



GREEN INFRASTRUCTURE

Valencia, Spain

VLC SYNERGIC
URBAN
INFRA
STRUCTURES

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0 Work Flow

INTRODUCTION

1 Green Areas in Valencia (General Map)

2 SWOT

SITE

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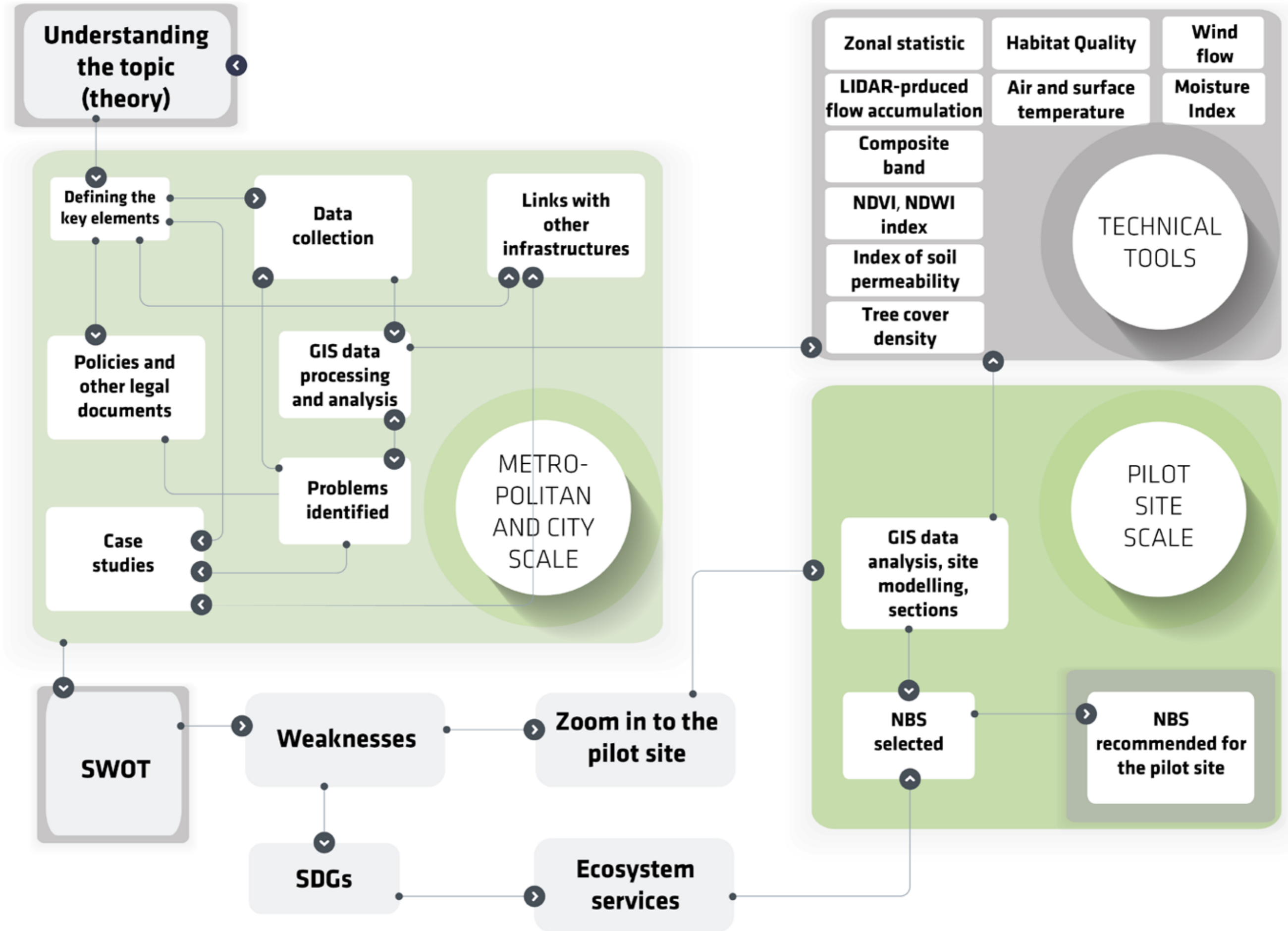
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0. Work Flow

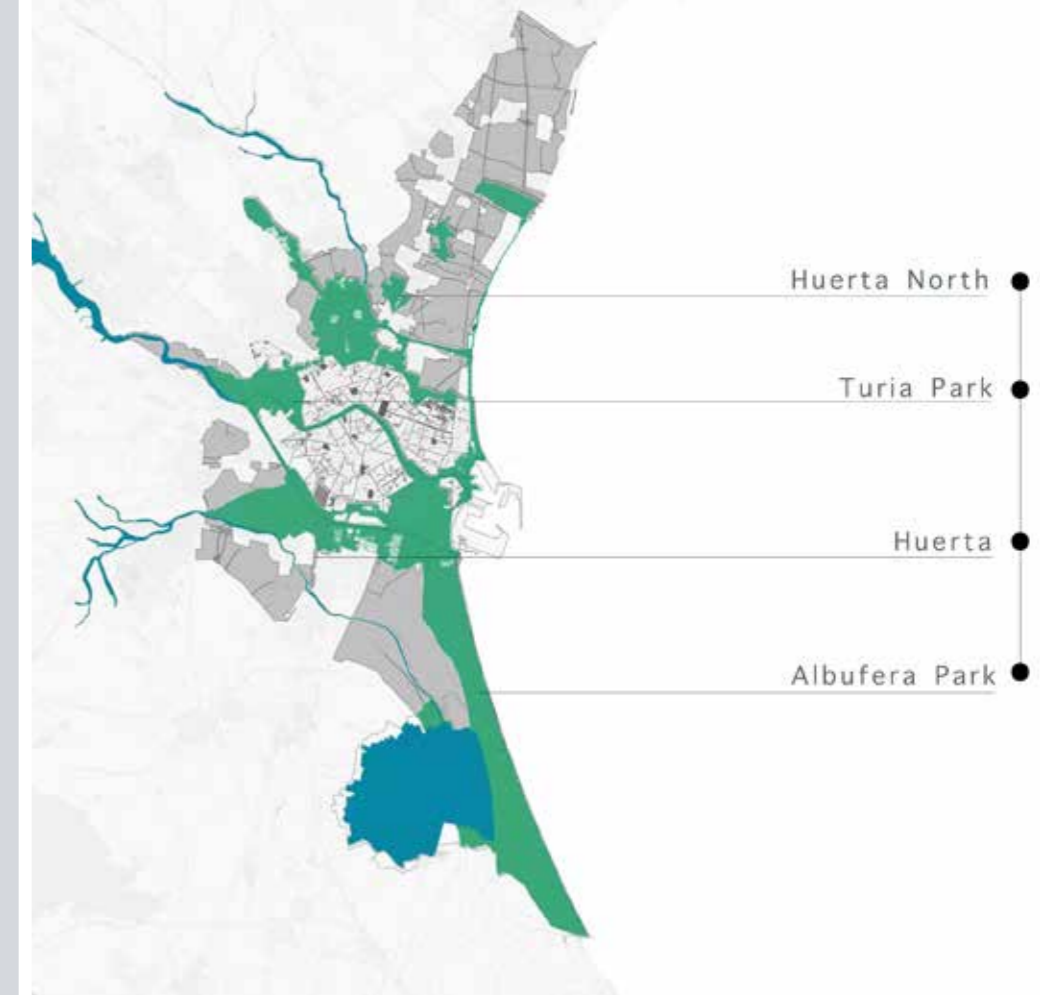


1. Green Areas



- barris-barrios
- green_areas**
 - FORMALES - A - Espacio Natural Protegido
 - FORMALES - A - PATHV
 - FORMALES - A - SNU
 - FORMALES - B - Parques de ciudad
 - FORMALES - C - Parques de barrio
 - FORMALES - D - Equipamientos públicos
 - FORMALES - E - Bulevares, paseos
 - FORMALES - F - Otros
 - INFORMALES - A - Equipamientos privados
 - INFORMALES - B - Residenciales
 - INFORMALES - C - Solares y SUBLE no desarrollado
 - INFORMALES - D - Intersticios

Four Ecosystems
Establish a connection between them



2. sWot



Weakness 1:
Green Areas' Fragmentation

**Main Pillar:
Increase Biodiversity**



2. sWot

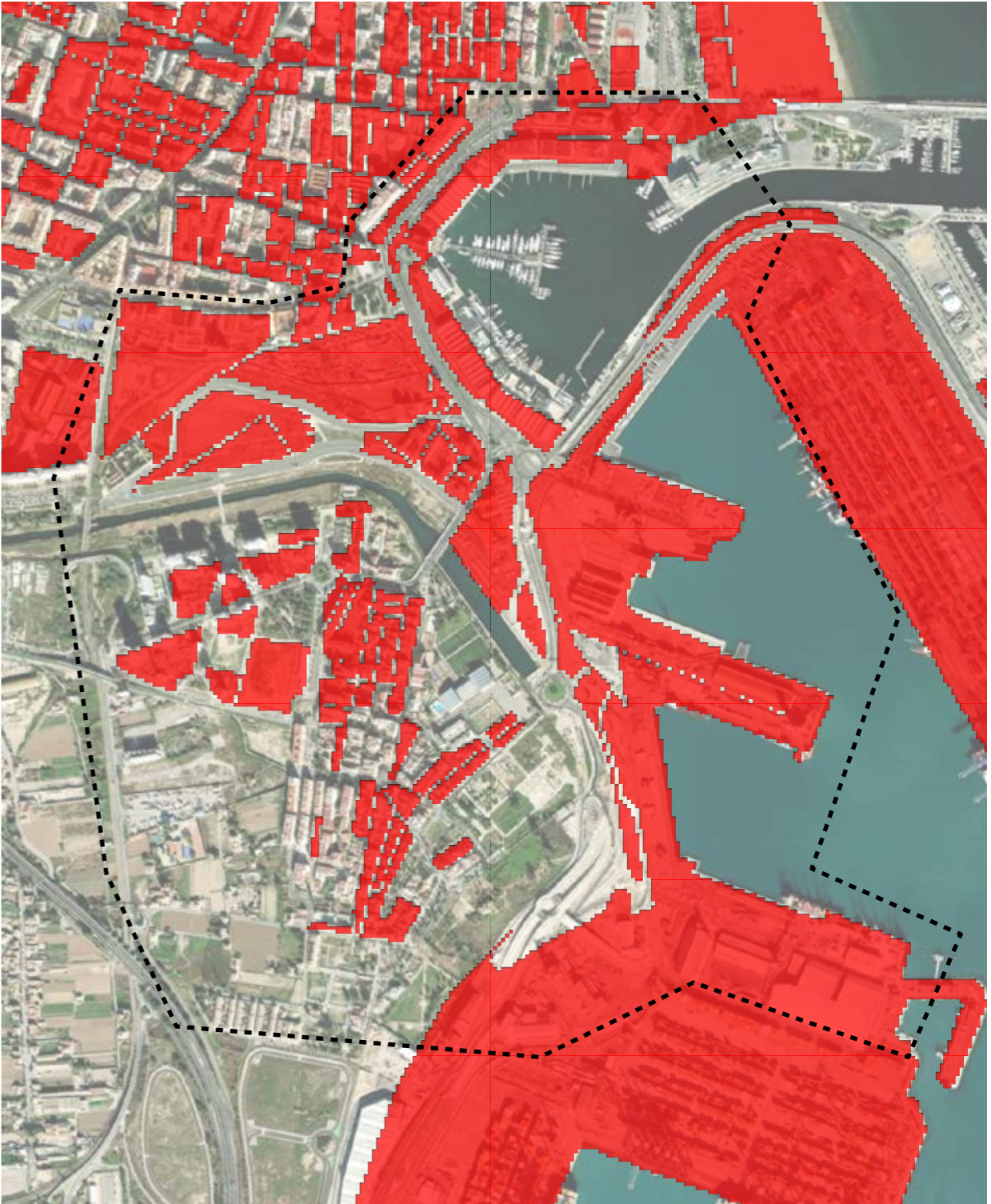


Weakness 2:
Sealed surfaces,
impermeability

**Main Pillar:
Increase Water
Management**

0,899 - 0,954
0,955 - 0,996

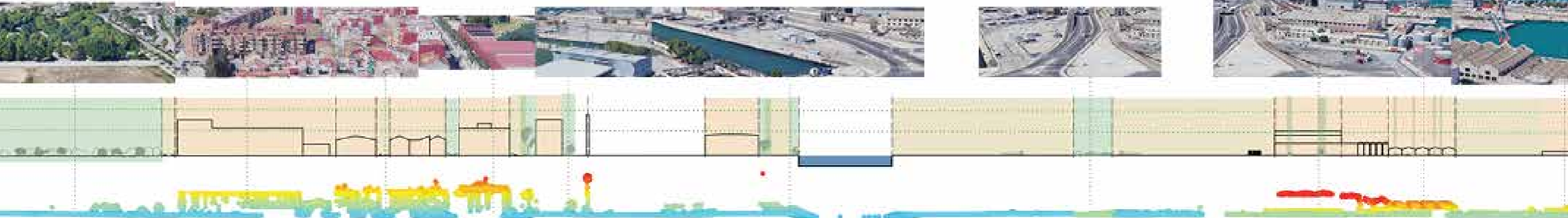
Rain water infiltration < 10%



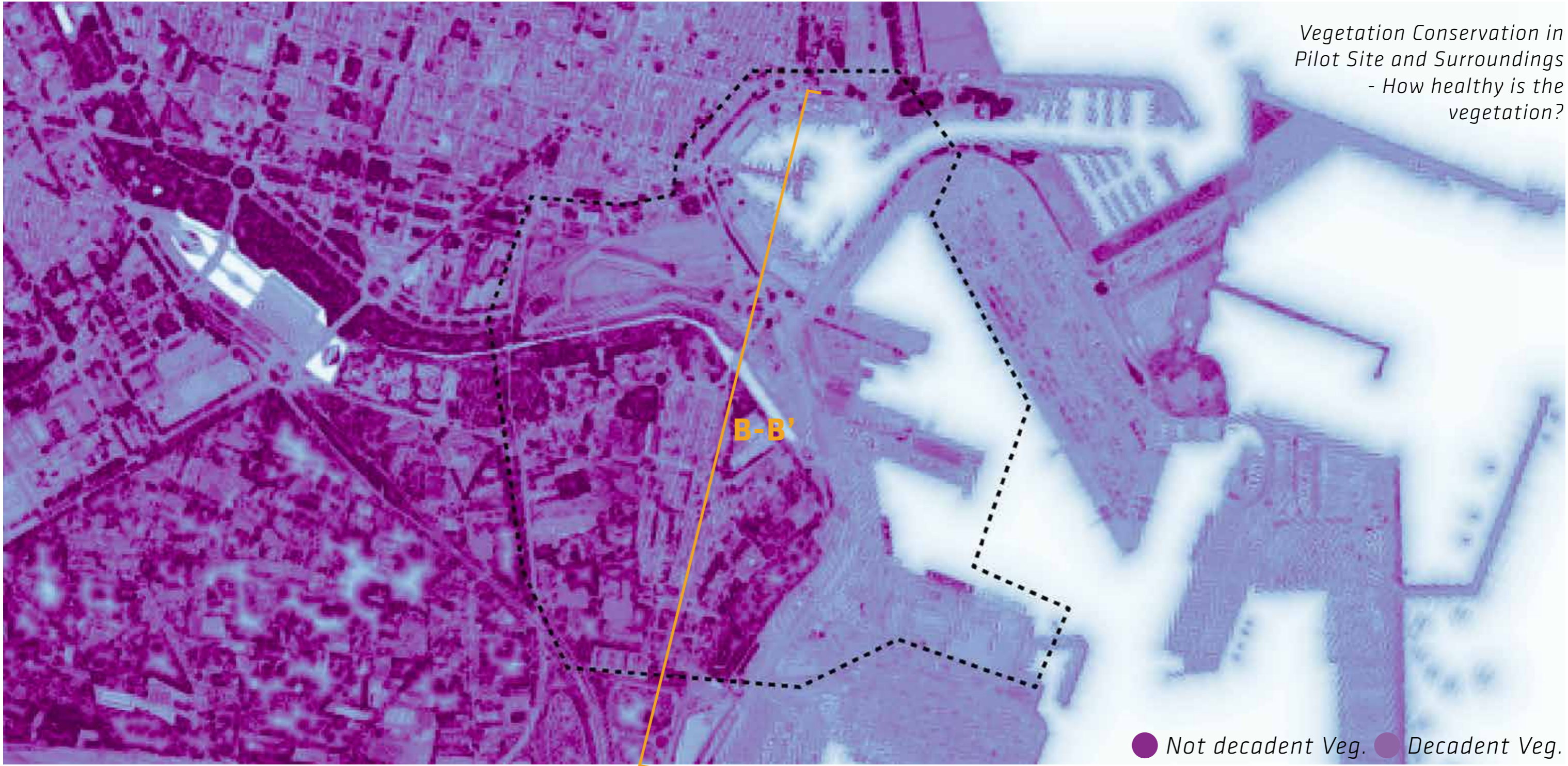
3. Pilot Site



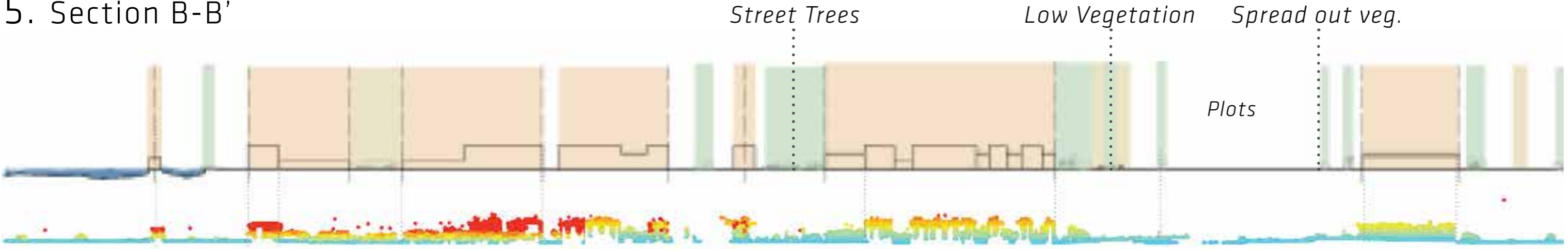
5. Section A-A'



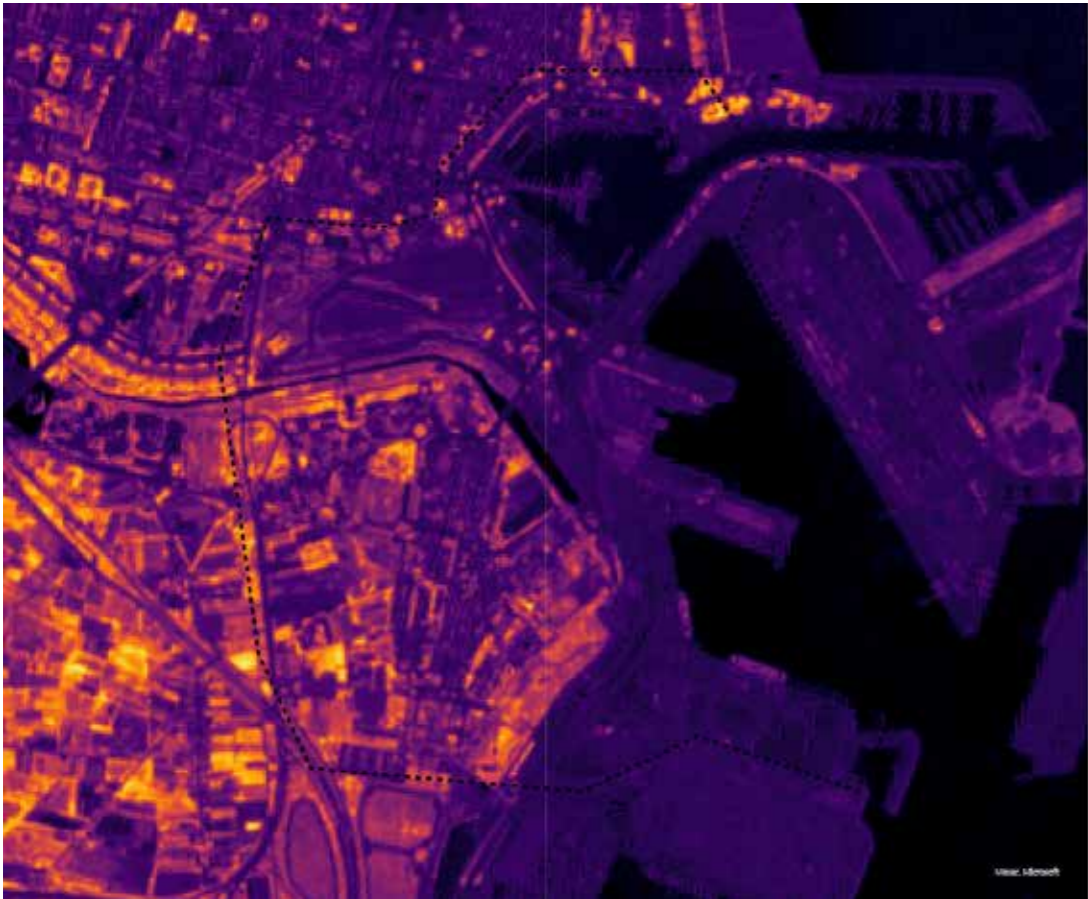
4. Biodiversity in Pilot Site



5. Section B-B'



6. Maps



Legend
 Site
 NDVI_Clip_T30SY2_
 Value
 0,604591
 -0,533198

Permeable Lands:
 Agricultural Lands
 Parks
 Small Concrete Surfaces
 (Concrete density is not so high)

Soil Quality Map (Moisture)

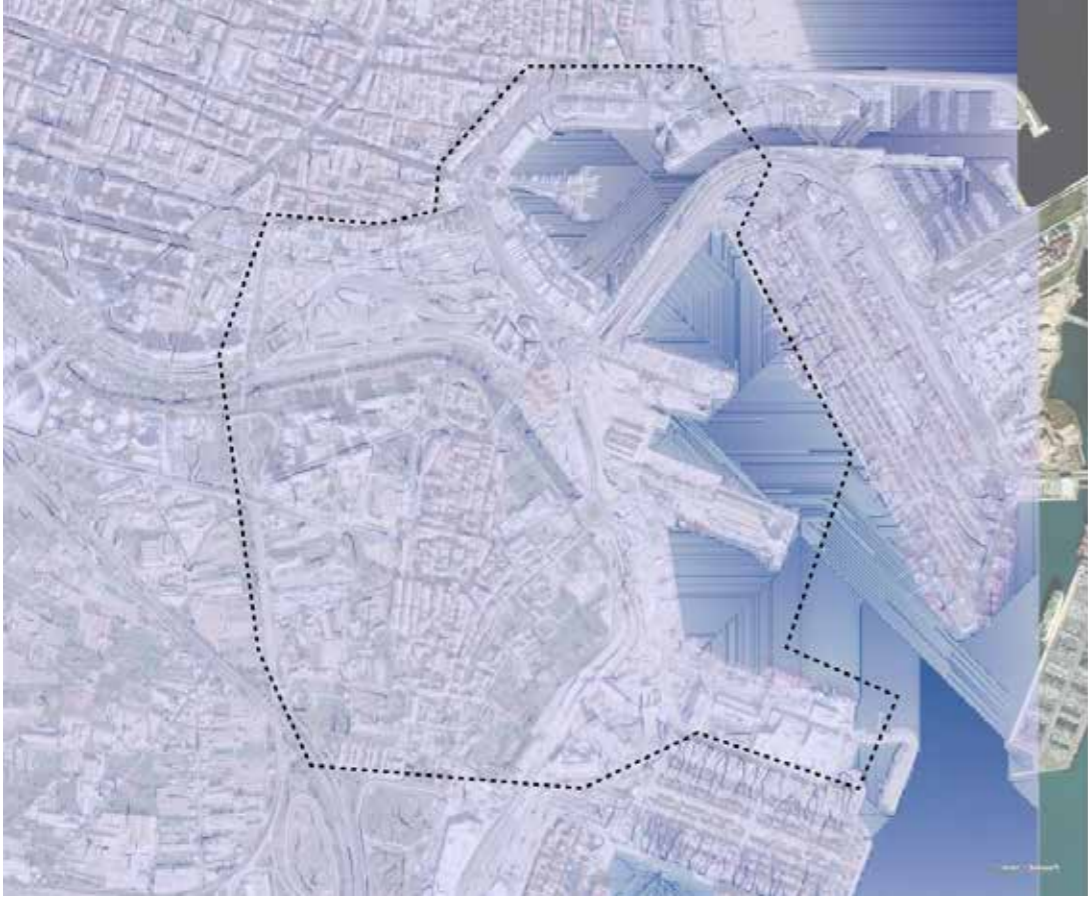


Legend
 ADM_GISARROLODO
 Site
 KernelID_ARBO1
 Value
 24796,6
 0

Tree Top Density
 In built neighborhoods
 through out the streets

Problem: Agricultural Lands
 have no trees.
 - No shade
 - No biodiversity
 - In Harbor Area: no wind
 protection
 - Generation of barrier
 - Propose Agroforestry

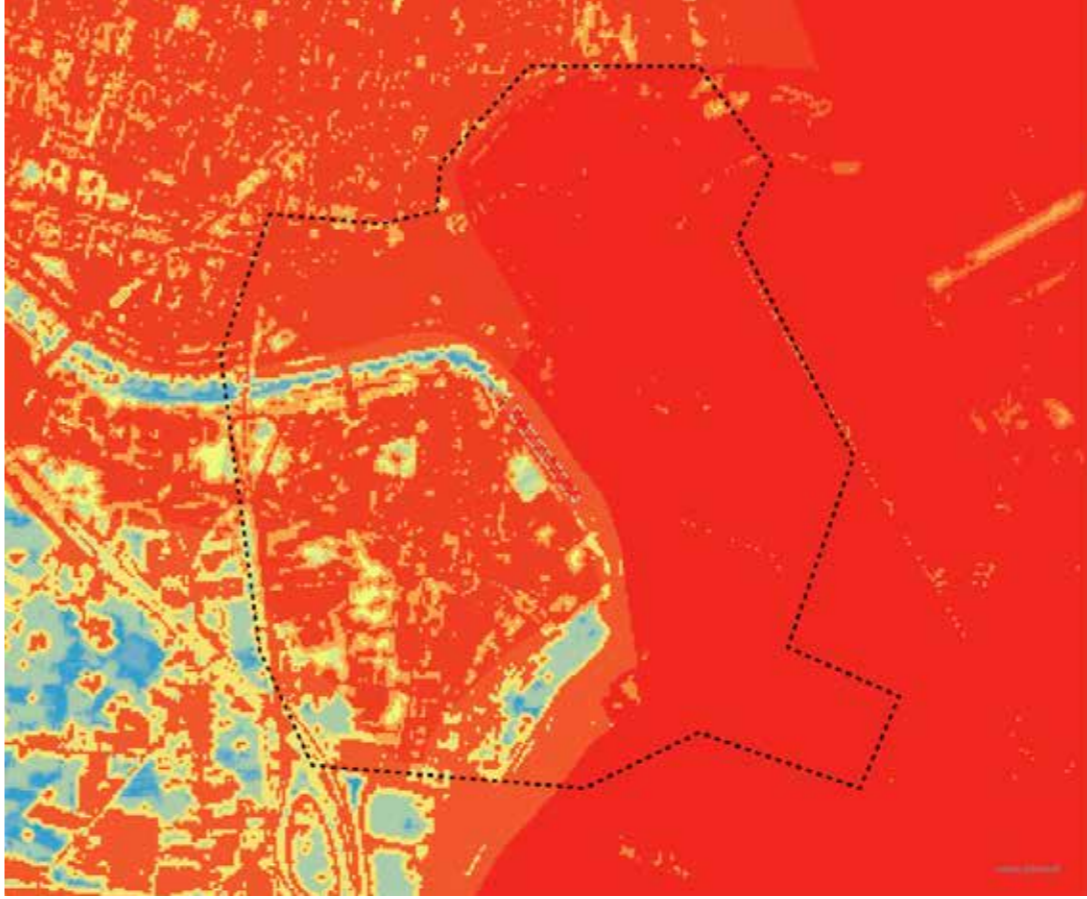
Tree Cover Density



Legend
 Site

Top Water Accumulation:
 Streets
 Canals
 Parks
 Plain Surfaces
 - Storage Surfaces in Dock
 - Concrete Surfaces

Water Flow Accumulation



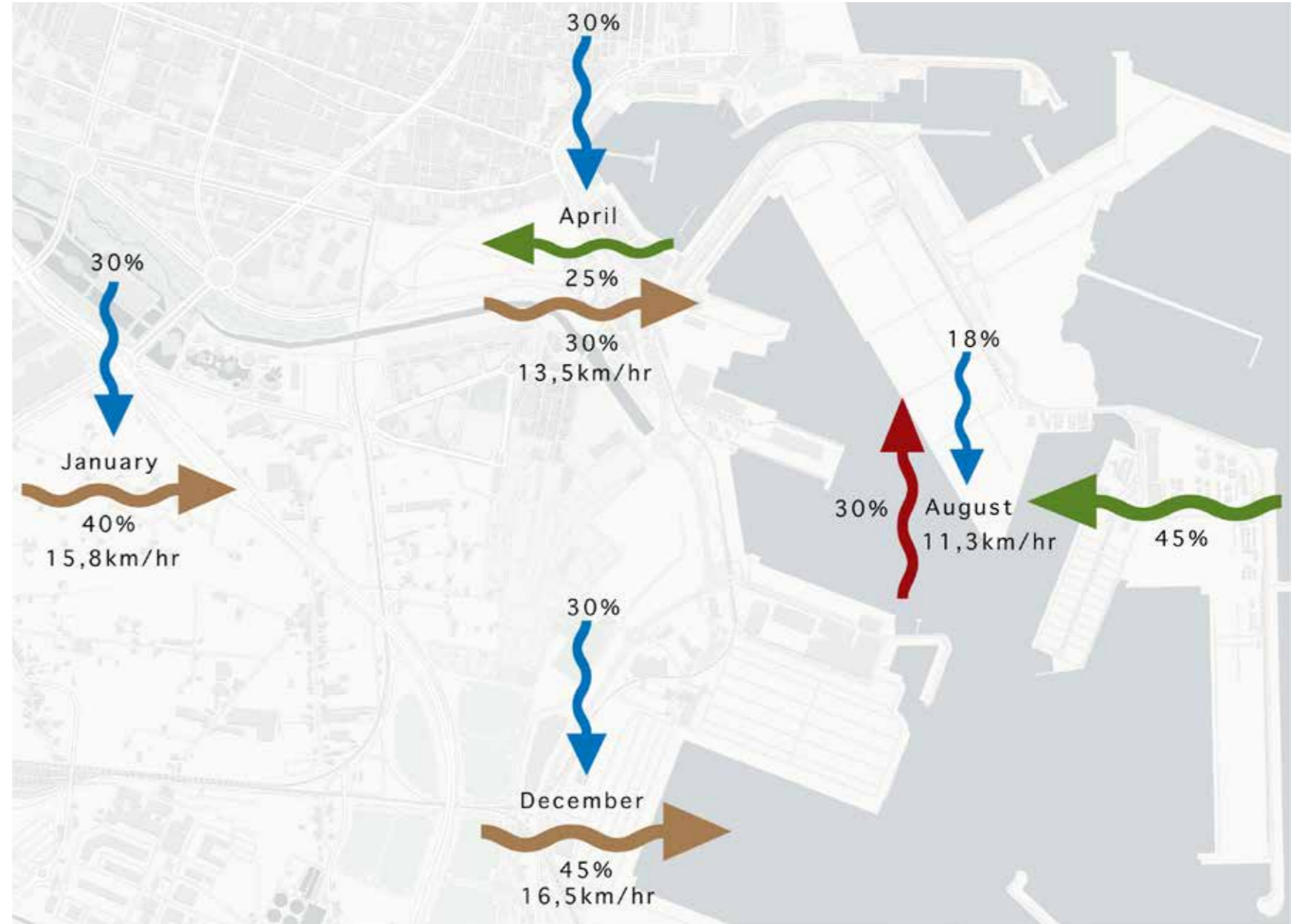
Legend
 Site
 runoff_ratio_1.tif_B
 Value
 0,1521

Water Runoff:
 Chance for flooding
 Opportunity for water
 recolection

Concrete Surfaces have a
 high water runoff index
 due to impermeability.

Water Runoff

6. Conditions



Moisture and Tree Cover Merged

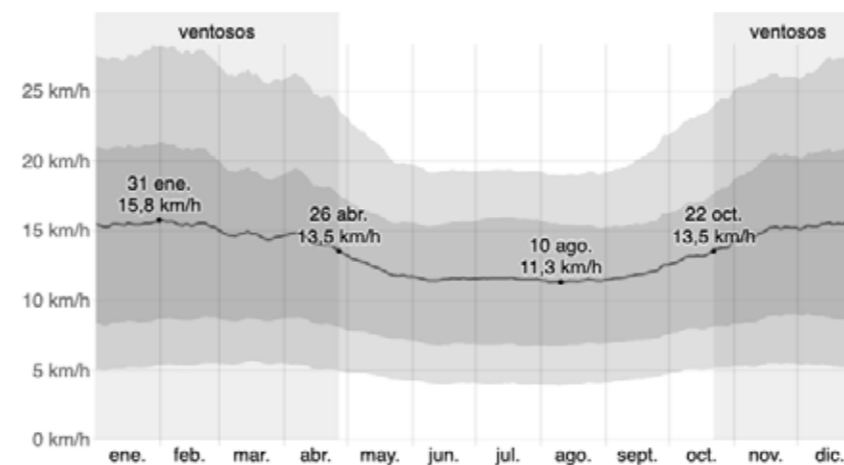
- Trees + Humidity
- Tree coverage
- Good conditions already -- to replicate

- Conditions for planting trees
- No tree coverage
- High humidity

- Low Moisture + Low Tree Coverage

- Tree coverage + low moisture
- Paved surfaces do not allow water retention
- Trees planted on sidewalks

Winds



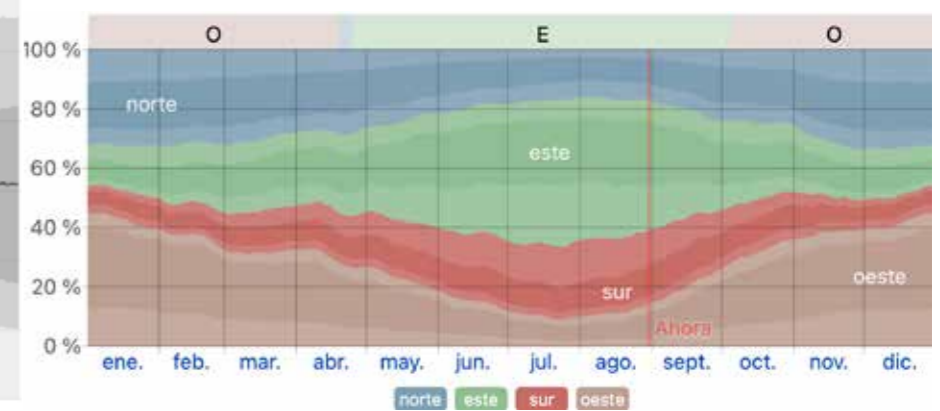
Average Winds during 2023

Windiest Months: January - April + November - December

Reference: Weather Spark

<https://es.weatherspark.com/y/42614/Clima-promedio-en-Valencia-Espa%C3%B1a-durante-todo-el-a%C3%B1o#Figures-WindSpeed>

● North ● South ● East ● West



Average Winds Direction in 2023

Predominant winds vary (mostly between Eastern and Western Winds)

8. Case Studies



Rotterdam, Netherlands

Green roof overseeing the city



Rotterdam, Netherlands

The roof extends by the use of bridges among buildings to generate connections



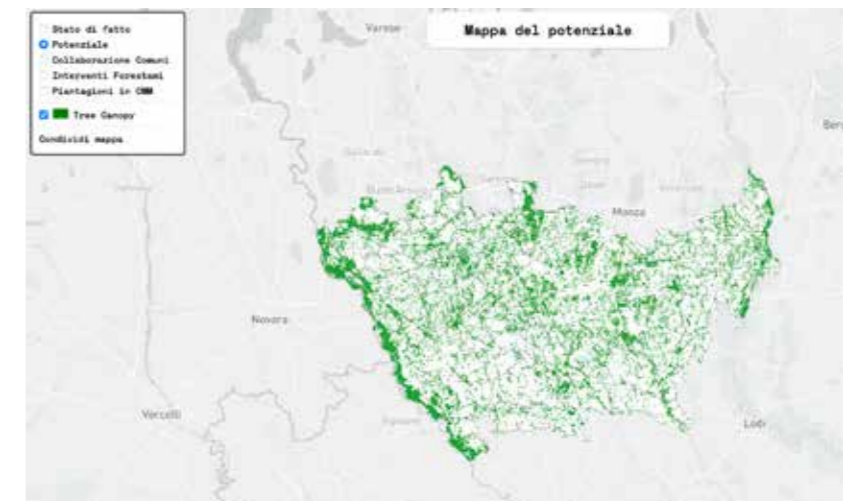
Rotterdam, Netherlands

Green Roof as part of architecture generating a linear park, integrated with the surrounding park as a whole



Milano, Italy. Forestami Project

Way to involve the community, bottom up initiative.



Potentiality Map for Reforestation

9. Toolbox for NBS

WEAKNESSES

DEFINED BASED ON ANALYSIS

- WATER RETENTION CAPACITY
- LACK OF BIODIVERSITY
- GI FRAGMENTATION
- AIR AND SOIL POLLUTION
- ACCESSIBILITY
- HEAT ISLAND EFFECT

SDG

SUSTAINABLE DEVELOPMENT GOALS

- **3** GOOD HEALTH AND WELL-BEING
- **11** SUSTAINABLE CITIES AND COMMUNITIES
- **13** CLIMATE ACTION
- **15** LIFE ON LAND

ES

ECOSYSTEM SERVICES

- RECREATION & WELLBEING
- POLINATION
- CLIMATE ADAPTATION
- AIR QUALITY REGULATION
- HABITAT PROVISION

NBS

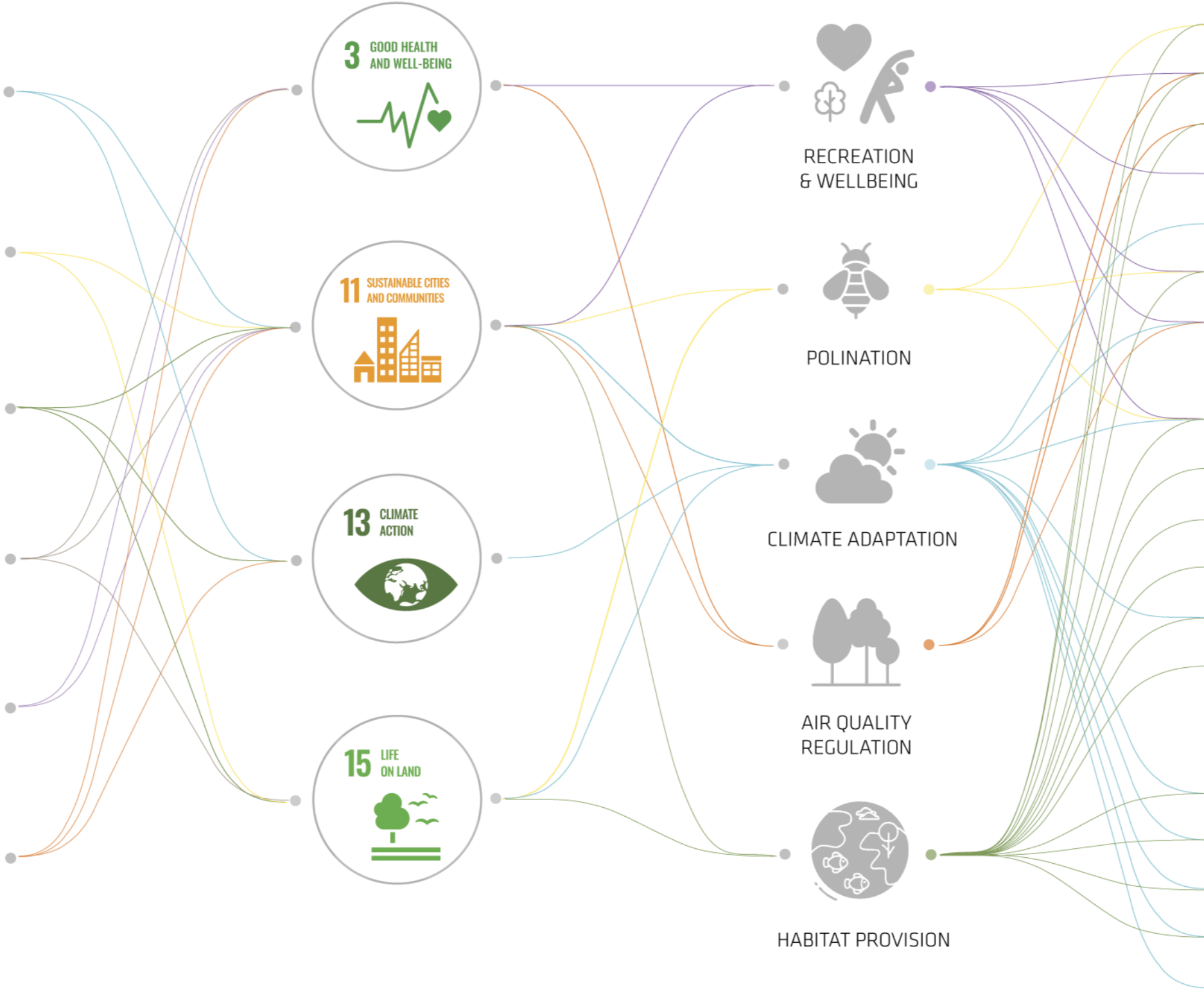
NATURE BASED SOLUTIONS

BIODIVERSITY

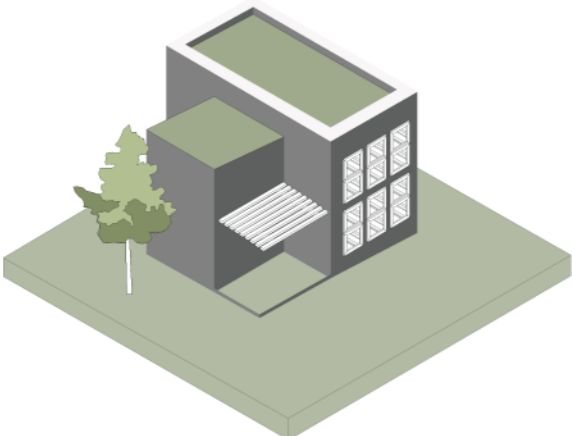
1. Facilities for birds and other fauna (pollinization)
2. Tree lined streets
3. Green barriers
4. Pocket green areas
5. Green roofs
6. Green roof gardens
7. Green facades
8. Riparian buffer
9. Agroforestry steppingstones
10. Rockpools
11. Bolt-on precast panels
12. Vertical pools
13. Green wall modules
14. Textured, grooved concrete surfaces

WATER MANAGEMENT

1. Infiltration strips
2. Wet biotopes
3. Rainwater run off ponds
4. Helophyte filters
5. Rain gardens



9. Toolbox for NBS - Building Scale Interventions



GREEN ROOF

Measure: Mitigation Adaptation

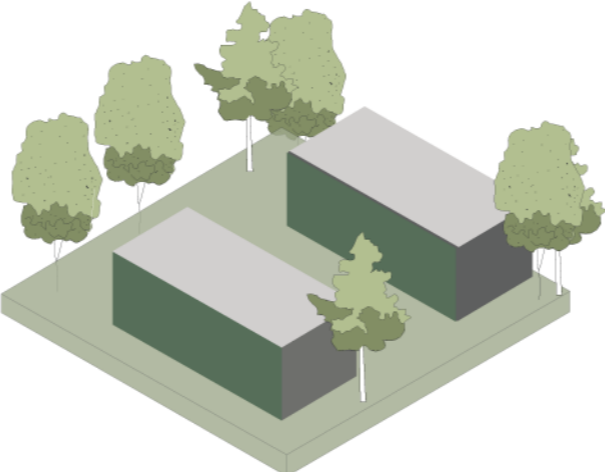
Efficacy: Immediate Medium-term

Infra: Energy | Blue | Green | Social | Housing

Main strategy: - Water Management
- Reduce Energy Consumption,
- Reduce Noise and Air Pollution,
- Increase Urban Biodiversity



Dimensional data: Retain 60-100% of the storm water



GREEN WALL MODULES

Measure: Mitigation Adaptation

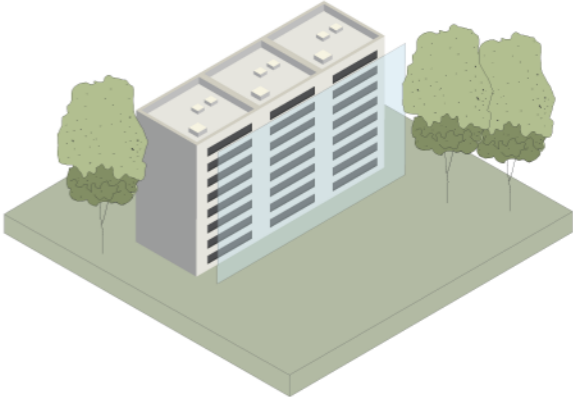
Efficacy: Immediate

Infra: Energy | Green

Main strategy: - Reduce Energy Consumption
- Urban Air Quality



Dimensional data: Case study 1263 sq m (more than 44,000 types of mosses and plants)



CLIMATE FACADE

Measure: Mitigation Adaptation

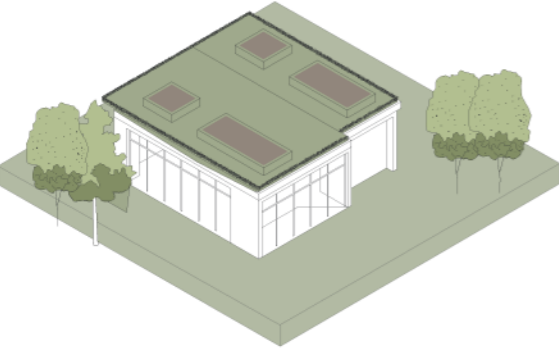
Efficacy: Immediate

Infra: Energy | Green

Main strategy: - Reduce Energy Consumption



Performance: 6.81 C in winter 8.79 C in summer



ROOFTOP GARDENS

Measure: Mitigation Adaptation

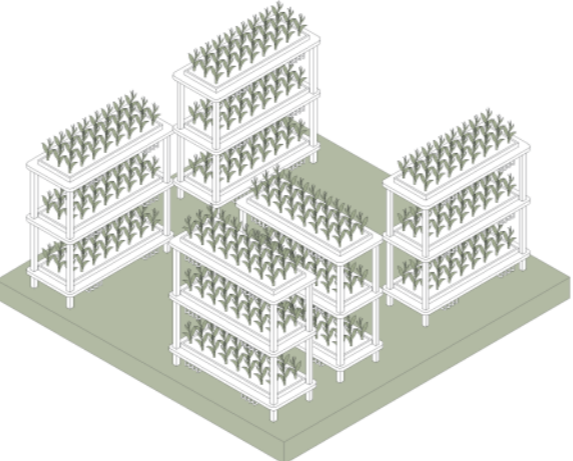
Efficacy: Immediate

Infra: Energy | Green | Blue | Social | Housing

Main strategy: - Urban Air Quality



Dimensional data: 20-40mm / 75-150mm depth, 60kg/ m² load



VERTICAL FARMING

Measure: Mitigation Adaptation

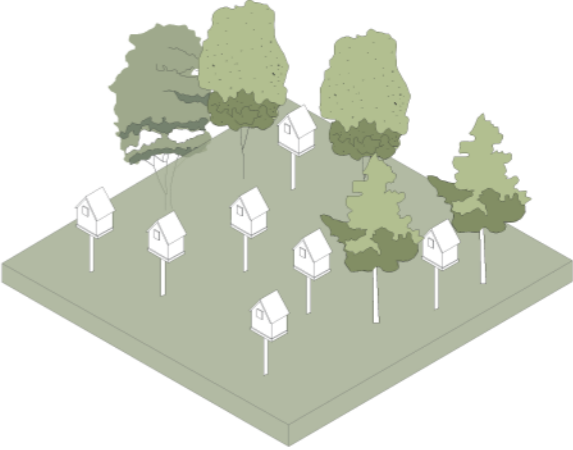
Efficacy: Immediate

Infra: Energy | Green | Social

Main strategy: - Food Security for Resilient Food Systems



Dimensional data:



FACILITIES FOR BIRDS AND FAUNA

Measure: Mitigation

Efficacy: Immediate Medium-term

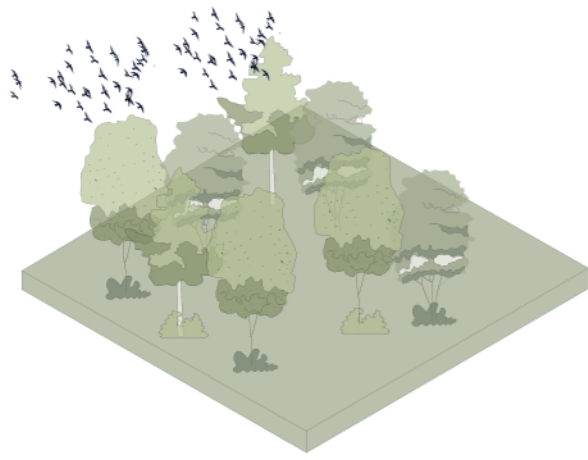
Infra: Green

Main strategy: - Natural Capital and Biodiversity



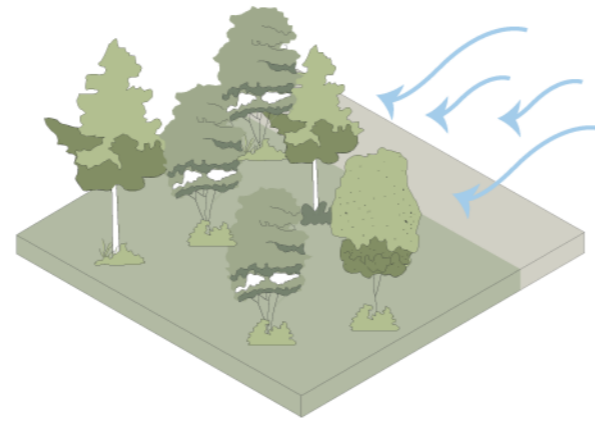
Dimensional data: Dependson the type and the amount of wildlife the intervention is aimed for

9. Toolbox for NBS - Urban Spaces Intervention



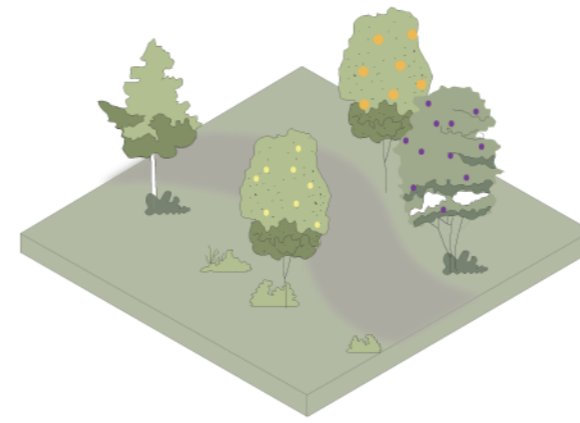
AGROFORESTRY

Measure: Adaptation
 Efficacy: Medium term
 Infra: **Energy | Green**
 Main strategy: - Ecological Corridor and Green Coverage
 - Energy from Biomass and Biogas
 Dimensional data: Up to 10,000 trees per ha. Around 1-2 ha covers energetic needs of a household. 50 ha needed for profitability



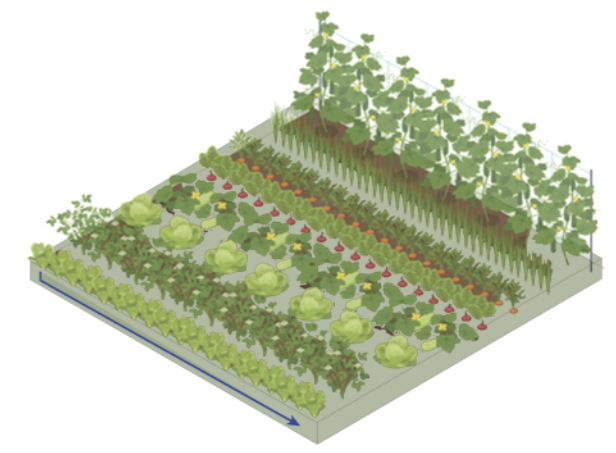
GREEN BARRIERS

Measure: Mitigation | Adaptation
 Efficacy: Medium term
 Infra: **Green | Social**
 Main strategy: - Reduce Noise and Air Pollution
 - Increase Urban Biodiversity
 Performance: Noise reduction up to 7 Db



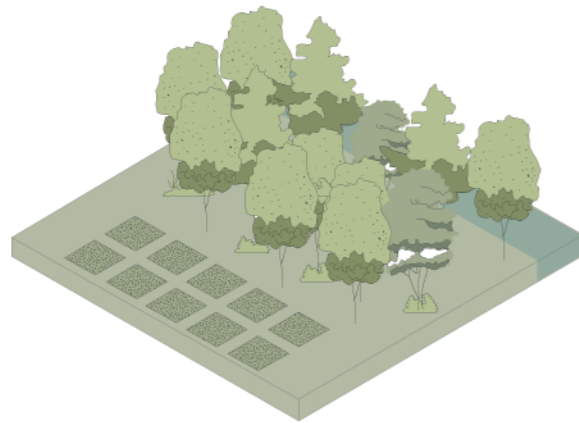
URBAN FRUIT TREES

Measure: Adaptation
 Efficacy: Medium term
 Infra: **Green | Social**
 Main strategy: - Urban Environment Quality
 - Support Urban Biodiversity
 Costs: € 15 per tree + maintenance



COMMUNITY GARDENS

Measure: Adaptation
 Efficacy: Immediate
 Infra: **Green | Social | Blue**
 Main strategy: - Land Consumption Prevention
 - Increase Urban Biodiversity
 Dimensional data: Average size: 125 sq m



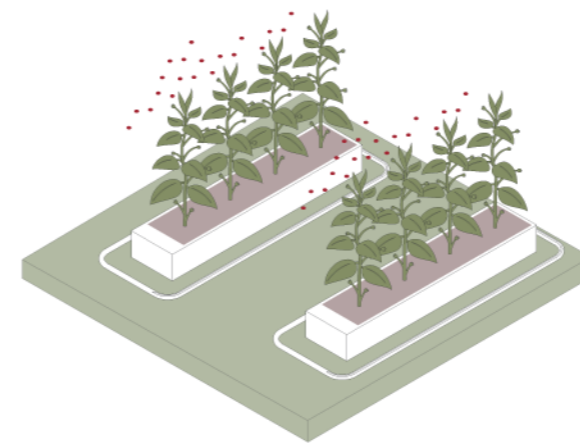
RIPARIAN BUFFERS

Measure: Mitigation
 Efficacy: Medium term
 Infra: **Green | Blue**
 Main strategy: - Buffer to pollutants entering a stream from runoff
 - Provides habitat and nutrient input into the stream



ISLANDS OF COOLNESS

Measure: Adaptation
 Efficacy: Medium term
 Infra: **Green | Social**
 Main strategy: - Efficient Water Management
 Dimensional data:



SOIL PHYTO REMEDIATION

Measure: Mitigation
 Efficacy: Medium term
 Infra: **Green | Blue**
 Main strategy: - Soil Improvement
 - Reuse of Brown Fields
 Costs: 5000-125000 US\$ /ha (site preparation, planting and harvesting)

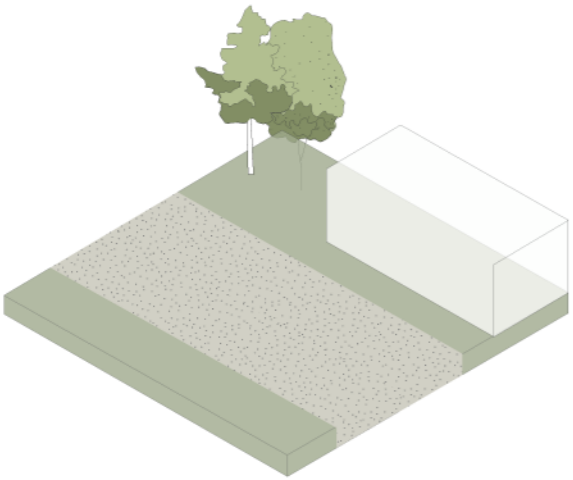


TREE LINED STREETS

Measure: Adaptation, Mitigation
 Efficacy: Medium term
 Infra: **Green | Social | Energy**
 Main strategy: - Urban Air Quality
 Dimensional data: Av. tree at 20-25m can store 3,660kg of CO2 in 20 years and capture pollutants

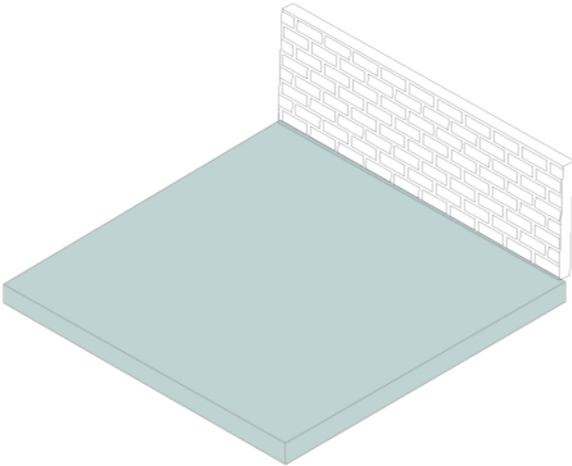


9. Toolbox for NBS - Water Bodies and Drainage System



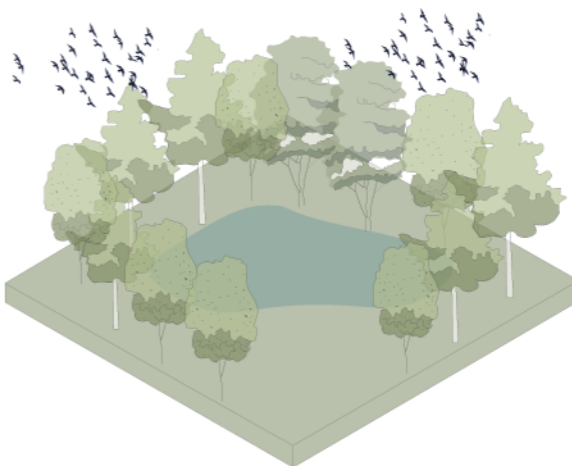
POROUS PAVING

Measure: Adaptation
 Efficacy: Immediate
 Infra: Blue | Green
 Main strategy: - Efficient Water Management



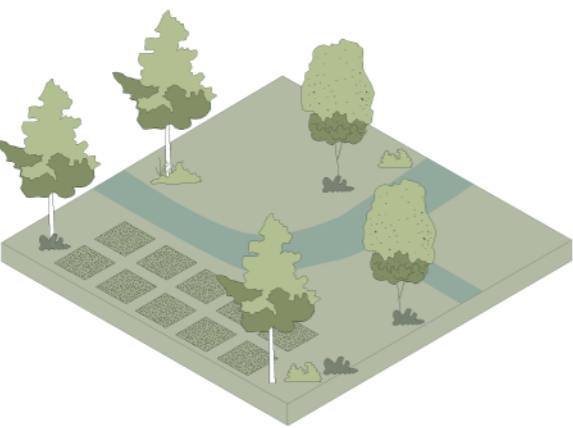
GROOVED BIODIVERSITY PANELS

Measure: Mitigation Adaptation
 Efficacy: Immediate
 Infra: Green
 Main strategy: - Increase Ecosystem Biodiversity



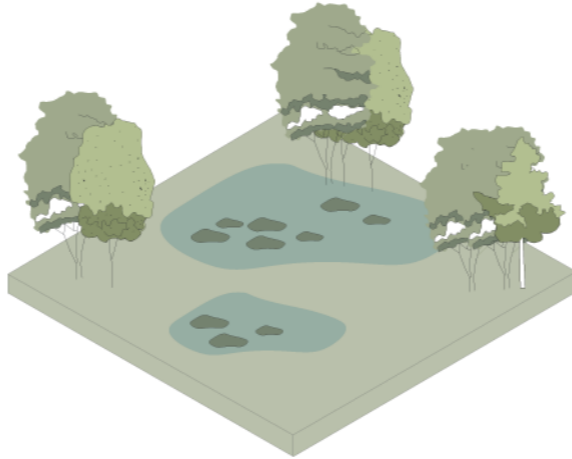
HELOPHYTE FILTERS

Measure: Adaptation
 Efficacy: Immediate
 Infra: Green | Blue
 Main strategy: - Efficient Water Management
 Dimensional data: 2.5-5 m2/IE, depth: 100cm - vertical, 80cm - horizontal



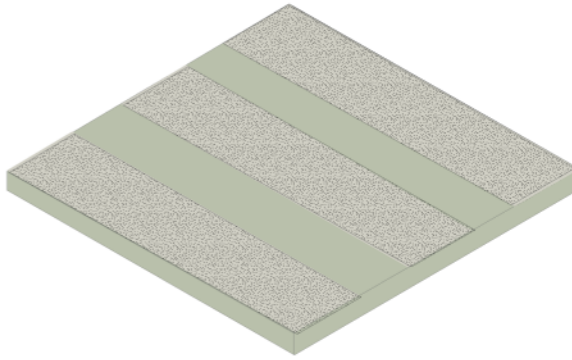
REGREENING OF WATER CANALS

Measure: Mitigation Adaptation
 Efficacy: Immediate
 Infra: Energy | Green | Blue | Social
 Main strategy: - Urban Air Quality
 Dimensional data: 20-40mm / 75-150mm depth, 60kg/ m² load



RAINWATER RUN-OFF PONDS

Measure: Mitigation Adaptation
 Efficacy: Immediate Medium term
 Infra: Green | Blue
 Main strategy: - Efficient Water Management
 Dimensional data: 10%-20% of the connected surface area,

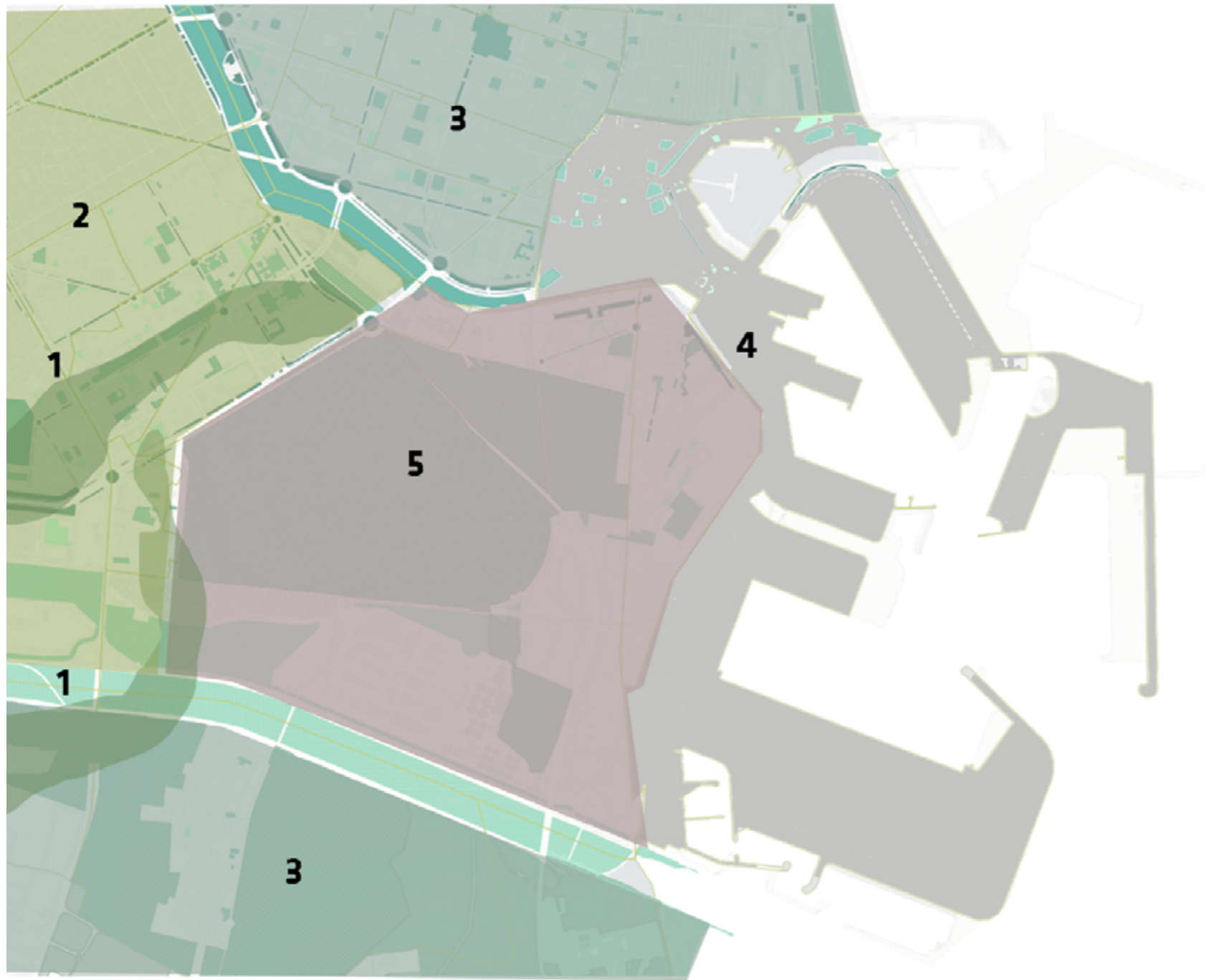


INFILTRATION STRIPS

Measure: Adaptation
 Efficacy: Immediate
 Infra: Green | Blue
 Main strategy: - Drainage Management
 - Filtration

9. Toolbox for NBS - Applications in Focus Areas

NBS



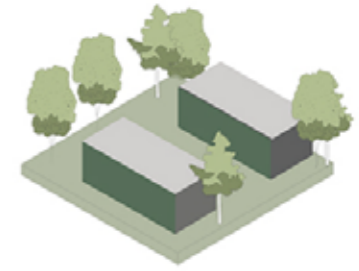
1) Green Areas Fragmentation



GREEN ROOF



ROOFTOP GARDEN



GREEN WALL MODULES

2) Loss of agricultural land



AGROFORESTRY



URBAN FRUIT TREES

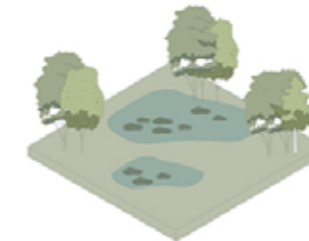


GREEN BARRIERS

3) Lack of continuity of irrigated landscapes of the coastal region



POROUS PAVING

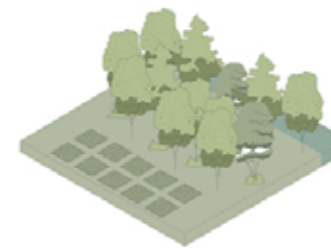


RAINWATER RUN-OFF PONDS



HELOPHYTE FILTERS

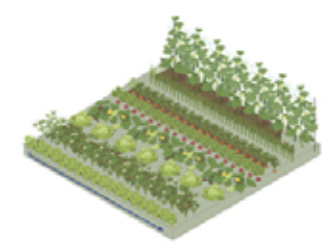
4) Sealed surfaces impermeability



RIPARIAN BUFFERS



SOIL PHYTO REMEDIATION



COMMUNITY GARDEN

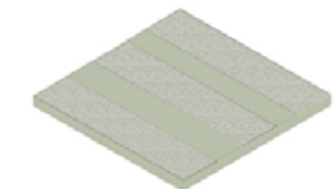
5) Water Flow Accumulation



REGREENING OF WATER CANALS



ISLANDS OF COOLNESS



INFILTRATION STRIPS

BIODIVERSITY

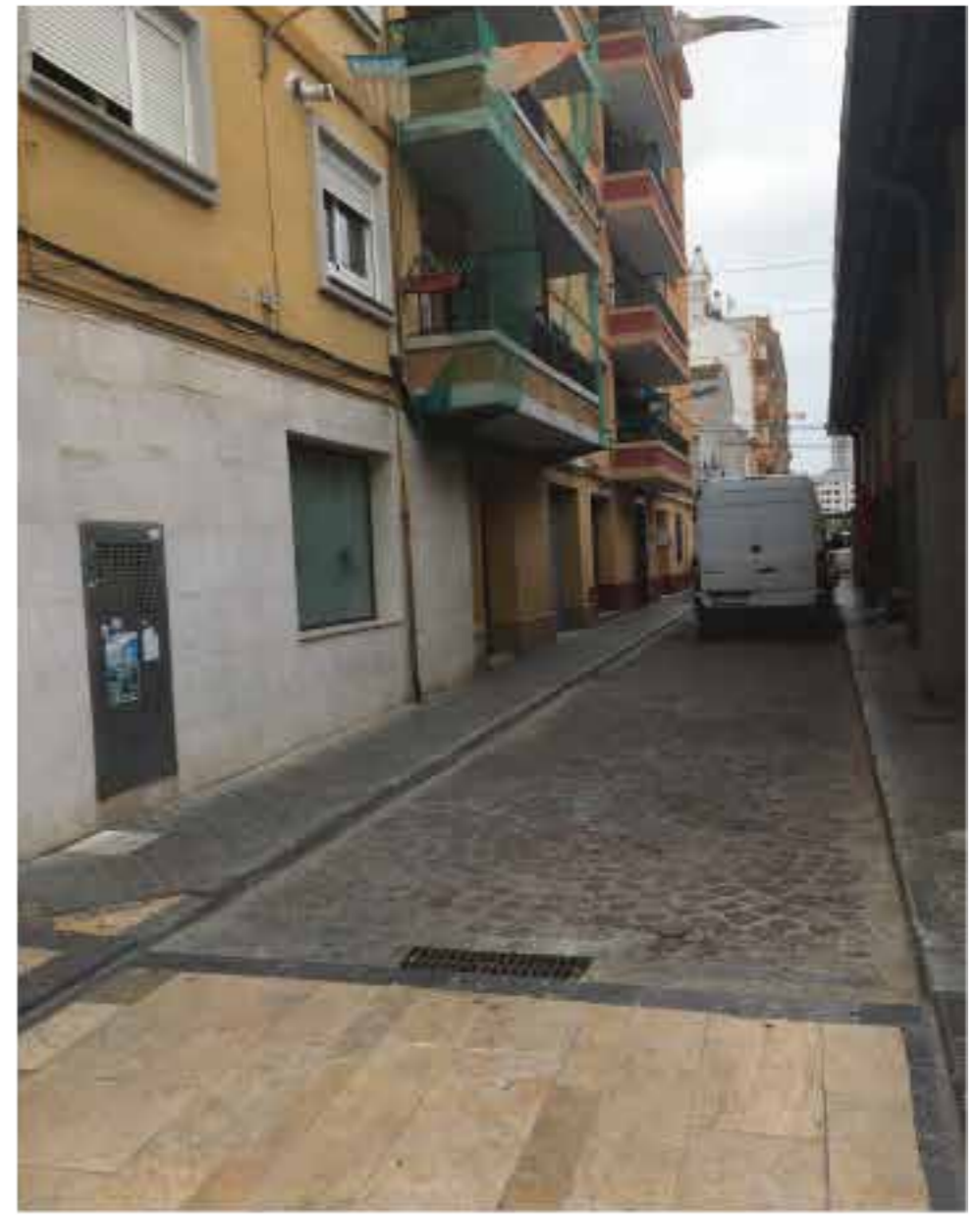
- 1) Green Areas Fragmentation
- 2) Loss of agricultural land
- 3) Lack of continuity of irrigated landscapes of the coastal region

WATER MANAGEMENT

- 4) Sealed surfaces impermeability
- 5) Water Flow Accumulation

Impervious surfaces in public space





Potential for NBS



9. Toolbox for NBS - Species Suggestions for Mediterranean Situation

GROUND COVER - GRASS



cynodon dactylon



poa spp.



festuca spp.



trifolium subterraneum



BRUSHES



cistus spp.



rosmarinus officinalis



thymus spp.



lavandula angustifolia



TREES



platanus orientalis



populus spp.







quercus spp.



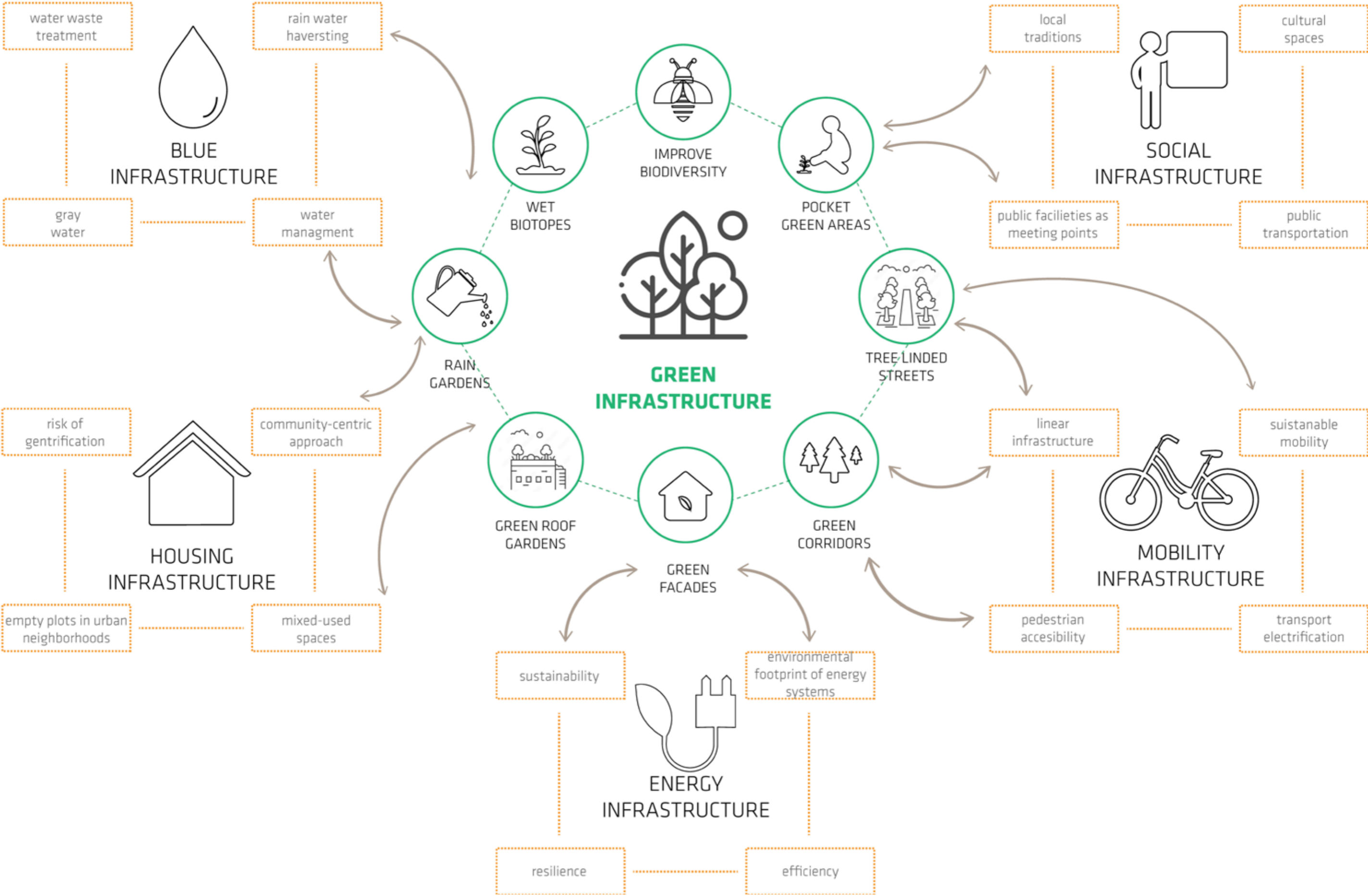
olea europaea



LEGEND

-  entomophilous characteristics
-  contaminat particle capturer
-  nitrogen cycling contributor
-  soil erosion stabilizer

10. Synergic Infrastructures



General impressions of the site visit



Potential of the pilot area

