‘PLANNING GREEN INFRASTRUCTURE AS INTEGRATED NETWORKS’

CAPE TOWN CASE STUDY

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Departments: Urban Planning & Design + Environmental Planning &and Sustainability

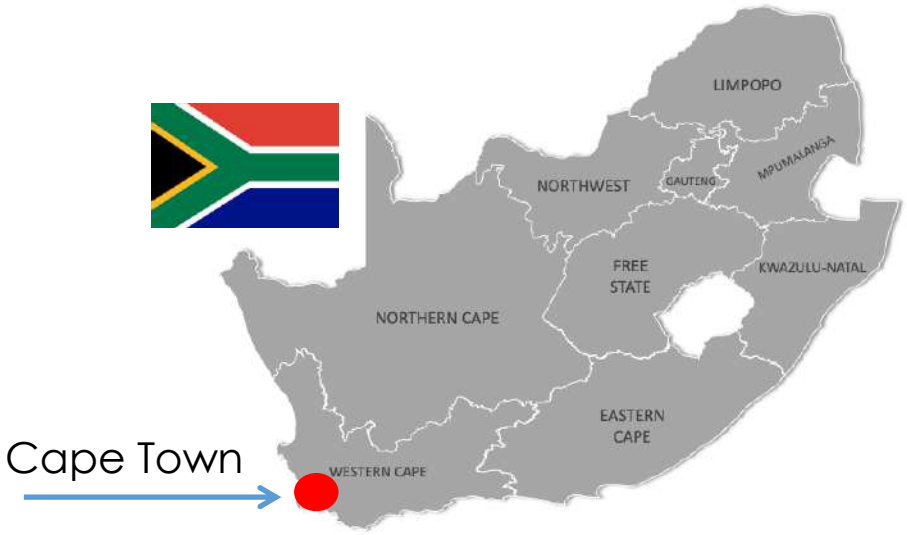
Spatial Planning & Environment Directorate

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

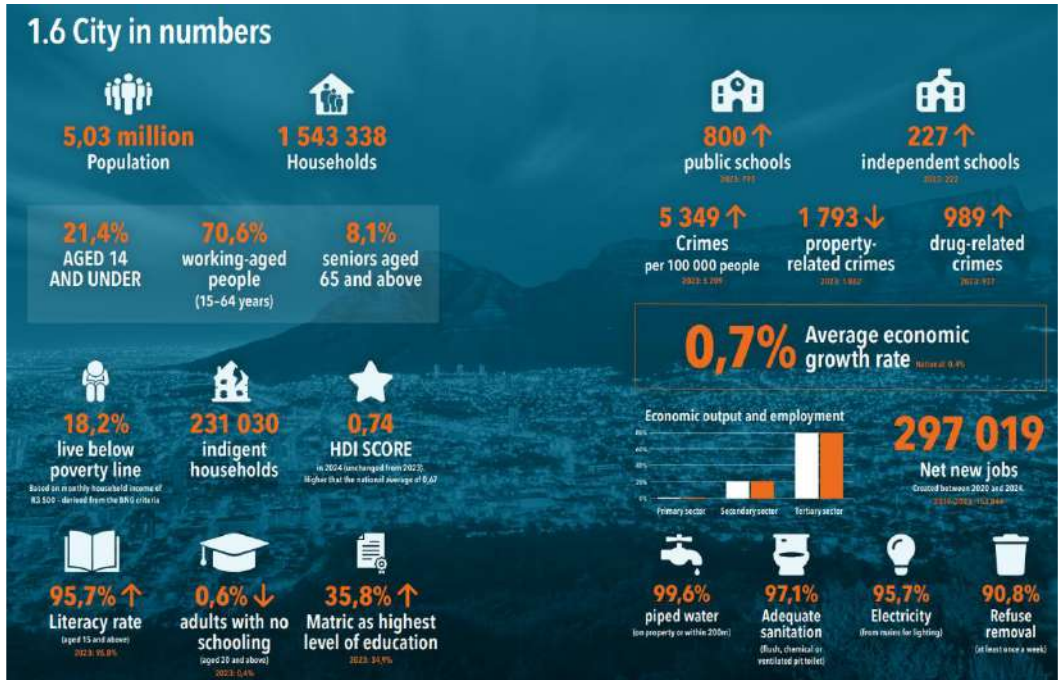
Making progress possible. Together

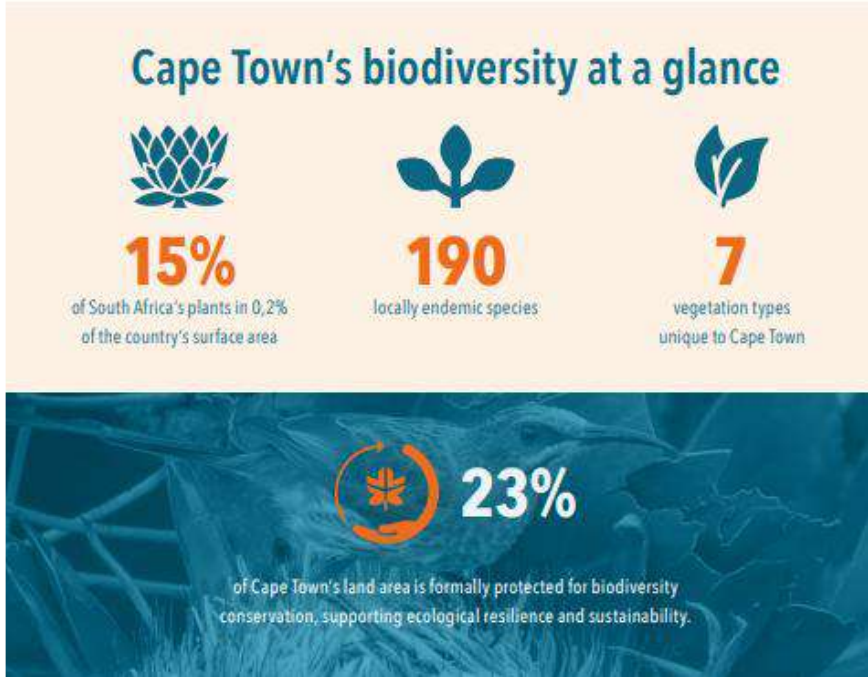
CONTENTS

INTRODUCING CAPE TOWN



- Located in South Africa, on southern point of Africa
- 1 of 9 provinces in SA: 1,8% total size of the Western Cape Province
- Fastest growing city in SA
- Size: ± 2445 km^2
- Population: ± 5 million
- Unique natural & cultural heritage





Environment

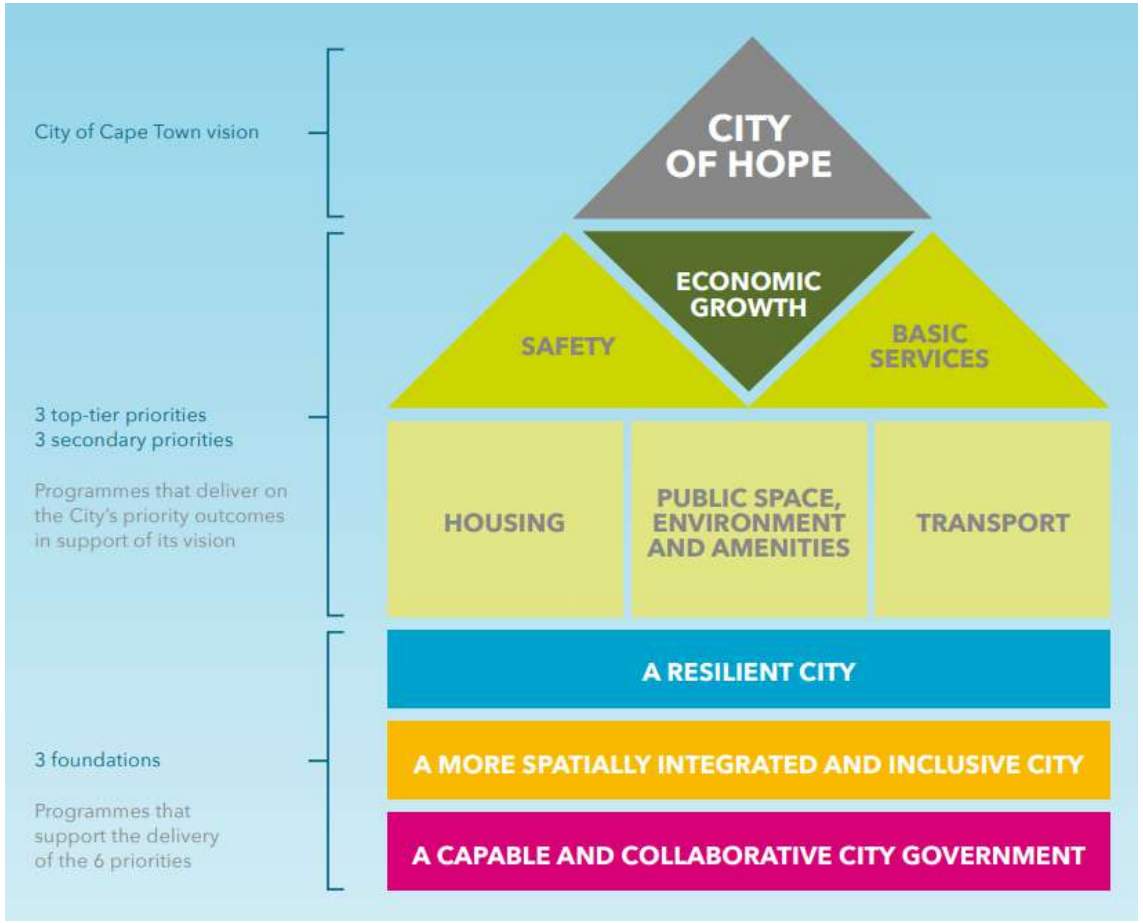
- Most biodiverse city globally
- Green space:
  - 1,349ha+ natural public green space
  - 55,000ha+ mostly publically owned, accessible protected areas
  - Table Mountain National Park
  - 2 x WHS (TMNP, Robben Island)
  - 1 x Ramsar site
  - 14 district parks, 354 greenbelts
- 307km coastline
- Ramsar Wetland City with large river & wetland network

BUILDING A CITY OF HOPE

The Vision for Cape Town to be a City of Hope for all

- a prosperous, inclusive and healthy city where people can see their hopes of a better future for themselves, their children and their community become a reality.

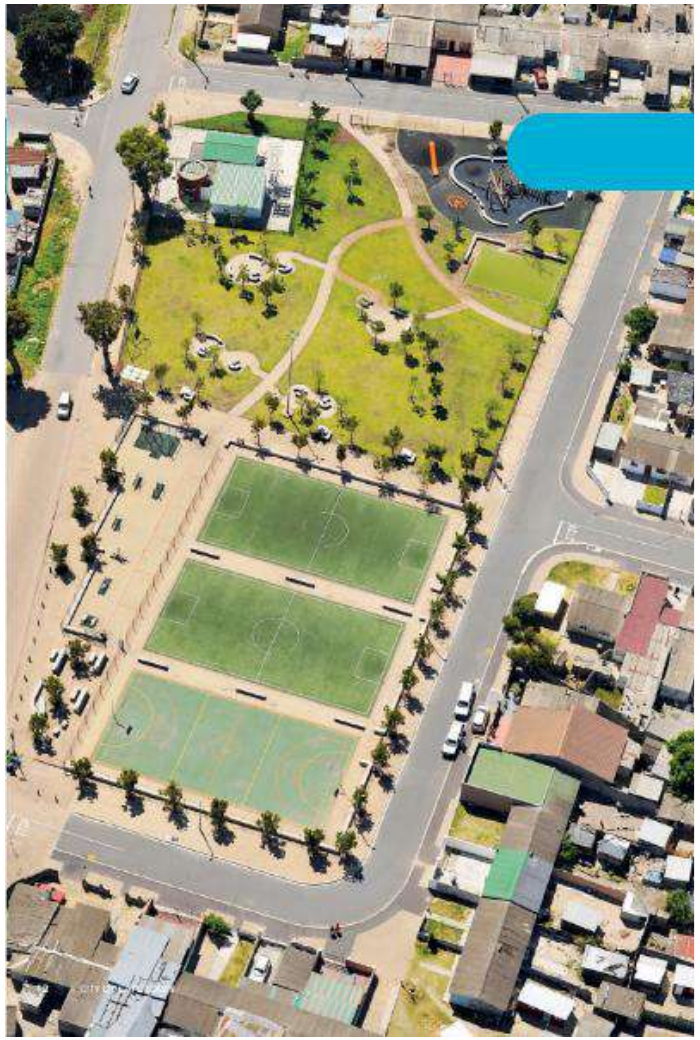
GUIDED BY THE INTEGRATED DEVELOPMENT PLAN (IDP: 2022-2027)



6 priorities identified, with programmes to deliver on them in support of the vision.

Pubic Space, Environment and Amenities

- Objective 9: Healthy and Sustainable Environment
  - 9.1 Environmental management programme
    - 9.1.A. Biodiversity Management initiative
    - 9.1.B . Green Infrastructure initiative
- Objective 10: Clean and Healthy Waterways and Beaches
  - 10.1 Healthy urban waterways programme
    - 10.1.B. Waterway rehabilitation project
  - 10.2 Coastal programme
    - 10.2.A. Coastal infrastructure initiative
- Objective 11: Quality and Safe Parks and Recreation Facilities supported by Community Partnerships.



7.6 PUBLIC SPACE, ENVIRONMENT AND AMENITIES

7.6.1 The importance of the public space, environment and amenities priority

Cape Town's public spaces, natural assets and community facilities are central to its identity as a liveable, inclusive and resilient city. They support environmental sustainability, social cohesion, economic activity, tourism and public health. The City continues to prioritise their protection, improvement and fair distribution.

In 2024/25, initiatives included rehabilitating vleis and coastal infrastructure, upgrading parks, and expanding recreational spaces in historically underserved areas. These efforts align with the Environmental Strategy and MSDF, which support compact, connected and climate-resilient development. The MSDF highlights the role of accessible green infrastructure in supporting densification and quality of life.

Interventions are being coordinated at the precinct level to increase impact. This includes optimising and managing public assets, and releasing land through the consolidated land pipeline.

The City is expanding its CBD beautification pilot into a broader programme for public space management, with plans to roll it out to two more CBDs by the end of 2025/26. It is also developing an asset management strategy for environmental, coastal and heritage infrastructure, and implementing the Development Management Optimisation Programme to improve regulatory efficiency.

Well-designed and well-maintained public spaces contribute to spatial justice, economic resilience and community wellbeing. They also help mitigate floods, support biodiversity and reduce urban heat.

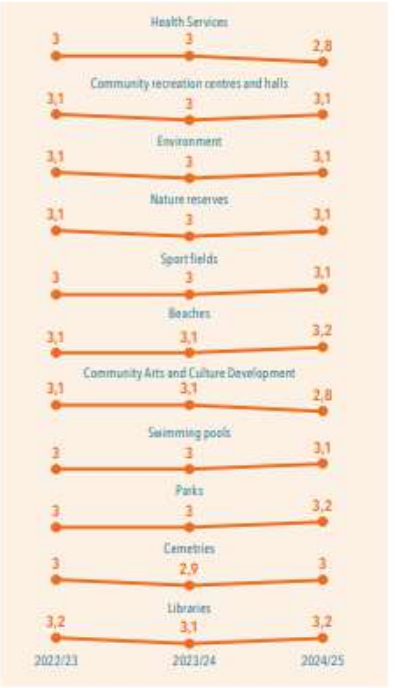
Where public spaces are well-maintained and equitably distributed, communities benefit – crime drops, health improves and social bonds strengthen. When neglected, these spaces decline, divide communities and cost more to fix.

By embedding environmental management and public space investment in its broader development agenda, the City is working to build a more inclusive and resilient Cape Town.

Community perception of service delivery

Between 2022/23 and 2024/25, most public amenities in Cape Town maintained stable ratings, with slight improvements in sport fields, swimming pools, beaches, parks and libraries. Parks showed the most notable increase, rising from 2,9 to 3,2. Community Arts and Culture Development saw a gradual decline, while cemeteries fluctuated slightly.

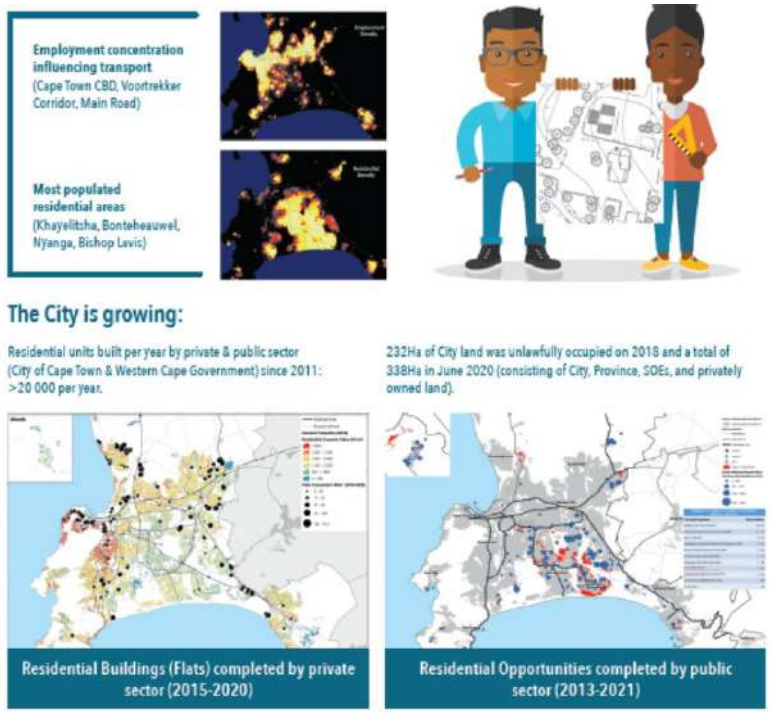
Findings of the 2024/25 Community Satisfaction Survey

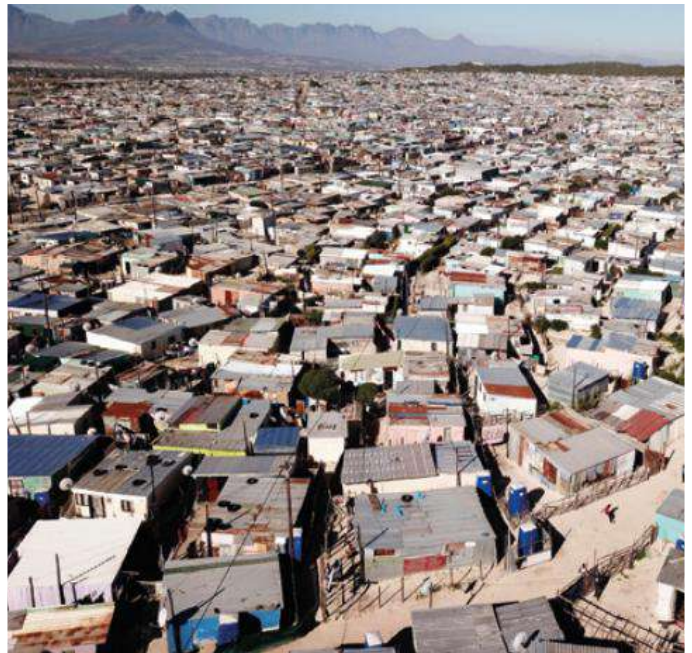


Rating scale: 1 = poor; 2 = fair; 3 = good; 4 = very good; 5 = excellent

CHALLENGES

- Extreme inequality, poverty and poor living conditions
- Water scare region
- Rapid growth, need for housing and limited space
- Spatially fragmented spatial structure- private vehicle dominance
- Natural systems under threat- Biodiversity cannot be moved…

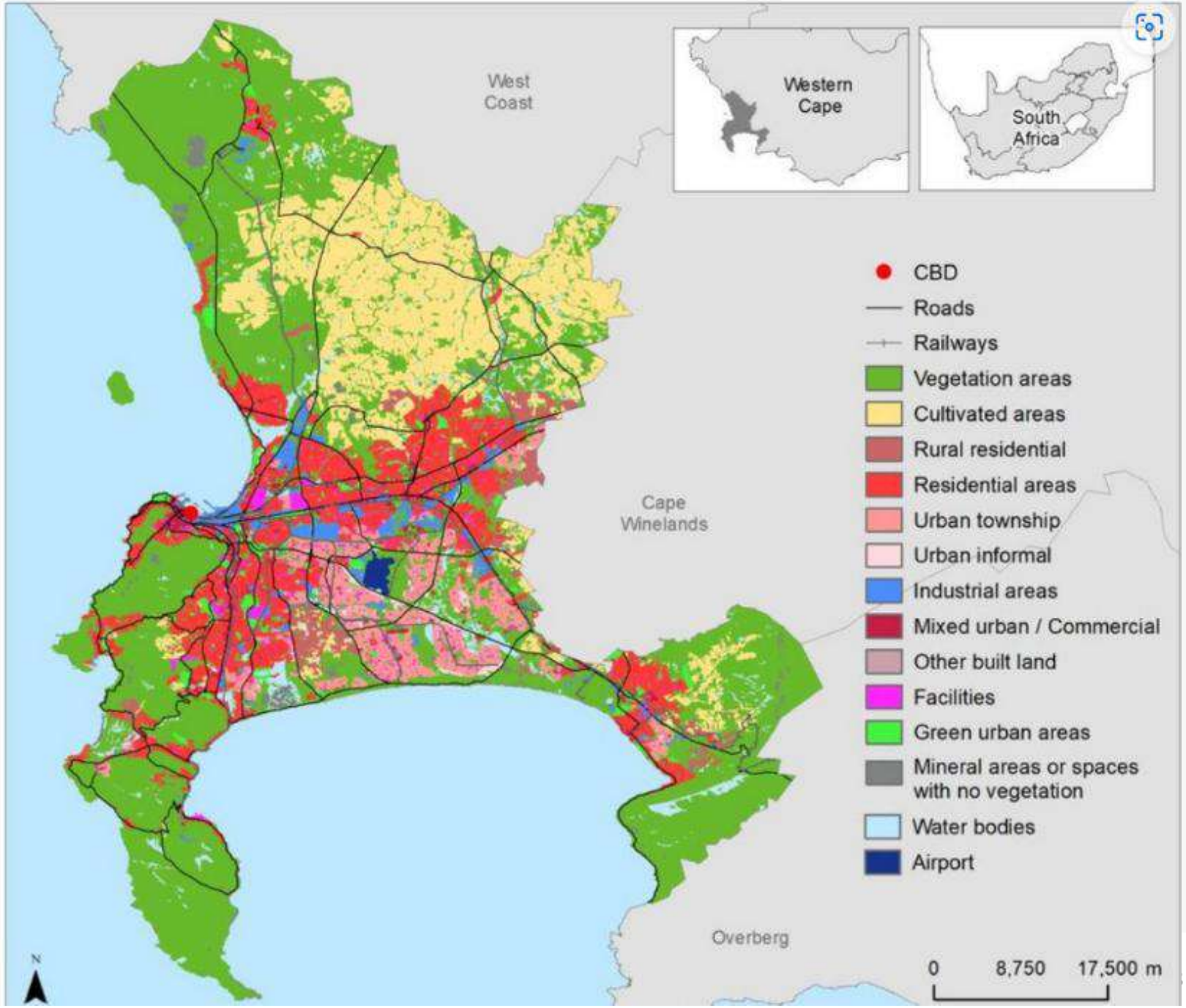




The planning challenge

From **fragmented** spaces to **connected** systems

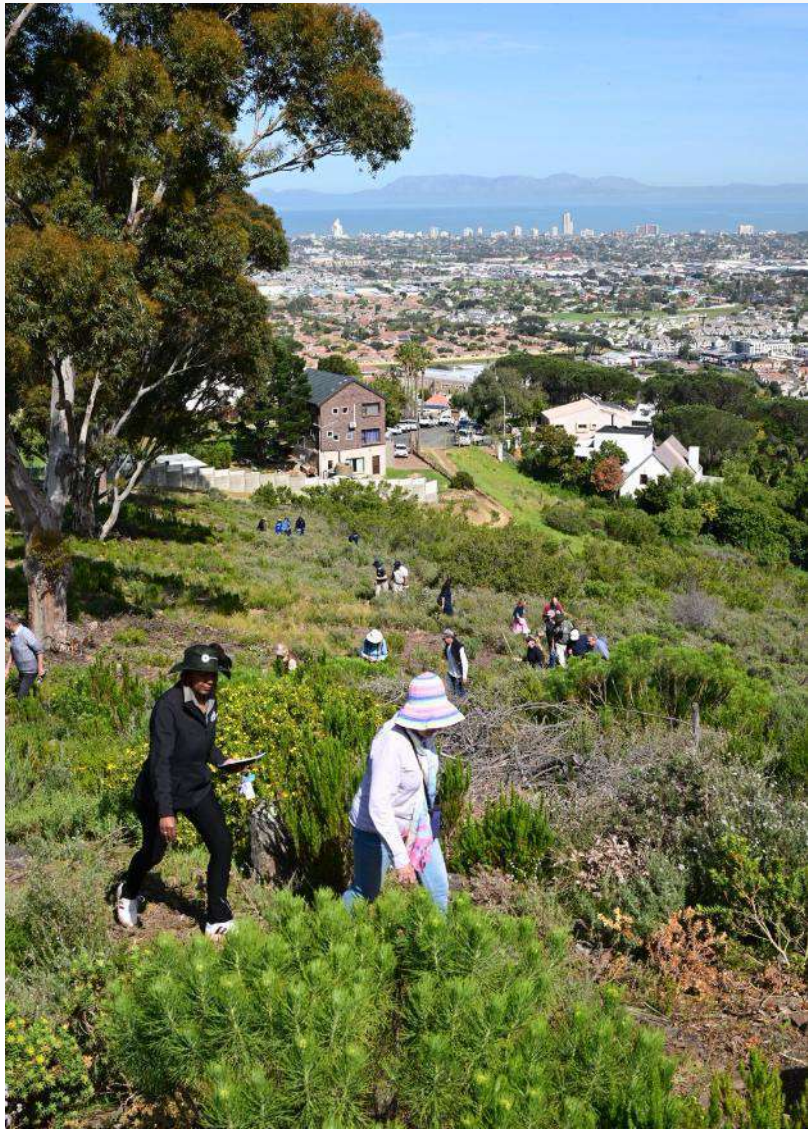
PLANNING FOR UNCERTAINTY TO BUILD A **RESILIENT CAPE TOWN**



The municipal role in sustainability

Local government is mandated to:

- Protect the environment
- Promote sustainable development
- Deliver services in an environmentally responsible manner



Understanding Green Infrastructure (GI)

Natural and semi-natural open spaces, natural and 'engineered' ecological systems, and other environmental features, that integrate with the built environment to provide a wide range of ecological, community and infrastructural services. GI assets ideally form an interconnected network within the urban environment.

A common thread through all GI definitions is **connectivity** and the **involvement of nature** to solve problems in the built environment of urban areas.

Macro → **Micro**

Nature reserves, wetlands, district parks, local parks, other open spaces (e.g. sports fields), gardens, green streets, public spaces, LID / WSUD (Low Impact Development/ Water Sensitive Urban Design incorporating e.g. permeable paving, swales, rain gardens, green walls, green roofs)

Corridors/ connectors

- **natural:** e.g. natural rivers
- **semi-natural:** e.g. canals and associated banks
- **built:** e.g. transportation routes & servitudes

Nature reserves and parks alone are not enough; natural systems must be connected.

SCALES OF PLANNING

Products

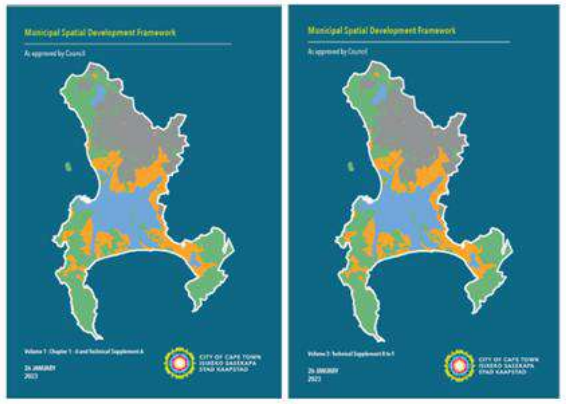
UPD Branches

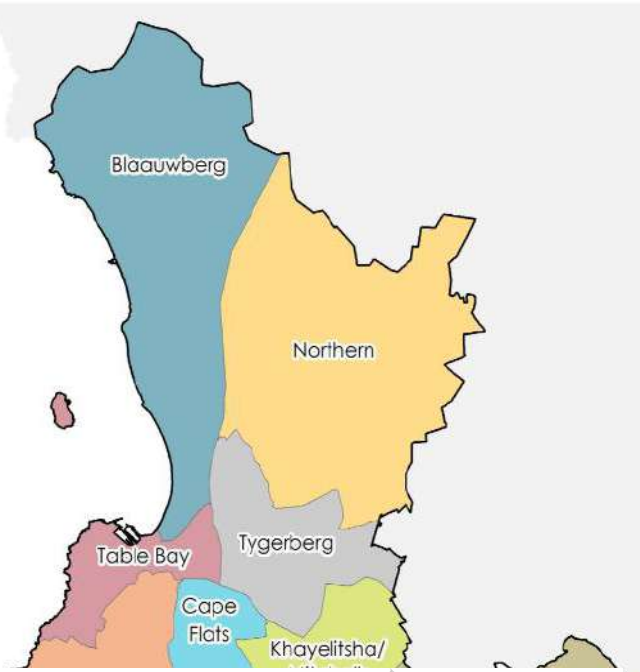
- [Metropolitan Spatial Development Framework (MSDF)](#)

Metro Spatial Planning & Growth Management

- [District Spatial Development Frameworks (DSDF)](#)

District Planning and Mechanism





- Local spatial Development Frameworks (LSDF)

Urban Design

- Precinct Development Plan (PDP)

Urban Development Implementation

- Site development Plan (SDP)

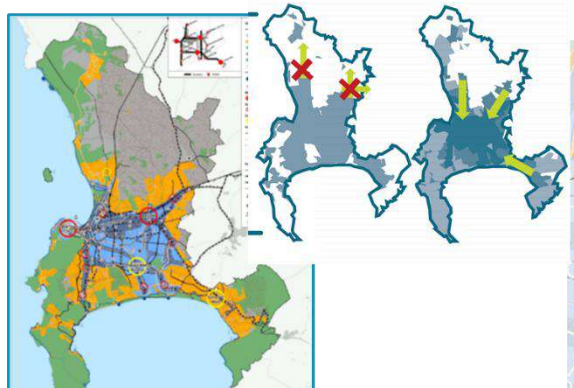
Urban Sustainability

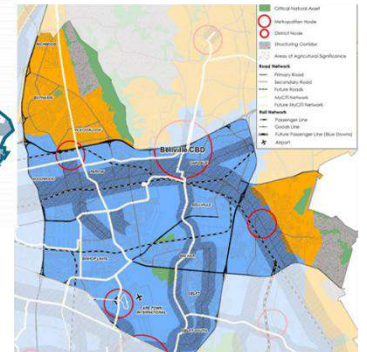
MSDF

- Sets overall spatial **vision and direction**
- Sets **policy objectives and desired outcomes**

DSDF (8 within the City of Cape Town)

- Translates vision and policy objectives into **district level spatial planning categories (SPC)** in order to provide more detailed development guidance



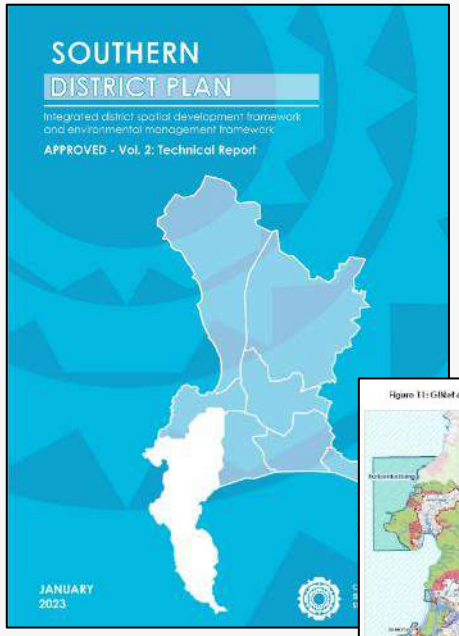


Integrating GI

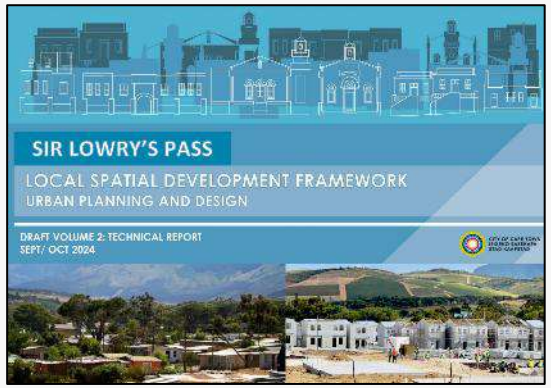
Incorporation of GI principles and considerations into appropriate City policy and spatial frameworks and by-laws

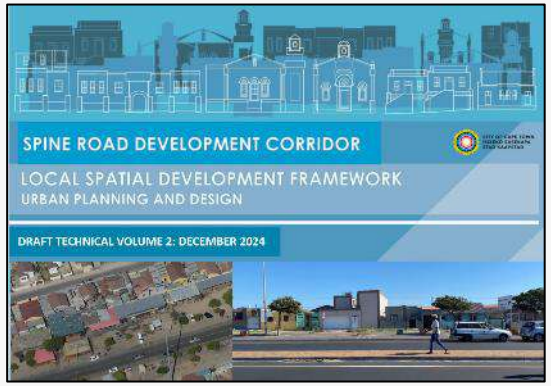
MSDF

DSDF



LSDF





A Systems Approach

Planning early to avoid conflict

01 Identify sensitive areas

02 Guide development decisions

03 Safeguard ecosystems for current and future generations

Photo by Darryl Colenbrander

GINet as an informant

GINet is **not intended to stop development**, but to be used as an **informant to flag aspects that need to be considered** with a view to retaining or enhancing services provided by green spaces.

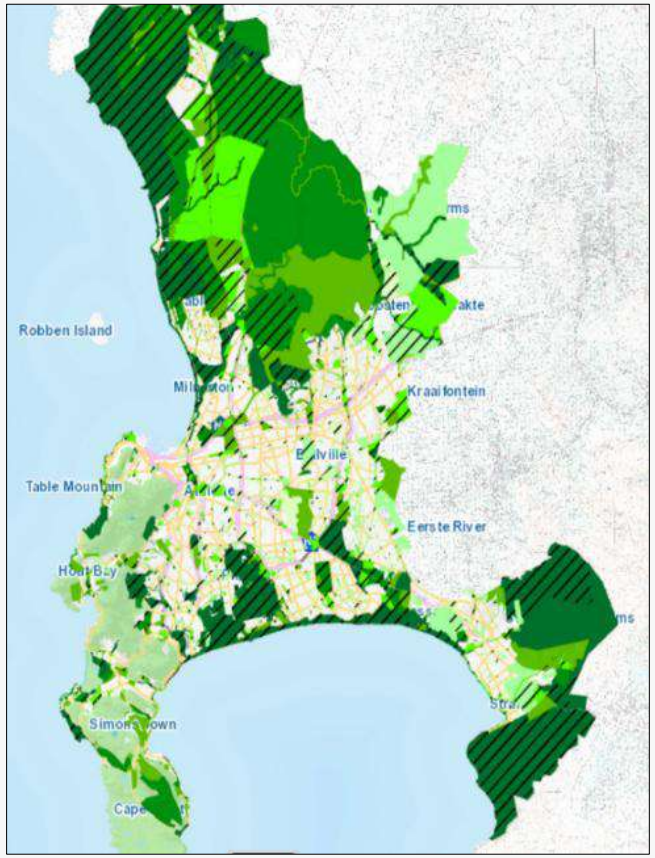
Looks to **highlight considerations** for design and layout of development

To consider 'softer' green infrastructure options and approaches for **managing and ameliorating impacts of urbanisation and climate change**, whilst **improving liveability** in the city.

GI considerations in relation to promoting:	
Water sensitive urban design (WSUDs)	Connectivity (ecological and social)
Sustainable urban drainage systems (SUDs)	Multi-functionality of spaces, incl. recreation
Tree retention and enhancement	Appropriate interfaces between built and natural – oversight, safety, integration
Vegetation retention and enhancement	Resource efficiency

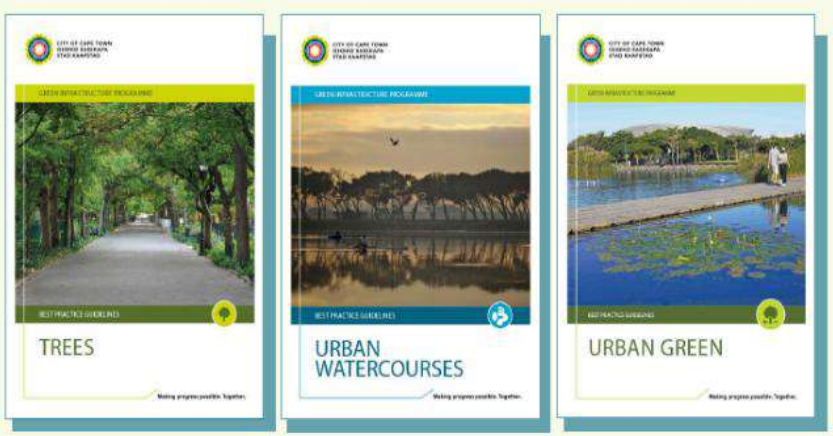
Green Infrastructure Programme Elements

Spatial Component (GI Network)



Toolkit (Policy/ bylaw and guidelines)

Gap Analysis



Implementation Actions and Projects

www.capetown.gov.za/GreenInfrastructure

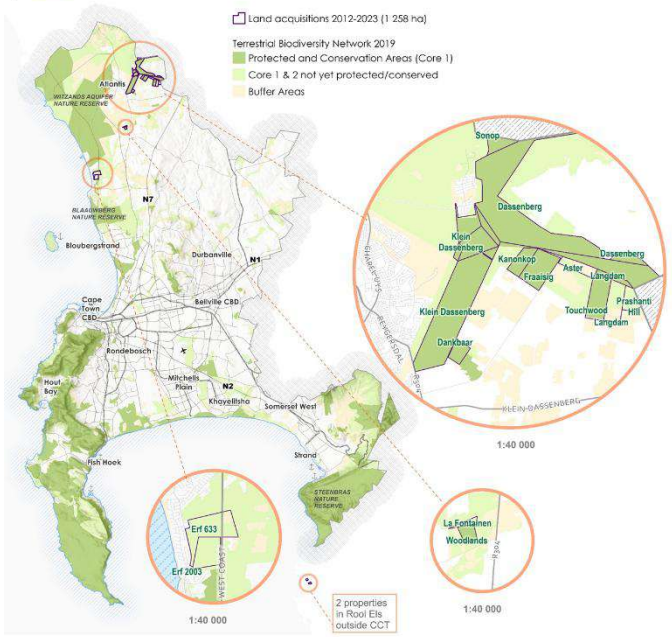
Spatial Trends – monitoring protection of resources

B.1 NATURAL AND AGRICULTURAL ASSETS

BIODIVERSITY NETWORK

This indicator shows **biodiversity-related land acquisitions** (2012-2022) in relation to the terrestrial **Biodiversity network** (2019)

Data source: Environmental Management, City of Cape Town



Map B1-c:Biodiversity network (2019) with biodiversity-related land acquisitions (2012-2022)

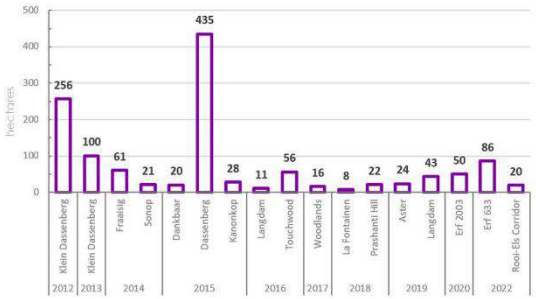
OVERVIEW

The Biodiversity Management Branch in the Environmental Management Department identifies land for the City to purchase to offset the loss of biodiversity network (BioNet) on sites where development is authorised. Where suitable, the proclamation process for these **land acquisitions** is then initiated to protect them into perpetuity and they become part of what- is known as the **conservation land bank**.

Offsets and proclamations are crucial as a certain extent of each vegetation type must be conserved to meet national targets, which are calculated to ensure that sufficient area remains for the survival of the resident species. Because of the high prevalence of endemics and limited habitat remaining, offsets may not always be an alternative.

OVERALL TREND

Between 2012 and mid-2022, 1258 ha of land were purchased by City of Cape Town towards conservation. See map B1-c for an illustration of where these sites are located as well as graph B1-c for a breakdown of hectares acquired per year.



Graph B1-c: Area (hectares) of land acquired for conservation (2012-2022)

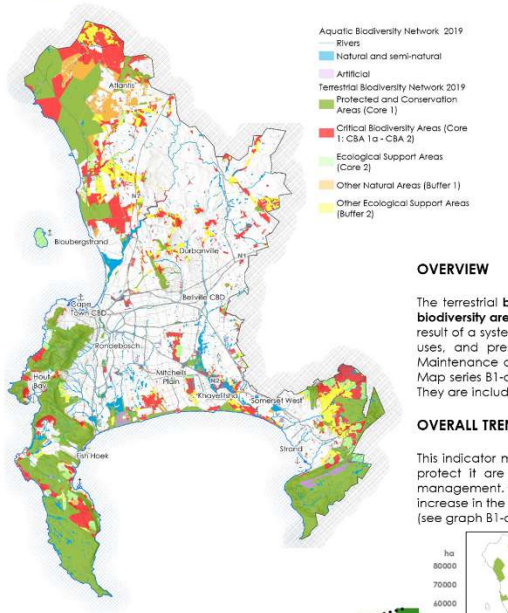
SPATIAL TREND (DISTRIBUTION/PATTERN)

The land purchased in 2012-2019 has been the gradual acquisition of contiguous sections in the northeast as well as two erven to the east of Witzands Aquifer Nature Reserve. In 2020 and 2022, two erven that form part of a corridor linking Blaauwberg and Koeberg Nature Reserve were also purchased. Critically endangered indigenous vegetation types found on the purchased land include Atlantis Sand Fynbos and Swartland Granite Renosterveld. In 2022, two erven were purchased outside of City of Cape Town in Rooi Els, south of Steenbras Nature Reserve.

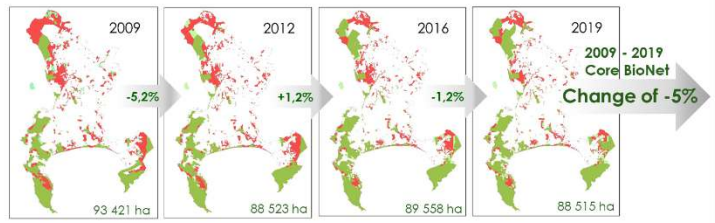
B.1 NATURAL AND AGRICULTURAL ASSETS

BIODIVERSITY NETWORK

This indicator shows the change in the extent of the terrestrial **biodiversity network** over time (2009-2019), including protected and conservation areas.



Map B1-a: Terrestrial and aquatic biodiversity network (2019).



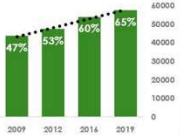
Map series B1-a: Extent (hectares) per year of core biodiversity network i.e. the prioritised remnants of indigenous vegetation.
Note: Only core areas shown above. Biodiversity network buffer 1 and 2 areas not shown above.

OVERVIEW

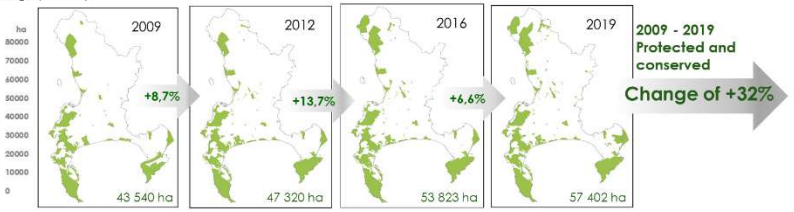
The terrestrial **biodiversity network** (BioNet) is a network of the remaining indigenous vegetation in the city, classified into **critical biodiversity area** (CBA) categories that prioritise the relative importance for conservation of each remnant. The classification is the result of a systematic scientific analysis done periodically that takes into account many factors such as least conflict with other land uses, and presence of threatened species. The aquatic component of the BioNet comprises of the rivers and wetlands. Maintenance of the BioNet is essential to ensure species survival, resilience to climate change and critical ecosystem functioning. Map series B1-a shows the core BioNet areas. These are either protected or conserved areas, or CBAs that are irreplaceable if lost. They are included as **critical natural assets** in the City's Metropolitan Spatial Development Framework.

OVERALL TREND

This indicator monitors the pace at which biodiversity is being lost to other land uses and whether City policies and strategies to protect it are effective. It also investigates the rate at which habitat is being protected via proclamation and/or on-site management. The overall trend is a loss of 5% core BioNet between 2009 and 2019: an area of 4 906 ha. However, there was a 32% increase in the extent of BioNet that is protected and/or conserved (see map series B1-b), which equates to 65% of the Core BioNet (see graph B1-a).

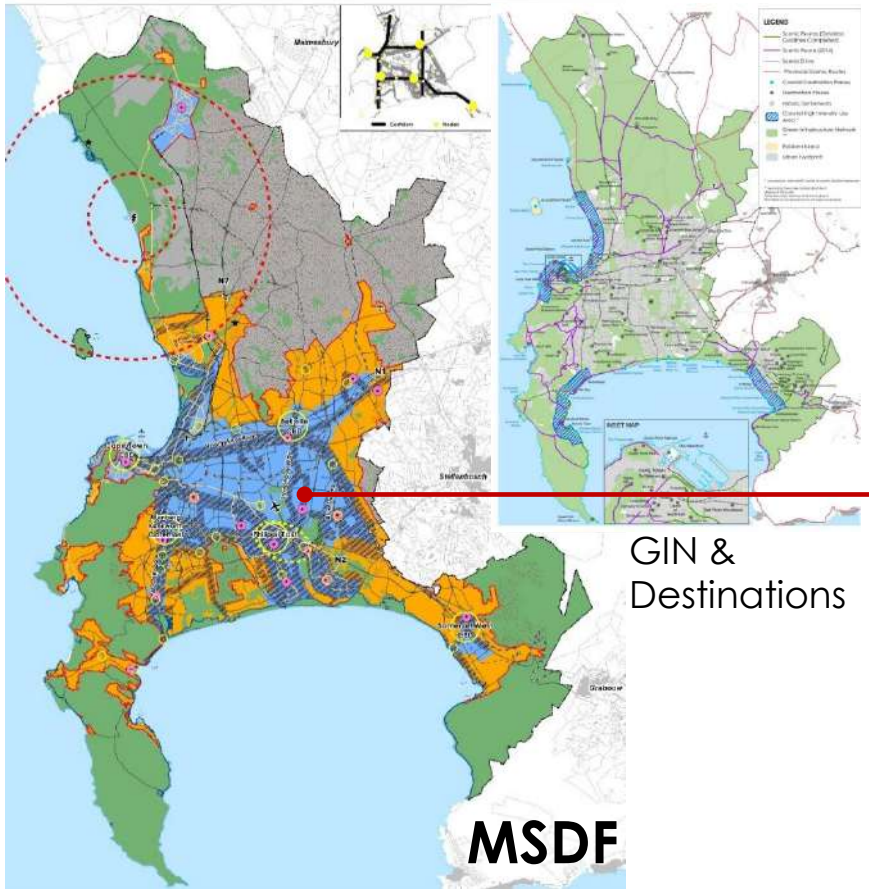


Graph B1-a: Area (ha) and percentage of core biodiversity network that is protected or conserved.



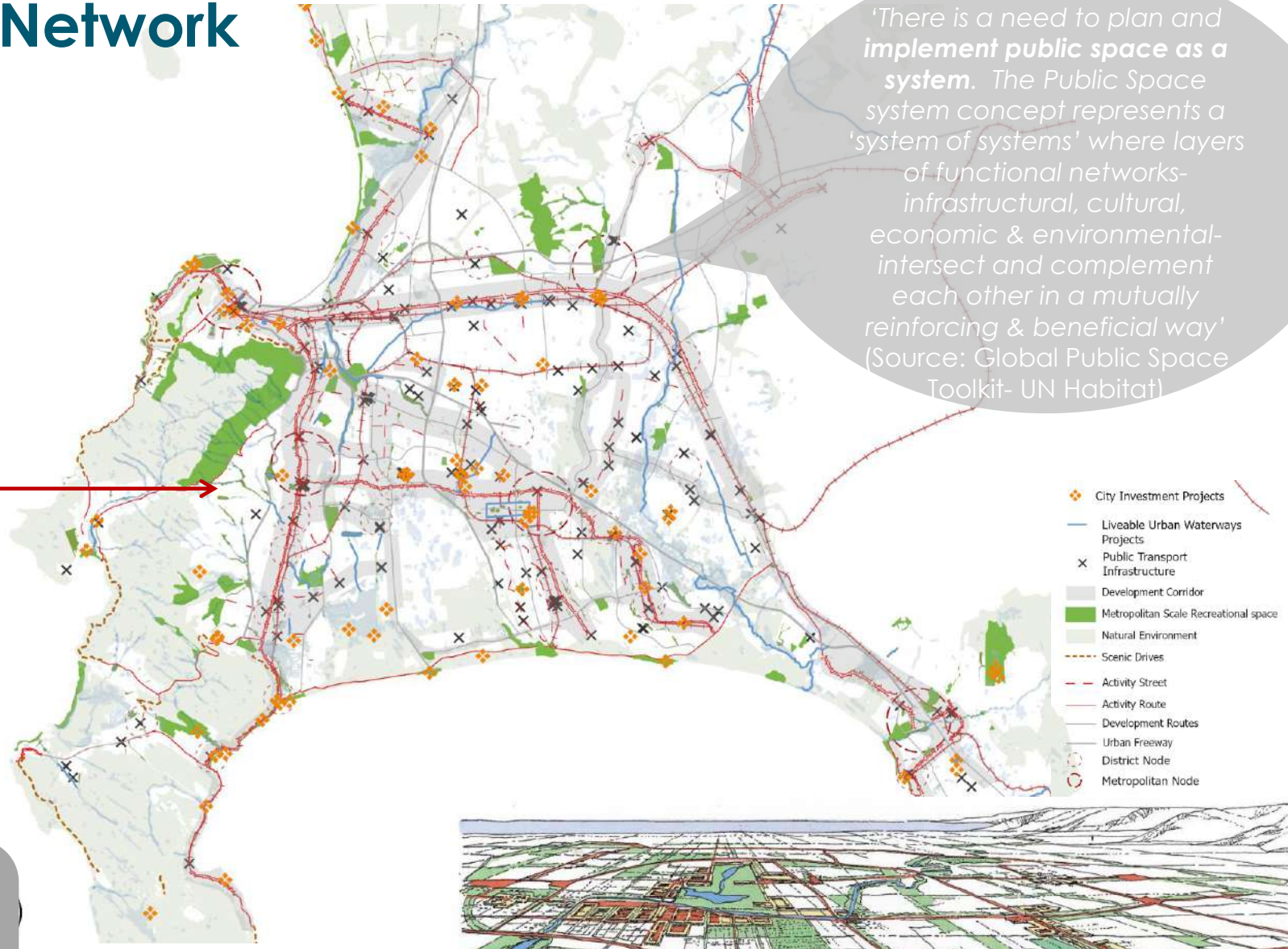
Map series B1-b: Extent (hectares) per year of protected and conserved areas within the biodiversity network.
Note: 2019 area (ha) includes mountainous Table Mountain National Park areas that are managed by SANParks but not yet gazetted.

Integrated Public Realm Network

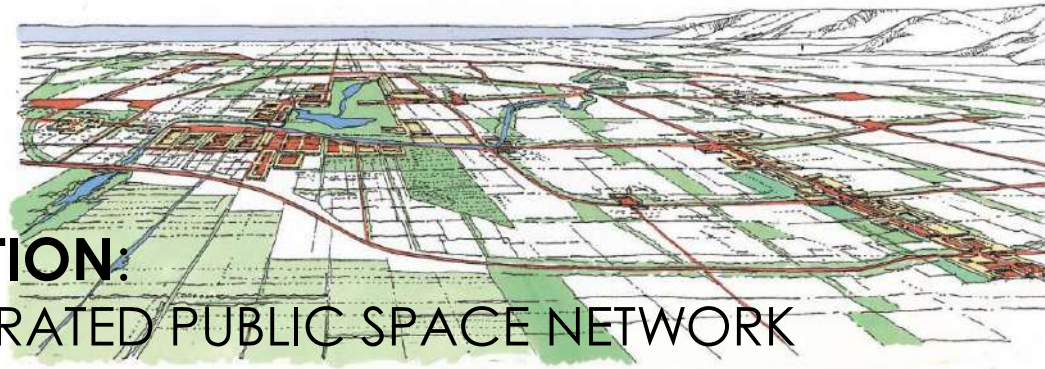


GIN & Destinations

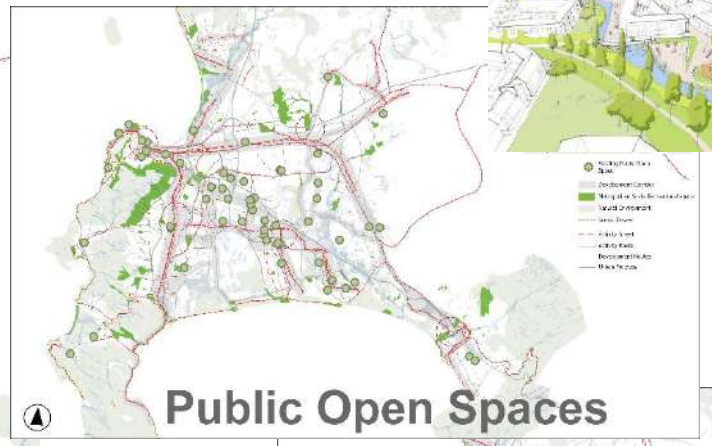
*'There is a need to plan and **implement public space as a system**. The Public Space system concept represents a 'system of systems' where layers of functional networks- infrastructural, cultural, economic & environmental- intersect and complement each other in a mutually reinforcing & beneficial way'* (Source: Global Public Space Toolkit- UN Habitat)



Public space collectively forms the **connective matrix** or **skeleton** of the city, upon which all else rests. It is the **overarching structuring system** that links **urban (built)** & **natural** systems. These spaces jointly form the **Public Realm**



VISION & DIRECTION:
EMERGING INTEGRATED PUBLIC SPACE NETWORK



"Public Spaces are places publicly owned or of public use, accessible and enjoyed by all for free and without a profit motive."

Public space takes many spatial forms and are categorised into the following main types:

- ***Public Open Space**;*
- ***Public Facilities**;*
- ***Markets**; and*
- ***Streets***

EMERGING INTEGRATED PUBLIC SPACE NETWORK

THE LAYERS OF PUBLIC SPACE

Public space serves as the **'image of the city'** by shaping its character, defining its identity, and influencing how **people perceive and interact with the urban environment**. It is the physical and visual framework—including streets, green open spaces, parks, and squares—that represents the city's **social, economic, and cultural life**, both to its residents and outsiders. A **city's public spaces are not merely a backdrop but are active elements that communicate its values** and function as a stage for collective experience and civic life

Projects and Actions to support GI

Green Infrastructure Programme Quality Public Places Programme

Green Infrastructure Programme (GIP) – IMPLEMENTATION

LIVEABLE URBAN WATERWAYS

- Waterway rehabilitation
- Public realm upgrading
- Flood risk reduction
- Biodiversity restoration

INVASIVE SPECIES REMOVAL

- Water supply augmentation by reducing water loss
- Fire risk reduction

COASTAL DUNE REHABILITATION

- Coastal erosion and windblown sand management
- Restoring buffer function of dunes
- Biodiversity restoration

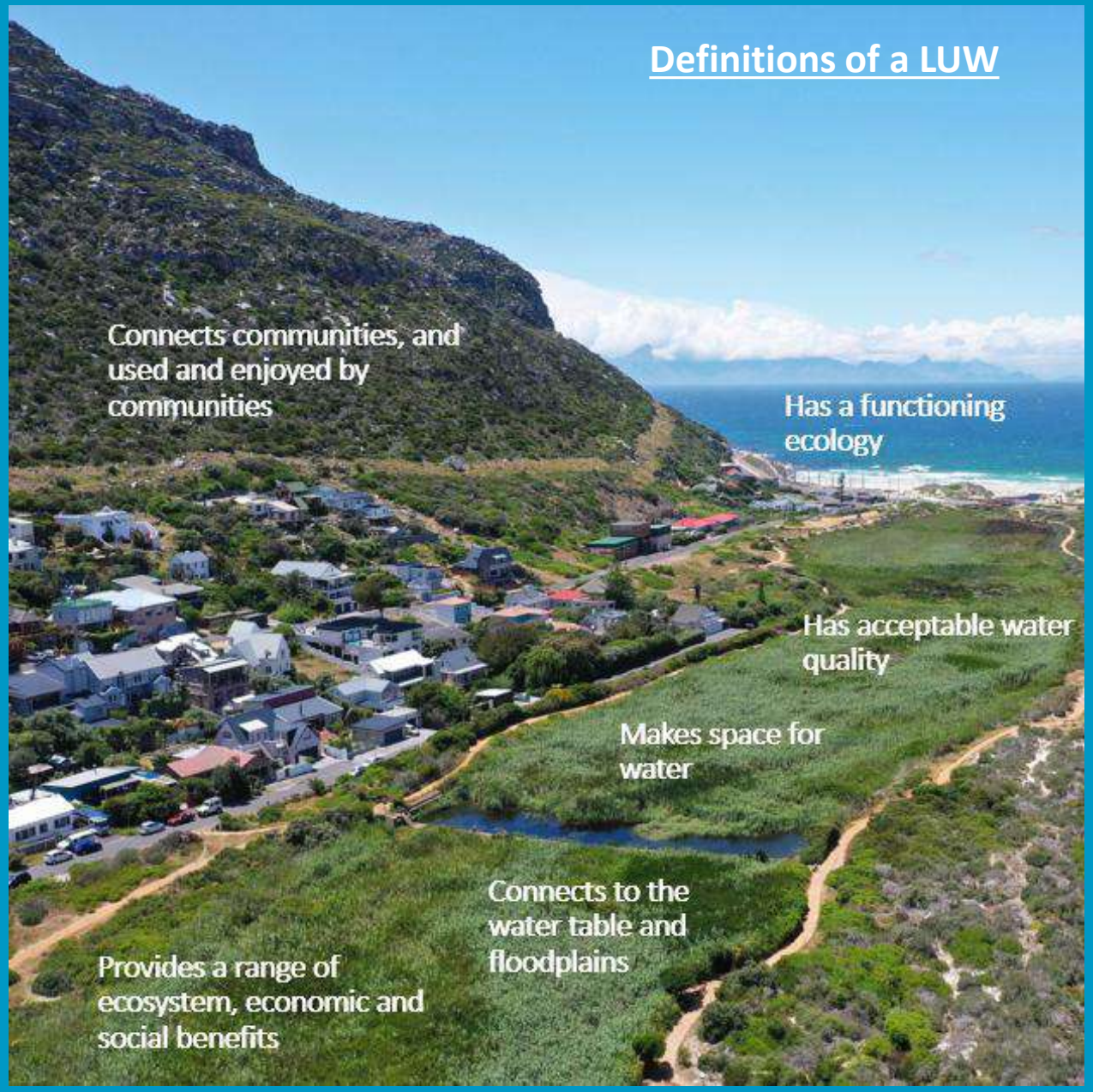
RIVER CLEANING PROGRAMME

- Weed and excess vegetation removal
- Litter traps/nets/ booms/fences
- Dredging/silt removal

LIVEABLE URBAN WATERWAYS (LUW)

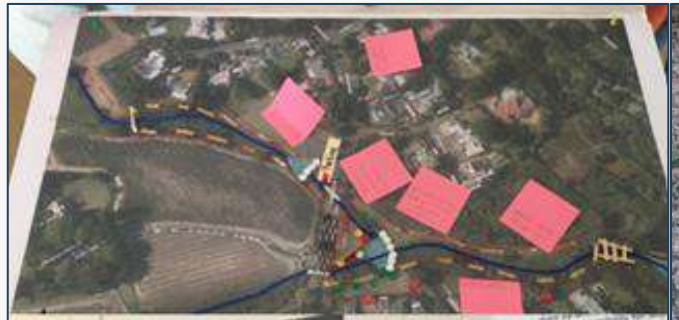
The LUW Programme is a strategic and transversal programme for transformative change, which systematically, proactively and collaboratively rehabilitates waterways across Cape Town using water-sensitive design, green infrastructure and nature-based approaches.

It aims to achieve multiple benefits for the environment, society and the economy.



Project Implementation

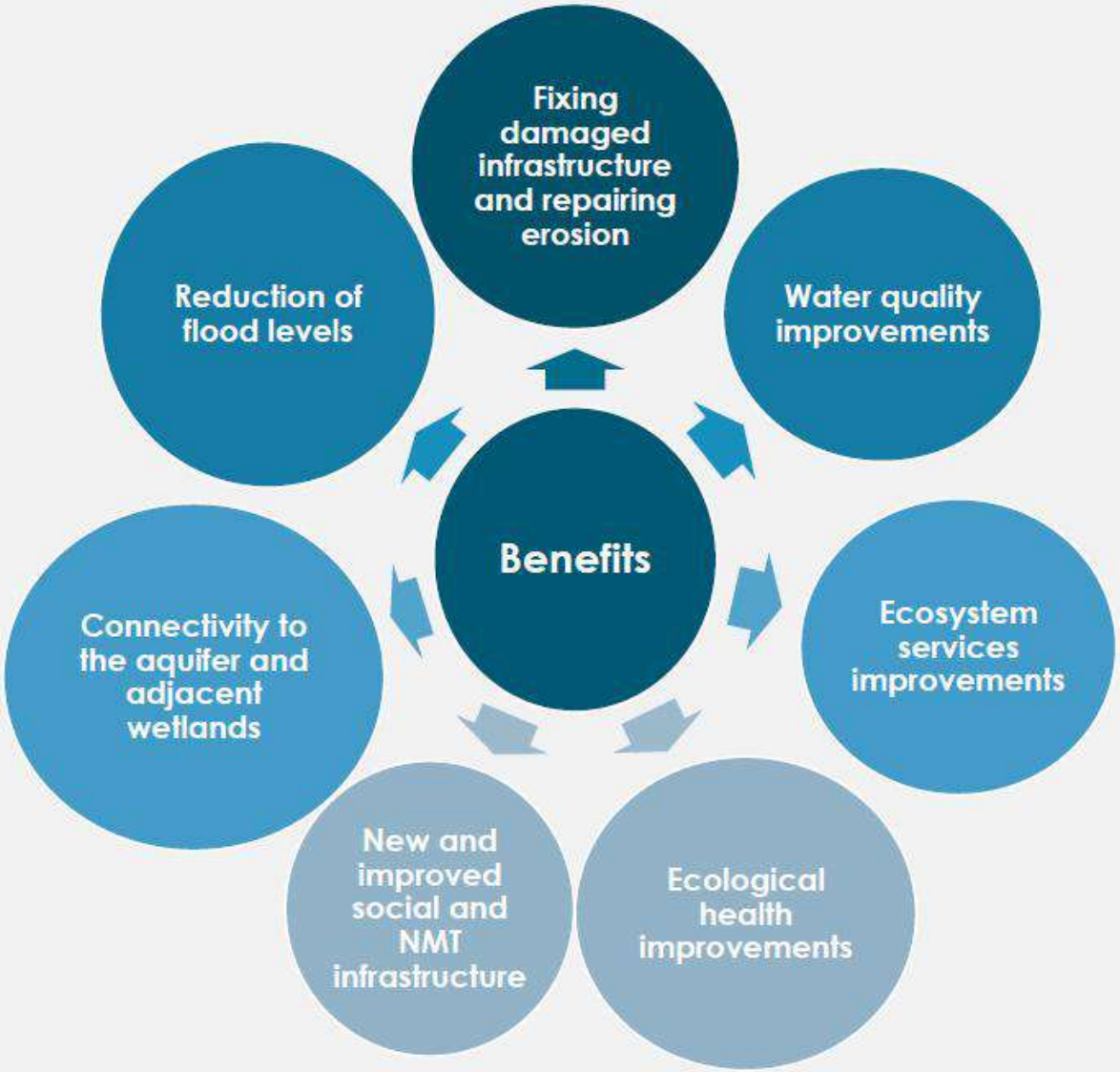
- 44 projects in the LUW project pipeline.
- Tranche 1 - 8 projects currently underway in 2 catchments.
- Tranche 2 – in prep.
- C40 CFF funded “GI options for improved waterway and catchment management” project prepared a masterplan for Diep-Sand and Zeekoe catchments.
- Community engagement is a key to projects – collaboration and partnering is a key principle.



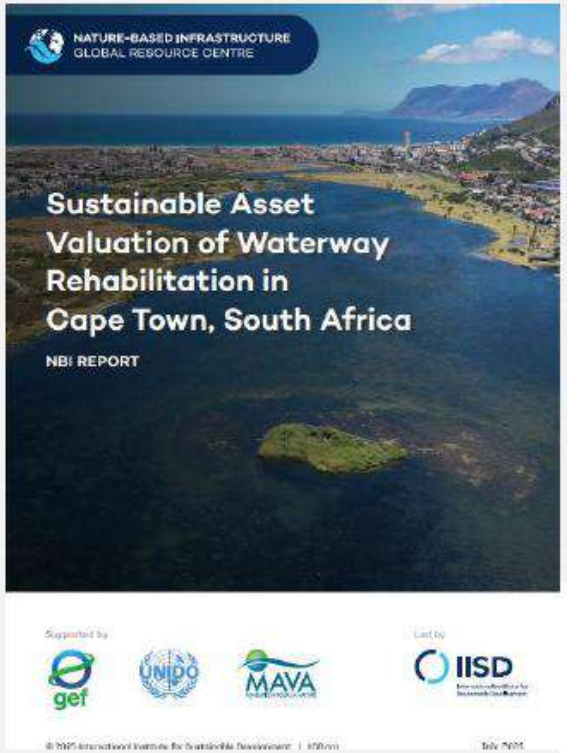
Sand Langevlei Project will:

- Remove 550m of concrete canal and replace with a naturalised river.
- Reuse all the old concrete to create footpaths and a permeable berm.
- If possible, use eco-aggregate concrete for other structures – 7 200kg of plastic that could be diverted from landfill (equivalent of 288 000 bottles or 3.6 million chip packets).
- Daylight stormwater pipes and create new swales.
- New and improved litter traps.
- Create 6000m^2 of new treatment wetland and a further 2500m^2 of dune slack wetland habitat, including habitat for the endangered *Kedestes* butterfly
- Plant 100 000 new plants (49 indigenous species).

Cost Benefit Analysis

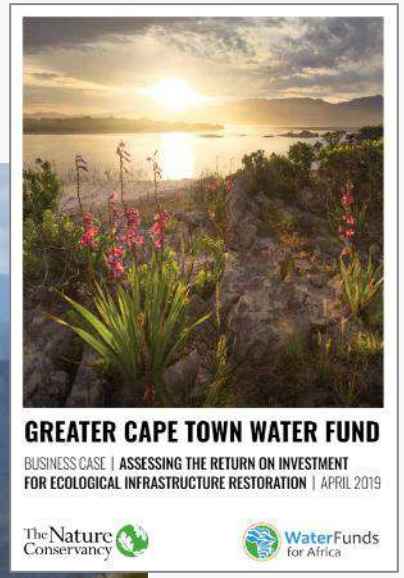


For every R1 invested in waterway rehabilitation, up to R2.50 in benefit can be realised over a 25 year period



Scan here to access the cost benefit study

Invasive Species Removal: Nature-based Solution (NbS) for future water supply



- About **55 billion litres** of water, approx. 2 months water for Cape Town, is lost every year to invasive species
- City working with The Nature Conservancy, helped establish **Greater Cape Town Water Fund** (GTWF) in 2018
- GCTWF clears alien invasives from mountain catchments feeding City's main water reservoirs, enhancing and protecting Cape Town's water supply – **increases water supply, protects natural biodiversity**, **reduces fire risk**
- Most cost effective and sustainable way to **secure** Cape Town's water supply and meet **future water demands**

Coastal Dune Rehabilitation

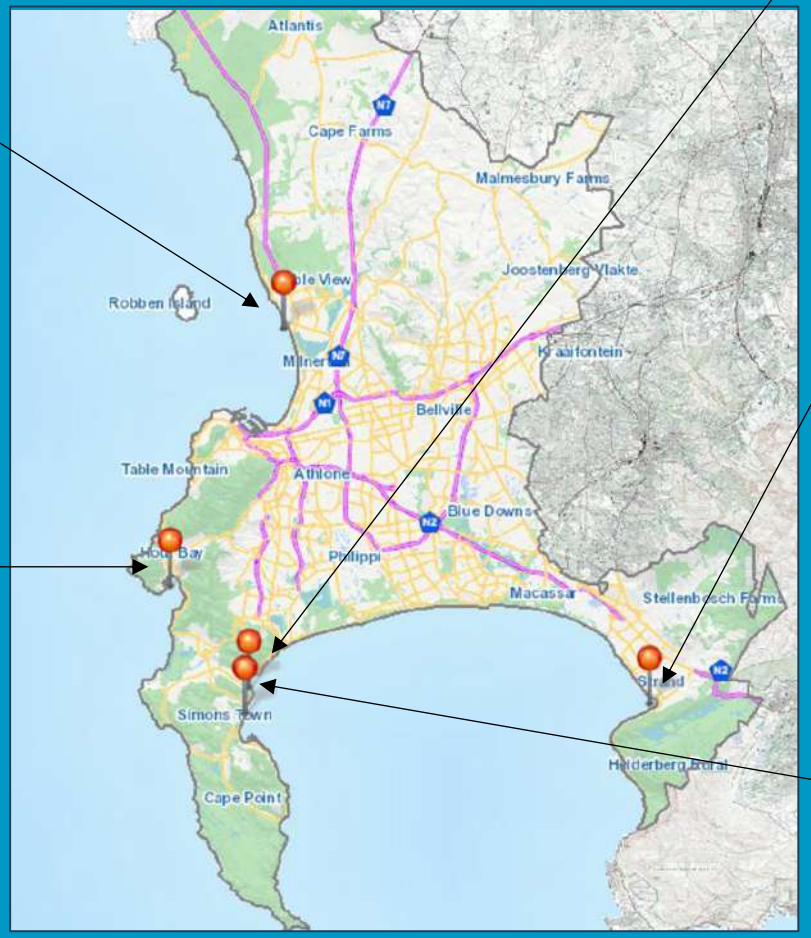
Objectives of Coastal Dune Restoration Projects:

- Protect infrastructure from coastal erosion and associated impacts
- To protect public & private buildings and infrastructure from wind-blown sand impacts
- Improve coastal experience and destination place
- Reinstate the coastal ecology

Dune Rehabilitation sites (as of 2024)

Table View Dune Rehabilitation
Area: 8 hectares

Hout Bay Dune Rehabilitation
Area: 7 hectares



Fish Hoek Dune Rehabilitation
Area: 4.5 hectares

Gordons Bay Dune Rehabilitation
Area: 5 hectares

Glencairn Dune Rehabilitation
Area: 0.5 hectares

HOUT BAY: AFTER – 5 YEARS

- Successfully managed wind blown sand, and returned ecological function
- 8 workers from local community are permanently employed
- Annually approximately 6 000m^3 sand back is mechanically pushed back to sea
- Vegetation sufficiently established in back dune areas to strategically remove nets.
- Continued maintenance of marram and dynamic zone is most critical
- Vandalism of irrigation big challenge impacts on foredune

Quality Public Places Programme

- To facilitate the development of an ***integrated and dignified public realm*** with the making of resilient, accessible and high-quality public spaces across the city. This will be achieved through a variety of actions and working with a range of stakeholders & partners (internal & external)

- To ***demonstrate*** best practice in placemaking with the implementation of ***strategic*** public place interventions

Past/ Recently Complete Projects

1. DPP: Philippi Grand Parade, Philippi (1999)

3. QPS: Church Square, Cape Town CBD (2006)

9. Kruskral Avenue, Bellville- 2025

2. DPP: Gugulethu Zac (2004)

4. DPP: Nyanga Market (2004)

9. Dunoon Library 2019

raal, Durbanville (2021)

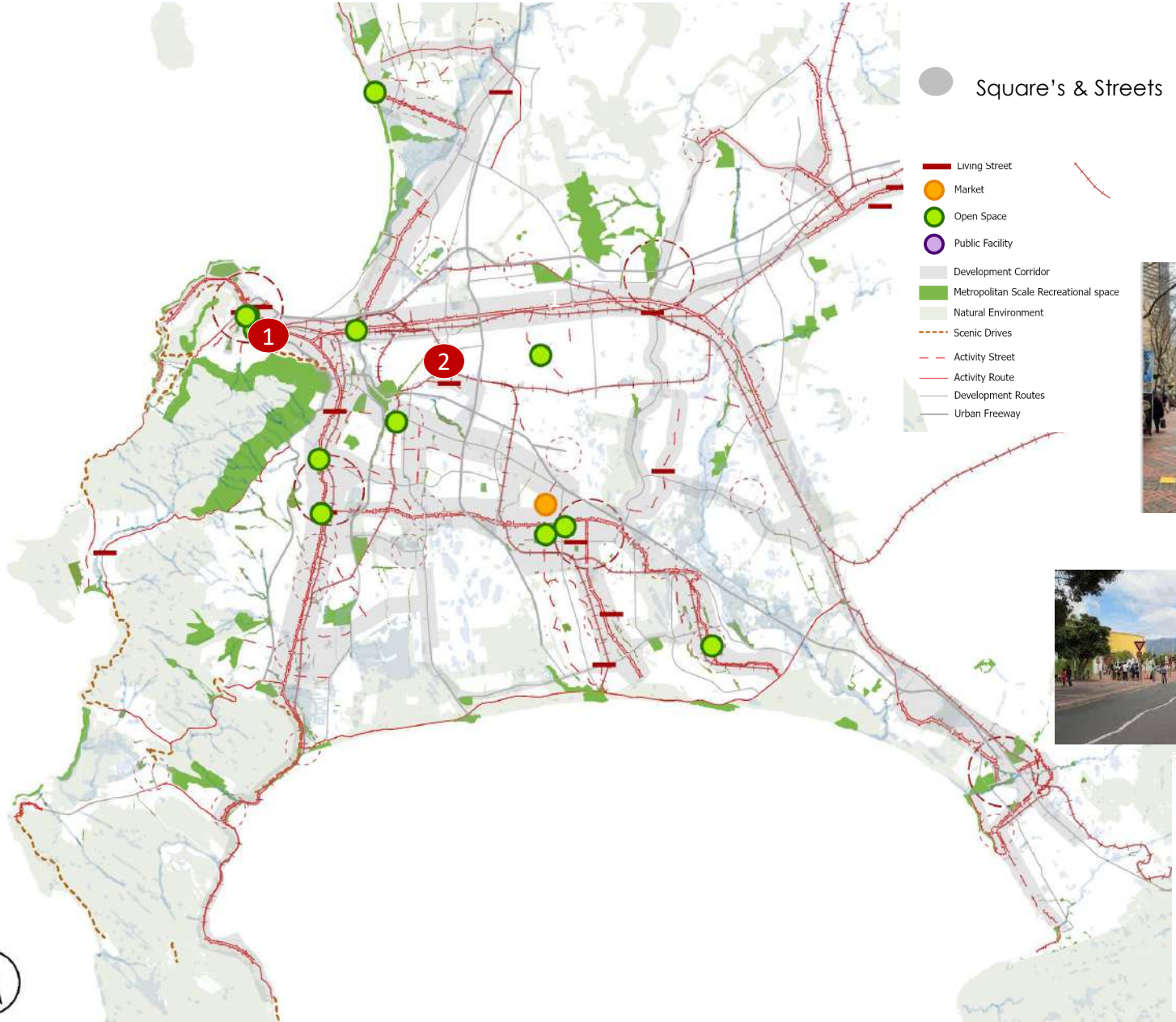
6. QPS: Bonteheuwel Community Square (2023)

5. Sea Point Coastal Promenade- 202

106 completed projects across the City since 1999

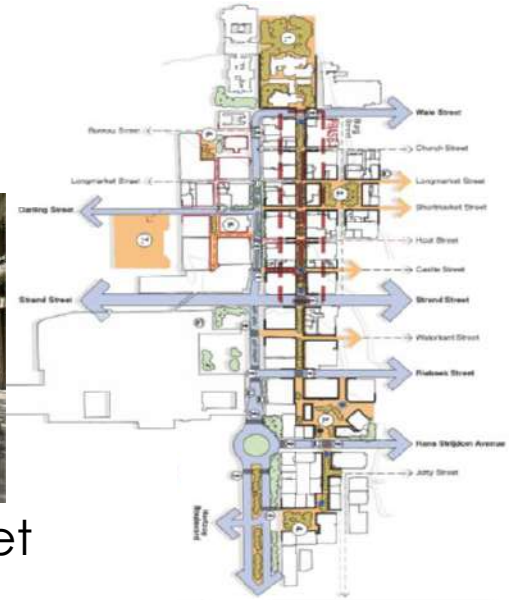
In Planning: case studies

35 Public Space projects currently identified for future implementation (as part of QPPP:15 year pipeline)

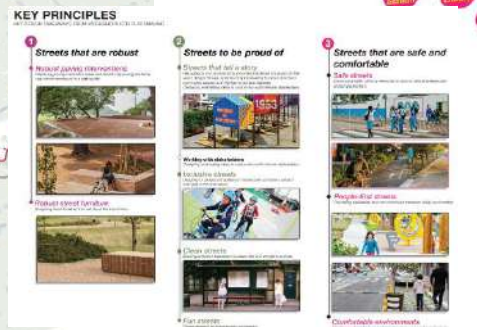


Living Street Examples:

1. St Georges Mall Revitalisation



2. Langa Living Street



Lessons learnt

Challenges for adaptation and types of support needed

Urbanisation: High "in-migration" (housing, basic service needs, informality, inappropriate land-use)

Species loss: Invasive species vs indigenous biodiversity

Agriculture: Increasing food needs vs land/water shortage

Wildfires: Increasing number and severity

Over-exploitation: Scarce resources, especially water

Pollution and waste management: Air, water, land

NbS projects: OPEX programmatic vs City: CAPEX infrastructure delivery

How to take NbS projects to scale?

Overcome perceptions: '*Green not as good as Grey infrastructure*'

'Sustaining solutions': Operational & management budget 1st to cut

Approval process complexity: External funders & Treasury

Funding into City's budget: Complex process, timeline, allowances

Quantifying and proving co-benefits

Proving viability of innovative alternatives: Pilot vs full-scale projects

Alternate funding options: "selling the unusual"

Balancing priorities in City's project pipeline

"Silo-thinking" vs transversal project management

THANK YOU

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