
Sustainable Cities

Principles & Case Studies for Discussion



Meeting objectives

- To discuss the sustainable development and future proofing of the masterplan in light of Government of Gibraltar's sustainability/resilience strategy.
- To review the experience from smart cities elsewhere including the London Environment Strategy.
- To agree key sustainability principles/ protocols.
- To identify clear objectives to inform the new masterplan.

Sustainable Cities

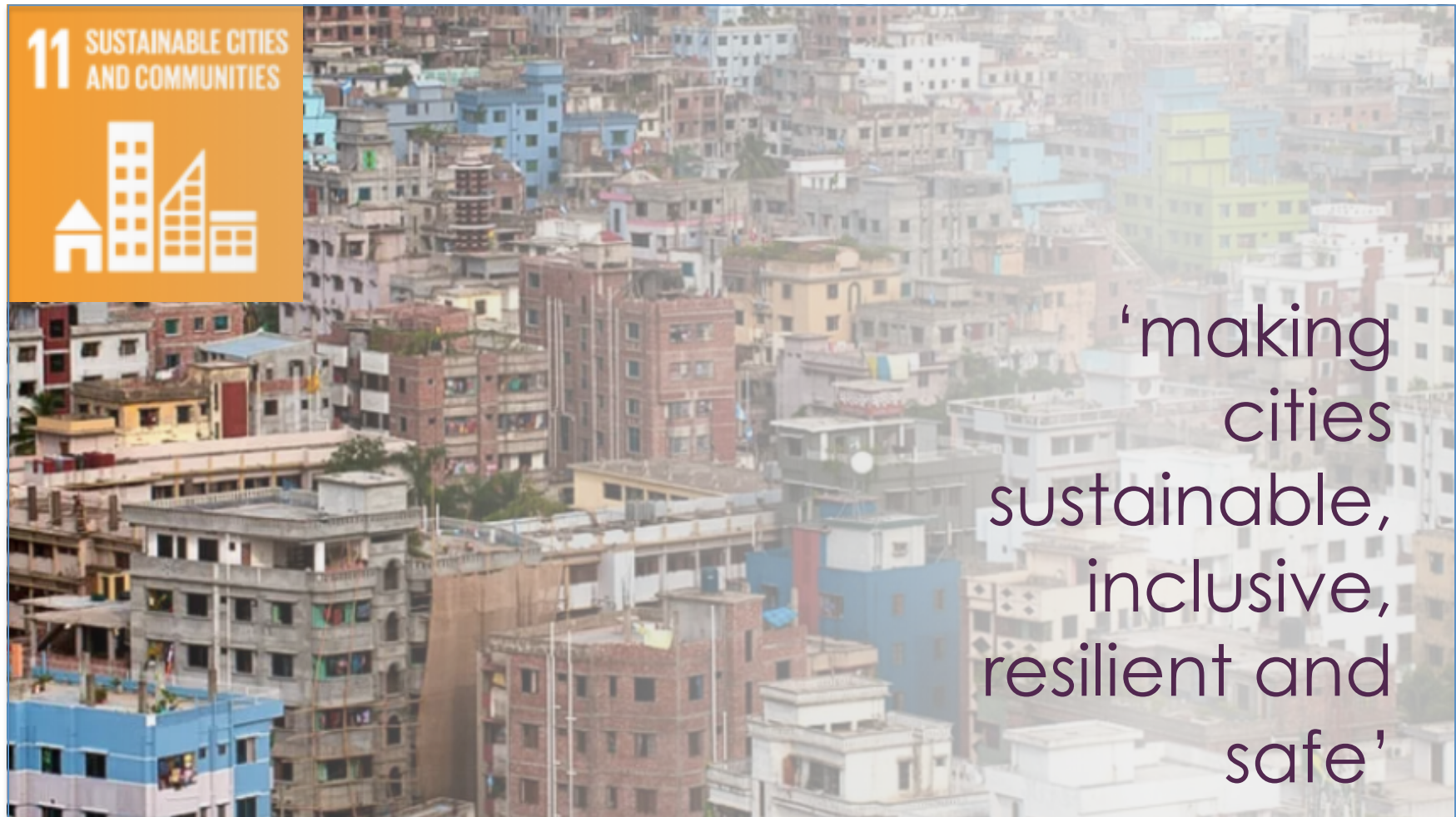
Principles & Case Studies for Discussion

An overarching framework



Sustainable Cities
Principles & Case Studies for Discussion

Goal 11 – Sustainable Cities & Communities



Sustainable Cities
Principles & Case Studies for Discussion

Resilient Cities

Cities are complex systems that are constantly adapting to changing circumstances.



Urban resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt and grow no matter what kinds of chronic stresses and acute shocks they experience.

Sustainable Cities

Principles & Case Studies for Discussion

7 Qualities of Resilient Systems

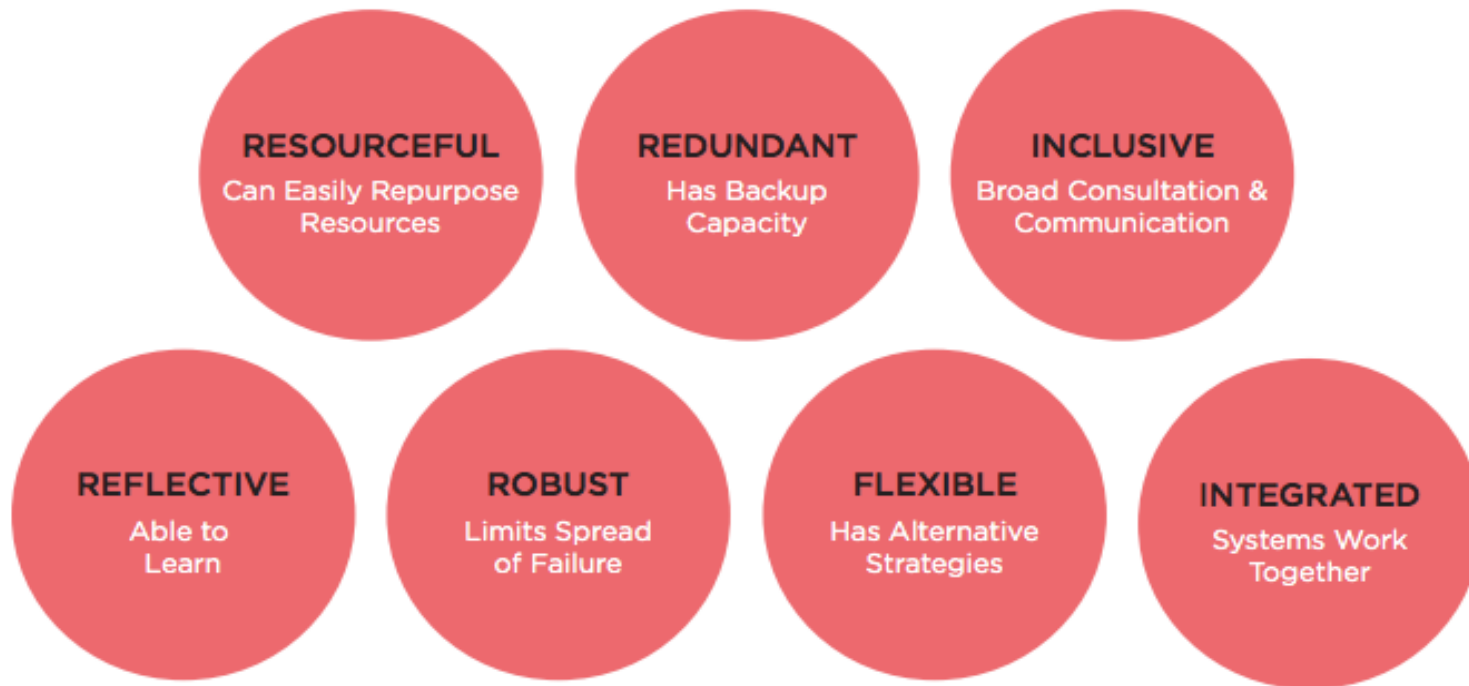


Figure 1 Source: Arup and The Rockefeller Foundation, City Resilience Framework, 2014

Sustainable Cities

Principles & Case Studies for Discussion

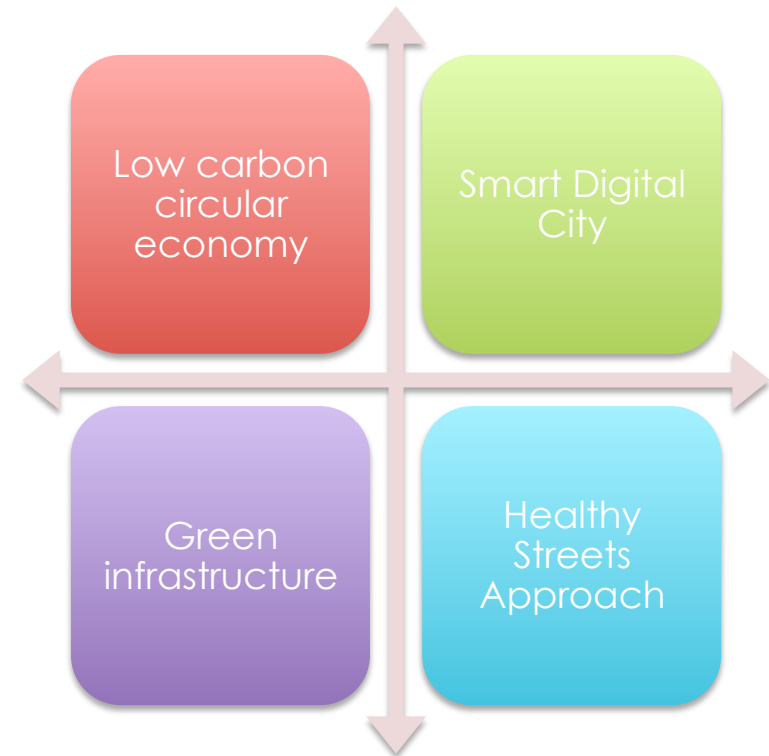
How to drive city resilience?



Sustainable Cities
Principles & Case Studies for Discussion

London: a holistic approach

Through its Environment Strategy, London is taking **four strategic approaches** to maximise environmental opportunities now and in the future

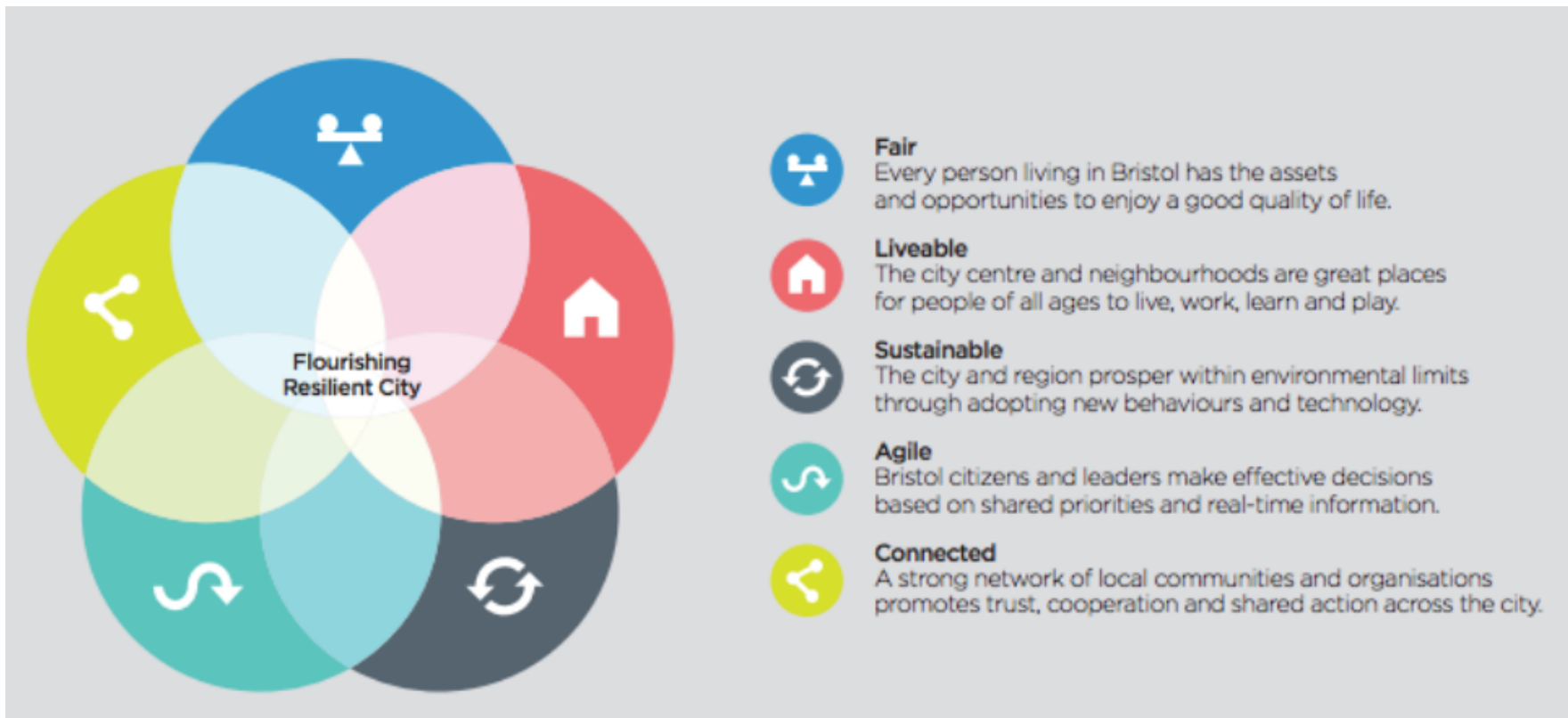


Sustainable Cities

Principles & Case Studies for Discussion

Bristol: a resilience strategy

A dynamic vision for how Bristol could look 50 years from now



Sustainable Cities

Principles & Case Studies for Discussion

City of York, Brighton & Hove

One Planet Living framework

	Health and happiness Encouraging active, sociable, meaningful lives to promote good health and well being		Local and sustainable food Supporting sustainable and humane farming, promoting access to healthy, low impact, local, seasonal and organic diets and reducing food waste
	Equity and local economy Creating bioregional economies that support equity and diverse local employment and international fair trade		Sustainable materials Using sustainable and healthy products, such as those with low embodied energy, sourced locally, made from renewable or waste resources
	Culture and community Respecting and reviving local identity, wisdom and culture; encouraging the involvement of people in shaping their community and creating a new culture of sustainability		Sustainable transport Reducing the need to travel, and encouraging low and zero carbon modes of transport to reduce emissions
	Land use and wildlife Protecting and restoring biodiversity and creating new natural habitats through good land use and integration into the built environment		Zero waste Reducing waste, reusing where possible, and ultimately sending zero waste to landfill
	Sustainable water Using water efficiently in buildings, farming and manufacturing. Designing to avoid local issues such as flooding , drought and water course pollution		Zero carbon Making buildings energy efficient and delivering all energy with renewable technologies

What targets are leading cities aiming for?

London 2050 aims



Liveable city

- Citizens will benefit from the multi-functional value of green infrastructure and the natural environment
- All-age friendly city
- People using sustainable modes of transport
- Clean air

Sustainable city

- Zero waste city
- Carbon neutral
- Environmentally responsible and fair trade supply chains

Agile city

- City data is used to reduce inequality
- New partnerships to co-create and scale-up city solutions
- Finance: Local bonds and place-based investments to transform the city

Connected city

- City charter for shared values
- City-wide community cohesion
- Self-organised communities designing and delivering services

Amsterdam 2025 aims



Index Indicators

TABLE 1: LIST OF INDICATORS USED IN THE SUSTAINABLE CITIES INDEX.

New indicators to the 2016 Index are shown in orange

INDICATOR NAME	INDICATOR DESCRIPTION	MAIN SOURCE	SUB-INDEX
Education	Literacy rate	World Bank	People
	University rankings	QS	
	Share of population with tertiary education	Barro & Lee, various national sources	
Health	Life expectancy	World Bank	People
	Obesity rate	World Health Organization	
Demographics	Dependency ratio	World Bank	People
Income inequality	Gini coefficient	World Bank	People
Affordability	Consumer price index	UBS Prices and Earnings	People
	Property prices	UBS Prices and Earnings	
Work-life balance	Average annual hours worked	OECD, UBS Prices and Earnings	People
Crime	Homicide rate	UN Office on Drugs and Crime	People
Environmental risks	Natural catastrophe exposure	The International Disaster Database	Planet
Green spaces	Green space as % of city area	Siemens Green City Index	Planet
Energy	Energy use	Energy Information Administration (EIA)	Planet
	Renewables share	Energy Information Administration (EIA)	
	Energy consumption per \$ GDP	Energy Information Administration (EIA)	
Air pollution	Mean level of pollutants	World Health Organization	Planet
Greenhouse gas emissions	Emissions in metric tonnes (per capita)	CDP Cities open data	Planet
Waste management	Solid waste management (landfill vs recycling)	World Bank	Planet
	Share of wastewater treated	OECD & FAO Aquastat	
Drinking water and sanitation	Access to drinking water (% of households)	World Health Organization	Planet
	Access to improved sanitation (% of households)	World Health Organization	
Transport infrastructure	Congestion	TomTom Traffic Index	Profit
	Rail infrastructure	Metrobits World	
	Airport satisfaction	Skytrax World Airport Awards 2015	
Economic development	GDP per capita	Brookings Global Monitor	Profit
Ease of doing business	Ease of Doing Business Index	World Bank	Profit
Tourism	International visitors per year, absolute & per capita	Euromonitor International	Profit
Connectivity	Mobile connectivity	United Nations Statistics Division	Profit
	Broadband connectivity	United Nations Statistics Division	
	Importance in global networks	Geography Department, Loughborough University	
Employment	Number of people employed, % of city population	Brookings Global Monitor	Profit

Sustainable building design

Examples

University of York, Environmental Building



Living wall – helps regulate building's temperature, thus reducing mechanical heating/cooling; acts as a sound insulation.

Sustainable Cities

Principles & Case Studies for Discussion

Horizon House, Bristol

UK Environment Agency's HQ



BREEAM score 85%

Over 85% of the material from the buildings demolished to build Horizon House was recycled in the construction of the new building.

Includes solar panels, natural ventilation, ground-source heat pumps, rainwater harvesting and intelligent lighting systems that reduce how much energy is used.

Building uses 69% less mains water and about 37% less energy than the office buildings it replaced.

Cycle parking and showers to encourage sustainable travel.

Sustainable Cities

Principles & Case Studies for Discussion

One Angel Square, Manchester

The Co-Operative Group's HQ



Double skin façade
CHP (combined heat and power) plant located within the building.
Intelligent heat recovery system that takes heat generated by the IT systems and reuses it to heat the building.

Sustainable Cities

Principles & Case Studies for Discussion

Green Roofs, Germany



Germany is a pioneer with 14% of all roof area being green.

e.g. Munich has more than 3 million m² of green roofs.

Feasible for dry climates too.

Help reduce Urban Heat Island effect.

Improve air quality

Help reduce and slow stormwater run-off.

Sustainable Cities

Principles & Case Studies for Discussion

One Embankment Place, London

PWC's HQ



40,000 m² building, refurbished to BREEAM Outstanding.

Heating system is fuelled by recycled biodiesel produced from waste cooking oil sourced from a 5 mile radius, producing heat, cooling and power to the building.

Cycle storage and showers installed to promote staff to use sustainable transport methods.

Sustainable Cities

Principles & Case Studies for Discussion

Abu Dhabi (UAE)

International Renewable Energy Agency HQ



Permanent external screening installed on windows maximises the amount of light allowed into the building whilst minimising the heating effect inside.

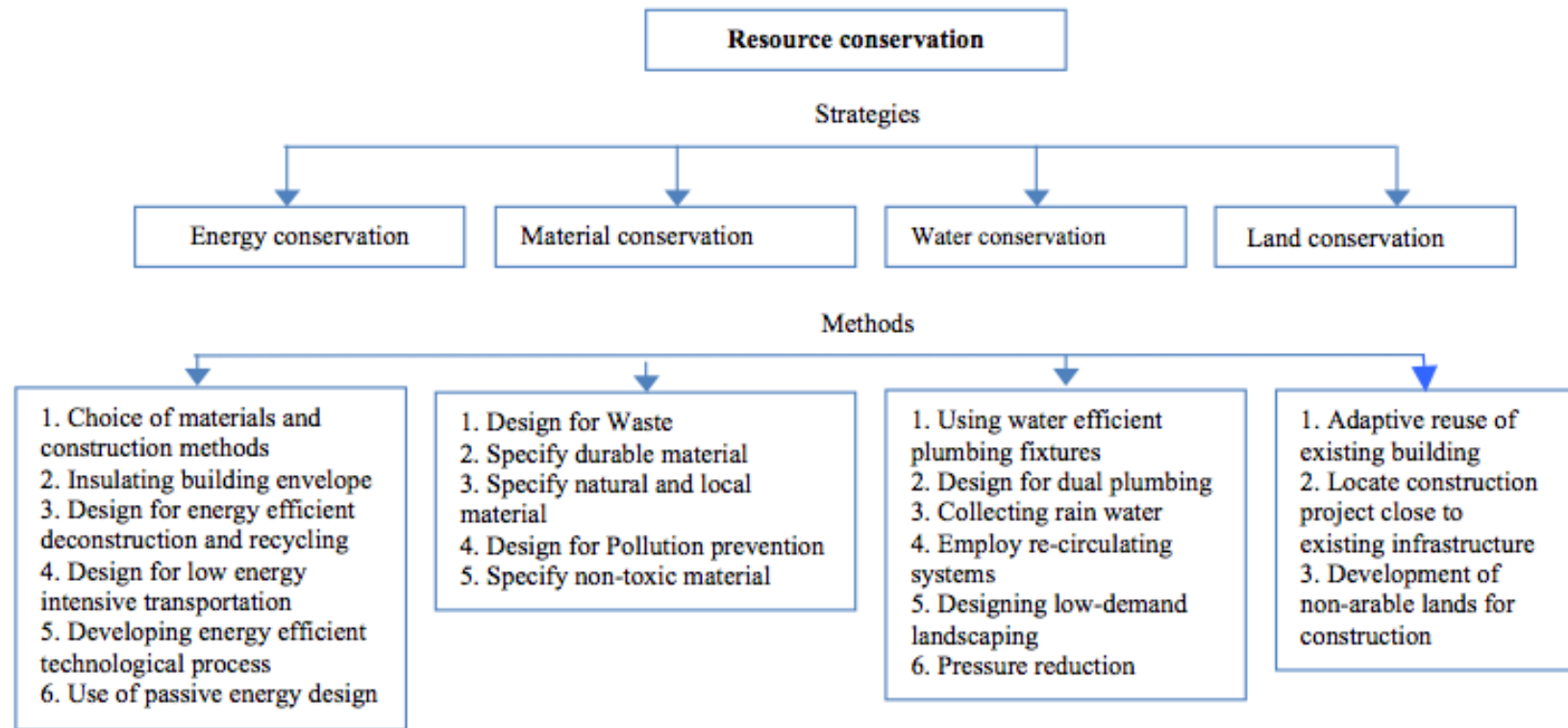
Produces own energy via rooftop 1000m² photovoltaic system.

Solar powered thermal water heaters expected to fulfil 75% of the building's annual hot water demands.

Sustainable Cities

Principles & Case Studies for Discussion

Strategies and Methods for Resource Conservation



Masterplan

Key Aspirations

Key Aspirations

Sustainable construction & design

- Passive measures to reduce energy demand.
- Use of recycled or sustainably sourced materials wherever possible.
- Rainwater harvesting
- Planted areas/open spaces/living walls
- Urban Biodiversity
- Waste management for flats
- Installation of below-ground technology for future smart technology in readiness for greener economy
- Air pollution reduction

Placemaking

- Healthy living and healthy streets including metrics to measure successes for health and economic gains & savings.
- Recreation and leisure facilities open to wider community.
- Design for repurposing facilities – e.g. car parking areas, with phased-in pedestrianised zones to eventual emission free area.

Sustainable Cities

Principles & Case Studies for Discussion

Key Aspirations

Urban metabolism

- Circular economy framework related to waste and resource use.

Energy

- Solar PV/Solar thermal onsite
- Solar pavements
- Microwind
- Zero energy buildings: heat recovery
- Smart metering

Sustainable transport

- Consideration of accessibility to key areas – public transport/cycle lanes/pavements; pedestrianisation.
- Cycle parking and cycle lanes
- Electric vehicle charging points
- Consider relaxing current parking requirements under Development Plan – consider car sharing scheme or similar for residents.
- Install infrastructure in readiness for public transport system.

Sustainable Cities

Principles & Case Studies for Discussion