

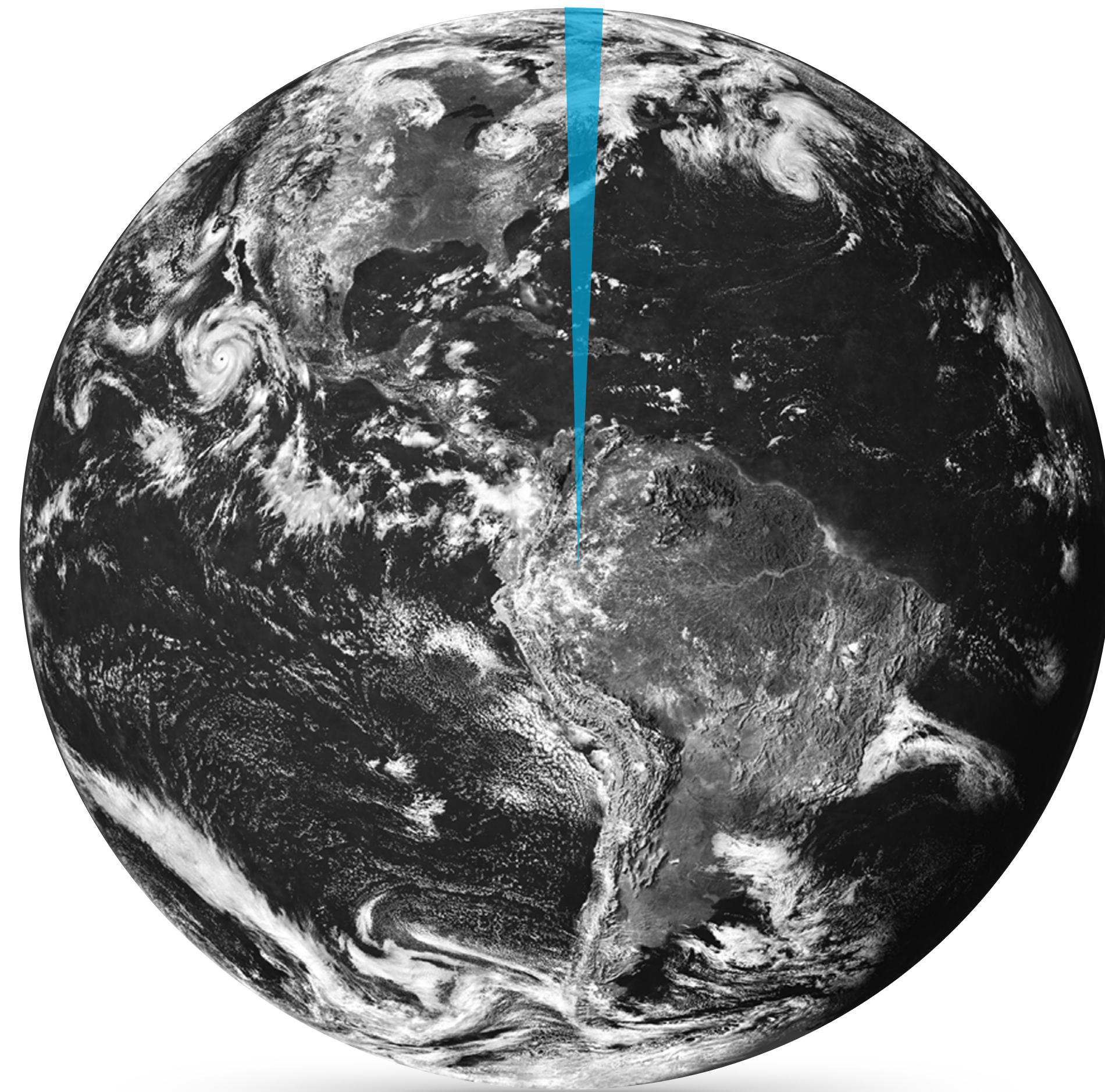
BioUrbanism

Green & Blue Grids for
21st Century Cities

 **MCGREGOR
COXALL**

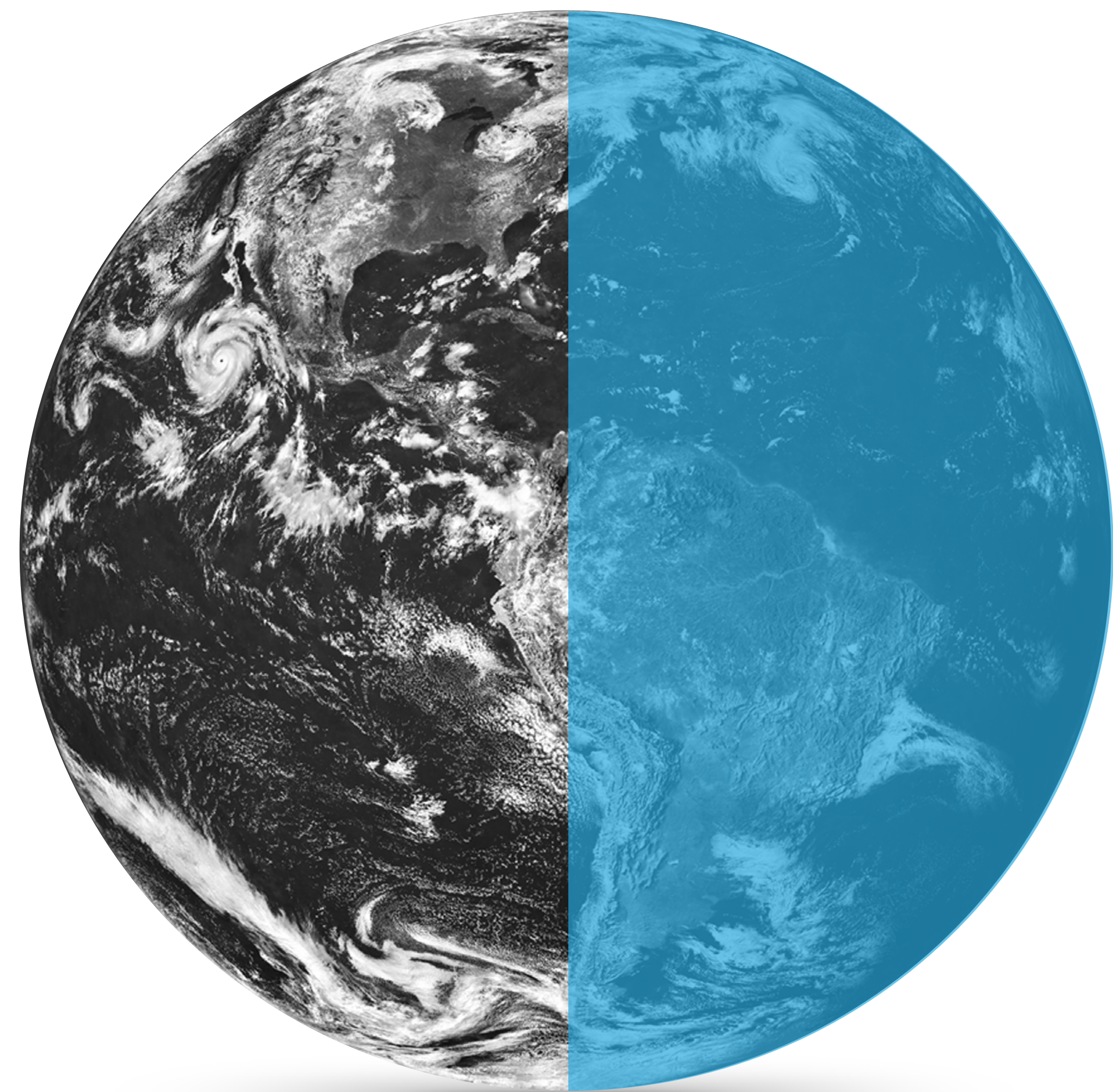
LANDSCAPE ARCHITECTURE
URBANISM
ENVIRONMENT
BIOCITY RESEARCH

SYDNEY
MELBOURNE
SHANGHAI
BRISTOL



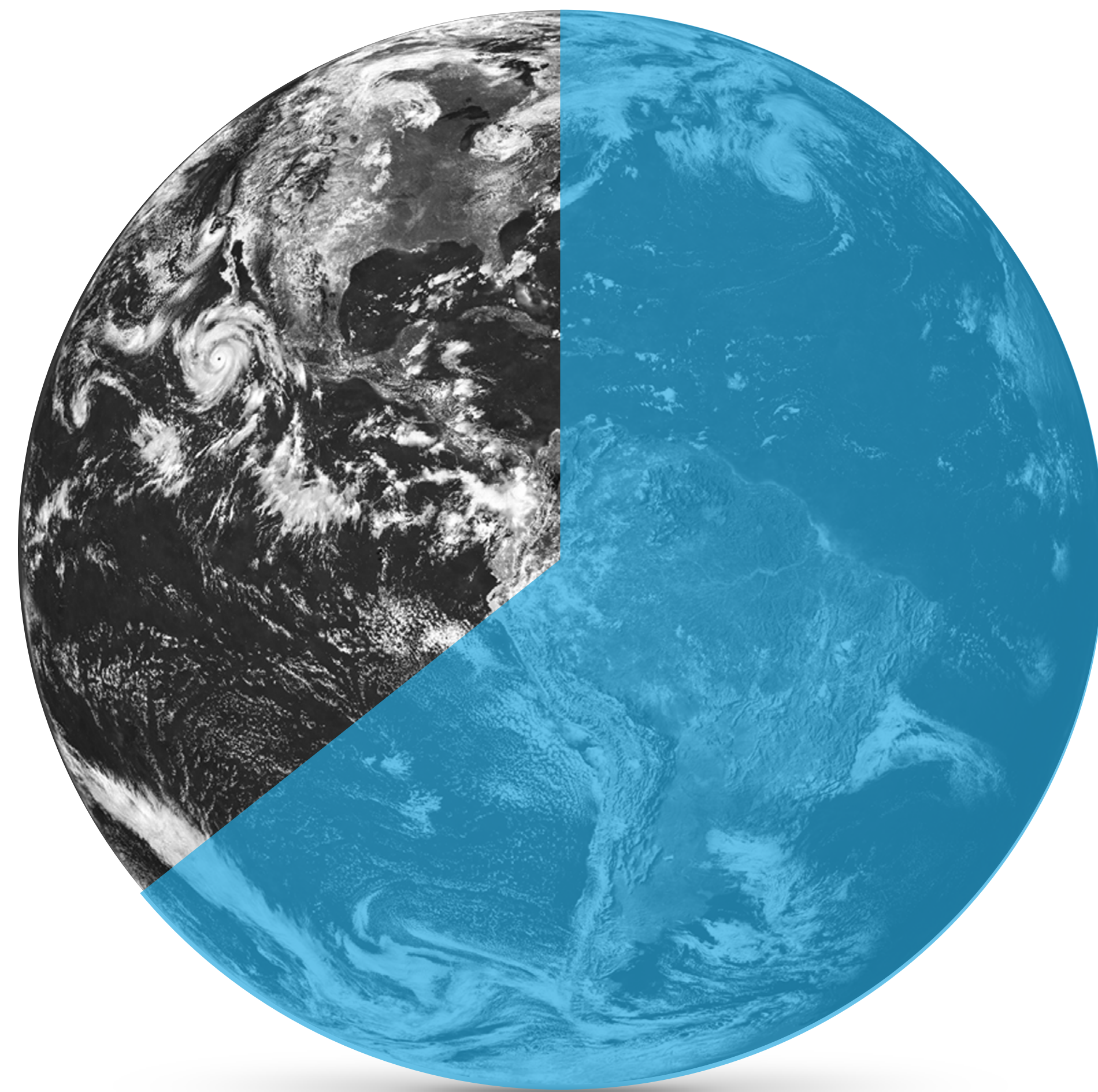
pre1800

3% *POPULATION
LIVING
IN CITIES*



Year 2010

50% **POPULATION
LIVING
IN CITIES**



Year 2050

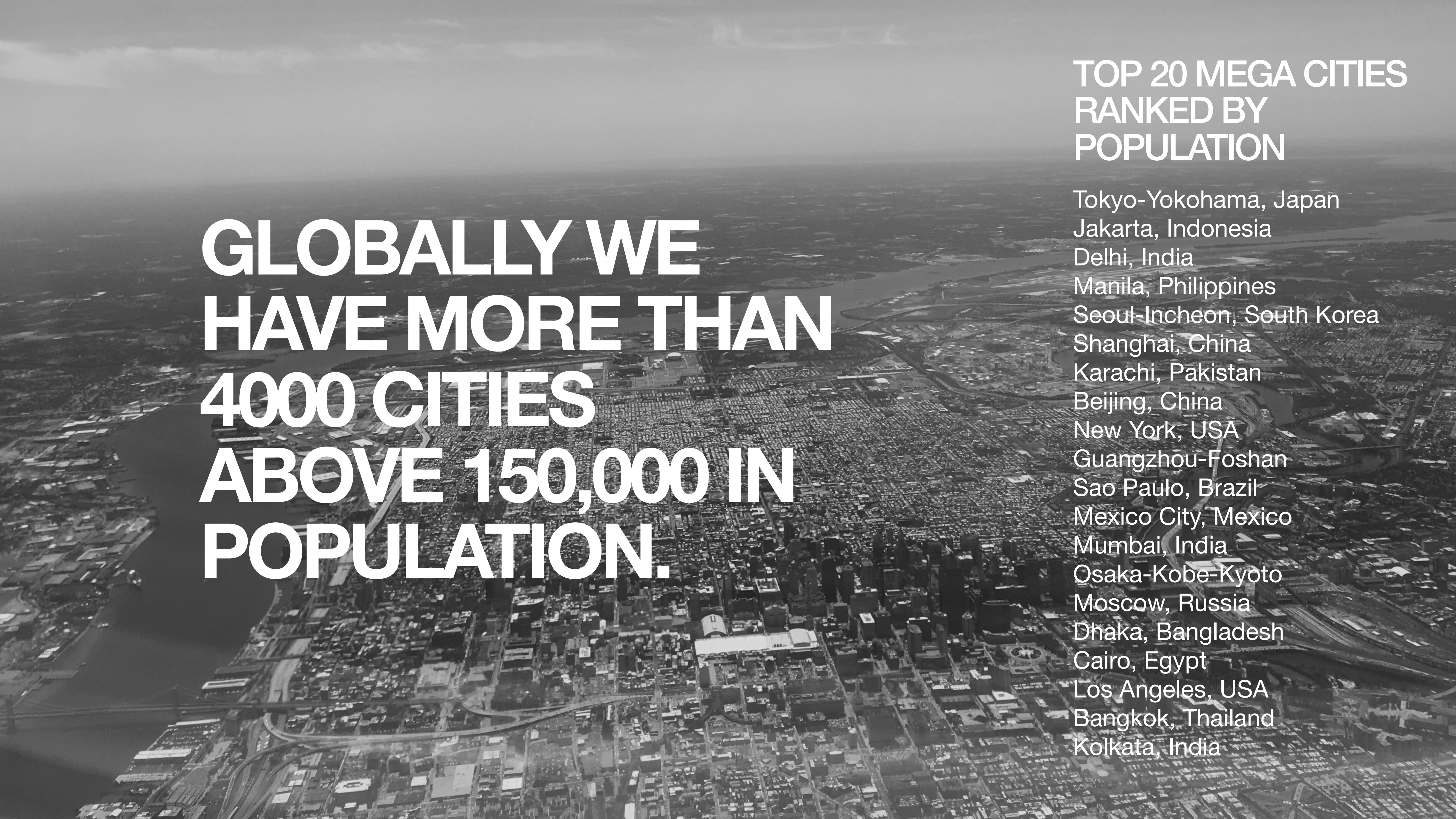
70% **POPULATION
LIVING
IN CITIES**



**WE HAVE
MADE CITIES
TO BE...**



**THE MAJOR
HABITAT OF THE
HUMAN RACE.**



**GLOBALLY WE
HAVE MORE THAN
4000 CITIES
ABOVE 150,000 IN
POPULATION.**

TOP 20 MEGA CITIES RANKED BY POPULATION

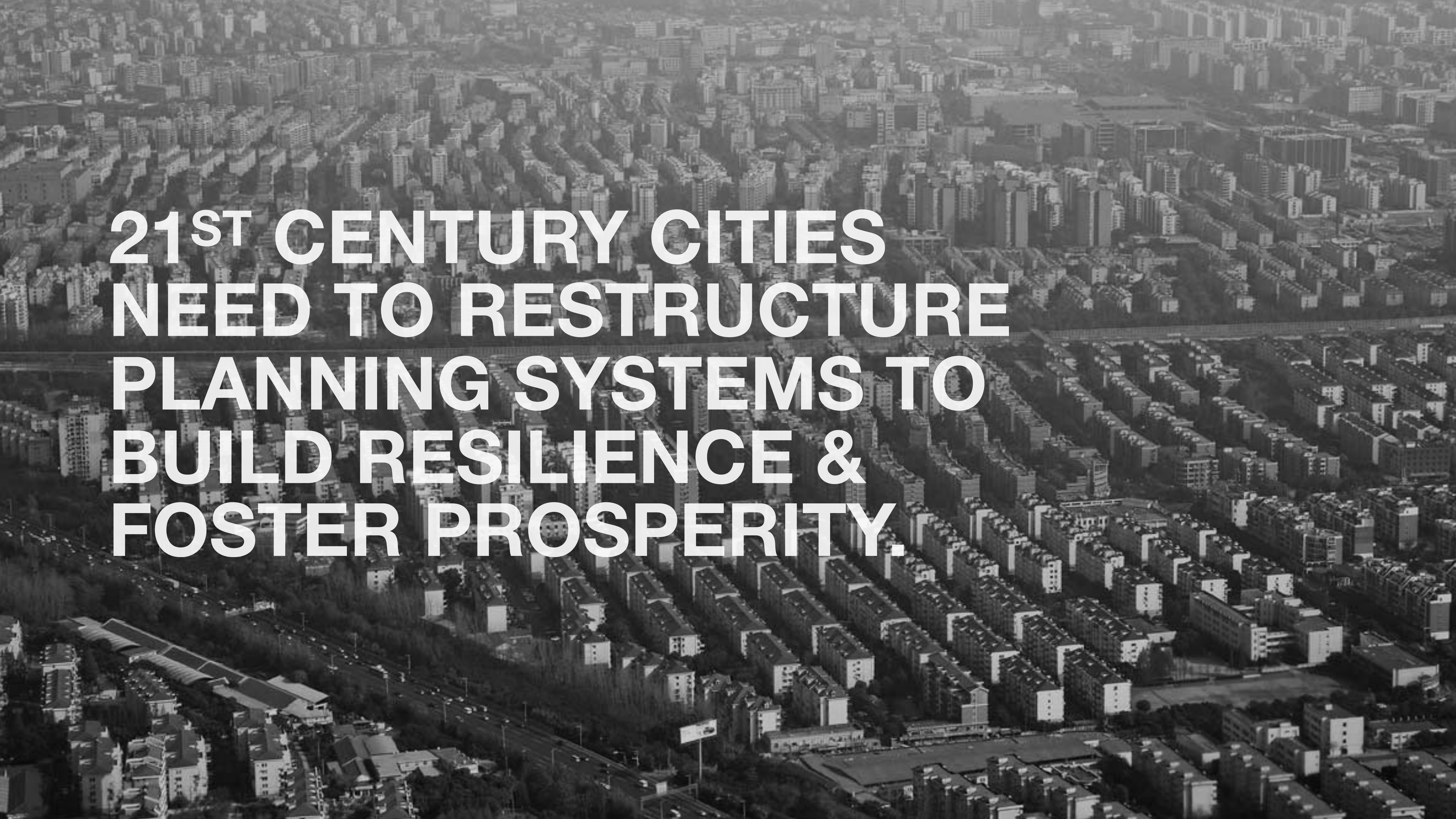
Tokyo-Yokohama, Japan
Jakarta, Indonesia
Delhi, India
Manila, Philippines
Seoul-Incheon, South Korea
Shanghai, China
Karachi, Pakistan
Beijing, China
New York, USA
Guangzhou-Foshan
Sao Paulo, Brazil
Mexico City, Mexico
Mumbai, India
Osaka-Kobe-Kyoto
Moscow, Russia
Dhaka, Bangladesh
Cairo, Egypt
Los Angeles, USA
Bangkok, Thailand
Kolkata, India



**IN 2050 WORLD
POPULATION WILL
BE 9 BILLION.**



**CITIES ARE FACING
INCREASING RISK AND
MUST ADAPT TO
CLIMATE CHALLENGES.**

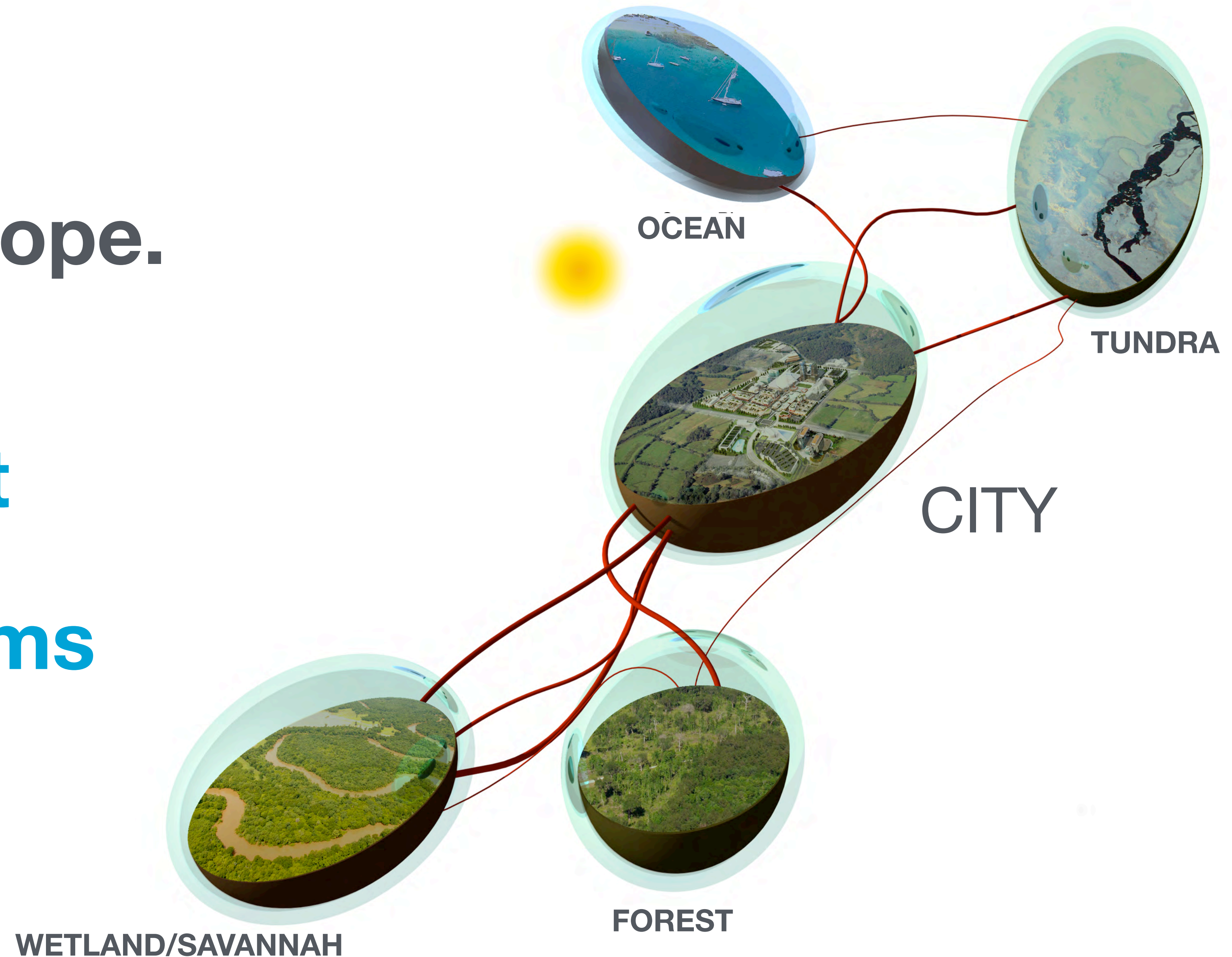
An aerial photograph of a densely populated urban area, showing a vast expanse of high-rise buildings and residential structures. The image is in grayscale, with a semi-transparent dark horizontal band across the middle where the text is located. The text is in a bold, white, sans-serif font, arranged in five lines. The background shows a mix of building heights and some greenery interspersed among the structures.

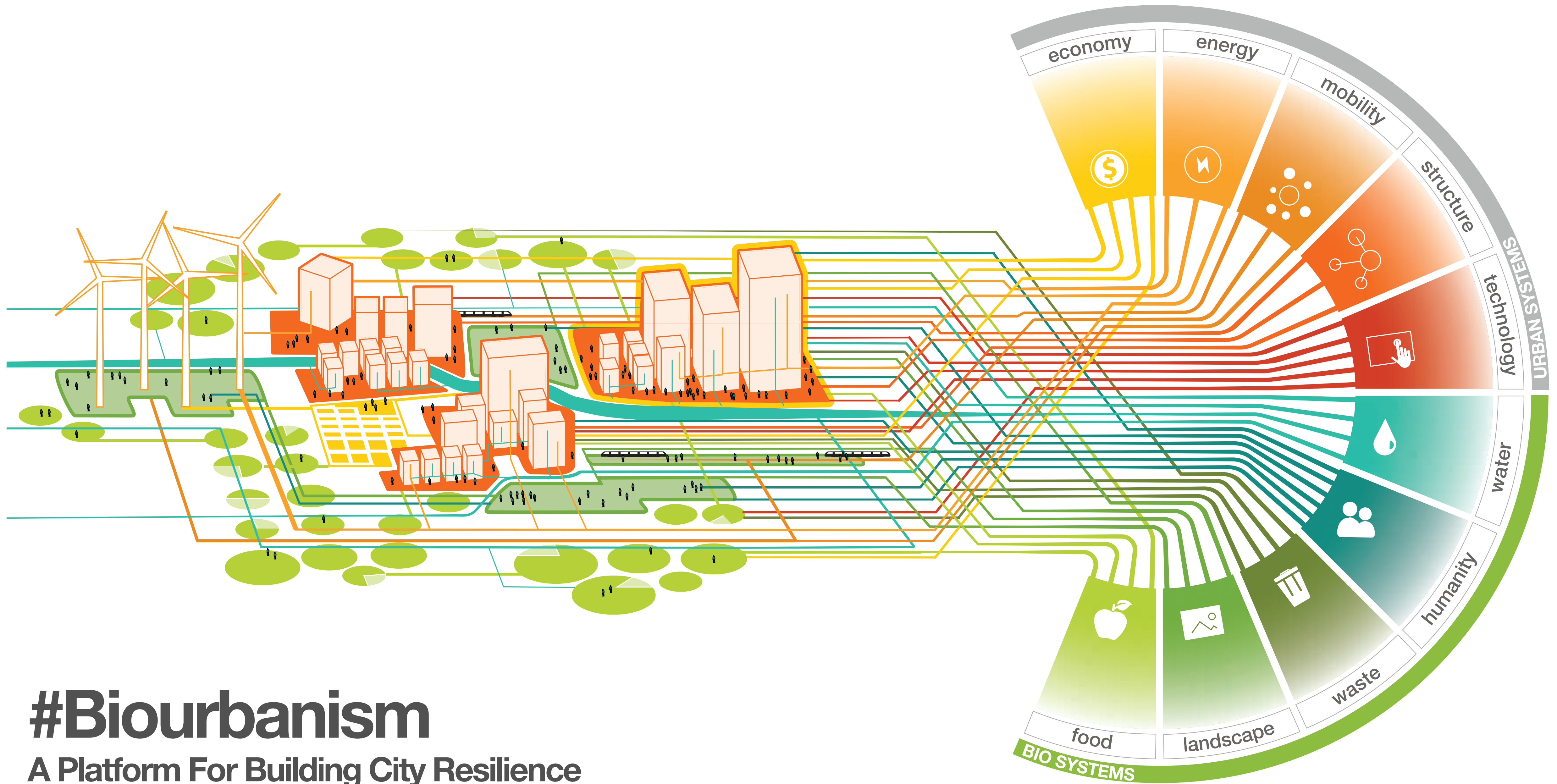
**21ST CENTURY CITIES
NEED TO RESTRUCTURE
PLANNING SYSTEMS TO
BUILD RESILIENCE &
FOSTER PROSPERITY.**

#Biourbanism

City as Biotope.

**Cities are
human built
natural
suprasystems**





#Biourbanism

A Platform For Building City Resilience

Bio Systems



Food

Local, regional, national and global agricultural networks



Humanity

Governance, legal frameworks, education and health



Landscape

Terrestrial ecosystems and terrains



Waste

By products of resource processing



Water

Aquatic ecosystems and waterscapes

Urban Systems



Economy

Inputs required to power cities



Energy

Production and consumption of goods and services



Mobility

Urban transit across all modes



Structure

Urban form, infrastructure and architecture



Technology

Digital information and mechanisation

Bio Systems



Food

Local, regional, national and global agricultural networks



Humanity

Governance, legal frameworks, education and health



Landscape

Terrestrial ecosystems and terrains



Waste

By products of resource processing



Water

Aquatic ecosystems and waterscapes

Urban Systems



Economy

Inputs required to power cities



Energy

Production and consumption of goods and services



Mobility

Urban transit across all modes



Structure

Urban form, infrastructure and architecture



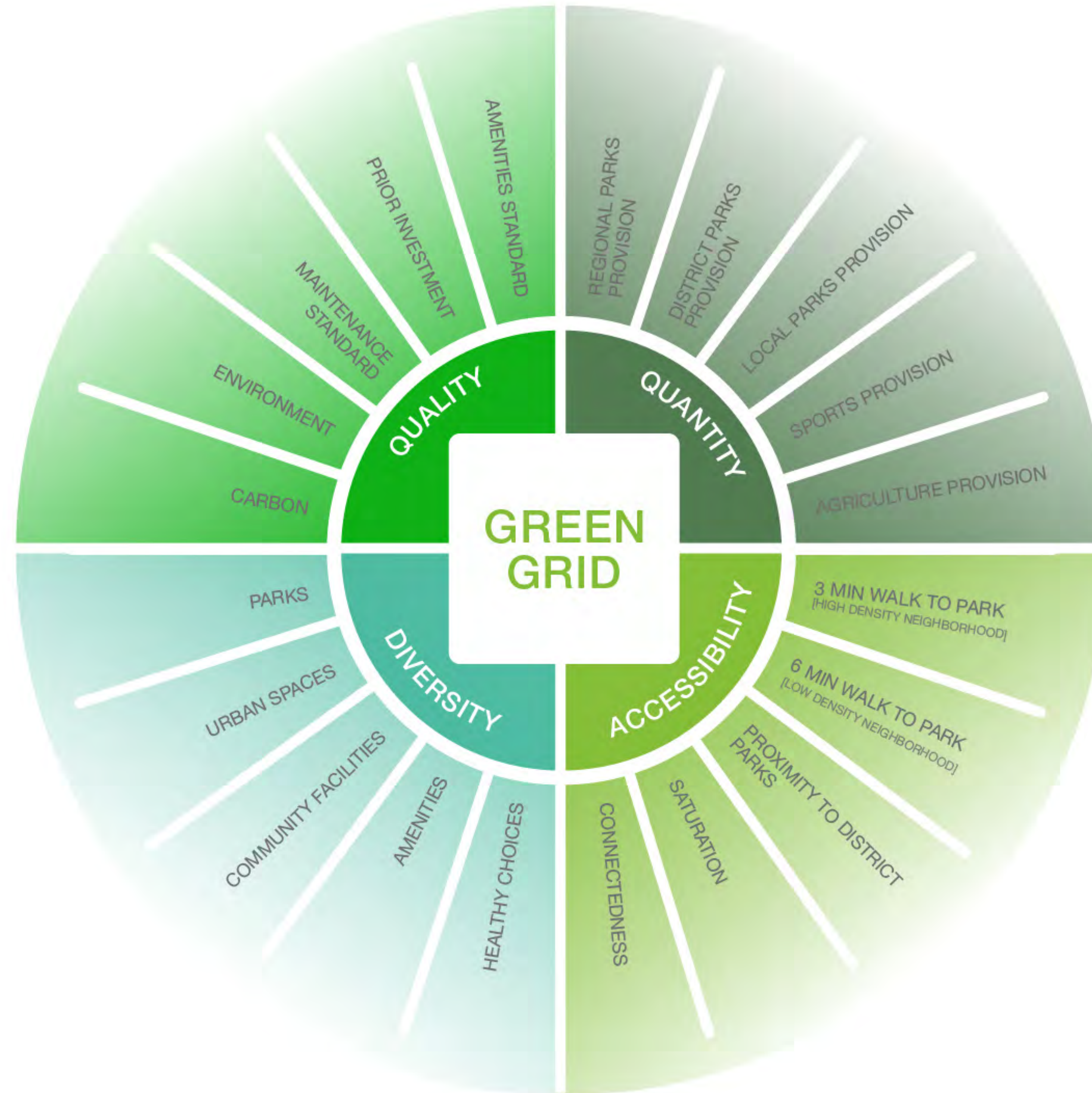
Technology










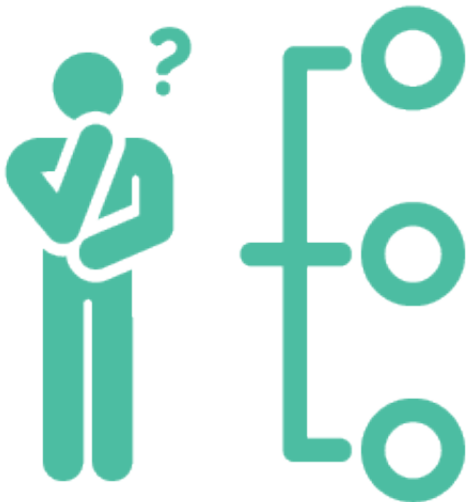



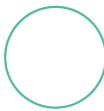


Digital information and mechanisation

Green Grid.

Framework platform



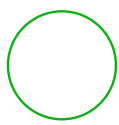


SUB-FRAMEWORKS	PERFORMANCE INDICATORS	NEEDS ASSESSMENT CRITERIA
<div>ACCESSIBILITY</div> <div>  </div>	<div>  <div>3 MIN WALK TO PARK [high density neighborhood]</div> </div> <div>  <div>6 MIN WALK TO PARK [low density neighborhood]</div> </div> <div>  <div>PROXIMITY TO DISTRICT PARKS</div> </div> <div>  <div>SATURATION</div> </div> <div>  <div>CONNECTEDNESS</div> </div>	<div>  <div>Dwellings outside 200m catchment [>100 dwellings/ha] of any local/district/regional OS</div> </div> <div>  <div>Dwellings outside 400m catchment [<100 dwellings/ha] of any local/district/regional OS</div> </div> <div>  <div>Dwellings outside 2km catchment of any district/regional OS</div> </div> <div>  <div>Resident population of park walking catchment compared to park size</div> </div> <div>  <div>Public transport to regional/district OS & network of greenway/trail corridors</div> </div>
<div>DIVERSITY</div> <div>  </div>	<div>  <div>PARKS</div> </div> <div>  <div>URBAN SPACES</div> </div> <div>  <div>COMMUNITY FACILITIES</div> </div> <div>  <div>AMENITIES</div> </div> <div>  <div>HEALTHY CHOICES</div> </div>	<div>  <div>Distribution of park typologies to suit demographic need</div> </div> <div>  <div>Distribution of urban space typologies to suit demographic need</div> </div> <div>  <div>Distribution of communtiy facilities to suit demographic need</div> </div> <div>  <div>Amenity provision inside parks & urban spaces compared to demand</div> </div> <div>  <div>Obesity mapping and number of nutritious food outlets in parks</div> </div>

QUALITY



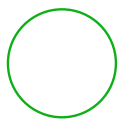
ENVIRONMENT



Extent of ecological habitat protection and native species urban tree canopy for air quality/heat island ameleoration



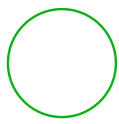
CARBON



Potential for sequestration of carbon & bio banking



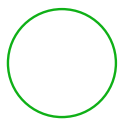
AMENITIES STANDARD



Design quality & safety of OS amenities



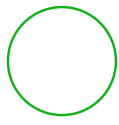
PRIOR INVESTMENT



Open space embellishment expenditure per m2 per year

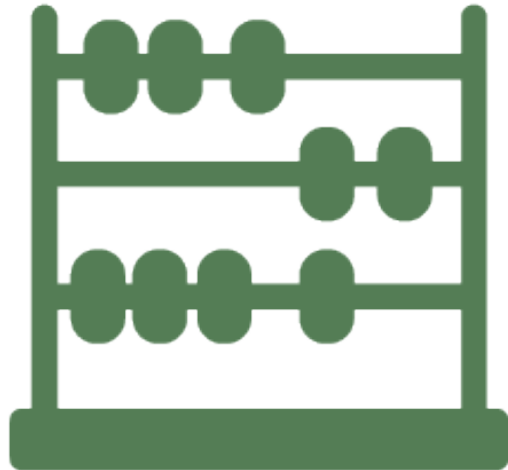


MAINTENANCE STANDARD

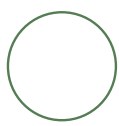


Open space maintenance expenditure per m2 per year

QUANTITY



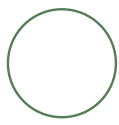
REGIONAL PARKS PROVISION



Metropolitan biodiversity & nature based recreation index



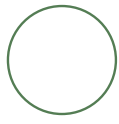
DISTRICT PARKS PROVISION



m2 per resident & median park size in each district



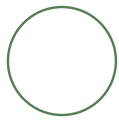
LOCAL PARKS PROVISION



m2 per resident & median park size in each district



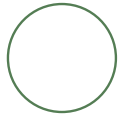
SPORTS SPACE PROVISION



Metropolitan comparison of supply, availability & unmet demand



AGRICULTURE PROVISION



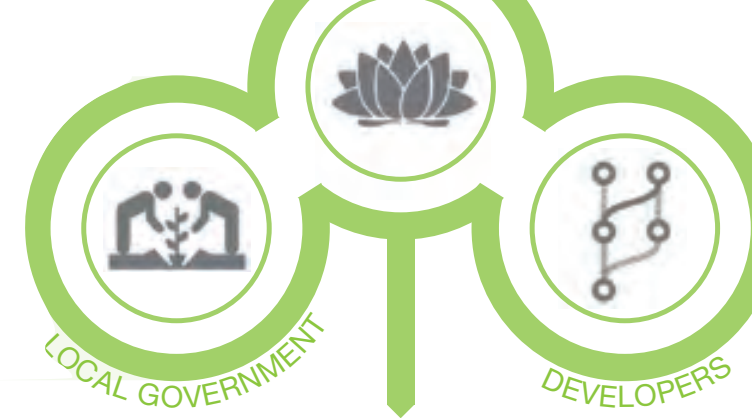
Soil mapping of metropolitan land

Change Drivers

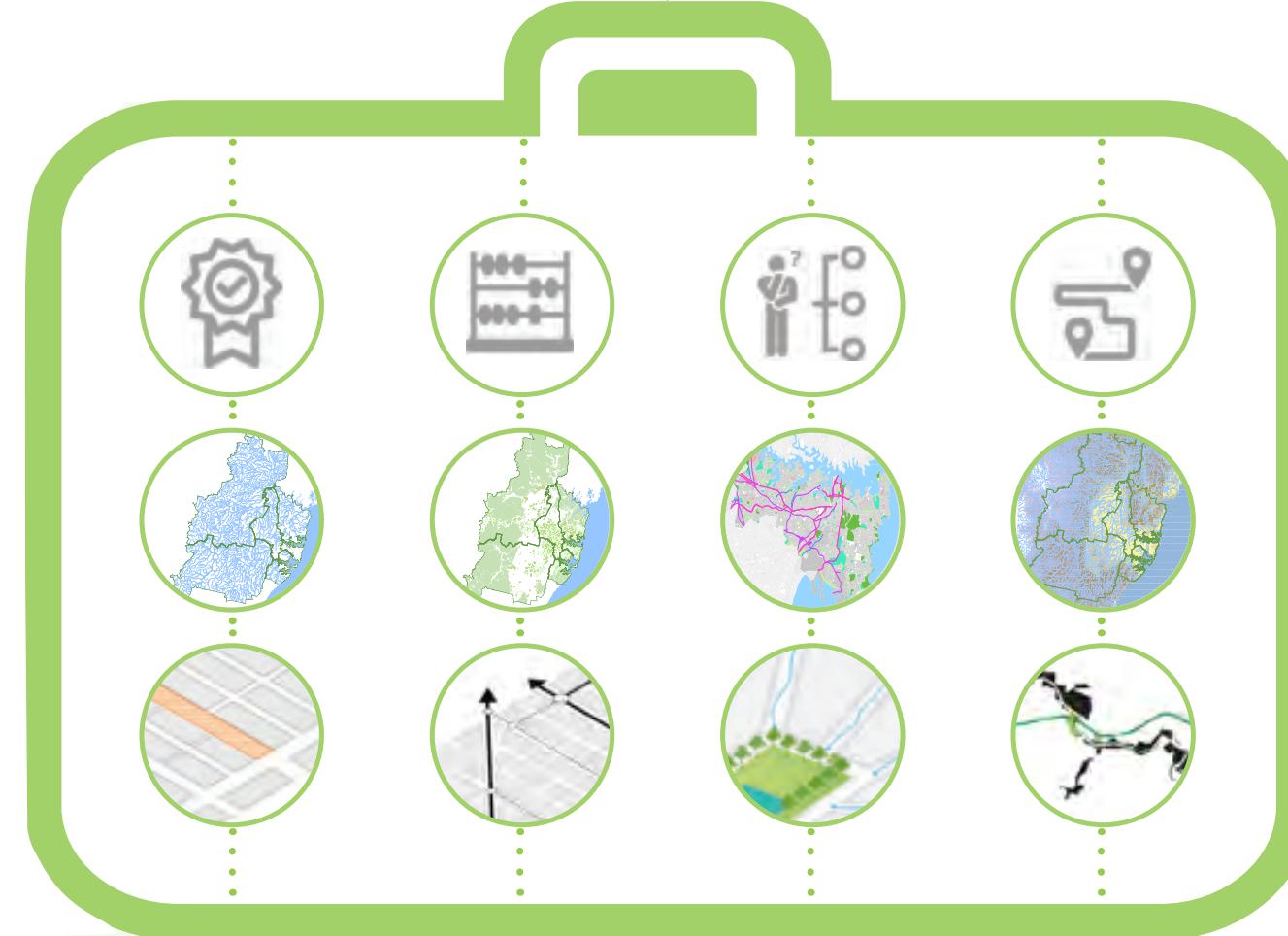


NSW GOVERNMENT

Green Grid Users



Green Grid Tool Box
1. Framework / Subframes
2. Needs Assessment
3. Initiatives

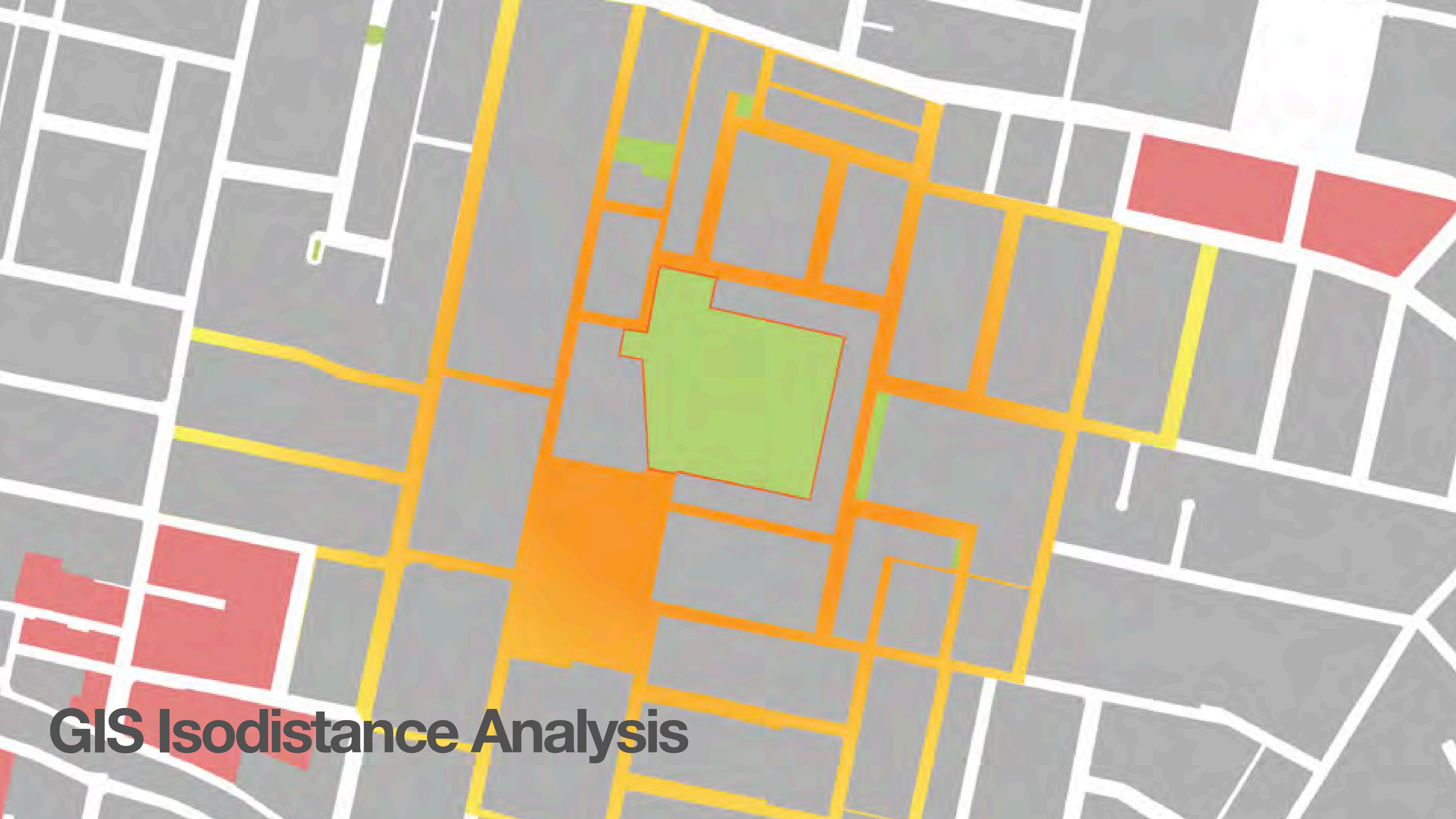


Open Space Plans

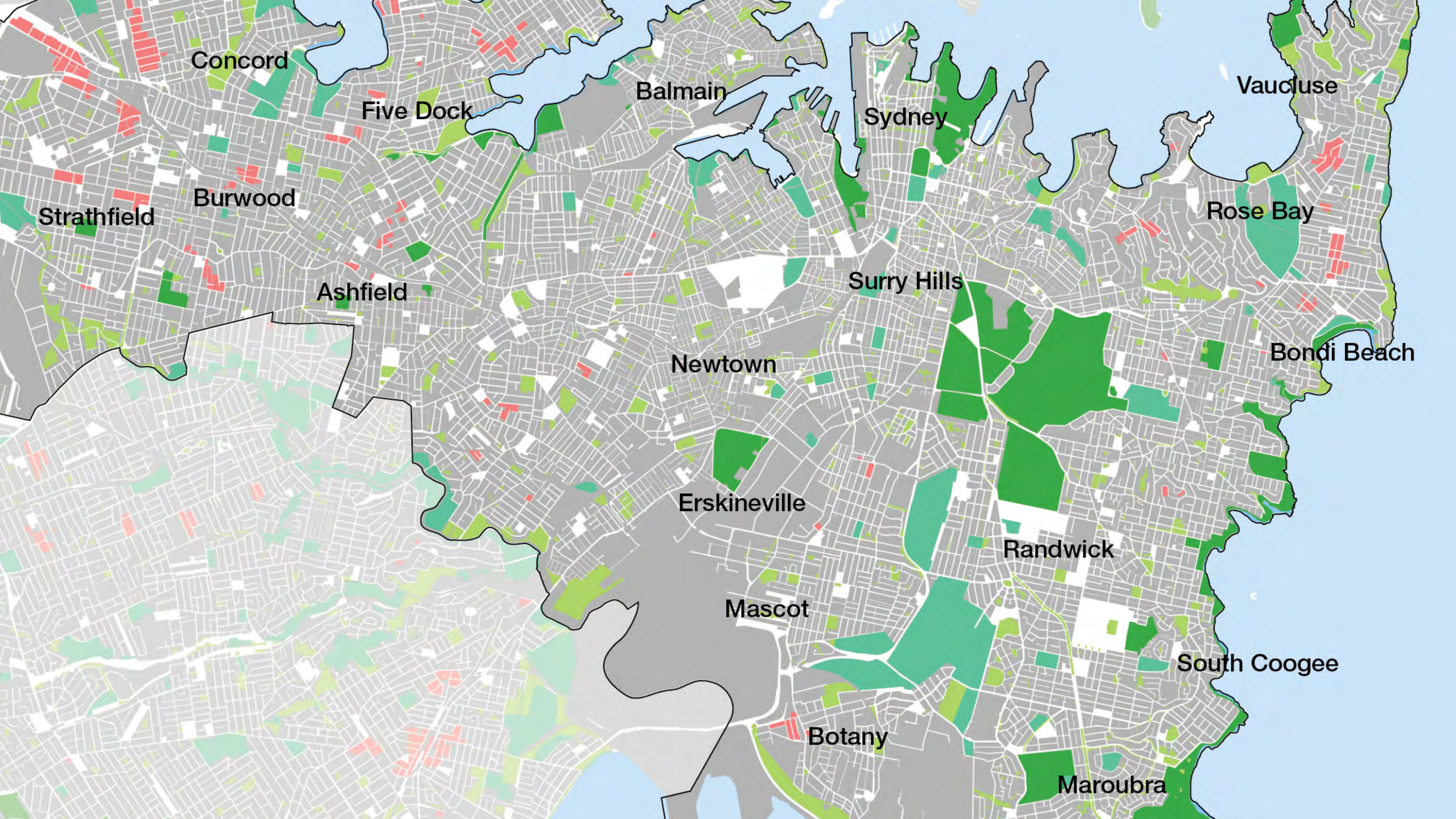


Implementation





GIS Isodistance Analysis



Concord

Five Dock

Balmain

Sydney

Vaucluse

Strathfield

Burwood

Rose Bay

Ashfield

Surry Hills

Bondi Beach

Newtown

Erskineville

Randwick

Mascot

South Coogee

Botany

Maroubra

CENTRAL DISTRICT



CHARACTER

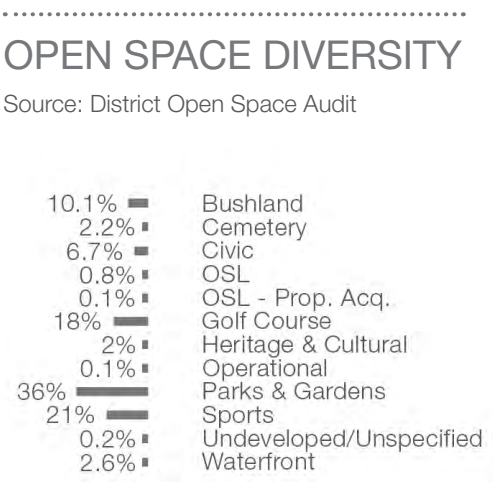
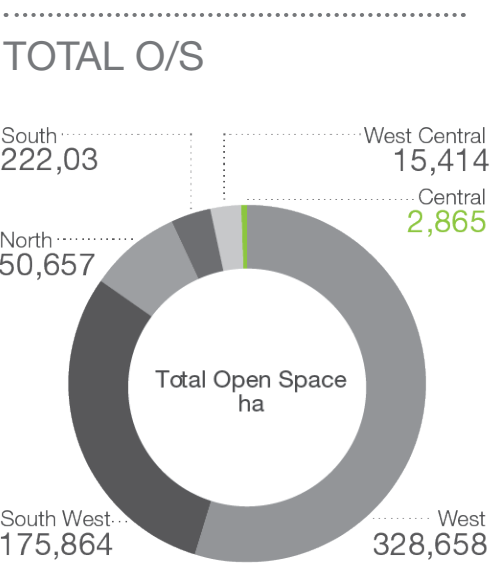
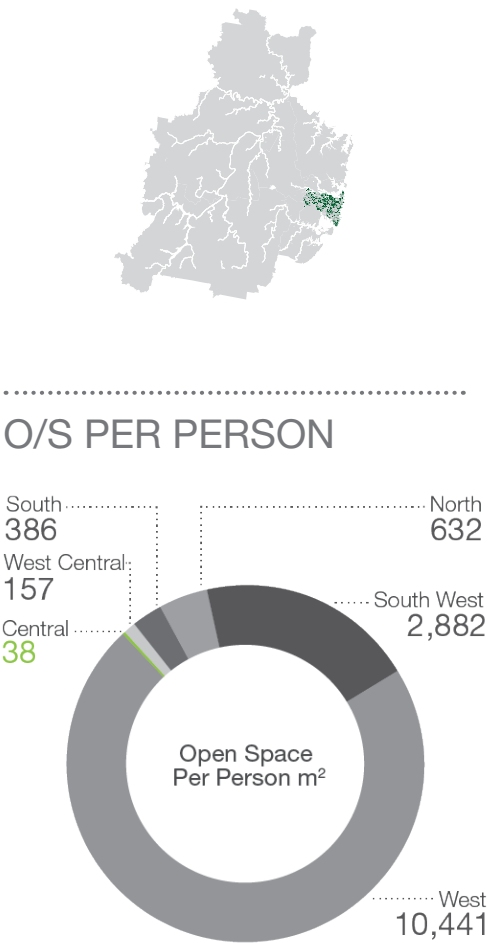
The subregion lies at the heart of the metropolitan area and the City of Sydney is the major centre. The landscape has features such as sandstone cliffs, beaches along the harbour edge and east coast, gently undulating shale in the west of the subregion and dune landscapes around Botany Bay. Much of the subregion is densely developed and there are significant industrial areas around Alexandria, Port Botany, Sydney Airport, Strathfield South and Enfield.

AUDIT FINDINGS

The total numbers of people in the district that live outside the target distance to open space classifications are as follows:

- Neighbourhood - 17, 130
- District/Regional - 3,939
- Regional - 3

	Neighbourhood		District & Regional		Regional	
Central district LGA	Population not within 400m of combined Local, District or Regional open space		Population not within 2km of combined District or Regional open space		Population not within 5km of Regional open space	
ASHFIELD	1,085	2.7%	0	0.0%	0	0.0%
BOTANY BAY	162	0.4%	855	2.2%	0	0.0%
BURWOOD	1,321	4.1%	0	0.0%	0	0.0%
CANADA BAY	5,419	7.2%	2,303	3.1%	0	0.0%
LEICHHARDT	48	0.1%	778	1.5%	0	0.0%
MARRICKVILLE	1,014	1.3%	0	0.0%	0	0.0%
RANDWICK	171	0.1%	0	0.0%	0	0.0%
STRATHFIELD	4,394	12.5%	0	0.0%	0	0.0%
SYDNEY	294	0.2%	3	0.0%	3	0.0%
WAVERLEY	1,803	2.9%	0	0.0%	0	0.0%
WOollahra	1,419	2.8%	0	0.0%	0	0.0%



WEST CENTRAL DISTRICT



CHARACTER

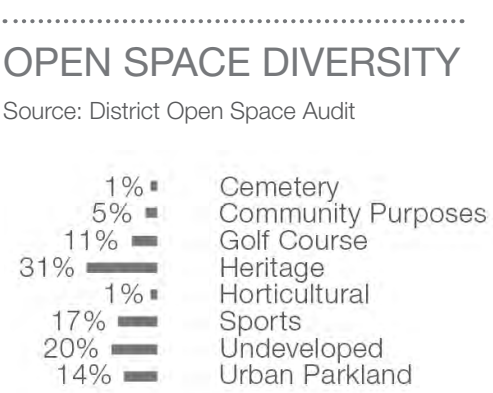
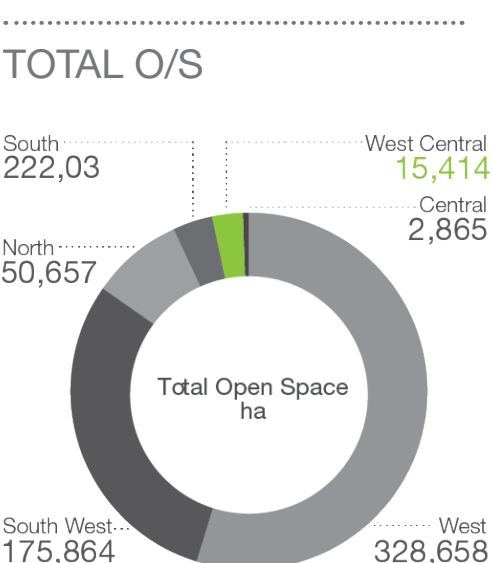
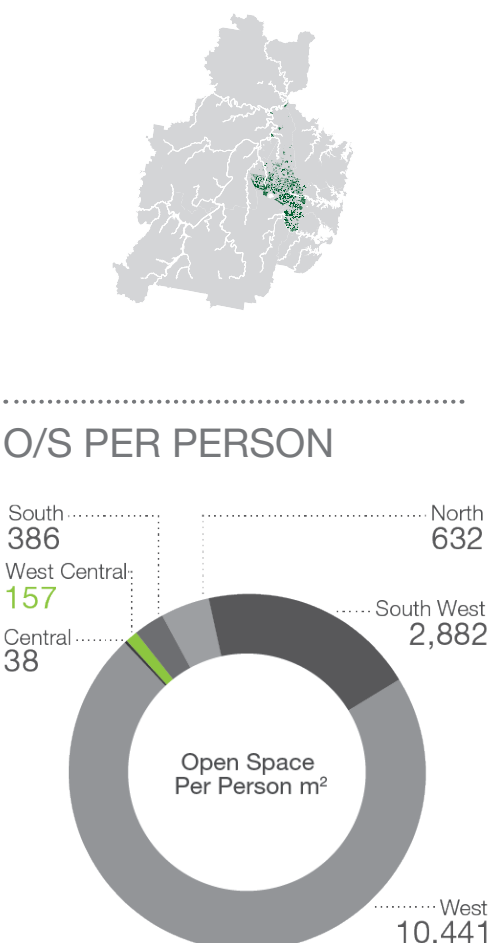
The subregion is comprised of three major water catchments and their associated estuarine and fresh water areas. The subregion is highly urbanised in the southern part, with the north consisting of extensive rural lands, Aboriginal and Crown land reserves. The urbanised part of the subregion forms part of the Cumberland Plain, which stretches from Ryde in the east to the Nepean River. The gentle topography and richer soils of the Cumberland Plain relative to the rugged, steep and less fertile sandstone plateaus surrounding it have made the area very attractive for a range of land uses including agriculture and more recently urban expansion.

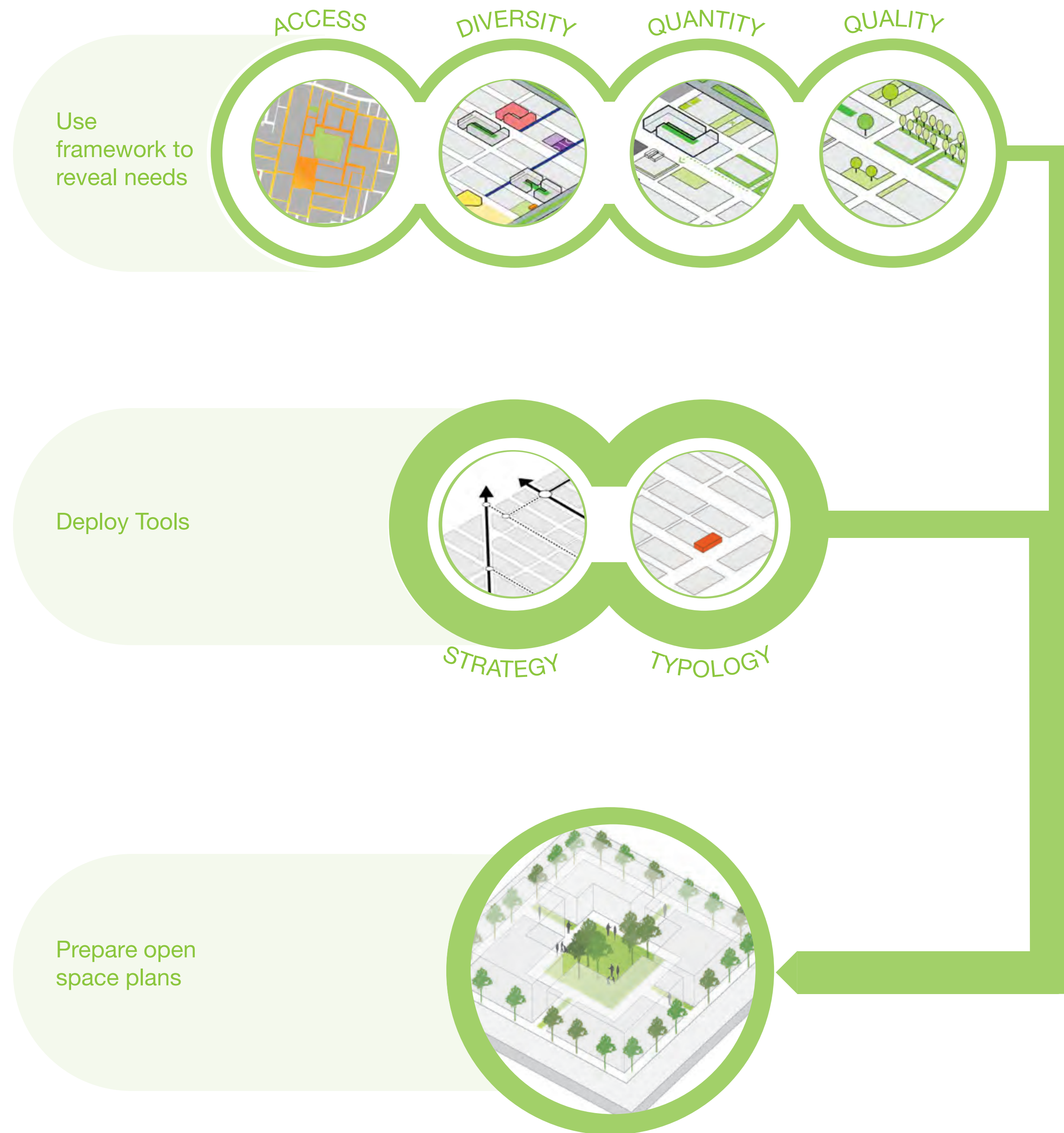
AUDIT FINDINGS

The total numbers of people in the district that live outside the target distance to open space classifications are as follows:

- Neighbourhood - 27,165
- District/Regional - 4,291
- Regional - 439

	Neighbourhood		District & Regional		Regional	
West Central district LGA	Population not within 400m of combined Local, District or Regional open space		Population not within 2km of combined District or Regional open space		Population not within 5km of Regional open space	
AUBURN	5,426	7.6%	0	0.0%	0	0.0%
BANKSTOWN	5,430	3.0%	0	0.0%	0	0.0%
BLACKTOWN	3,370	1.1%	274	0.1%	0	0.0%
HOLROYD	157	0.2%	0	0.0%	0	0.0%
PARRAMATTA	2,529	1.5%	0	0.0%	0	0.0%
THE HILLS SHIRE	10,253	6.1%	4,017	2.4%	439	0.3%





OPTIMISE INFRASTRUCTURE LANDS



- Relocate barrier fencing in rail/utility corridors to create space for active transport trails & trees

ACTIVE TRANSPORT NETWORKS



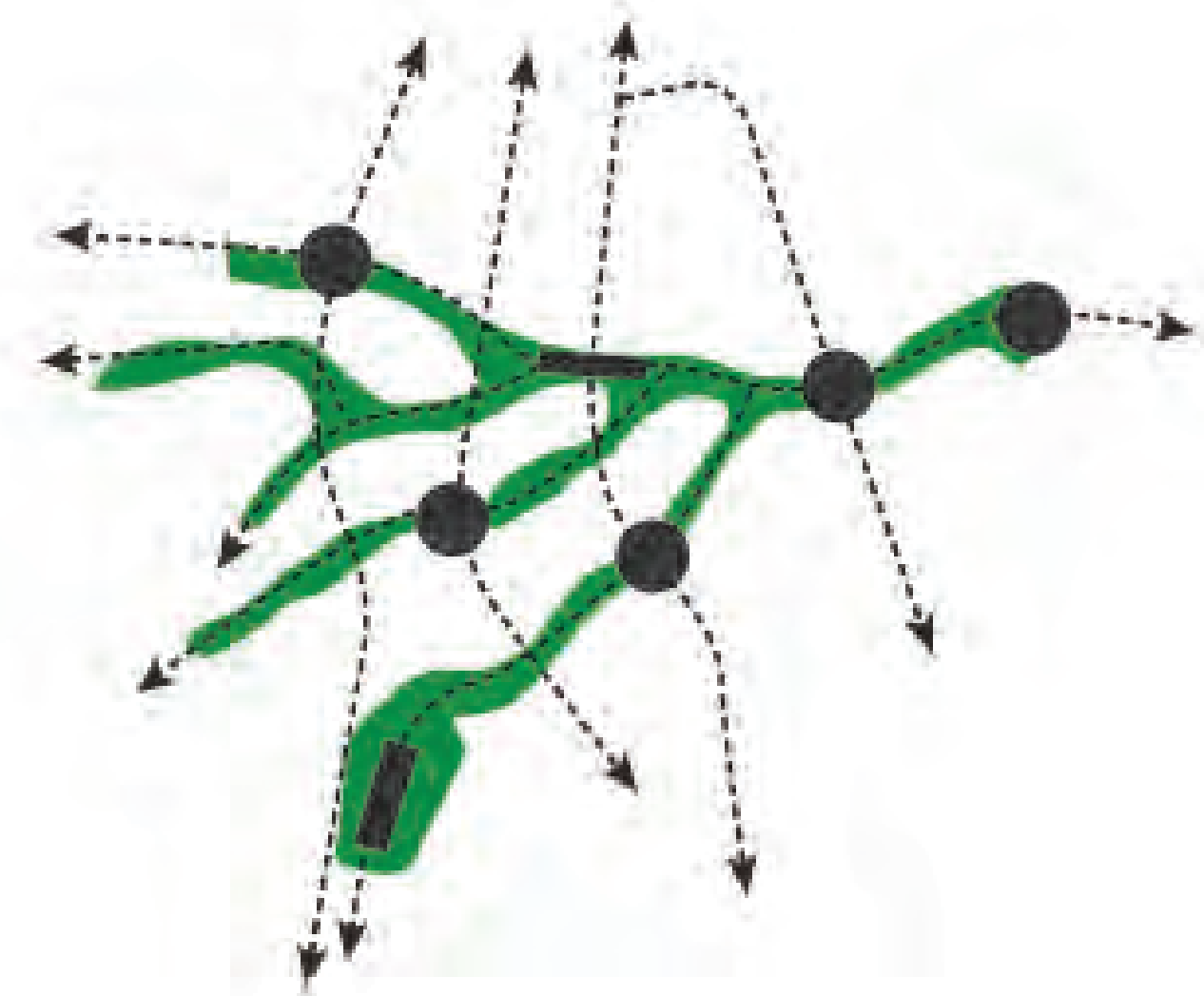
- Utilise & link infrastructure corridors for commuter/recreation cycle trails & pedestrian systems

REGENERATE WATERWAYS



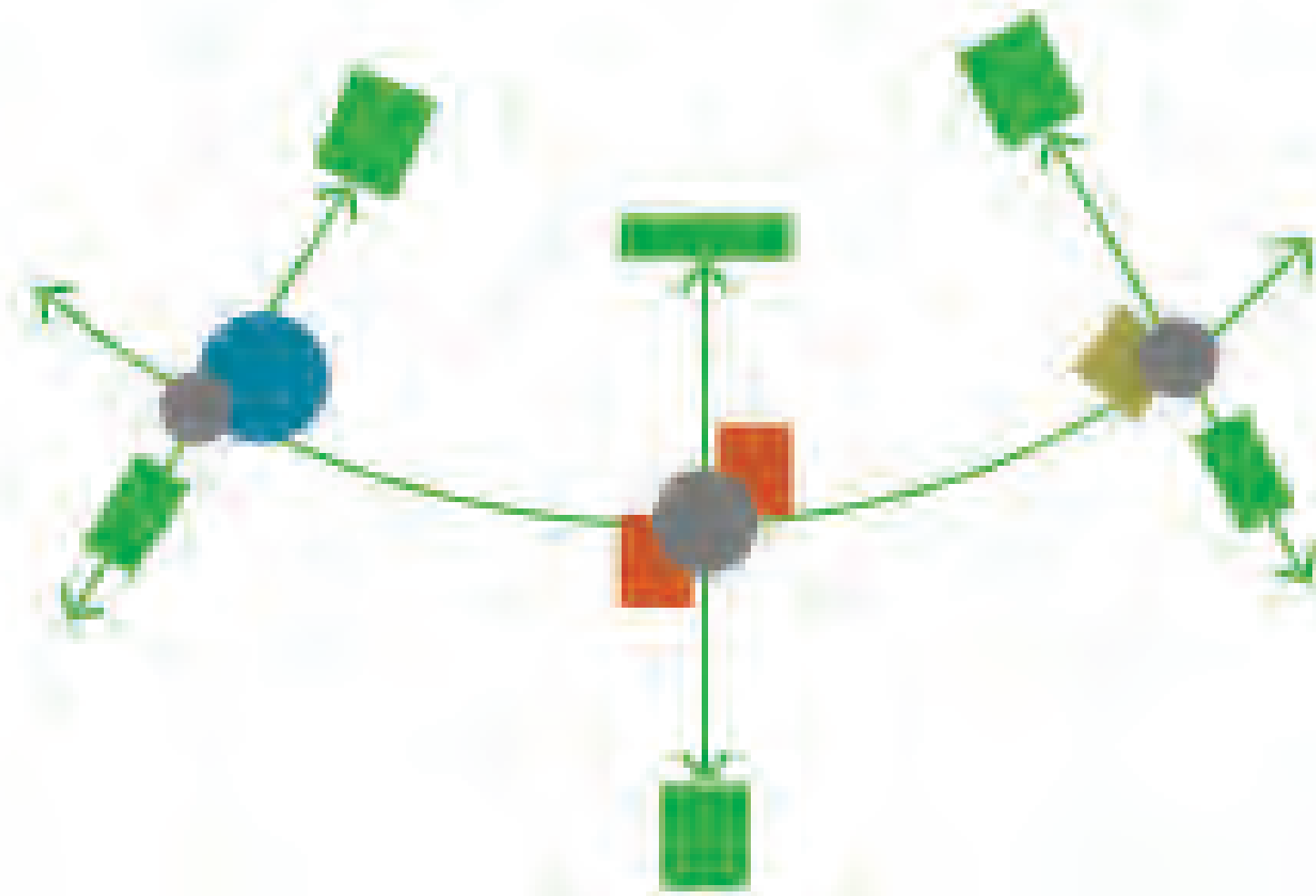
- Remove grey infrastructure & regenerate riparian landscapes for habitat & recreation uses

LINK TRANSIT HUBS



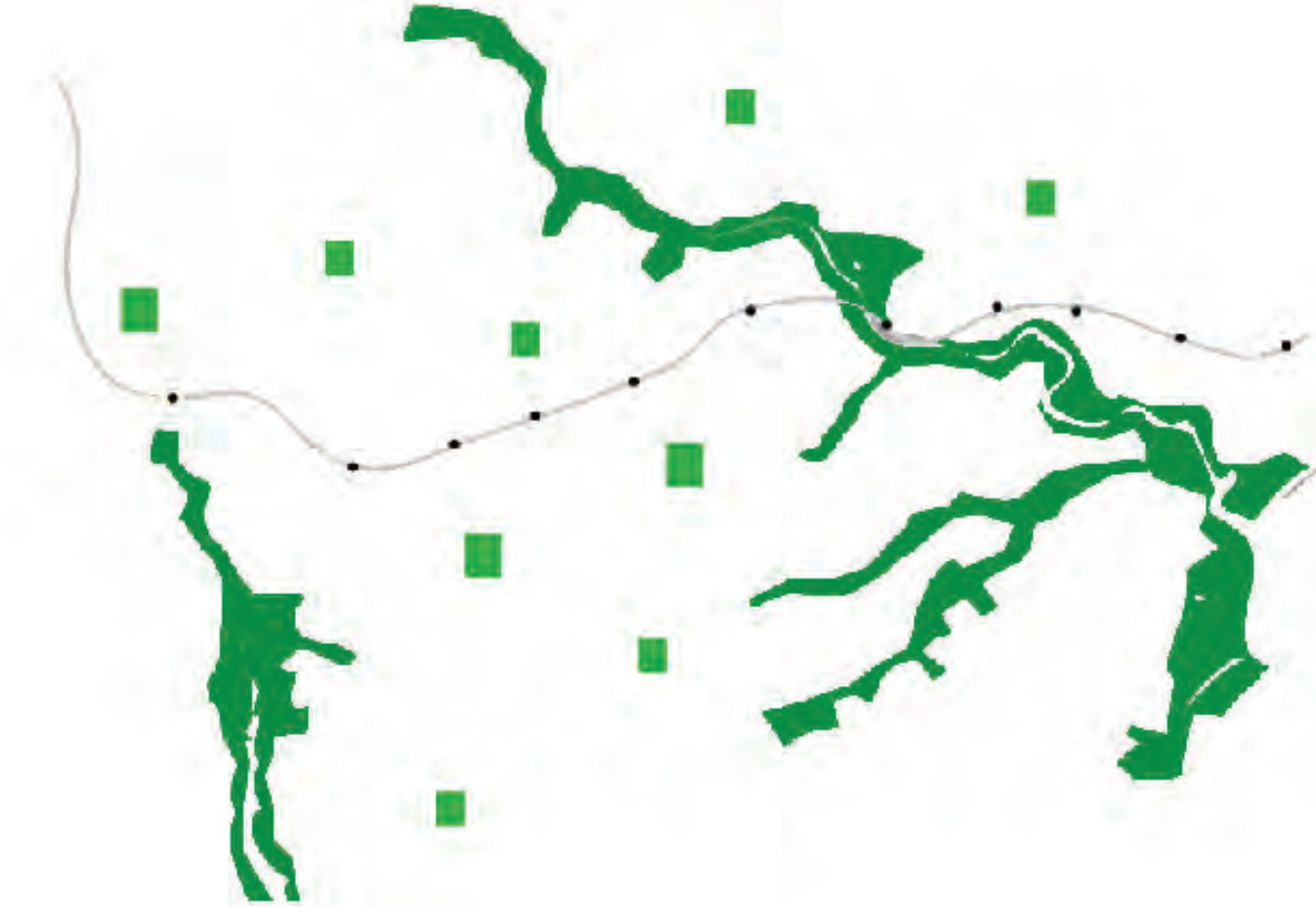
- Integrate transit stations and stops with the Green Grid trail network to support modal choice

DEPLOY DIVERSE TYPOLOGIES



- Maximise the diversity of open space typologies in corridors to suit demand for amenities

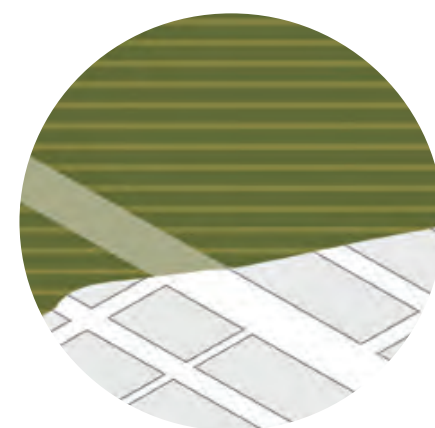
SHARE SCHOOL YARDS



- Open school yards on weekends for public use as markets & neighbourhood open space

REGIONAL [12-30+ HA]

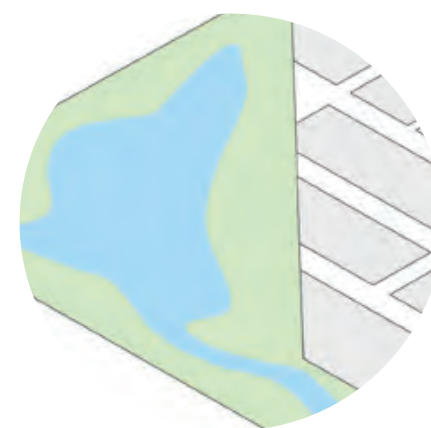
NATIONAL



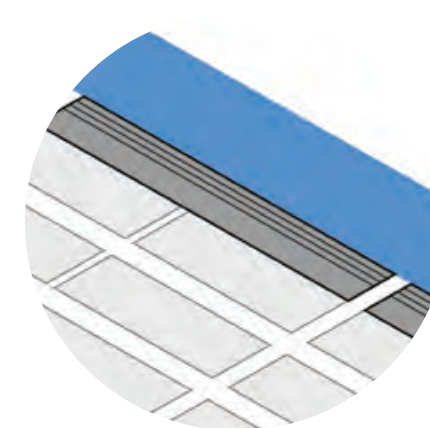
Ecological Reserve



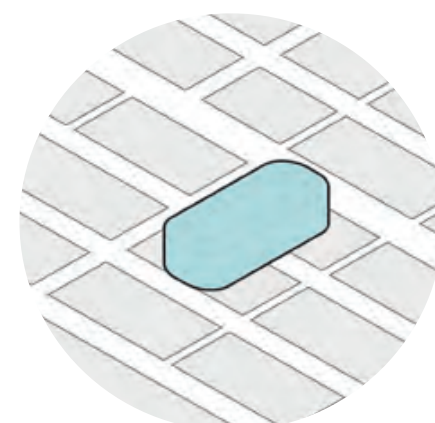
Lagoon



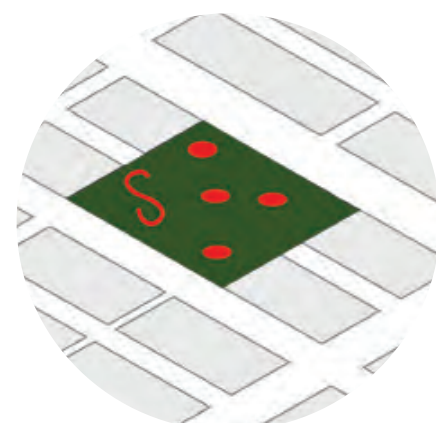
Lake



Urban Waterfront



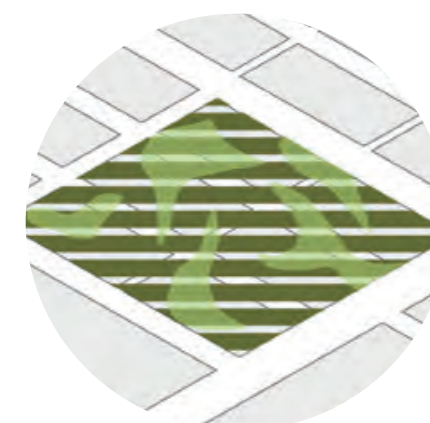
Aquatic Centre



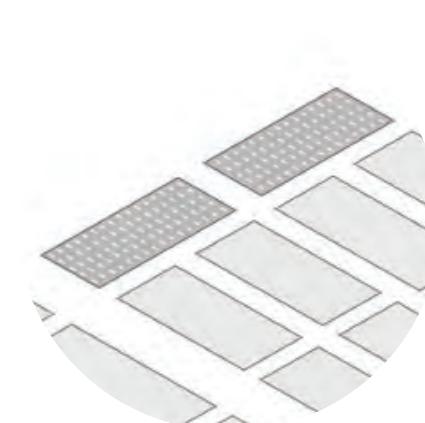
Art Park



Beach



Botanic Garden



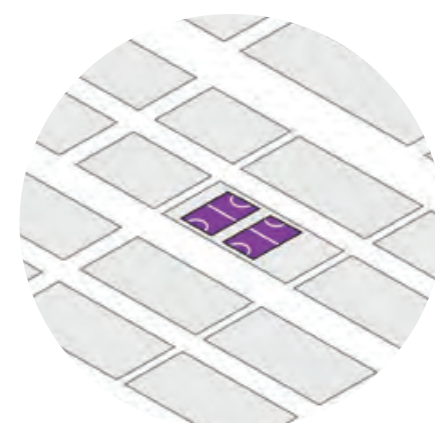
Cemetery



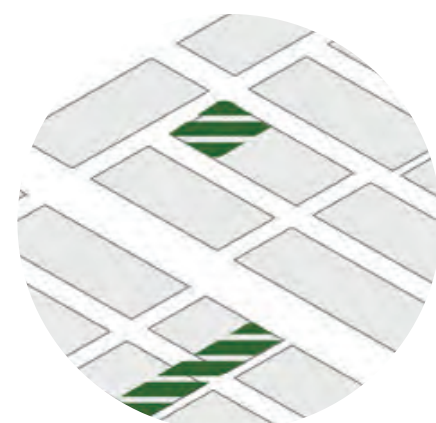
Golf Course Public



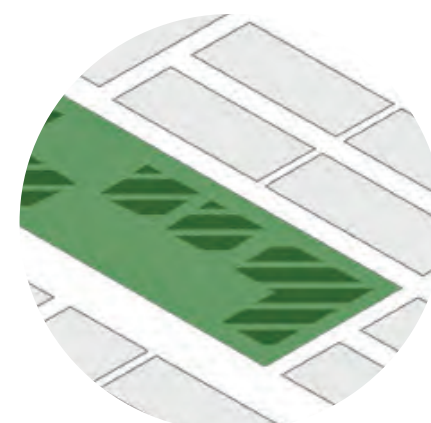
Sport Programmed
Grass



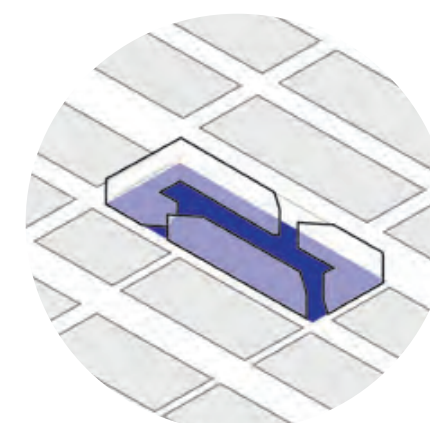
Sport Programmed
Synthetic



Wetland



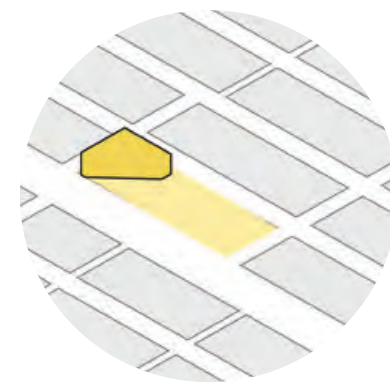
WSUD Park



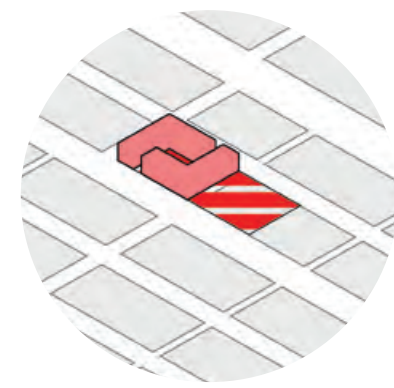
Institution

LOCAL [0.1 - 2 HA]

DISTRICT [2 - 12 HA]



Community Hub



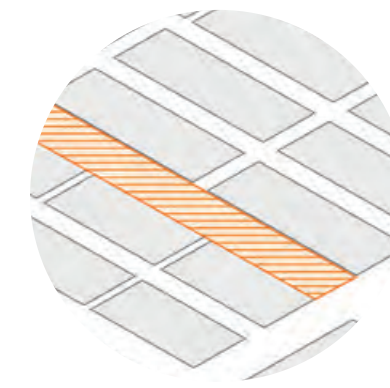
Library



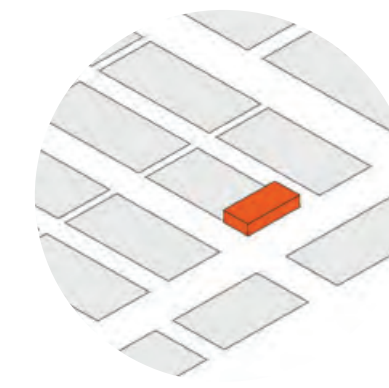
Indoor Sport



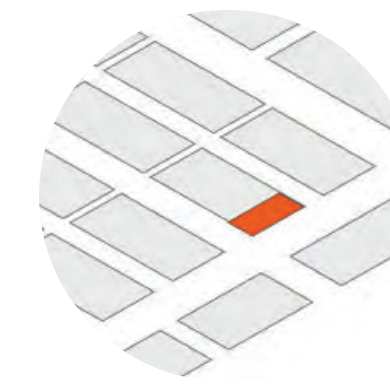
Boulevard



Corso



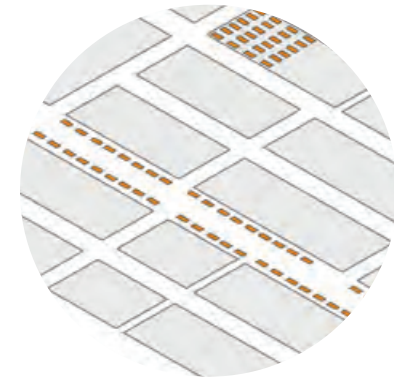
Carpark Multi Storey



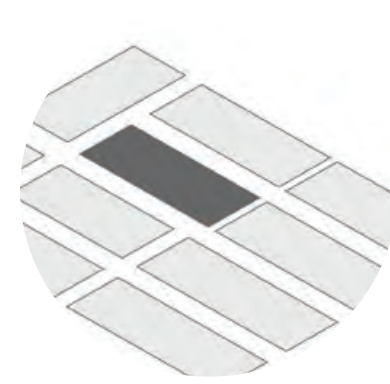
Carpark Surface



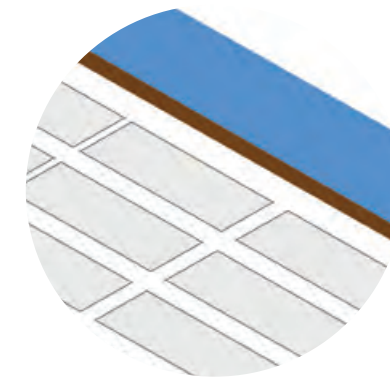
Green Street



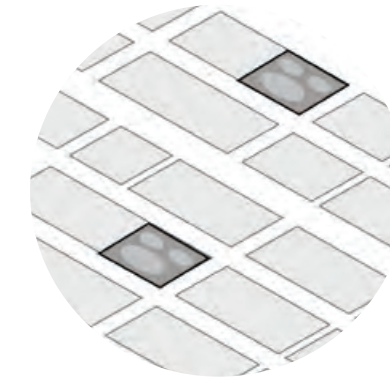
Market



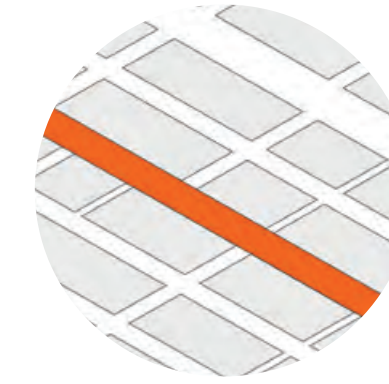
Plaza



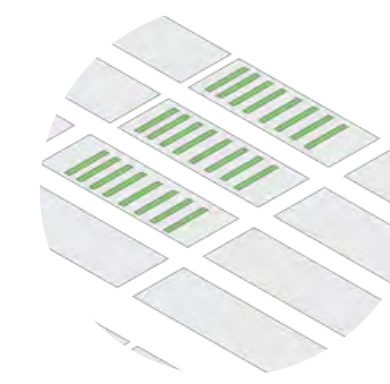
Promenade



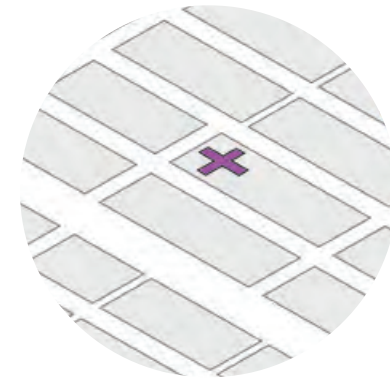
Skate



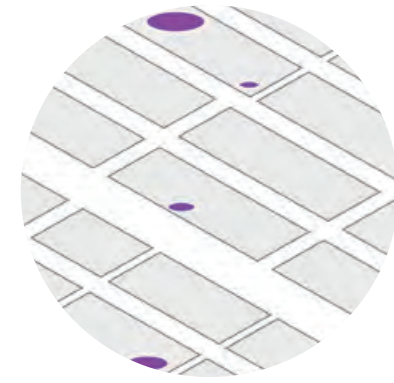
Shared Street



Urban Agriculture



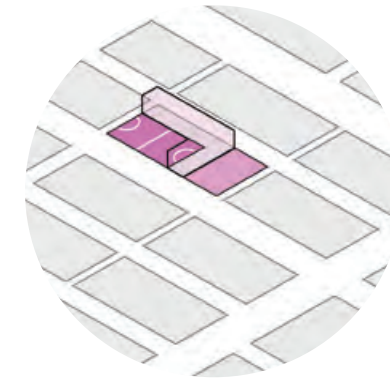
Urban Play



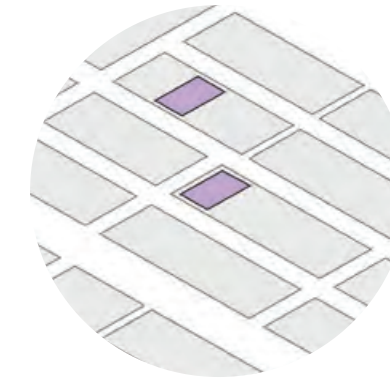
Play Children



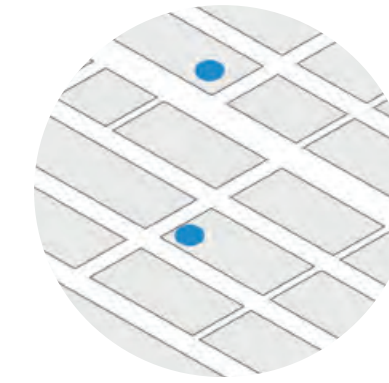
Post Industrial



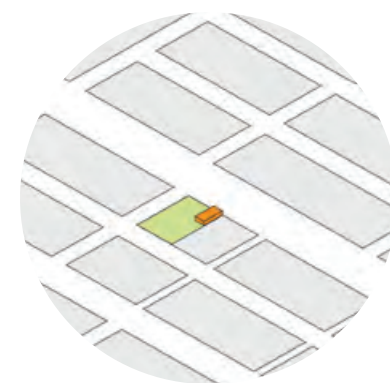
Sport School



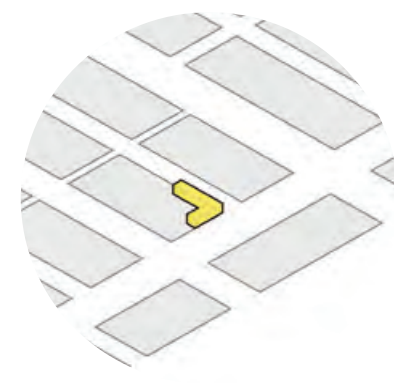
Sport Unprogrammed



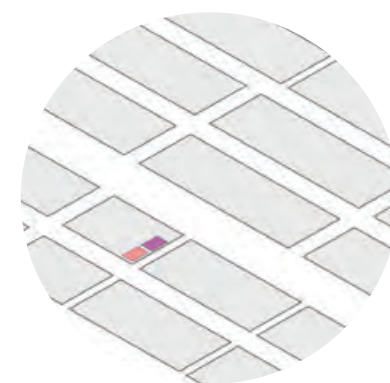
Play Youth



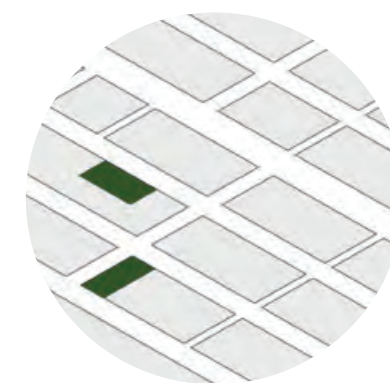
Bowling



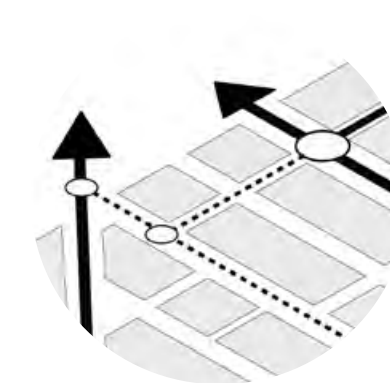
Scout/Guide Hall



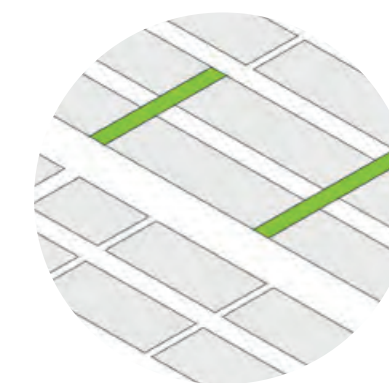
Community Garden



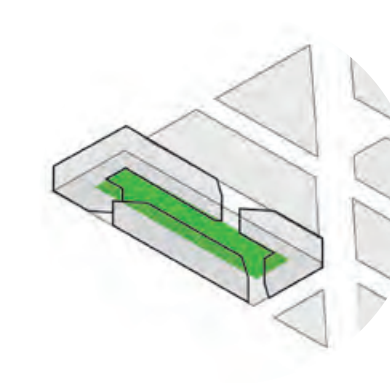
Pocket Park



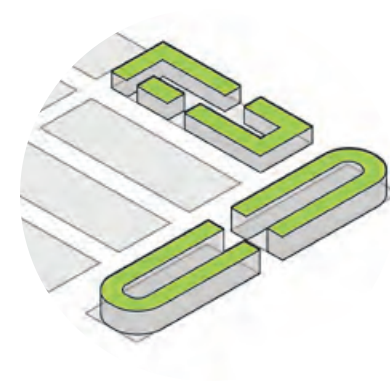
Transit



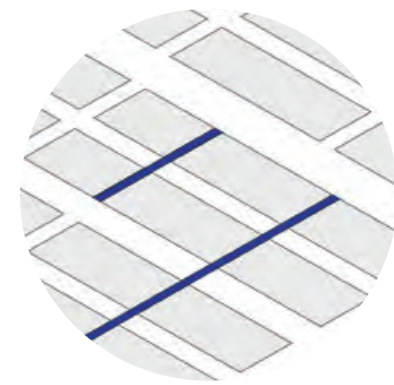
Biostreet



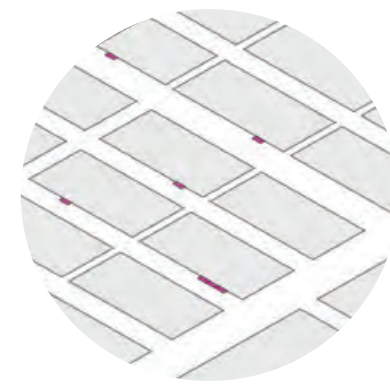
Courtyard



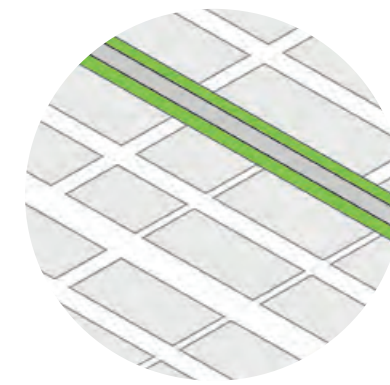
Green Roof



Laneway



Parklet



Verge

Green Grid.

Projects

Ballast Point Park

Birchgrove, Sydney (悉尼, 澳大利亚)















STONE STATUES OF ANCIENT WAVES

TOM LIKE DINGHOES ON S ARE

Design Element	Components	Environmental Outcome
<div>CONCRETE</div> 	 <div>Coal Power Plant Waste</div>  <div>40% Fly ash & slag (154t)</div>  <div>20% Recycled aggregate (220t)</div>  <div>20% Recycled ground slag(154t)</div>	<div>528t</div> <div>Saved virgin materials</div>
<div>RUBBLE WALLS</div> 	 <div>100% Recycled rubble (1,450t)</div>  <div>100% Site-soil back fill (18,000t)</div>  <div>100% Recycled crushed aggregate (700t)</div>	<div>19,450m³</div> <div>Saved virgin materials</div>
<div>TIMBER</div>  	 <div>Jarrah hardwood</div>  <div>100% Recycled 30mm x 18mm timber</div>	<div>9,333m</div> <div>Saved virgin materials (Linear metres)</div>
<div>BIODIVERSITY / CARBON</div>  	 <div>98% Provenance -Trees (980)</div>  <div>95% Provenance -Understorey (32,300)</div>	<div>350t Co₂</div> <div>Sequestered in trees lifetime</div>
<div>SOIL / MULCH</div> 	 <div>Used Timber Pallet</div>  <div>100% Recycled Mulch (600m³)</div> <div>+</div>  <div>Organic Waste</div>  <div>100% Recycled Soil (2000m³)</div>	<div>2,600m³</div> <div>Saved virgin materials</div>
<div>LUBE RING</div> 	 <div>Demolished 'tank 101'</div>  <div>25% Recycled tank skin</div> <div>+</div>  <div>100% Wind power (8x 1kW vertical axis turbines)</div>	<div>8kW</div> <div>Wind energy potential</div>

