Re-treat;

creating a regional framework for the future of Semarang

strengthening sustainability with strategies balancing
urban development, population increase, climate change and ecology

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4932811

MSc Landscape Architecture
Shared Heritage Lab

SEMARANG

area: 373.7 km2

population: 1,454,594 (1.41% annual increase)

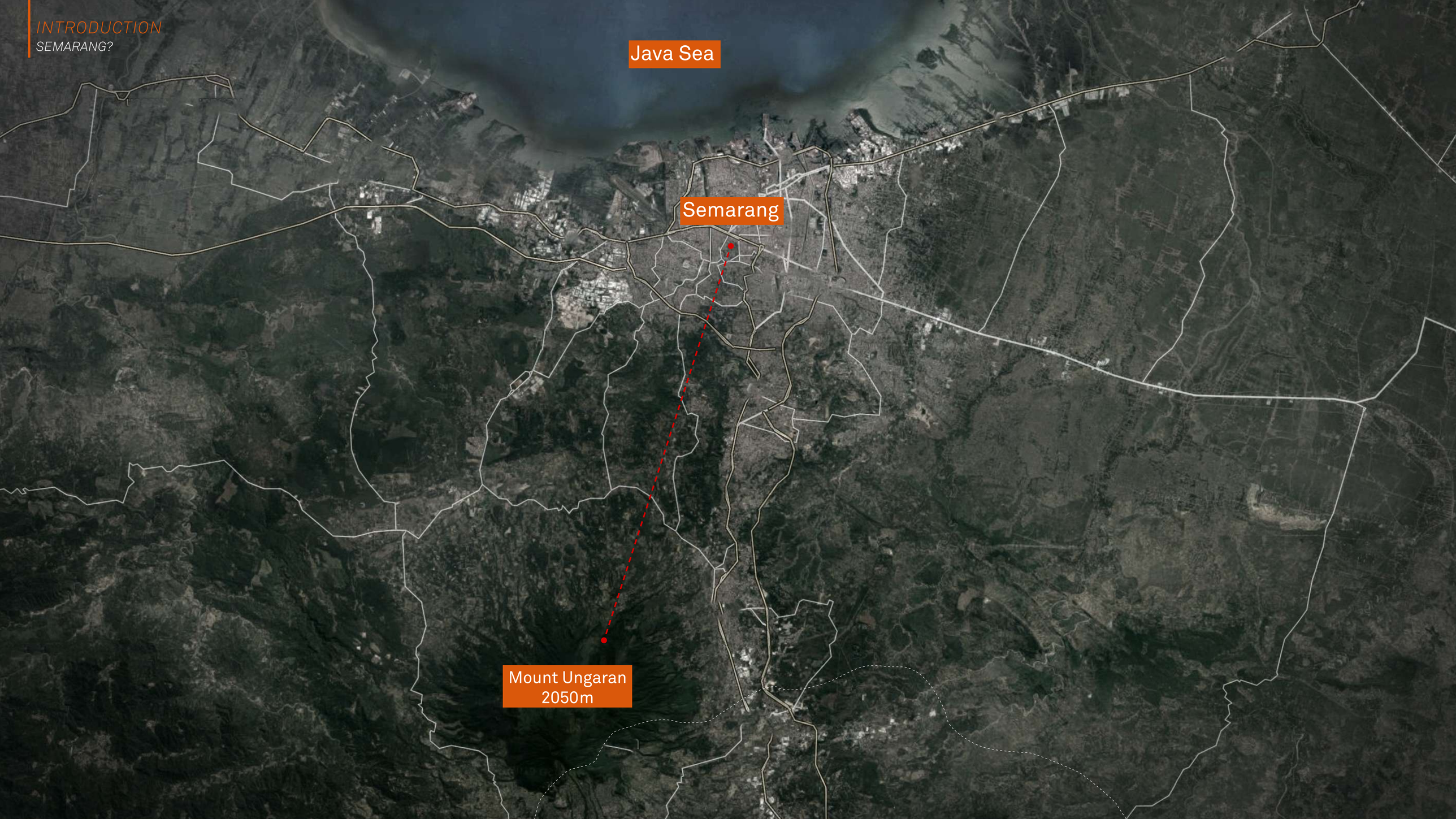
precipitation: 2183mm - 2215mm (December to January)

temperature: 25 C - 30 C

humidity: 60% - 80%

Kota Lama

area: 0.31 km2
- UNESCO World Heritage listed
- 'old town' of Semarang
- historical / cultural significance
- tourist attraction

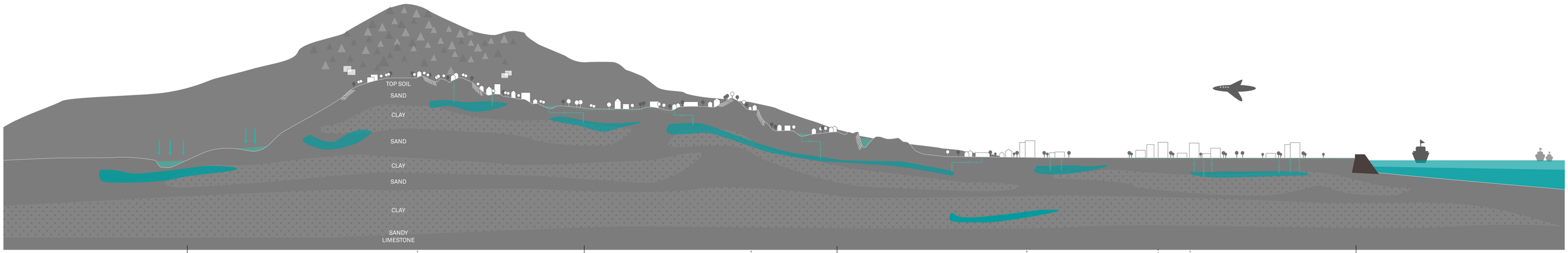

Java Sea
Semarang
Mount Ungaran
2050m

UPLANDS
66% of the area
(5 ~ 345m)

LOWLANDS
33% of the area
(0.75 ~ 5m)

COASTAL PLAINS
1% of the area
(0 ~ 0.75m)

Java Sea



VOLCANIC ROCKS
- volcanic breccias
- lava flows
- tuffaceous sandstone and clay stone

Landslides
Groundwater overexploitation

MEDITERRANEAN SOIL
- high internal drainage
- netural pH

Low water retention
Low ecological value

GRUMUSOL / LATOSOL
- can support very rich vegetation
- very permeable

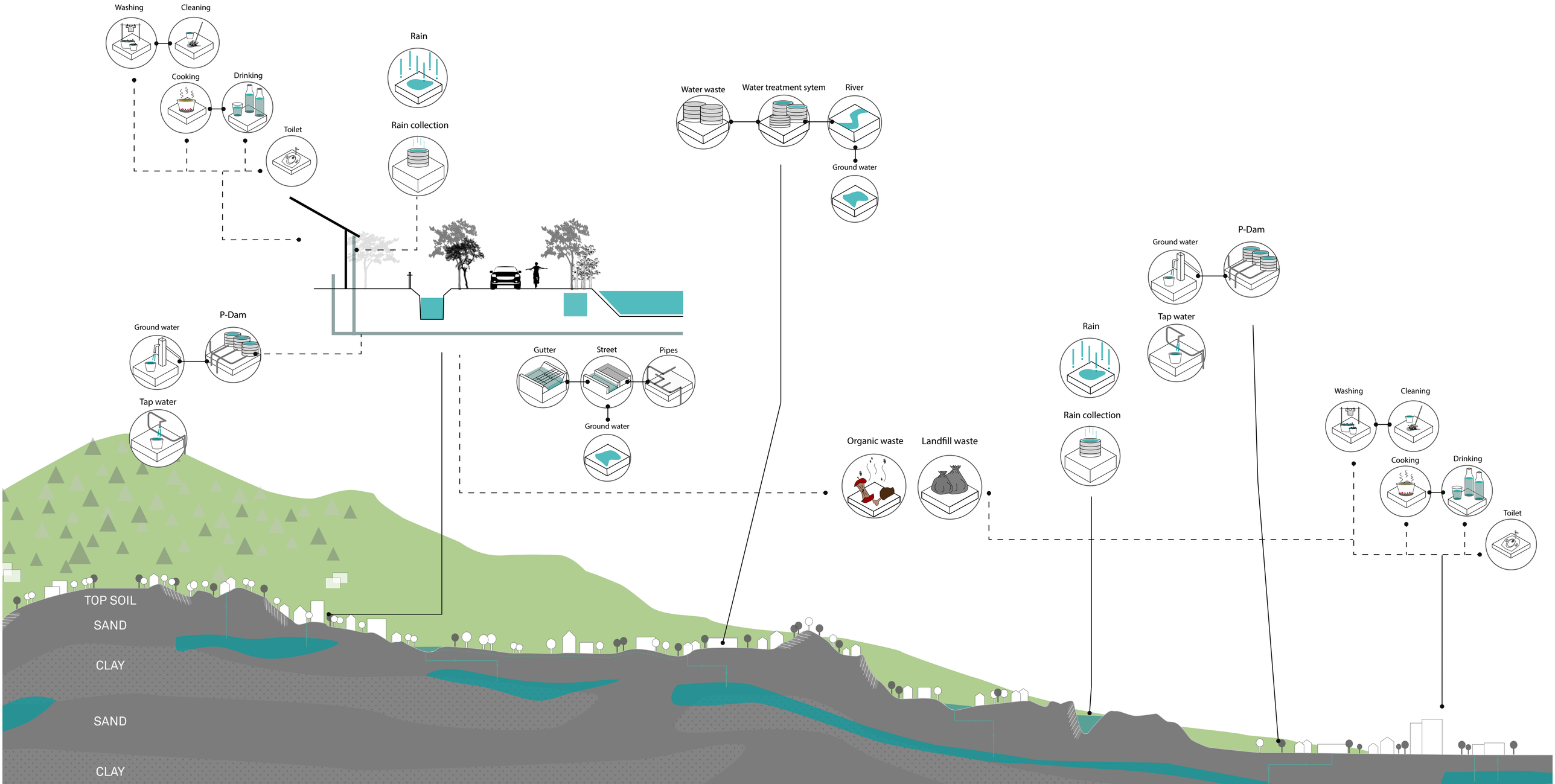
Canal disconnection
No natural infiltration
Low social value

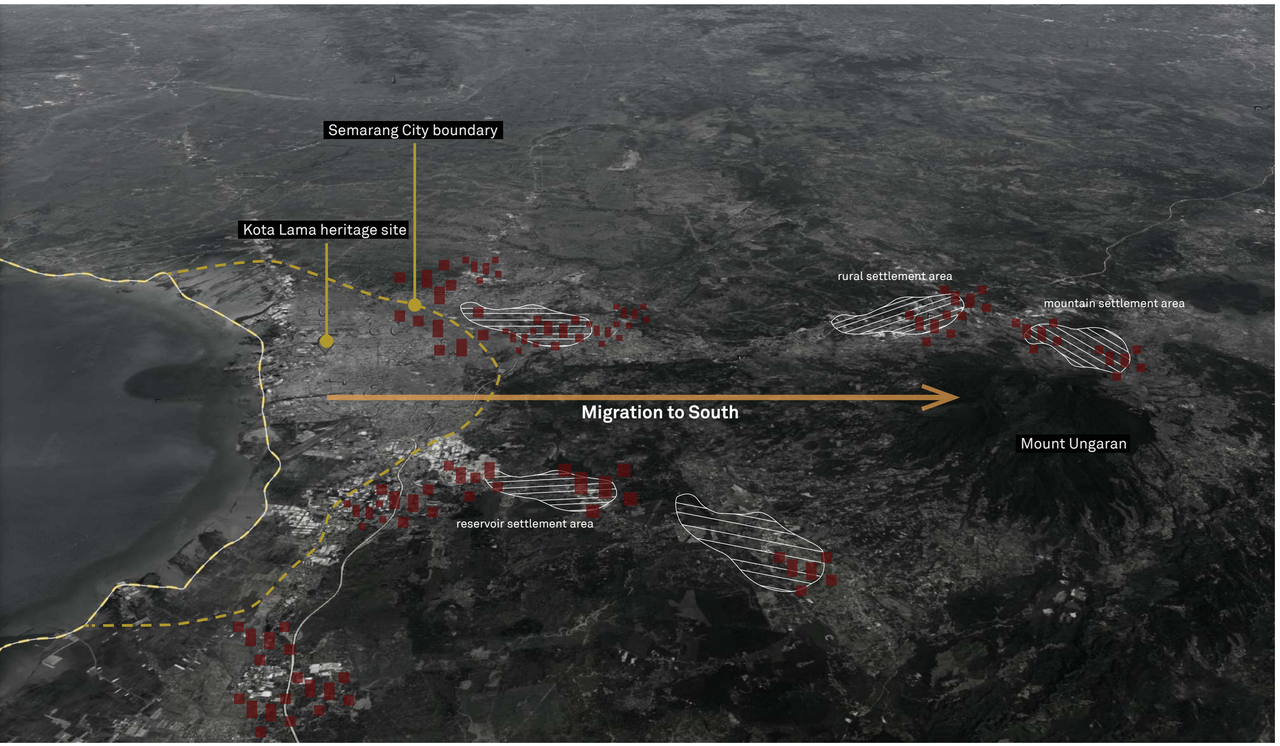
Ground water over exploitation

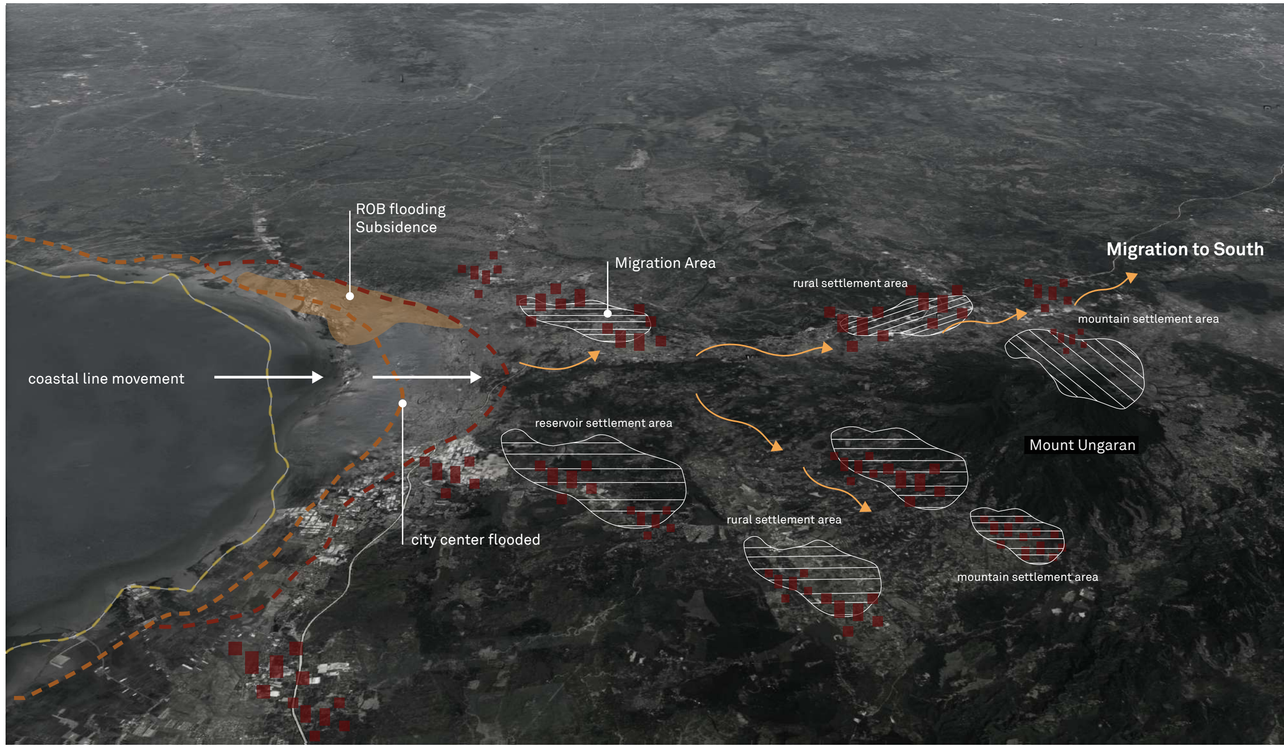
Ground water over exploitation
Depleted aquifer
Land subsidence

ALLUVIAL / FLUVIAL CLAY
- from sedimentation plains / flood plains
- usually flat gradient
- good drainage
- good for agriculture
- great for fish culture

0 1 KM


Washing
Cleaning
Cooking
Drinking
Toilet
Rain
Rain collection
Water waste
Water treatment sytem
River
Ground water
P-Dam
Ground water
Tap water
Gutter
Street
Pipes
Ground water
Organic waste
Landfill waste
Rain
Rain collection
P-Dam
Ground water
Tap water
Washing
Cleaning
Cooking
Drinking
Toilet
TOP SOIL
SAND
CLAY
SAND
CLAY


N
Semarang City boundary
Kota Lama heritage site
rural settlement area
mountain settlement area
Migration to South
Mount Ungaran
reservoir settlement area


N
ROB flooding
Subsidence
Migration Area
rural settlement area
Migration to South
mountain settlement area
coastal line movement
reservoir settlement area
Mount Ungaran
city center flooded
rural settlement area
mountain settlement area

River

Water source damaged

Reservoir source

Uncontrolled rural development
near water sources

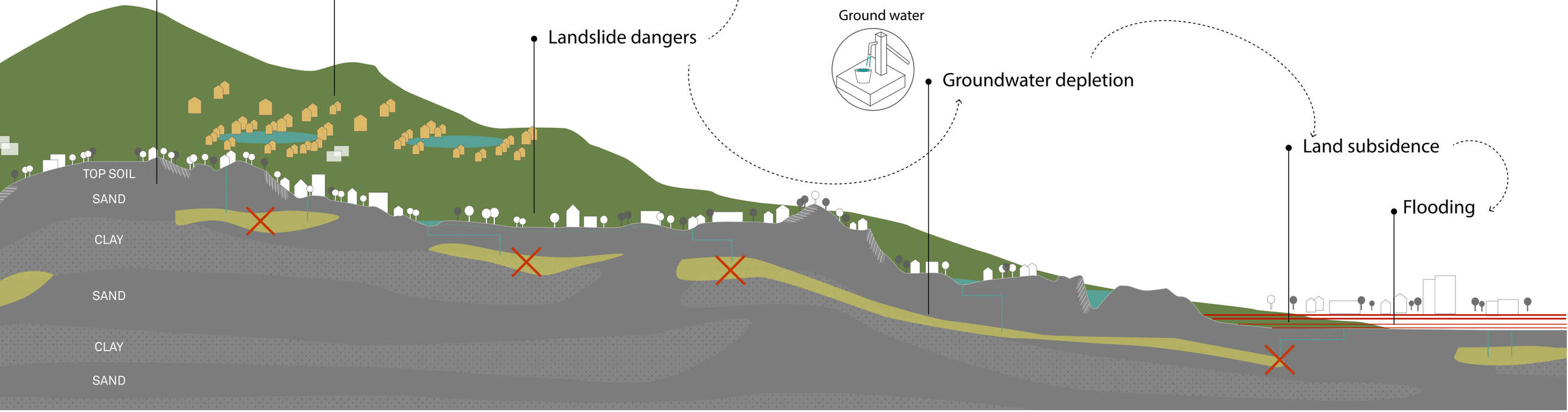
Landslide dangers

Ground water

Groundwater depletion

Land subsidence

Flooding



PROBLEM STATEMENT

Local inhabitants migrate South where there is fresh water and no danger of flooding or landslides.

As seen by the migration patterns of the inhabitants of Semarang,
fresh water availability plays a crucial role in urban development patterns.

Thus, urbanization is guided where fresh water is available
and this development pattern without a master plan is hazardous for the future.

EDUCATION

WATER POLLUTION

to prepare for the future

WATER

HEALTH ISSUES

FUTURE

We are not running away,
we are creating a new framework
that works WITH nature not AGAINST it

It is a FRAMEWORK

A NEW FRAMEWORK

Problem Statement:

Local inhabitants migrate South where there is fresh water and no danger of flooding or landslides.

As seen by the migration patterns of the inhabitants of Semarang,
fresh water availability plays a crucial role in urban development patterns.

Thus, urbanization is guided where fresh water is available and tthis development pattern without a master plan is hazardous for the future.

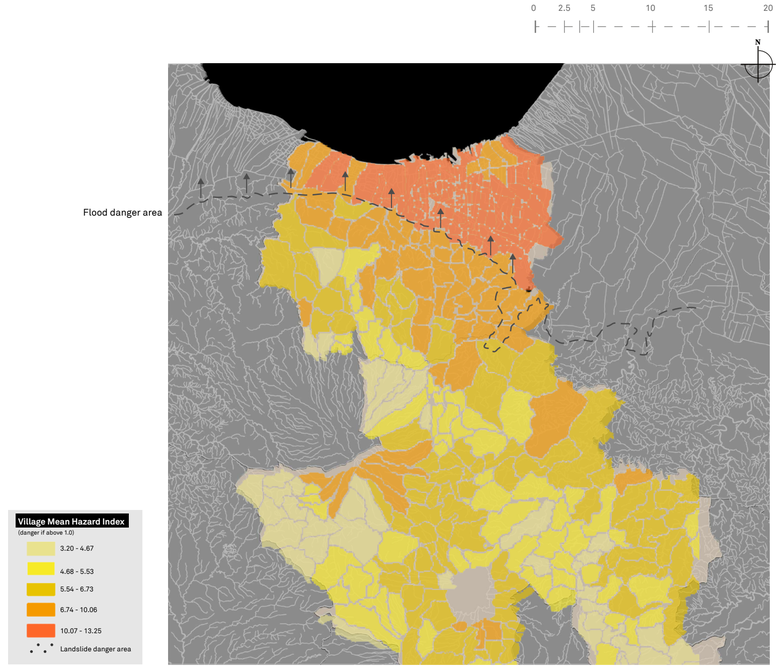
Research Question

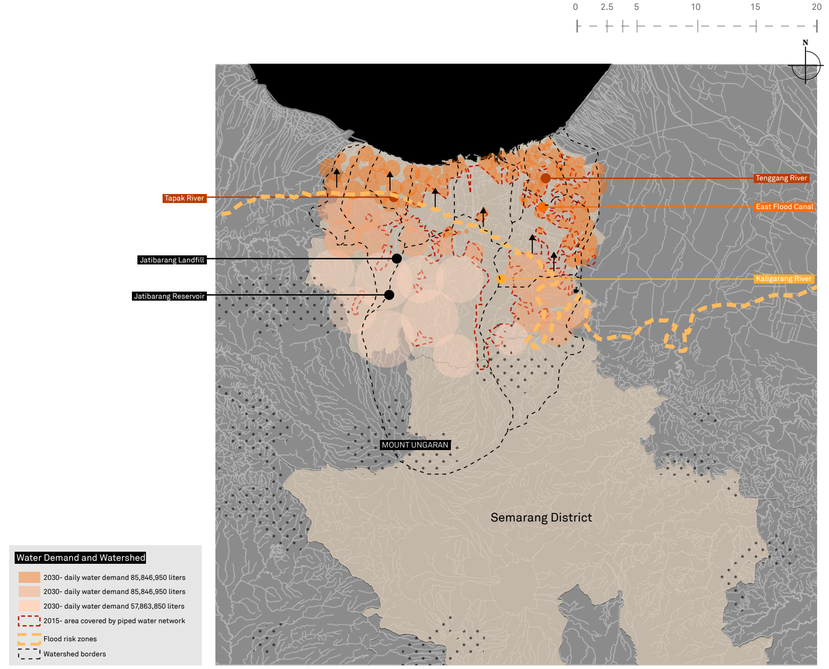
What is a spatial **framework** to **guide urbanization Southwards**

- while providing a sustainable method of water resource usage,
- as well as keeping biodiversity intact
- and also offering a good living environment?

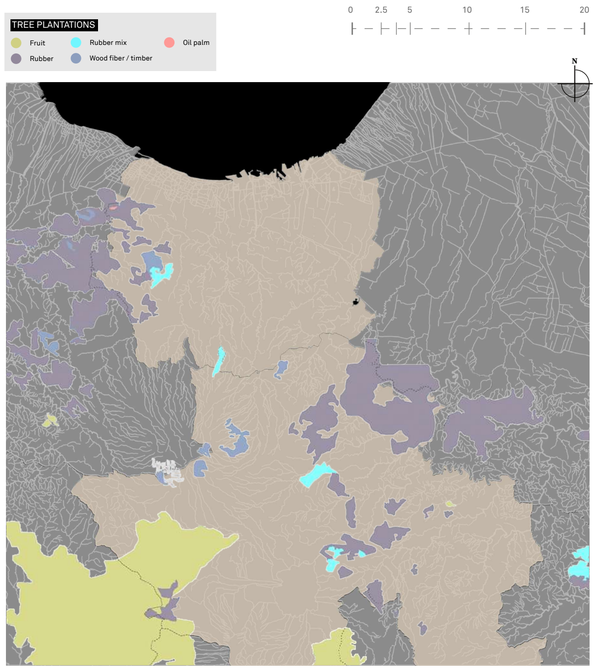
ANALYSIS
S-W-O-T

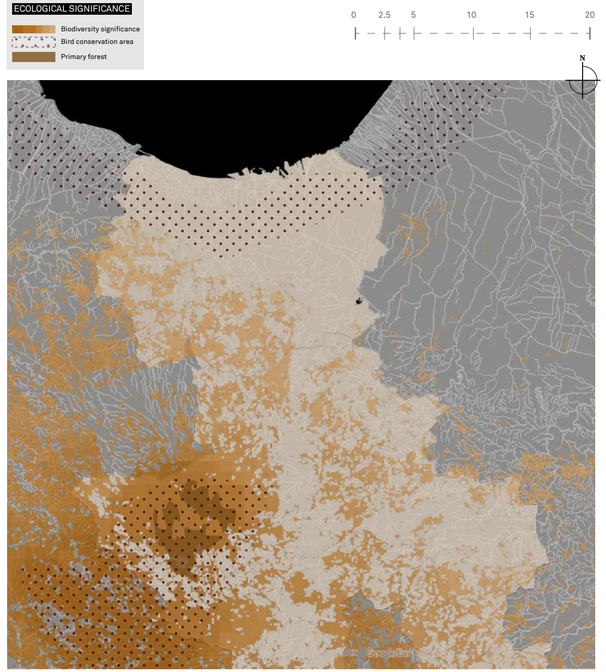
CHALLENGES

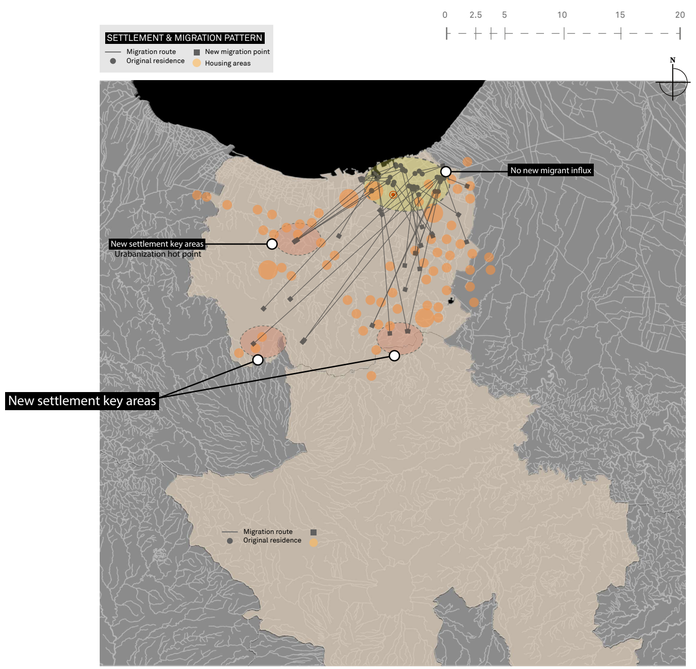




OPPORTUNITES



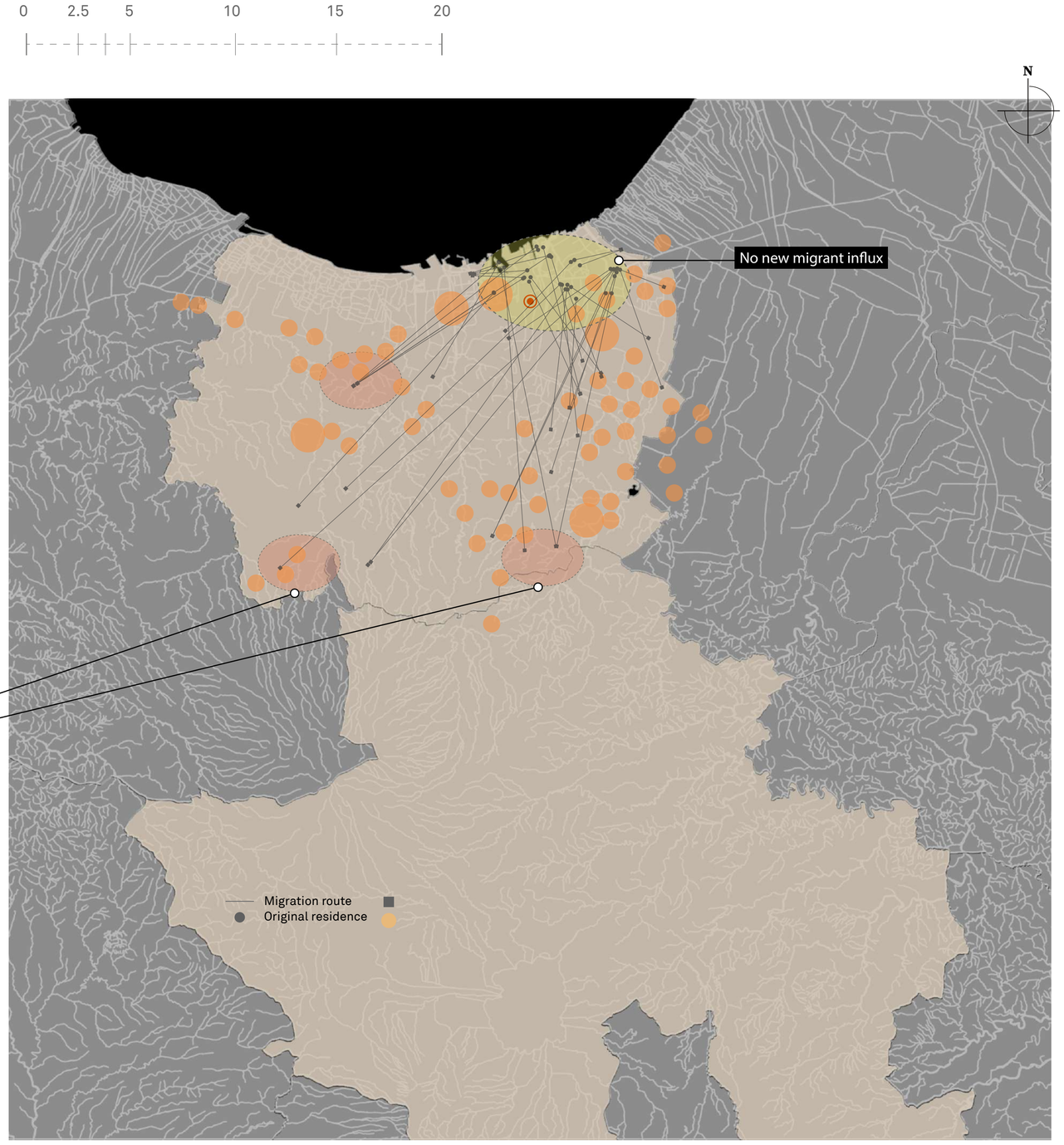




ORIGINAL RESIDENTIAL AREA

MIGRATION PATTTERN

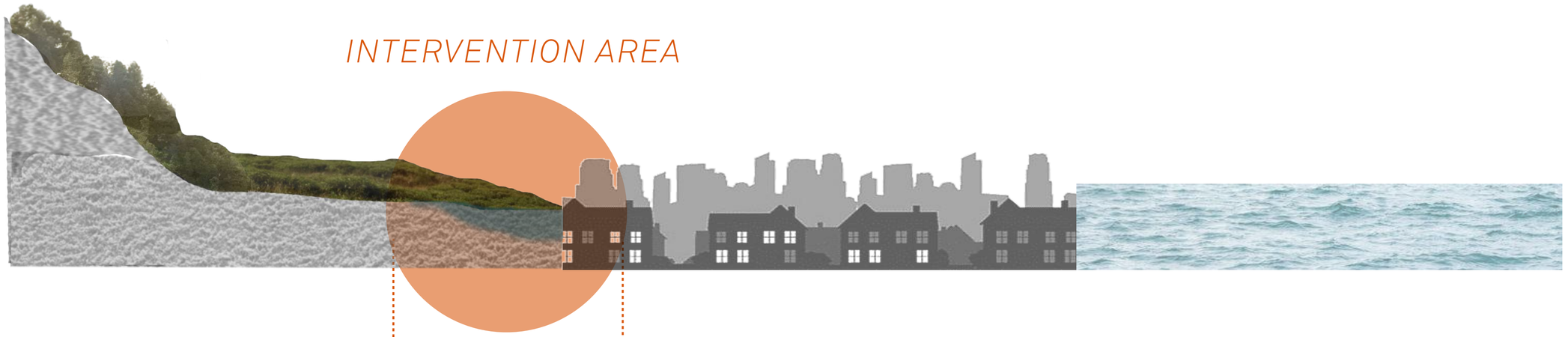
New settlement key areas



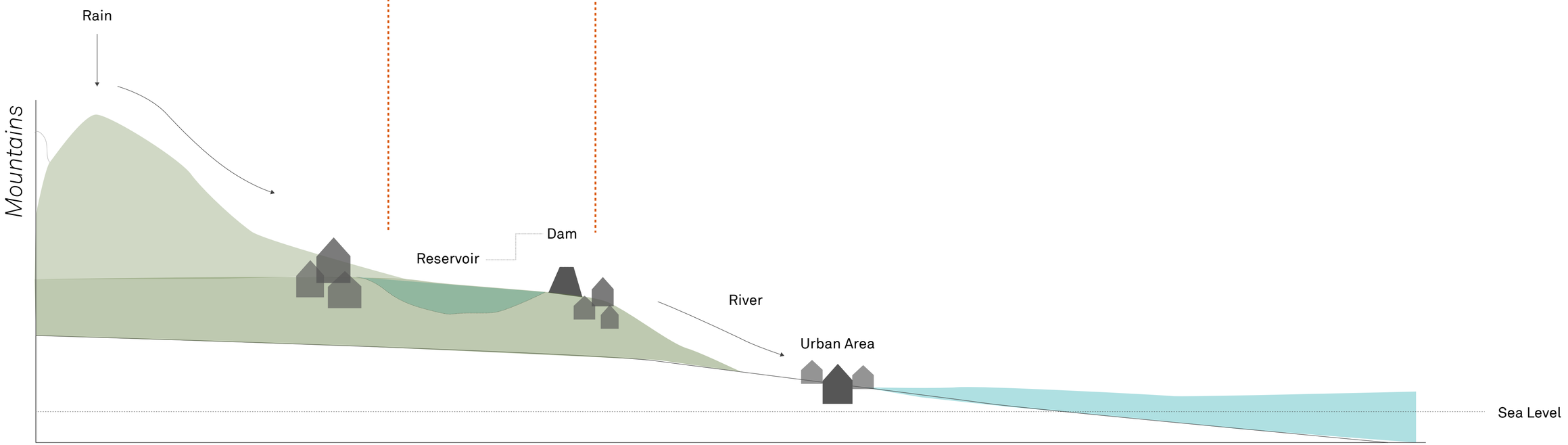
SETTLEMENT & MIGRATION PATTERN

Migration route
Original residence
New migration point
Housing areas

PERFECT LOCATION,
THE DOORWAY INTO THE HINTERLANDS



INTERVENTION AREA



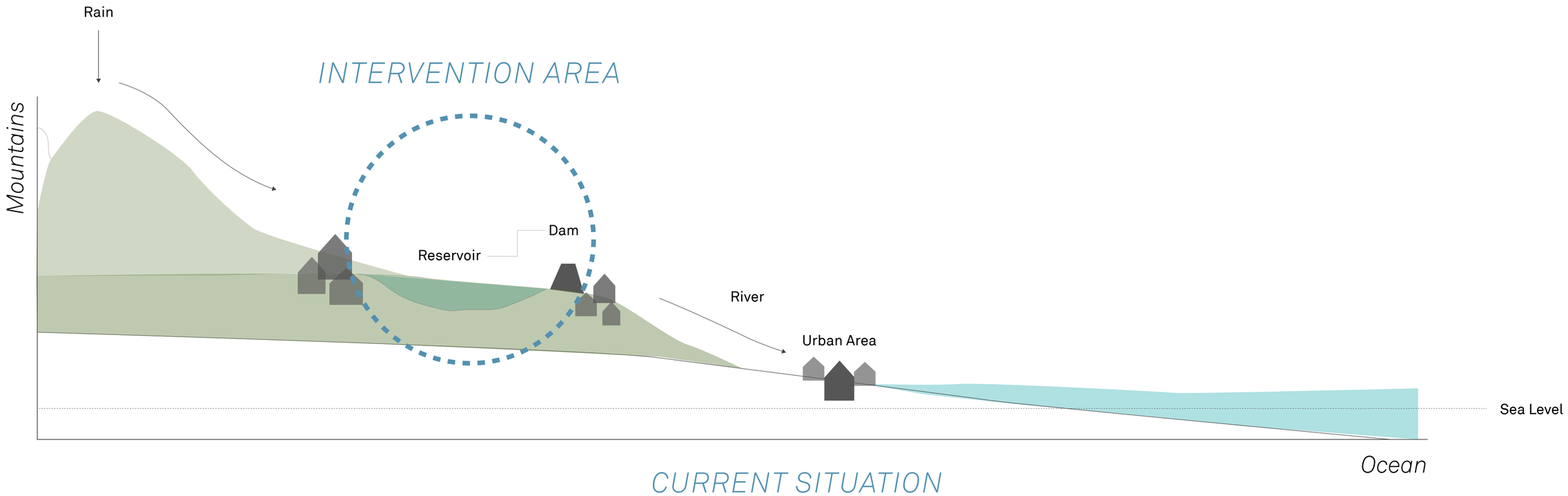
CURRENT SITUATION

Up-hill area and land subsidence relation

Land use change in up-hill area ⟶ Reduction in recharge of groundwater in lowland + Extensive ground water extraction ⟶ Land subsidence

CURRENT SITUATION

Sedimentation particles ⟷ Uncontrolled Development ⟶ Flooding Polution Soil erosion ⟶ Canal blockage Flooding Water level rise /Erosion ⟶ Sedimentation from ocean current



INTRODUCTION — ANALYSIS — DESIGN APPROACH — DESIGN STRATEGY — DESIGN SOLUTIONS

Local inhabitants migrate South where there is fresh water and no danger of flooding or landslides. As seen by the migration patterns of the inhabitants of Semarang, fresh water availability plays a crucial role in urban development patterns. Thus, urbanization is guided where fresh water is available and this development pattern without a master plan is hazardous for the future.

How can guidelines for natural disasters and nature preservation be useful for sustainable urban sprawl / urbanization?

CASE STUDY

LITERATURE STUDY
Principles

SITE ANALYSIS
Desk analysis
Site visit

MAPPING
Challenges
Opportunities

THEORETICAL STUDY

DESK ANALYSIS

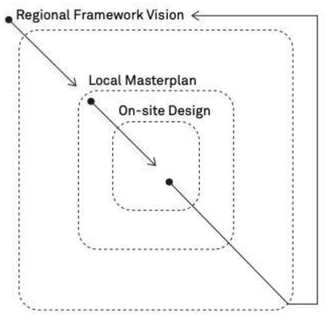
PROBLEM FIELD
Challenges
Opportunities

Problem Statement

Research Question
WATER
BIODIVERSITY
HOUSING

Design Objective

Sub-Research Questions



REGIONAL SPATIAL FRAMEWORK

LOCAL MASTER PLAN DESIGN

ON SITE DETAIL DESIGN

MACRO
Regional Framework Vision

MESO
Local Masterplan

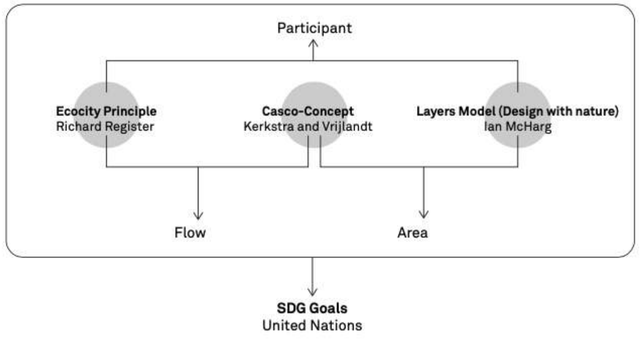
MIRCO
Site Specific Design Interventions

Design with nature
Ian McHarg

Casco-Concept
Kerkstra and Vrijlandt

Ecocity Principle
Richard Register

1. Danger + Nature | How can we build with nature to prevent natural disasters in urban areas
2. Nature + Urban | How can urbanization occur within the carrying capacity of nature
   | How can the quality of nature in urban areas be improved
3. Danger + Urban | How can disaster resistant urban development occur

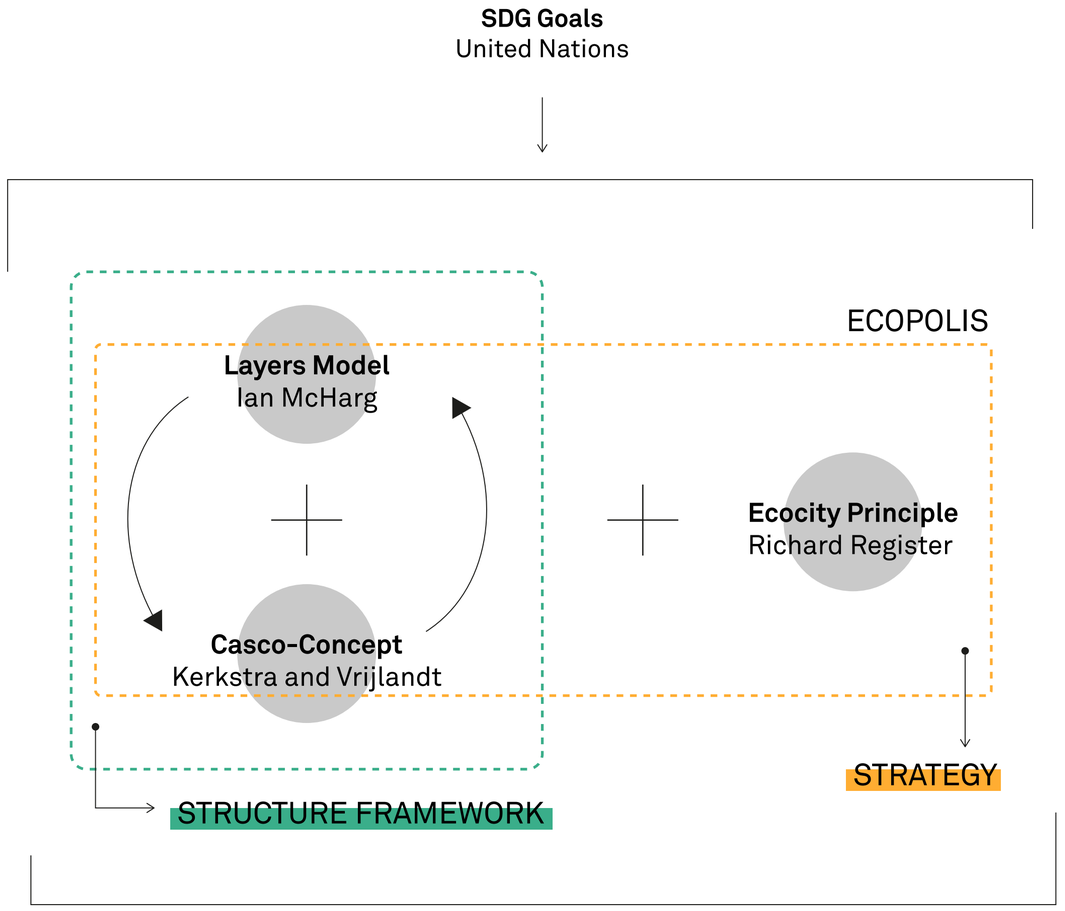


Theoretical Research

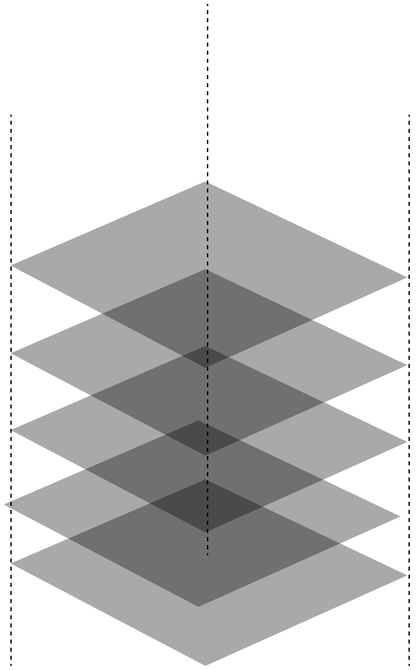
1 **Ecocity Principle**
Richard Register

2 **Layers Model**
Ian McHarg

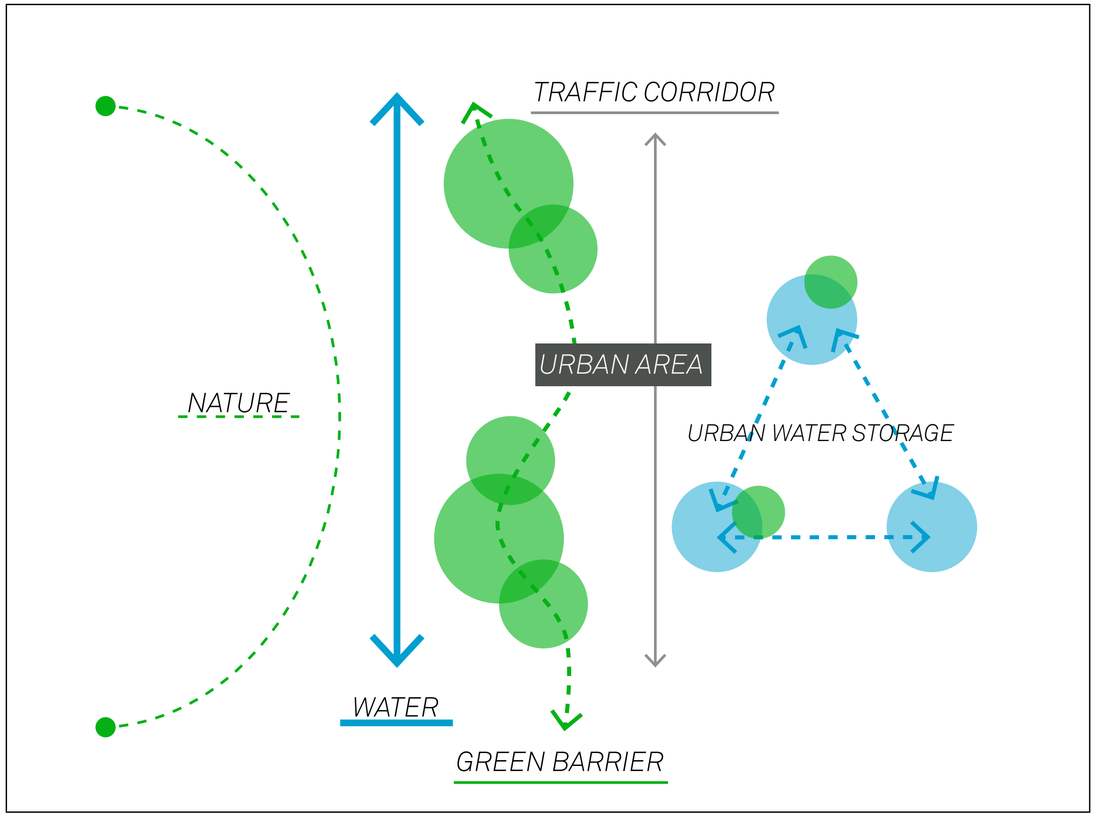
3 **Casco-Concept**
Kerkstra and Vrijlandt



INVENTORY



DESIGN

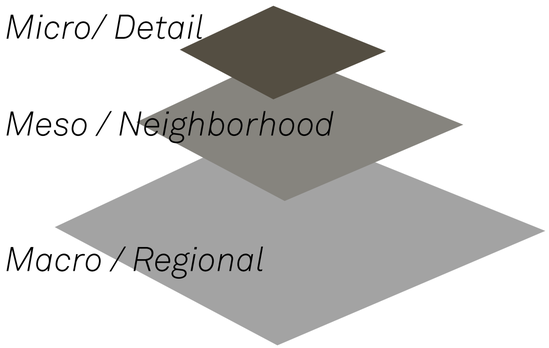


CASCO CONCEPT LAYERS MODEL

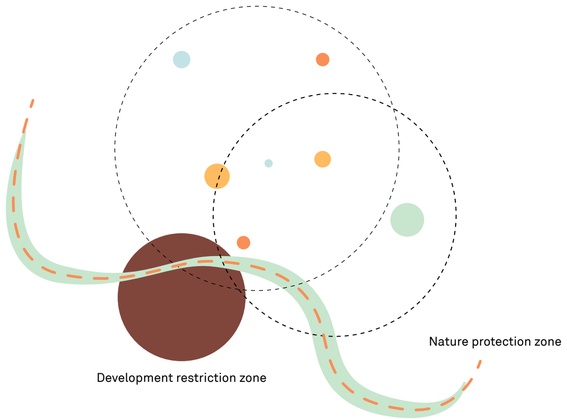
ECOPOLIS ECOCITY

Macro	REGIONAL SPATIAL FRAMEWORK	Regional Framework Vision	scale	
Meso	LOCAL MASTER PLAN DESIGN	Local Masterplan	zoning	Heritage Zoning: - landscape - architectural heritage Restriction Zoning: - nature protection zone - development restriction zone - aquifer protection zone
Micro	ON SITE DETAIL DESIGN	Site Specific Design Interventions	phase	Time Nature - Infra

scale



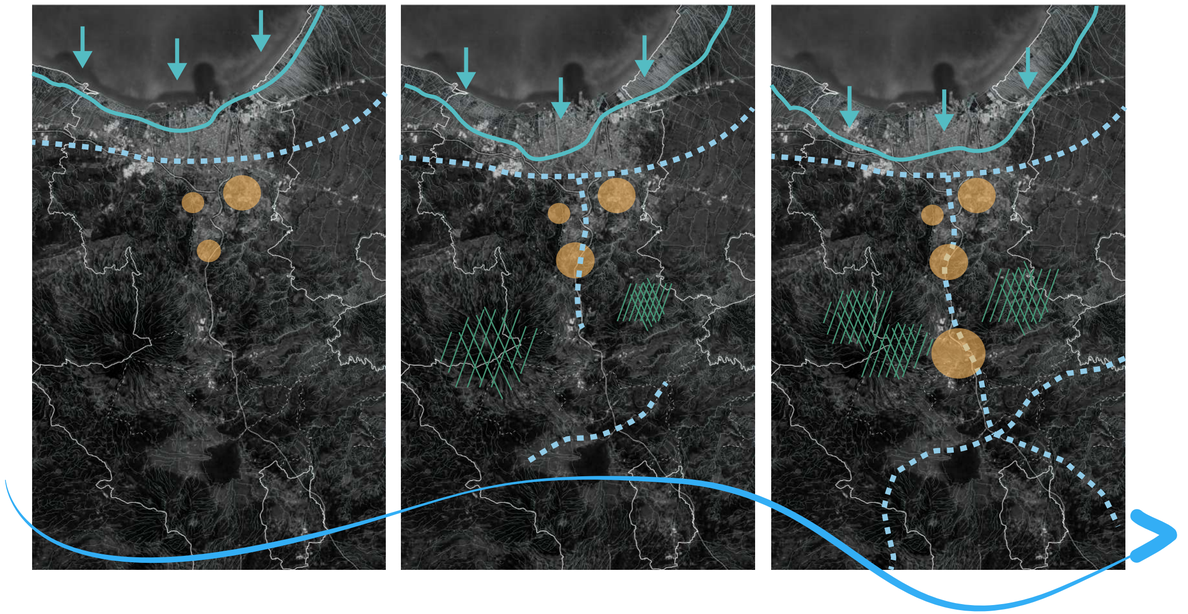
zoning



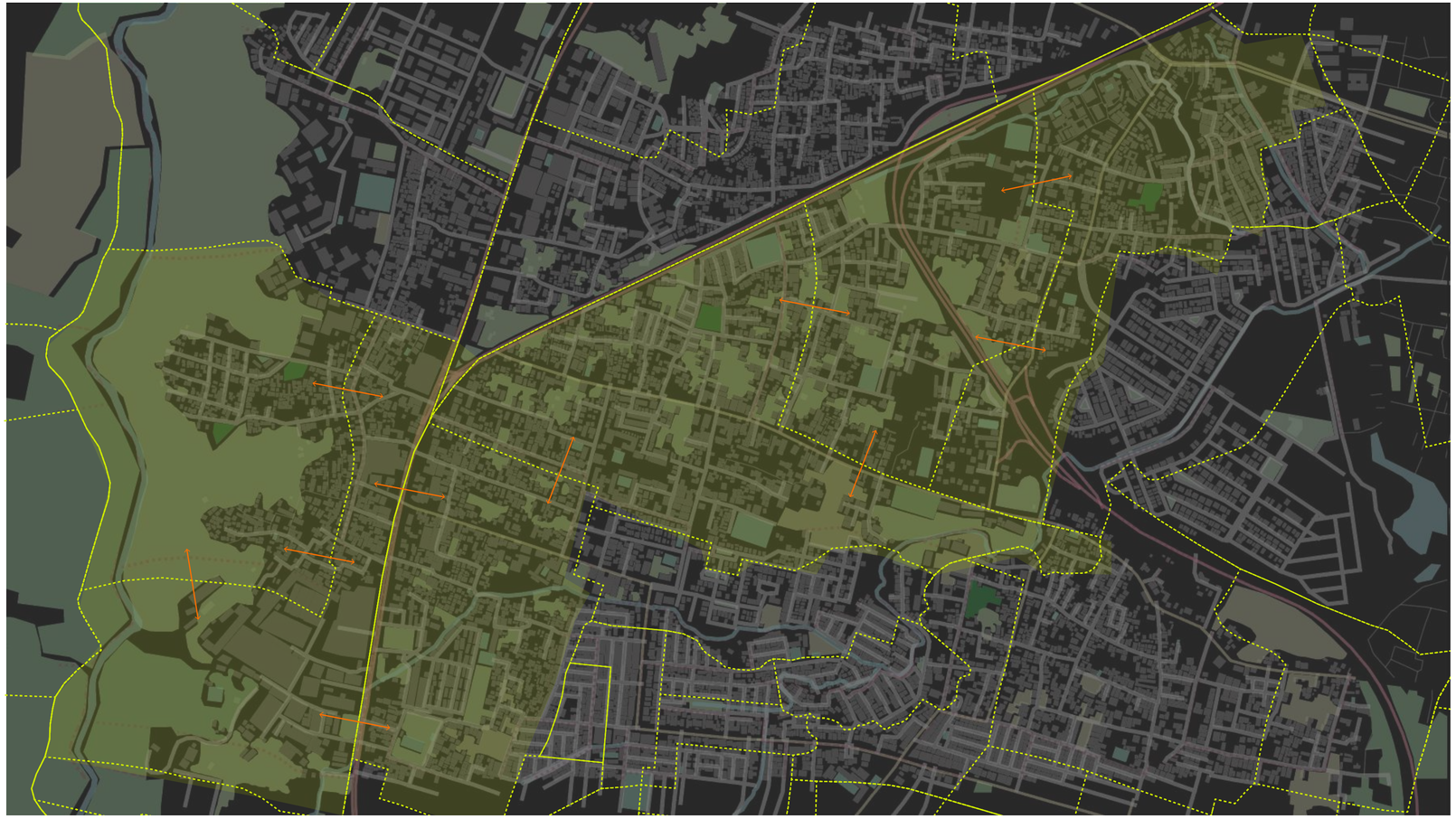
Restriction Zoning

- *nature protection zone*
- *development restriction zone*
- *aquifer protection zone*

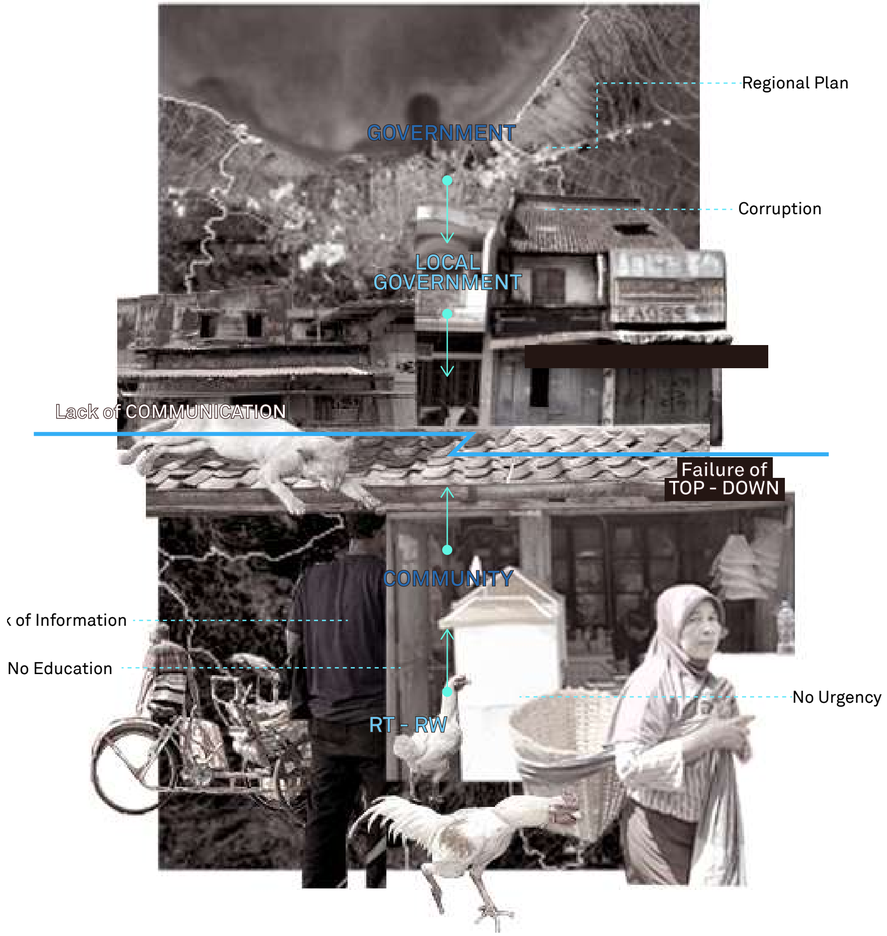
phase



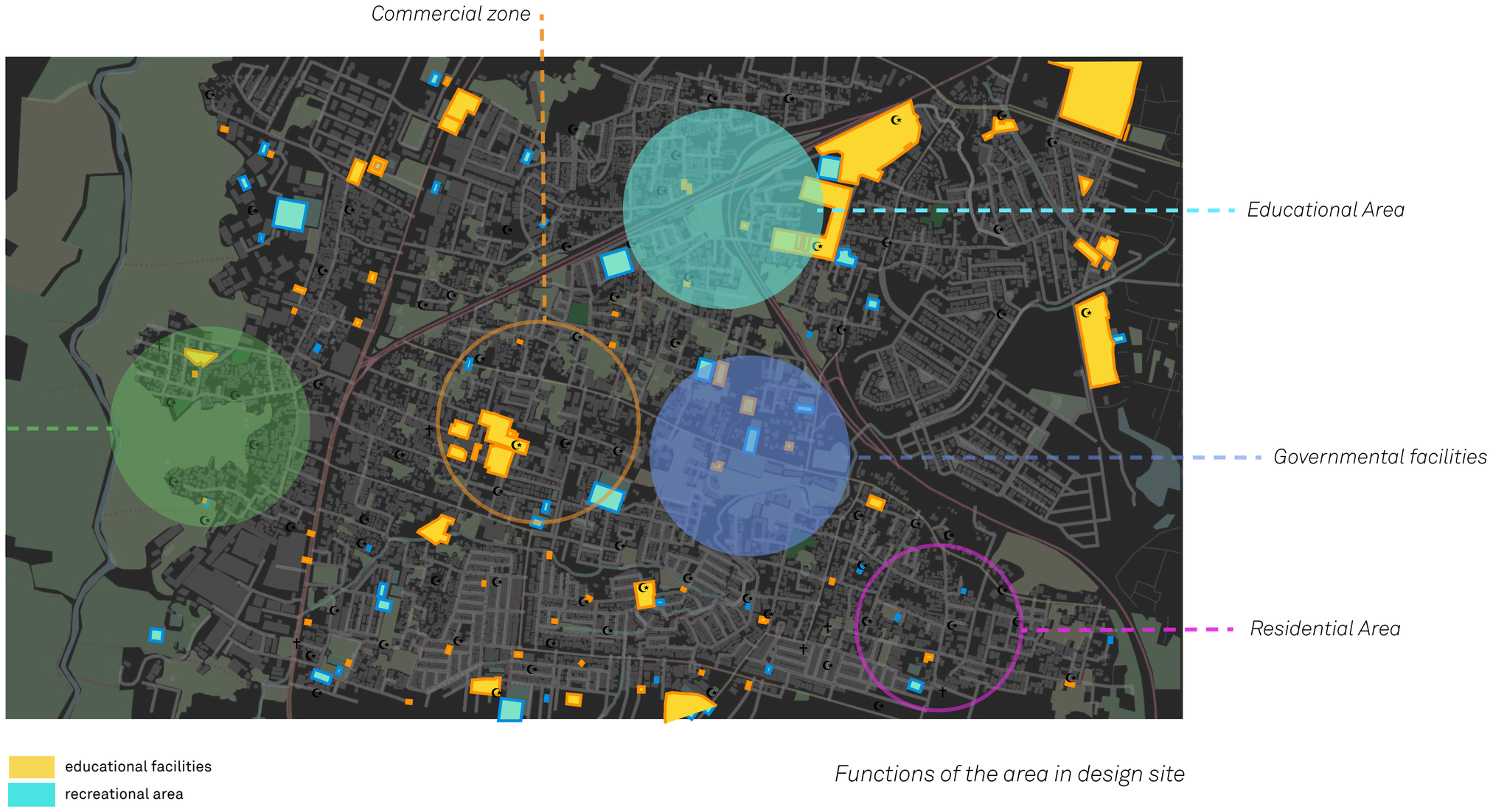
Metaboliism flow in design site



District boundaries in design site



RT - RW structure in Indonesia



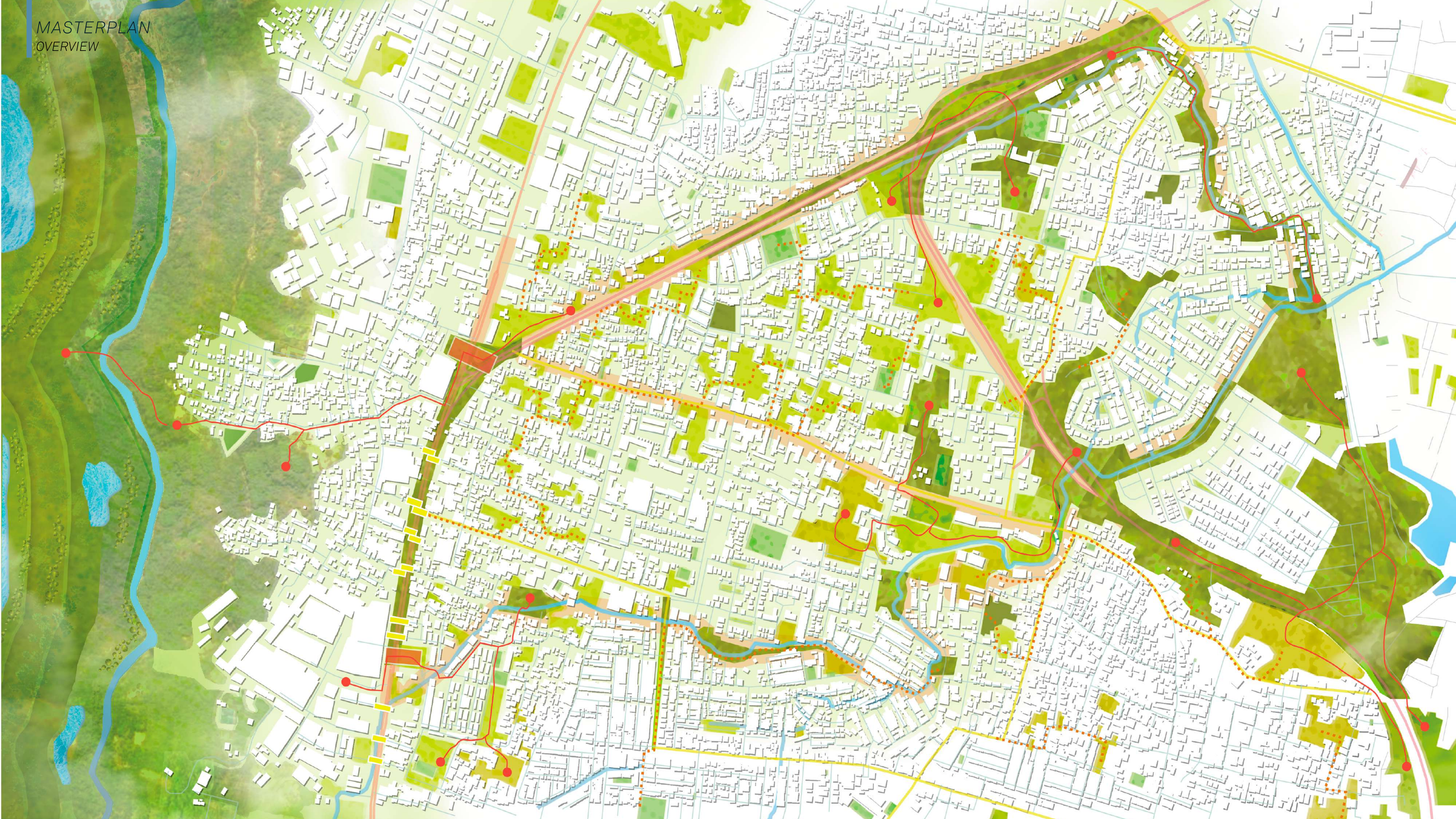
Functions of the area in design site

S-W-O-T Analysis

"Reinforce the weakpoints of the site"

Masterplan

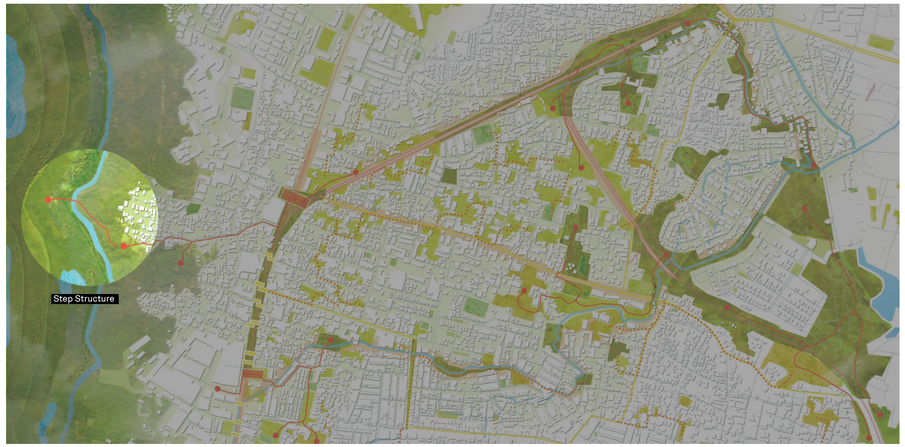
MASTERPLAN
OVERVIEW



MASTERPLAN
OVERVIEW

MASTERPLAN DETAIL

1 STEP STRUCTURE



0m 200m

NOW

NO INTERVENTION

DESIGN FUTURE

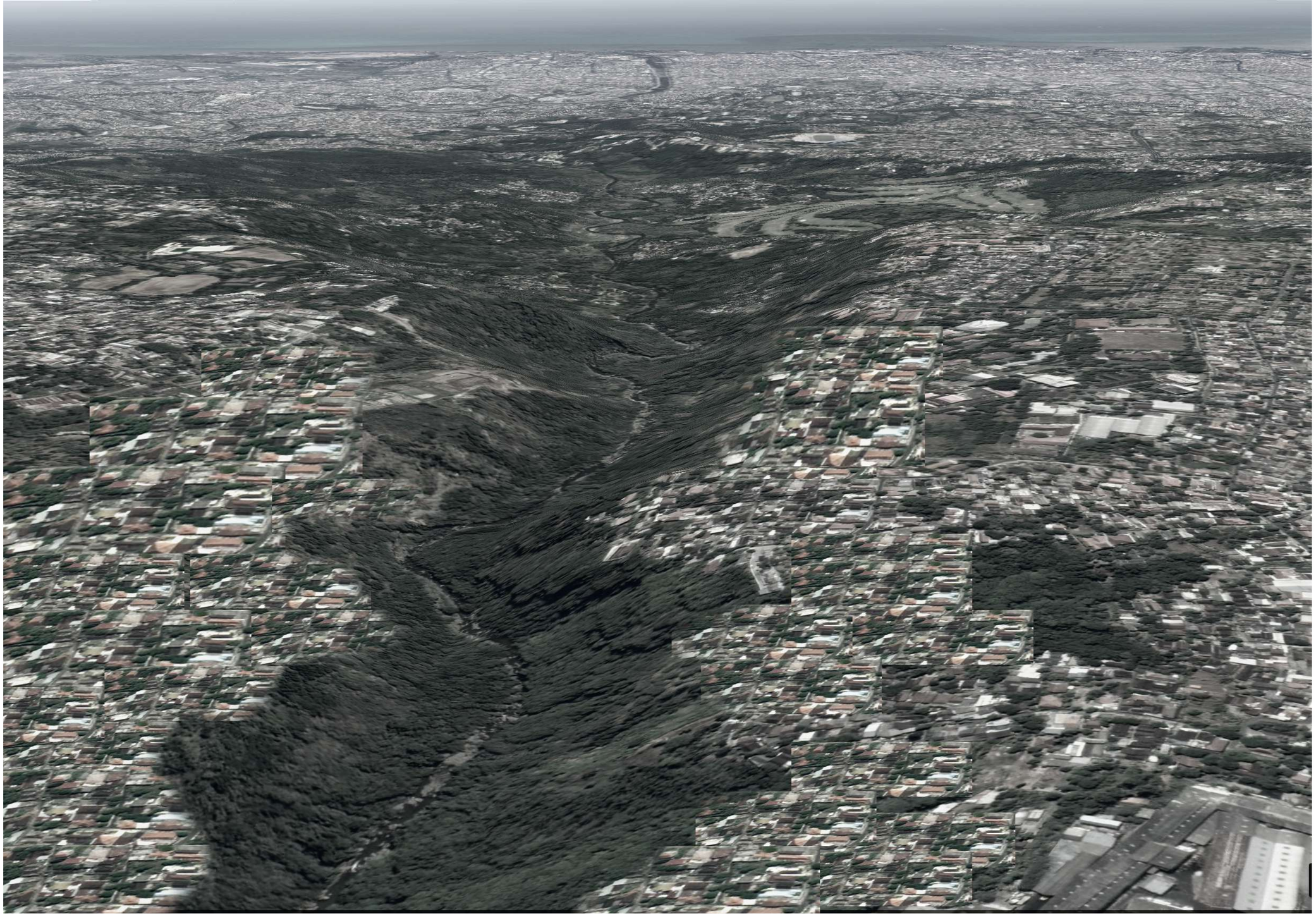
MASTERPLAN DETAIL

1 STEP STRUCTURE

NOW

NO INTERVENTION

DESIGN FUTURE



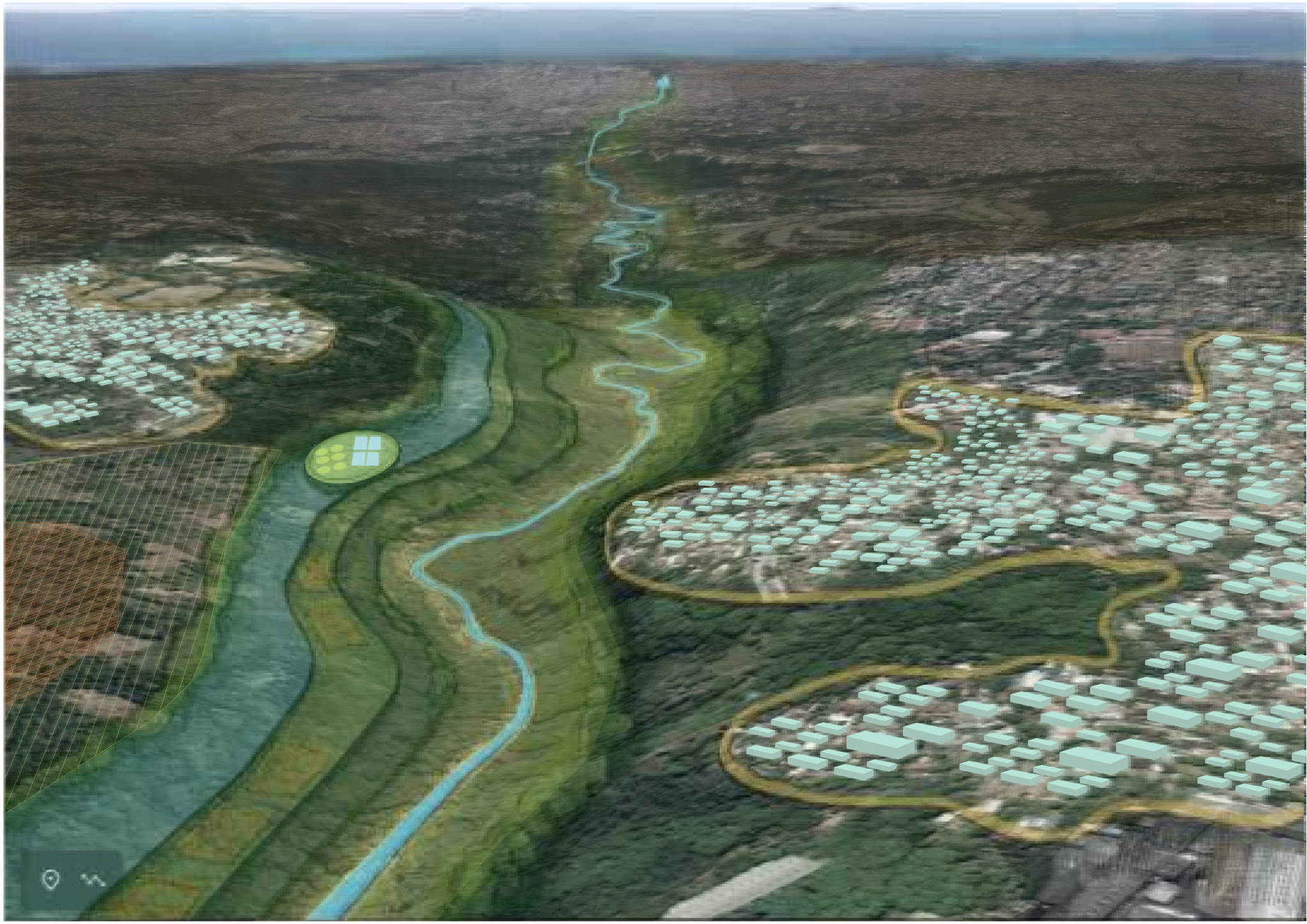
MASTERPLAN DETAIL

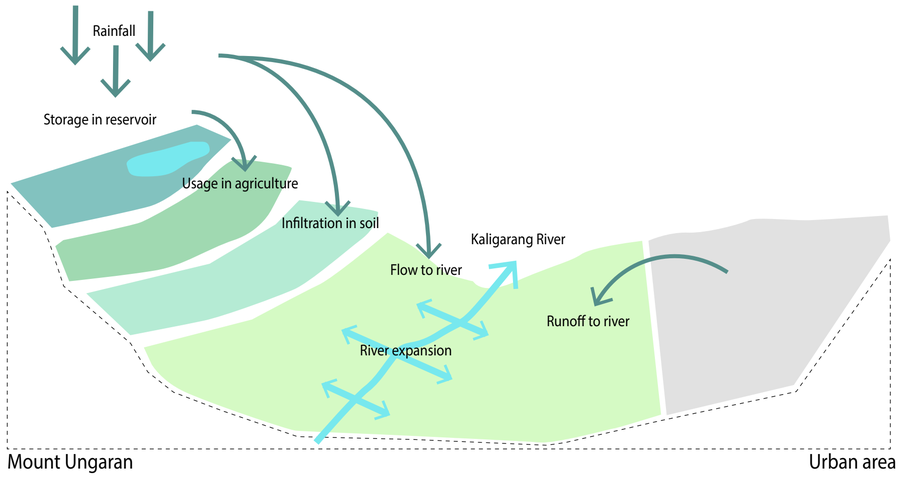
1 STEP STRUCTURE

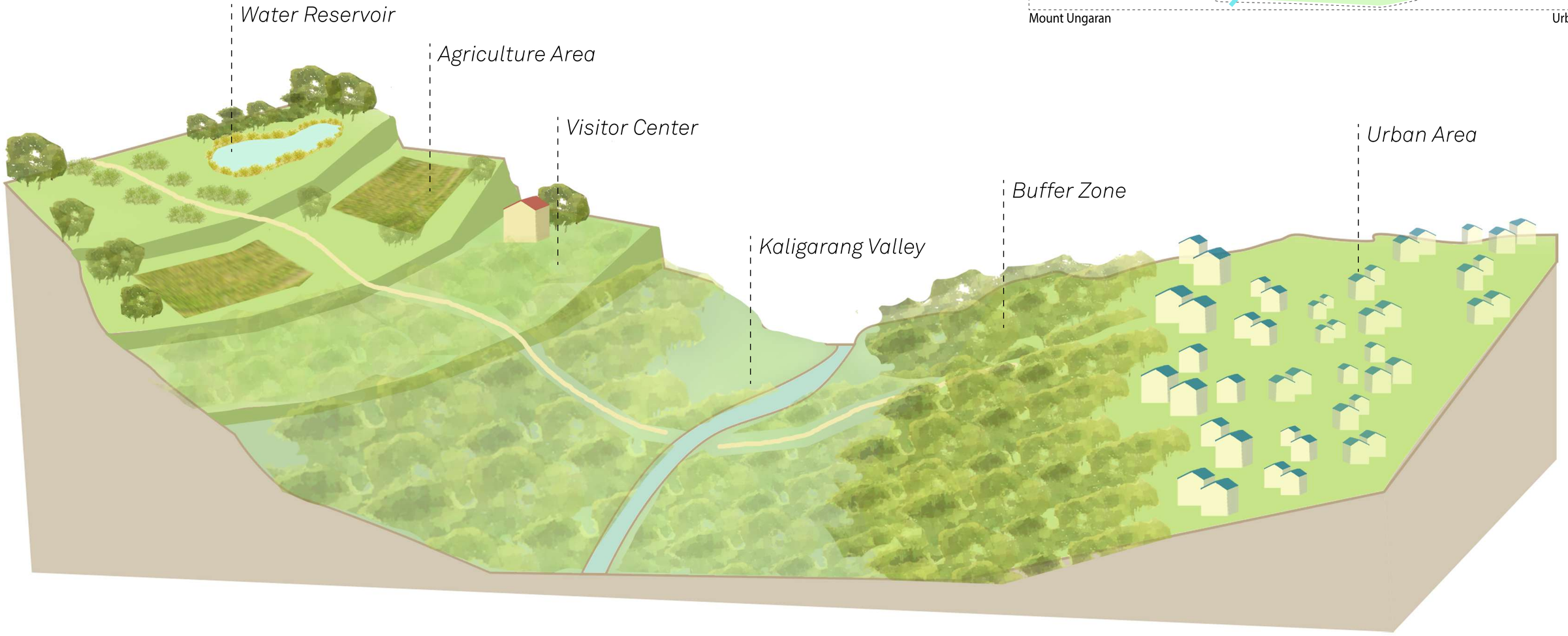
NOW

NO INTERVENTION

DESIGN FUTURE

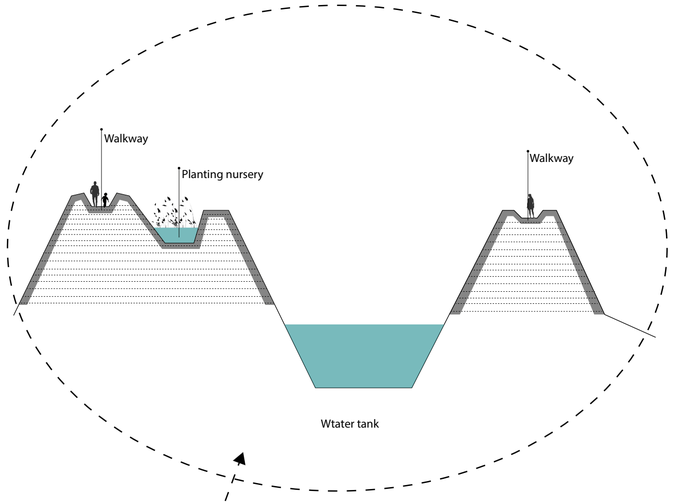


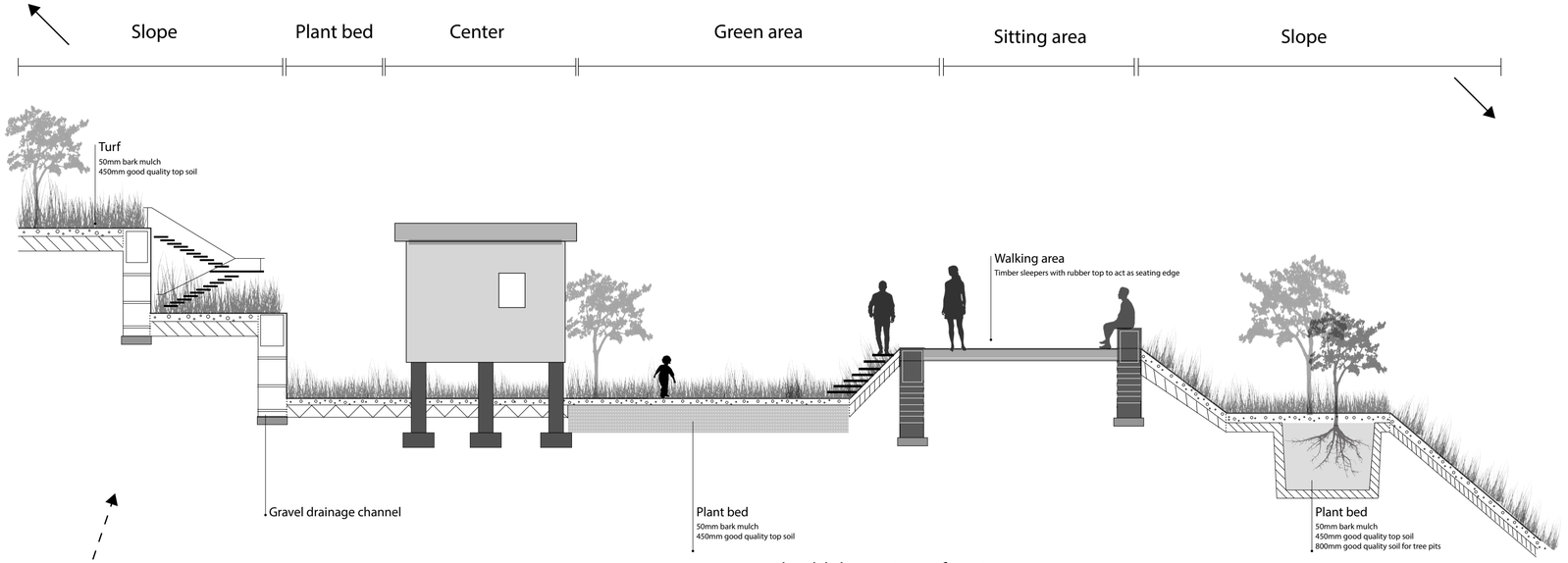

Rainfall
Storage in reservoir
Usage in agriculture
Infiltration in soil
Kaligarang River
Flow to river
Runoff to river
River expansion
Mount Ungaran
Urban area


Water Reservoir
Agriculture Area
Visitor Center
Kaligarang Valley
Buffer Zone
Urban Area

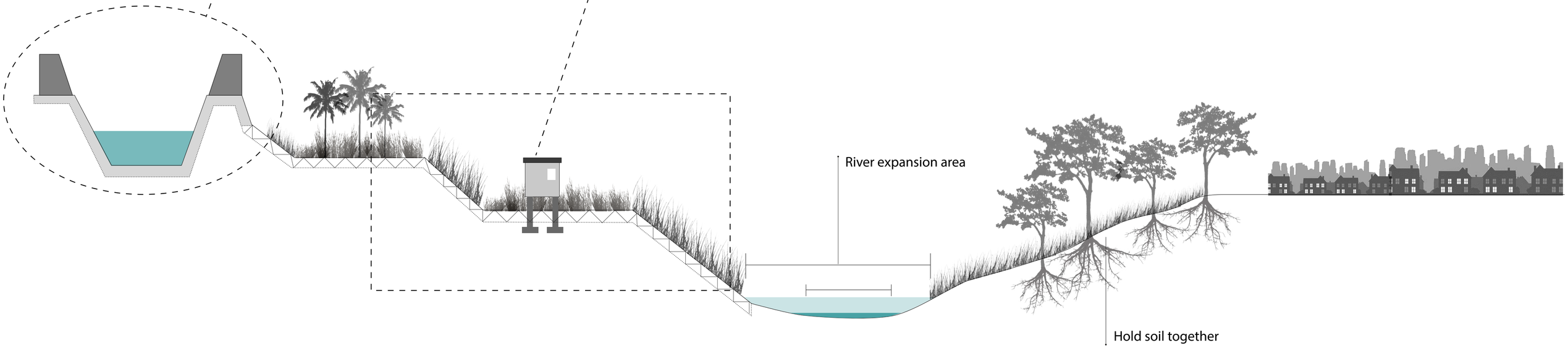
MASTERPLAN DETAIL

1 STEP STRUCTURE



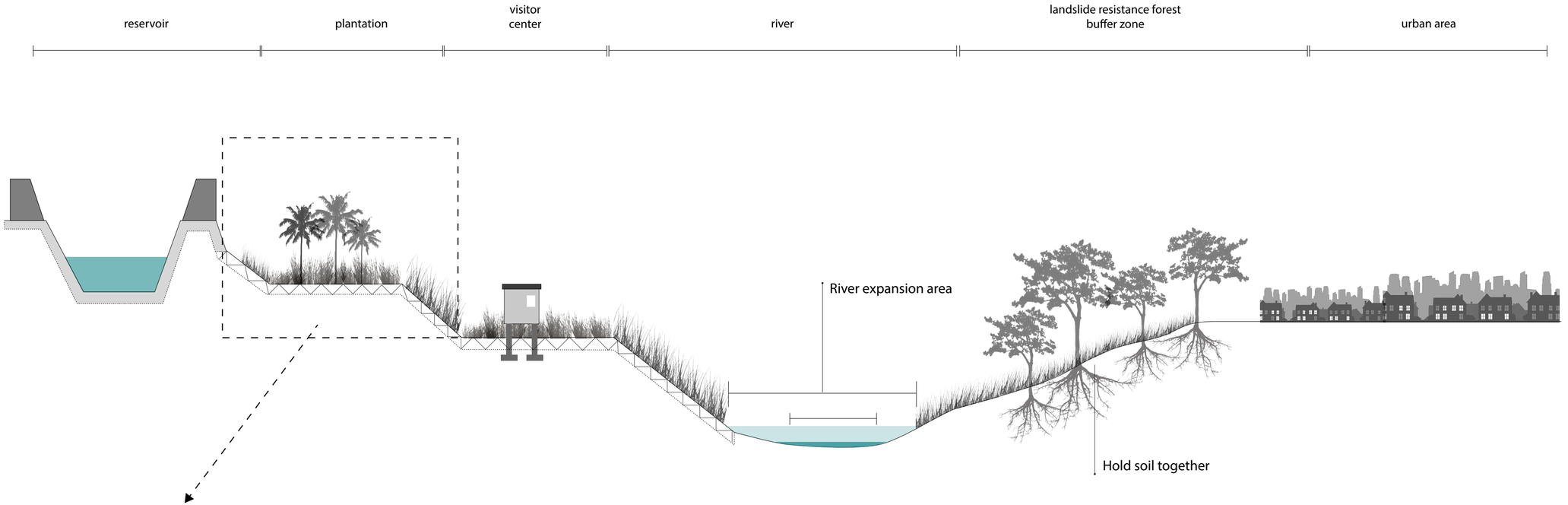


reservoir | plantation | visitor center | river | landslide resistance forest buffer zone | urban area

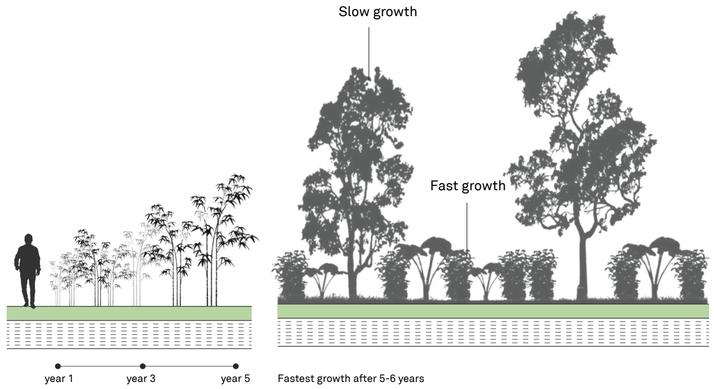


MASTERPLAN DETAIL

1 STEP STRUCTURE



Tree growth phasing



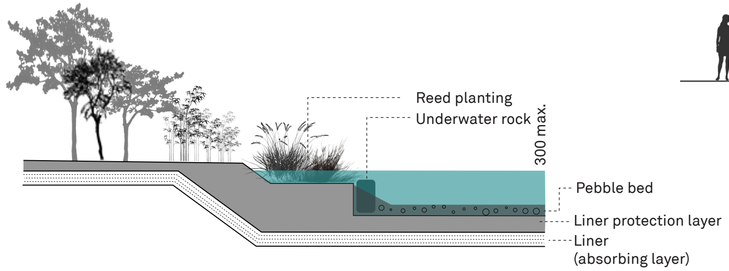
10 years

Fast growing plants
(ex. bamboo, palm trees,)

30 years

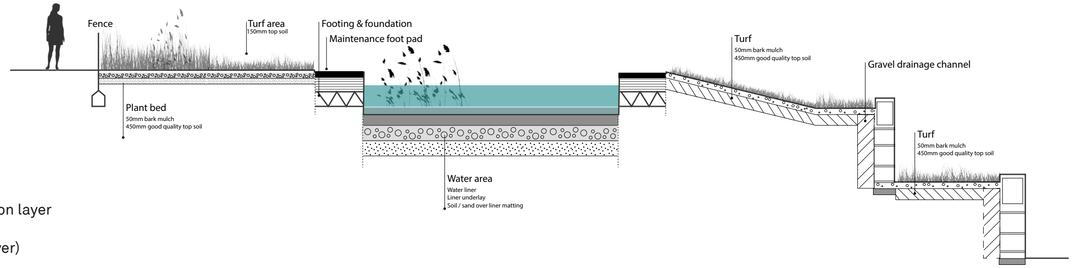
Slower growth time
(ex. vv,)

Reservoir gradient section



Pond gradient section

Alternative



Materialization

Wooden Deck

Tropical timber
- Mahogany
- Teak
- Ebony
- Rosewood
- Narra
- Chloroxylon

Deck lighting

Solar power lighting

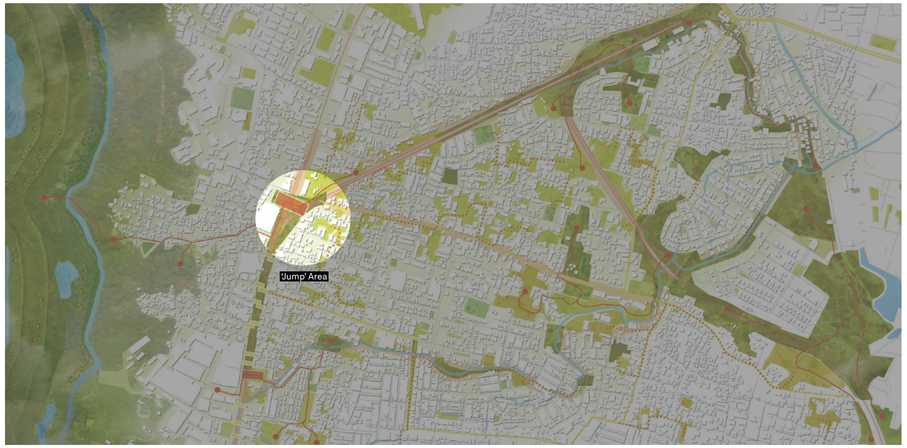
Plant Specification

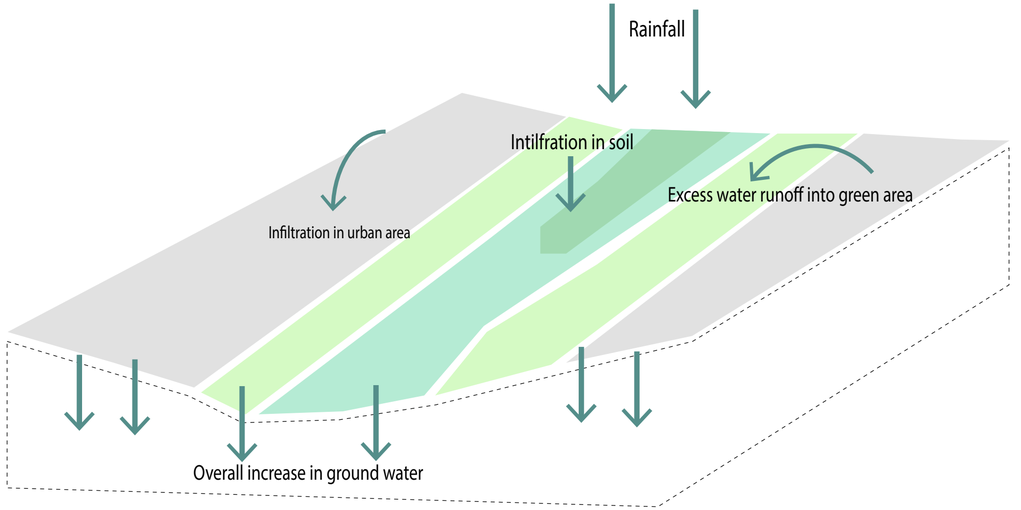
Pandanus amaryllifolius

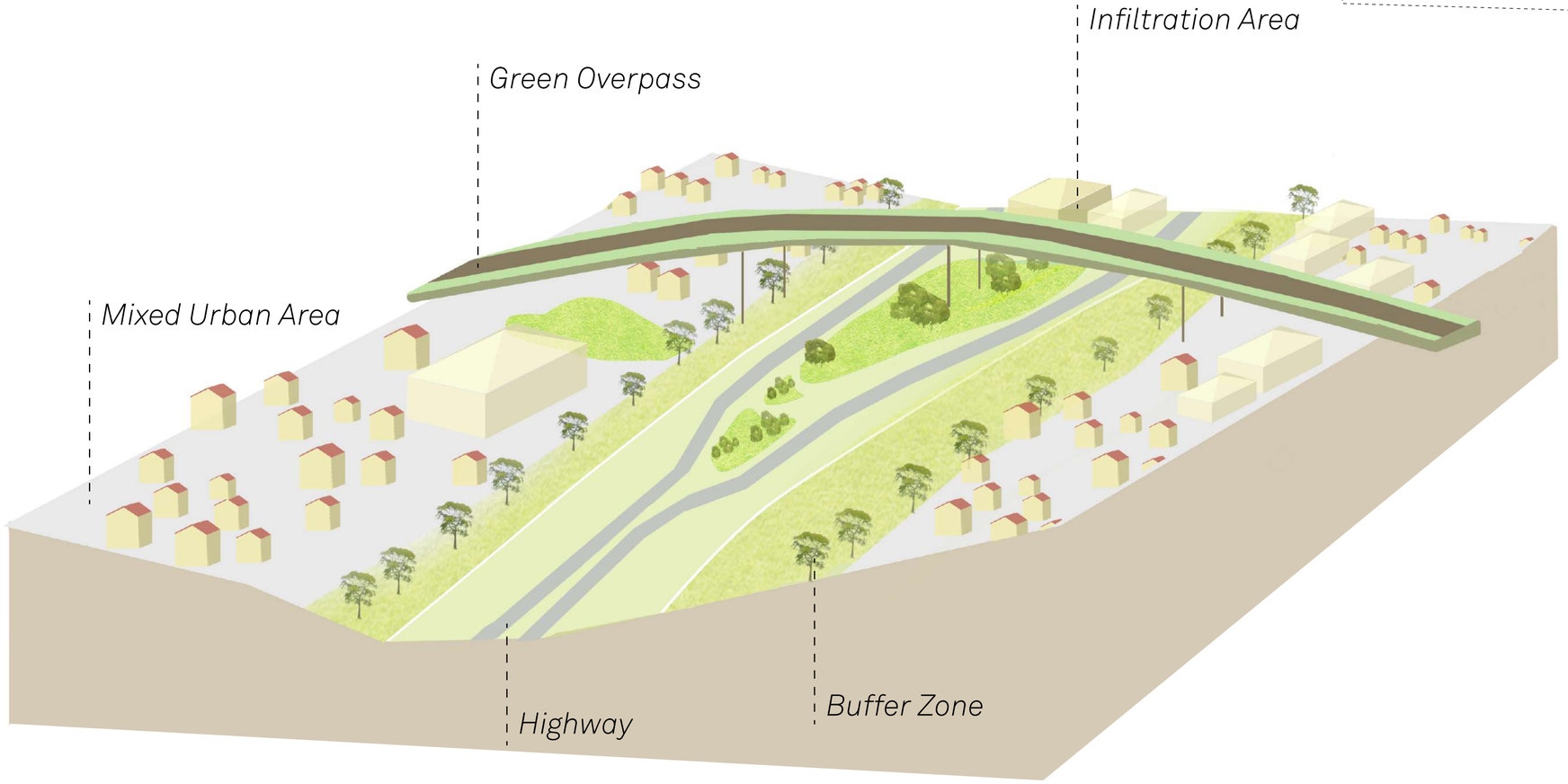
Platycerium biforcatum

Asplenium nidus ‘Victoria’

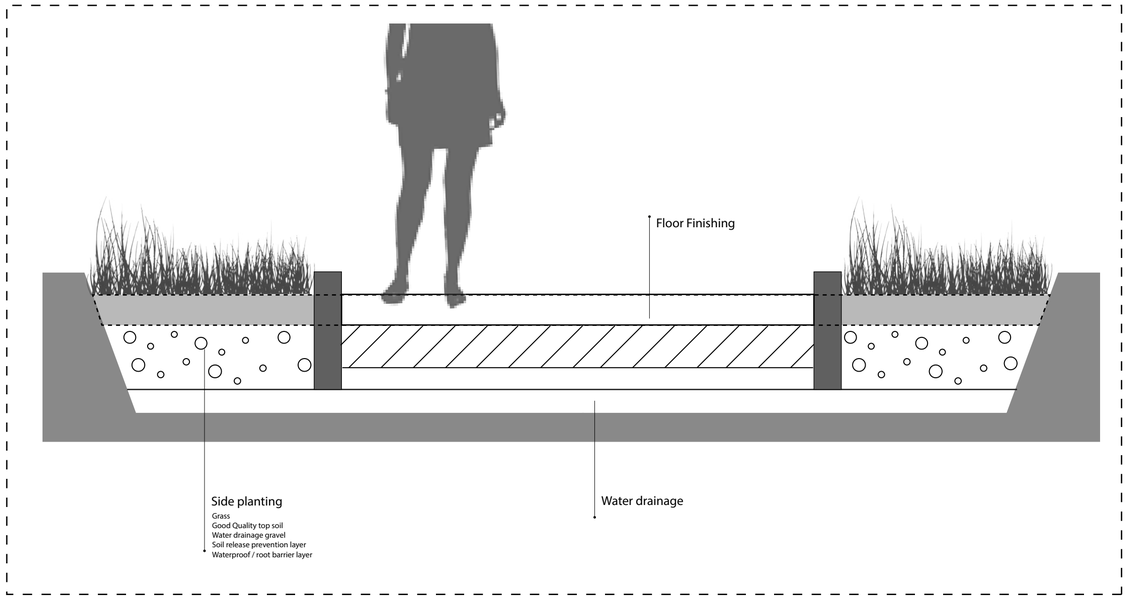
MASTERPLAN DETAIL
2 JUMP AREA

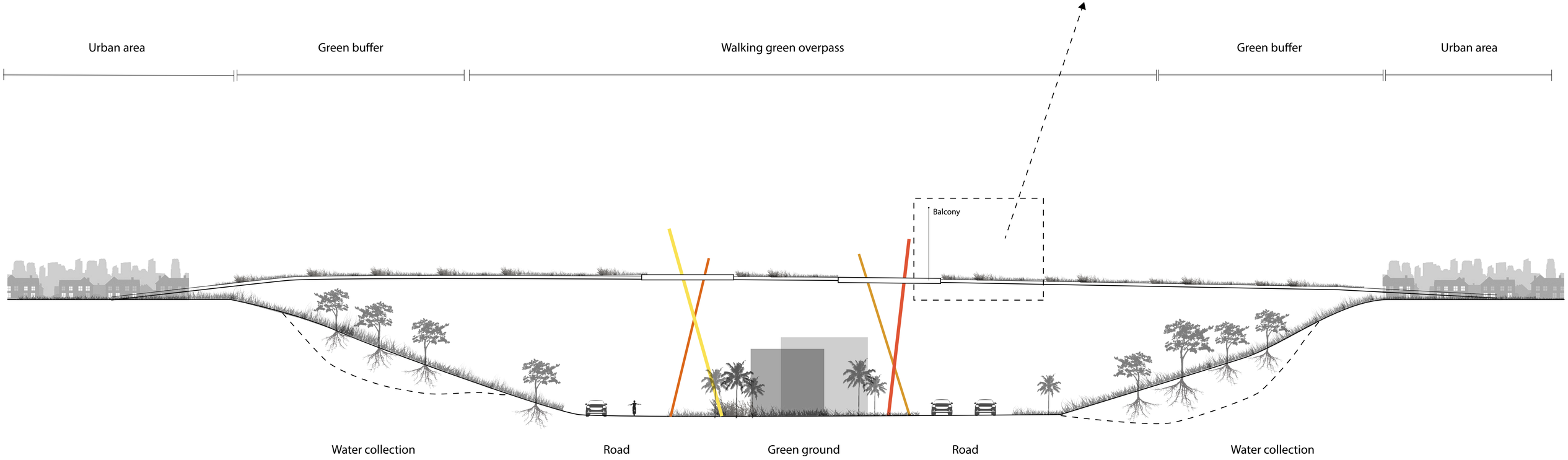


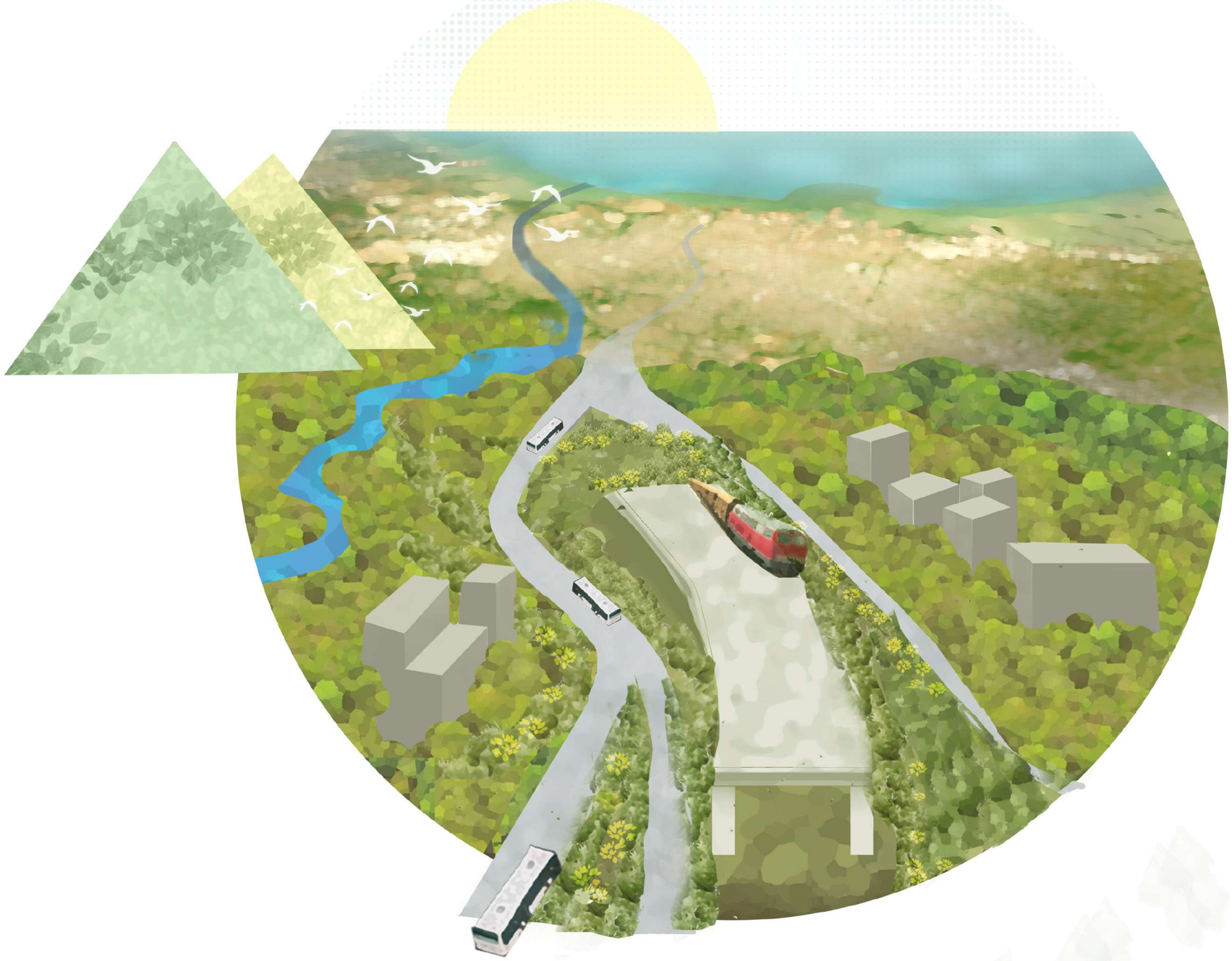

Rainfall
Intilfration in soil
Excess water runoff into green area
Infiltration in urban area
Overall increase in ground water


Infiltration Area
Green Overpass
Mixed Urban Area
Highway
Buffer Zone

MASTERPLAN DETAIL
2 JUMP AREA

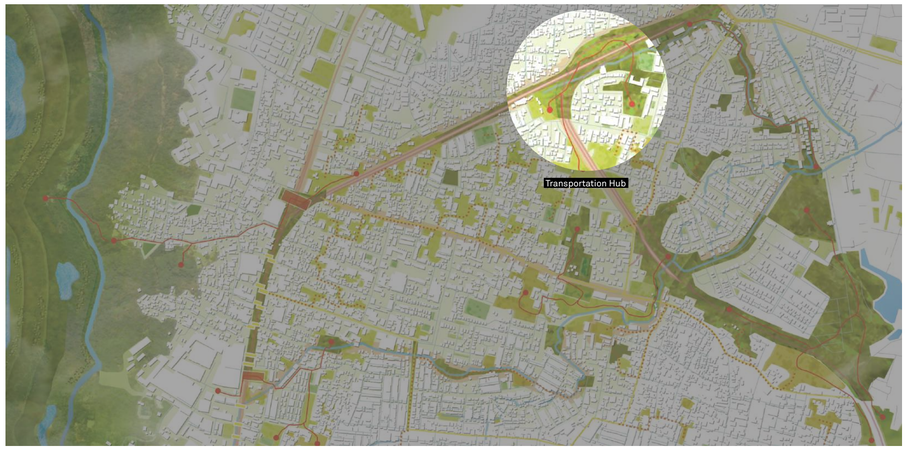


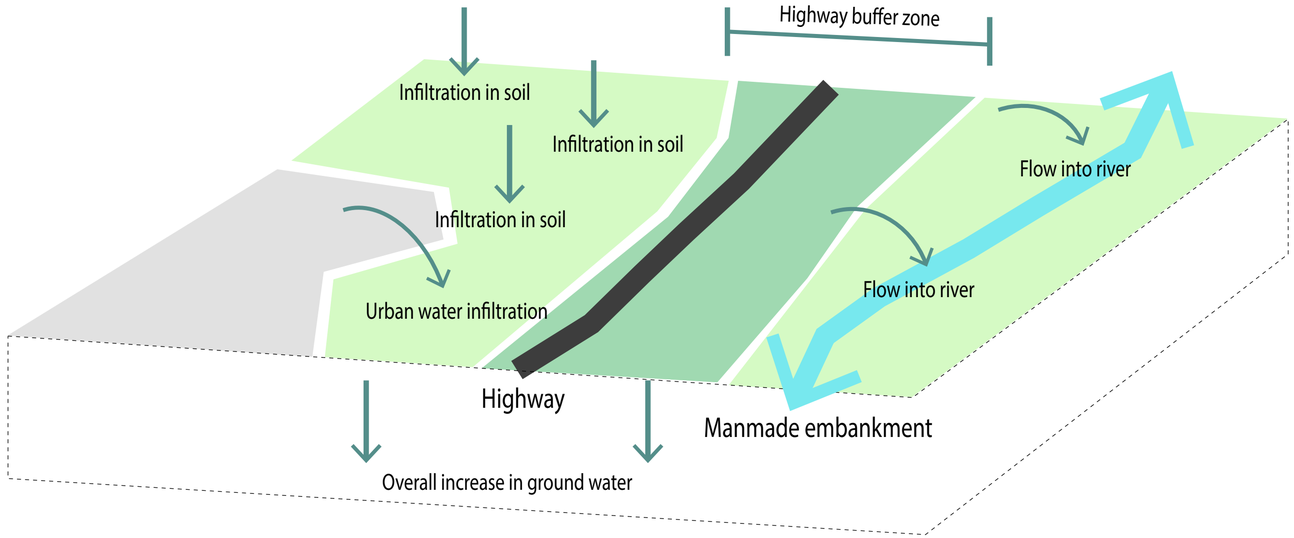


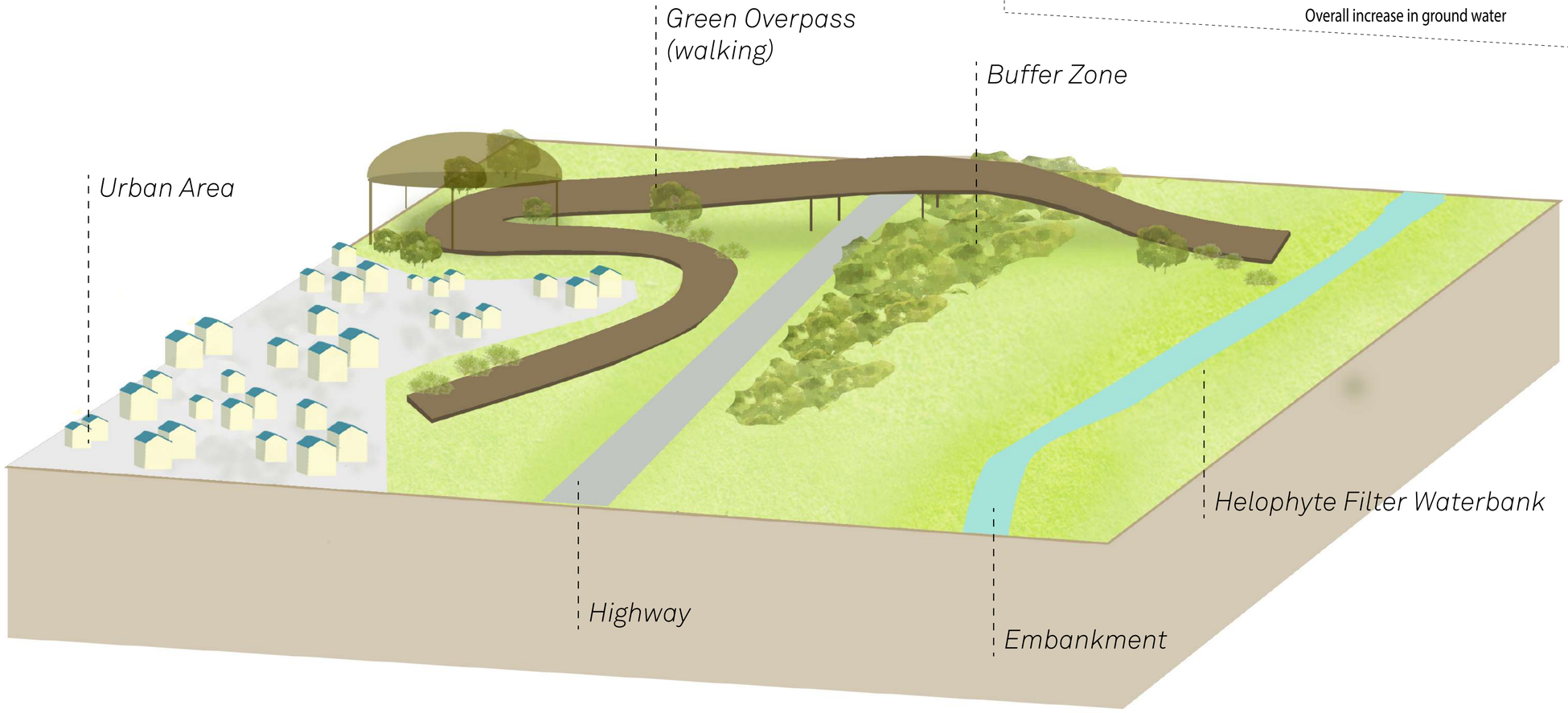


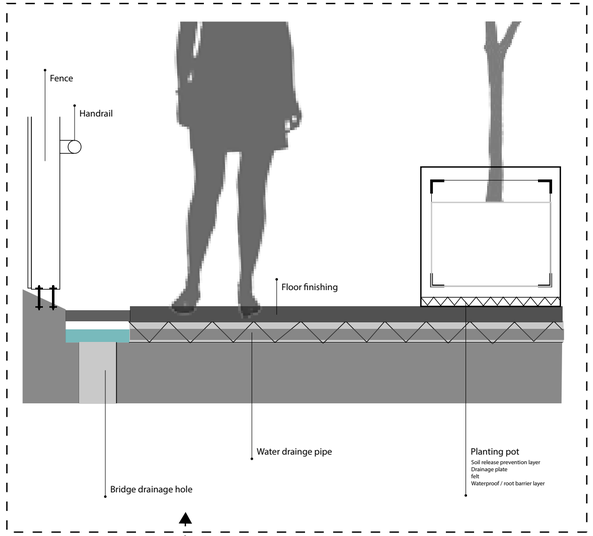
MASTERPLAN DETAIL

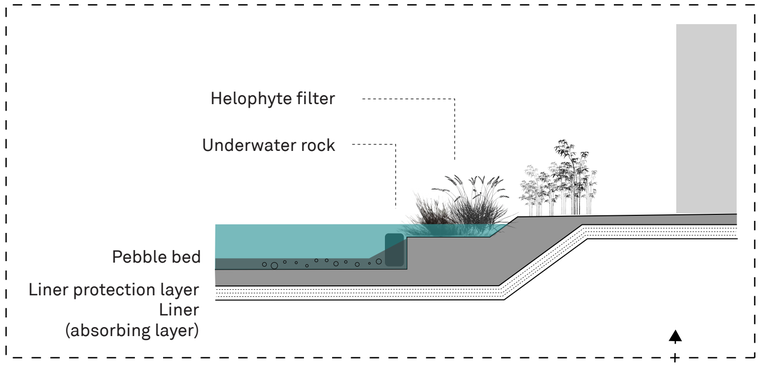
3 TRANSPORTATION HUB

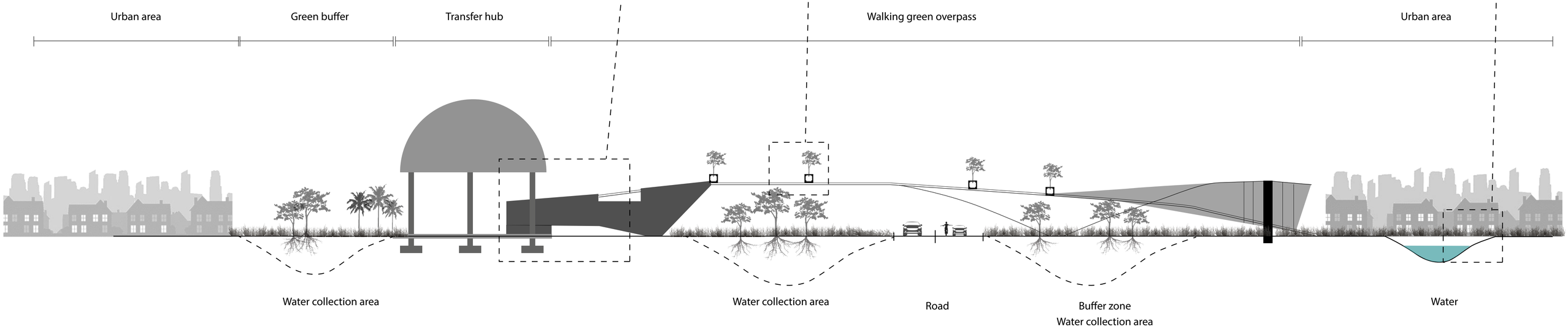



Highway buffer zone
Infiltration in soil
Infiltration in soil
Infiltration in soil
Flow into river
Urban water infiltration
Flow into river
Highway
Manmade embankment
Overall increase in ground water

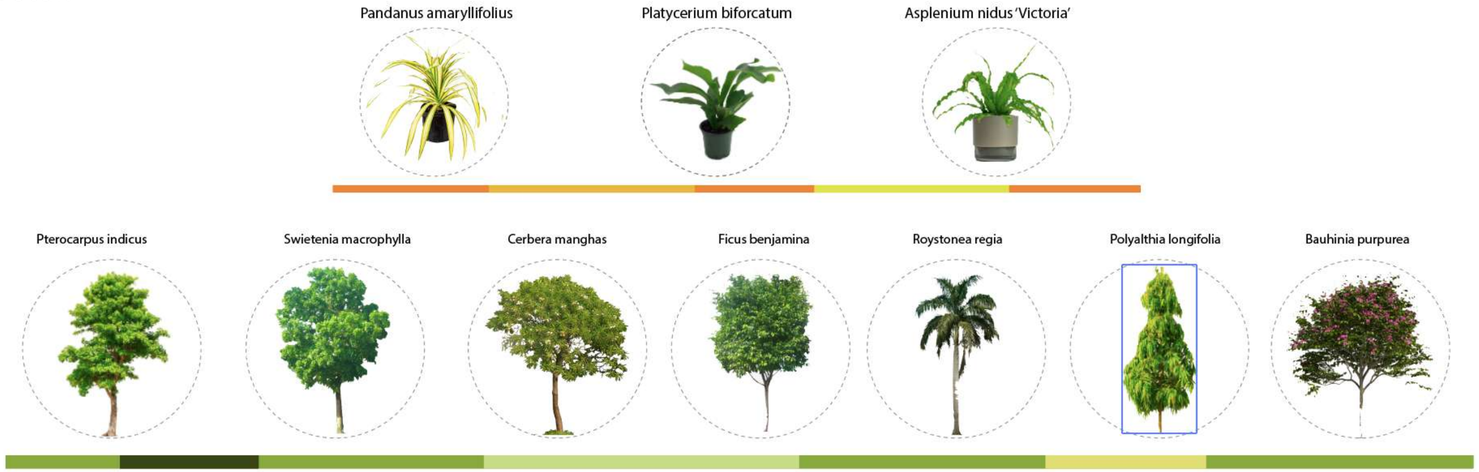

Green Overpass
(walking)
Buffer Zone
Urban Area
Helophyte Filter Waterbank
Highway
Embankment


Fence
Handrail
Floor finishing
Water drainge pipe
Bridge drainage hole
Planting pot
Soil release prevention layer
Drainage plate
felt
Waterproof / root barrier layer


Helophyte filter
Underwater rock
Pebble bed
Liner protection layer
Liner
(absorbing layer)


Urban area
Green buffer
Transfer hub
Walking green overpass
Urban area
Water collection area
Water collection area
Road
Buffer zone
Water collection area
Water

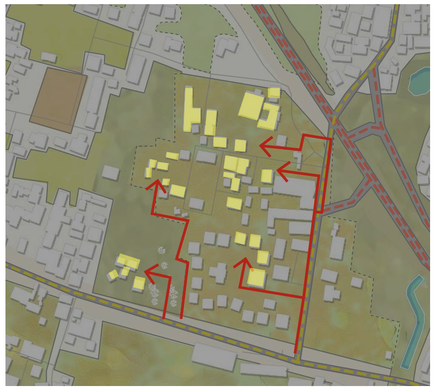
Species Detail



Planting Detail

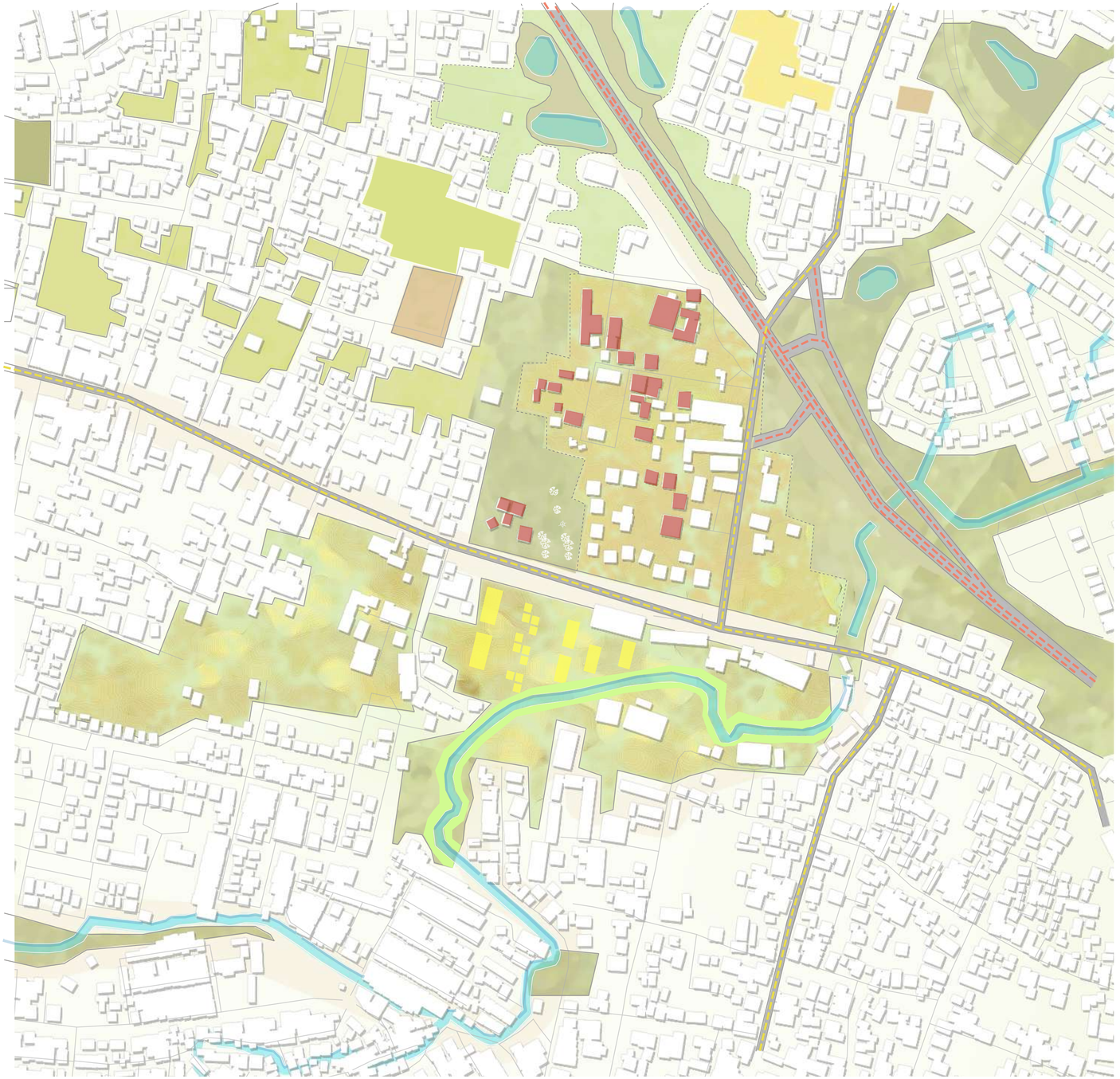
MASTERPLAN DETAIL

4 DENSIFICATION AREA



before change;
tree branch networks is bad for walking

after change;
web-like networks make it easy for walking



200m

NOW

NO INTERVENTION

DESIGN FUTURE

MASTERPLAN DETAIL

4 DENSIFICATION AREA

NOW

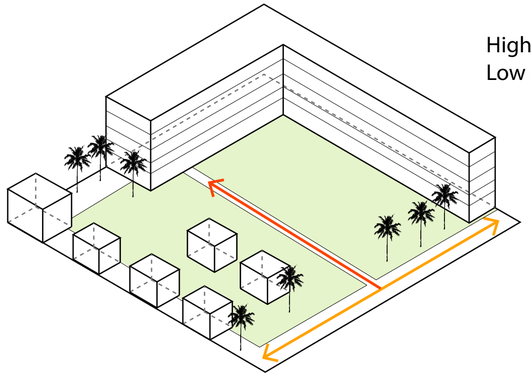
NO INTERVENTION

DESIGN FUTURE

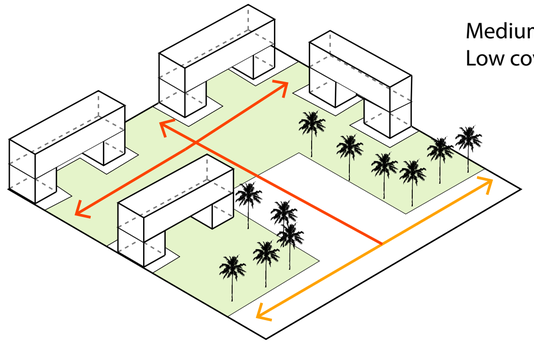
NOW

NO INTERVENTION

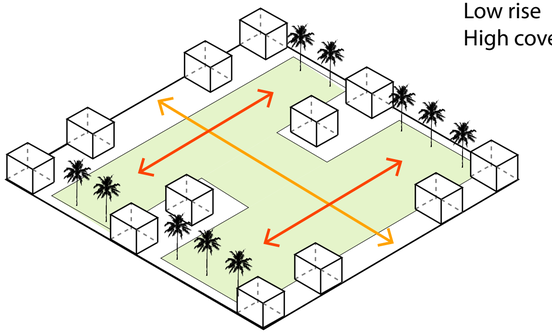
DESIGN FUTURE



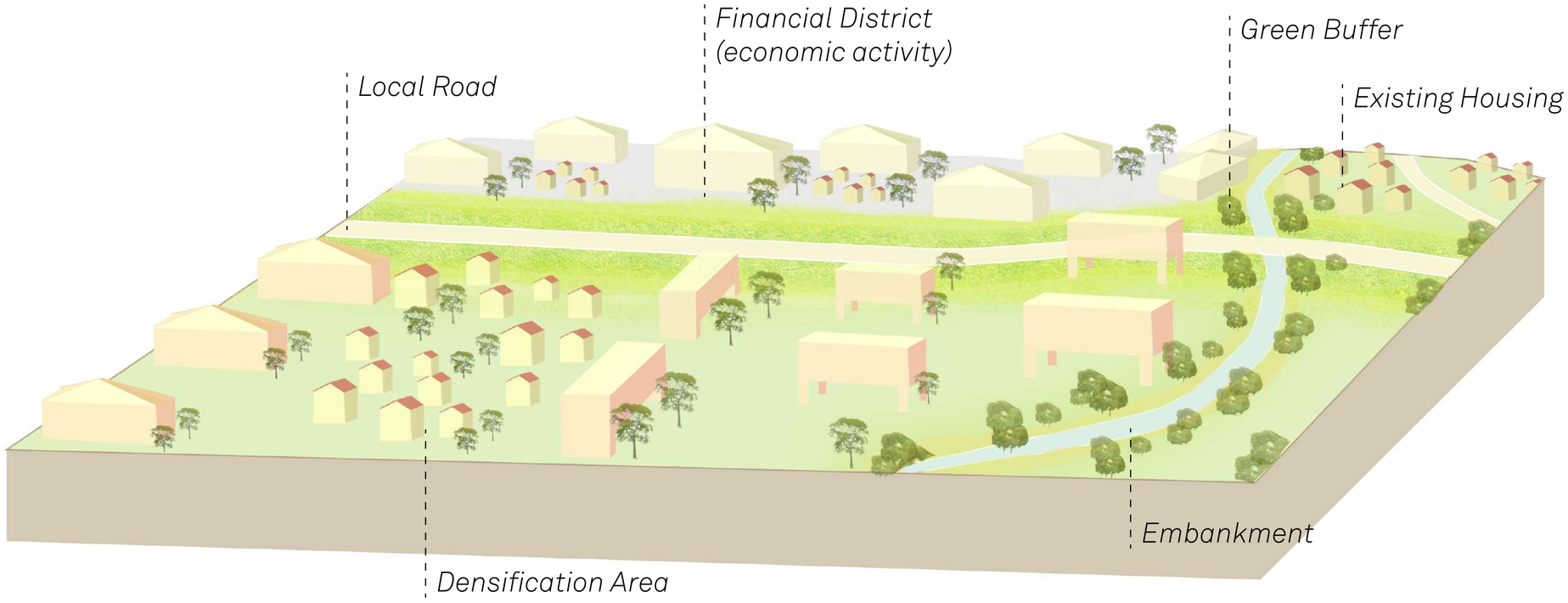
High rise
Low coverage



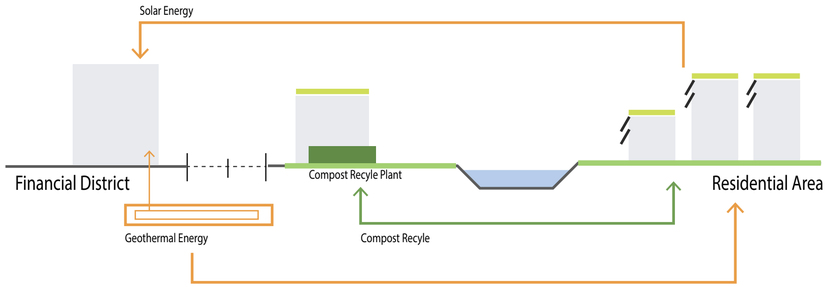
Medium rise
Low coverage



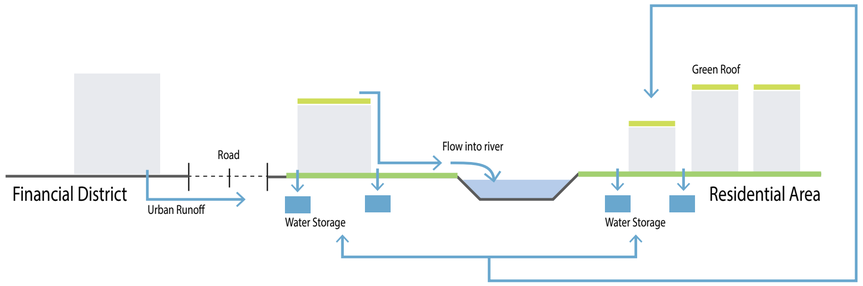
Low rise
High coverage

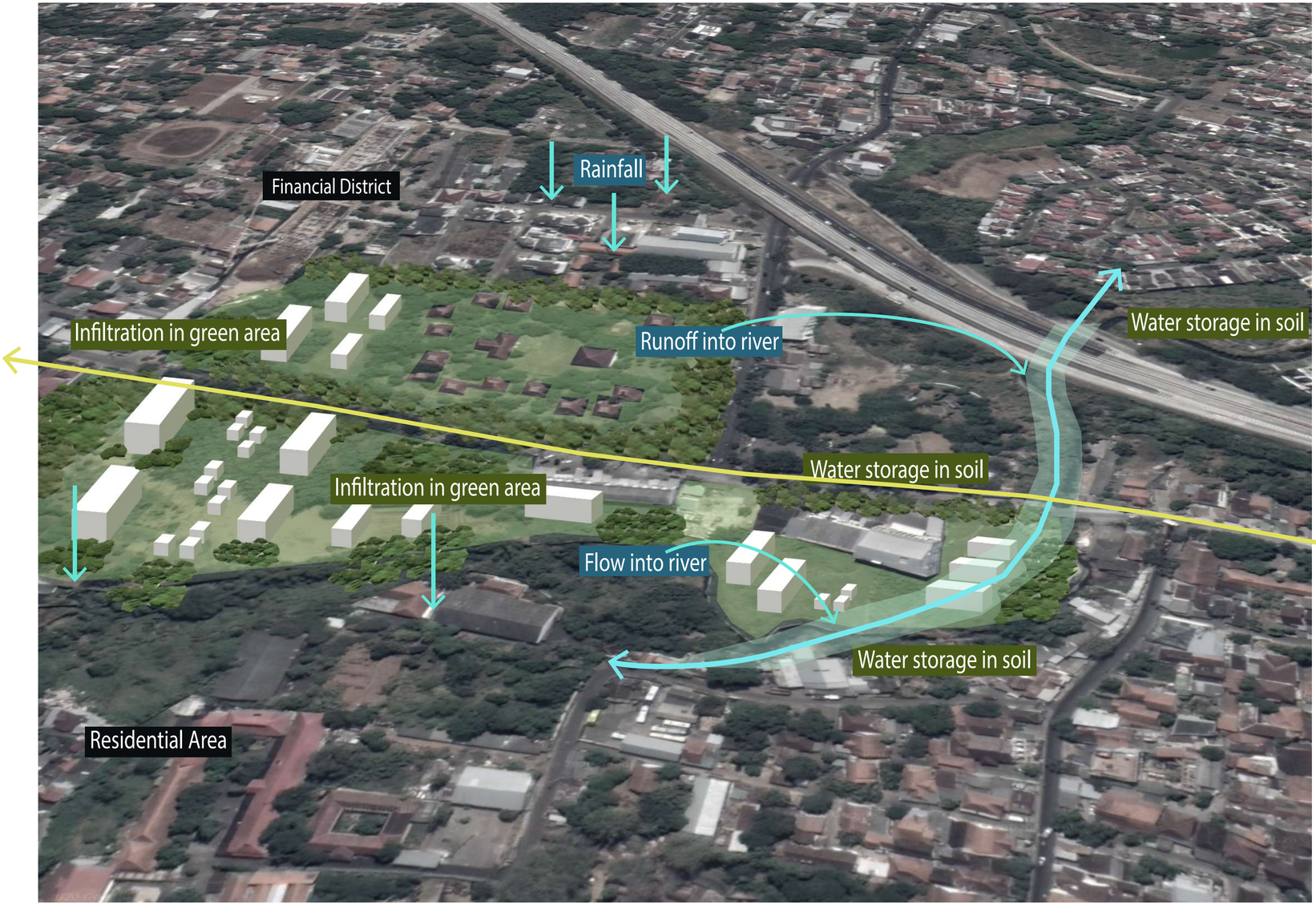


Energy Recycle

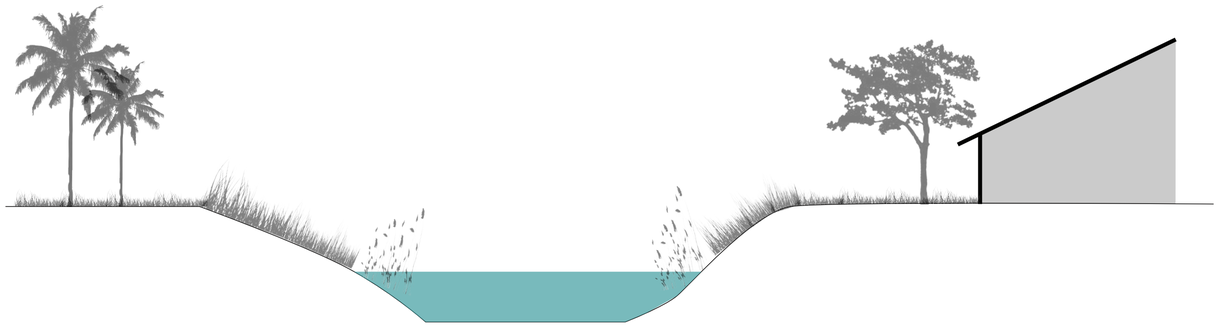


Water Re-use

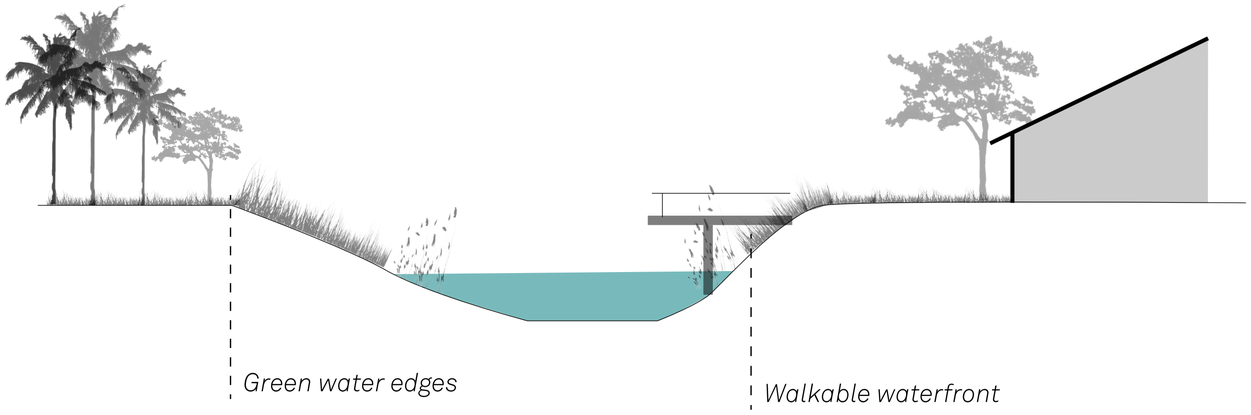




CURRENT

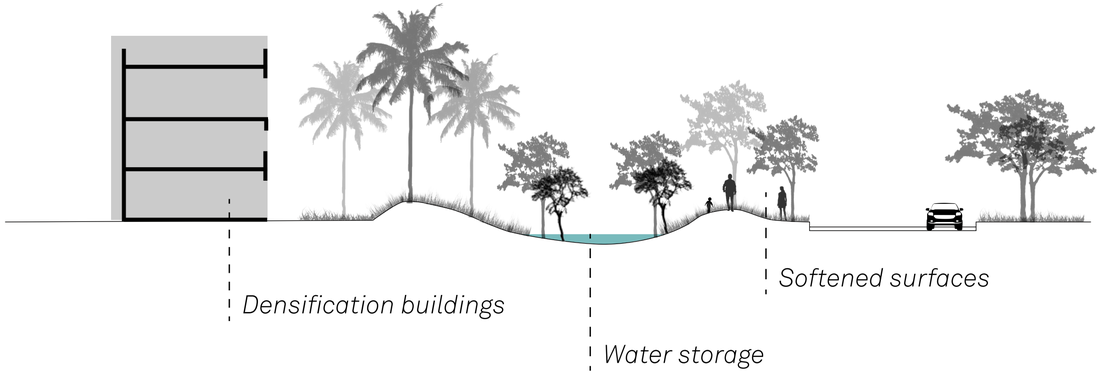


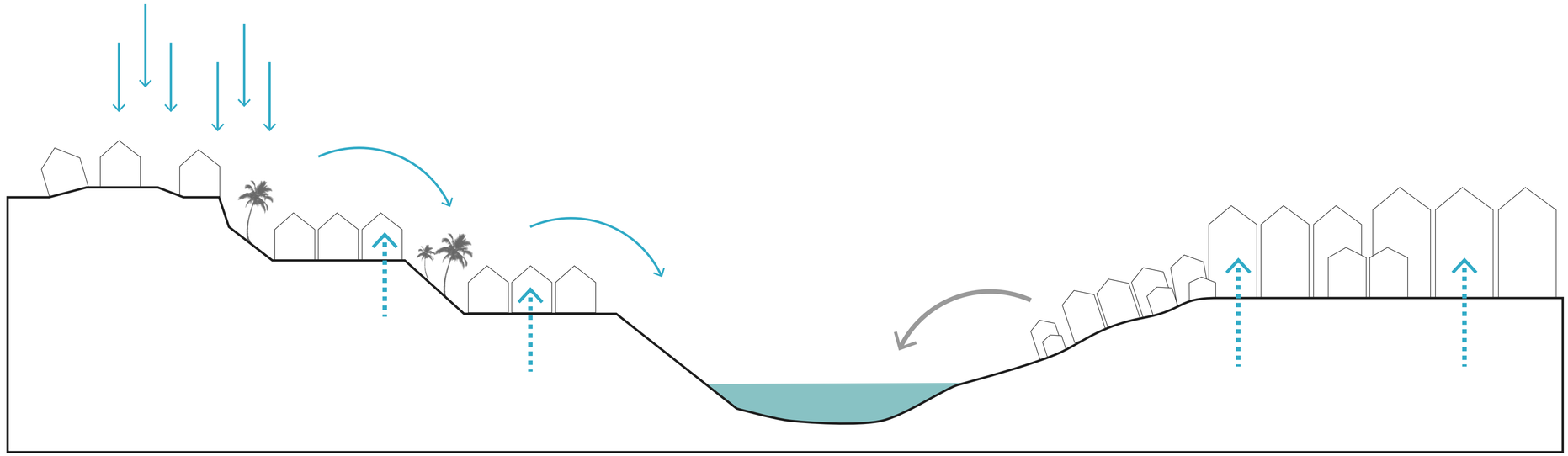
EXPECTED



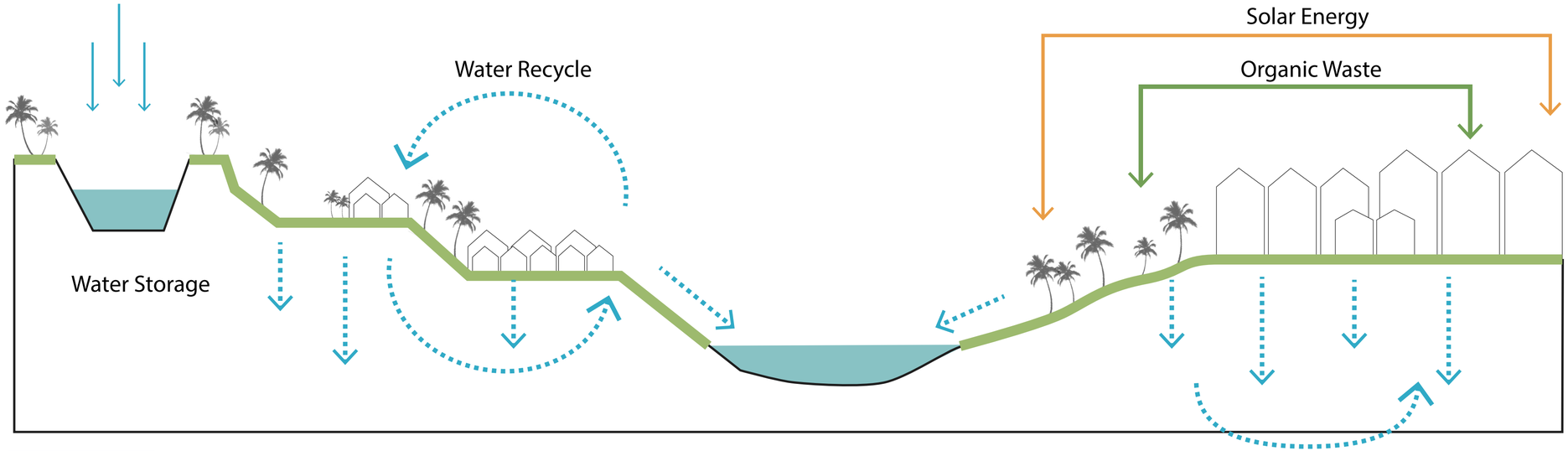
CURRENT

EXPECTED

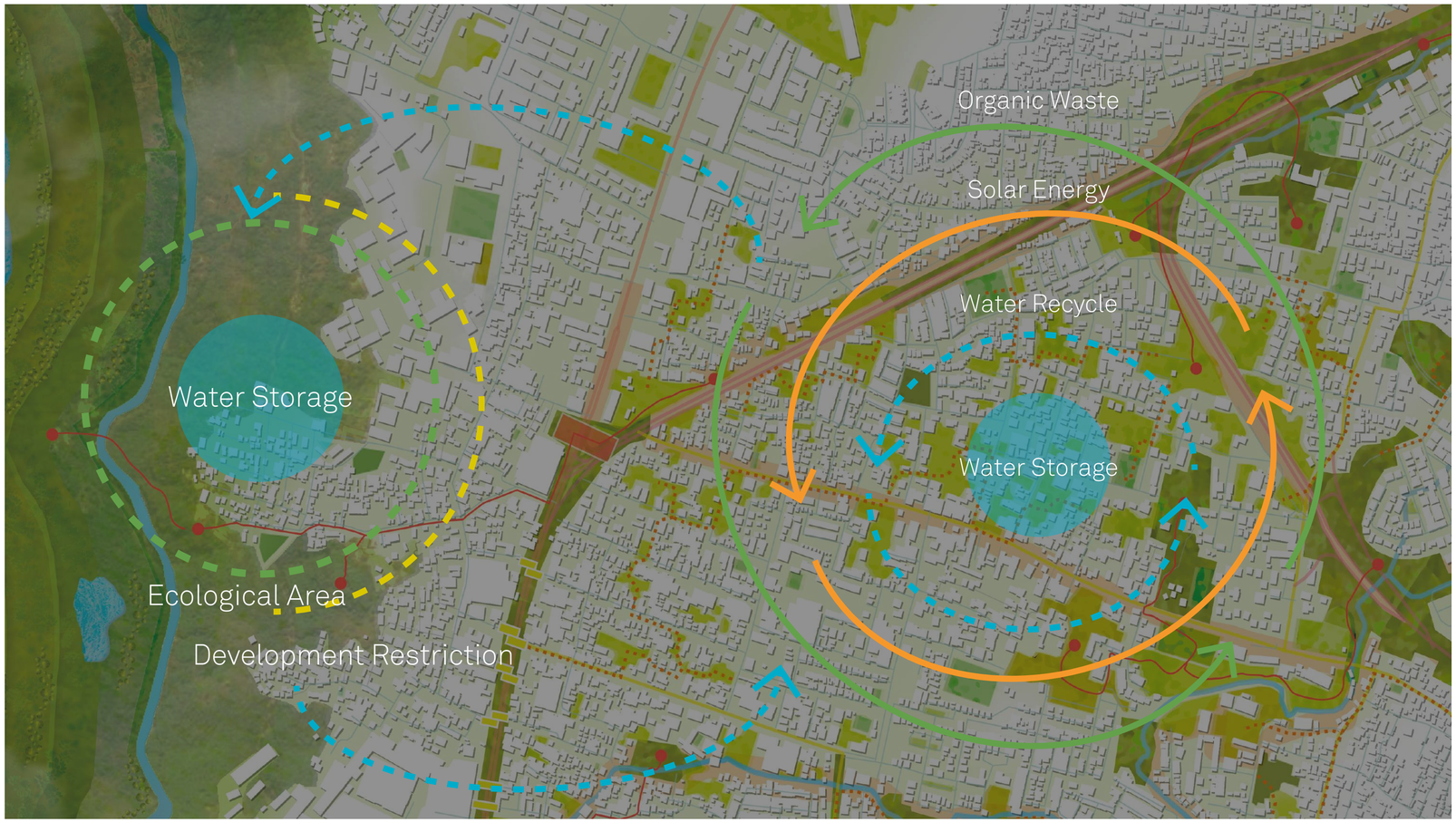


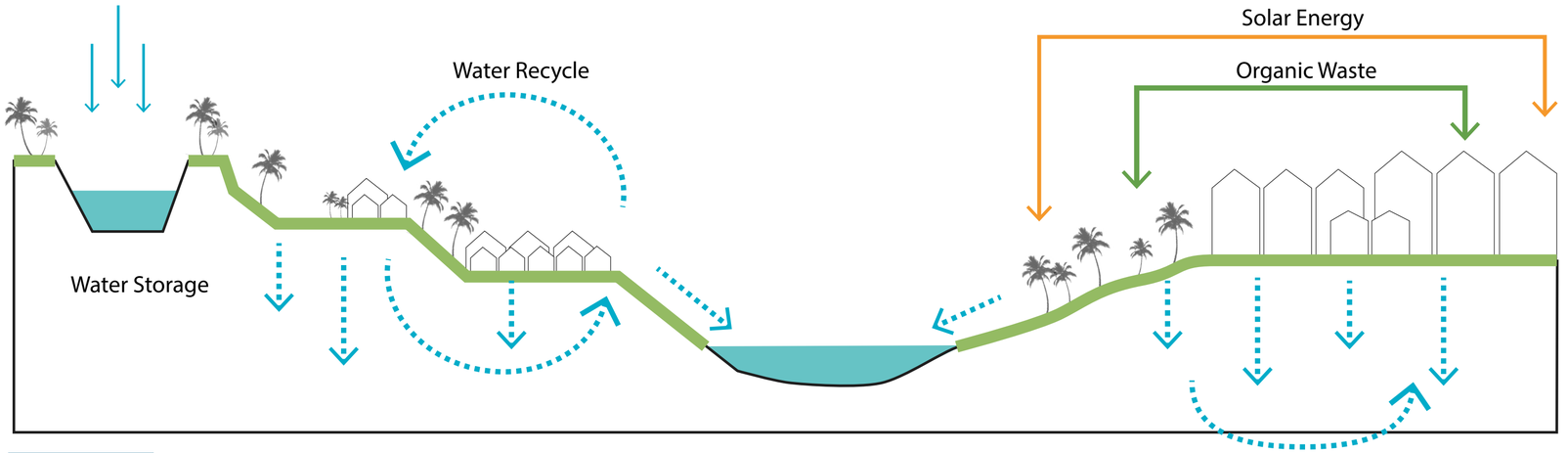


CURRENT

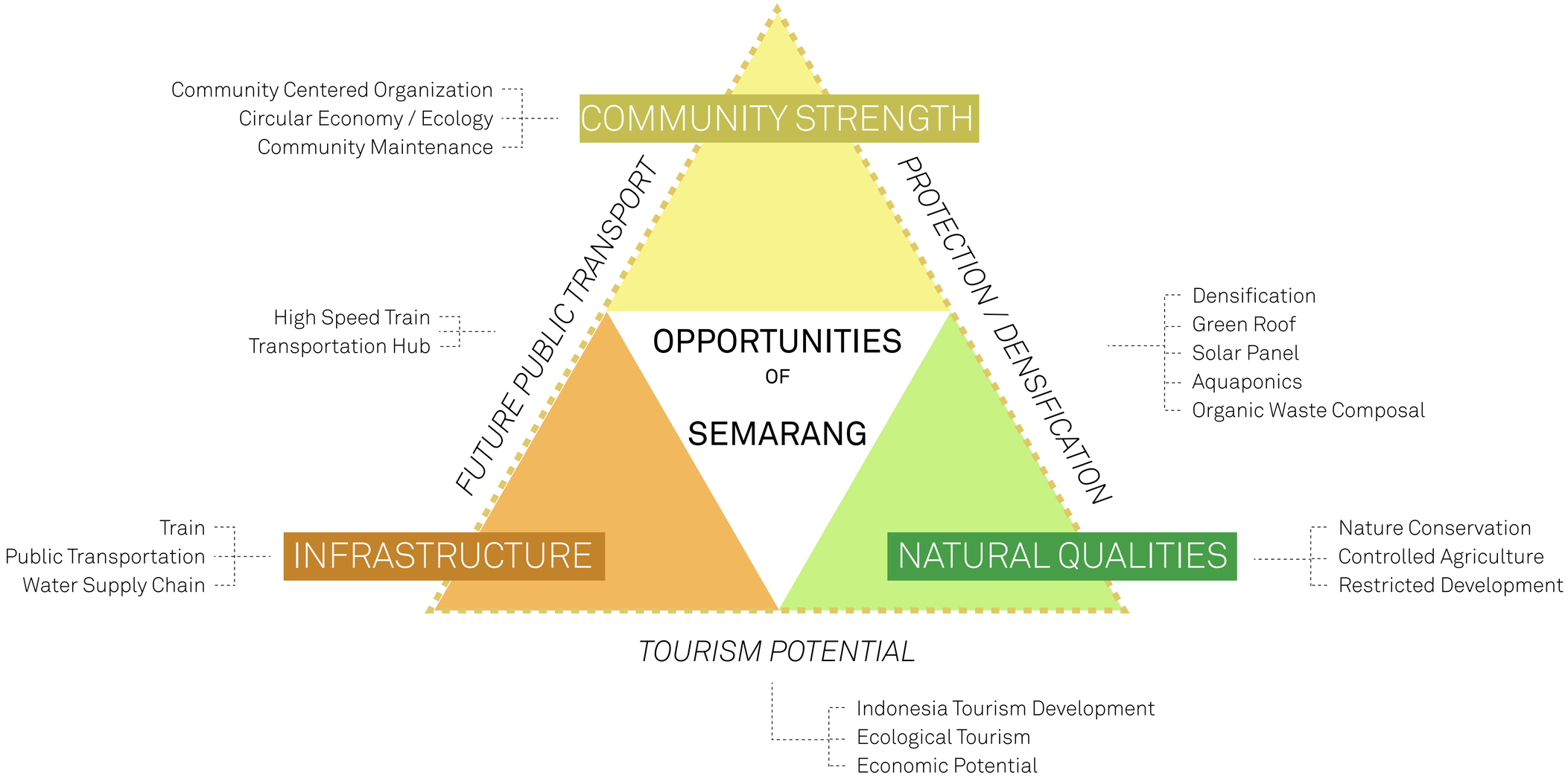


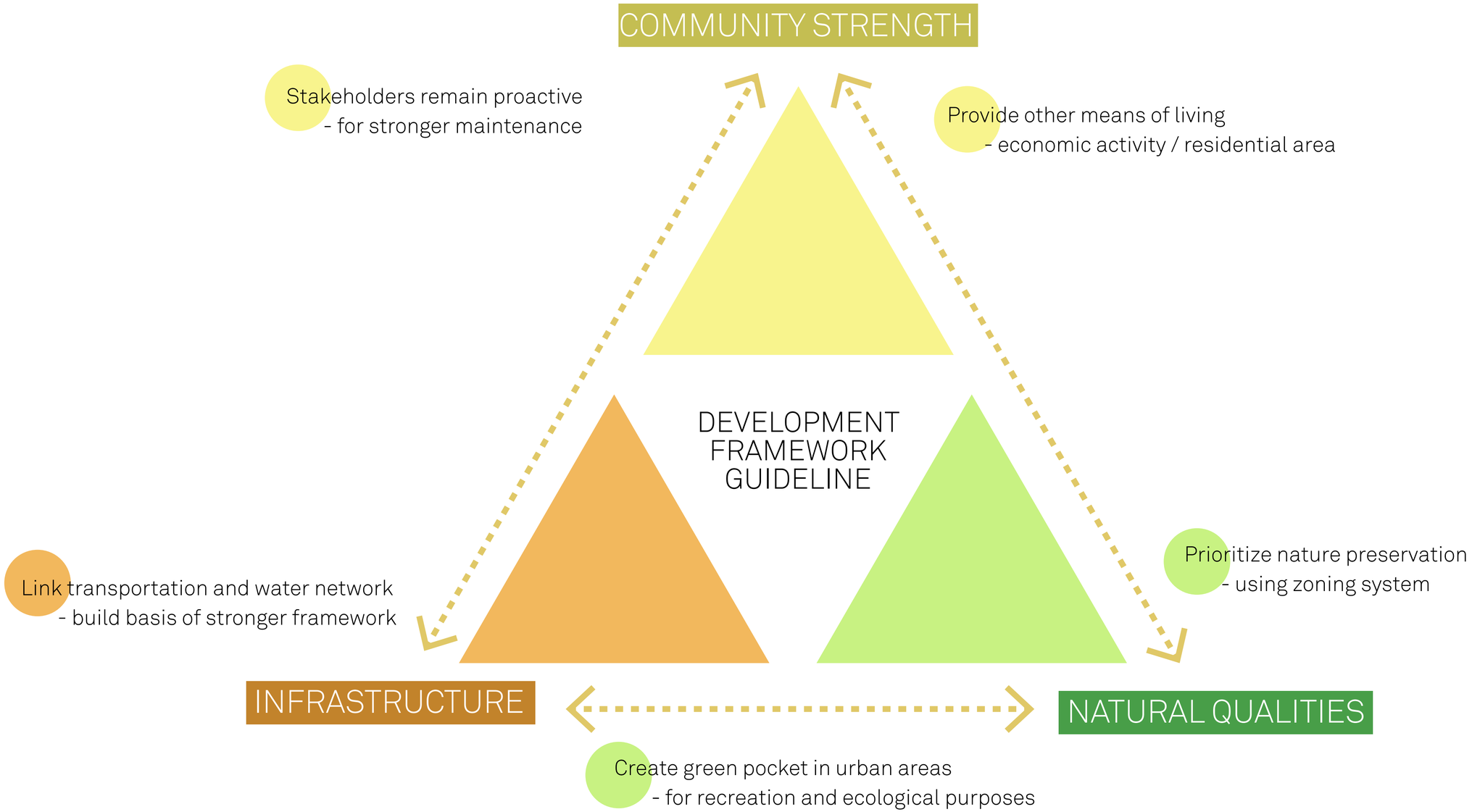
EXPECTED

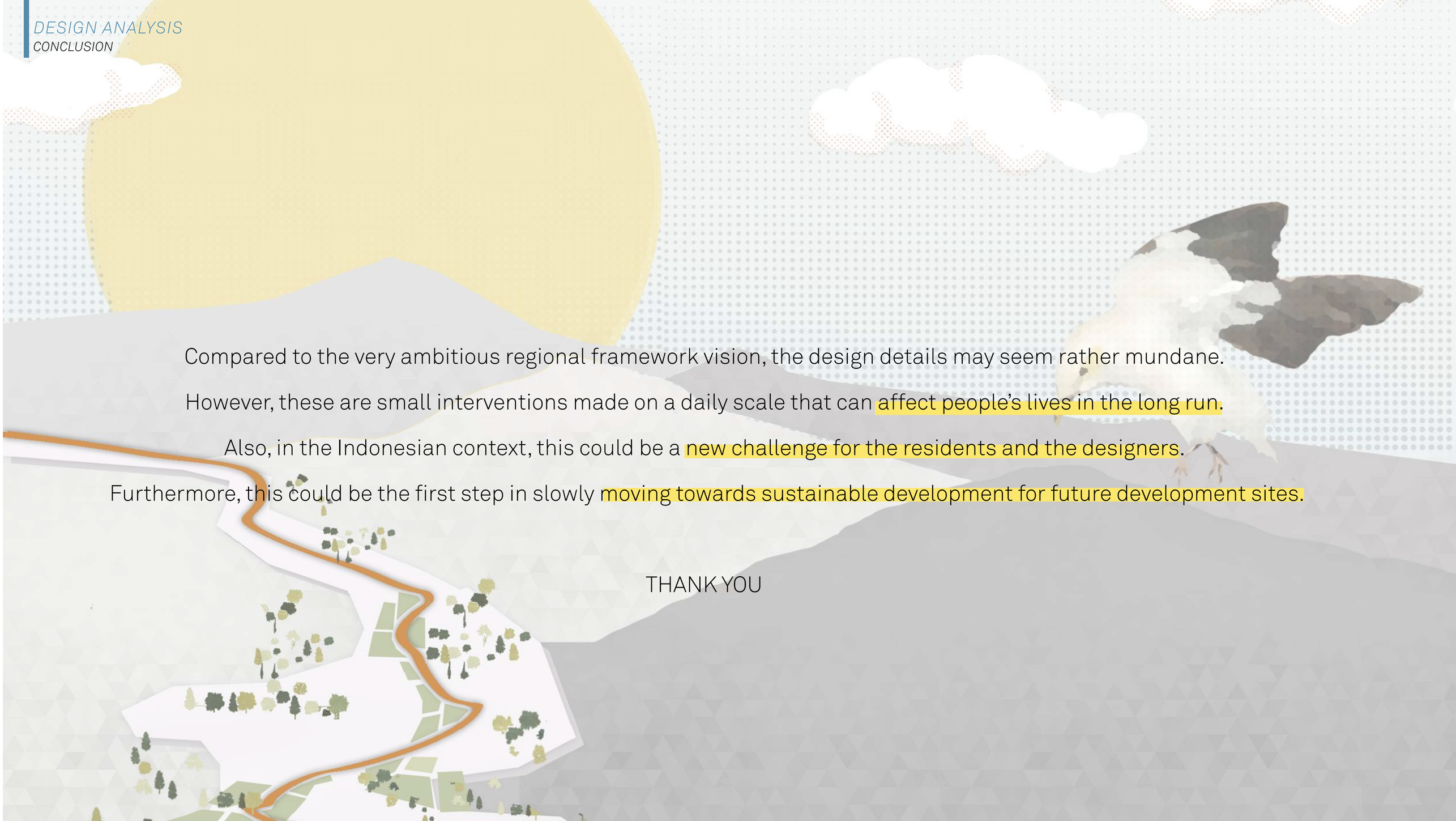

Organic Waste
Solar Energy
Water Recycle
Water Storage
Water Storage
Ecological Area
Development Restriction


Water Recycle
Water Storage
Solar Energy
Organic Waste
Water Recycle

EXPECTED


Community Centered Organization
Circular Economy / Ecology
Community Maintenance
COMMUNITY STRENGTH
FUTURE PUBLIC TRANSPORT
PROTECTION / DENSIFICATION
High Speed Train
Transportation Hub
OPPORTUNITIES
OF
SEMARANG
Densification
Green Roof
Solar Panel
Aquaponics
Organic Waste Composal
Train
Public Transportation
Water Supply Chain
INFRASTRUCTURE
NATURAL QUALITIES
Nature Conservation
Controlled Agriculture
Restricted Development
TOURISM POTENTIAL
Indonesia Tourism Development
Ecological Tourism
Economic Potential


COMMUNITY STRENGTH
Stakeholders remain proactive
- for stronger maintenance
Provide other means of living
- economic activity / residential area
DEVELOPMENT
FRAMEWORK
GUIDELINE
Link transportation and water network
- build basis of stronger framework
Prioritize nature preservation
- using zoning system
INFRASTRUCTURE
NATURAL QUALITIES
Create green pocket in urban areas
- for recreation and ecological purposes



Compared to the very ambitious regional framework vision, the design details may seem rather mundane.

However, these are small interventions made on a daily scale that can affect people's lives in the long run.

Also, in the Indonesian context, this could be a new challenge for the residents and the designers.

Furthermore, this could be the first step in slowly moving towards sustainable development for future development sites.

THANK YOU