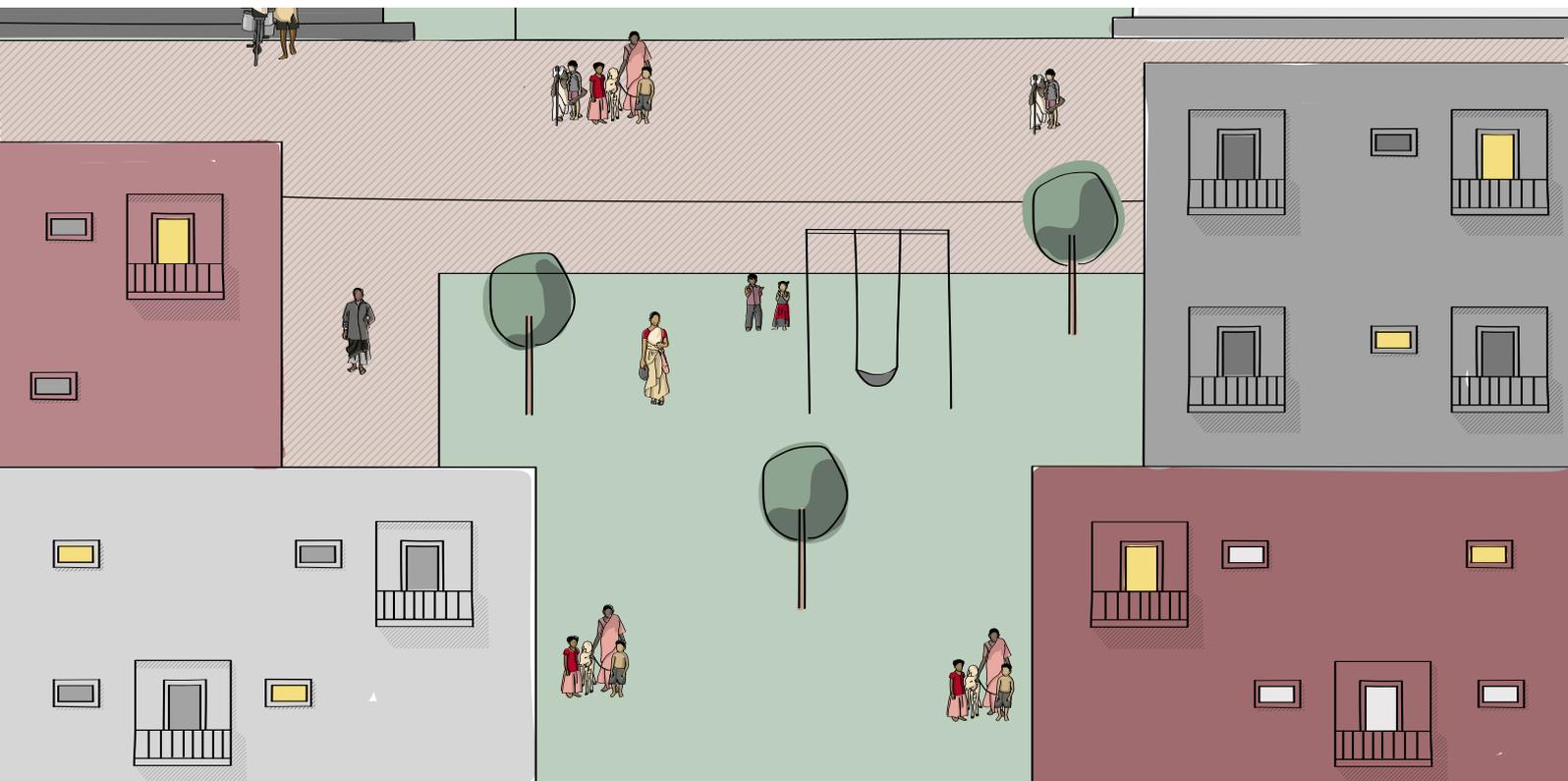


Dignifying Margins  
A case for affordable housing at Bhalswa



## Abstract

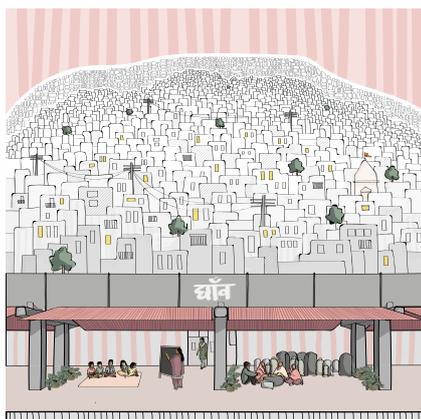
The idea of dignifying the margins comes from an attempt to alleviate the deplorable living conditions that persist at Bhalswa. Understanding that public housing is more than just provision of housing stock, the team uses grounded research to contextualize seminal texts and create a means to creating liveable densities that are locale and humane. The resultant model strays away from the city's practice of the cookie-cutter model of housing, in turn it is a soft urban insert for Bhalswa, one that integrates the urban fabric, and adds to the context.

## Bhalswa and Pocket F

Before Bhalswa was known as its landfill, it was known for its historic horseshoe lake. The magnificent waterbody in the North Yamuna Flood Plain was once home to an ecosystem of rich flora and fauna. While today the lake is polluted, it still serves as a sponge to the surrounding urbanscape. The site for the competition – Pocket F, is an essential part of this urban ecology, acting as a soft scape in regulating Bhalswa's hydrology and climate. With considerations of a high density housing project, it is essential to retain sensitivity to this existing ecology.

## A case for affordable housing

As a land parcel considerably away from the sanitary landfill, Pocket F promises a dignity in otherwise hazardous living situations at Bhalswa. The Delhi Urban Shelter Improvement Board's understanding for the site reflects in the Public Works Department tender (NIT No. : 10/CE(OP)/EE,EPD-III/PWD/2020-21.) The tender, seeking architectural consultancy services for **Construction of Multi-storeyed EWS Houses for Slum Dwellers at Bhalswa**, reflects two ideologies to public housing; first, the nature of public housing being multi-storeyed; and, second, their end-user being termed under the broad umbrella of nearby slum dwellers. These ideologies counteract two imperatives raised by C40 for the competition:



The study identifies two models to housing; the organic informal and mechanical formal. The proposed is a synthesised idea focusing on creating ecosystems for the people.

- **The Imperative of Emissions Reduction**

The multi-storeyed development model is reflective of the Delhi Masterplan 2021 incentivising developers to consider public housing with increased FAR, and relaxed height and ground coverage restrictions. This yields a high-rise high-density model with greater construction costs, material requirements, and hence, embodied emissions. The model also contributes to an additional urban heat island effect, and in turn has high operational emissions. The necessary inclusion of elevators, advanced fire safety provisions, and energy-intensive services add to these operational costs and emissions, making it not only climatically detrimental, but also unaffordable for the urban poor to live in.

- **The Imperative to Ensure the Quality of Life for Local Communities**

In catering to ideas of rehabilitation of the urban poor, policy measures focus on a generalist treatment where community ideologies are not taken into consideration. It must be understood that the word slum is an umbrella term that admonishes the individuality of these vibrant settlements. In an effort to approach numbers - to achieve adequate housing stock, the Delhi Masterplan caps public housing for the urban poor at 900 dwelling units a hectare, more than four-fold the density it seeks towards general housing development.

The proposal questions these approaches to public housing as they lead to unliveable, unaffordable housing development. The proposed approach is one that considers urban development as inclusive and humane.

The proposal values informal settlements for their ingenious space utilisation solutions and construction technologies. It does understand that unregulated construction in an organic scheme makes for several hazards that formal housing can cater to.



Public housing under the Delhi Masterplan 2021 is understood as dehumanising with an unliveable density of 900Du/ha



Communities at Bhalswa face deplorable living conditions owing to the hazards posed by the landfill and the choked ecosystem surrounding it.





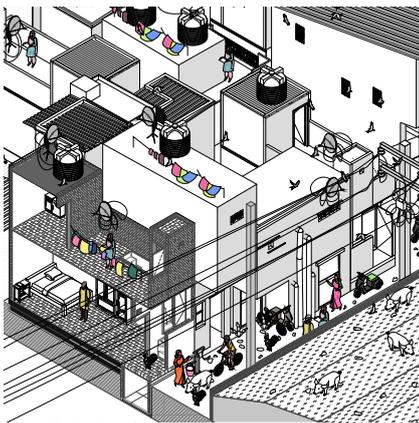
Following a liveability study, the rehabilitation of Kalandar Colony, a hyper-dense settlement adjacent to the landfill is proposed.

## Dignifying the margins

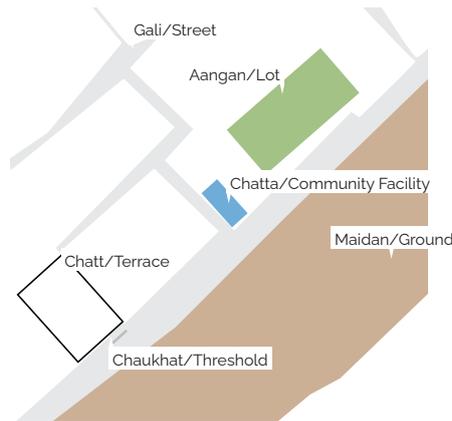
The first call to action towards a dignified housing is to map out stakeholders and identify who could best benefit from the development. Four informal settlements identified within Bhalswa are assessed for liveability based on their ground densities, open spaces, and available services. A consideration factor is also employed for their proximity to the landfill. As a takeaway, it is understood that Kalandar Colony, a settlement of 1700 households' right by the landfill is in immediate need of rehabilitation owing to its hazardous living conditions.

A further grounded study conducted for Kalandar Colony reveals spatial logics evident within the dense settlement. Through this study, an understanding for the dwelling unit, and open spaces is evolved. An open space syntax is developed, and formalized for the housing design scheme. This syntax suggests a hierarchy to the identified open spaces.

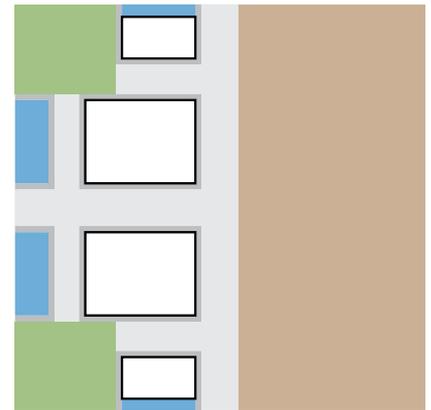
These ideas are appropriated with the development of a context sensitive masterplan for a soft urban insert.



The groundwater at Kalandar colony shows fecal contamination with a TDS of 5846. The permissible value being 2000.



Open spaces at Kalandar Colony are documented for their interconnecting and spatial hierarchies



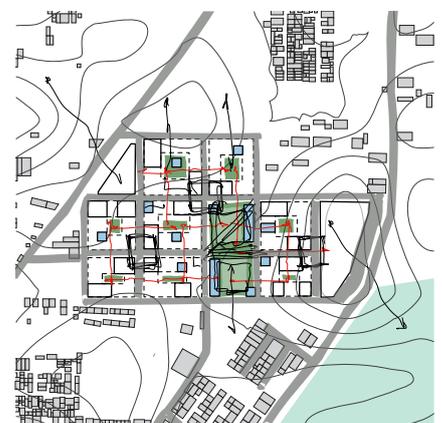
The open space network is then formalised to yield a holistic interpretation of public housing.



The greenfield site is interpreted as an urban insert with the potential of integrating the urbanscape



The design scheme proposes affordable housing and a cross-subsidising mixed use building at the lake edge



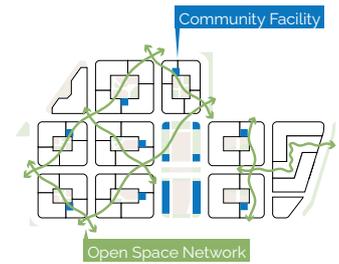
The ground level is thought of as an integrated open space network with community spaces laid out for walkability



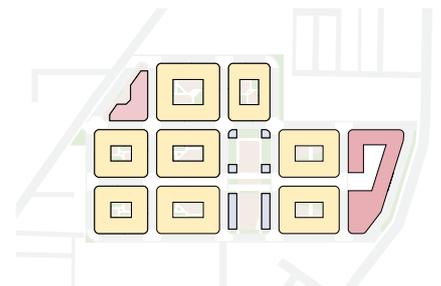
## The Fifteen Minute City

In creation of the fifteen minute city, four design principles are presented:

Close to home and thriving streets	% of population that are located within ¼ mile from the nearest fresh food store, healthcare facility, school, and green space etc.	100%
	Distribution and proportion of different land uses by sqm	
People-centred mobility & thriving Streets	% of public space dedicated to pedestrian and cycling access only	100%
Connected place	% of housing within ¼ mile of public transit	100%
A place for everyone	% of residents in affordable accommodation	90%



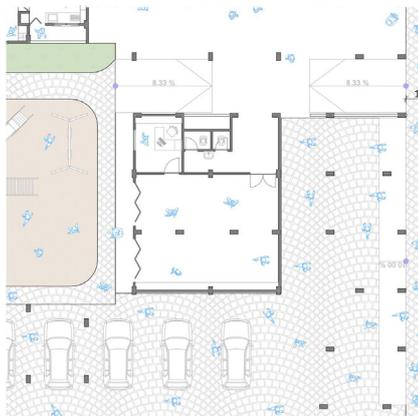
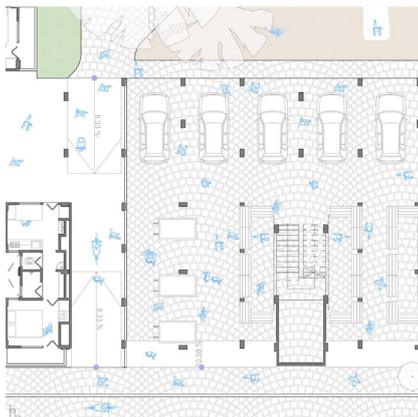
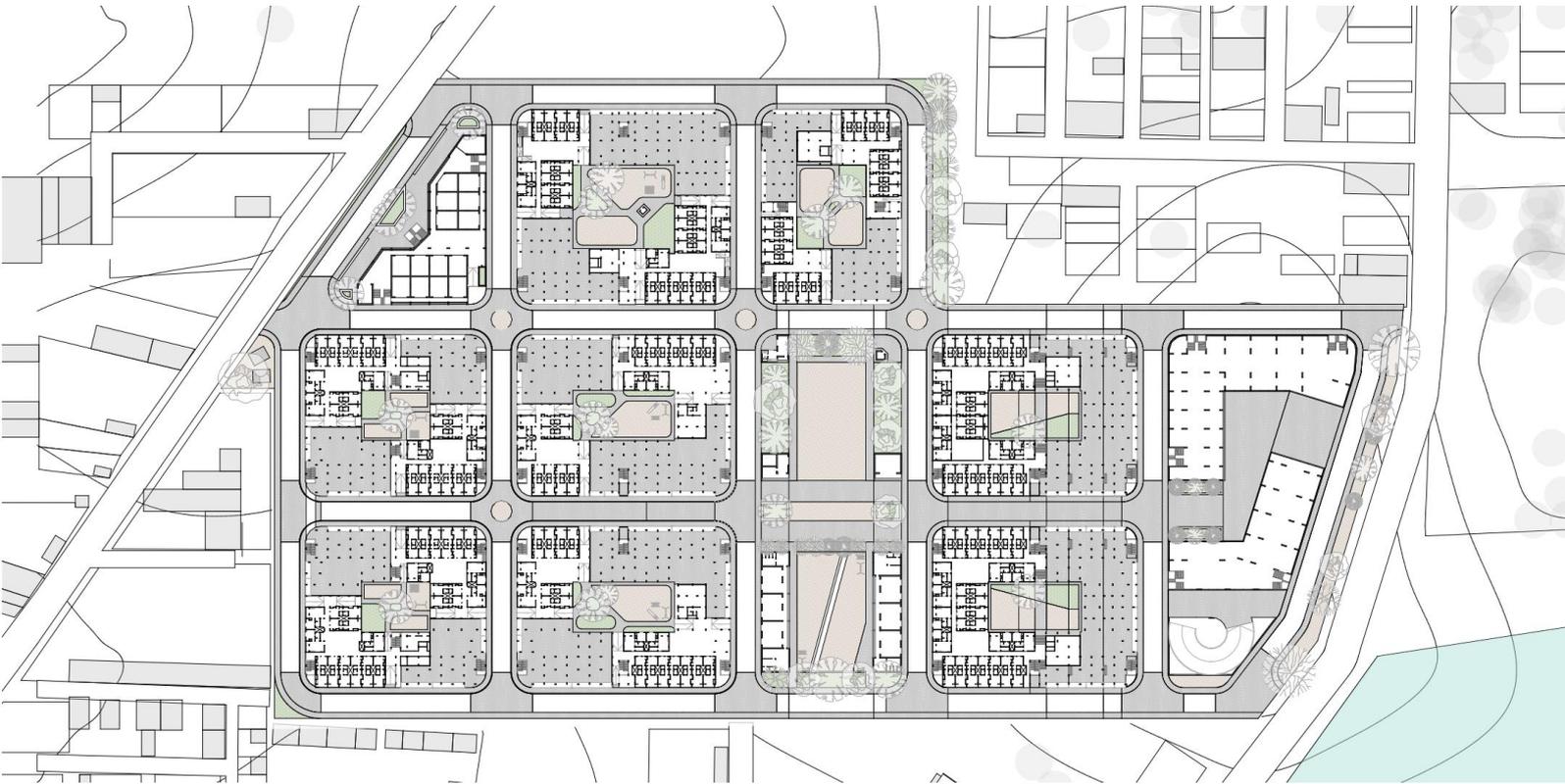
An independent open space network is designed around community spaces to achieve the fifteen minute city



## A place for everyone

The masterplan

An acute understanding of the urbanscape gives an idea of linkages and connections that can be established on site as a measure to integrate the urban fabric. In the scheme for the masterplan are ideas of the thoroughfare and the bazaar gali as parallel streets. The street in itself is differentiated as pedestrian and vehicular empowered streets through differences in texture and material; asphalt for vehicles, and a tactile, permeable cobblestone for pedestrians.



A network of eight affordable housing blocks are visualized not as cookie cutter replications, but as distinct perimeter blocks that are unique in their own regard. These blocks are integrated into the fabric through their connected central open courts, and their greater connection to the maidan, the largest open space. Along these interconnections are placed community facilities such as clinics, fair-price shops, aanganwadis, and public toilets. These then serve as value additions to the crafted fabric, and lie within walkable distance for the community.

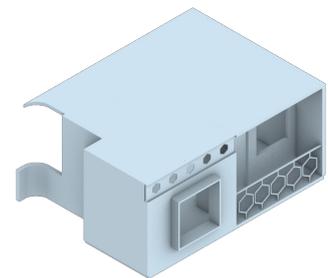
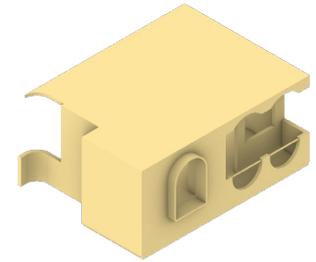
What is also emphasised upon is the value that the ground floor has the potential of creating in this knit fabric. The designed interpretation is a flexibility between a built ground floor and a stilted development. While the built ground floor enhances considerations of universal accessibility, and potential for dwelling units to double up as pop-shops, the stilted development serves as space not only intended for vehicular parking, but as storage, interconnections, and as extensions to the streets.

Central to the affordable housing scheme is a maidan – the largest open space. Attempting for its constant activation, the maidan's edges are lined with community facilities such as a primary school, police, milk, and vegetable booths, and a religious structure. The primary school is thought of as a multifunctional space serving as a school in the morning and a community centre right after. The edges are also lined with fruiting trees such as mulberries, mango, and jamun, as means to provide some fruit and shade and create an inclusive space. What bifurcates the maidan is an extension of the bazaar street as a paved plaza for a spill over marketplace. Its nature is then interpreted as a multifunctional soft scape – for casual sports, events, and general recreation.

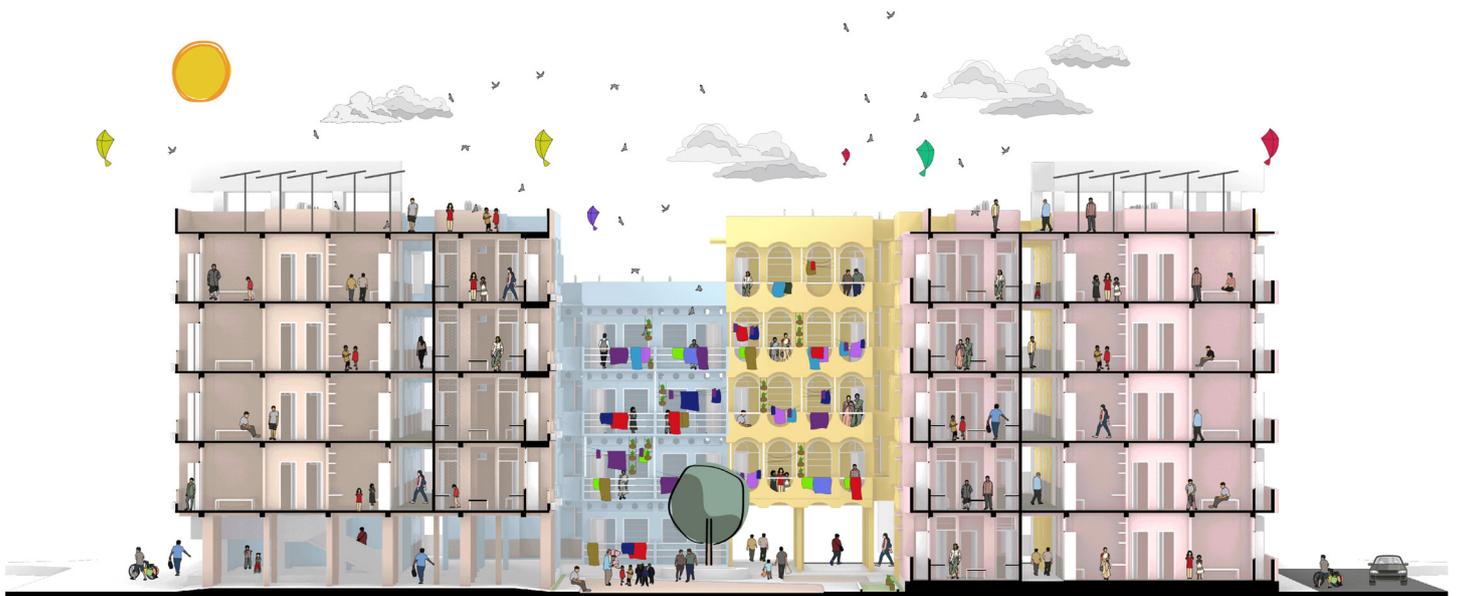
As a measure for not achieving the third masterplan's recommended density, the idea of cross subsidisation in the form of a mixed-use building by the lakeside is proposed. It is recommended that this insert be designed flexibly so as to appropriate a variety of programs such as retail, offices, and a high-quality mixed-income dwelling stacked atop as lake view apartments. A municipal market is also proposed on the western edge of the site to connect it to the informal settlements of Shradhanand Colony and Rajiv Nagar. The market can feature retail outlets, some offices, and a plaza to its edge to activate as a hawking zone. Parking facilities for the municipal market are offloaded to the stilts at the surrounding blocks

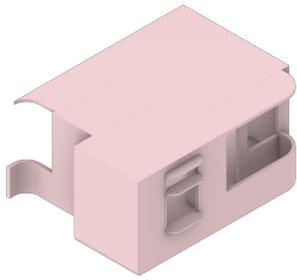
**The Perimeter Block**

Every housing block in itself is broken up as four individual buildings. These individual buildings are then developed in unique material technologies and aesthetic qualities by individual agencies as a decentralised measure. The result is a unique mixture of an architectural variety of low to mid-rise buildings. The genesis of every building is in how its dwelling units interact with each other. For the designed interpretation, the key is a *chaukhat* designed at the intersection of two long houses and one broad house. With a ventilation shaft opening into a doubly loaded corridor as a light well, the *chaukhat* is a wider section of the corridor facilitating activity spill over from the dwellings. These *chaukhats* are then interlaced through a *gali*, here the doubly loaded corridor. The *gali*, as a transitional space then opens up into a *chatta*, a larger square to facilitate community activities of a larger locality. Every *chatta* is a threshold to the locality, a means in and out of it. This is realized by connecting the *chatta* to a staircase. A *chatta* in turn opens to either a *chowk*, or an *aangan* enclosed within every block. An open space that functions with both greens for vegetation and browns for tot lots, play fields, and spaces for recreation. Atop every block is its terrace, which split on multiple levels is visualized as an elevated ground for community activity.



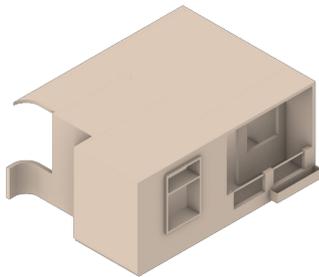
The housing masterplan brings in the thoughtful interpretation of the street for the people. Here, two characteristic streets are designed. The thoroughfare for the passer-by and the bazaar street to host weekly markets and events.





## Clean and Green

Clean construction	% of recycled materials used for construction	>25%
	% (or quantity) of low-carbon construction materials used (e.g. wood)	>25%
Green energy and buildings	% of buildings incorporating GRIHA and ECBC-R Standards	100%
Circular resources		>25%

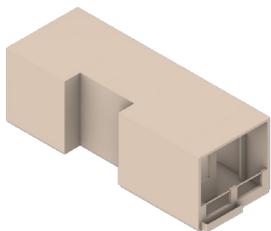
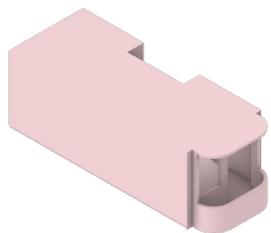
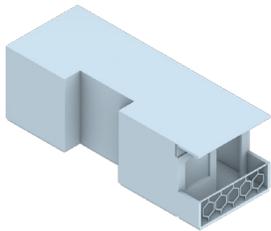
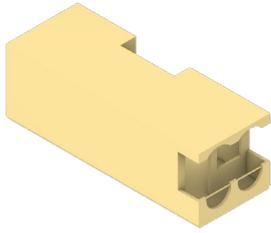


The high-rise high-density model often results in an architectural monotony owing to its reliance on a single reputed architect and developer. While quality is made better through the means of public open tenders, the effort in itself is not enough. The proposal presents the idea of reimagining the housing block as several smaller buildings realized by several small contractors. This is a means not only to a better architectural variety, but also to achieve several definitions to low-cost architecture.

As an initiative towards its Housing for All mission, the government of India launched the Global Housing Technology Challenge leading to model housing or Light House Projects attempting to basket innovative technologies that are sustainable, green, and disaster resilient. One aspiration for the proposal is to be integrated with this central scheme. The idea also extends to inculcating not only cutting edge technologies,



but also the use of traditional knowledge systems implying affordability. Charting material practices on a Cartesian graph of technology and fidelity, the proposal identifies four such alternatives. These are:

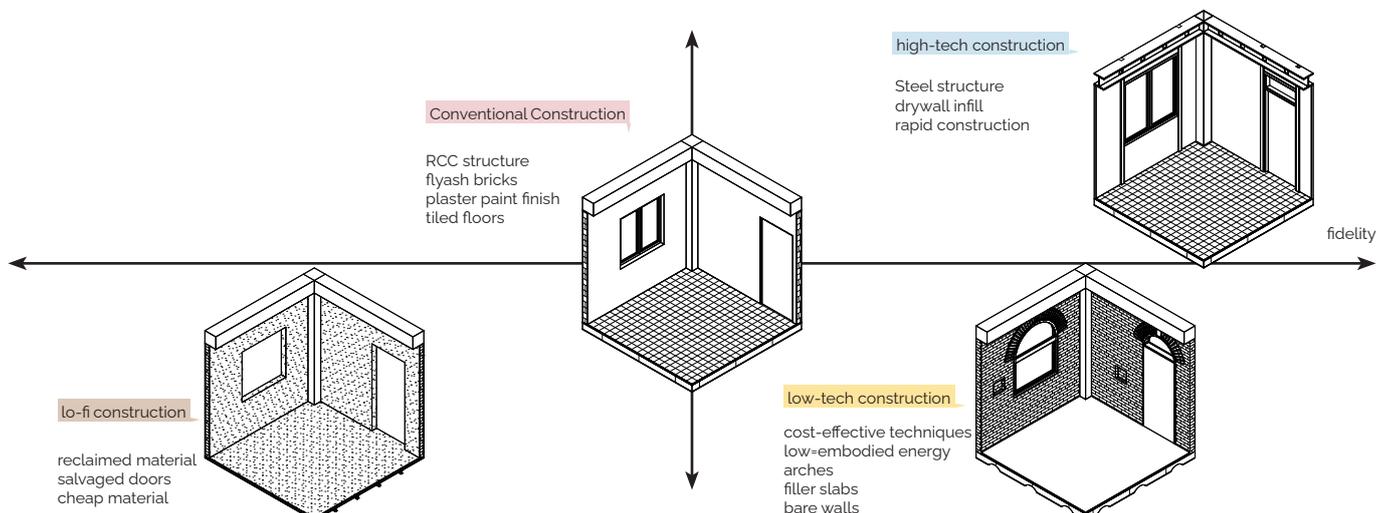


- The low-tech low-fidelity model with increased labour cost and little material cost involving salvaging construction material and fenestration from Kalandar Colony itself as measure to promote circular resources and reduction of construction and demolition waste;
- The low-tech high-fidelity model featuring non-conventional construction technologies such as arches, filler slabs, and flat shell roofs, at the cost of a labour intensive exercise;
- The high-tech high-fidelity model featuring rapid construction technologies such as steel and precast;
- Finally, the conventional market model with market prevalent practices as a means for affordability in the ease of material procurement and construction.

To further the effort, the four models are adapted to adhere to market considerations for affordable housing at ₹1500-1800/sq. ft.

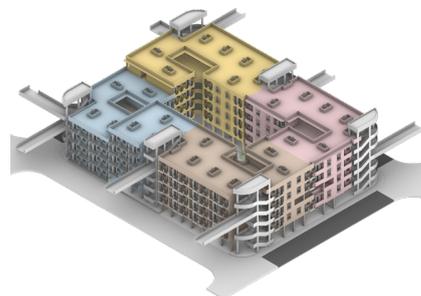
A theoretical understanding of having these different models to low-cost for a single masterplan is also the idea of synergies it is bound to produce in practice. The idea is for several small to medium scale developers and architects to take up building responsibilities for the various buildings in technologies and ideas they are comfortable with. The thesis aspires that the architectural variety that is aimed at will also inspire a cross-pollination of technologies. Of course, it is understood that conventional market practices are taken forward by many with the idea that these are no-headache hassle-free practices. In such a scenario, non-conventional building techniques as proposed may be incentivised in policy as environmentally friendlier means to cleaner construction.

It is also of essence that the overall design scheme and material technologies work to cut down on operational costs for the community. The East-West aligned roads facilitate the movement of natural breeze across the site. The design of the blocks inculcates the traditional courtyard scheme to facilitate cross and stack ventilation. Every dwelling in the design is also individually or mutually shaded from harsh summer sun in the city. For its cost winters, sunlit open spaces act as refuge. These design ideas fall directly under the state's ECBC-R and GRIHA guidelines towards reducing operational costs and promoting a green infrastructure.



# Sustainable Futures

Green space, climate resilient and nature-based solutions	% of residents that can access a high-quality open green space within 15 minutes (by walking or cycling)	100%
	Number of trees planted during the project	50
	% of the district surface (sqm) that is permeable surface	40%
Sustainable lifestyles	Distribution and proportion of different land uses by sqm	
	Residential	18564
	Community Facilities	820
	Commercial	1066
	Mixed Use	3210
Green economy	New green jobs created, split by demographic and type	



While state-led public housing often ends at the provision of dwelling units, the proposal finds housing to be much more than just a numbers game. Emphasizing on the need for designing densities with considerations of livability it also brings attention towards sustainable futures for the rehabilitated community.

The housing master-plan imbibes the idea of every resident having access to high-quality open greens by considering a hierarchy of open spaces ranging from the house's threshold to the larger block, and maidan. Considering operations and maintenance costs, and also the nature of open spaces as used by the Indian demographic, the design proposes these open spaces not only be designed as green spaces but as brown grounds, and paved paths catering to distinct activities. While open greens are a great forum for people to relish and spend leisurely time, it is the browns that activate for play or to host a bazaar. These open spaces also double up as sponges to soak in rainwater and contribute to the ground water recharge.

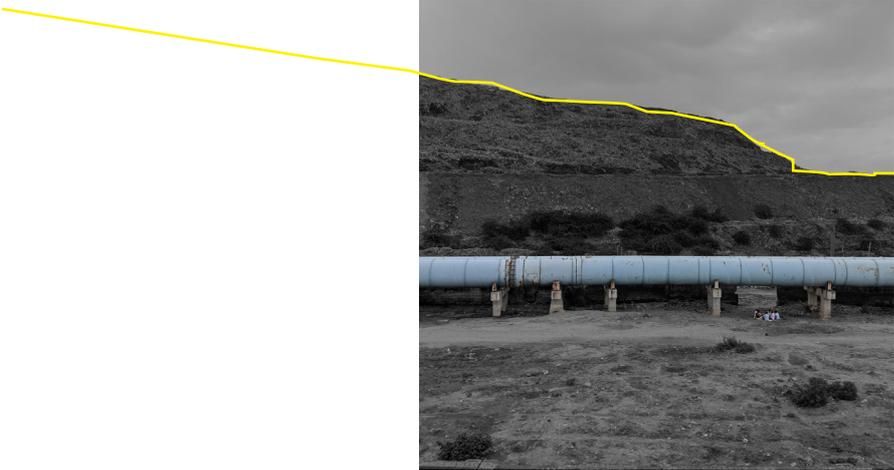
Trees and vegetation are inherent to livability. With proper consideration, the landscape can be so designed that it benefits not only the people inhabiting the housing project but also the surrounding ecosystem. Within every block are placed medicinal and fruiting trees such as Neem, Amla, Curry leaf tree, Lime, and Banana. These when closely accessible to an immediate community allow for them to use it to their benefit. In the public forum of the design scheme is the maidan which is lined with fruiting trees such as Mulberry, Jamun, and Mango in its perimeter. This is to create avenues for the community to sit in and enjoy seasonal fruit. Along the site's perimeter is a green belt lined with local trees such as Babool, Kikar, and Alstonia. These are to form a green buffer around the site while also helping to cut down on any urban heat island effect the scheme contributes to.



The master-plan allocates a mixed land-use through the laid out design scheme. While a major chunk is dedicated to the affordable housing project at 37.5%, a municipal market is proposed to the western edge at 2.16%, and mixed use cross-subsidizing development on the lake-front at 6.5%. The remainder 52.14% is dedicated to usable open space. Further, with the introduction of stilts in selective areas across the affordable housing scheme, a significant 55% built component is alleviated opening up the space for community interaction. This is space designed with community infrastructure and facilities.

With the idea of a decentralized development process with the involvement of several smaller contractors, developers, and architects for the eventual execution of the project comes in the idea of considering construction as not only a means to an end-product but also a process to endow skills and provide employment to the urban poor at Bhalswa. Through synergised techniques adopted with the proposed idea of several adopted construction technologies as discussed in the previous section is the intent of training the people as specialists for a better contribution to the city. While architectural design alone can only attempt to make people's lives better, an ecosystem generated around it can aspire to do much more, including helping people get back on their feet.

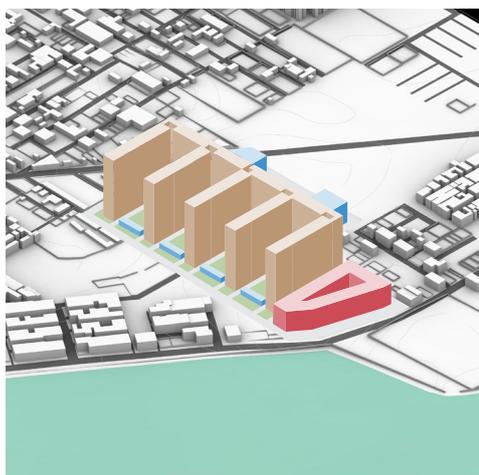




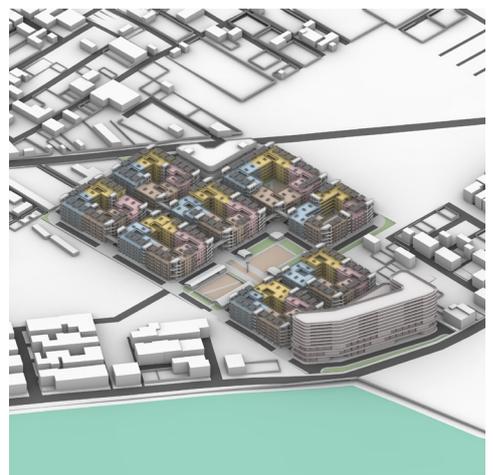
Dignifying Margins  
Appendix

# Preface

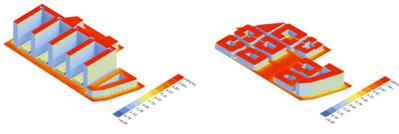
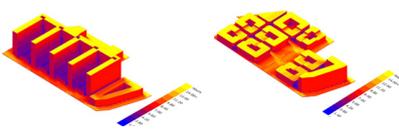
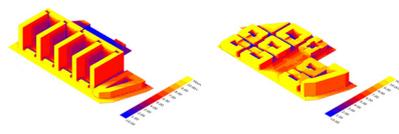
Through the Delhi Master-plan 2021, the state has adopted the high-rise high-density model for housing development. With increased FAR, and relaxed height and ground coverage restrictions, the state's idea is to incentivise developers towards engaging in the realm of public housing. The adopted model though presents several contentious in terms of livability and human-centric considerations. While the report provides instances on how this can be achieved by a mid-rise high-density model with design considerations, the appendix compares the two models in terms of emissions; operational, embodied, and consumption. For this, it relies on simulation through Ladybug tools, and on external references, namely Ashok B. Lall's Position Paper on Low Carbon Resource- Efficient Affordable Housing, 2017.



< High Rise High Density model



Proposed Liveable model>

	Current Model	Proposed Model	Takeaways
Density (Dwelling Units/ Hectare)	900	400	<b>Reduced density for liveability considerations and occupancy load on site</b>
Dwelling Units	4500	2000	
FAR	400	200	
<b>Neighborhood Level</b>			
Building Footprint	15820	23660	<b>14% Reduction in Solar Irridiation</b>
Open Spaces	33615	25775	
<b>Solar Irridiation</b>	283788	246862	
			
<b>Sunlit Hours</b>			
Summer Solstice	733636	568703	<b>22.5% reduction of harsh sun through mutual shading</b>
			
Winter Solstice	418981	372415	
			
<b>Solar Energy Potential @50% Roof Area (AC : kWh/day)</b>	2788	7248.8	<b>2.6 times more rooftop solar potential</b>

## Inferences

At the neighbourhood level the proposed model demonstrates a 22.5% reduction in harsh sun. This is facilitated through the perimeter block pattern instead of the isolated megalith in the high-rise high-density housing model. The proposed model takes advantage of mutual shading to create a better liveable habitat that is climate resilient.

	Current Model	Proposed Model	Takeaways
<b>Building Level</b>			
<b>Embodied Energy (MJ/M2)</b>	3590	2519	<b>30% reductions in embodied energy through construction</b>
Steel in RCC	70%	54%	
AAC Blocks	8%	11%	
Bricks	0.30%	1%	
Cement	18%	28%	
Others (Fine & Coarse Aggregate, plaster etc.)	2%	3%	
CO2 Emissions (CO2/M2)	310	233	<b>25% reductions in CO2 emissions</b>
<b>Operational Energy</b>			
<b>Energy Consumed for thermal comfort at flat level(uncomfortable hours /year)</b>			
Energy Consumed in common building-level services (Kwh/DU/year)	278	59	<b>80% reduction in energy consumed by building services such as elevators and water pumps</b>
Maintenance Cost (₹/year)	10000	1000	<b>90% reduction in maintenance costs</b>
Solar Energy Potential (Solar Fraction %)	31%	83%	<b>2.6 times more rooftop solar potential</b>
<b>Common Plot (Green space / Person)</b>			
<b>Rooftop / Person</b>			
Carpet area to Built-up area ratio	59.3 : 40.7	68 : 34	
<b>Sustainability</b>	<b>Low</b>	<b>High</b>	
<b>Environmental Impact</b>	<b>High</b>	<b>Low</b>	

## Inferences

At the building level the proposed model achieves 30% reductions in embodied energy through construction simply by the reduction of FAR and built area. This is an important insight on the load a housing project generates at a greenfield site. For a context such as Bhalswa already torn by adverse effects of climate change and waste-management systems, it is imperative that interventions be made as soft-inserts with focus on liveability.

Further, the proposed model with its mid-rise walk up structure is also efficient in the operational energy criteria. This is achieved by omitting the use of elevators that can amount to a higher operational cost contributing to an unaffordable to operate housing project.