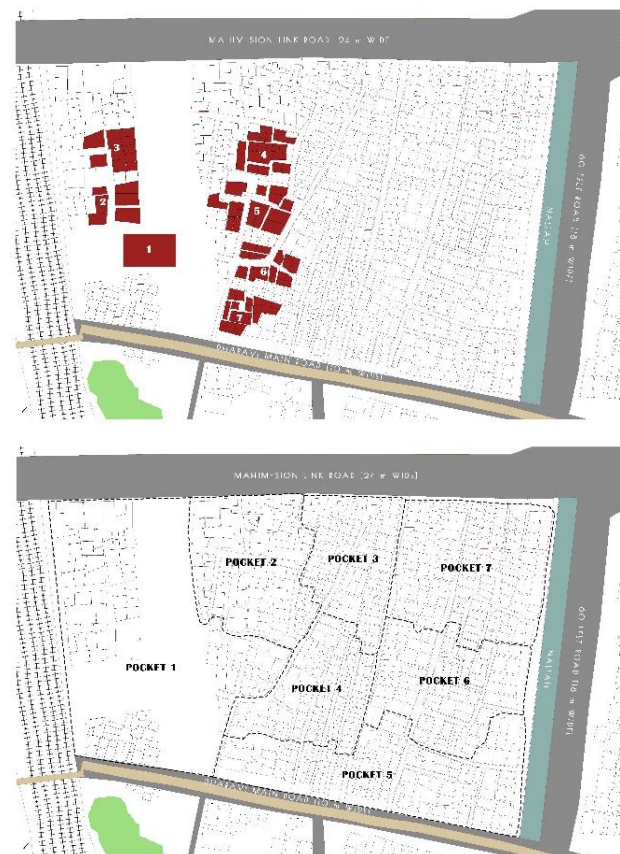


Figure 16: Phasing Option 2
Source: Author



Figure 14: Phasing Option 1 Source: Author

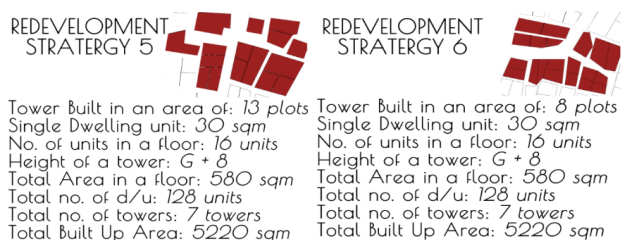
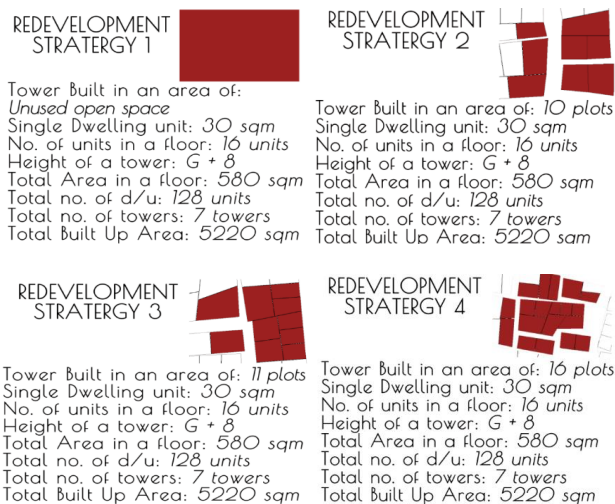


Figure 17: Redevelopment Strategies for Phasing 2
Source: Author

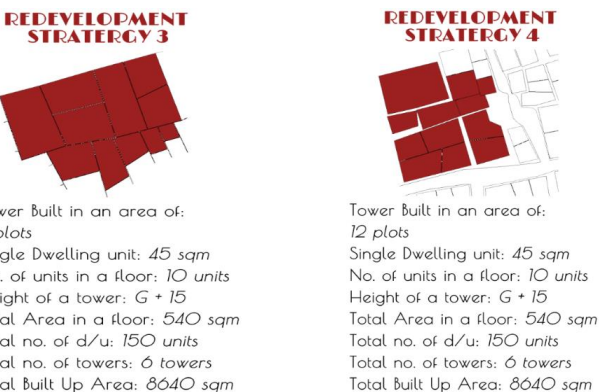


Figure 19: Redevelopment Strategies for Phasing 3
Source: Author



Figure 18: Phasing Option 3
Source: Author



Figure 20: Phasing Option 4
Source: Author

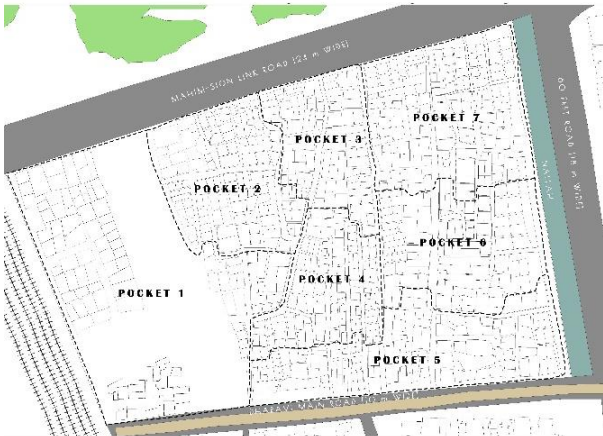


Figure 20: Phasing Option 4
 Source: Author

REDEVELOPMENT STRATEGY 7



Tower Built in an area of:
 10 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

Figure 21: Redevelopment Strategy for Phasing 4
 Source: Author

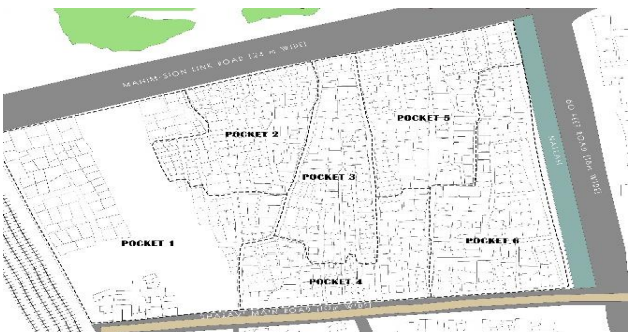


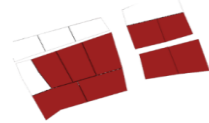
Figure 22: Phasing Option 5
 Source: Author

REDEVELOPMENT STRATEGY 1



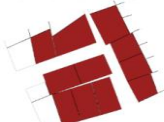
Tower Built in an area of:
 Unused open space
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

REDEVELOPMENT STRATEGY 2



Tower Built in an area of:
 8 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

REDEVELOPMENT STRATEGY 3



Tower Built in an area of:
 11 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

REDEVELOPMENT STRATEGY 4



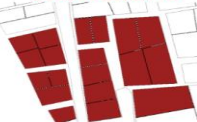
Tower Built in an area of:
 16 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

REDEVELOPMENT STRATEGY 5



Tower Built in an area of:
 15 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

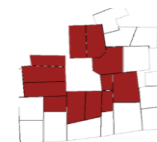
REDEVELOPMENT STRATEGY 6



Tower Built in an area of:
 19 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm



Tower Built in an area of:
 Unused open space
 Single Dwelling unit: 30 sqm
 No. of units in a floor: 10 units
 Height of a tower: G + 15
 Total Area in a floor: 360 sqm
 Total no. of d/u: 150 units
 Total no. of towers: 6 towers
 Total Built Up Area: 5760 sqm



Tower Built in an area of:
 12 plots
 Single Dwelling unit: 30 sqm
 No. of units in a floor: 10 units
 Height of a tower: G + 15
 Total Area in a floor: 360 sqm
 Total no. of d/u: 150 units
 Total no. of towers: 6 towers
 Total Built Up Area: 5760 sqm

Figure 23: Redevelopment Strategies for Phasing 5
 Source: Author

Figure 21: Redevelopment Strategies for Phasing 4
 Source: Author

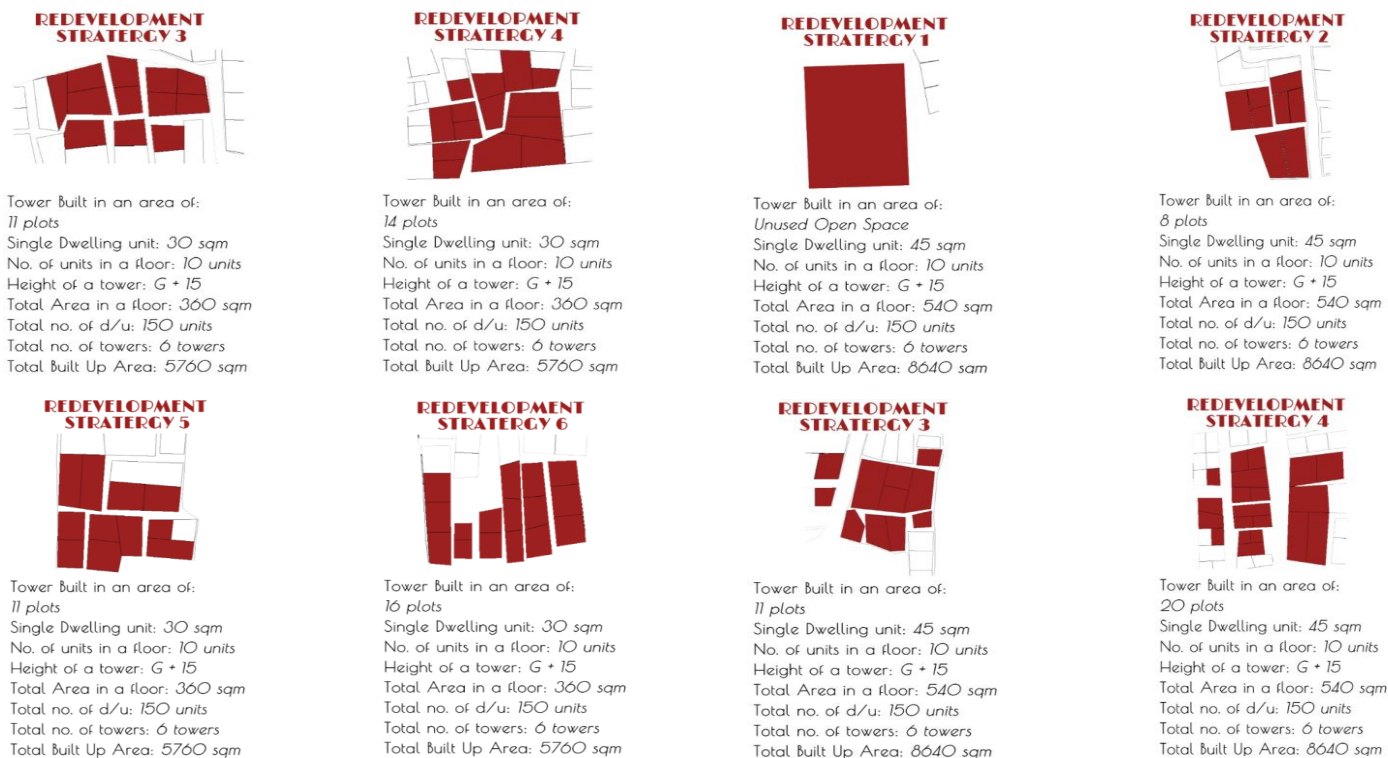


Figure 23: Redevelopment Strategies for Phasing 5
Source: Author



Figure 24: Phasing Option 6
Source: Author

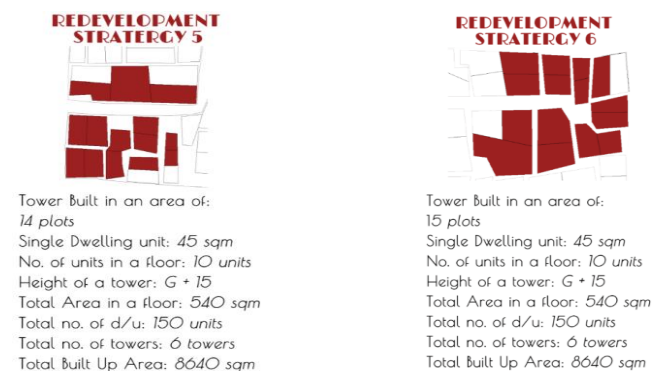


Figure 25: Redevelopment Strategies for Phasing 6
Source: Author



Figure 26: Phasing Option 7
Source: Author

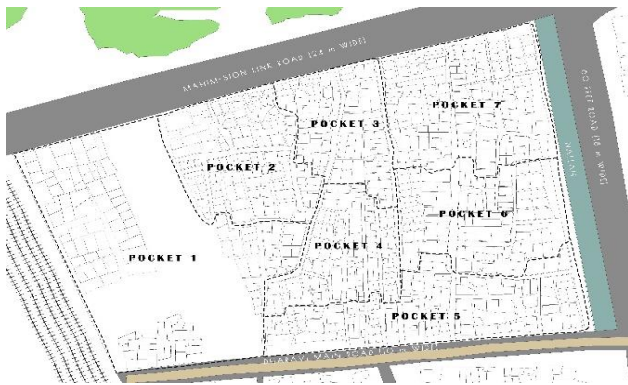
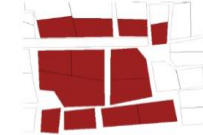


Figure 26: Phasing Option 7
 Source: Author

REDEVELOPMENT STRATEGY 7



Tower Built in an area of:
 13 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

Figure 27: Redevelopment Strategies for Phasing 7
 Source: Author

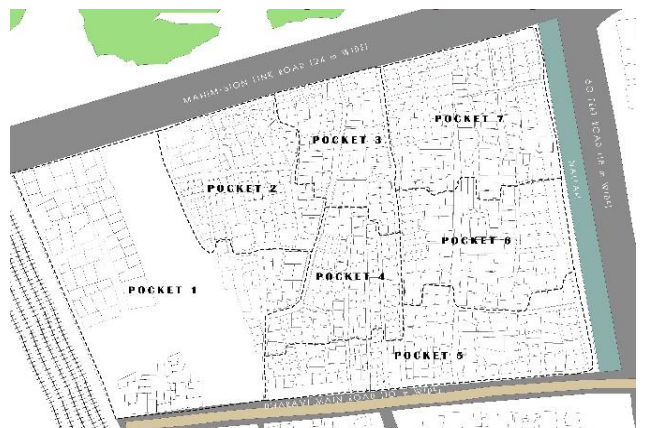


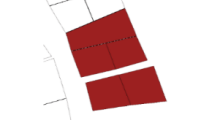
Figure 28: Phasing 8
 Source: Author

REDEVELOPMENT STRATEGY 1



Tower Built in an area of:
 Unused open space
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

REDEVELOPMENT STRATEGY 2



Tower Built in an area of:
 6 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

REDEVELOPMENT STRATEGY 3



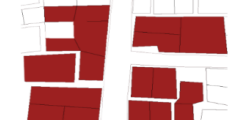
Tower Built in an area of:
 20 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

REDEVELOPMENT STRATEGY 4



Tower Built in an area of:
 27 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

REDEVELOPMENT STRATEGY 5



Tower Built in an area of:
 18 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

REDEVELOPMENT STRATEGY 6



Tower Built in an area of:
 13 plots
 Single Dwelling unit: 45 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 870 sqm
 Total no. of d/u: 128 units
 Total no. of towers: 7 towers
 Total Built Up Area: 7830 sqm

Figure 27: Redevelopment Strategies for Phasing 7
 Source: Author

REDEVELOPMENT STRATEGY 1



Tower Built in an area of:
 Unused open space
 Single Dwelling unit: 30 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 580 sqm
 Total no. of d/u: 128 units

REDEVELOPMENT STRATEGY 2



Tower Built in an area of:
 Unused open space
 Single Dwelling unit: 30 sqm
 No. of units in a floor: 16 units
 Height of a tower: G + 8
 Total Area in a floor: 580 sqm
 Total no. of d/u: 128 units

Figure 29: Redevelopment Strategies for Phasing 8
 Source: Author

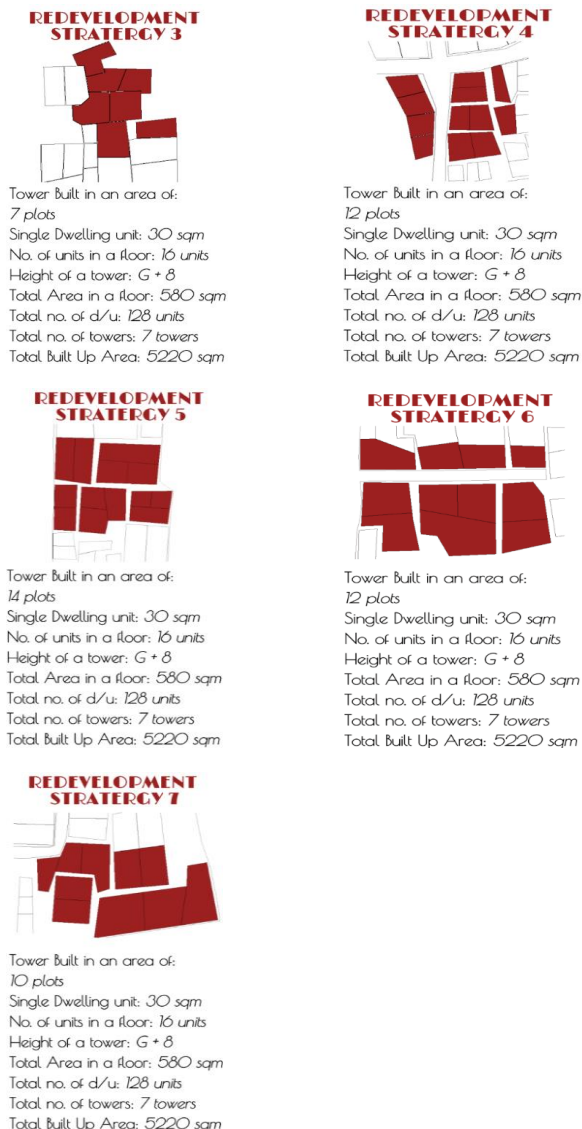


Figure 29: Redevelopment Strategies for Phasing 8
 Source: Author

The design proposal has been meticulously crafted to address various challenges encountered during the redevelopment process, particularly focusing on eliminating negative aspects and maximizing positive outcomes. One key issue tackled is the reluctance of slum dwellers to relocate, which has led to the adoption of an in-situ slum redevelopment approach. Additionally, concerns about housing during the redevelopment phase have been mitigated through a phased approach, with the initial construction prioritizing unused land based on single-digit land use criteria.

Moreover, the potential impact on residents' livelihoods has been thoroughly considered, with measures such as inventory mapping to assess total inventories and incorporating livelihood considerations into the rehabilitation component. In conjunction with these efforts, the proposal emphasizes enhancing community spaces, promoting organic spread-out, allocating part of the site to remuneration to ensure project feasibility and viability.

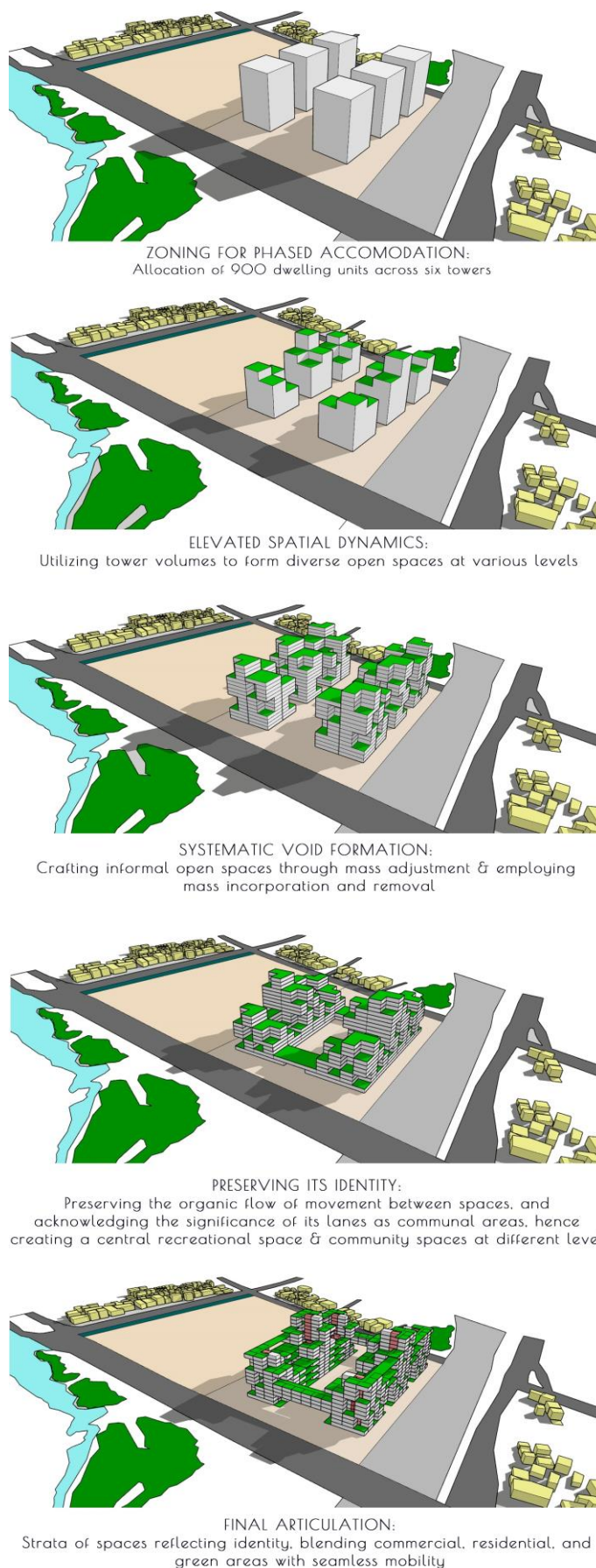


Figure 30: Design Evolution
 Source: Author

The fundamental design concept is to incorporate all positive aspects in Dharavi as shown in the figure.

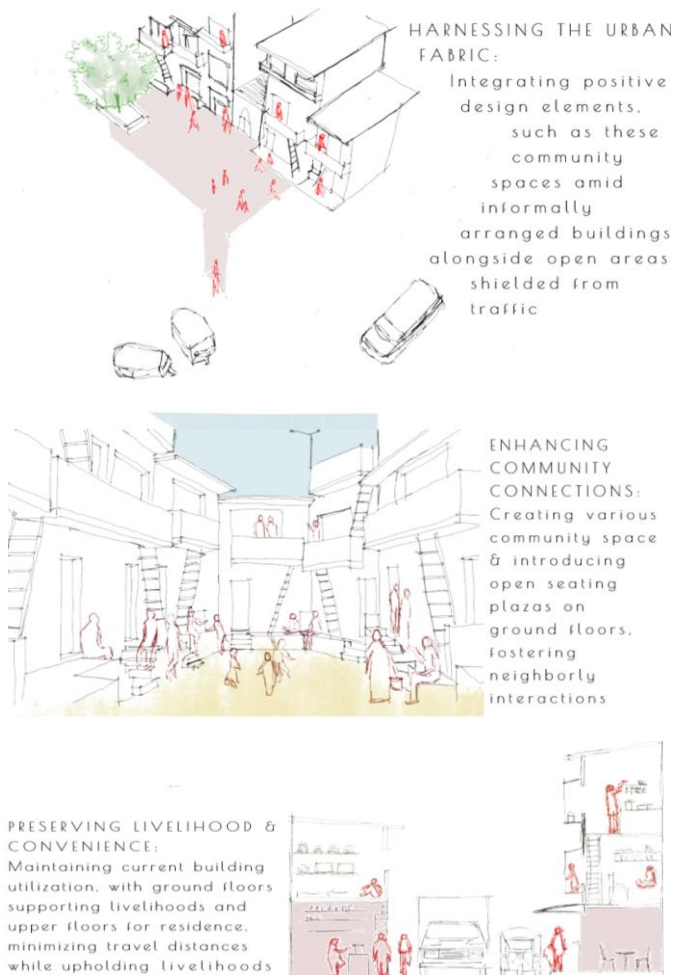


Figure 31: Positive Aspects of Dharavi
Source: Author

By integrating these strategies into the design proposal, it aims to create a vibrant and inclusive urban environment that meets the needs of the community while addressing existing challenges.

VII.CONCLUSION

In conclusion, the research deals with various multi-layered challenges of enhancing qualitative aspects in habitable spaces of Navrang, Dharavi, keeping in consideration complex socio-economic dynamics and spatial constraints of the area. Using the analysis of present living conditions and demographic profiles, the study identifies key areas for intervention to improve livability.

The redevelopment proposals ensure that they are inclusive, sustainable, and uplift the community, yet respect the colorful culture and economic activity. The design proposal is such that it ensures in-situ slum rehabilitation, keeping in mind the resistance to relocation and the disruption of livelihoods during redevelopment in phases based on single-digit land use

categories, the initial block to be constructed on the unused open land.

The inventory mapping and incorporation of residents' livelihoods into the rehabilitation component ensure holistic coverage of the community's diverse needs. Besides, the space allocated for community betterment, organic spread-out, and remuneration contributes to its viability of the project.

The case of Navrang Compound shows that redevelopment strategies need to be nuanced, keeping in view economic development and social equity. The proposed strategies integrate resilience and vibrancy of the community in its core to transform Navrang into a model of sustainable urban living, where quality of life is improved without hampering Dharavi's unique identity.

VIII. REFERENCES

- [1] Ahana Sarkar, R. B. (2020). Socio-physical liveability through socio-spatiality in low-income resettlement archetypes - A case of slum rehabilitation housing in Mumbai. *Cities*
- [2] Banao, C. (2008). *The Frontlines of Contested Urbanism Mega-projects and Mega-resistances in Dharavi*.
- [3] Bank, T. W. (2013). *Urbanization Beyond Municipal Boundaries: Nurturing Metropolitan Economies and Connecting Peri-Urban Areas in India*. Washington, DC.
- [4] Burdett, R. D. (2011). *Living in the endless city*. London.
- [5] Caroline, M. (2013). *Dharavi- from mega slum to urban paradigm*.
- [6] Davis, M. (2006). *Planets of Slum*. London.
- [7] Debnath, R. B.-b. (2019). *Discomfort and distress in slum rehabilitation: Investigating a rebound phenomenon using a backcasting approach*. Habitat International.
- [8] Deepak. (2017). *The Chaotic and Dynamic Slum*.
- [9] Gaventa, S. (2006). *New Public Spaces*. Chicago.
- [10] Govender, T. B. (2011). *Housing conditions, sanitation status and associated health risks in selected subsidized low-cost housing settlements*. Habitat International.
- [11] Habitat, U. (2003). *Challenges of the slum*.
- [12] Habitat, U. (2016). *Global report on human settlements*.
- [13] J, N. (2015). *Mumbai since Independence*.
- [14] Jain, R. D. (2020). *Revamping Dharavi*.
- [15] Jana, A. B. (2016). *Framework to assess and locate affordable and accessible housing for developing nations*.
- [16] Joseph, C. (2013). *Dharavi: The city within*.
- [17] Mukhija, V. (2003). *Squatters as Developers? Slum Redevelopment in Mumbai*.
- [18] Nijman, J. (2008). *Against the odds: Slum rehabilitation in neoliberal Mumbai*.
- [19] Patel. (2010). *Slums In India*.
- [20] Patel, S. A. (2007). *An offer of partnership or a promise of conflict in Dharavi, Mumbai*.
- [21] Patel, S. B. (2005). *Housing policies for Mumbai*.
- [22] Rao, P. (2015). *Smart Housing for Smart Cities*.
- [23] S, G. (2012). *Economics of affordable housing in Indian cities the case of Mumbai*.
- [24] Skalicky, V. (2019). *Comprehensive assessment methodology for liveable residential environment*.
- [25] Vaid, U. (2021). *Assessing housing quality impacts of slum redevelopment in India*.
- [26] Wilmsen, B. A. (2019). *Challenging the risks-based model of involuntary resettlement using evidence from the Bui Dam, Ghana*.
- [27] Zang, Y. (2018). *The credibility of slums: Informal housing and urban governance in India*.