Housing and the city

Case studies of integrated urban design

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Housing for the just, green and healthy city

Housing is the backbone of a well-functioning and equitable city. The way in which housing is procured, financed, designed and allocated has significant implications for the lives of all urban residents. However, governments are failing to provide the human right of housing for all. The Council on Urban Initiatives has argued that mission-oriented approaches are needed to galvanise the whole of government engagement, while sectoral investment and cross-disciplinary collaboration are needed to realise the right to housing and prioritise the common good.[1]

Housing has a profound spatial impact on cities. Apartment blocks, condominium towers, detached and terraced houses, self-built shacks and informal slums occupy by far the largest portion of urban land in cities around the world. Decisions about the physical distribution and design of housing will shape the social, economic and environmental dynamics for millions of urban residents for decades to come – particularly in Asia and Africa where urban populations are projected to balloon.[2] Irresponsible development, poor community engagement, and overly permissive regulations and standards have encouraged architectural and urban design practices that foster inequality, exclusion and negative environmental impacts.

The inadequacy of urban housing has been exacerbated by the financialisaton of housing markets, which has meant that housing is treated as a financial asset rather than a place to live. Rising housing prices make real estate a lucrative form of investment.[3] The rents that have accrued due to rising prices have been largely captured by banks and landlords. Most governments have so far failed to take sufficient action to address this challenge, tinkering on the margins instead of reshaping housing markets with the goal of achieving decent and sustainable housing for all.[4] Financialisaton and changing planning paradigms have contributed to the spatial transformation of the urban fabric, with implications ranging from the proliferation of gated communities in greenfield areas to empty or gentrified city centres.[5] Affordable residential communities are poorly integrated into the wider urban system, fostering social segregation and unsustainable patterns of urban sprawl. Residents have become physically distanced from key community assets such as centres of employment, and cultural and social amenities.

As an interdisciplinary group of mayors, urban leaders, academics, designers and housing experts, the Council on Urban Initiatives is committed to examining cities and urban housing holistically. In our view, well-designed, sustainable and affordable housing is a prerequisite for just, green and healthy cities. This report focuses on the spatial dimension of housing, complementing the mission-oriented and human rights-based approach investigated in our previous research, *The Right to Housing: A Mission-Oriented and Human Rights-Based Approach* by Mariana Mazzucato and Leilani Farha.[6]

Leveraging the experience and expertise of individual Council members, we have assembled a series of case studies on housing initiatives from different cities that are designed to promote inclusive, sustainable and integrated design. The project initiatives range in scale and geographic location, but in each case represent a clear commitment on the part of the project sponsors (both public and private) to achieve positive social and environmental outcomes through innovative yet people and planet-focused design.

We have chosen projects that place an emphasis on the maximisation of public value and the delivery of the common good.[7,8] The design of these initiatives prioritises the collective experience of urban living, promoting the integration of housing into the surrounding city. For many generations, housing 'projects' have consisted of isolated residential units located in alianated environments without public space that sustains community and social interaction – the street, the piazza, the neighbourhood, the park, a sense of being an integral part of a wider urban community. Many of the featured initiatives recognise that shared amenities are necessary for a more inclusive response to the global housing crisis. Some of these initiatives also recognise the importance of designing housing so that it can change and adapt over time, often on an incremental basis, as cities and their communities go through cycles of economic, environmental and social change.[9]

The report is divided into three sections: inclusive design, sustainable design and integrated design. Each section highlights examples of housing initiatives with short descriptive texts authored by individual Council members and their teams. Barcelona's commitment to realising the right to radical housing policies that are expanding accommodation in the inner city is featured in the first section, alongside Bogotá's impactful Plan Terrazas campaign, which has allowed residents to retrofit fragile homes in

some of the city's most vulnerable neighbourhoods. Despite the differences in economic and social development in these two cities, city leaders explain how the commitment to housing as a human right and the promotion of public value creation has driven the policies and design approaches of these successful housing initiatives.

Focusing on sustainable design, the second section explores the innovative design approach adopted by the Nightingale project in Melbourne. As one of the fastest growing cities in the world, the city has struggled with rising land prices, car dependency and suburban sprawl. A cooperative housing project, Nightingale is experimental in its design, procurement and financing structures, offering a model of housing intervention that is not only environmentally responsive but also focused on affordability.

The final section on integrated design considers two projects at a significantly larger scale but in different political, economic and environmental contexts: Mumbai and Singapore. The Sites and Services Scheme in Charkop, a neighbourhood in northern Mumbai, was established over 20 years ago and is an example of mass housing designed to address the deep inequalities and housing deficiencies of one of the world's largest and poorest megacities. The scheme was designed to accommodate residents from different social and economic groups and to provide housing units capable of adapting to the changing needs and requirements of occupants. The case study from Singapore focuses on public housing in Punggol New Town, which has grown to accommodate over 170,000 residents. It explores how housing policy and funding have been structured to deliver a large number of subsidised housing units for Singapore's residents, in neighbourhoods designed to accommodate the varying needs of residents, including an increasingly large elderly population.

From small-scale retrofits in Bogotá's informal areas to Singapore's massive state-driven investments, the case studies highlight that governing and designing housing for the common good is critical to the creation of just, green and healthy cities.

Ricky Burdett
Co-Chair, Council on Urban Initiatives, Professor of Urban Studies and Director; LSE Cities, London School of Economics and Political Science
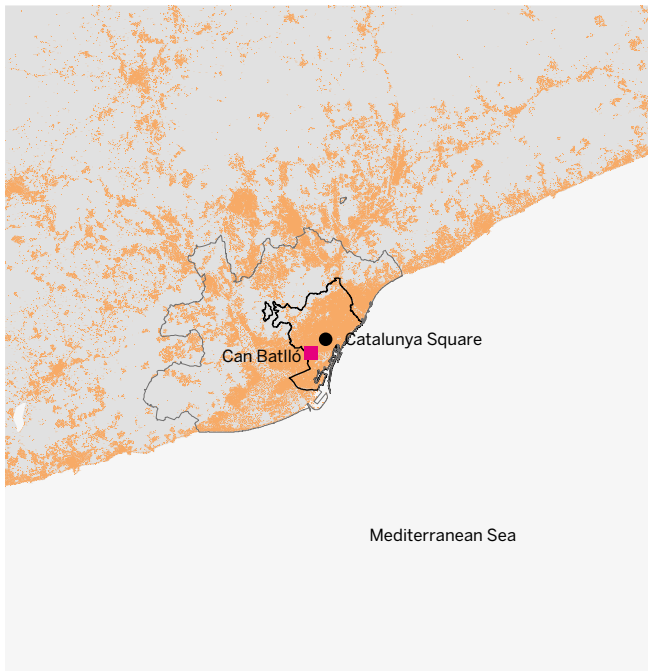
Mariana Mazzucato
Co-Chair, Council on Urban Initiatives; Professor in the Economics of Innovation and Public Value; Founding Director, UCL Institute for Innovation and Public Purpose

Map of Barcelona

- ■ Case study area
- ● Point of interest
- ▢ Metropolitan boundary
- ▭ City boundary
- ▬ Urban footprint

0   20 km
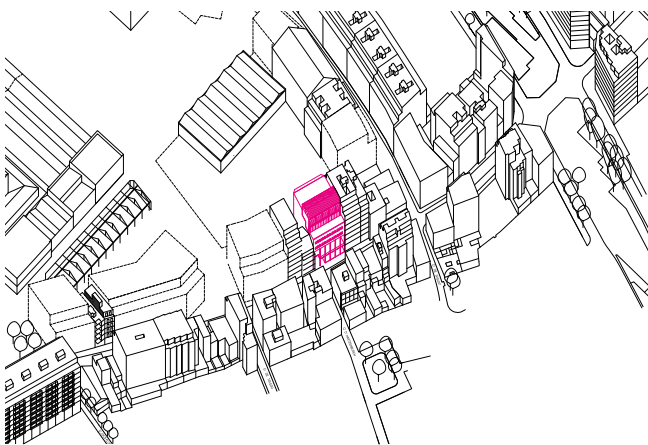
The La Borda Housing Cooperative is integrated in the urban fabric of Barcelona's inner city. Drawing © Lacol

La Borda Housing Cooperative, internal courtyard with access balconies and communal spaces. The layout is based on a basic grid structure (16m²) made up of individual housing units, which can be freely adapted by each resident. Housing units can also be expanded by moving partitions and fixtures, easily accommodated by the legal framework of the cooperative, the ultimate owner of the building and responsible for its management. © Lluc Miralles

La Borda Housing Cooperative, Barcelona, Spain

The La Borda Housing Cooperative in Barcelona reflects the civic administration's dual commitment to the right to the city and the right to housing. A cornerstone of a large urban regeneration scheme on the former industrial Can Batlló site, the residential and social housing scheme stands out for its imaginative yet pragmatic design, supporting a progressive social programme. Born out of a local community action group, the La Borda Housing Cooperative owns the building; it is built on publicly owned land and allocates residential right-of-use to its members. This ownership model means that value is placed solely on the use of the home, and not on its exchange value in the market, to avoid speculation and financialisation.

Designed by members of the cooperative and the Lacol architecture studio – in close and constant collaboration with its future occupants, the building was conceived as an open structure which adapts to the evolution of the community and the changing needs of its residents.

The architecture of La Borda in many ways represents a spatial response to the increased cellularisation of housing, where individual units are getting smaller and smaller and the number of people living alone is also increasing, reinforcing a state of isolation that pushes cities towards individualism and loneliness.[1] There is a significant investment in communal space and amenities, not only to strengthen bonds and interactions between residents but also to improve efficiency and reduce costs by centralising activities such as laundry, kitchens and social spaces. Similar attention has been paid to minimising energy consumption and reducing running costs to ensure affordability for the residents.

Aside from its progressive engagement, funding, management and allocation programme, the La Borda project has highlighted the role that design can play in creating inclusive environments. It was awarded the prestigious EU Mies van der Rohe Emerging Architecture Award in 2022. Building on the achievements of the 1970s cooperative movement, the architects have co-created a residential complex that is more than just a collection of single units. Its architectural language is restrained and welcoming, using daylight, space and materials creatively to respond to the needs of individuals and families living in the city.

La Borda Housing Cooperative, view along Carrer de la Constitució in Barcelona's Sants-Montjuïc inner-city district © Baku Akazawa

Unlike typical social housing designs that tend to reduce public amenities to a minimum, La Borda is designed around generous circulation areas, common spaces and facilities that enhance residents' interrelationships, promote cooperation and reduce isolation. Almost a quarter of the floor area is given over to common spaces (rather than the standard 10 per cent), with a large communal kitchen-cum-dining room (which doubles as a meeting place) and a 100m² covered multipurpose space as well as guest rooms, a laundry room and collective bicycle parking (underground car parking was excluded on environmental grounds).

(Clockwise from top left): section through the housing block showing apartments and social spaces © Lacol; the common room/laundry area © Lacol; view of central atrium © Institut Municipal de l'Habitatge i Rehabilitació de Barcelona.

Legend

- Open space
- Green space
- Amenities (ground floor)
- Education
- Medical
- Bus stop
- Metro line and metro stop
- Cycle lane
- Site boundary
- Social housing
- Amenity – neighbourhood centre

N

Scale: 1:7500
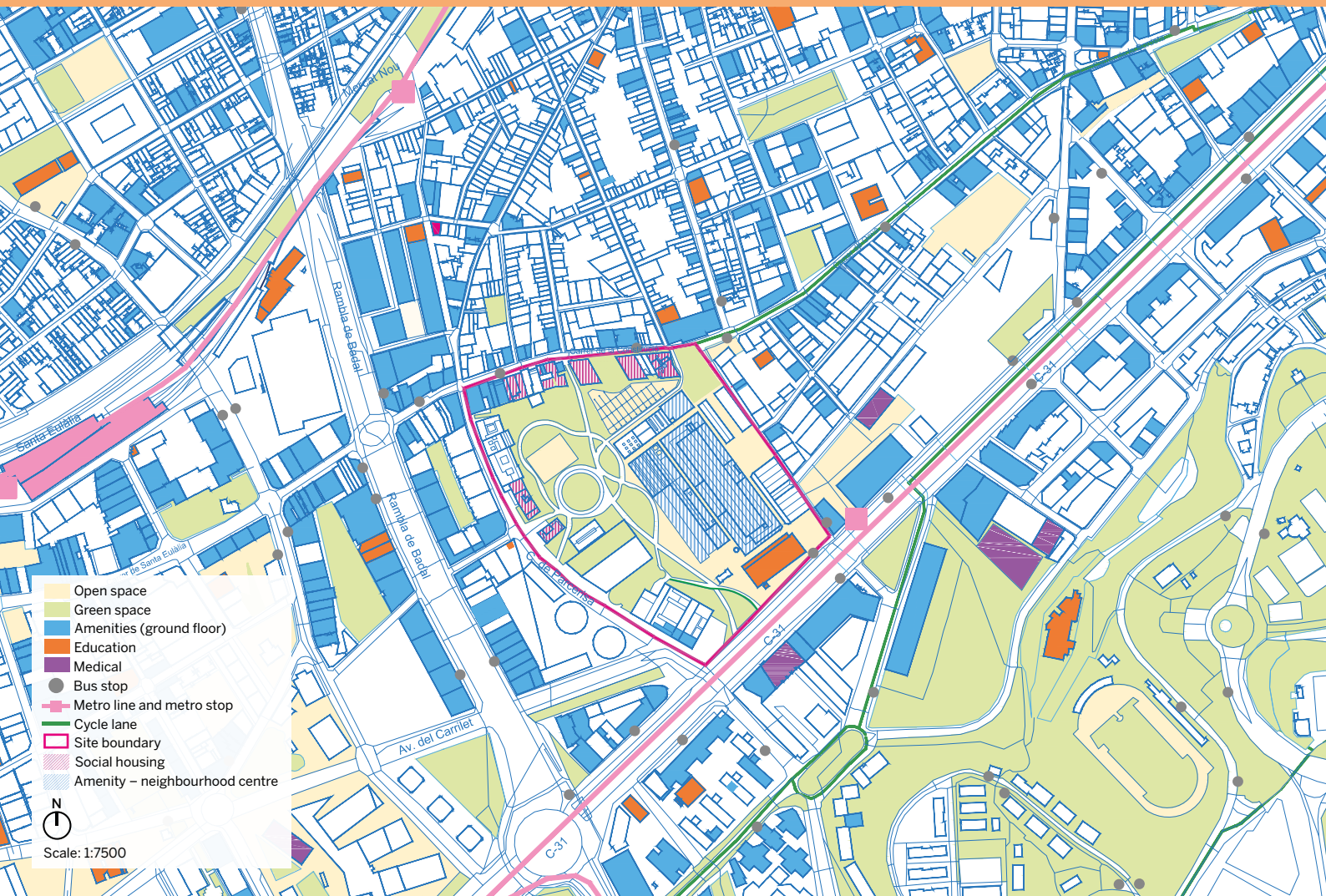
Map and aerial view of Barcelona illustrating the strategic urban location of the former industrial Can Batlló site – close to Montjuïc Hill and its cultural and sports facilities – and its potential to become fully integrated with the surrounding residential neighbourhoods. Image (collected July 2023) © European Space Imaging

The densely populated Can Batlló textile factory occupies a significant tract of land in a relatively central part of Barcelona surrounded by dense, popular neighbourhoods. Following the cessation of industrial activities, the site has become the focus of a complex, incremental process of occupation, reclamation and regeneration, creating a new urban quarter with open spaces, schools and public facilities.
© Batlleiroig Arquitectura
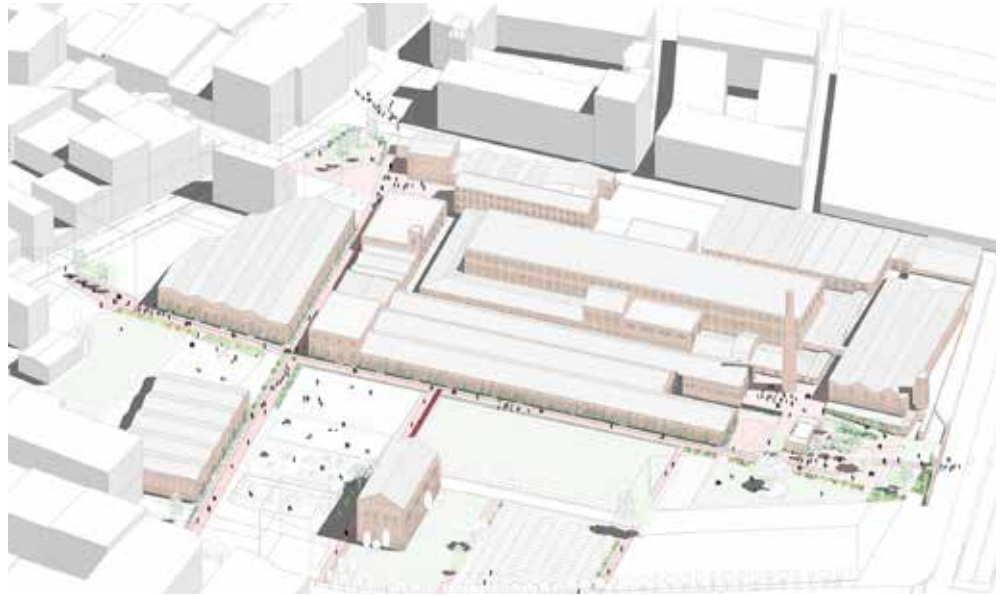
The wider regeneration of the site includes affordable housing next to social and educational facilities – including the recent social housing building designed by Espinet/Ubach, which has been fully integrated into the residential architecture of the local neighbourhood.
© Pedro Pegenaute

The main 1847 factory building of the Can Batlló textile complex has been sensitively converted to house a primary and middle school, in addition to a media lab, exhibition areas, and performance and rehearsal spaces which provide social infrastructure for residents and visitors, reconnecting the industrial building with its surroundings.
© Adrià Goula

La Borda Housing Cooperative © Álvaro Valdecantos

Can Batlló: the right to housing in Barcelona

Members of former Mayor (2015–2023) Ada Colau's housing team explain how the city's progressive housing policy has led to the regeneration of Can Batlló, from an old industrial site in the heart of Barcelona, into affordable residential accommodation and social amenities for the local community.

In 2016, Barcelona launched a Right to Housing Plan aimed at restructuring the housing system to ensure access to decent and affordable housing for its residents.[1] This represented a departure from Spain's traditional market-led housing procurement model, which was largely centred on owner occupation and private rental. The plan set out to significantly expand the stock of public and social rental housing, with the aim of doubling Barcelona's social housing provision over a 10-year period. It exemplifies political investment in the production of public value.

To meet this target, the City Council accelerated the development of new public housing units and established partnerships with private developers and non-profit cooperatives to build social and affordable housing. The city administration also scaled up public acquisition of private housing through the 'right of first refusal', which targeted purchases in the city centre in neighbourhoods at risk of gentrification and in areas with little pre-existing public housing. To bring vacant housing back into use, the city also provided incentives, including renovation grants offered to homeowners in exchange for renting out units at social rent for fixed periods.

These strategies have led to a 53 per cent increase in the public housing stock (from 7,500 units in 2015 to 11,500 units in June 2023). With an additional 2,200 units under construction, the City Council is on track to almost double the size of the social housing stock by 2025.

As well as having an impact at a city-wide level, the Right to Housing Plan aimed to change how housing developments were designed, governed and experienced by residents at a neighbourhood scale. Can Batlló, a redevelopment site in the distinctive Sants-Montjuïc hill district, is emblematic of this new approach. Previously occupied by a 19th-century textile mill located in the neighbourhood of La Bordeta, the 14-hectare site was once one of the largest centres of the successful Catalan textile industry, but the buildings fell into disuse as production declined in the 1960s.

In 1976, the City of Barcelona's General Metropolitan Plan designated the area for green spaces and public facilities. Even though later iterations of the masterplan envisaged residential development, the site remained largely vacant with the exception of a small number of private apartments located on

the periphery, until 2006 when regeneration works began. The 2007/08 global financial crisis halted development and the dereliction of the site continued until 2011, when a group of local community residents – *Can Batlló és pel barri* (Can Batlló belongs to the neighbourhood) – occupied the buildings and demanded they be converted into housing.

As a result of the occupation, residents were granted the right to use one of the buildings on the site, Bloc Onze. Within a year, and with some additional funding from the City Council, the residents had renovated the building and constructed community spaces including a self-managed library, a brewery and spaces to host cultural events, workshops and classes.

In 2012, the city government resumed redevelopment of the area and began to acquire private land on the site through a process of expropriation. Pre-existing residential developments were either demolished or extended and more housing was planned on the site along the main road frontage. The overall scheme envisaged community facilities and public spaces in the central zone, including one of the city's largest green spaces, covering almost 26,000m^2. Public facilities include two nurseries and a secondary school, a health clinic and media school, as well as a centre for the promotion of the cooperative economy.

Given the quality of the architectural industrial heritage of some of the original factory buildings, many have been retained and imaginatively renovated to incorporate new internal uses, integrating existing structures with external community gardens and children's play areas.

Following adoption of the Right to Housing Plan, the city administration allocated a large percentage of land on the Can Batlló site to social and public housing, leasing some of the plots to residential cooperatives to develop non-equity-based housing. As a result of this process of land expropriation and a city-led housing allocation policy, over 80 per cent of Can Batlló now comprises social and public housing, community facilities and green spaces. New-build residential facilities, including the La Borda Housing Cooperative, have been completed on the site.

Can Batlló has become a vibrant and inclusive neighbourhood, frequented by nearly 50,000 people in 2017 who took part in almost 850 community activities. The successful regeneration of this former industrial complex confirms that public land ownership is fundamental to the implementation of public value-oriented urban and housing policies, allowing the City of Barcelona to fulfil its human rights obligations to provide housing for all.

Javier Burón,
Housing Manager, Barcelona City Council
Eduardo González de Molina,
Policy Advisor, Barcelona City Council and Research Fellow, UCL-IIPP
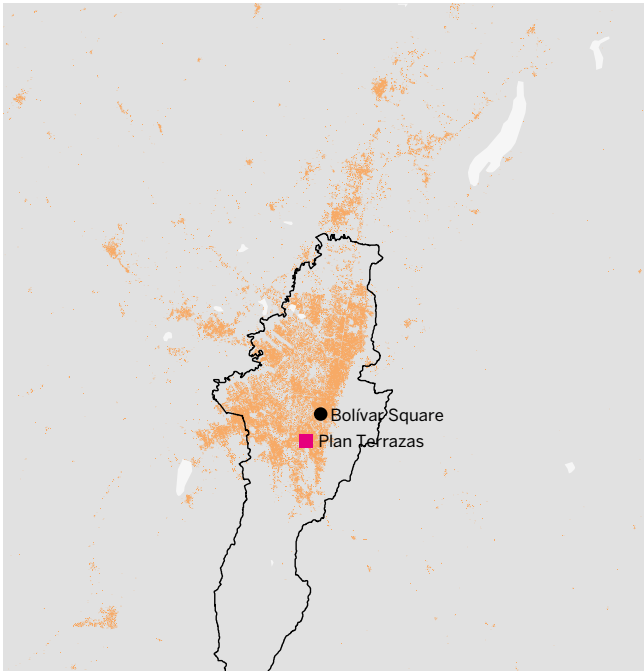**Eduard Cabré,**
International Policy Consultant, Barcelona City Council

Accessible public spaces for local residents and their families are at the heart of the mixed-use neighbourhood of Can Batlló © Barcelona city council

Map of Bogotá (case study area marked does not included full extent of Plan Terrazas initiative)

■ Case study area
● Point of interest
☐ Metropolitan boundary
☐ City boundary
■ Urban footprint

0   20 km

Implementing authority	Bogotá City Hall
Date of implementation	2020–2023
Number of beneficiaries	797 households (as of August 2023)
Target number of beneficiaries (2021–2023)	1,250

Bogotá's unique geographic location has concentrated much of the informal growth pattern onto steep hills on the edges of the city, with precarious self-built housing units poorly served by public infrastructure. © Ryan Bellinson

Plan Terrazas, Bogotá, Colombia

Providing the right to affordable and adequate housing to millions of new urban residents is a priority for city and national leaders. The pressures for housing in Africa and Asia will become even more pronounced as city populations grow exponentially because of migration and increased natural birth rates. Other regions, such as South America, will experience a slowdown in growth but an urgent need to consolidate and improve the living conditions of marginal groups.

Bogotá, the capital of Colombia, experienced a period of rapid urbanisation during the late 20th century, growing tenfold from a town of 600,000 people in the 1950s to 6 million in 2000.[1] Much of the growth was through the construction of self-built shacks on the edges of the city erected by families who came to Bogotá looking for new opportunities and a better quality of life.[2]

As population growth outpaced the state's capacity to provide adequate housing and infrastructure, settlements were built on steep slopes in risk-prone areas on unstable ground, many of which were overcrowded, fragile and lacked basic services such as clean water and sewers.[3] By the turn of the 20th century, Bogotá's poverty levels reached 30 per cent and informal settlements represented approximately the same percentage of the total urban land.[4]

Even today, the city of 9 million has not been able to keep pace with housing demand, particularly for low-income groups.[5] While 33,000 housing units have been built through formal processes every year[6] on average since 2012,[7] up to 15,000 units are created informally, most commonly through the subdivision of houses into flats. Self-built housing remains a lifeline for thousands of families despite their poor quality and fragility.

Yet, these neighbourhoods constitute robust urban communities where families have settled, and commercial and social infrastructures have been established – and their residents play an important part in the metropolitan economy. Living in a safe and healthy environment is a human right recognised by the city administration which has developed policies and initiatives to retrofit buildings in these under-served urban communities.[8]

Over the last decades, Bogotá has pioneered a sequence of progressive public transport, health and community initiatives – from cable cars to care blocks – designed to improve the conditions of these marginal communities.[9] Together, they represent a sustained and coherent approach to city-wide inclusive design.

The recent focus on small-scale, targeted intervention on the built fabric of individual homes is a significant policy intervention with profound spatial and social impact. The policy enables families in vulnerable districts like San Cristóbal to benefit from grants to upgrade their homes, improving their services and allowing for the safe construction of extensions to accommodate larger families or commercial activities. It belongs to a strong lineage of urban acupuncture projects that stretch back to Barcelona in the 1980s, retrofitting homes in existing environments and providing communities with the things they need

most. Importantly, the Plan Terrazas programme facilitates the regularisation of property ownership, placing the complex and expensive process of granting building permits in areas originally built through informal processes in public hands, limiting the vested interests of the private sector. As such, it constitutes a form of inclusive design predicated on the belief that every urban citizen has a right to the city, and that right includes access to a safe space and a sense of ownership.

Many of the self-built housing units erected in Bogotá over the last decades lack basic services, are structurally unsound and have no legal status. The Plan Terrazas policy is designed to provide building permits and access to grants to retrofit and improve existing building stock.
© Secretaría del Hábitat

Distribution of deprivation in Bogotá

Multidimensional Poverty Index

— Sub-city boundaries
- 0–9
- 10–27
- 28–48
- 49–76
- 77–100

0   5 km
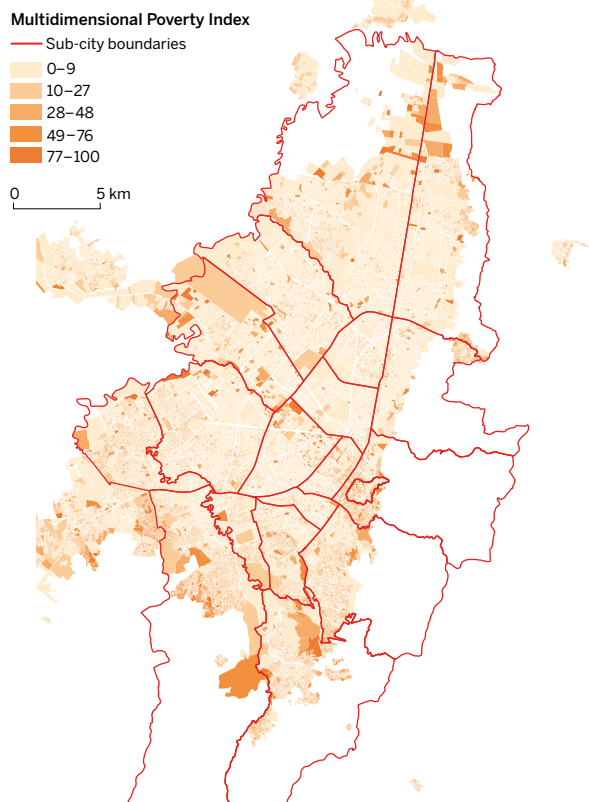
Informal settlements and status of legalisation

- Legalised
- Denied
- Regularised
- Area under verification
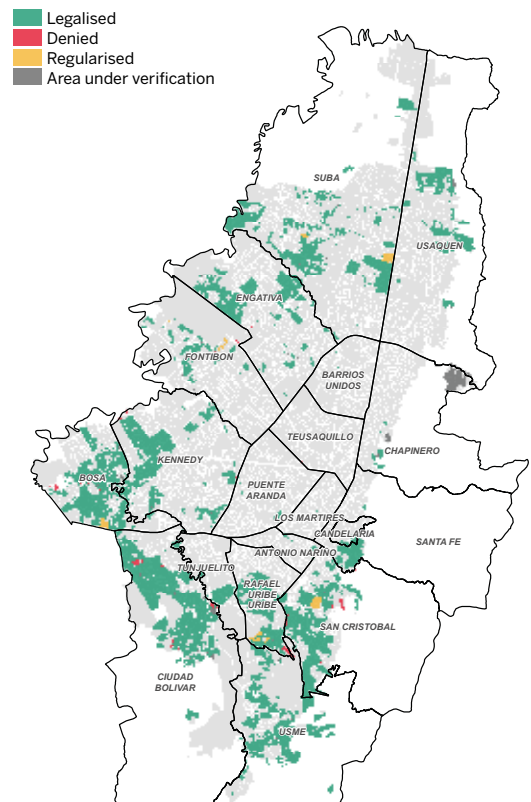
Location of Plan Terrazas initiatives and home improvement programmes

- Plan Terrazas
- Housing upgrading/ improvement programme
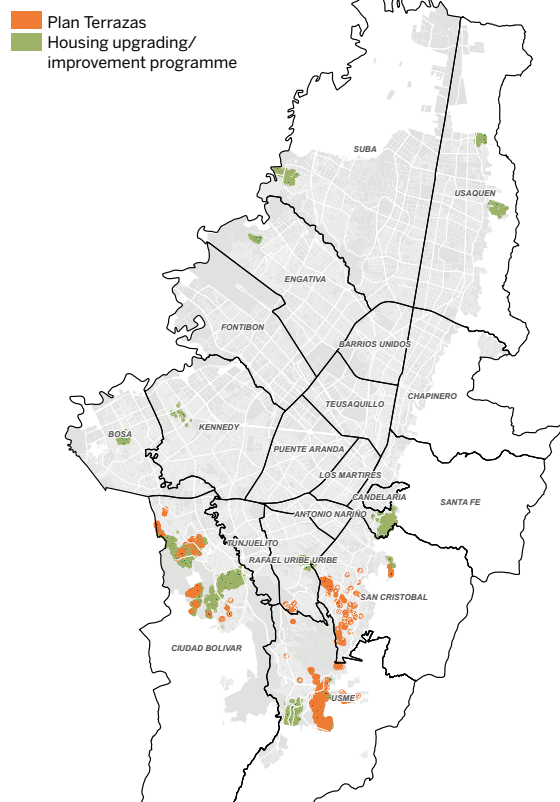
Bogotá has a distinctive pattern of distribution of social inequality, with most deprived communities concentrated on the periphery of the city where new migrants have built precarious homes in areas that, over time, have become consolidated though underserved neighbourhoods (top left). This pattern is to a degree matched by an ongoing process of legalisation and regularisation of these informal properties (above) which allows residents to benefit from financial support and access to services. The most recent Plan Terrazas initiative (left), which has concentrated initially on some of the southern districts like San Cristóbal, takes this process a stage further with a focus on facilitating access to building permits and grants that allow families to make their homes safer, more liveable and adaptable to the needs of Bogotá's residential communities.
All maps © Secretaría del Hábitat

Parque Metropolitano
Bosque San Carlos

Carrera 10

Carrera 10

Parque Metropolitano
San Cristóbal

Portal TransMilenio

Parque Gaitán Cortés

Hospital La Victoria

Plan Terrazas projects
Cable car stations (future)
Parks (existing and proposed)
Multipurpose public buildings (proposed)

N

0   0.5 km
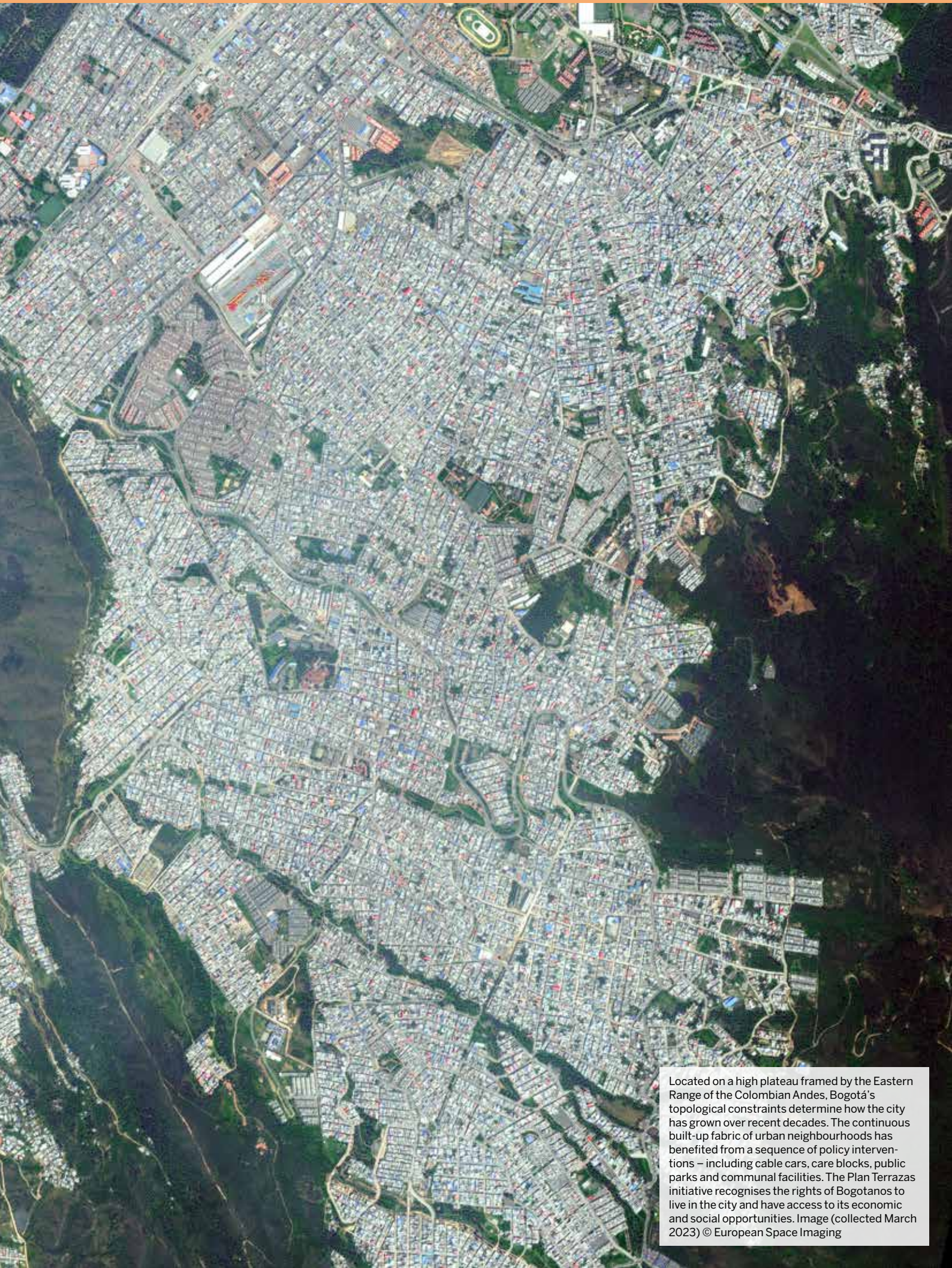
Located on a high plateau framed by the Eastern Range of the Colombian Andes, Bogotá's topological constraints determine how the city has grown over recent decades. The continuous built-up fabric of urban neighbourhoods has benefited from a sequence of policy interventions – including cable cars, care blocks, public parks and communal facilities. The Plan Terrazas initiative recognises the rights of Bogotanos to live in the city and have access to its economic and social opportunities. Image (collected March 2023) © European Space Imaging

Block infill
New structure
Existing
Structural improvement
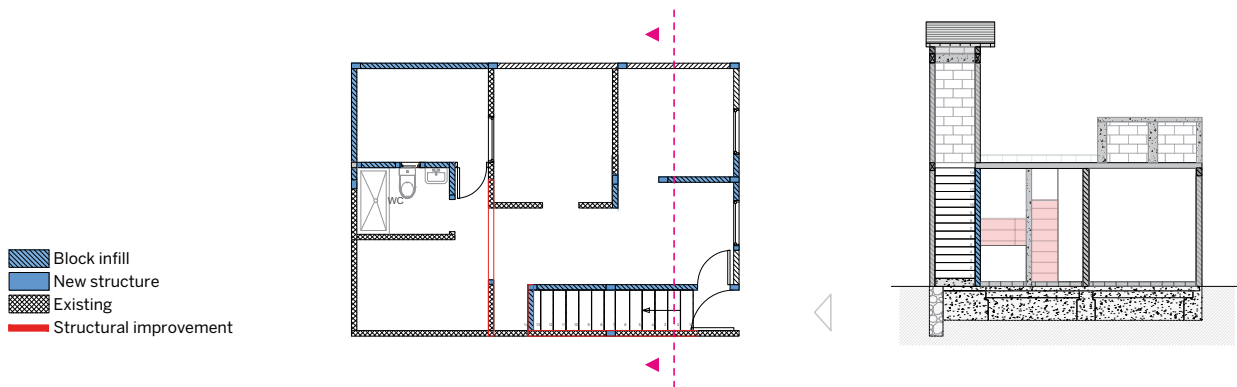
Plan and section of the Rosario Castro Residence scale 1:100. © Secretaría del Hábitat

Block infill
New structure
New floor
Existing floor
Existing
Structural improvement
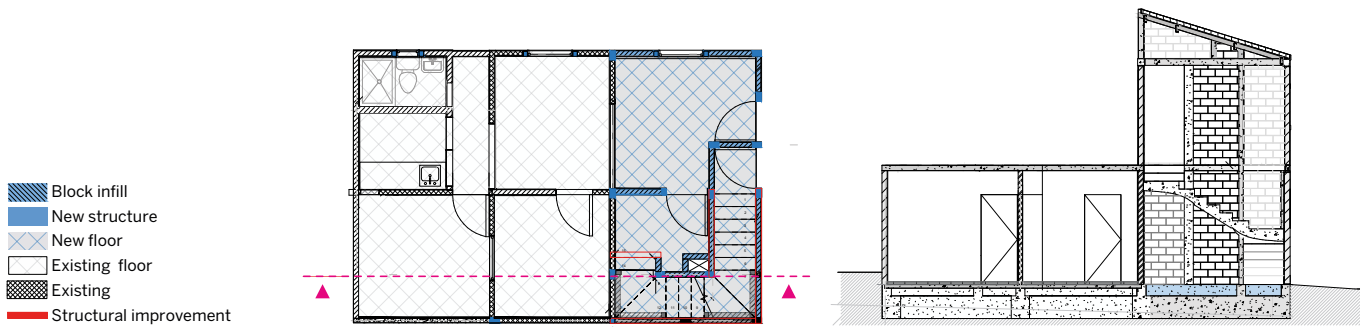
Plan and section of the Gilma Diaz Residence scale 1:100. © Secretaría del Hábitat

Before

After

Housing unit before and after improvements. © Secretaría del Hábitat

Block infill
Block infill
New structure
Existing columns
Existing
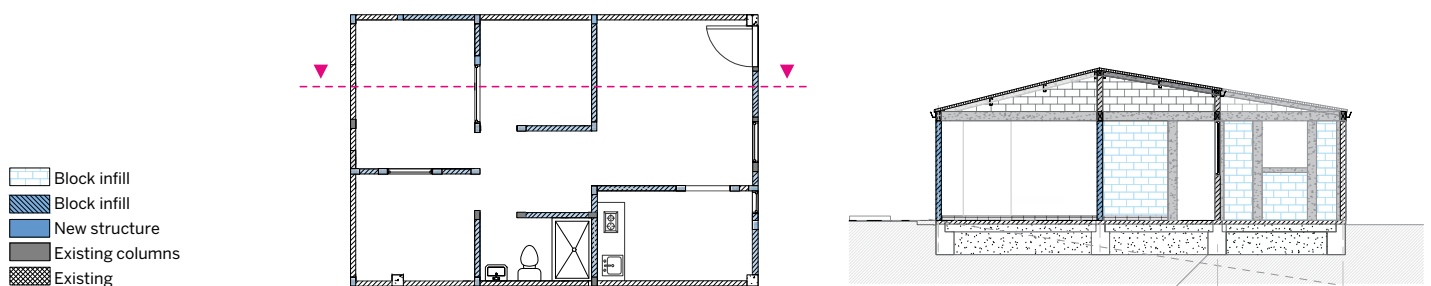
Plan and section of the William Sierra Residence scale 1:100. © Secretaría del Hábitat

Before

After

The Plan Terrazas is a combined process that allows residents of self-built houses to secure a building permit through a public agency managed by the city administration, without incurring costs. House owners are then entitled to receive grants to improve the stability of often precarious structures (with reinforced concrete and brick construction which allows for extensions and expansion), improve protection from the weather (with new and more resilient roof coverings and walls), access to modern sanitation units, water and waste as well as straightforward interior decoration and upgrading. As some of the before and after images show, the combined effect of this retrofitting approach provides security, safety and dignity to existing communities as part of city-wide commitments to inclusive design. All images © Secretaría del Hábitat

Repairing the city

The initiative to repair and retrofit existing houses with small interventions in some of the poorest barrios of Bogotá is part of a sustained city-wide strategy to embed inclusive design in its DNA. Mayor Claudia López shares the story.

For the thousands of families in Bogotá who have built their houses informally, things are finally looking up. Until recently, building permits to validate new constructions or refurbishments of existing buildings have been issued by private agencies, which often impose expensive fees that leave low-income households with no choice but to build informally. Consequently, many unregulated and unsafe constructions have been erected, creating extensive unplanned neighbourhoods with poor living conditions for many disadvantaged residents.

In 2020, the Bogotá city government initiated the Plan Terrazas housing programme whereby building permits were issued by the public authorities for the first time in 27 years. This has made it possible for thousands of poor families to officially regularise the status of their homes free of charge, ensuring that they meet building codes and have full tenure, allowing the owners to upgrade and expand their homes on a sound legal footing. As straightforward as it may sound, in a city where 30 per cent of land has been developed informally and in a country where formal land and housing markets have been inaccessible for millions, a whole-of-society approach (involving public, private and social organisations) was needed to make a real change.

Since the 1950s, internally displaced people fleeing violence and civil war have settled in the outskirts of the capital, either purchasing land or occupying buildings without formal permissions or tenure. In the 1970s and 1980s, the city authorities passed a number of laws (such as the *Norma Mínima*) which set new, less onerous standards. This allowed informal settlements to be officially recognised as formal entities, fully incorporated into Bogotá's jurisdiction with access to public infrastructure and services such as water and electricity as well as municipal roads and public parks. While the plans to improve neighbourhoods benefited from investments from partners such as the International Development Bank, the public realm in these areas – often in precarious locations on steep inclines and close to polluted streams and watercourses – has remained of insufficient scale and quality for the number of local families and residents.

Today, the informal, self-built city extends across different boroughs (such as Usme and Ciudad Bolívar) along the periphery of the metropolis. Approximately 300,000 residents of Bogotá's 2.8 million households live in inadequate housing. People build incrementally using popular and cheap construction techniques, using their own hands or getting help from neighbours. Perhaps over a *sancocho* and beer, they hire a friend with some level of construction skills. Many households erect a second storey over the original core construction after a few years, when they have saved enough money. Yet, a significant proportion of these informal settlements remain single storey because their owners do not have the means to build upwards safely. In addition, a resident from a low-income neighbourhood most likely does not know how to obtain a building permit and comply with building codes, nor can they afford the fees of a building professional or certified contractor.

That's where the Plan Terrazas comes in. The programme's objective is to simplify the process of legalisation of informal housing, improving conditions for inhabitants and allowing them to extend and upgrade their residential accommodation within the law. For decades, the city authorities have been improving living conditions – fixing bathrooms, kitchens, floors, roofs – legalising neighbourhoods, improving public spaces and granting legal tenures. But previous regulations made it impossible for City Hall to grant legal tenure to constructions located in informal settlements. National and city regulations were constrained and offered no concrete solutions to the residents of these areas. As a result of lobbying and engagement with civil society, these regulations have been changed in recent years.

In December 2020, the Plan Terrazas established one of its most powerful policy institutions: the *Curaduría Pública* – a so-called public 'curator' or custodian, the first public agency to grant building permits in Bogotá. The *Curaduría* issues 'recognition acts', free of charge, which allow families to qualify for building permits, including the right to build reinforcements for foundations to support the construction of upper storeys without incurring structural risk.

Apart from improving the built fabric, the Plan Terrazas programme has an impact on the economic well-being of family units which benefit from the investment. Typically, any spaces used for economic

Plan Terrazas investments: number of households (2021–2023)
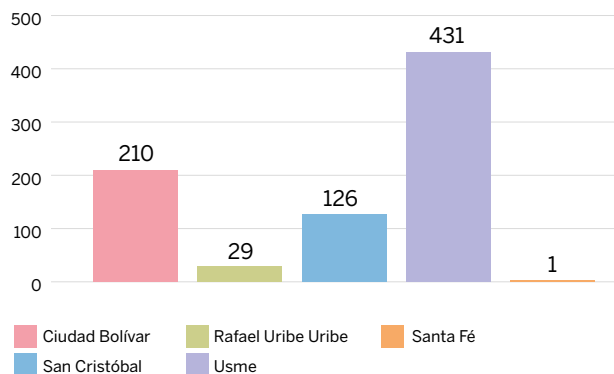
activity – workshops, offices, services, etc – can be preserved and upgraded, and newly-extended upper floors can be rented out, generating additional income. For example, Rodolfo Gómez - one of the 58 recipients of the programme in San Cristóbal – was able to the improve structural stability of his home and include stairs leading to a future upper level. At a later stage he built an upper level using his own resources – in strict adherence to building codes – which is now rented out and contributes to the financial well-being and stability of the family.

Curaduría staff go door to door in informal neighbourhoods and target houses that have been identified as suitable for the plan. They consult residents to ensure their participation in the process, establishing a relationship that involves technical and financial assistance. To be eligible for the programme, a member of the household must be the owner of the property and the total monthly family income must be equal to or less than USD 1,181,[1] equivalent to four times the national minimum wage. To ensure that safe construction techniques are employed, the programme adopts the Build Change methodology[2] to improve the resilience of vulnerable houses and their resistance to earthquakes – which has a direct impact on the skills and abilities of the local construction workforce.

In the initial pilot phase of 1,250 homes, over 700 grants were allocated in the first months of 2023, with subsidies of over USD14,000[1] per home in addition to USD 1,400[1] worth of construction materials. This amounts to a total investment of USD 18.1 million[1] over the current four-year mayoral term (2020–2024). Reflecting the administration's wider commitment to gender balance and women's empowerment, 60 per cent of beneficiary household owners were women and the programme employs women in all phases of the procurement and construction process.

In its preliminary stage, it can be argued that Plan Terrazas has delivered four main benefits to residents and the community. Firstly, and most significantly, self-built houses that were constructed without building permits can now receive a document of recognition, allowing homeowners to claim rights to their houses in cases of complaints and lawsuits. Secondly, the programme ensures that many fragile constructions are rendered safe and more resistant to earthquakes. Thirdly, through the plan, City Hall – with the support and technical assistance of a registered construction company – can grant subsidies, licences and permissions for the construction of additional storeys.[3] Fourthly, Plan Terrazas offers residents building materials at lower costs thanks to procurement agreements with construction suppliers. As part of the plan, the city has also upgraded and expanded energy networks and water efficiency standards, reducing its carbon footprint and lowering household costs.

In sum, Plan Terrazas has created public value in a variety of ways: improving quality of housing and living conditions, strengthening community networks and allowing family members who have had to live farther apart to live close by, reinforcing local bonds. It has also reduced poverty (families can rent out new space, open a small a business on the ground floor or even divide the property) as well as maintenance and repair costs. Finally, legal tenure allows homeowners to mortgage the house and pass it down the family line as a legal inheritance.

Future mayors of Bogotá will be able to build on this initial phase of 1,250 households. We are certain it will improve the quality of life for thousands of residents in the long term. But, most importantly, we hope it will continue as part of a more democratic housing policy for low-income communities which does not overlook the reality of life for many thousands of people. Plan Terrazas was envisaged as a strategy to empower people. It acknowledges that the informal city will continue to grow, and the state must adapt to people's complex and changing situations. We must invest in policies that benefit underprivileged residents. If we succeed in helping them thrive, the city will thrive.

Claudia López,
Mayor of Bogotá

Sustainable design
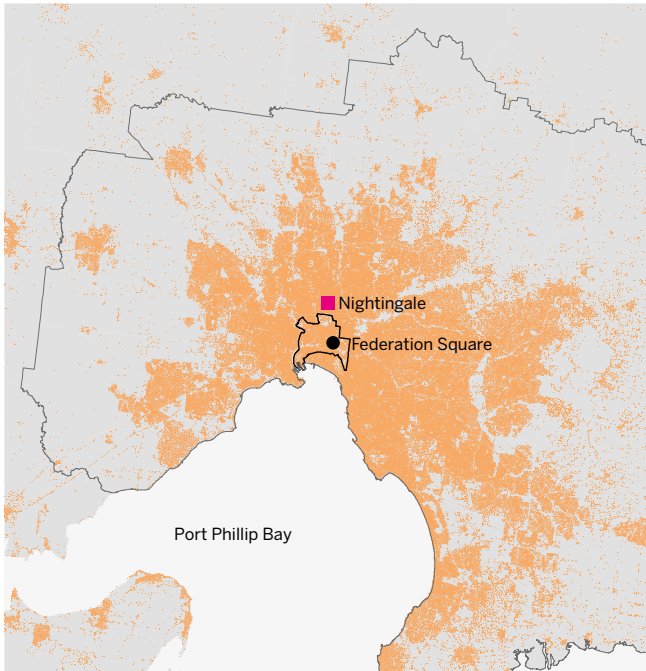
Map of Melbourne

Map of Melbourne

- ■ Case study area
- ● Point of interest
- ☐ Metropolitan boundary
- ☐ City boundary
- ■ Urban footprint

0   20 km

Date of first development	2013–ongoing
Completed apartment blocks	15
Completed units	411
Units under construction	254
Units in planning	380

The well-designed, compact housing units and public spaces of Nightingale Village are located in a formerly industrial urban area, relatively close to Melbourne's downtown district and accessible by public transport. © Hacer

Nightingale Housing, Melbourne, Australia

Sustainability is a key objective for urban planners and policymakers, shaping the ways cities are governed, managed and designed. It cuts across different scales of intervention, from regional planning and public transport to building construction and energy systems. With housing occupying such a high proportion of urban land, its procurement, location and design have significant consequences for the social and environmental sustainability of cities worldwide. Dense, compact cities use land more efficiently and reduce energy consumption. Dispersed, low-density cities stretch services and infrastructure, eat up valuable open land, and depend increasingly on private cars which fuel pollution and exacerbate climate change.

As a sprawling city of an advanced economy, Greater Melbourne has many assets, but it is emblematic of unsustainable growth. Its fragmented governance structure works against metropolitan-wide environmental initiatives that impact on its energy footprint in any meaningful way. Hence, any initiative that disrupts the status quo of market-led housing provision and prioritises environmentally progressive developments deserves greater attention.

The Nightingale Housing project is innovative and experimental at many levels. At the metropolitan scale, the selection of the site itself reflects a commitment to sustainability. Located close to the inner city and next to public transport, the project makes use of former industrial land rather than occupying greenfield sites on the edges of the city. At a local level, the investment by a not-for-profit developer has created an incremental sequence of well-designed buildings and public spaces that bring residents to a centrally located area, contributing to its economic sustainability.

At a building level, the individual high-density apartment blocks include shared facilities and communal areas, dispense with expensive car parking, and employ a range of sustainable materials and energy-saving devices that lower residents' carbon footprints. To promote a more socially sustainable residential mix that offers more affordable options, residents are chosen by ballot and the housing units are sold at cost by a not-for-profit developer, with a percentage reserved for minority groups, keyworkers and housing associations.

Green space
Amenities (ground floor)
Education
Medical
Industrial
Bus stop
Cycle lane
Rail and rail station
Tram and tram station
Site boundary
Nightingale Housing

N

Scale: 1:6000
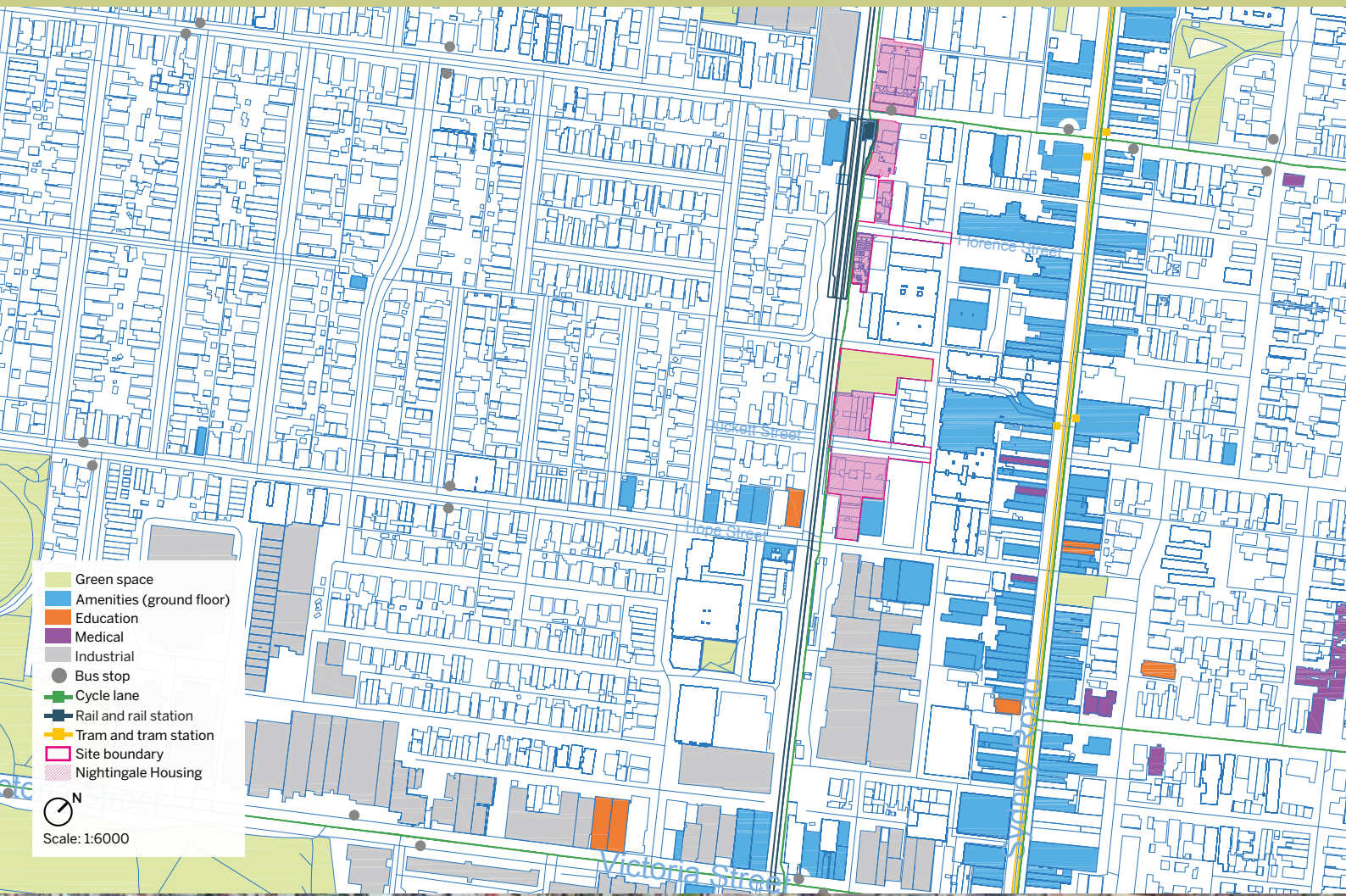
The Nightingale project stitches together the urban fabric in this mixed inner-city district of Greater Melbourne, occupying a number of smaller sites with residential buildings and open spaces in close proximity to local shops and amenities as well as the tramway and rail services. Image (collected March 2023) © European Space Imaging

The apartment blocks in Nightingale Village are designed to optimise the development potential of the site with relatively high-density buildings that define street edges and create a sense of identity. Western elevation, scale 1:750 © Hayball

Evergreen
Clare Cousins Architects

Leftfield
Kennedy Nolan

Urban Coup
Architecture Architecture x BREATHE

The different phases of the Nightingale project add up to an integrated 'piece of city', where individual buildings are designed around landscaped open spaces which are easily accessible to new and existing residential communities within the wider district.
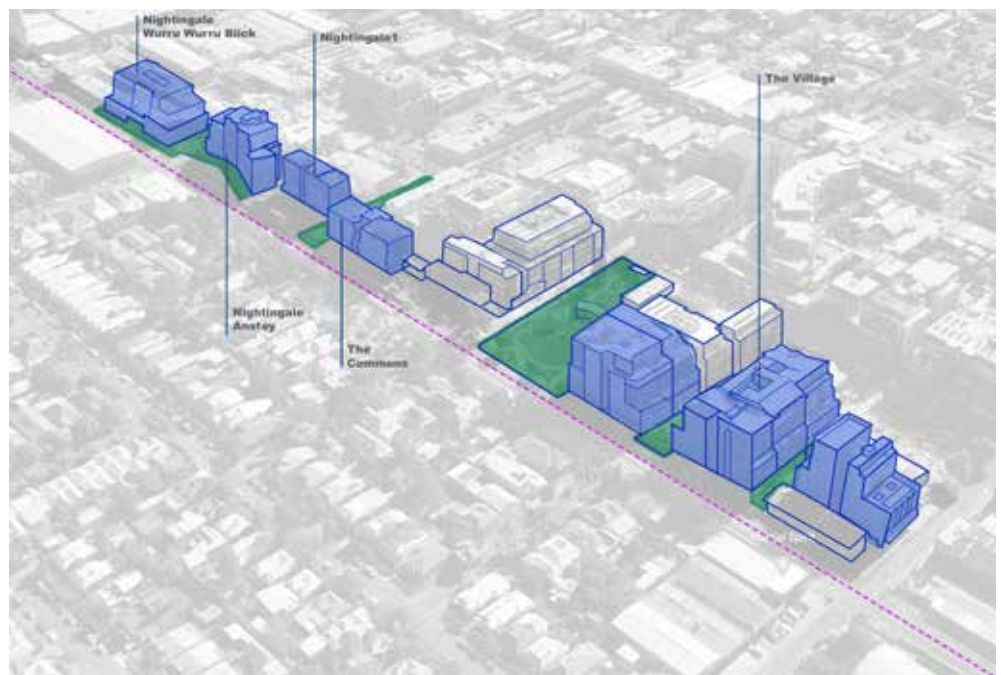
View of Nightingale Village from the west showing the difference in scale between the new apartments and the surrounding single-storey neighbourhoods. The open spaces of the new development have been designed to connect to the surrounding street pattern to connect existing communities and local amenities. © Hacer

Section
Scale: 1:750

Ground floor
Scale 1:1000

N

1. **Urban Coup** by Architecture Architecture and Breathe
2. **Leftfield** by Kenedy Nolan
3. **CRT+ YRD** by Hayball
4. **Skye House** by Breathe
5. **Evergreen** by Claire Cousins Architects
6. **Parklife** by Austin Maynard Architects

HOPE ST

DUCKETT ST

Sixth floor
Scale 1:1000

Plans and sections of three apartment blocks of Nightingale Village showing how the buildings and its communal spaces are open at street level, and how the residential units are arranged at upper levels with shared terraces and amenities, including laundry rooms. All drawings © Hayball

Top: Interior view of the kitchen/dining area in Nightingale ParkLife building, designed by Austin Maynard Architects. © Tom Ross
Bottom: The bicycle storage is one of the communal facilities at ground level at Nightingale ParkLife which facilitates more sustainable and healthy commuting patterns for local residents in a complex which does not provide car parking spaces. © Tom Ross

Sustainable living under difficult circumstances

The combined efforts of a not-for-profit developer and a socially committed designer have delivered a small but significant new residential intervention: an innovative, sustainable and affordable model which breaks the traditional mould of Australia's housing system.

The urban context

Melbourne generally occupies the upper reaches of most global 'quality of life' city rankings, for what they are worth. It won the *Economist* Global Liveability Ranking seven times in a row between 2010 and 2017, and currently sits at number three. Yet the city also suffers from systemic challenges to a fairly fundamental aspect of 'quality of life': housing.

In March 2022, Melbourne was ranked the fifth least affordable city in the world, with its median house price 12 times its median household income. The average house price had multiplied by 22 per cent over the past four decades, almost four times

faster than wages. In a market traditionally geared towards home ownership, the cost of renting a typical Melbourne house or apartment had risen by 10 per cent in 2022.

On top of this, the residential sector in the state of Victoria is responsible for 30 per cent of its carbon emissions, well ahead of commercial services (17 per cent) and manufacturing (17 per cent). This is largely associated with heating, cooling and electricity in homes, and transport-related emissions due to urban sprawl. All of these systems are still largely fossil fuel-based in Victoria.

This represents what happens when economic policy remains fixed on the idea that financialisation of housing should be central to household wealth creation. The outcome is a broadly unaffordable housing offer embodied in a largely unsustainable built and living environment.

The development of Nightingale

Nightingale's innovation started quietly in what was seen as 'slack' space on the edge of the city centre. Brunswick is an inner-north, formerly industrial

Nightingale ParkLife (Austin Maynard Architects) and Nightingale Evergreen (Clare Cousins Architects) apartment buildings and the surrounding urban context. © Tom Ross

suburb that few mainstream property developers were interested in back in 2007. Yet, as elsewhere, this form of rough, 'knockabout' industrial fabric and richly diverse culture tends to provide fertile soil for invention. Brunswick was also far enough from the central business district to be affordable, yet close enough to be well served by trains, trams and buses.

In response to what they saw as this entirely "broken housing system", local firm Breathe Architecture purchased a site in Brunswick, and over the next six years, with help from ethical developers, completed what would be an inhabited prototype of the Nightingale model called The Commons, in 2013.

The first Nightingale-proper building, across the street from The Commons, was purchased in 2014, by what was now a broader consortium including leading architecture firms and impact investors. Homes in Nightingale 1 were sold at cost for set prices, through a ballot process which has continued as the method for offering fair access to Nightingale homes.

As the projects developed, into Nightingale 2 and 3 and beyond, an independent not-for-profit entity, Nightingale Housing, emerged to drive project delivery forwards, now managing site acquisition, financing, construction delivery and community engagement. As at June 2023, 411 homes had been delivered by Nightingale, with a further 254 homes under construction and 380 in planning. The recently completed Nightingale Village development is a cluster of six neighbouring buildings, each designed and developed by a different award-winning Melbourne architect.

Given the city's context, it's hard to overstate what a breakthrough this is: highly sustainable buildings by almost any measure, yet sold at cost by a not-for-profit developer, and with in-built financial structures that ensure ongoing affordability.

The Nightingale model

All Nightingale developments are 100 per cent carbon neutral in their operations and meet a minimum of 7.5 NatHERS (the national housing energy rating scheme). All buildings are fossil fuel-free, and they include rooftop solar and water harvesting for productive shared gardens. They are also essentially car-free and are located close to public transport and bike routes, and with ample bicycle parking. The apartments are designed to reduce operating and maintenance costs, for both environmental and affordability reasons combined. Material is pared

back, with a strong focus on energy efficiency, built around high thermal insulation, no air conditioning, passive ventilation, and shared rooftops with vegetable patches and communal laundries.

Yet these market-leading sustainability outcomes are delivered 'at cost': as a not-for-profit, each Nightingale home is sold for what it costs to procure, design, manage and construct. Nightingale homes are only sold to owner-occupiers and community housing providers (CHPs), with buyers pre-selected using a ballot system. They are not sold to investors, mitigating against the financialisation which Josh Ryan-Collins[1] has shown as directly leading to unsustainable housing.

In each project, 20 per cent of apartments are allocated to CHPs and a further 20 per cent to essential service workers, Indigenous Australians, people with a disability, carers, and single women aged over 55. The model also has a strict resale process to ensure long-term affordability. Apartments that come up for resale must first be offered to someone in the community and the maximum resale price of the property cannot exceed the price initially paid for it (excluding stamp duty) plus the percentage increase in median house prices for that suburb. This helps to deter speculation upon the margin between the sale price and the market value.

Material impact

Nightingale's sustainability approach is based around 'reductionism', an attempt to reduce costs and environmental impacts for their residents by paring back aspects of the development in order to use resources – environmental, cultural, financial – more effectively elsewhere.

The developments remove elements which typically add significant cost to a project – agent fees, marketing campaigns, on-site car parking spaces, second bathrooms and individual laundries – as well as reducing energy consumption, carbon emissions and waste in the construction, operation and maintenance of each building.

Often working in brownfield areas, Nightingale's 'reductionism' starts at the demolition phase, where any existing structures on site are dismantled and salvageable materials are recycled where possible. Their design not only saves internal space in the apartments, but also reduces associated construction costs.

Yet Nightingale Village is also *generous*, via its shared spaces and amenities at the scale of the building and street, and to the community beyond. Reducing duplication inside apartments also allows for each of the architects involved to foreground connections, helping to foster community by providing a place for residents to cross paths and engage with each other. Beyond the edge of the buildings, active street frontages, vibrant planting and open spaces, tactile pedestrian experiences for passers-by, and commercial spaces for values-aligned businesses – such as a not-for-profit bike shop – help to create connected communities across the neighbourhood.

Social impact

In Melbourne, architecture is typically practised in unrelated single buildings. These buildings are sometimes excellent in themselves yet can be unsuitable next to each other and the spaces and services in between are frequently left 'out of scope'.

Uniquely, Nightingale Village has offered the opportunity to produce a group of buildings where a new balance of simple, well-thought-through apartments might also cultivate complex shared interactions – again with a goal of minimising its negative environmental footprint while maximising its positive social impact at the same time ("building less, to give more").

Individual, distinctive residential blocks are set within the common identity of street and building interfaces, a shared network threaded between courtyards and roof terraces. Residents mingle along the active street edges, on oversized access decks adjacent to borrowed light wells, in their common laundries and on the elevated setbacks where washing lines, pet-friendly spaces and barbecues create a sense of collective life.

By blurring the boundary of the buildings with the neighbourhood around, and by visibly diversifying a monolithic housing market, Nightingale indicates that true sustainable development cannot happen without also addressing housing tenure, ownership, financing, operating models, public discourse and civic engagement. This careful architecture of shared spaces and amenities, within a medium-density urban form, allows for both affordability and sustainability entwined.

Conclusion

Nightingale offers us much food for thought. Ideas of shared spaces, common ground, open form and collective participation are clearly not new, but Nightingale has infused them with a strong environmental and social agenda within Melbourne's complex context. The inventive architecture of its buildings is matched by that of its organisation and business model. Nightingale manages to speak truth to its immediate surroundings – residents, community, environment – as well as to the climate crisis, systemically drawing together neighbourhood-scale, urban-scale and global-scale concerns. It has done this with little or no governmental or institutional investor support, within the context of the city's highly financialised housing sector, and within a state which is increasingly at the front line of the climate and biodiversity crisis. The Nightingale model may not directly scale outside of Australia, but its practices, principles, ideas and sheer sense of ambition could spread far and wide.

Nightingale's architect- and community-led non-profit sustainable and affordable housing innovation, produced under extremes, has undoubtedly changed the city. It has raised the ambition for housing in Australia, by diversifying the way we create sustainable, just and convivial places, resilient within the next climate. What might work elsewhere?

Dan Hill
Director of Melbourne School of Design,
University of Melbourne
Alan Pert
Deputy Dean, Faculty of Architecture, Building and
Planning, University of Melbourne

Facing page (top): The Nightingale residential apartments, designed by Hayball, establish a direct relationship to the street and the surrounding townscape. © Tom Ross
(bottom): Taking advantage of Melbourne's climate, the apartments are designed to maximise healthier lifestyles with shared communal terraces and rooftops that promote outdoor activity and sociability. © Tom Ross
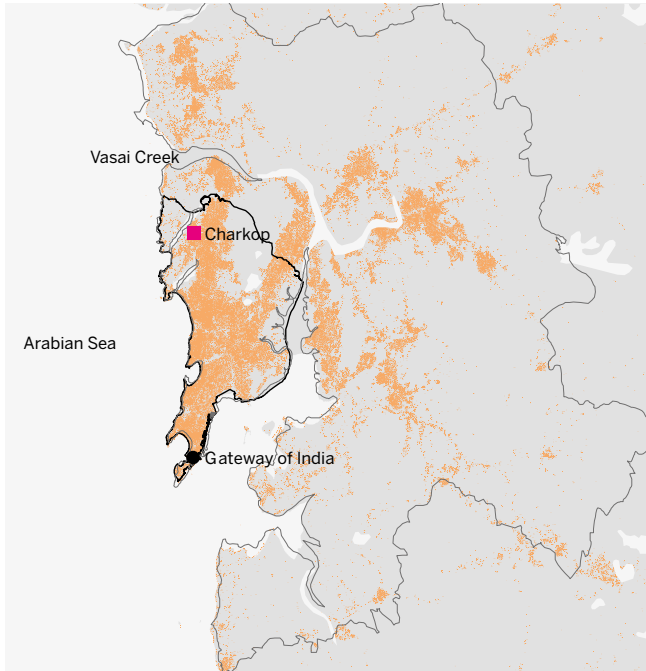
Map of Mumbai

■ Case study area
● Point of interest
▢ Metropolitan boundary
▭ City boundary
■ Urban footprint

0   20 km

Start date	1979
Completion date	1993
Funding body	World Bank
Implementation authority	Maharashtra Housing and Area Development Authority (MHADA)
Land tenure	Public land leases
Size	1.5km²
Units	25,150
Number of residents	Over 125,000
Size of individual plots	Ranging from 21m² to 100m²
Average courtyard size	400m²

A typical street in the Charkop housing scheme in North Mumbai showing how housing units of different sizes have been adapted since their construction in the 1980s, maintaining an active frontage at ground level. © Rohan Verma

Sites and Services Scheme, Charkop, Mumbai, India

The Sites and Services model emerged in the international development sector in the 1970s as a means of providing shelter to the poor in India's rapidly urbanising areas. The schemes were designed to offer small, serviced plots for sale to low- and middle-income residents, sometimes with a core housing unit. The idea was that, over time, residents would build out and develop their own homes incrementally, based on the specifications provided in the scheme with subsidised housing loans to enable construction. The central mandate of this approach was to facilitate incremental growth through a formal framework of subsidies and building norms.

The Sites and Services Scheme at Charkop in Mumbai was located on reclaimed marshland in a remote location north of the city. Launched in 1979, it was part of the World Bank-funded Bombay Urban Development Project. The Maharashtra Housing and Area Development Authority (MHADA), the state government's housing agency, was the implementing authority.[1]

Targeting communities living in Mumbai's informal settlements, the World Bank and MHADA planned 25,150 units on the site and aimed to ensure that a minimum of 45–55 per cent of units would be occupied by families on very low incomes (in the 10th to 35th percentiles of the Bombay Metropolitan Region income distribution) and 10–20 per cent occupied by families on low incomes (in the 35th to 50th percentiles of the income distribution).[2] To attract different income groups, the scheme incorporated a range of different plot sizes, from 21m² to 100m². Pricing and payment plans were tailored to different income groups, based on analysis of household incomes and affordability. Higher-income residents and commercial occupants were charged market rates for larger plots and required to pay the full purchase price upfront. Profits from these sales subsidised the costs of smaller plots which were sold to lower-income residents who could pay for their plots through monthly instalments over a period of 20 years. All plots were sold to households on long-term land leases from MHADA. To optimise the use of land and keep costs down, the developers planned for a target density of 725 persons per hectare, much higher than the densities of 414 persons per hectare that were common in large Indian cities at the time.

Mangrove

Open space
Green space
Amenities (ground floor)
Education
Bus stop
Metro

N

Scale: 1:15000

The satellite view of the Charkop Sites and Services housing scheme illustrates the clear urban structure and scale of the intervention and its proximity to the Gorai Mangroves, while the surrounding urban landscape of residential towers and wide boulevards erected since its completion appear fragmented and lack a sense of identity. The map indicates how the original masterplan placed open spaces and public amenities – schools, temples, health centres – at the heart of the scheme in a successful effort to create an integrated and inclusive piece of city rather than an isolated housing ghetto. Image (collected March 2023) © European Space Imaging

Due to its remote location and lack of transport links to the primary business districts and employment centres of the city at that time, the scheme suffered from a seemingly low rate of occupation and general interest in the scheme in the years after completion, and was considered a failure by the World Bank. However, over the years, Mumbai's northward expansion and improvements in the transport system have meant that Charkop is now much more accessible to centres of economic activity and potential livelihoods for the occupants of this housing scheme. A rise in household incomes has also facilitated increased mobility for the residents to and from the city more broadly.

Two decades after the Sites and Services model was largely abandoned by the World Bank, a team of researchers from the World Bank re-evaluated the developments and concluded that their scheme had worked. They estimated that 99 per cent of units had been built out by homeowners since the project's completion, with many adding additional floors for tenants or extended family. This had led to higher densities than the originally planned 725 persons per hectare estimated to be around 1,100 persons per hectare. They found that the area had retained its mixed-income character and continues to benefit low-income residents. The cross-subsidy model also proved to be a success, with the costs of development and infrastructure provision fully recovered by the project completion date in 1993.

In a city like Mumbai, where around 42 per cent of the population still lives in slum-like conditions, any formal housing scheme with good infrastructure will eventually get built out or occupied. What makes Charkop more successful than other housing schemes are the informal incremental additions that households were able to make outside the remit of the original design where building specifications were stipulated, and the process was regulated through economic subsidies which intended to ensure some consistency in construction.

The formal entrance to one of the many housing courtyard clusters that define the Charkop Sites and Services Scheme, Mumbai. © Kunal Bhatia (Studio Kunal Bhatia) Sameep Padora & Associates

Detailed map of the Charkop Sites and Services Scheme, Mumbai

Legend:
- Open space
- Green space
- Amenities (ground floor)
- Education
- Medical
- Banks
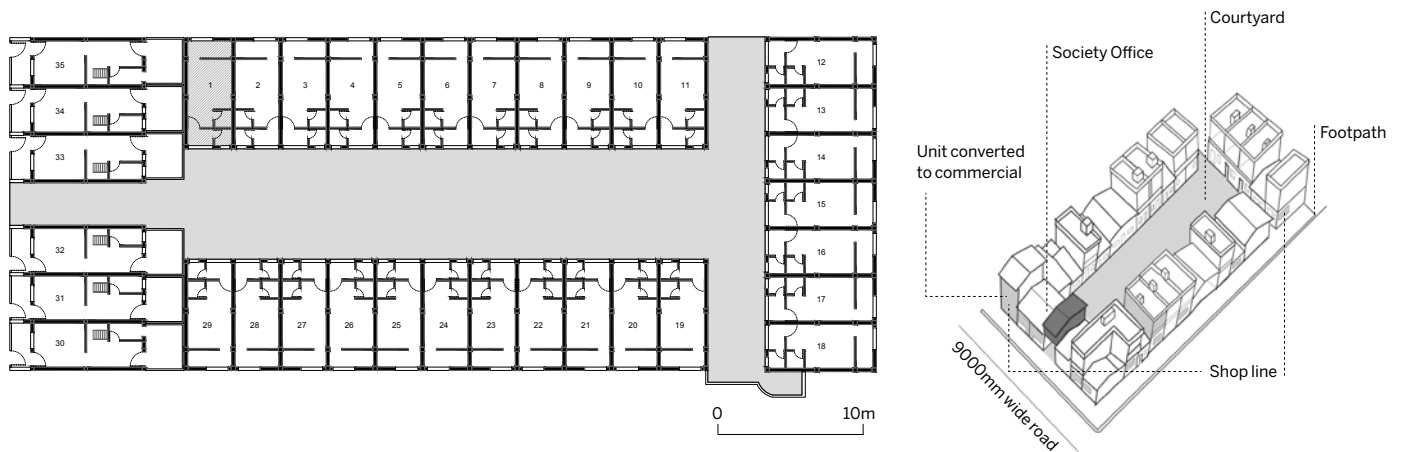
The basic courtyard was originally conceived as a regular layout with apartments of varying modular size. Over time, the individual residential units have been modified internally and externally to create a more diverse environment. Courtyard layout © Housing in India: Mapping of Precedents and Prototypes, 2018

Labels: Courtyard, Society Office, Footpath, Unit converted to commercial, Shop line, 9000mm wide road

The Charkop masterplan was designed around a basic courtyard unit with house types of different sizes to cater to different income groups. The courtyard unit is repeated across the entire site and intersected by shop-lined streets and a wider cross-axis with schools, temples and other institutions set within a broad corridor of open spaces (often used for festivals, celebrations, community events and cricket matches). The inner courtyard forms the core of a cluster of homes, sustaining a more domestic dynamic for resident families, while shops and commercial units face outward on the lateral streets to participate and engage with the transactions of the wider city economy. The architecture and construction of the individual house units were designed intentionally to be modified and expanded to accommodate the changing needs of individual families in line with their own changing economic and demographic prospects. This programmatic strategy and the built-in flexibility accommodate a more metropolitan mix of uses than a traditional single-use, large-scale housing project.

Housing unit

Shop unit
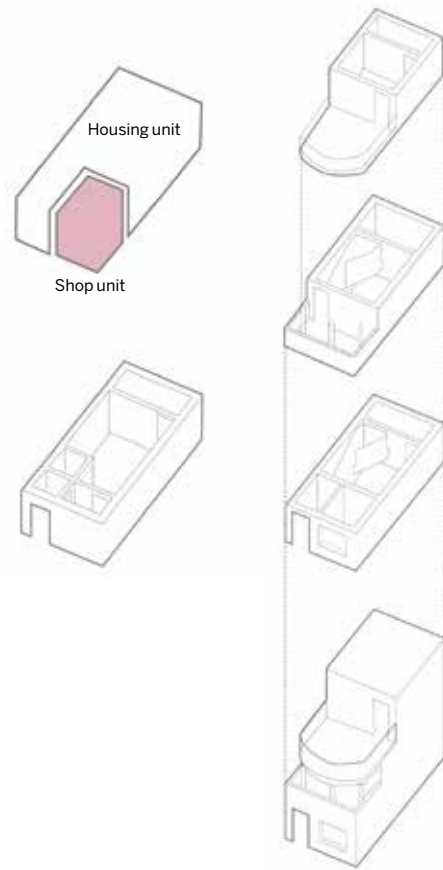
Top left: One of the many housing units that have converted the ground floor into a shop with residential above. © Harvard Mellon Urban Initiative

Top right: Diagrams illustrating how the basic two-storey unit has been adapted with a commercial unit at ground floor and extra stories added to provide more accommodation.[4]

Above: Interior kitchen area of one of the residential units. © Kunal Bhatia (Studio Kunal Bhatia) Sameep Padora & Associates/Harvard Mellon Urban Initiative

Right: A small commercial unit provides a valuable service to the community and a source of income to the landlord. © Aditya Sawant

Top: The residential courtyard supports the more domestic family life in a protected and enclosed environment with pedestrian access and visibility to the surroundings. © Philipp Rode

Bottom: Since its completion, the Charkop Sites and Services Scheme has become a genuinely vibrant and integrated part of North Mumbai's DNA with a typically vibrant street life that coexists with the residential neighbourhood. © Philipp Rode

Incrementalism and adaptation in housing design

Creating integrated and inclusive environments which respond to the changing needs of residents has been a challenge for urban planners for decades. The Charkop housing scheme in Mumbai, the authors argue, provides a model for how to design in adaptability in an incremental and sustainable way.

Mumbai falls short when it comes to providing adequate affordable housing to all its citizens. The Maharashtra Housing and Area Development Authority (MHADA) has provided affordable housing in the form of slum rehabilitation schemes or through the construction of new housing for low- and middle-income groups, but these initiatives have provided homes for only a small percentage of residents in need. It is also limited in terms of housing typology in that the housing is typically built as purely residential apartment buildings within gated enclaves, and increasingly in the form of high-rise buildings that have been described as "vertical slums". When compared to these solutions, the Sites and Services Scheme in Charkop provides an alternative worth re-examining.

During the late 1970s and 1980s, the World Bank advocated for a reduced role of the state in housing delivery in India. The Sites and Services model was designed to enable the public sector to act as a facilitator in the provision of housing for low-income groups, while involving residents and private enterprise in its delivery. In the case of Charkop, the state provided basic infrastructure such as water, electricity, roads, drainage and sewerage networks along plotted land parcels, and households themselves built the housing units through private contractors as per specifications provided by the World Bank and MHADA. The scheme was originally planned to support a population of about 125,000[1] people and today consists of approximately this population spread over a total of nine sectors across an area of 1.5km^2.

What distinguishes Charkop from other housing projects in the city of Mumbai is the quality of life it provides to residents while also remaining affordable to low-income groups. This is a result of three important aspects.

The first is the possibility of informal incrementality in terms of vertical expansion of the units and using the residential spaces for livelihood activities.

Houses were originally designed as ground-floor structures with mezzanines covered with cement corrugated roofs. Today, most of these houses have additional rooms and floors that have been built onto the original structure. In many cases, these rooms have been converted into shops or workspaces or rented out by residents for supplementary income.

This flexibility also extends beyond the individual housing units. The Charkop scheme was structured at three scales – the housing unit, the cooperative housing society, and the sector grid where the housing societies aggregate. Houses were clustered into housing societies of 35 units, centred around a shared open courtyard. These housing societies were planned along a sector grid of streets that underpinned the entire scheme, with each sector allocated plots for schools, community centres and open spaces or maidans. Since project completion, this street network has become a vibrant public realm that has enabled the growth of other types of uses such as grocery shops, small service shops, gymnasiums, playschools, temples, doctors' clinics, newspaper stands, moneylenders, offices, bakeries, vegetable vendors, meat shops, beauty salons and small restaurants. Many of these uses were never planned or anticipated as part of the original scheme. However, the flexible street grid was able to absorb the increase in built form without resulting in slum-like conditions. The government's lax implementation of original land use regulations in the Sites and Services Scheme allowed this monofunctional residential project to organically evolve into a vibrant multiuse neighbourhood.

The second feature critical to the success of the scheme is the inclusion of plots for middle- and high-income residents. These were lesser in number than the low-income housing units, but they helped to sustain the different shops and services that emerged and created livelihood opportunities for the lower-income groups. Significantly, too, because of the mix of income groups, the Charkop scheme was not perceived as a purely low-income housing project which sometimes carries negative perceptions, but instead was always perceived as a diverse but integrated neighbourhood of the city.

The third crucial aspect of the scheme is the scale of the project in terms of area and population. The scheme has become a neighbourhood integrated into the city instead of remaining an isolated project. The scale of the scheme in terms of population also led to the provision of affordable transport connections in

the form of a bus system to the nearest mass transit stations of the city. This provided some connectivity to primary employment centres.

In this model, the basic unit of the city – the house – is adaptable which, by extension, makes the entire urban neighbourhood open to change. The user-driven process of incremental design and construction has created a much richer texture of building form and urban fabric than the traditional housing schemes, where uniform units are constructed by the state or private developers with little consideration of the varying needs of residents. In Charkop, diverse forms of architectural expression are all held together by a low-rise, high-density model.

So why, then, was the scheme considered a failure by the World Bank after completion, and why was the Sites and Services model for providing affordable housing in the city abandoned? One answer may be that the success of the scheme at Charkop lies more in how it has evolved rather than the metrics that were established at its inception. The scheme was planned as a purely residential development for households which at the time lived in informal settlements in Mumbai. It was considered a failure because at the time of project completion it did not attract those households that were targeted as part of the project to the new residential district. But if we move away from this narrow short-term metric and evaluate the project through the lens of quality of life and affordability for the low-income groups that did eventually settle there, the scheme can be seen as a success. This is especially true when Charkop is compared to the other low-income housing projects in the city. It is therefore crucial to understand the role of 'design' that allowed this informal unplanned incremental evolution and the eventual success of the project.

Despite its successes, the Sites and Services Scheme is not today considered an affordable housing model for Mumbai or for other cities in India. One of the main challenges in advocating this model is the availability of land. The land in Charkop was acquired through the reclamation of wetlands along the Mumbai coast which would not be permissible today under the national coastal regulations which protect the natural environment. City and state governments are reluctant to acquire land for low-income housing due to lack of capacity and political will, together with an aggressive real estate market which makes land acquisition difficult. However, there are more than 50 cities in India today that have populations of more

than 1 million[2] and that are rapidly expanding due to migrations from smaller towns and rural areas. They urgently need affordable housing. By facilitating adaptability and incrementality, the Charkop Sites and Services Scheme offers an effective and inclusive model for the provision of adequate and affordable housing in emerging megacities, as well as in medium-sized towns.

In fact, it serves as a model that should be seriously considered to address the challenge of housing solutions that engage both the public and private sectors in equal measure. The state here provides the armature for development, allowing individuals to drive the actual production of housing suited to their needs. In the contemporary context where, globally, the state has been unable to solve the housing needs of society, Charkop shows us how society itself can be productively engaged in the process of making homes, neighbourhoods and by extension the city itself.
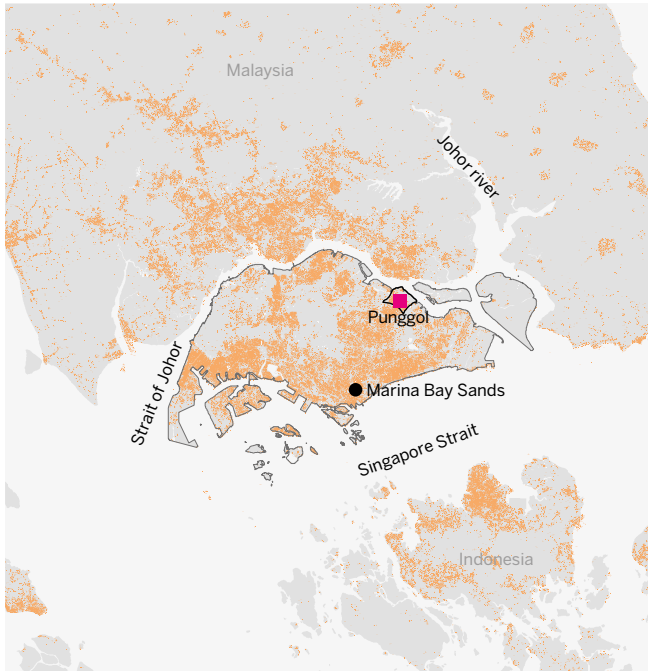
Rahul Mehrotra
Founder Principal, RMA Architects, and Professor, Graduate School of Design, Harvard University
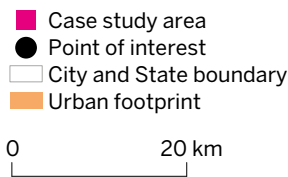**Aditya Sawant**
Assistant Professor, Kamla Raheja Vidyanidhi Institute for Architecture and Environmental Studies

Map of Singapore

■ (magenta) Case study area
● Point of interest
□ City and State boundary
■ (orange) Urban footprint

0   20 km

Start date	1996–ongoing
Developer	Housing & Development Board (HDB) (Government of Singapore)
Land tenure	Public land leases
Size	9.57 km²
Units	Approx 58,000 units under HDB's management (2023)
Number of residents	187,800 (2023)

Singapore delivers public housing to over 80 per cent of its citizens, building high-density mixed residential neighbourhoods like Punggol New Town which are fully integrated with nature and the city-state's public transport systems.
© Alamy

Punggol New Town, Singapore

Situated on the Tanjong Punggol peninsula in the northeast region of Singapore, Punggol was initially developed from a rural fishing village into a New Town by the government's Housing & Development Board (HDB) in 1998 under the Punggol 21 Plan. It is representative of the Urban Redevelopment Authority's decentralisation strategy, with polycentric, well-connected, mixed-use urban nodes (New Towns and Estates) distributed around the island. Residents live within relatively easy access to places of work (including the city centre) and close to shops, recreational facilities and services. While construction of Punggol New Town slowed following the 1997 financial crisis in Asia, it was given new impetus by the Punggol 21+ Plan to rejuvenate and expand the original plans. At the time of writing, Punggol is one of 24 New Towns in Singapore, with just over 50,000 flats developed by HDB and an estimated residential population of 187,800.[1]

When fully developed, Punggol Town is expected to yield 96,000 residential units, comprising of a mix of high-density public and private housing blocks located within easy reach of the city's efficient public transport system, as well as a local bus and cycle network. Most housing units are located within 400 metres of the nearest Light Rail Transit (LRT) station which incorporates retail units and public areas.

As in other HDB developments, households of varying income levels are accommodated in Punggol and range from one to four bedrooms for different household sizes within the allocated ethnic quotas. The majority of HDB apartments have been sold to residents on 99-year public leases, but some are rented on the private market to lower-income residents. In terms of housing mix, 60 per cent of the units in Punggol are designated as public housing, 30 per cent as private housing and 10 per cent as executive condominiums.

Surrounded by water on three sides, the original masterplan for Punggol New Town – 'A Waterfront Town for the Twenty-First Century' – was inspired by its relationship to nature and the environment and has since been adapted to take account of changing priorities and opportunities, with a strong focus on technology and sustainability. To optimise local economic growth, the government has invested in the Punggol Digital District, a growth cluster for digital

and cyber-security industries closely integrated with local industry, academic institutions and the residential community, which is currently under construction and due to be completed in 2026, bringing 28,000 new jobs to the area.[2]

Reflecting the HDB's urban design and planning approach to its New Town portfolio, Punggol has been designed at different scales.[3] At the district scale, the plan seeks to build a distinct identity for Punggol by responding to its geographic location: its proximity to coastlines and the presence of water. At the neighbourhood scale, the scheme defines the streetscape and public spaces of each local area based on a specific 'urban character'. Residential blocks of between 2,000 and 3,000 units are clustered around open landscaped spaces and integrated with community facilities such as schools, places of worship and common green spaces. On a more granular level, for precincts of between 400 and 600 residential units, the plan sets out designs for playgrounds, exercise circuits, and street and park furniture.[4]

With HDB embracing quality and sustainability for its new generation of mixed-use projects, greater attention is paid to sense of place, identity, culture and the environment. A critical design feature at the heart of this new neighbourhood is the new 4.2km Punggol Waterway, which acts as a recreational hub for residents and visitors alike but also adds to Singapore's freshwater reserves and mitigates flood risk. It serves as a key connector between different parts of the New Town, with a promenade and public spaces along its banks facilitating social interaction. Similarly, the Old Punggol Road – a key historical landmark, formerly the main transportation route for agricultural and fishing goods serving the farms and 'kampungs' (Malay term for a traditional village) in the area – has been transformed into a Heritage Trail Park which will allow pedestrians and cyclists easy access to housing areas and the future Digital District. To improve connectivity and encourage green commuting, a comprehensive intra-town cycling network and Park Connector Network (PCN) have been planned – including a linear green activity corridor below the LRT viaduct creating links to the waterway and the Punggol Digital District.

In its efforts to create a 'piece of city' as opposed to a dormitory town, the design team has successfully added layers of complexity and variety across the New Town and its constituent parts. Investment in jobs, education, welfare, health and well-being are driving some of the newer additions to this

'city-in-the-making'. The Punggol Town Hub, which opened in October 2022, for example, is a one-stop community facility providing residents with a range of services and amenities, including a hawker centre (a traditional open-air complex with food stalls selling affordable food), regional library, community club, child and senior care centres, and a health centre with blood testing and kidney dialysis services. The upcoming Punggol Regional Sports Centre will soon provide community sports facilities in addition to training spaces for national athletes.

Behind the dense, efficient and compact layout of the evolving New Town, Punggol is maturing into a diverse urban habitat which attempts to balance residential living with demographic change, economic development and environmental sustainability. The progressive delivery and procurement process which has driven Singapore's housing policy thus far is being revised and modernised at the spatial level, offering urban design insights to urban policymakers and city-shapers alike.

This is an edited version of short text by Lay Bee Yap (Urban Redevelopment Authority) and Fook Loong Chong (Housing & Development Board), 'Cultivating a place identity in Punggol', submitted to the Council on Urban Initiatives, June 2023

Despite the sheer scale and massing of Singapore's high-rise residential projects, they are well connected to public services (schools, light rail, buses, health centres) with access to local shops and community facilities (playgrounds, swimming pools, hawkers' markets) which generates a degree of urban activity at the heart of the housing communities. Images (clockwise from top left) © Alamy; © Urban Redevelopment Authority; © Housing Development Board Singapore; © Housing Development Board Singapore

SERANGOON HARBOUR

Coney Island

SERANGOON HARBOUR

SENGEI PUNGGOL

Punggol North Avenue

Punggol Way

Punggol Road

Punggol North Avenue

Open space
Green space
Amenities
Education
Bus stop
Metro line and metro stop
Cycle lane and pedestrian
footpath/walkway

N

Scale: 1:17000

Built on reclaimed land over a 30-year period, each phase of Punggol New Town is designed as an integrated cluster that is connected to the metropolitan, district and local scale. The sheer height and density of the developments are mitigated by carefully landscaped spaces and waterways along green corridors that improve the microclimate and encourage healthier lifestyles. Image (collected August 2023) © European Space Imaging

Green space
Play areas
Swimming pools

Each cluster of tall residential towers in Punggol New Town makes the most of the tropical climate and lush vegetation with buildings and open spaces that are fully integrated with nature, water and a highly connected public realm. All images © Housing Development Board Singapore

The town, the neighbourhood and the precinct are the three scales on which each of Singapore's 24 New Towns are developed. The town layer offers the overall vision for the town, as well as information about its landmarks and the key routes to connect the city. The neighbourhood layer, also known as the district layer, determines each area's history and personality. The precinct layer, a ground-level manual, provides specifics on how each project will be designed, including the kind of playgrounds or street decor. Punggol's coastal setting and surrounding vegetation serve as sources of inspiration on a local level. Eleven housing districts, each with a unique character, are planned for the town. To establish small, close-knit communities, each district is further divided into estates of 2,000 to 3,000 flats.

The recently completed Punggol Northshore District is designed with public-facing functions that respond to the needs of the residential community, including a new facility that caters for its elderly residents with exercise areas, meeting rooms and performance spaces. Plans © Housing Development Board Singapore; image © Ricky Burdett

- Neighbourhood centre and shopping
- School
- Elderly pavilion
- Precinct pavilion
- Green space
- Adult/elderly fitness stations
- Punggol cycle/pedestrian walkway
- Metro system

Punggol New Town, Singapore. © Alamy

Delivering affordable and adequate housing as a human right

After five decades of implementation, Singapore's housing procurement model remains unique in its ability to deliver consistently high numbers of public housing units in quality environments that are fully integrated in the life of the city.

Singapore is a small island city-state in Southeast Asia. Its ethnically and linguistically diverse population of over 5.6 million[1] – with citizens of Chinese, Malay and Indian origin as well as foreign-born residents – live in close proximity on a relatively small footprint of only 728.3 square kilometres.[2] For over 50 years, the Government of Singapore has pioneered a radical and effective approach to housing, providing a model of policy development, design innovation and efficient implementation. Over 90 per cent of the relatively scarce land available in the city-state is publicly owned, with the government operating a leasing system for housing which is sold to eligible residents on 99-year leases.[3]

More than 80 per cent of residents live in publicly developed housing units in Singapore, most of which are owner-occupied. A smaller percentage are housed by the private sector which operates within this robust public political infrastructure. Singapore's unique public development home-ownership model is based on the interrelationship of three institutional and policy levers: the supply of housing through the public Housing Development Board (HDB); the supply of land through the Land Acquisition Act of 1966; and the demand-side subsidy of home ownership through mortgage financing.[4]

The national public housing authority was established by the first elected Government of Singapore in 1960 as part of a slum clearance programme, designed to alleviate severe overcrowding and tackle poor-quality housing. In its early days, the HDB focused on accommodating a large number of low-income residents quickly and cheaply in multi-level apartment blocks, but by the 1970s the focus had shifted to the provision of good-quality new housing for a wider cross-section of the population.

On the supply side, the rapid construction of HDB apartments was enabled by the Land Acquisition Act of 1966, which allowed the government to buy land at below-market rates for public purposes, including housing. As a result, the proportion of publicly owned land increased from 44 per cent in 1960 to 76 per cent by 1985. The policy was based on the premise that private landowners should not benefit from increases in land value brought about by taxpayer-funded economic and infrastructure developments.[5]

On the demand side, the government has supported the purchase of housing by Singaporeans through the Central Provident Fund, the national savings scheme which mandates monthly contributions by employees and employers as part of the social security system. Established as a pension scheme by the British colonial government in 1955, the government passed a law in 1968 which allowed the fund to be used for housing mortgages and repayments.[6]

As the proportion of Singaporean residents living in HDB apartment blocks has grown, the government has leveraged its public housing programme to achieve the wider sociopolitical objectives of greater integration among its diverse ethnic populations and promoting nation-building. In 1989, the government introduced the Ethnic Integration Policy which sets a maximum limit for each ethnic group in every HDB neighbourhood or block. While this policy has promoted a degree of mixing among residents of different races, there are separate housing arrangements for other sectors of the population such as foreigners and migrant workers who do not have access to the public housing system.

HDB developments are designed to accommodate different income and demographic groups and cater for a range of household types, with flats of varying sizes available for rent and for sale. Income caps restrict HDB-subsidised flat purchases to Singaporeans on monthly incomes of not more than SGD 14,000 and rental flats to those earning below SGD 1,500 per month. The Executive Condominium Housing Scheme was introduced as an additional housing option for middle-income Singaporeans who earn more than the income cap for HDB flat purchases but cannot afford to purchase on the private market. Income caps do not apply to the resale of HDB flats.

Given the scale and proportion of the population accommodated in Singapore's New Town and housing developments, there has been a concerted effort by planners to create neighbourhoods with a sense of community rather than provide soulless, monofunctional residential projects. While some level of private parking is included in the housing projects, the planning strategy is founded on high levels of public transport use through the extensive Mass Rail Transit (MRT) and Light Rail Transit (LRT) systems which provide affordable options and reduced commuting times. Singapore has been a pioneer in limiting private car ownership through various measures (including a bidding process for the Certificate of Entitlement), encouraging residents to use more efficient and greener modes of transport over many decades.

With some New Towns providing homes for nearly 300,000 residents at extremely high densities (some of the highest in the world), the projects have been designed to break down the scale into urban precincts and neighbourhoods, creating high-rise clusters or 'villages' with a range of collective services and amenities. Built around the concept of walkable neighbourhoods, residents have access to shops, markets and food halls near where they live, with good local public transport and cycle connections to schools, health and childcare centres, as well as parks, nature reserves, swimming pools and water activities. As the average life expectancy of Singaporeans increases rapidly, a major focus of more recent developments has been on age-friendly neighbourhoods, with amenities specifically designed for senior residents.

In many respects, Singapore's public housing has proved a successful model that delivers public housing at scale for a significant proportion of its citizens. However, more than 60 years after its implementation, the model now faces new challenges. A major concern is the impact of rising prices in the private housing market which has influenced the resale prices of HDB flats, rendering them less affordable to younger residents in the early stages of their careers. In addition, some early HDB developments are now fairly close to the expiry date of the original 99-year leases and the government needs a clear policy in place to address the economic and social challenges of this new reality.

These are some of the significant – but not insurmountable – challenges facing Singapore's leadership as it reflects on its housing programme and looks to consolidate its legacy in the face of an increasingly uncertain future. Nevertheless, Singapore will continue to offer an instructive case study for cities around the world and for any government committed to providing affordable and adequate housing as a human right.[7]

Chan Heng Chee,
Professor, Lee Kuan Yew Centre for Innovative Cities, Singapore University of Technology and Design
Winston Yap
Research Associate, Lee Kuan Yew Centre for Innovative Cities, Singapore University of Technology and Design

Notes

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2. According to the World Bank report (1985) the Charkop scheme was planned for 25,000 households. Using the factor of 5, the total population comes to 125,000. But today with the additional rental units added incrementally and multi-generational households, it is safe to assume the population is much higher than this figure.

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Site location map of La Borda, Barcelona (p 5): Joint Research Centre (2015) GHS built-up grid; DIVA-GIS; Gencat.cat Barcelona (2023); and LSE Cities

Can Batlló Masterplan (p 8): OpenStreetMap contributors; Transports Metropolitans de Barcelona (2023); Barcelona City Council (2023); Àrea d'Ecologia Urbana, Gerència d'Urbanisme Ajuntament de Barcelona (2023); Google Maps (2023); Google Earth (2023); Google Street Views (2023)

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Site location map of Plan Terrazas, Bogotá (p 13): Joint Research Centre (2015) GHS built-up grid; DIVA-GIS; and LSE Cities

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Site location map of Nightingale Housing, Melbourne (p 23): Joint Research Centre (2015) GHS built-up grid; Data Vic, Victorian Government (2023); Merri-bek City Council (2023); and LSE Cities

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Sites and Services Scheme, Charkop, Mumbai

Site location map of Sites and Services Scheme, Mumbai (p 33): Joint Research Centre (2015) GHS built-up grid; DIVA-GIS; and LSE Cities

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Site location map of Punggol New Town, Singapore (p 43): Joint Research Centre (2015) GHS built-up grid; DIVA-GIS; and LSE Cities

Masterplan of Punggol New Town, Singapore (pp 46 and 48): Data source: OpenStreetMap contributors (2023); Urban Redevelopment Authority, Singapore (2023); Housing Development Board, Singapore (2023); Land Transport Authority, Singapore (2023); Google Maps (2023); Google Earth (2023); Google Street View (2023); https://estates.jtc.gov.sg/pdd/play; https://www.ura.gov.sg/Corporate/Planning/Master-Plan/Urban-Transformations/Punggol-Digital-District; https://legacy.data.gov.sg/; https://services2.hdb.gov.sg/web/fi10/emap.html; https://www.straitstimes.com/singapore/housing/new-waterfront-district-in-punggol-to-open-over-2000-new-flats-to-be-launched-in; https://stackedhomes.com/editorial/waterfront-ii-northshore-review/#gs.4thnlj

3D View (p 49): OpenStreetMap contributors (2023), Google Maps (2023), Google Earth (2023), Google Street View (2023

COUNCIL ON
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The Council on Urban Initiatives is a research and advocacy platform supporting international, national and local actors to deliver transformative shifts towards a better urban future. The council's work is centred on three interrelated themes: environmental sustainability (the green city), health and well-being (the healthy city) and social justice (the just city). Co-organised by UN-Habitat, UCL Institute for Innovation and Public Purpose (IIPP) and LSE Cities, the council comprises of mayors, academics and practitioners, and is co-chaired by Ricky Burdett (LSE) and Mariana Mazzucato (UCL-IIPP).

Organising Partners

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The UN-Habitat's vision of "a better quality of life for all in an urbanizing world" is bold and ambitious. UN-Habitat works with partners to build inclusive, safe, resilient and sustainable cities and communities. UN-Habitat collaborates with governments, intergovernmental, UN agencies, civil society organizations, foundations, academic institutions and the private sector to achieve enduring results in addressing the challenges of urbanization.

UCL IIPP Institute for Innovation and Public Purpose

The UCL Institute for Innovation and Public Purpose (IIPP) aims to develop a new framework for creating, nurturing and evaluating public value in order to achieve economic growth that is more innovation-led, inclusive and sustainable. We intend this framework to inform the debate about the direction of economic growth and the use of mission-oriented policies to confront social and technological problems. Our work will feed into innovation and industrial policy, financial reform, institutional change, and sustainable development.

LSECities

LSE Cities is an international centre that investigates the complexities of the contemporary city. It carries out research, graduate and executive education, outreach and advisory activities in London and abroad. Extending LSE's century-old commitment to the understanding of urban society, LSE Cities investigates how complex urban systems are responding to the pressures of growth, change and globalisation with new infrastructures of design and governance that both complement and threaten social equity and environmental sustainability.

Knowledge Partner

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on **Urban**
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Impact on Urban Health is a place-based funder, focused on improving health in inner-city areas by understanding and changing how inequalities impact our health. Rooted in the London boroughs of Lambeth and Southwark, some of the most diverse areas in the world, it invests, tests and builds understanding of how cities can be shaped to support better health. Impact on Urban Health is committed to achieving health equity by helping urban areas become healthier places for everyone to live.