

GREENING THE URBAN FABRIC LINEAR, NETWORKED, 3D GREENING

Serge Salat

Urban Morphology and Complex Systems Institute

World Bank

Cities4Biodiversity (C4B Second Deep-Dive Learning

Greening Cities: Urban Nature and Biodiversity

Promote “Nature-Positive” Development

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Life outside buildings is as important as what happens inside them. Green, water, light and earth combine to create a public realm that is rich in natural green life. The well-being of those who live and work can only be enhanced by such a close relationship with nature.

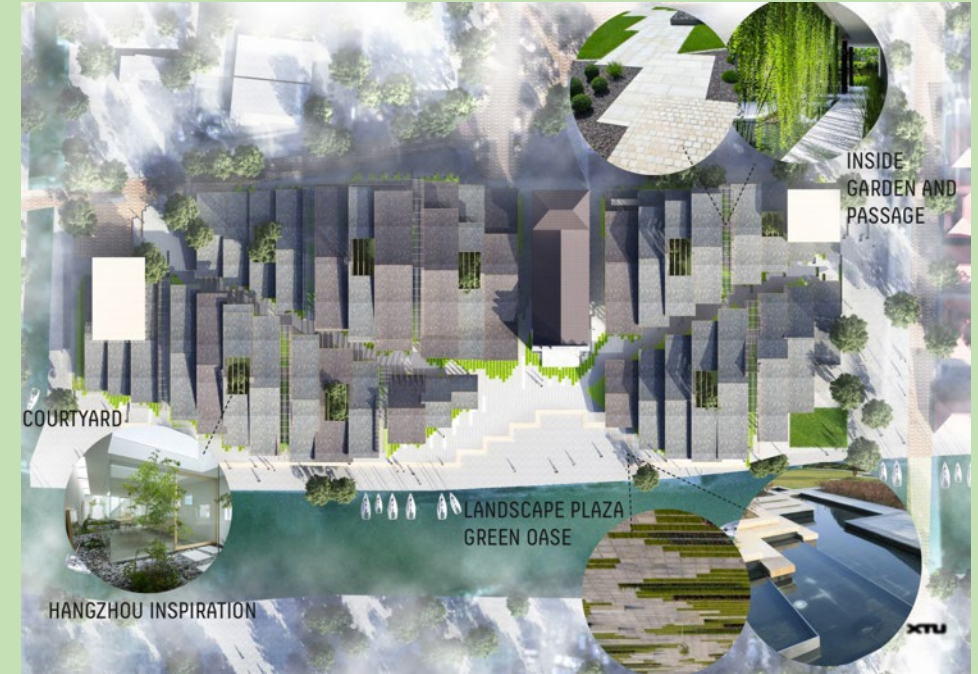
In good urban landscape design the buildings and green landscape are inextricably linked, creating a series of unfolding and everchanging views and vistas as the visitor moves through them.



Nature-based solutions should be integrated at all scales in the urban fabric



*Weaving nature at microscale in the urban fabric in French Dream Town, Hangzhou.
Design: Northern part Serge Salat Architect; Southern Part: Anouk Legendre, XTU Architect.*



- NbS meet climate adaptation and mitigation goals.
- They help biodiversity to thrive and human settlements to become more resilient.
- Incorporating nature in cities improves their liveability, particularly for vulnerable populations, by reducing temperatures, filtering water and cleaning the air.

LESSONS FROM HISTORIC CITIES: GREEN CITIES AND BLOCKS EMERGING FROM THE GREEN LANDSCAPE



LINEAR GREEN CONNECTORS FOR URBAN REGENERATION



NETWORKED GREEN FOR URBAN REGENERATION

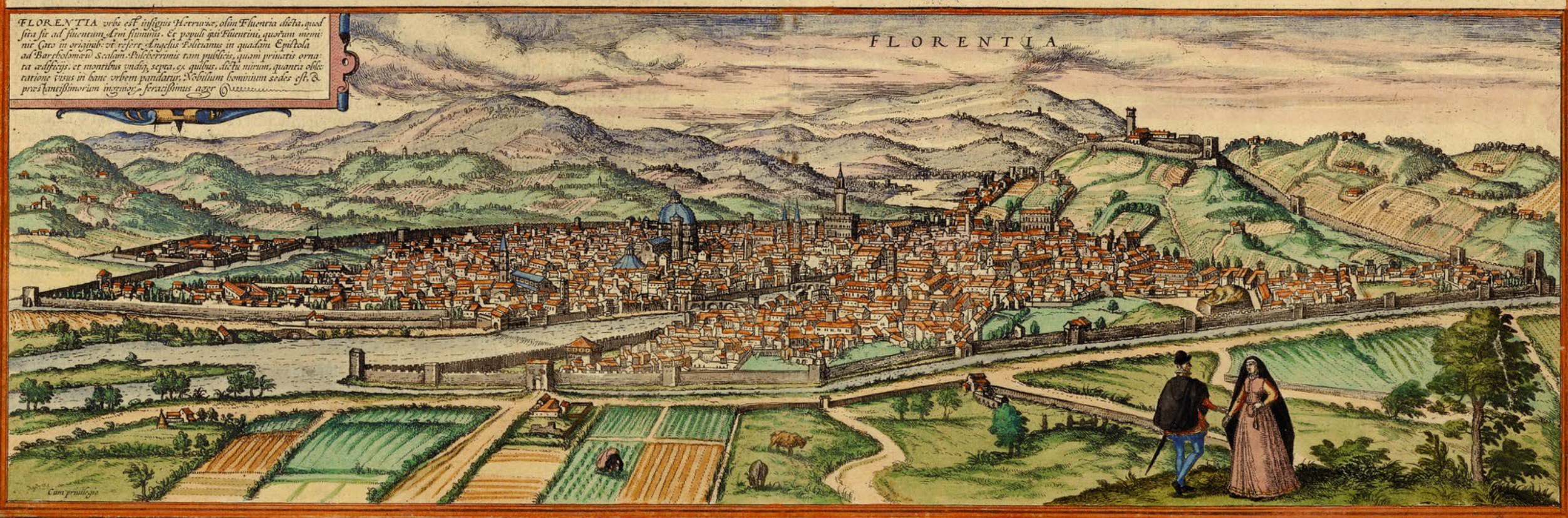


THREE DIMENSIONAL GREEN REGREENING MORE THAN 100 % OF THE ORIGINAL PLOT



LESSONS FROM HISTORIC CITIES: GREEN CITIES AND BLOCKS EMERGING FROM THE GREEN LANDSCAPE

Topographical urbanism in 16th century Florence



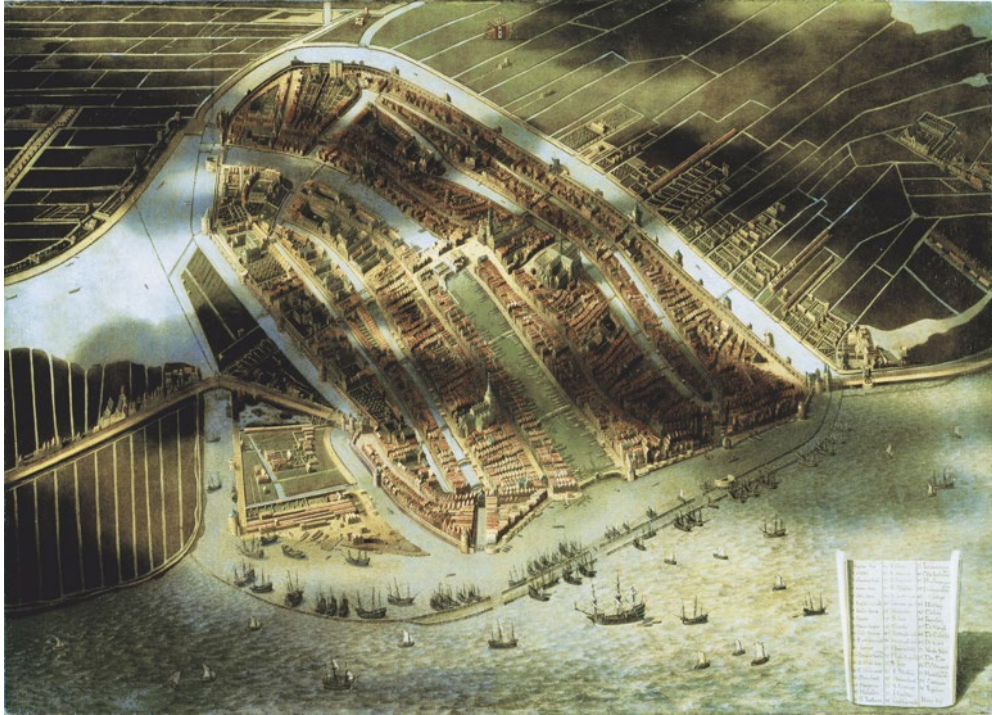
In historic cities there was no separation between the green landscape fabric and the urban fabric. The urban fabric emerged organically from the shapes of fields, irrigation canals and from the landscape topography

Blocks were developed around their perimeter and included urban agriculture and gardens within them.

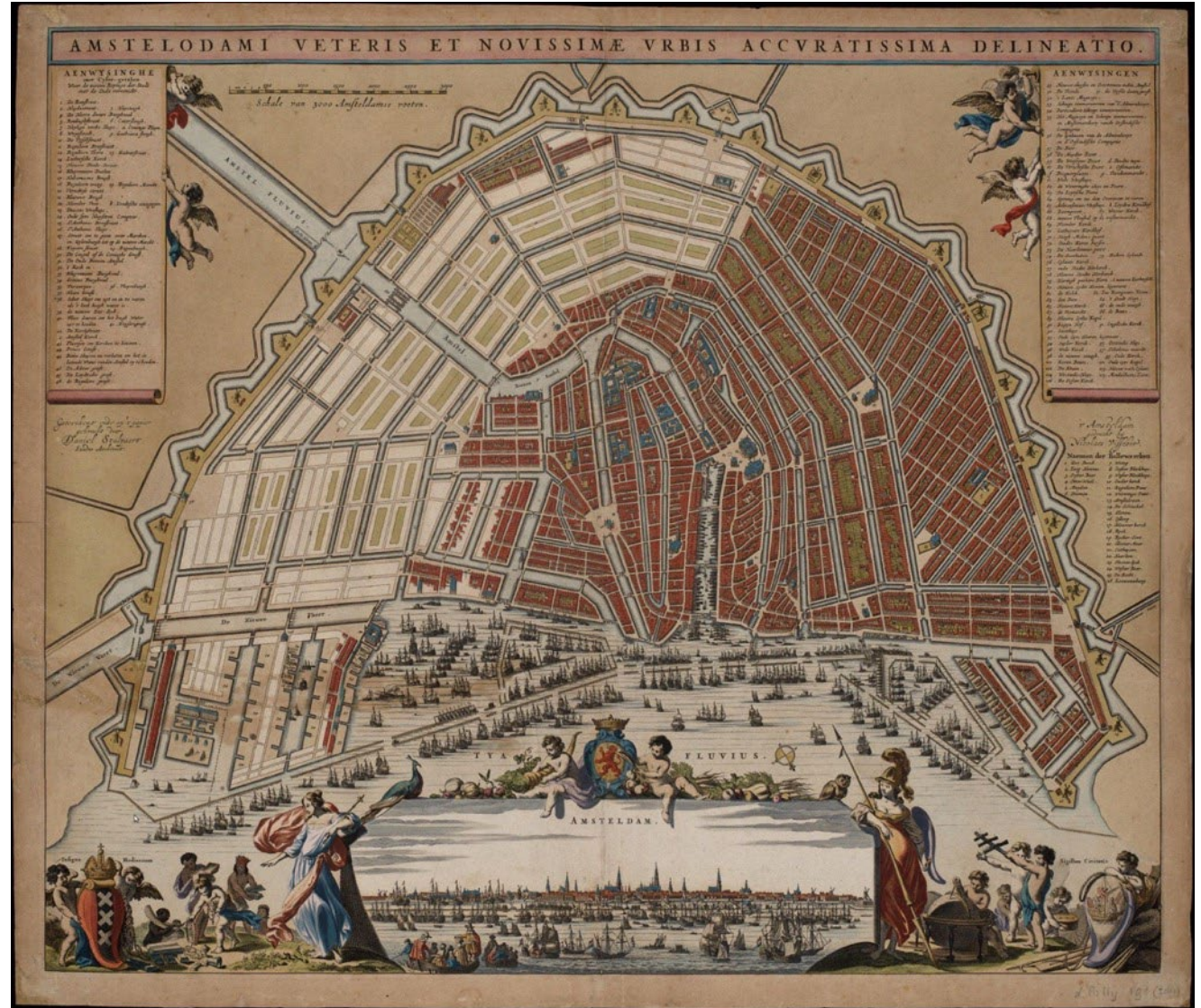


Paris 16th century

Amsterdam extension during the 17th century Golden Age followed the fields and irrigation canals pattern



Amsterdam 1500



Amsterdam 1625

Inner green blocks and row houses in Amsterdam



Amsterdam block types, 1876.

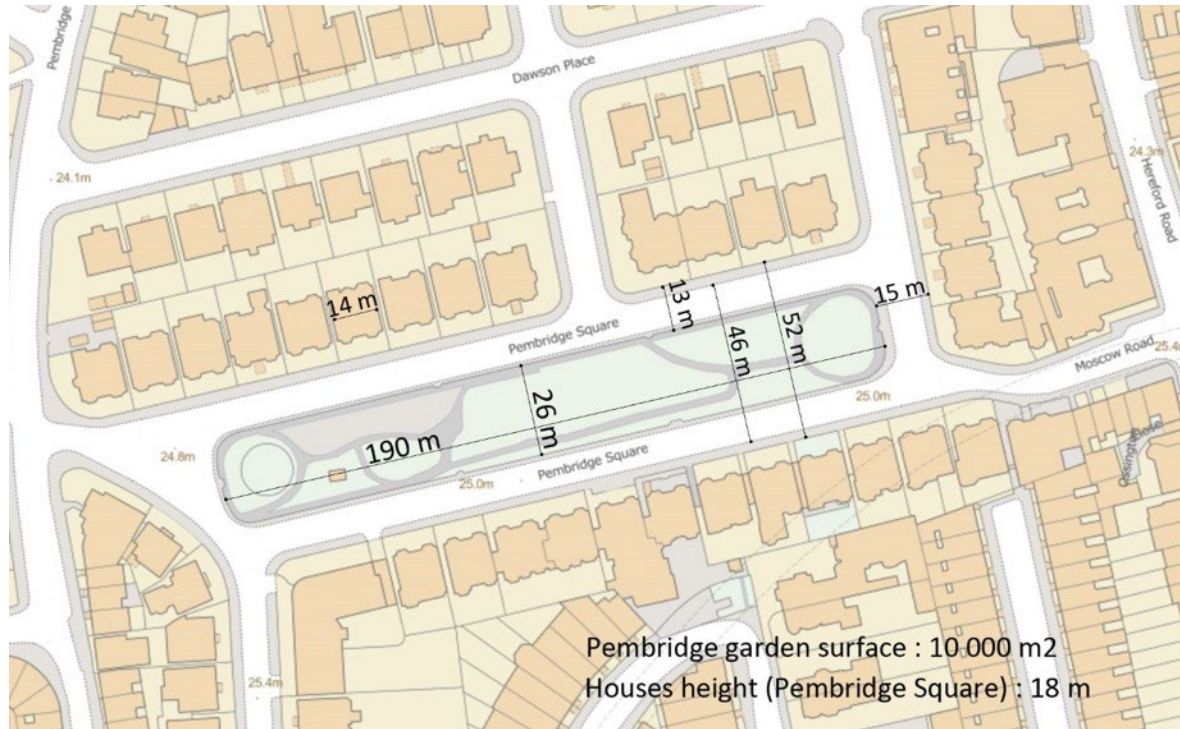


The spaciousness and shape of the gardens inside Amsterdam blocks provide residents with an interior space they can readily appropriate – in this case, to create an intimate, sociable setting in a French-style garden, bounded by plantings on a human scale. *Photo: Françoise Labbé.*

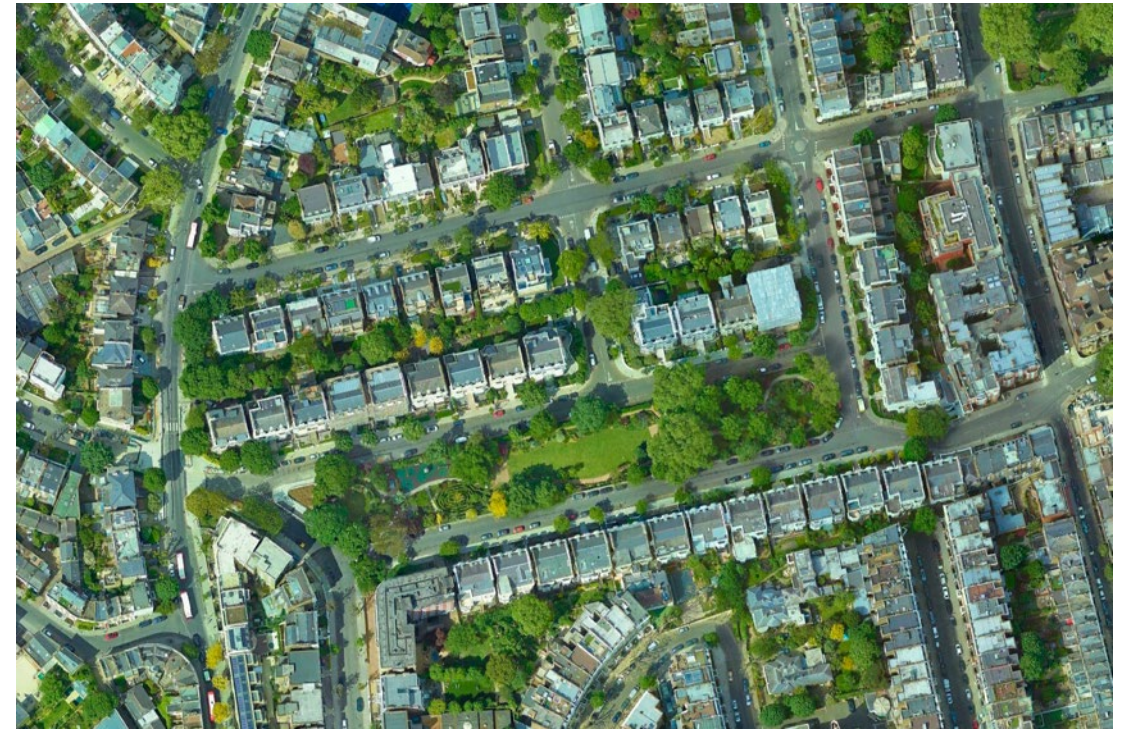


Community gardens, green blocks and row houses in London

Blocks developed around their perimeter establish a strong and coherent relationship with streets and the green private and public realm.



Urban block in Pembridge square, London. Typical block size is 45 m x 125 m (0.56 ha) with thus a density of 32 buildings per ha. Streets for pedestrians are slow traffic and 13 m wide. Source: Urban Morphology Institute.

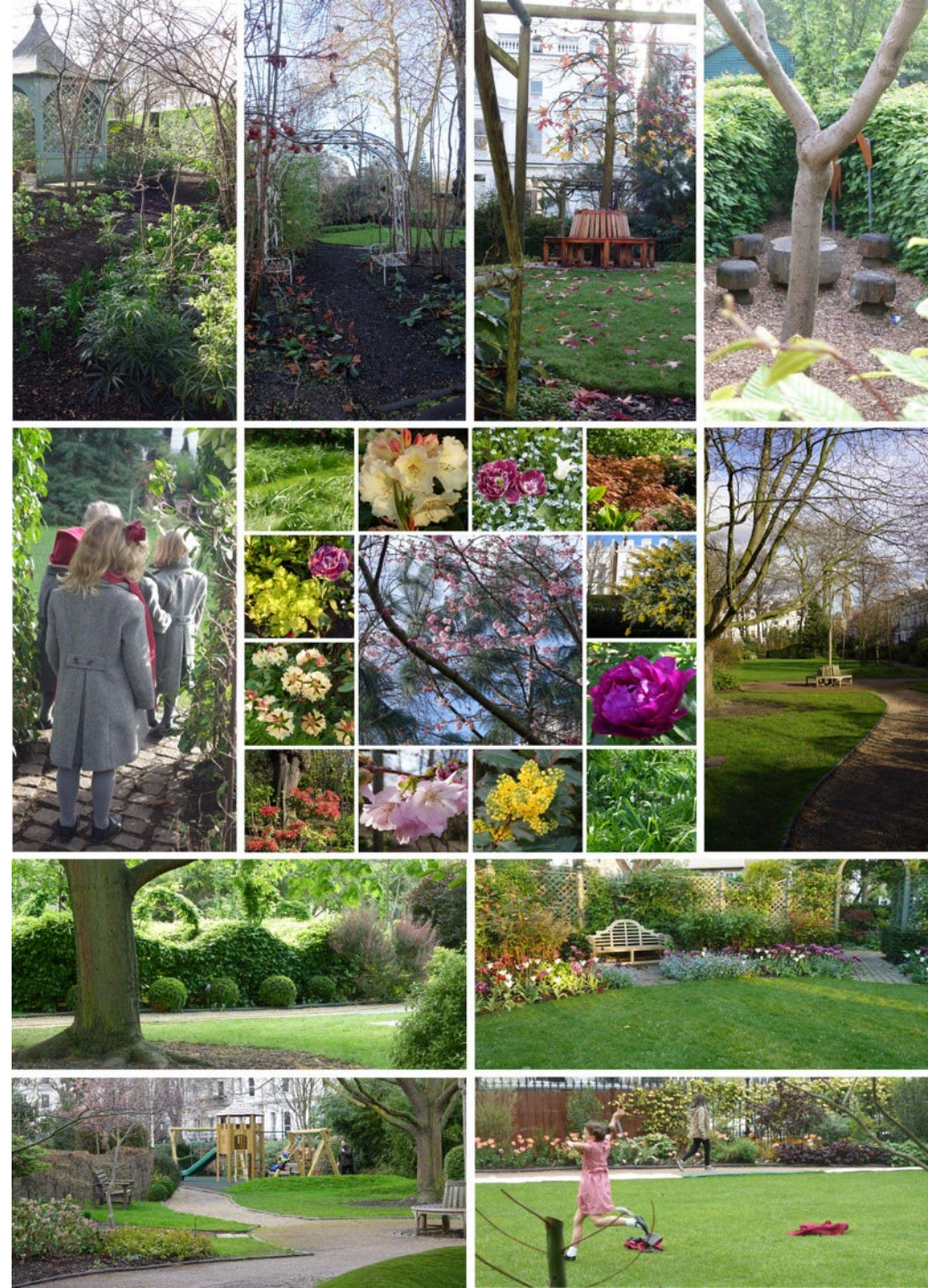


Blocks surround and frame a 190 m x 26 m (0,5 ha) community garden offering various children's playgrounds. Source: Urban Morphology Institute.

Vibrant pocket parks



The block pattern comprises about 18 buildings with an inner green core and is bordered by tree lined streets. Row houses are 18 m high and 14 m wide and each offers a garden at the back.



*Pembridge Square.
Photos: Françoise Labbé.*

Green blocks and row houses in London



Left: Pembridge square. Source: Françoise Labbé.



Middle and right: Urban block porosity, Dawson street. Source: Françoise Labbé.

Urban blocks define the network of streets around their edges, the building plots and green spaces arrangement in the middle.

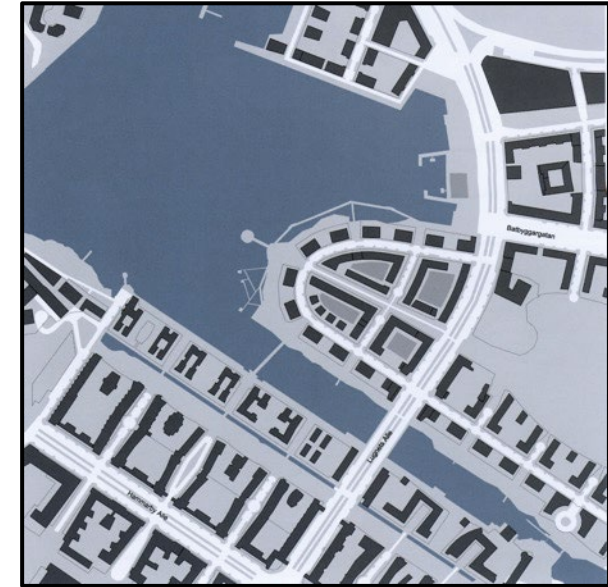


From Left to right:
from outside public
green to inside private
green

Photo: Françoise Labbé

Planning with green open blocks in Hammarby Sjöstad, Sweden

An example of successful transposition of traditional blocks into contemporary open green forms is Hammarby Sjöstad in Sweden. The blocks are open and organized around large green courtyards.



Left. Historical map of Stockholm.
Right. Hammarby map.. Source:
Urban Morphology Institute based
on Stockholm city hall plans.

Green open blocks, Hammarby Sjöstad. Source: Creative Commons.

Planning with green open blocks

The Hammarby Sjöstad open green blocks hold a green common space within, creating a semi-private area to serve the residents social needs.



In Hammarby Sjöstad, the design method integrates modern design elements with the traditional urban morphology and is a good tool to achieve sustainability. Hammarby Sjöstad Design Code. Source: City of Stockholm.



Open composition of buildings. The dense settlement structure comprises four- to five-story constructions around spacious green courtyards. Source: Françoise Labbé.

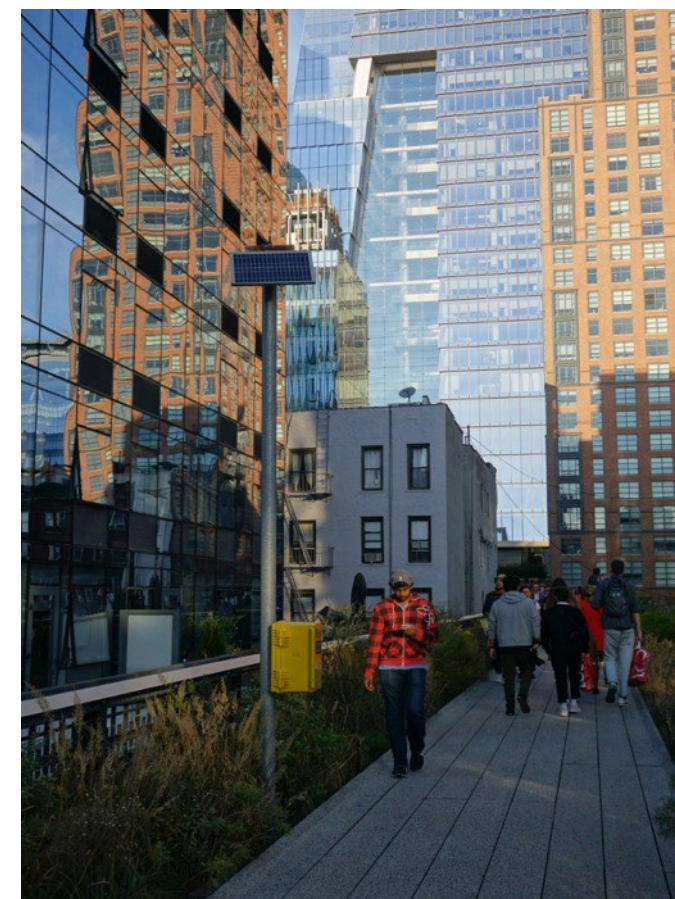
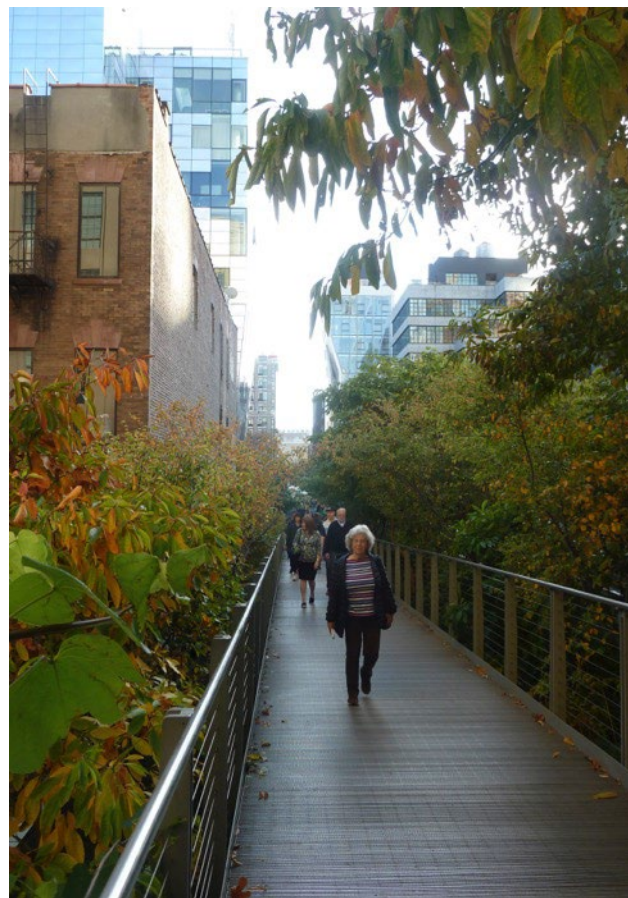
LINEAR GREEN FOR URBAN REGENERATION



The High Line, New York

Creating green connectors: The High Line, New York

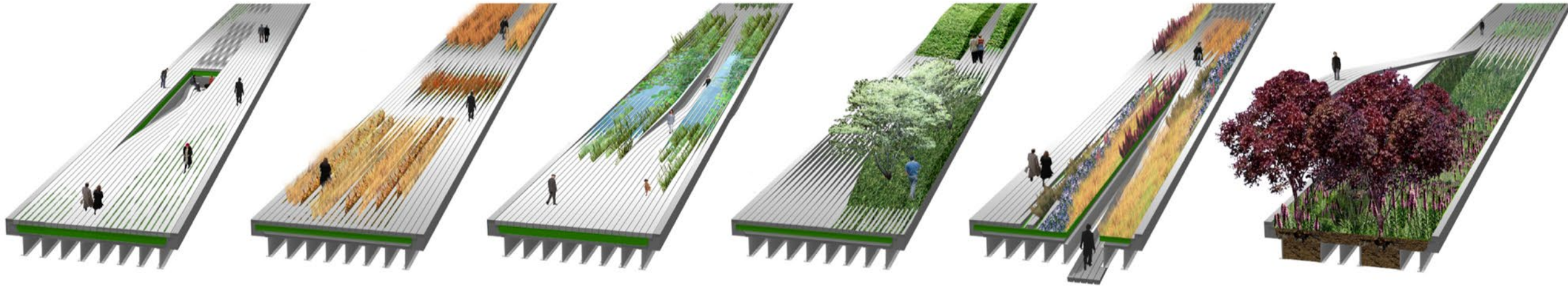




Manhattan High Line in New York. This new park interprets its inheritance. It translates the biodiversity that took root after it fell into ruin in a string of the site – specific urban microclimates along the stretch of railway that include sunny, shady, wet, dry, windy, and sheltered spaces. Through a strategy of agri-tecture – part agriculture, part architecture – the High Line surface is digitized into discrete units of paving and planting which are assembled along the entire length into a variety of gradients from 100% paving to 100% soft, richly vegetated biotopes.

Source: Françoise Labbé.

Diverse gradients of green along Manhattan High Line



PIT
0% : 100%

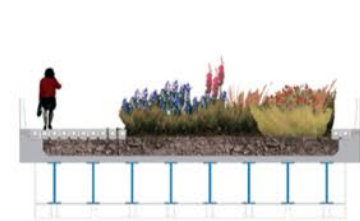
PLAINS
40% : 60%

BRIDGE
50% : 50%

MOUND
55% : 45%

RAMP
60% : 40%

FLYOVER
100% : 10%



MOSSLAND

Dieranum
Leucobryum
Polytrichum
Thuidium



wet

TALL MEADOW

Avena
Festuca
Miscanthus
Pennisetum
Sorghastrum



dry

WETLAND

Aster
Carex
Epimedium
Luzula
Lythrum
Verbena



wet

WOODLAND THICKET

Adiantum spp.
Asarum
Betula nigra 'Heritage'
Clostris barbinervis
Sassafras albidum
Osmunda spp.
Viburnum dilitatum



wet/average

MIXED PERENNIAL MEADOW

Artemisia
Eryngium giganteum
Heuchera
Monarda
Persicaria
Sanguisorba officinalis
Salvia



dry/average

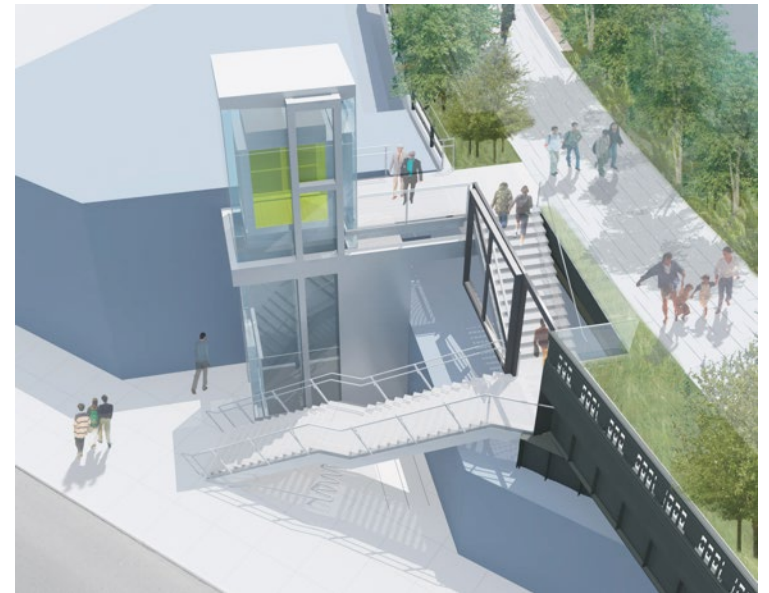
YOUNG WOODLAND

Agastache
Buxus sempervirens
Cercis canadensis
Lavatera
Rhus chinensis
Salix eleagnos



average

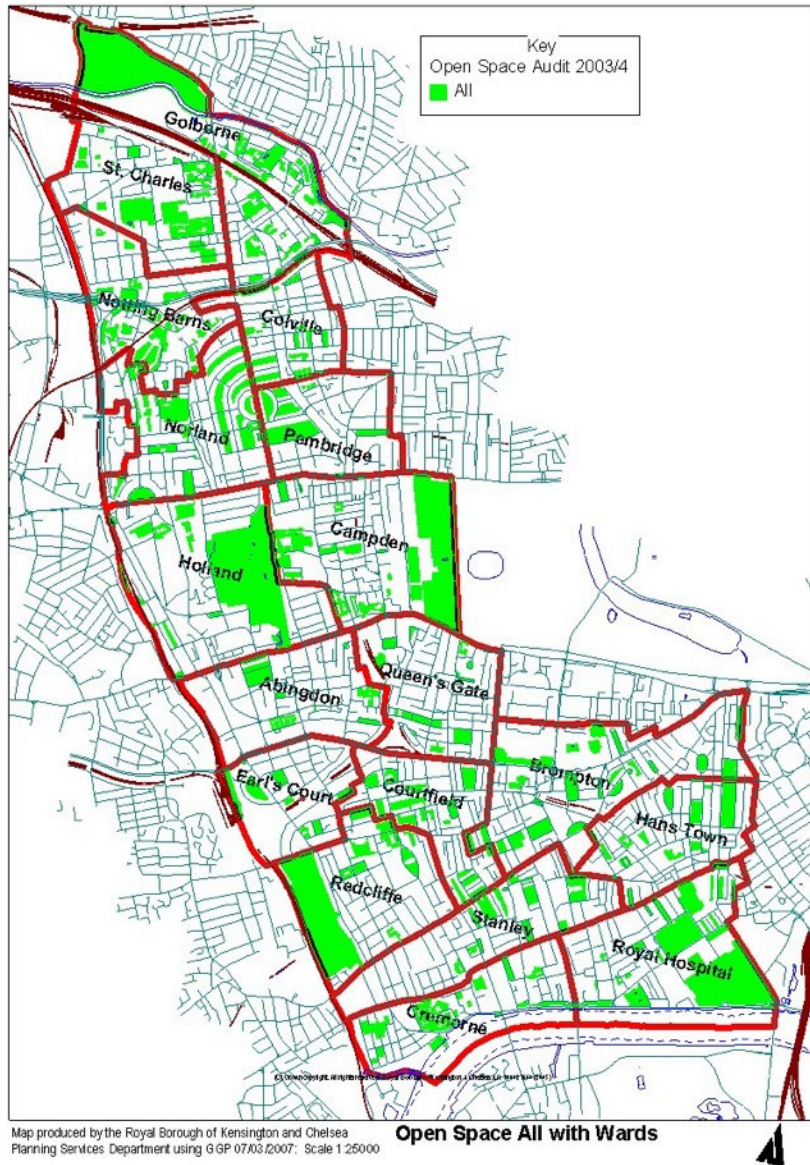
Integration of built form and green spaces along Manhattan High Line



NETWORKED GREEN FOR URBAN REGENERATION



A network of parks and gardens In Kensington and Chelsea



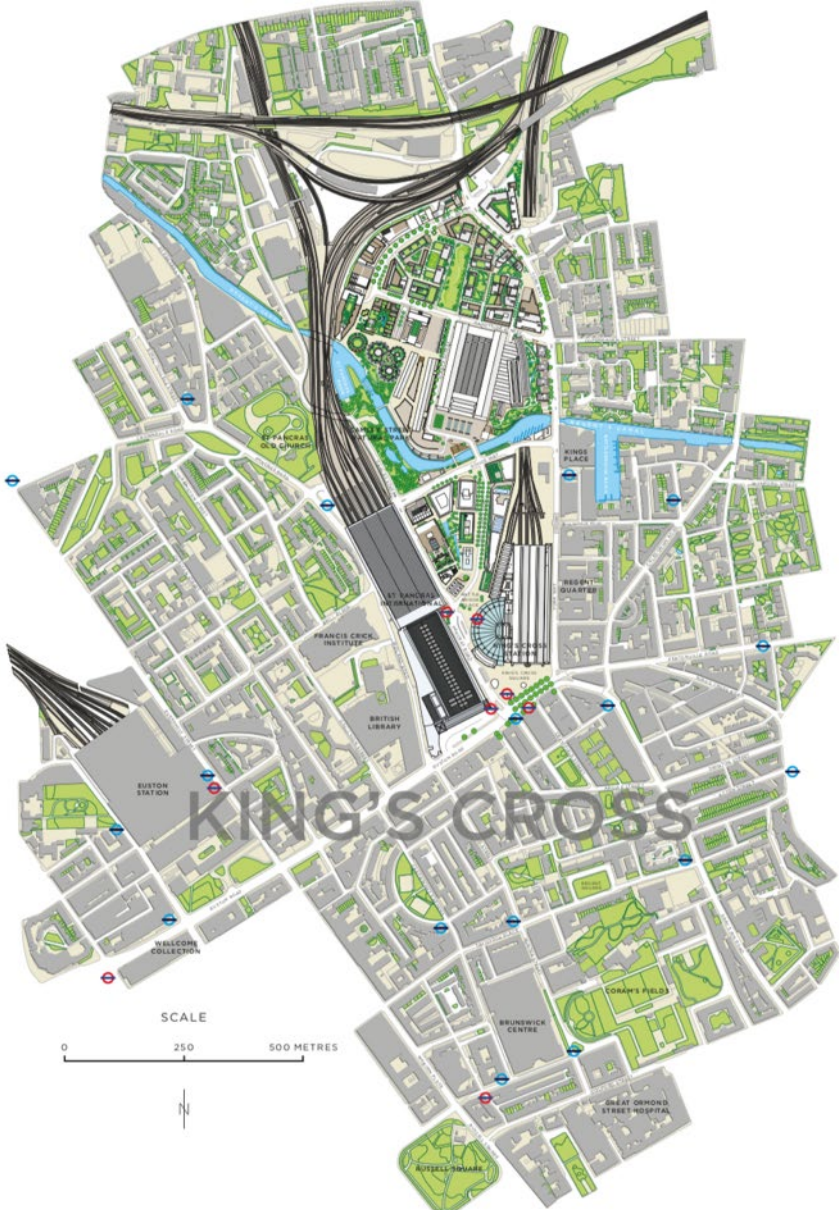
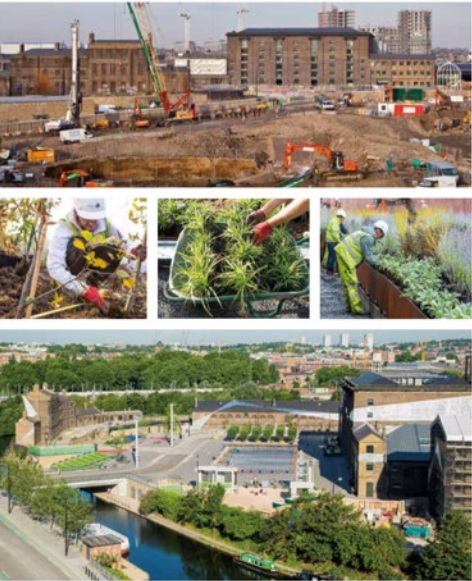
With an area of 12.13 km² and a population of 156,129, the borough of Kensington and Chelsea has a density of 12,871 people/km². Seventy-eight ha of public green space includes 28 parks, two cemeteries and a further 60 green spaces. They comprise over 3,200 trees of 180 species. To these should be added 235 private open spaces comprising 88 private squares with gardens accessible to surrounding residents only (most often of half ha to 1ha area) totalling 88 ha.



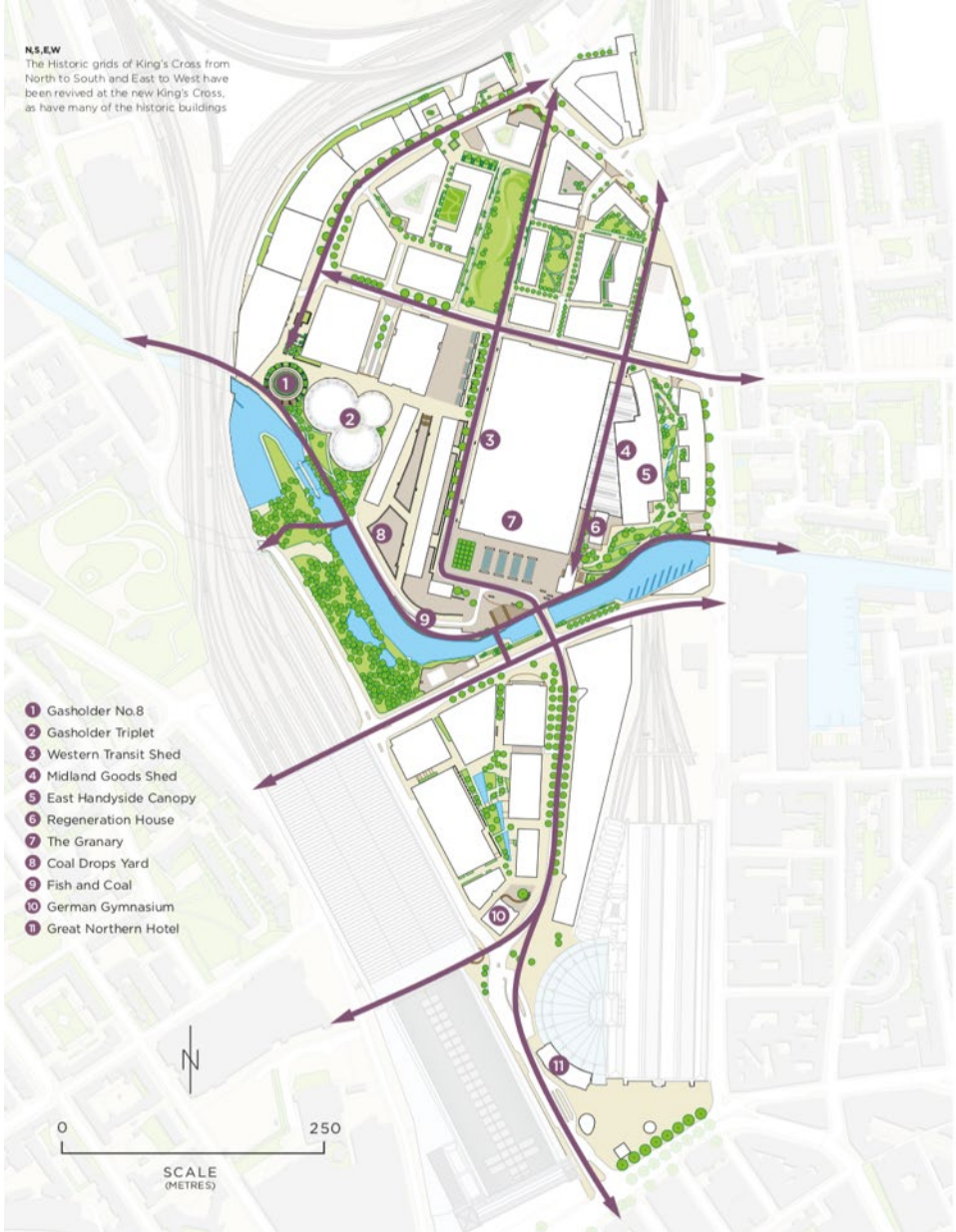
Each park has its individual history, landscape, features, user group profile and local community, all of which contribute to creating its feel or essence. The borough totals 166 ha of green space, that is 14% of the land area and 10.6 m²/inhabitant. When including three nearby parks of metropolitan size altogether 570 ha of green spaces are accessible, that is 36.5 m² per resident.

Making the green landscape the backbone of the master plan in Kings' Cross, London

- 27 HA
- 40 % PUBLIC AND GREEN SPACE
- 20 NEW CONNECTIVE STREETS
- 10 NEW SQUARES AND PARKS



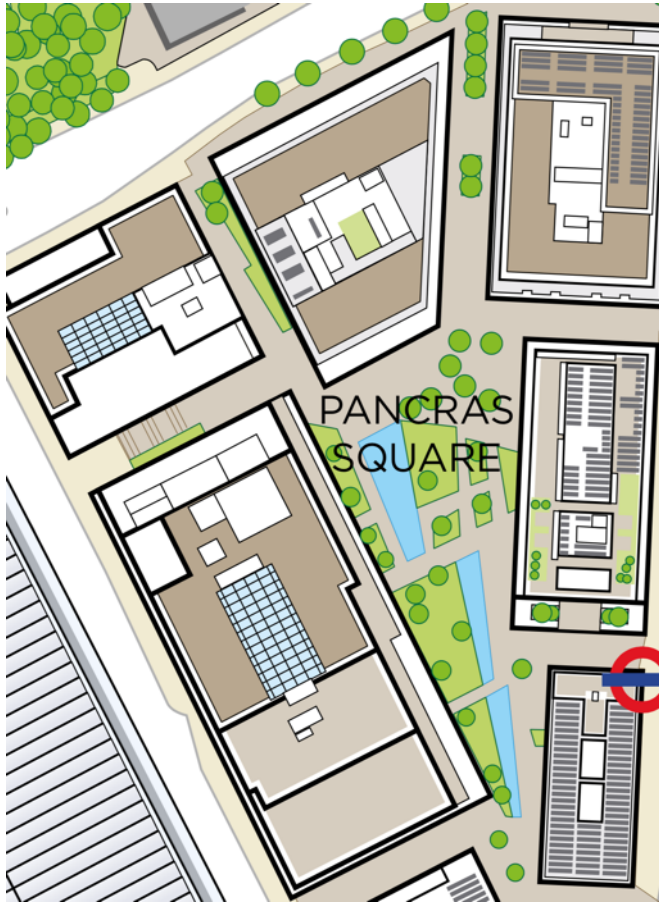
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King's Cross Master Plan

Streets and footpaths lead through a myriad of parks, leafy squares and other open environments. **The public spaces vary** from the wild wonder of Camley Street Natural Park to the endlessly flexible heart of King's Cross at Granary Square, with its one thousand choreographed fountains. All this, though, is at **a human scale** so visitors, residents, tenants, commuters - everyone - can benefit and enjoy.

PANCRAS SQUARE

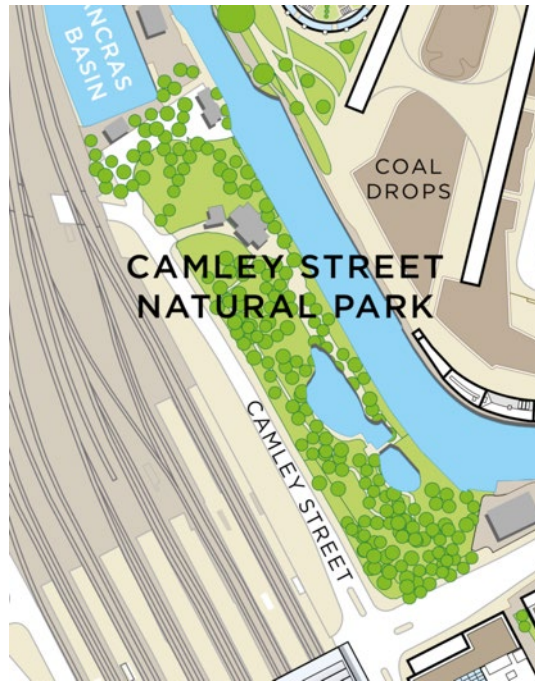
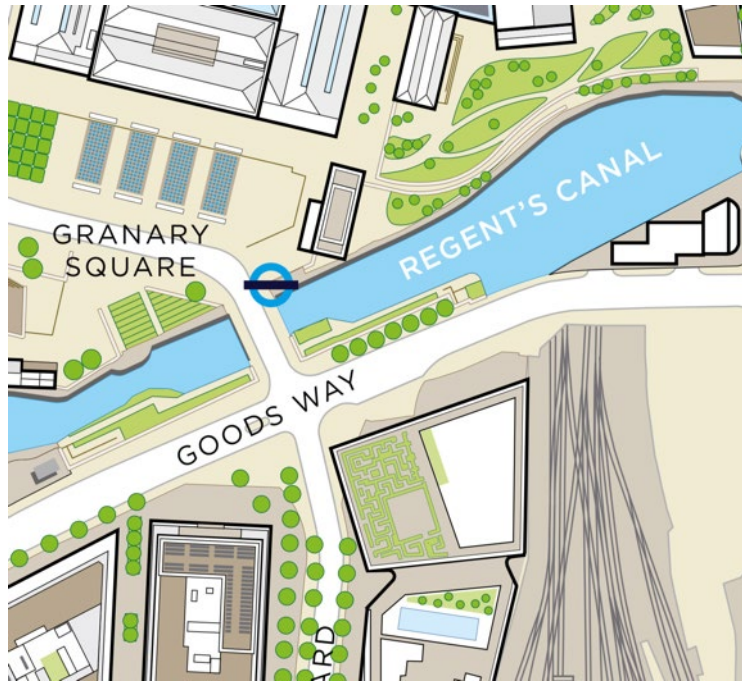


Pancras Square. Triangular Pancras Square stepped water terraces framing the historic landmark tower. Photo: Françoise Labbé.

GRANARY SQUARE



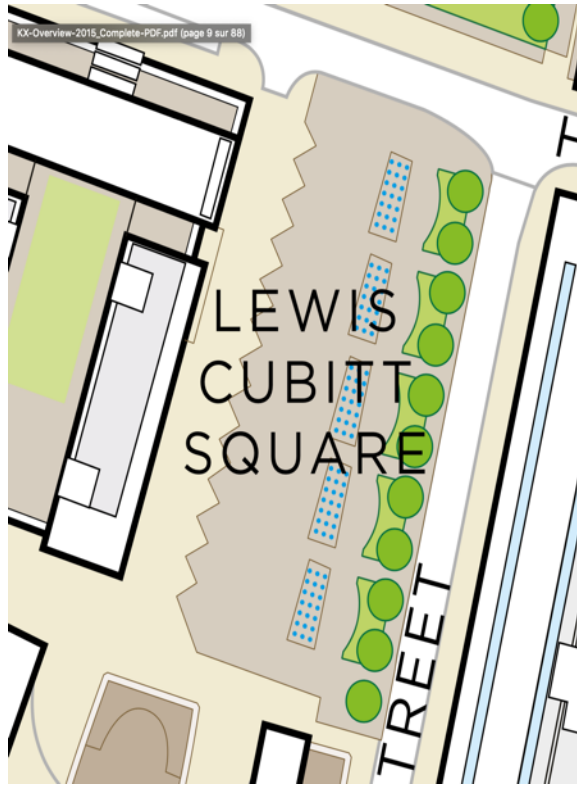
Granary Square. Photos: Françoise Labbé.



REGENT'S CANAL



Regent's Canal. Photo: Françoise Labbé.



Lewis Cubitt Square and Park. Photo: Françoise Labbé.



THE GASHOLDER PARK



Photo: Françoise Labbé.



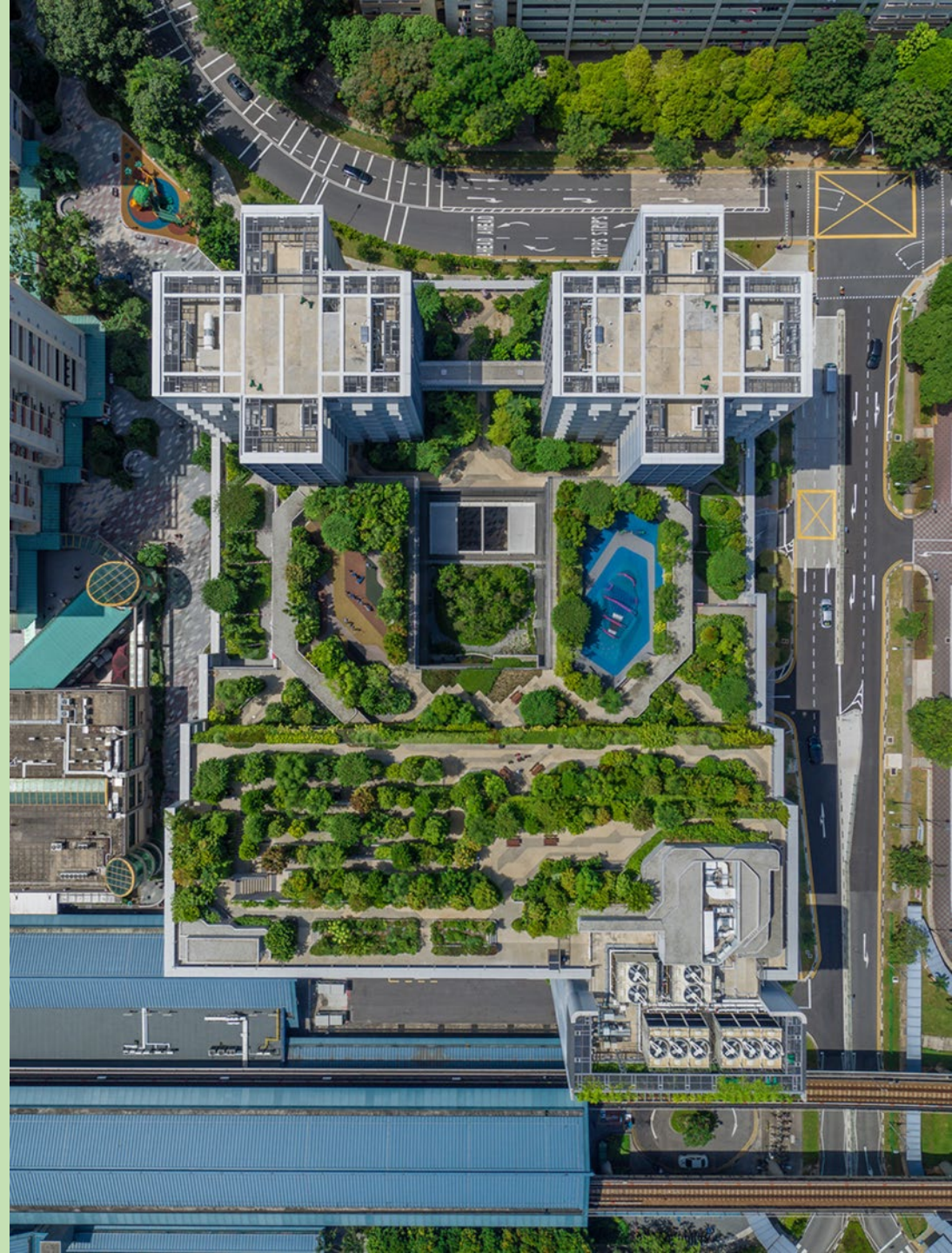
It is the framework of routes, streets, meeting places, squares and parks which is the lasting legacy of development, not the buildings themselves.

GOOGLE HEADQUARTERS



A plan for the garden shows it's split into a number of different zones, and includes a 200-meter running trail. Image: Google.

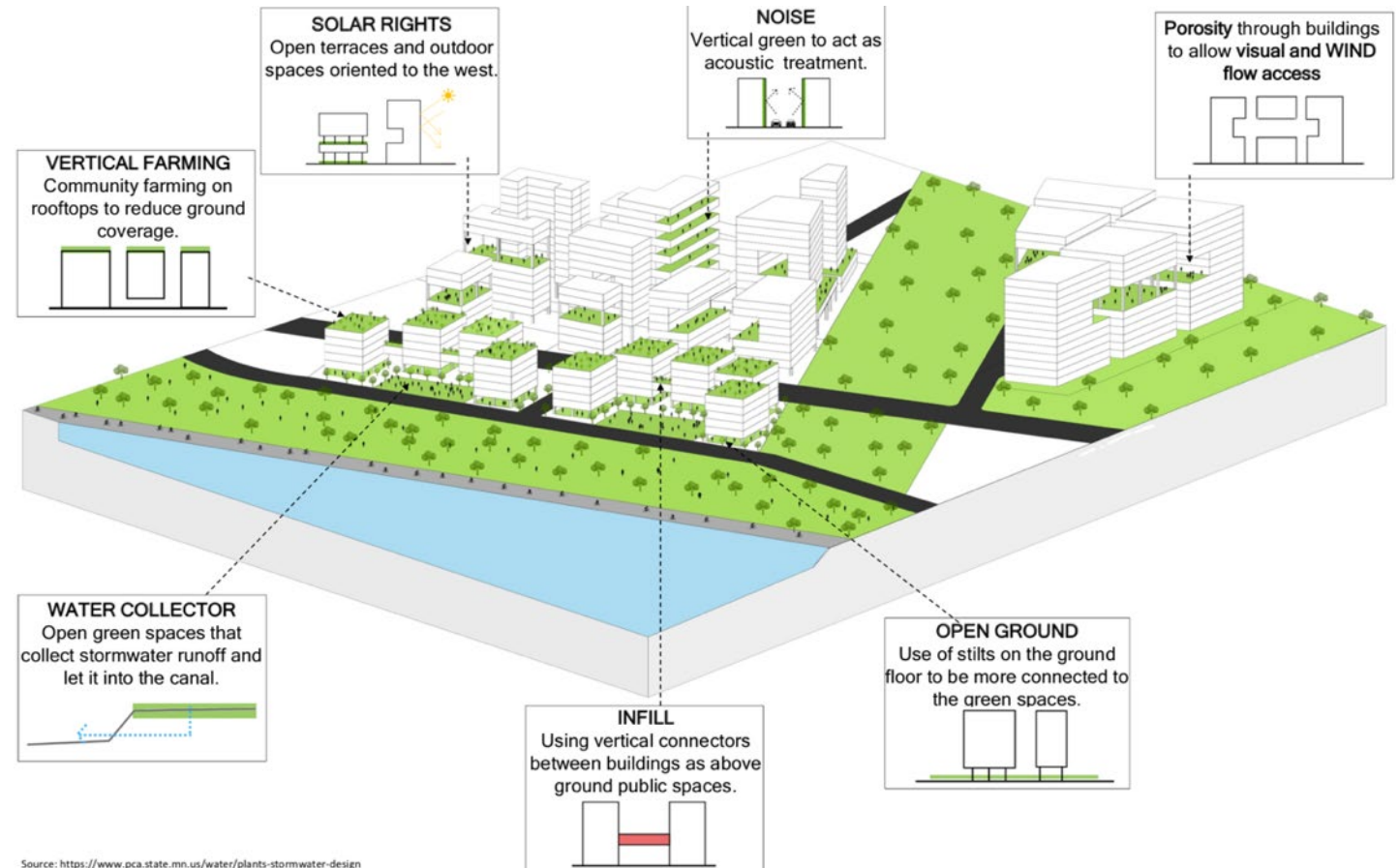
**TRHEE DIMENSIONAL GREEN
REGREENING MORE THAN 100 % OF THE ORIGINAL PLOT**



Green intensification is a process tailored to different climates

Green intensification is a process which should be tailored to different climates and various community cultures.

- In hot and humid climates like Singapore, the outdoor green can expand in three dimensions with sky gardens and lush green roofs and facades within a porous, 'breathing' urban fabric.
- Besides increasing the green coverage, green intensification improves the mix of functions, cools the urban fabric, and strengthens the character of a neighbourhood.



Seven Densification Strategies.

Source: Serge Salat Design Workshop at National University of Singapore.

Designing 3D green blocks, Kampung Admiralty, Singapore, WOHA Architects

In hot and humid climates, layering, hollowing and greening urban blocks in 3-D has the potential to recreate street life and community space.

These open-air precincts offer new street levels as part of a three-dimensional matrix.

- **Blocks with a 3-D micro urbanism** allow integrating solar energy, urban agriculture, commercial and recreational space, and housing in stacked structures.
- **Three-dimensional greening allows reaching a green plot ratio above 100%.** This mitigates the urban heat island effect, saves cooling energy and provides shading for communal spaces.



Breathing urban fabrics can offer outdoor community spaces at many scales and at multiple levels within a '3-dimensional green matrix'. In Kampung Admiralty, the various components are stacked and layered within a single building: markets, shops, food court, plazas, health-care facilities, children's playground and elderly facilities, sky gardens and a rooftop urban farm are integrated, not segregated.

Source: WOHA Architects

Kampung Admiralty 3D green, WOHA Architects



Community farm from 4th floor to 7th floor



Health care center, 4th floor



Children's playground, 4th floor



Shaded and breathing public plaza, ground floor

Weaving buildings and green spaces in 3D in Guangzhou Sino Singapore City

Maximize green spaces and site ventilation

- From the experience of Singapore's LUSH program, the combined total of regular greening and vertical greening is increased to 100% of the original plot.
- Buildings are crafted with a diversity of 3D greenery measures, including sky gardens, vertical greening, and green roofs, creating a three-dimensional urban forest.
- Hollow buildings and high-rise green spaces are utilized to allow breezes to infiltrate while providing community areas.

Source: Piloting nature based passive urban cooling options into urban regeneration and new town development. Guangzhou Yong Qing Fang Pilot and China-Singapore Guangzhou Knowledge City



Weaving buildings and green spaces in Guangzhou Sino Singapore City

A topographical approach to design

- Hilly microtopography and low-lying areas are combined to form rain gardens and wetland parks; a tidal landscape of green areas and water is fostered.
- Urban space is combined with natural elements such as ponds, low hills, and vegetation to form knowledge units. The overall layout follows the contours of the hilly topography, and public spaces are planned based on the topography.
 - The architectural design takes the connection with hills into full account. The use of stilts, three-dimensional setbacks, and other techniques are integrated with nature.
 - Both elevated floors and staggered floors are used, and vertical greening helps to integrate with micro-hills, thus forming a complete, connected, three-dimensional greening system.
 - The use of a microtopography design protects the original ecology, utilizes slope to form local breeze circulation, implements low-lying areas to form rain gardens, and creates vertical green spaces.



Location of bodies of water and major green spaces in Knowledge Green Valley

Source: Piloting nature based passive urban cooling options into urban regeneration and new town development. Guangzhou Yong Qing Fang Pilot and China-Singapore Guangzhou Knowledge City

THE WAY FORWARD

Green the urban/local planning frameworks

- Create a long-term vision of a green city within the local authority
- Develop master plans around a green landscaping vision
- Integrate green spaces within all infrastructural projects (housing, transport, business parks, community and health facilities) and urban rehabilitation approaches
- Engage the local community as part of the local planning and design process.

Have a long-term perspective and remain flexible

- Green spaces are a long-term investment: they may need some time to establish before they are fully usable, and they require long-term maintenance.
- The benefits of urban green spaces may only become apparent over time.
- Urban green spaces should be planned and designed in a flexible way, making functional adjustments possible to adapt to changing future demands.