



Better Planning Better Future

Delivering a more competitive South Australia



Government of South Australia

Department of Planning
and Local Government

GREEN INFRASTRUCTURE: re-interpreting natural systems (WSUD) from ground to green walls and roofs within the urban form.

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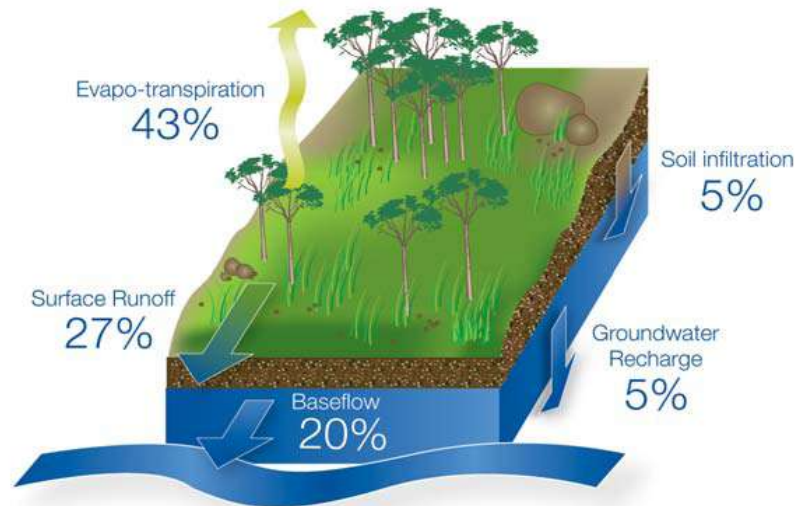
Cities are urban ecosystems

- “an ecosystem is a community of living things interacting with non living things”
Urban ecosystem is constructed from natural and socioeconomic subsystems (natural systems).
These systems are considered to be open systems as both energy and matter are transferred in and out, with resulting changes and evolution over time.

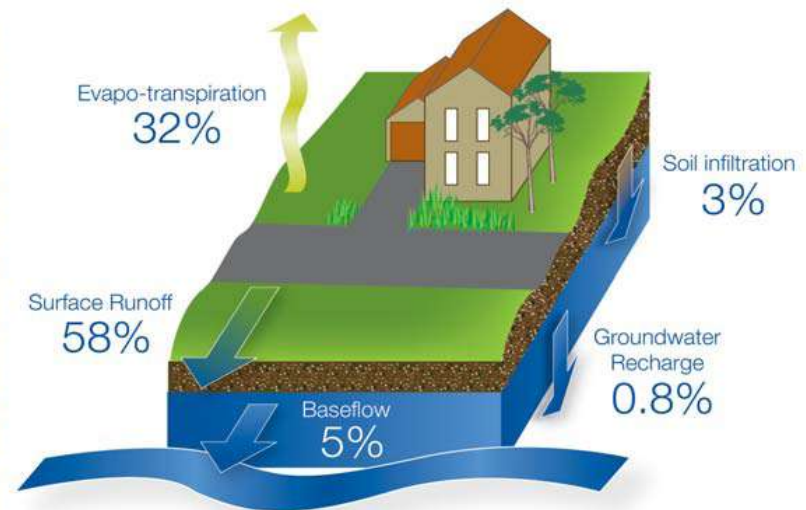


City as water catchment and storage areas

- Bio-mimic natural systems in the urban catchment
- Using the hard surfaces, vertical and elevated planes of the urbanform to collect, store, cleanse, recycle and reuse this urban stormwater as a vital resource.
- Creating ground level vegetated habitat corridors with bio-retention strips provides multi-layered strategies for water treatment, biodiversity and connectivity.
- Utilising the vertical and elevated planes of the builtform to perform stormwater management, water recycling, and to change the micro-climate.
- NATURAL

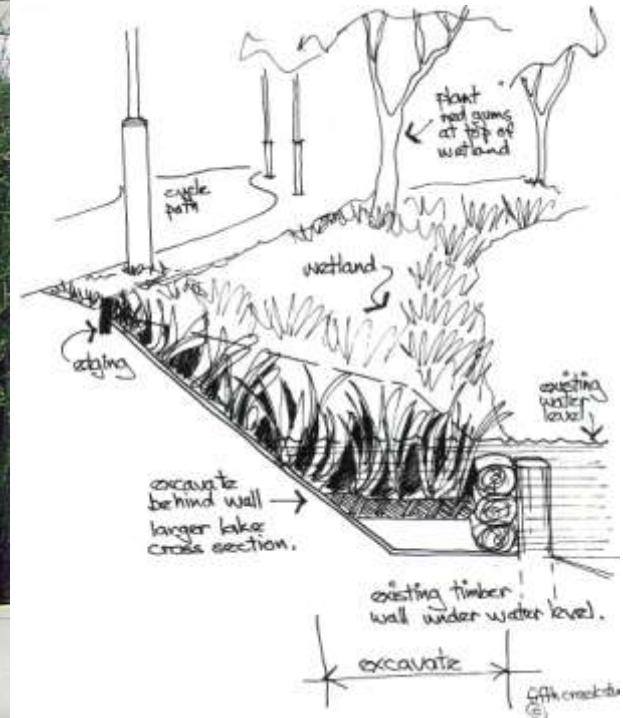


BUILT ENVIRONMENT



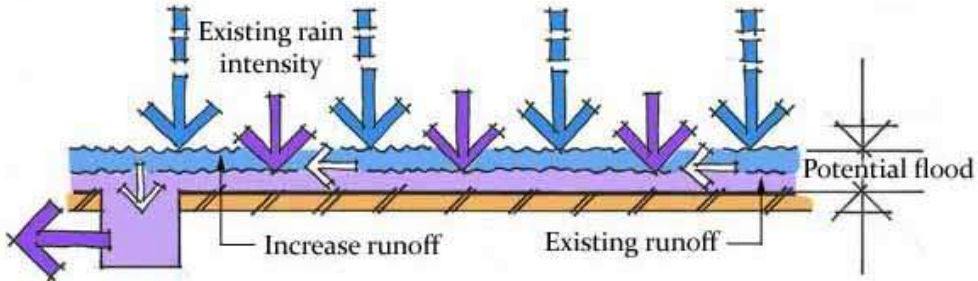
GREEN INFRASTRUCTURE

- Design with natural systems in the urban environment.
- Use natural systems to replace or augment existing built infrastructure.
- Natural systems are components of the urban ecosystem.
- Provide processes that repair, transform and transport matter to clean water and break down pollutants



NATURAL SYSTEMS –rainfall in a changing climate

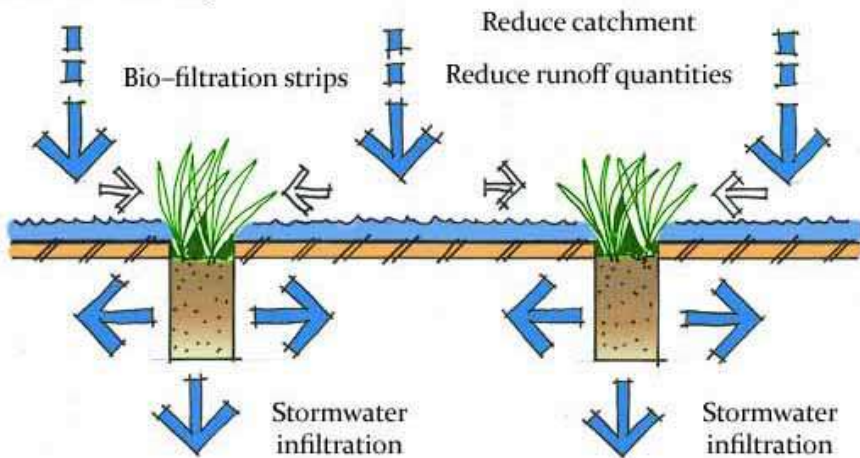
Increase rain intensity/events



EFFECTS OF CHANGING CLIMATE ON EXISTING HARD SURFACES



Increase rain intensity

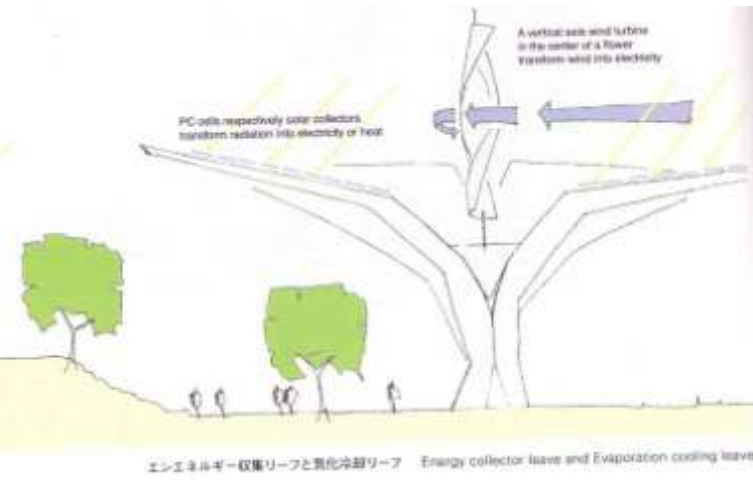
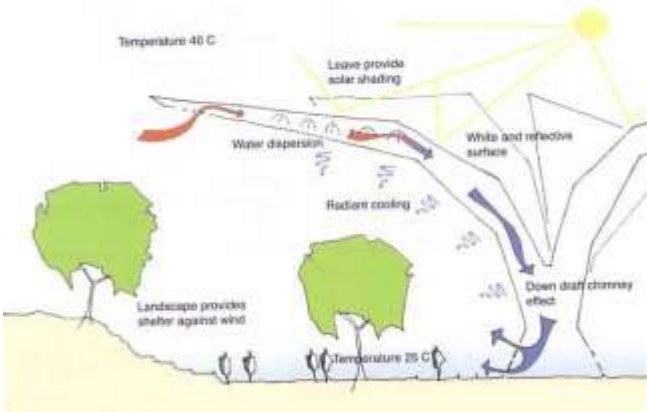


SMALLER CATCHMENTS REDUCE RUNOFF QUANTITY & INFRASTRUCTURE



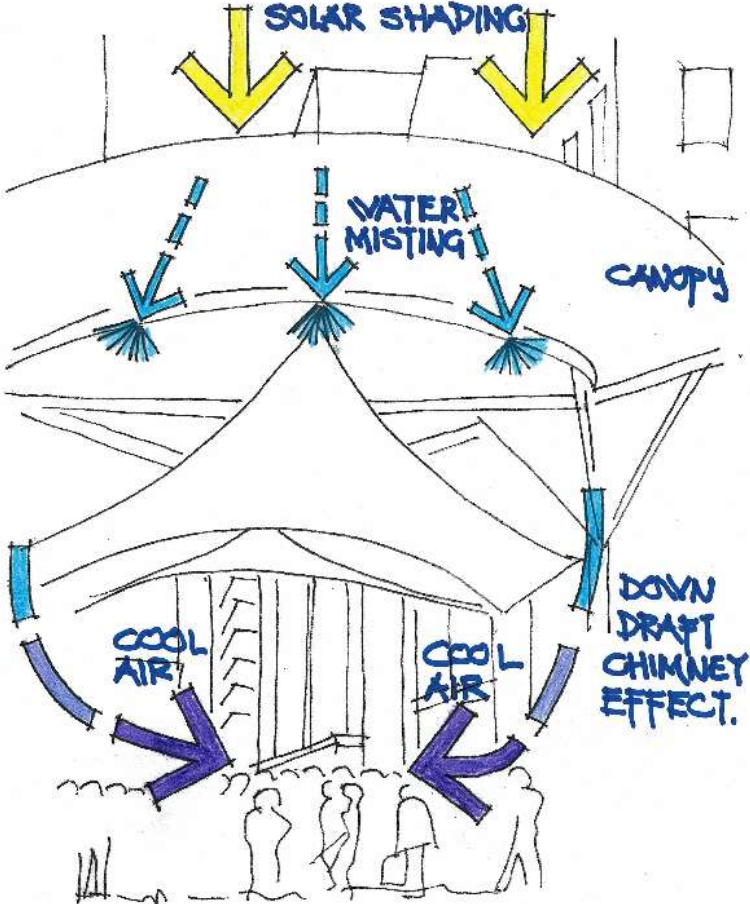
NATURAL SYSTEMS – vegetation -trees

- “an innovative flower – like structure which calls upon the natural remedial qualities of trees and plants – a heat pump-operated parasol”



NATURAL SYSTEM – heat pump -trees

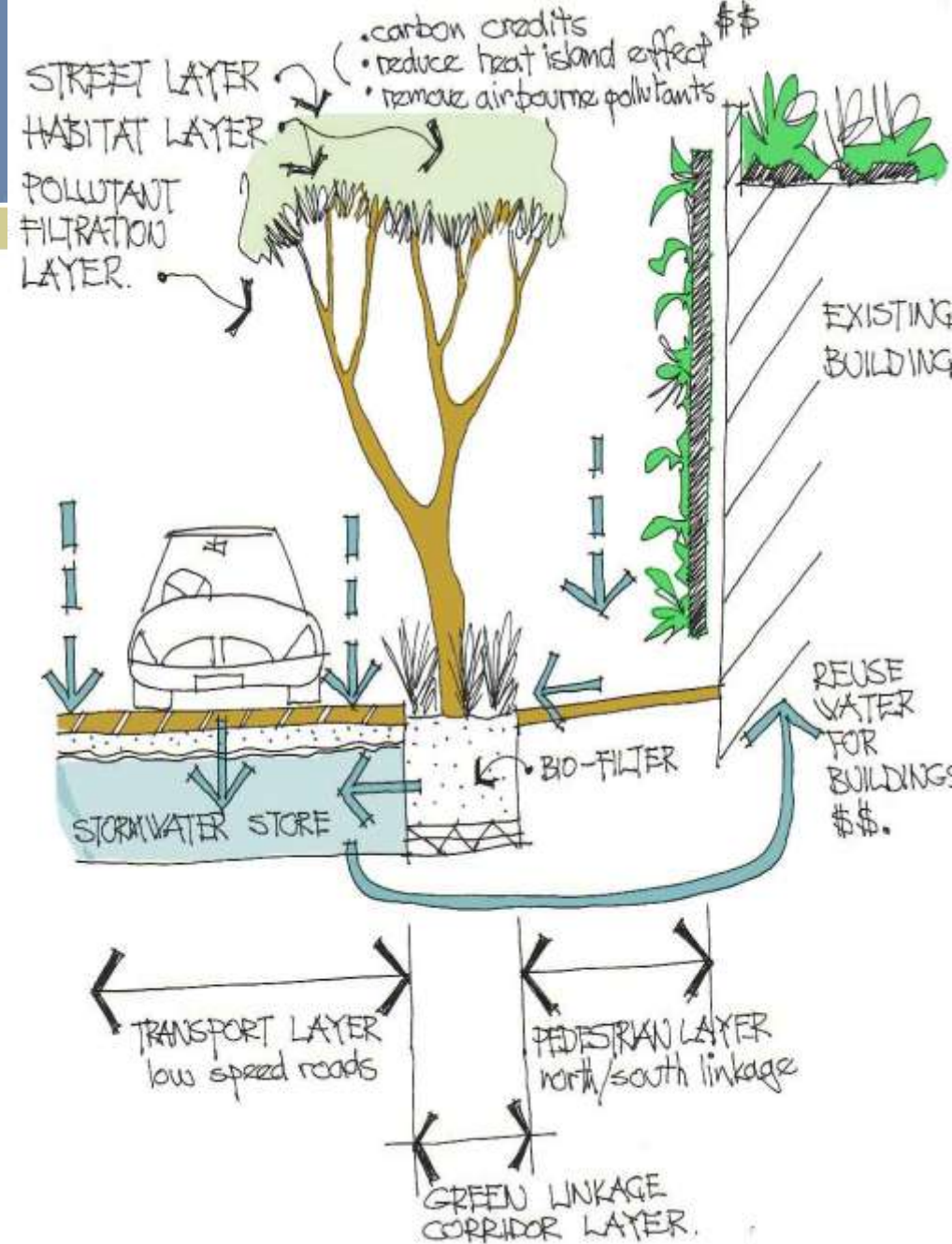
Rundle Mall
- Adelaide



NATURAL SYSTEMS - integrated

- **Integrated natural system**

“interconnected natural systems where energy and matter are transferred between them to reduce pollutants and excess stormwater runoff.”



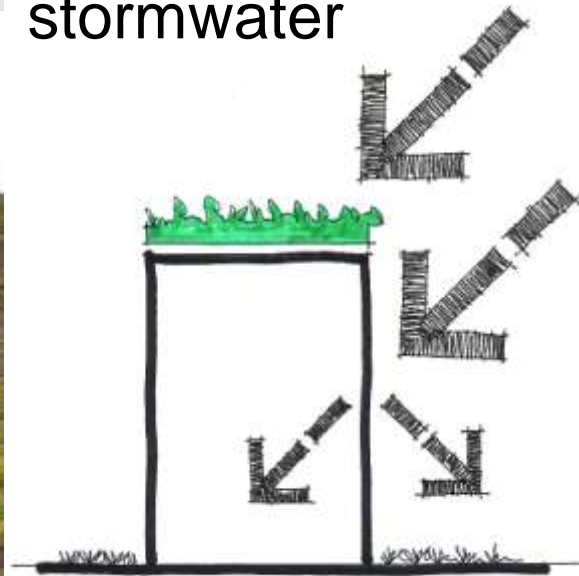
GREEN ROOFS – urban form



Increases shade and insulation

Reduces heat island effect

Reduces stormwater



GREEN ROOFS – natural systems

Reduces energy costs

Photovoltaic panels work more efficiently on green roofs-up to 20%
General rule 1c over 25c a decrease of 0.5% in efficiency.



Constructed wetlands

Clean grey water on roofs and walls - reuse back in building



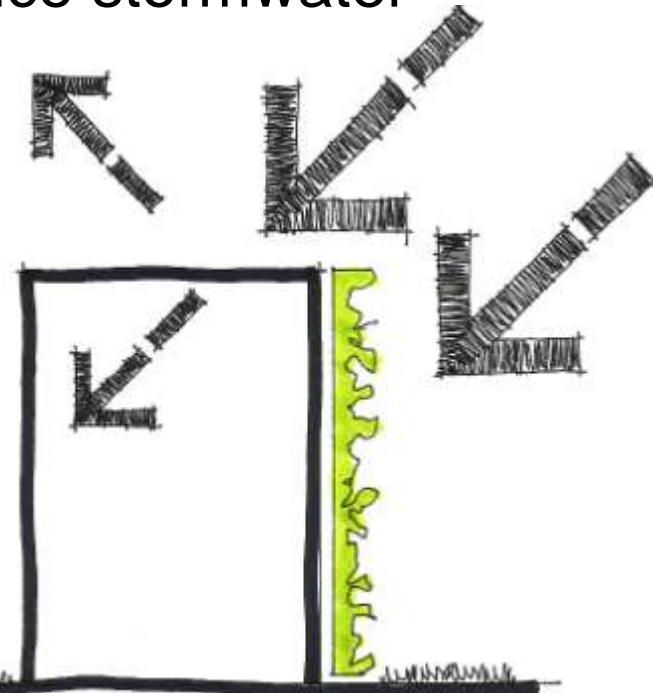
LIVING WALLS – URBAN TEXTURE



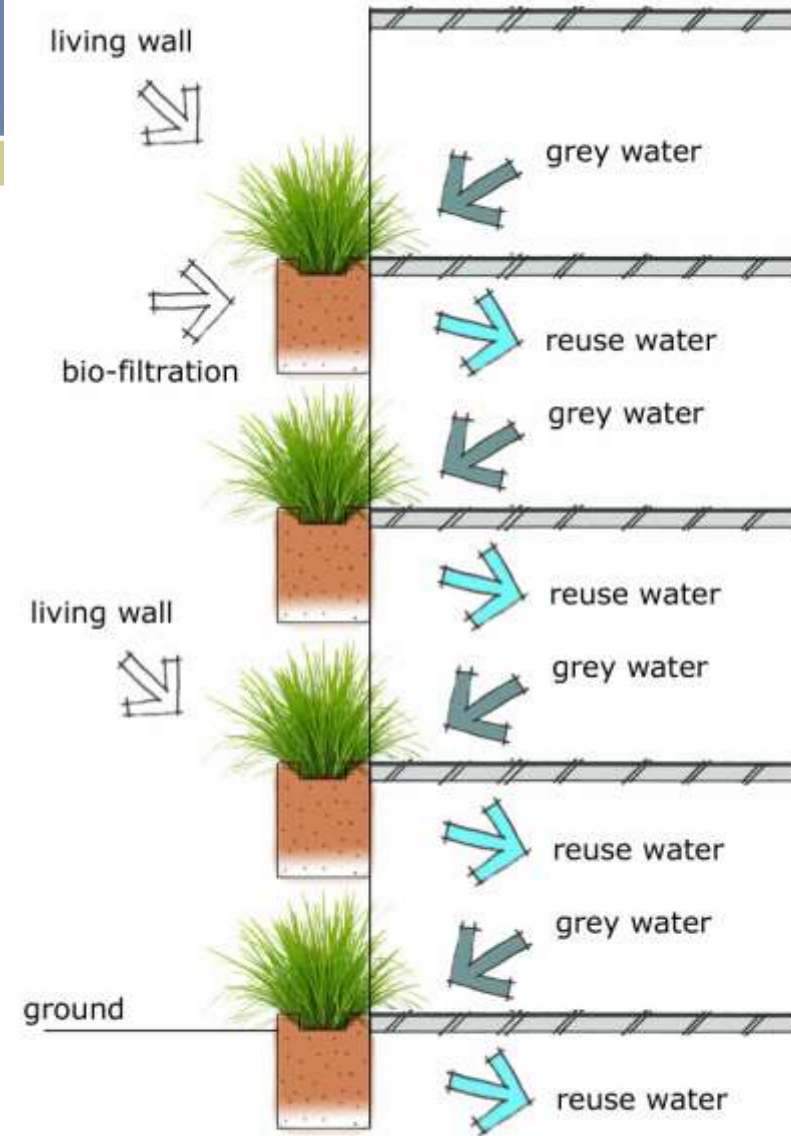
Increased shade and insulation

Reduced heat island effect

Reduce stormwater



LIVING WALLS – natural systems



LIVING WALL FOR MULTI STORY BUILDING
- using cascade method for reuse of water



GROUND TO ROOF CONNECTION

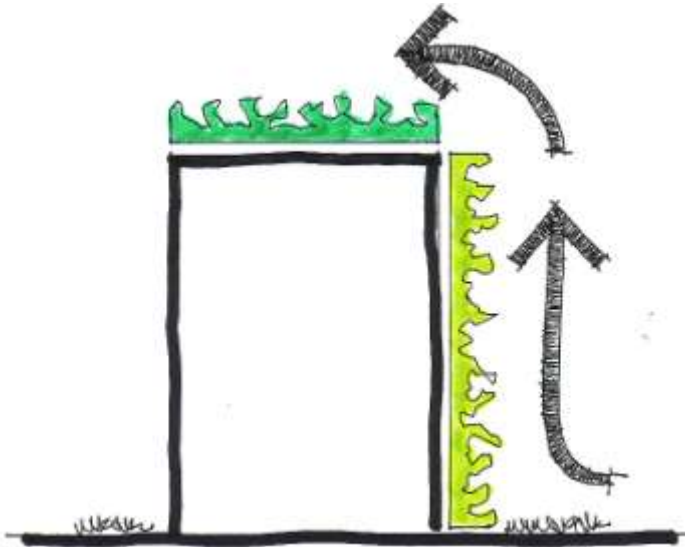
Reduces energy consumption

Develop green corridors

Greater habitat and biodiversity (busstop)

Reduces storm water runoff

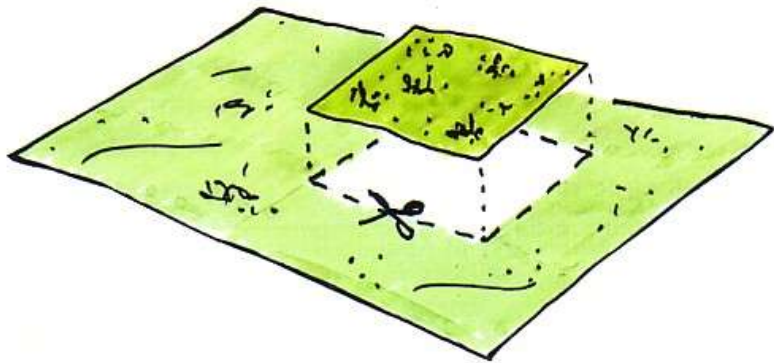
Greater open space and biomass



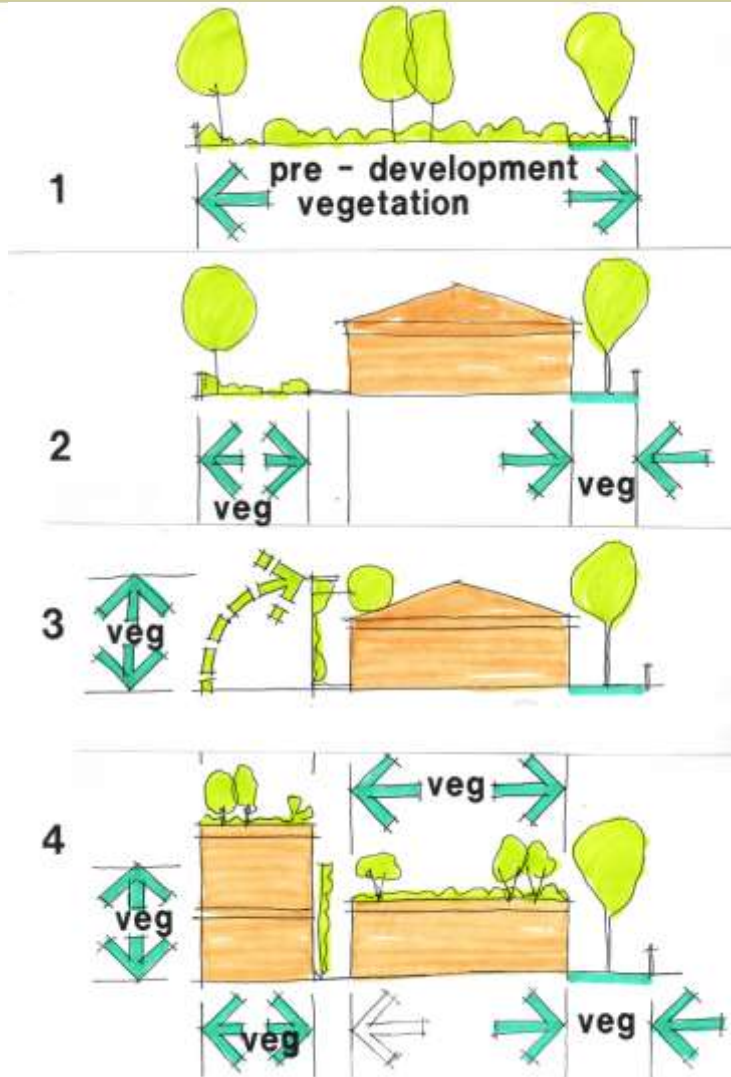
STEPPING STONE CORRIDORS USING BUSHTOPS

The Bushtop takes the concept of a green roof further in that it proposes to establish not just the physical structure of habitats or ecosystems, but also to introduce the relevant animal species into this type of green roof from the early design and implementation stages.

Metapopulation theory
(developed by Paul Ehrlich)



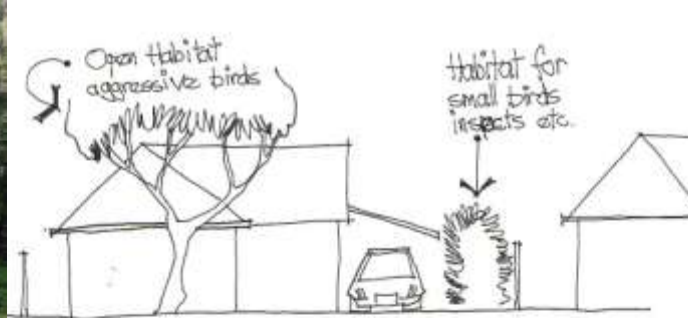
INCREASE OPEN SPACE WHILE INCREASE BUILDING DENSITY



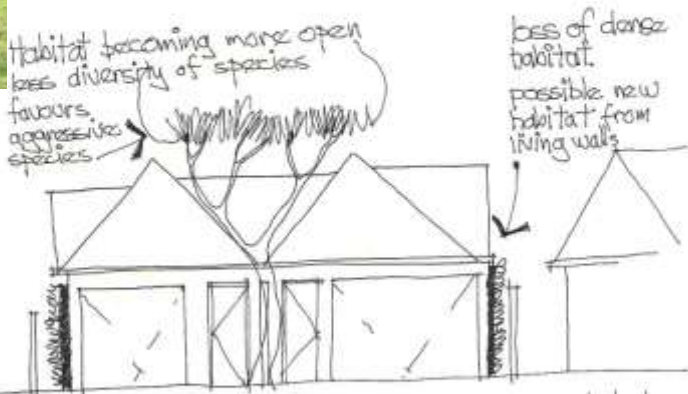
- Vegetation and bio-mass before any residential building development.
- Traditional residential development of single dwelling gives 25-30% of original vegetation.
- Tilt up backyard into living wall retains same amount of vegetation and bio-mass but reduced area.
- Use vacant space for extra dwellings with green roofs results in more vegetation than original and higher number of dwellings



LIVING WALL TECHNOLOGY – biodiversity in residential areas



EXISTING LOW DENSITY



INFILL DENSITY

- Methodology layers
- vegetation
 - habitat
 - open space
 - density

- new technology to replace loss habitat
- constraint and anew opportunity

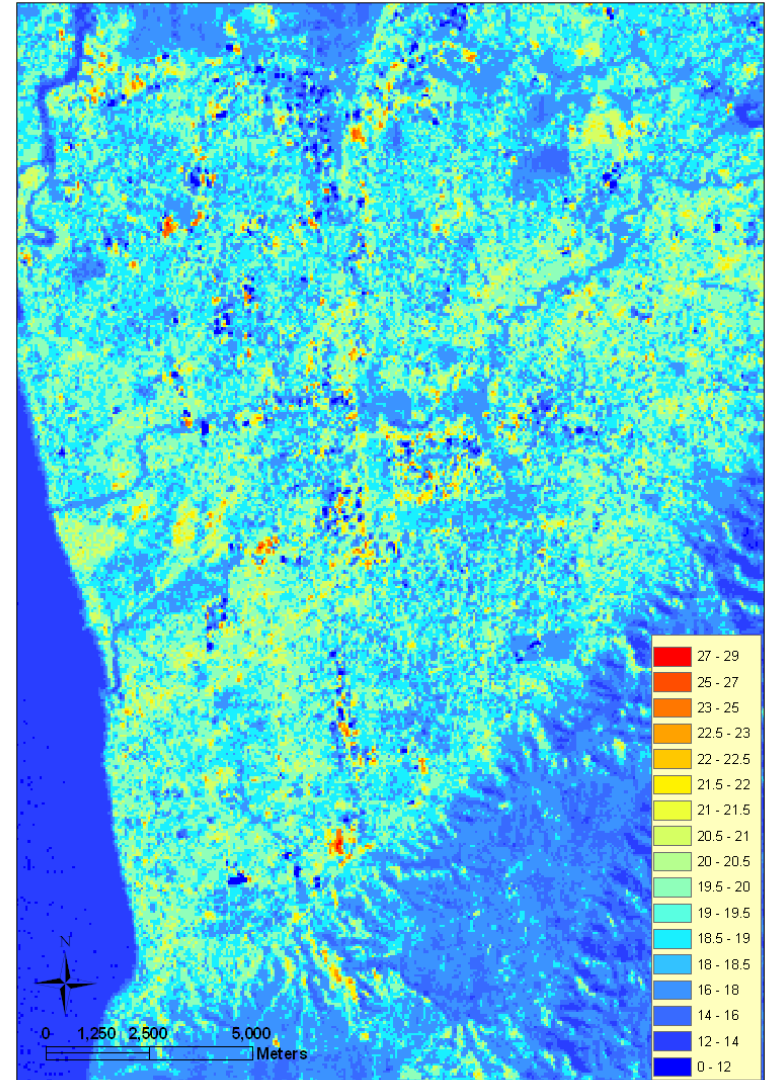
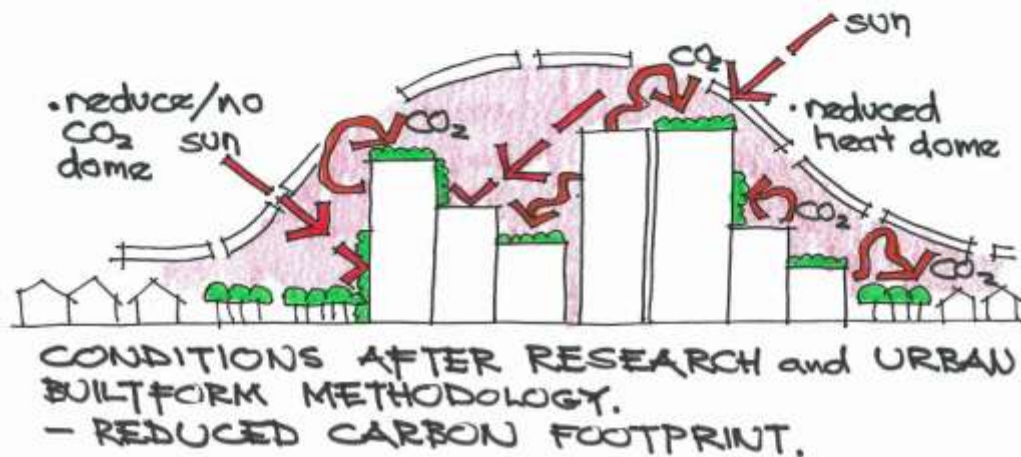
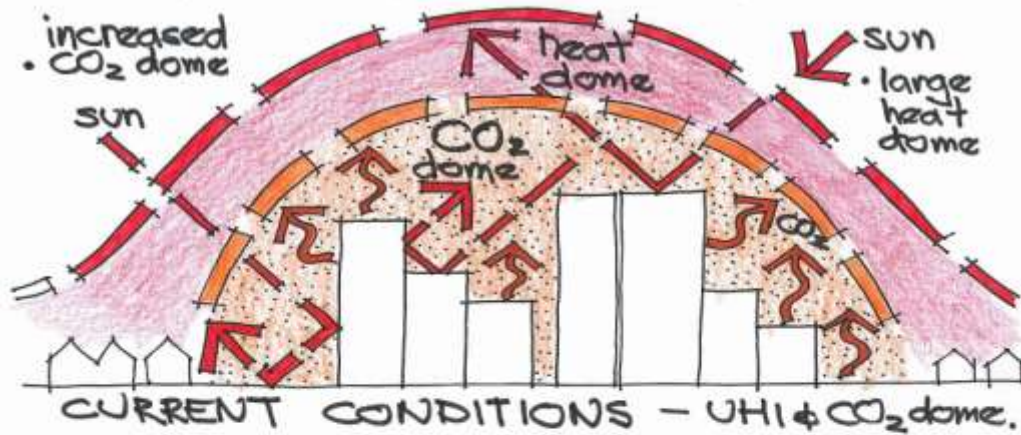


INTEGRATE WITH BUILTFORM

- Integrate the public and private realm.
- Connect streetscape activities with rooftop activity planes.
- Using bio-mimic natural systems on the builtform to complement and integrate with the public realm.
- Develop micro-climates using the natural systems in both the public realm and the builtform.
- Develop habitat connectivity from street to building facade.
- Develop the skin of the builtform as part of the 3-D form of the city



CURRENT RESEARCH – URBAN HEAT ISLAND EFFECT



Reclaim the Rooftops

A program where the rooftops become another active layer of the City: enhancing the environmental benefits of green roofs and walls, addressing climate change, providing lifestyle benefits for increased residential density by increasing biomass and open space, and creating opportunities for social and economic activity that does not currently exist at ground level.

Rooftops are lost opportunities – to the building owner, community and environment.

