



Urban Structure

Infrastructure

Ecostructure

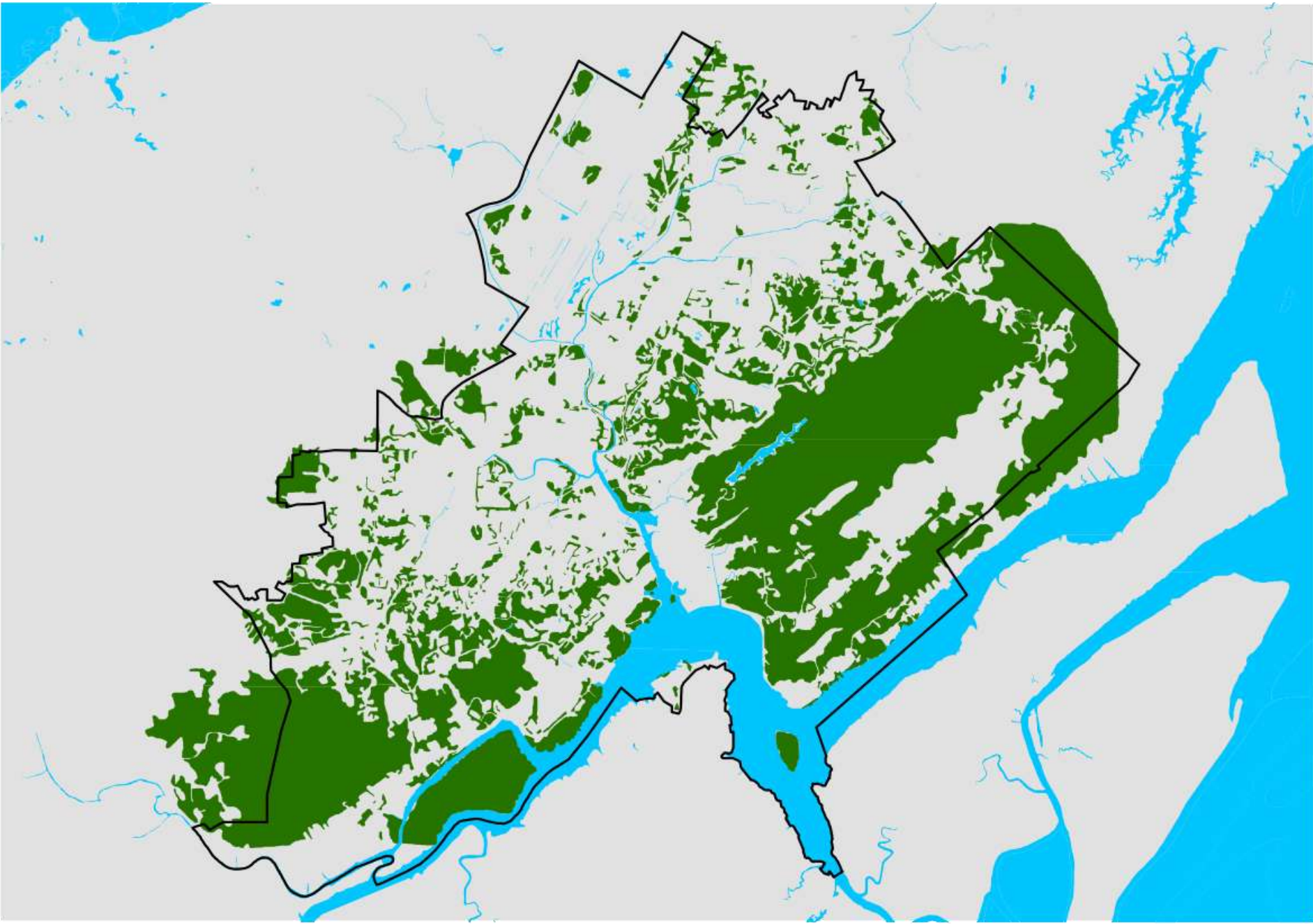


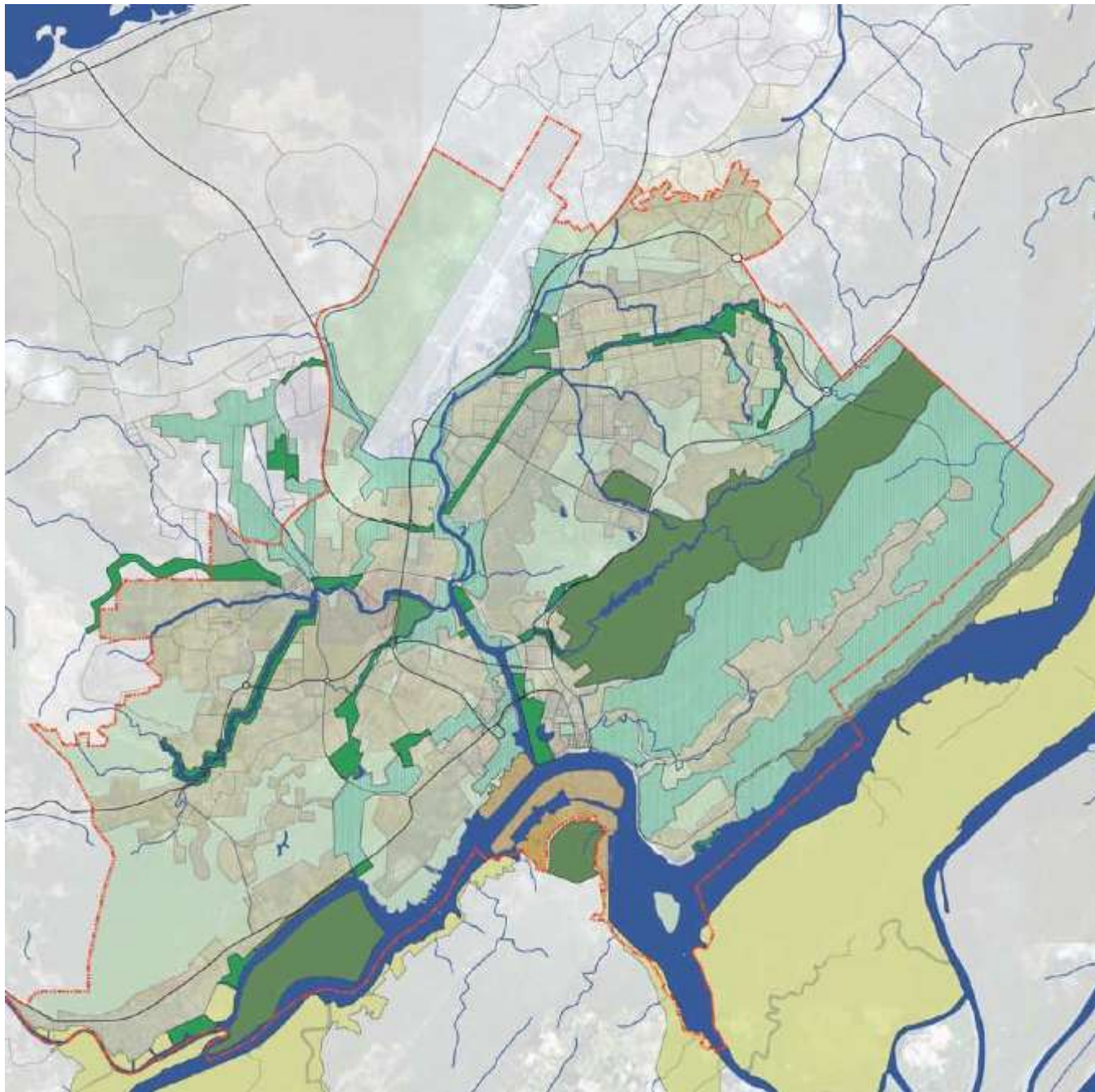
Ecological Performance Standards



Ecosystem Functions of Focus

- Water purification
- Soil stabilization and fertility
- Biodiversity support
- Food production





Proposed Green Linkage
 Link along corridors that have direct habitat connections along or to trails and corridors. Areas of these corridors that have habitat values along the corridors and have habitat design guidelines.



Urban Recreation & Soft Land Park Community areas for recreation, sports and events. Land-use design suitable for sustainability of open spaces but other guidelines may be relevant.



Urban Network - Built Environment This network is independent across the Systems. Habitat Corridors and the Habitat Protection Zones that surround it only. These areas will be assessed for different landscape design guidelines depending on their uses.



Urban Network - Car Built Environment These areas are green spaces within the city that are currently undeveloped and can be developed as part of the larger Habitat Network and development occurs and they are developed through specific landscape design guidelines depending on their uses.



Urban Protection Zones (Habitat Ecological Corridor) These are terrestrial open space areas that are managed for their ecological, and all other uses and activities.



Wetland Resilience Parks These are areas along waterways that are intended to be a temporary storage area for excess flood waters that reduce the capacity of the waterways.



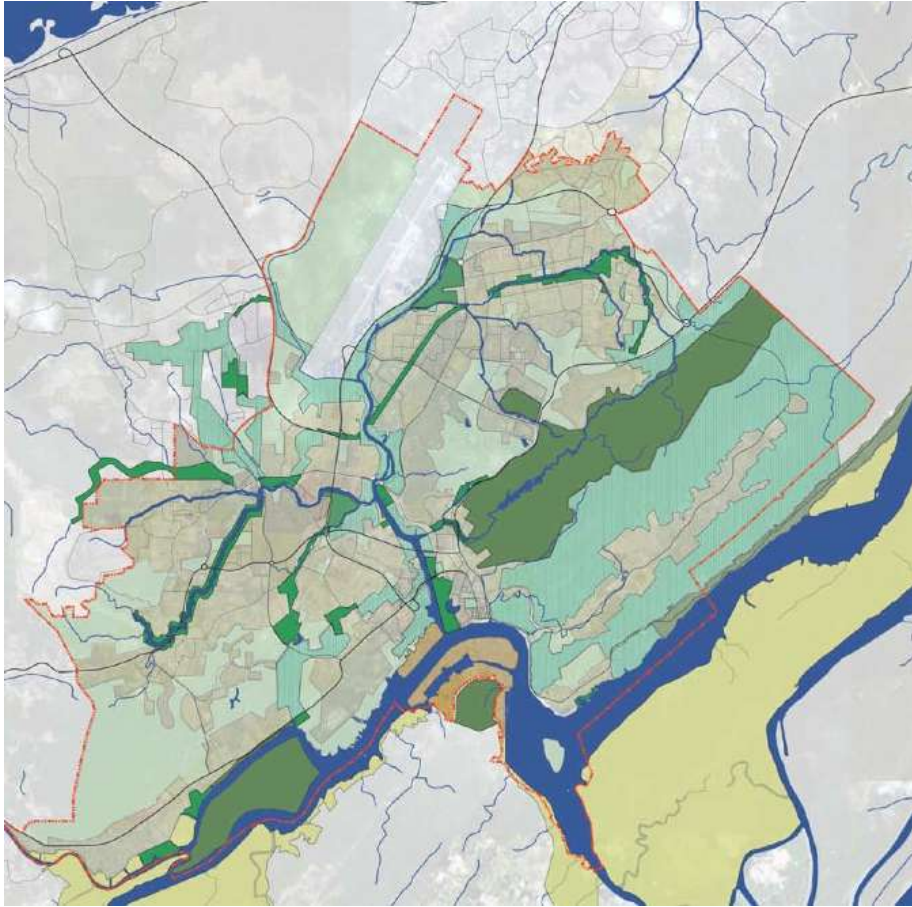
Mangrove Reef Filtration Areas These areas are located along the coastline of the World War II Heritage Areas that are affected by high tides. The primary function is to filter sediment from the water and filter some types of pollutants from the water.



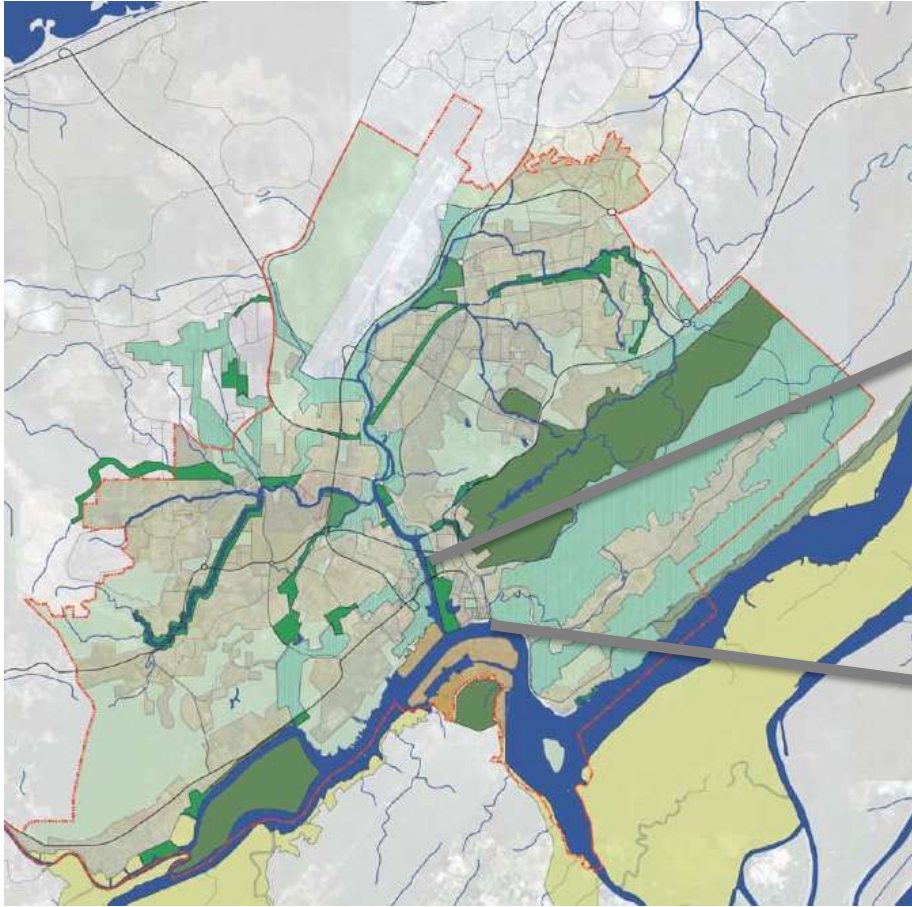
Water Village Palm Spring Areas These areas are located beneath Palm Spring Ays, where the habitat should be managed based on what is required for recreation uses.



Green Belt This is an arrangement of low land or ridge conservation areas, identifying broad reserves that provide urban development patterns.



Water Purification



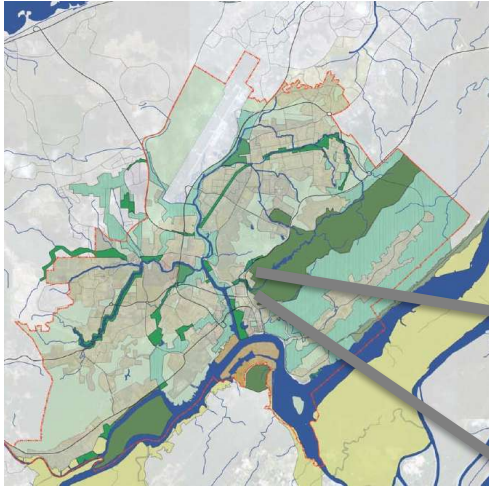
Natural
Systems

River edges

Mangrove

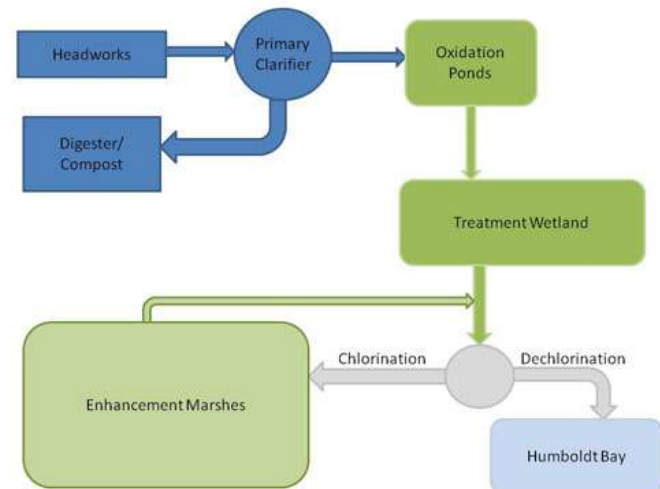
Water Purification

Secondary Wastewater Treatment

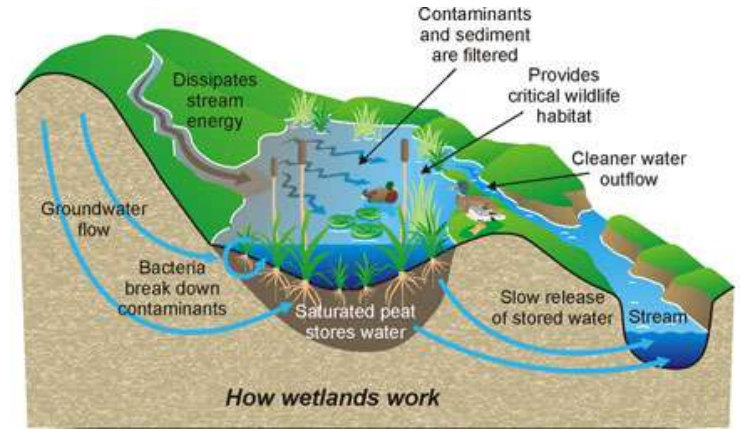
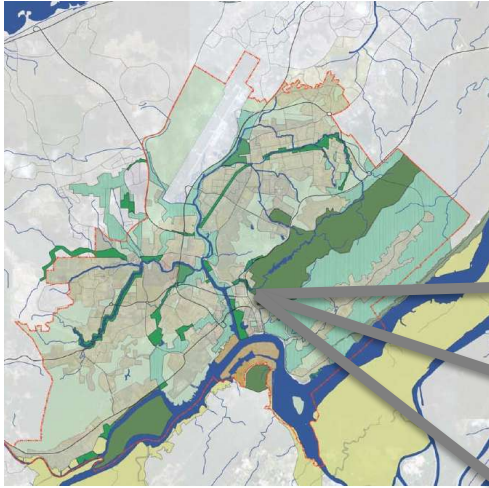


Water Purification

*Functions at the city scale



Stormwater Treatment in Wetlands

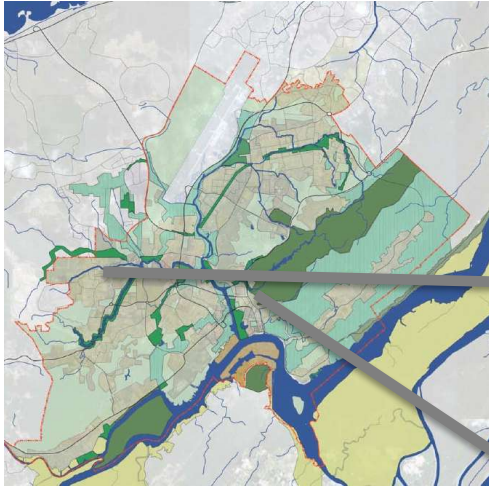


Water Purification

*Functions at the city scale in areas without high limitations on space.



Biological Blackwater Treatment in Buildings (Living Machines)

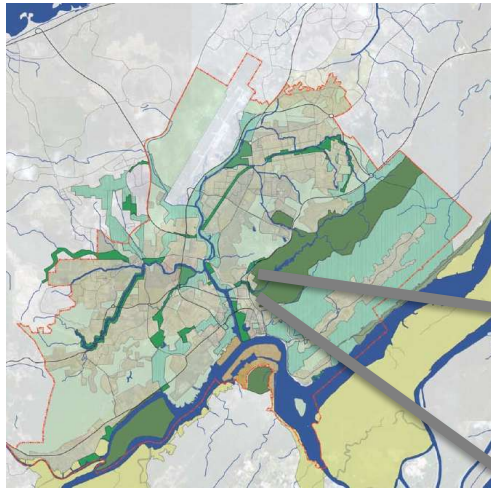


Water Purification

*Recommended in government buildings and new large scale office and commercial



Bioswales to Treat Greywater from Buildings

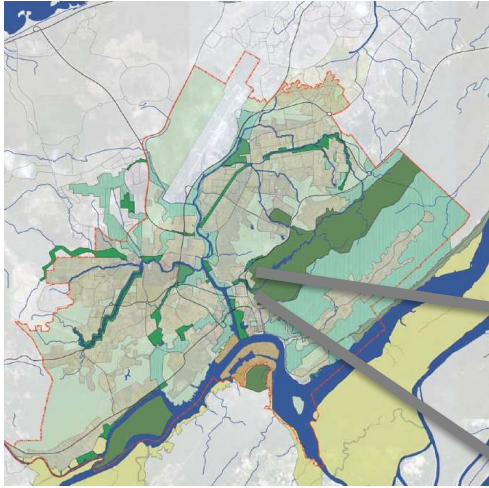


Water Purification

*Recommended in government buildings and new large scale office and commercial



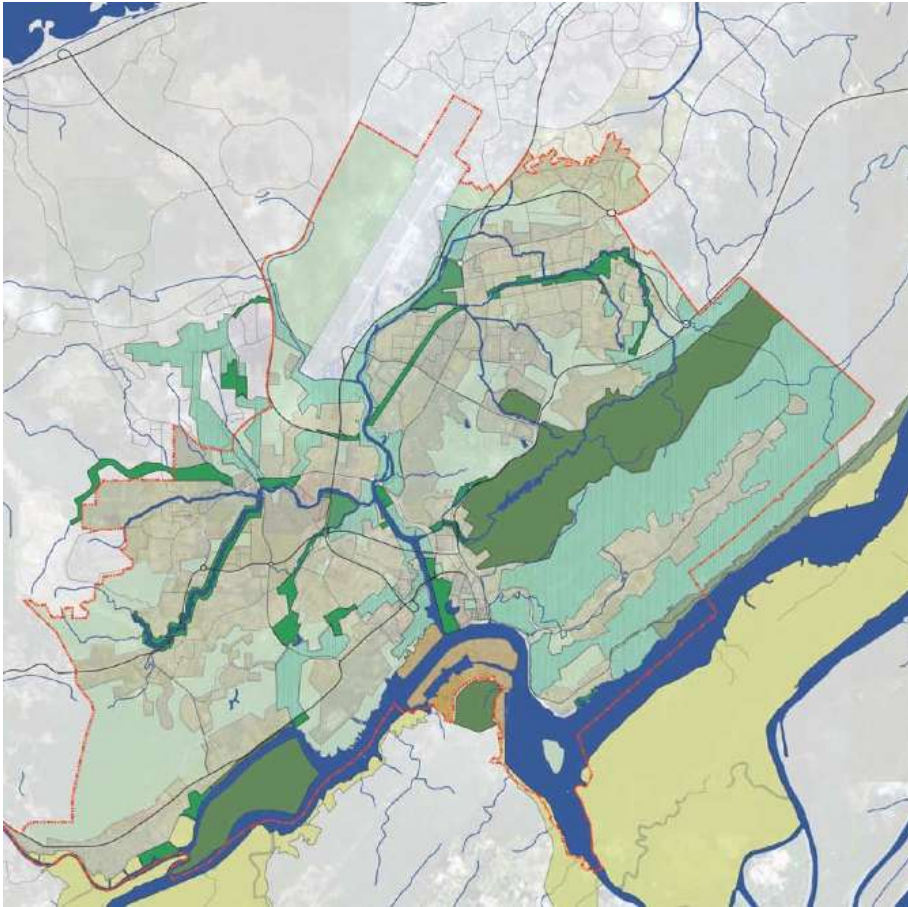
Green roofs



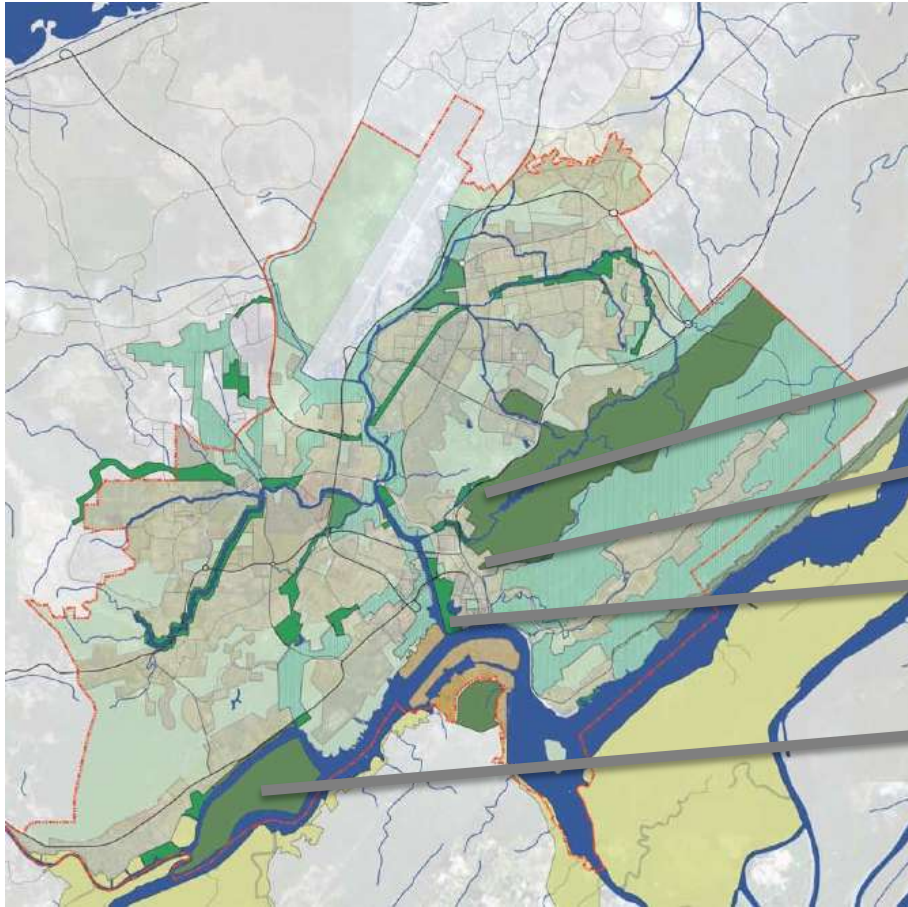
Water Purification
(also reduce peak flows)

*Recommended
for all new
construction in
densely built areas





Soil Stabilization and
Fertility



Natural Systems

Forest canopy breaks up raindrops

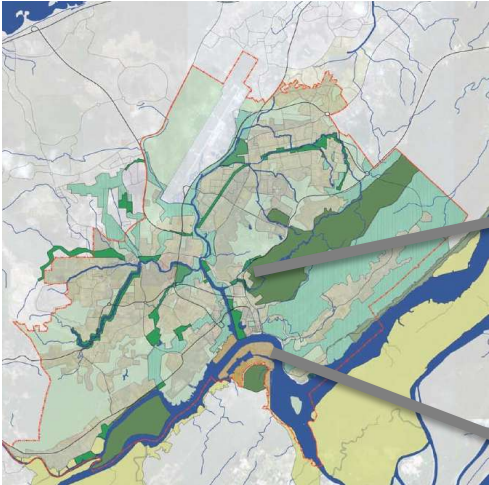
Leaf litter covers soil

Vegetated river edges collect sediments

Mangroves collect sediment

Soil Stabilization and Fertility

Soils NEVER Left Exposed and Unattended

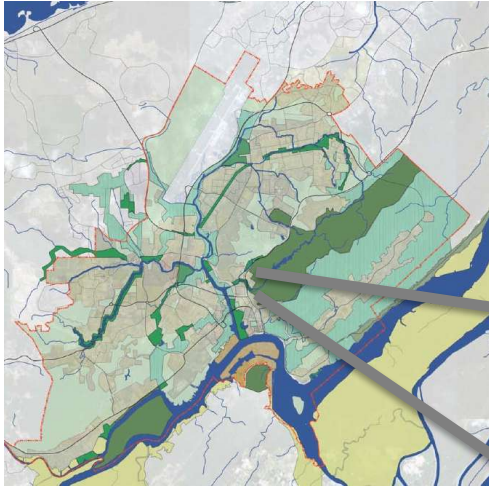


Soil Stabilization
and
Fertility

*Recommended
for all new
construction

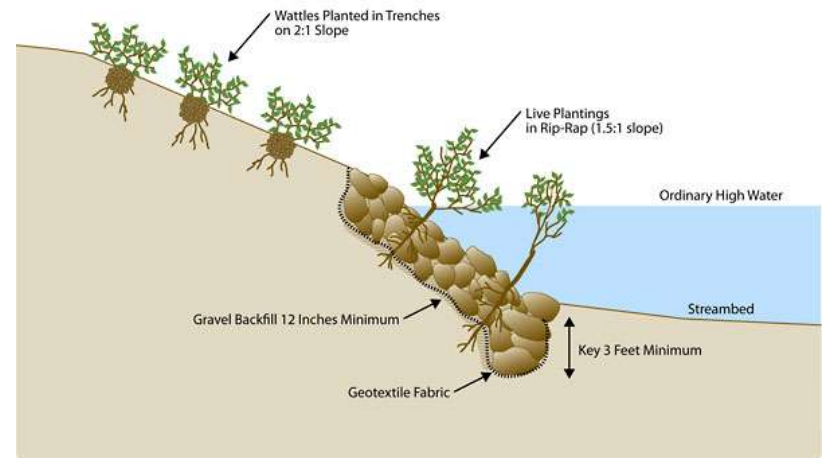


Stabilization Around Waterways

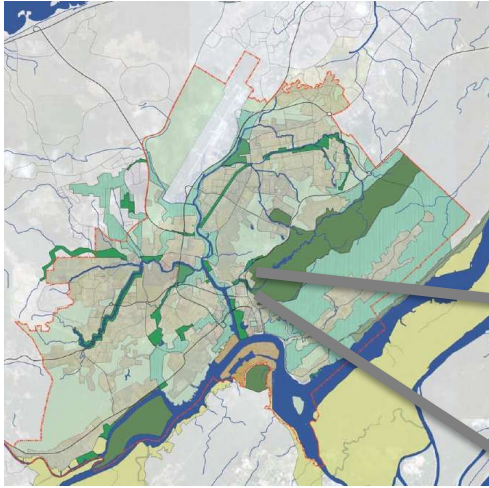


Soil Stabilization
and
Fertility

*Recommended
for all waterways



Optimal of 30m of Greenspace Around Waterways

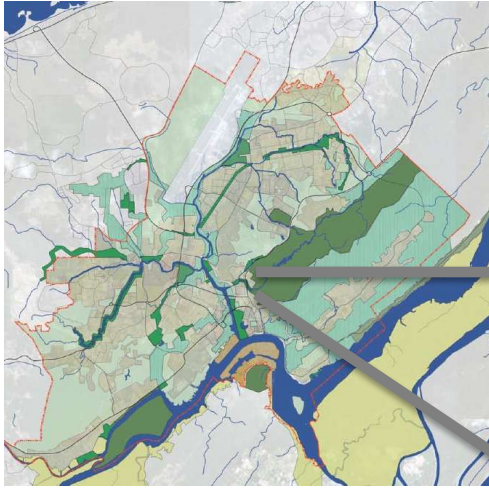


Soil Stabilization
and
Fertility

*Recommended
wherever possible
around waterways



Multi-tiered Vegetative Buffers Around Waterways

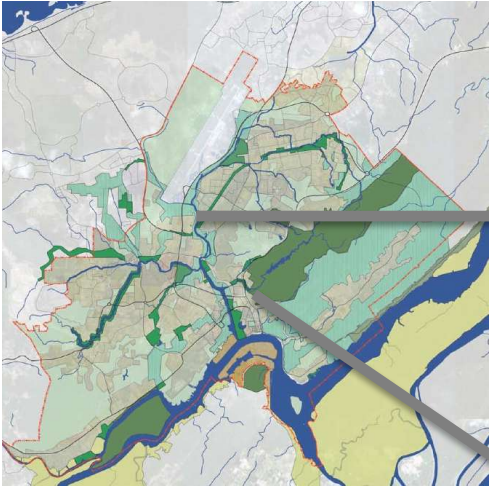


Soil Stabilization and Fertility

*Recommended for as much water front as possible



Nutrient Cycling



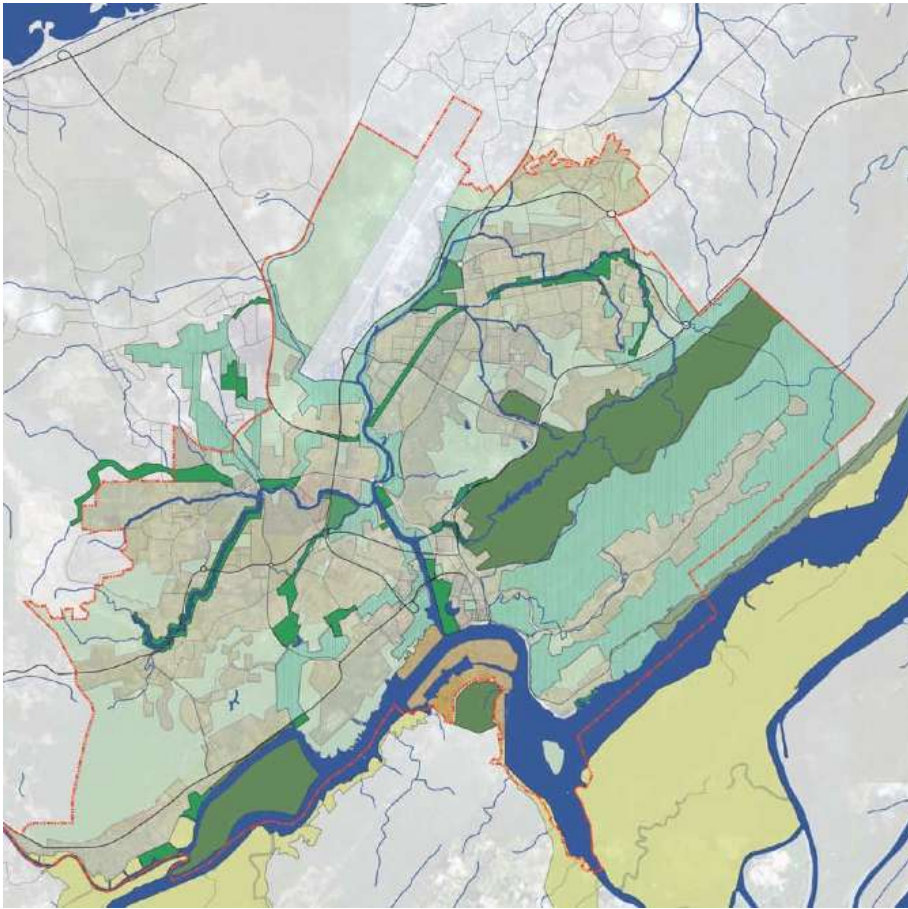
Composting of organic materials



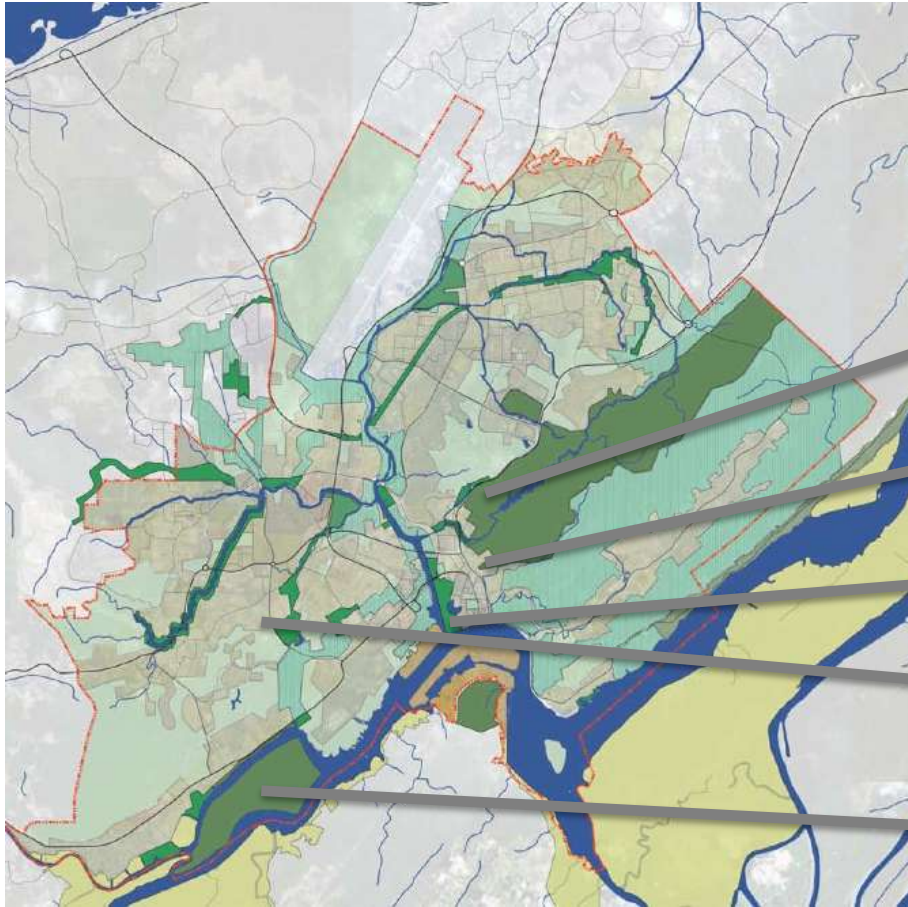
Sewage composting and methane production

Soil Stabilization and Fertility

*City-wide programs



Support Biodiversity



Natural Systems

Gap effects

Vertical structural complexity

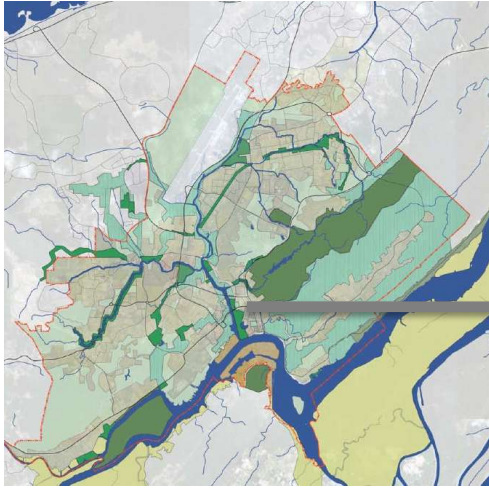
Seed distributors

Habitat connectivity

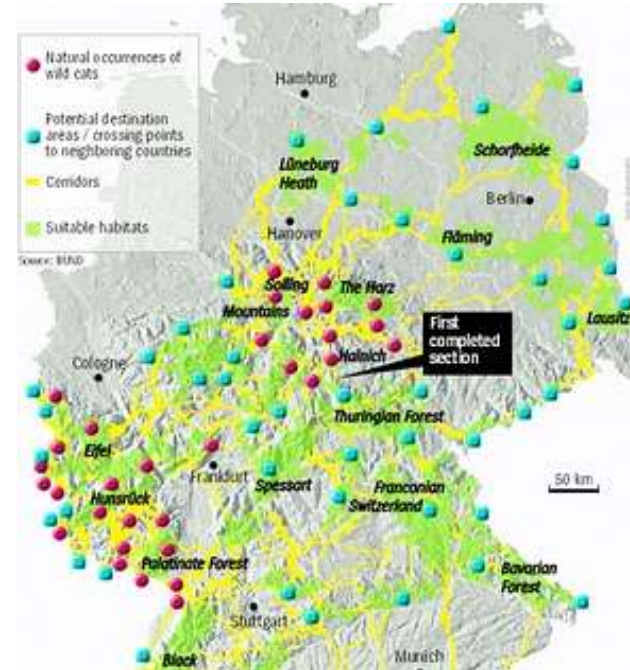
Wetlands

Support Biodiversity

Urban Habitat Linkages

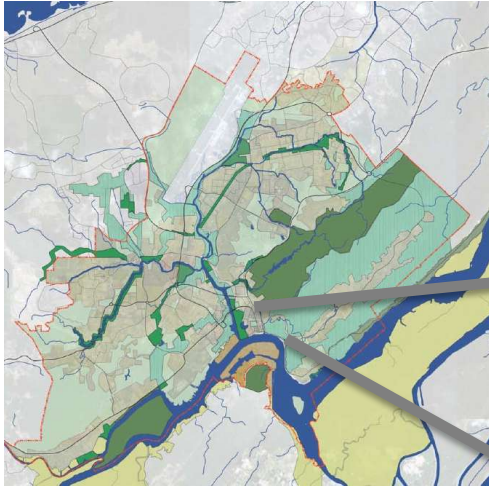


Support Biodiversity



*Regional system of nodes and corridors

Native Plantings in Landscaping



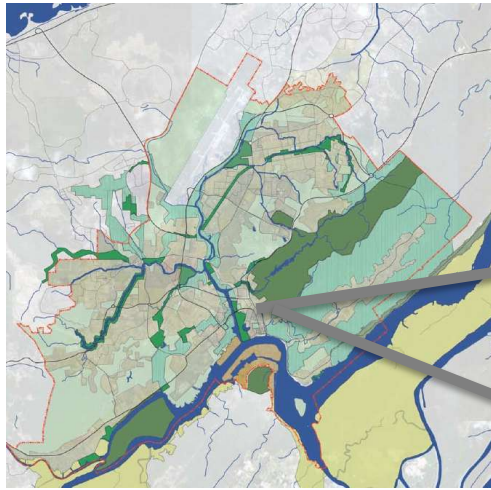
Support Biodiversity



*City-wide, parks,
parkways,
medians, etc.



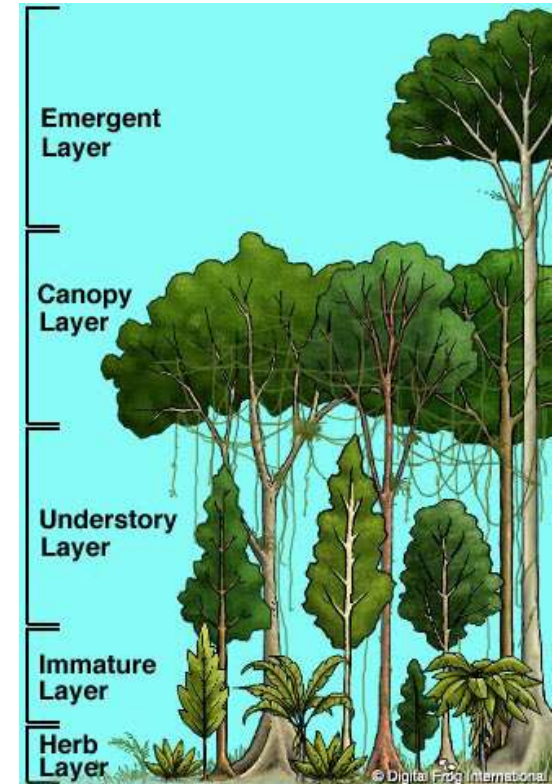
Five-tiered Vegetation



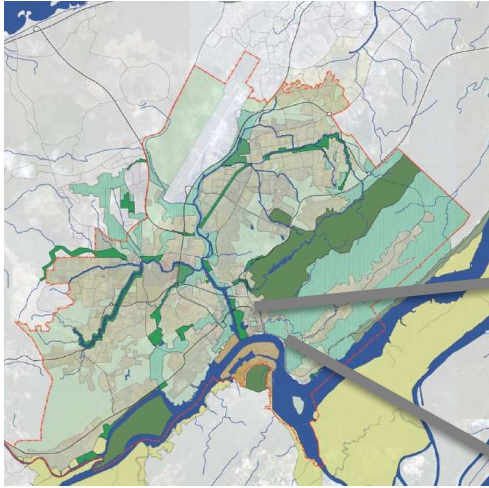
Support Biodiversity



*City-wide, public and private land



Varied Species of Plants on Green Roofs

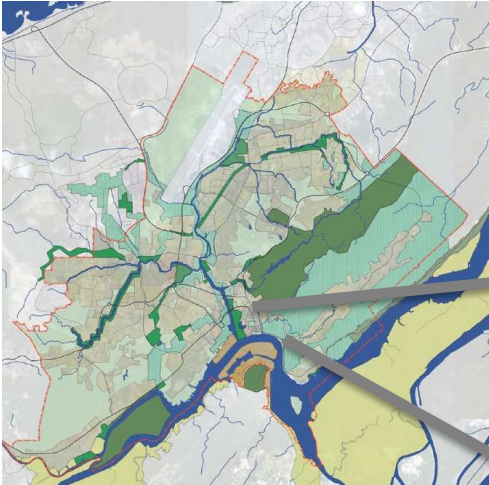


Support Biodiversity



*City-wide,
especially densely
built areas

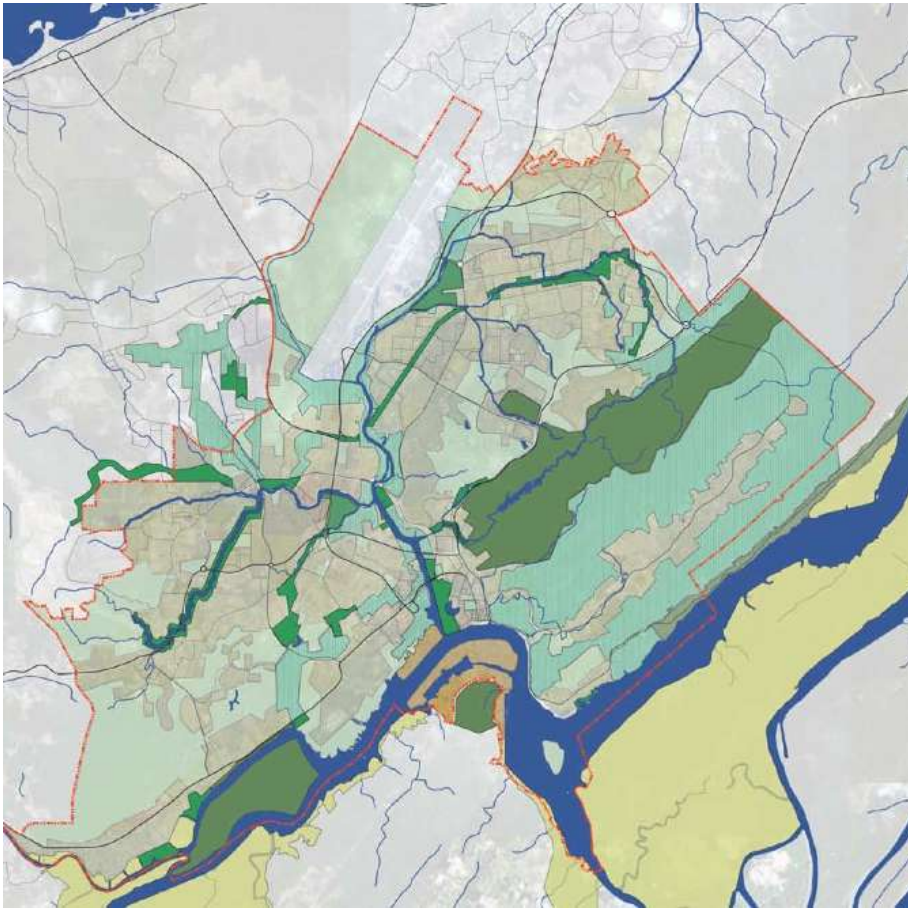
Vegetated Walls Provide Habitat



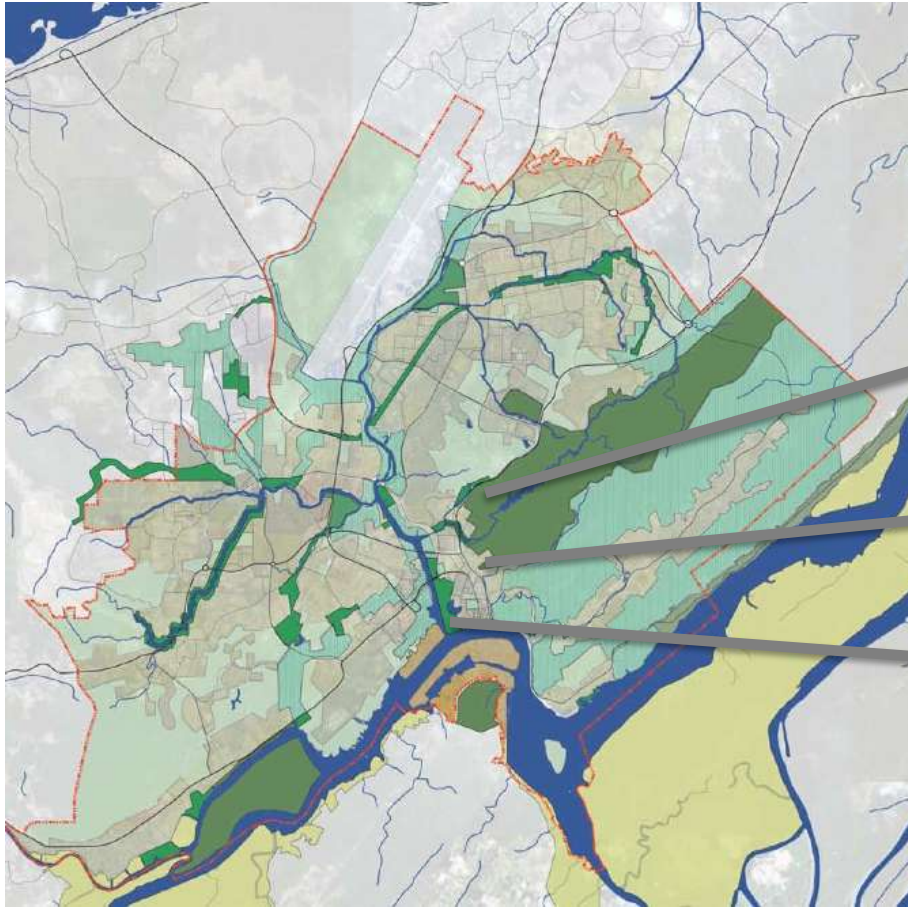
Support Biodiversity

*City-wide, especially densely built areas





Food Production



Natural Systems

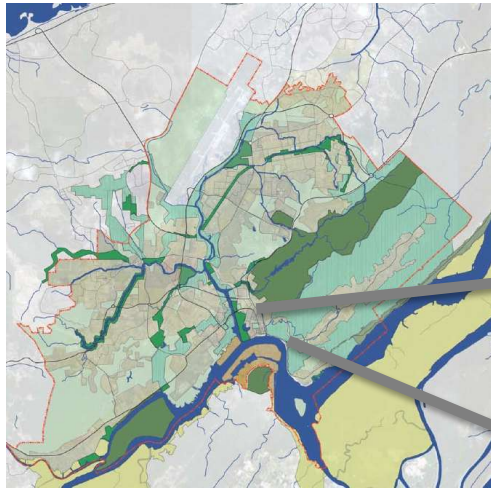
Supports life at all levels

High diversity of species

Productive processes cycle nutrients

Food Production

Kitchen Gardens



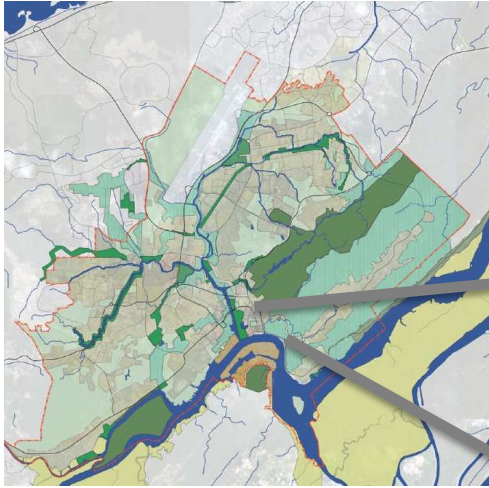
Food Production



*Recommended for govt buildings, schools and commercial operations with central kitchens



Vertical Surfaces



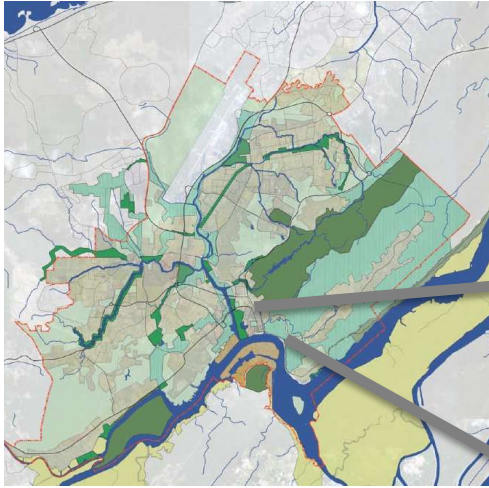
Food Production



*City-wide,
particularly near
restaurants



Community Gardens

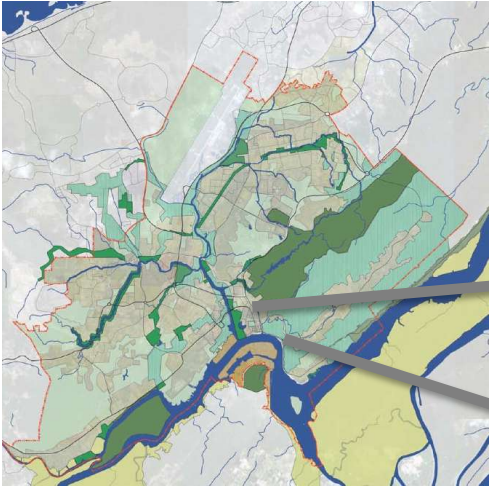


Food Production

*City-wide near multi-family and public housing



Food Forests



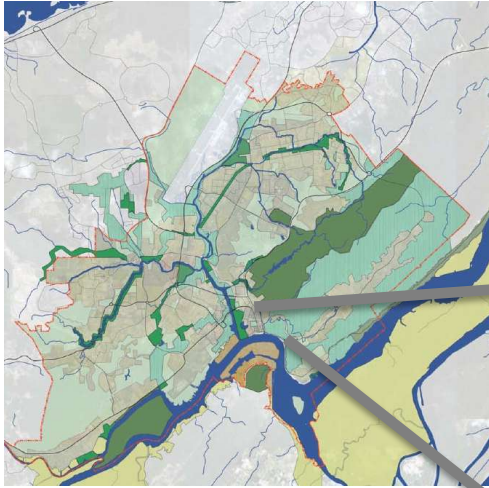
Food Production



*In public spaces and trails/walkways that currently require revegetation



Mangrove Fish Hatchery



Food Production

*In and around
Kampong Ayer

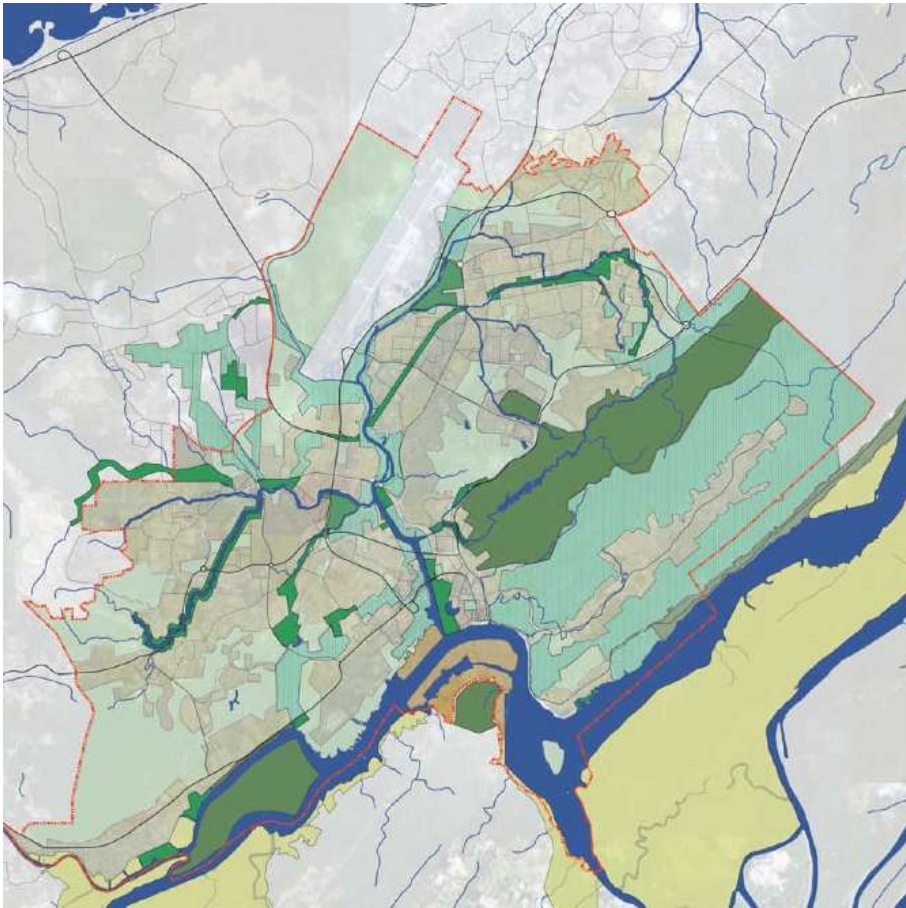




The Importance of Measuring Progress Towards Ecological Performance Standards...

- Function
- Disturbance
- Feedback loops
- Tipping points

Long Term Monitoring



- Establish Appropriate Metrics
- Identify Govt Agencies for Management Partnership
- Incorporate EPS into Inter-Agency Management and Development Plans
- Develop Monitoring Plans
- Track Progress and Changes Over Time

