

ADAPTIVE RESILIENCE

THE ADDED VALUE TO A CHANGING WORLD

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Bandung Metropolitan Area

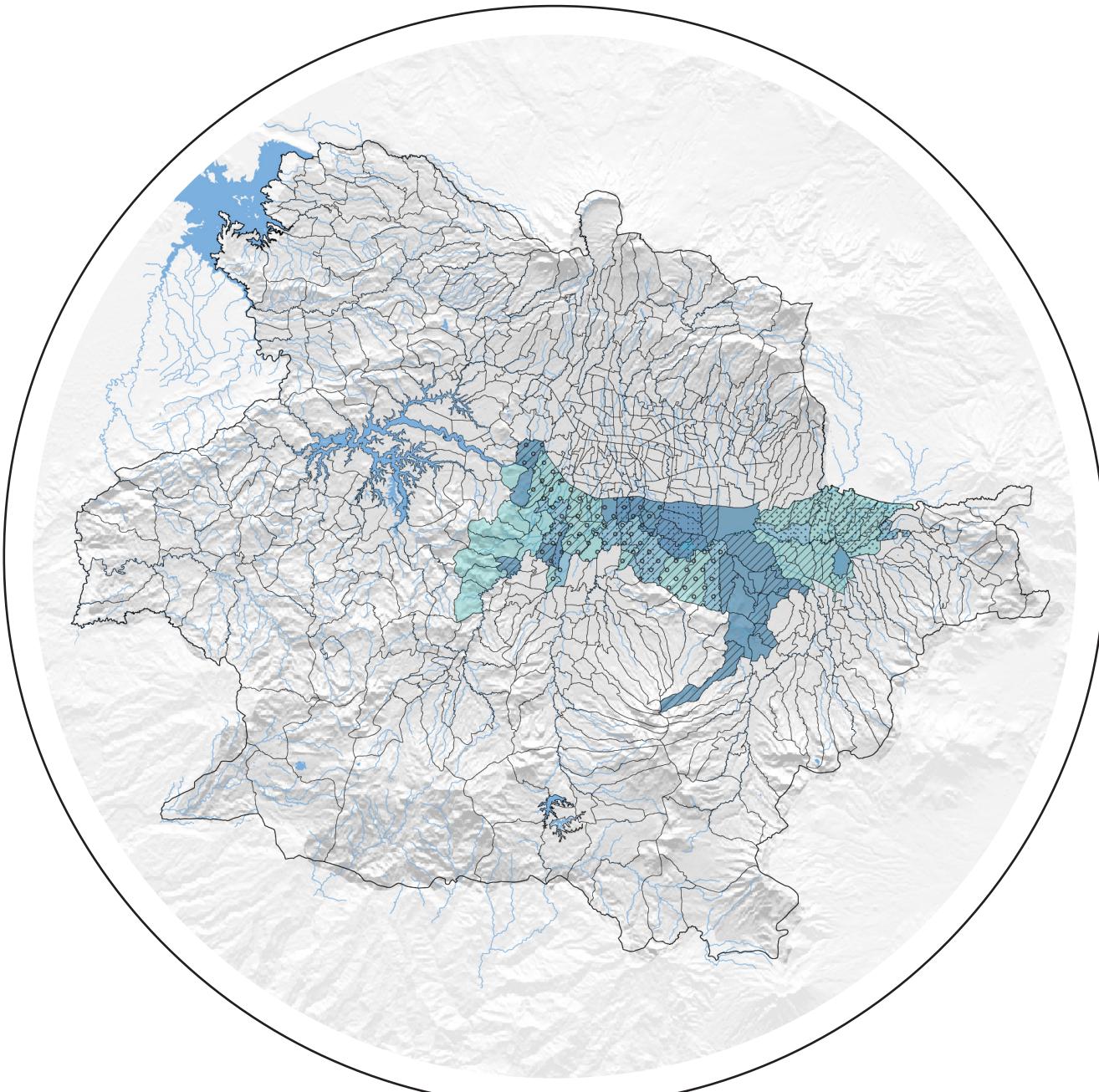


Figure 1 Citarum Harum
Source: Martin Muljana

Bandung Metropolitan Area

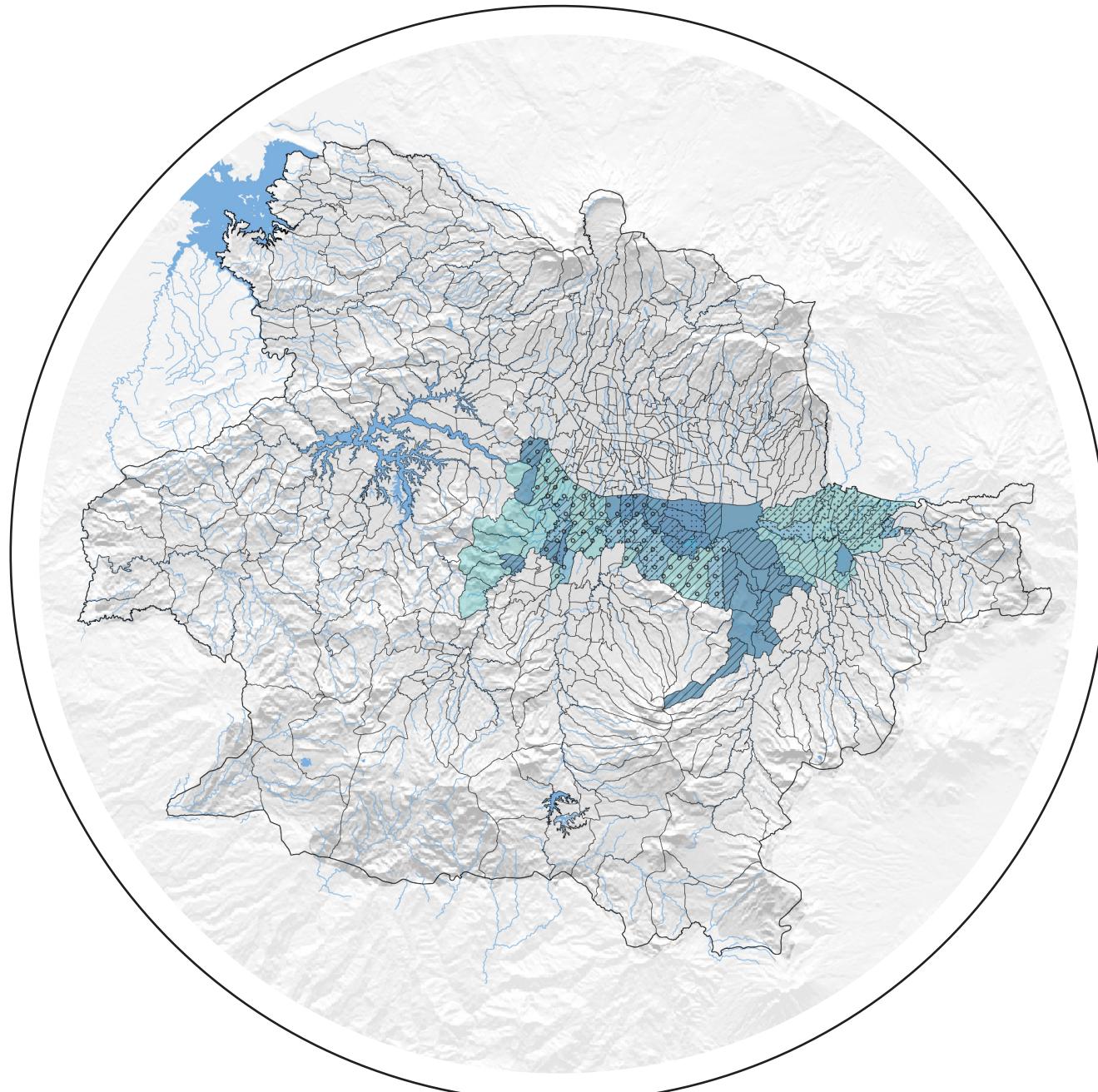


Figure 2 Citarum Harum
Source: Martin Muljana



Figure 3 Flooding in Dayeuhkholot Village, 21 April 2019
Source: Martin Muljana



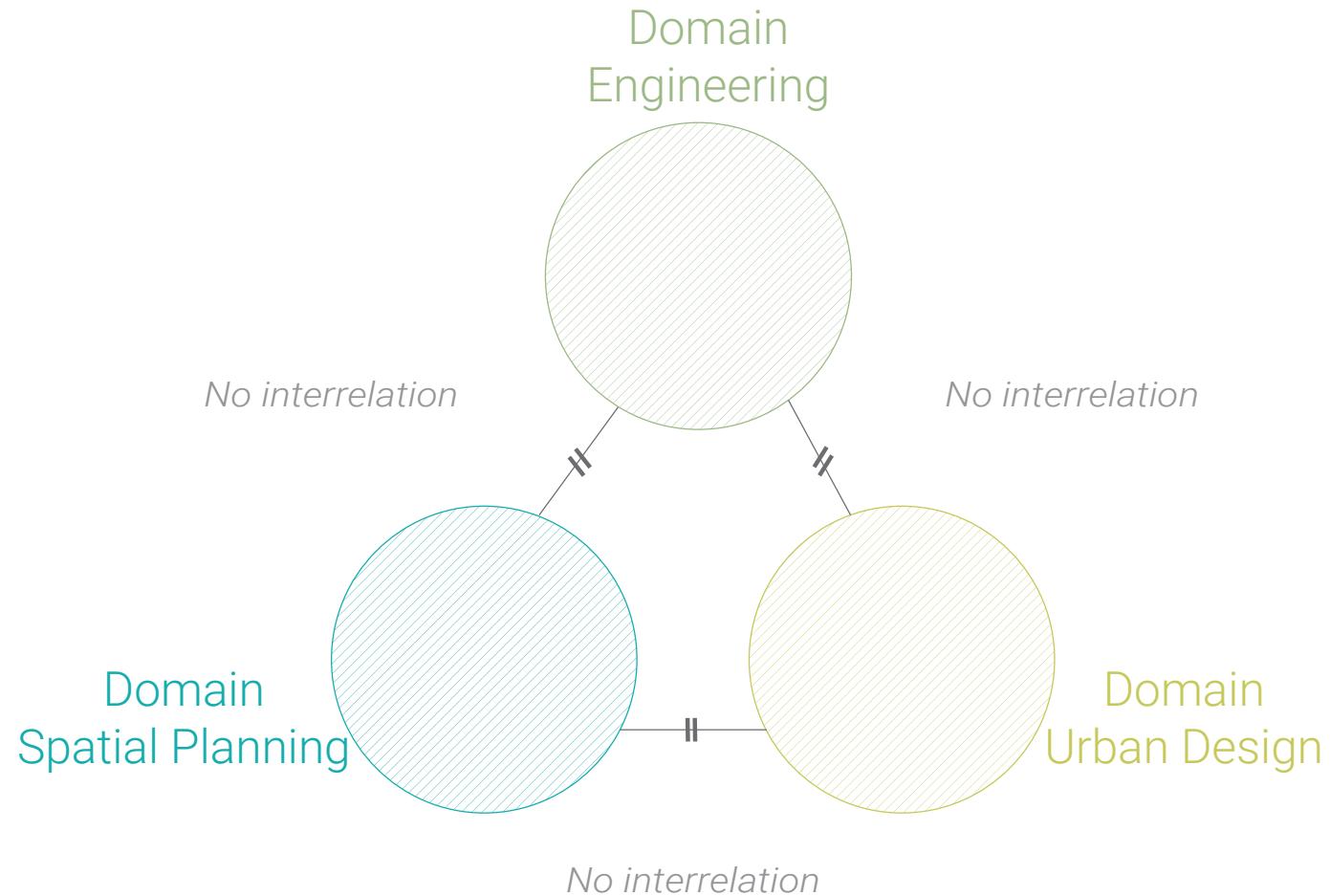
Figure 4 Waste Dike
Source: Author



Figure 5 Waste field
Source: Author

Why is there a difference between intentions and reality?

Current Model of Building Resiliency in the Urban Realm



Conceptual Model of Building Resiliency in the Urban Realm

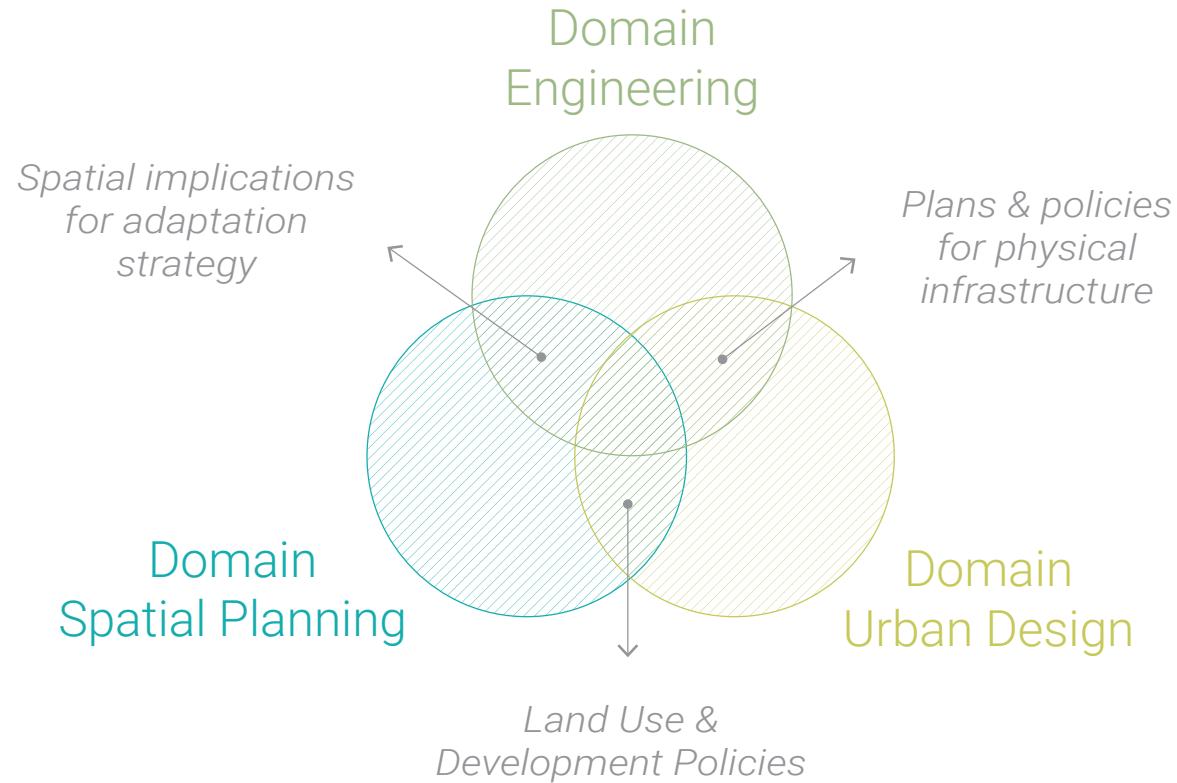




Figure 6 Formal - Informal
Source: unknown



Figure 7 Paj Yayat
Source: Author



Figure 8 Welcome
Source: Martin Muljana



Figure 9 "A baby in a bucket"

Source: Photo by Novrian Arbi / Antara, 2016, adapted by Author

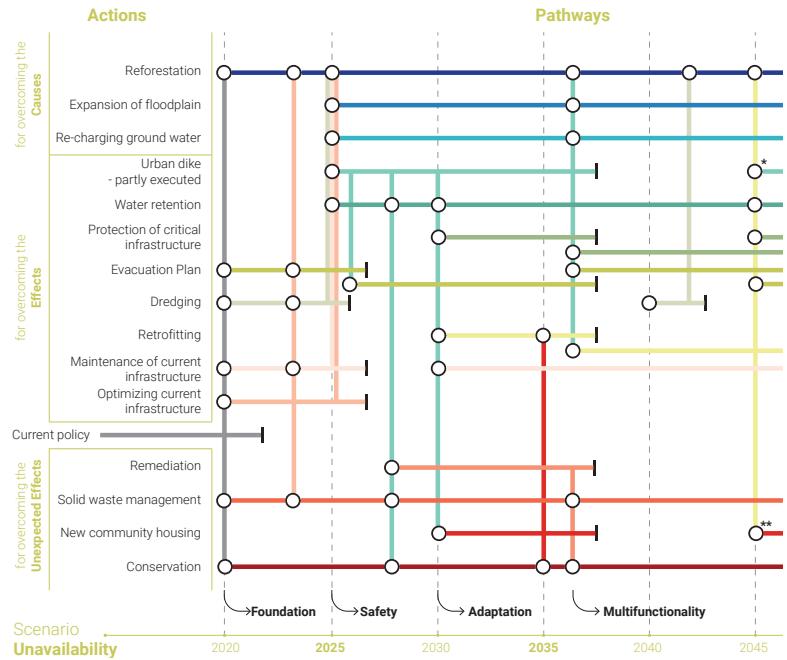
Research Question

How can the flood risk adaptation strategies overcome
both the physical and social vulnerabilities while sustaining
healthy and just urban environments in Bandung?

Answer

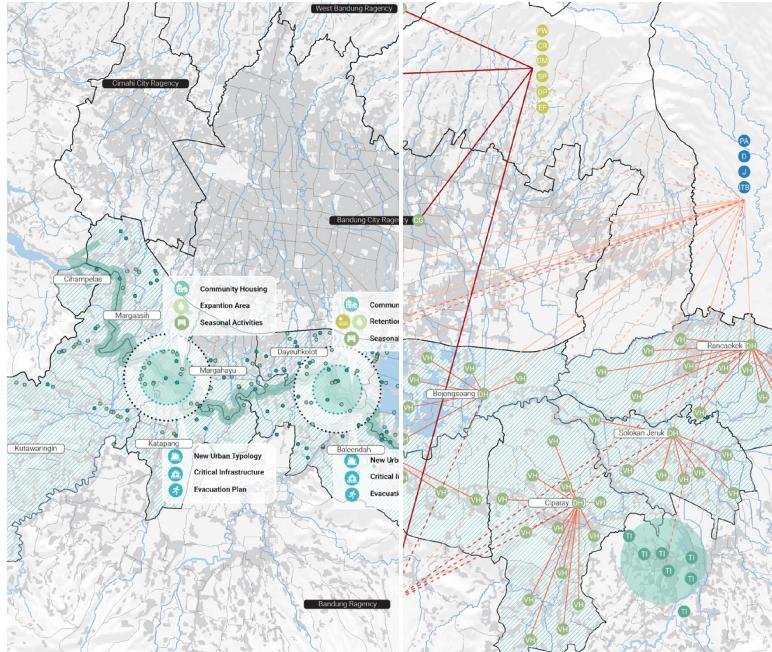
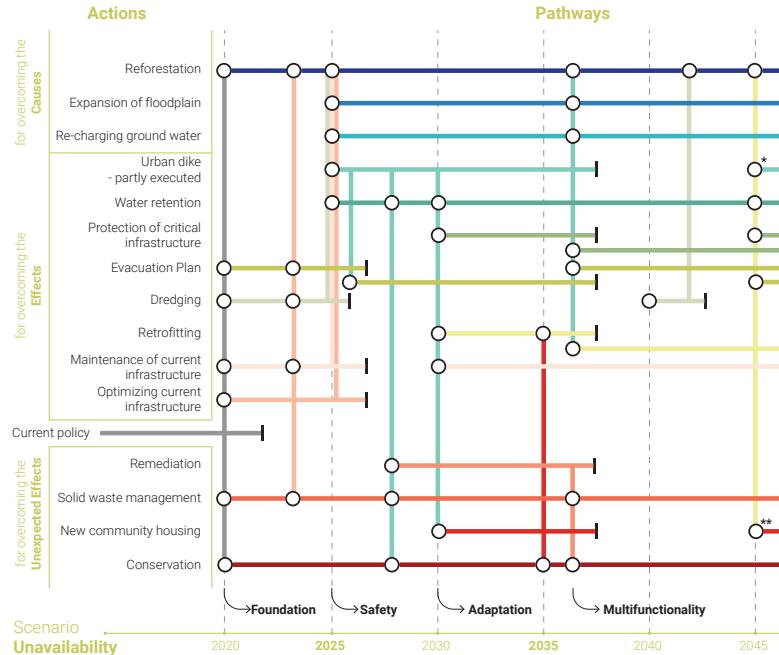
Answer

Planning



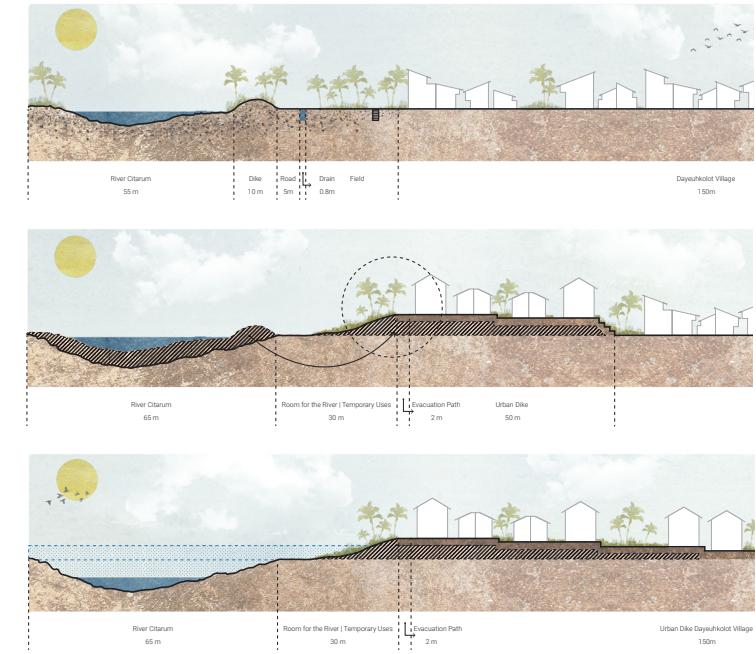
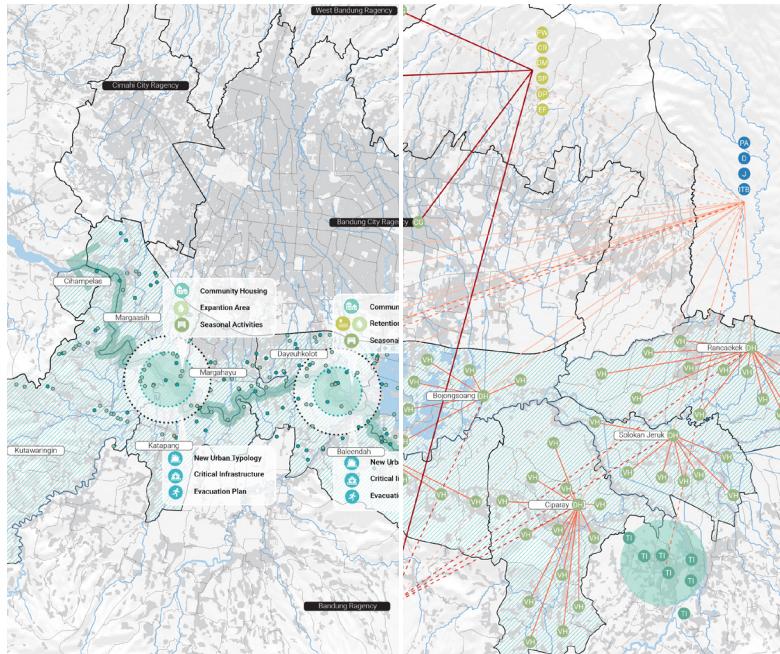
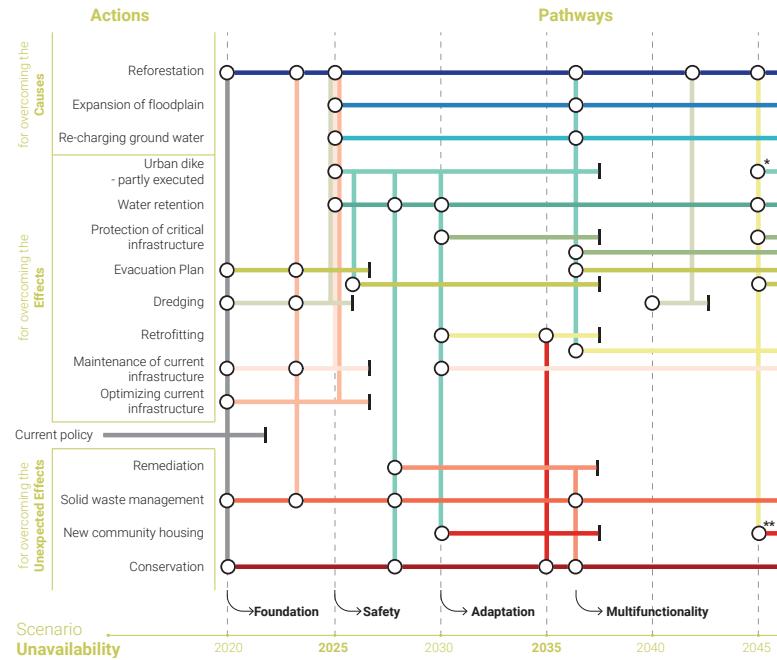
Answer

Planning → Strategy

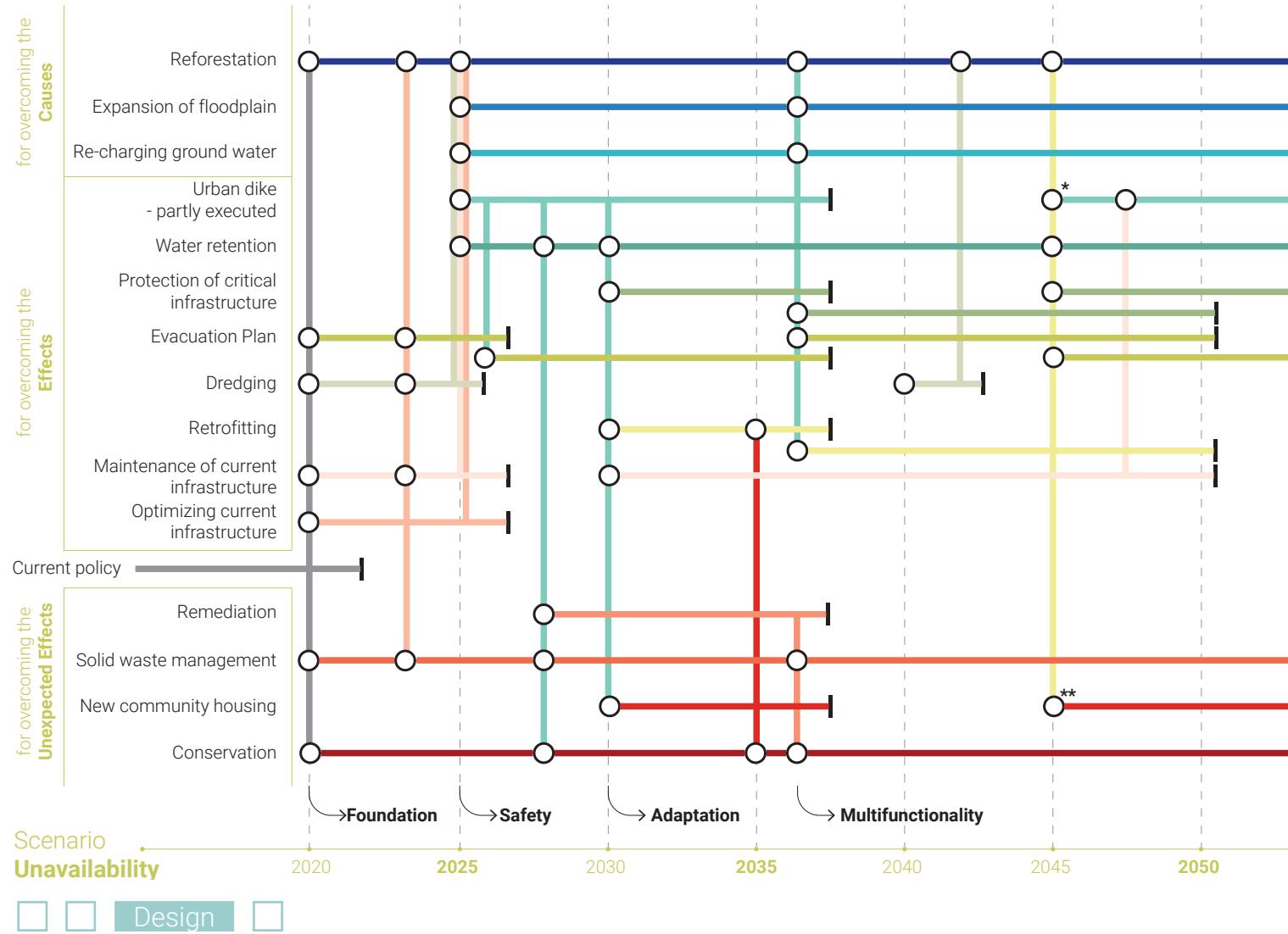


Answer

Planning → Strategy → Design

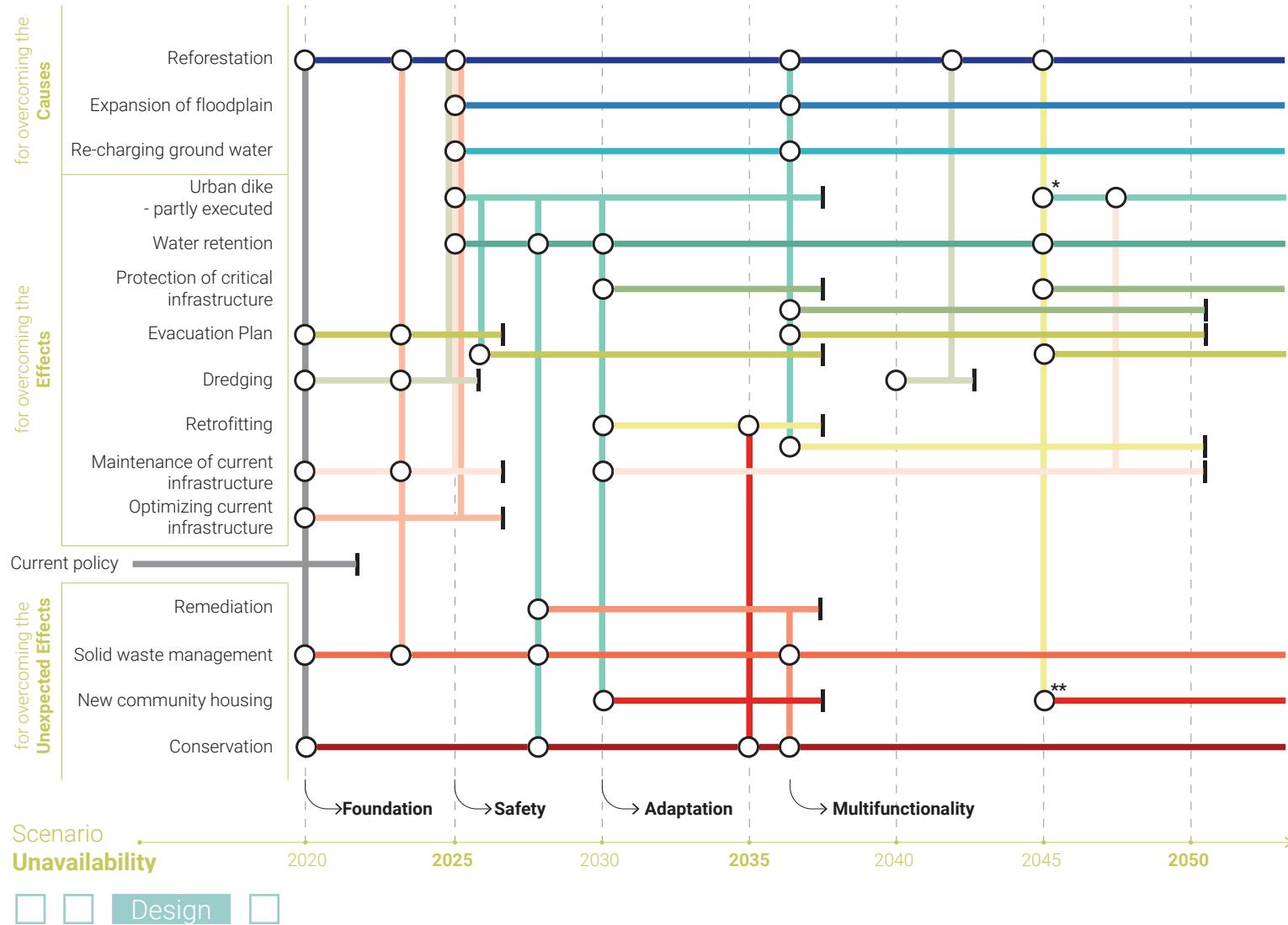


Dynamic Adaptive Policy Pathways



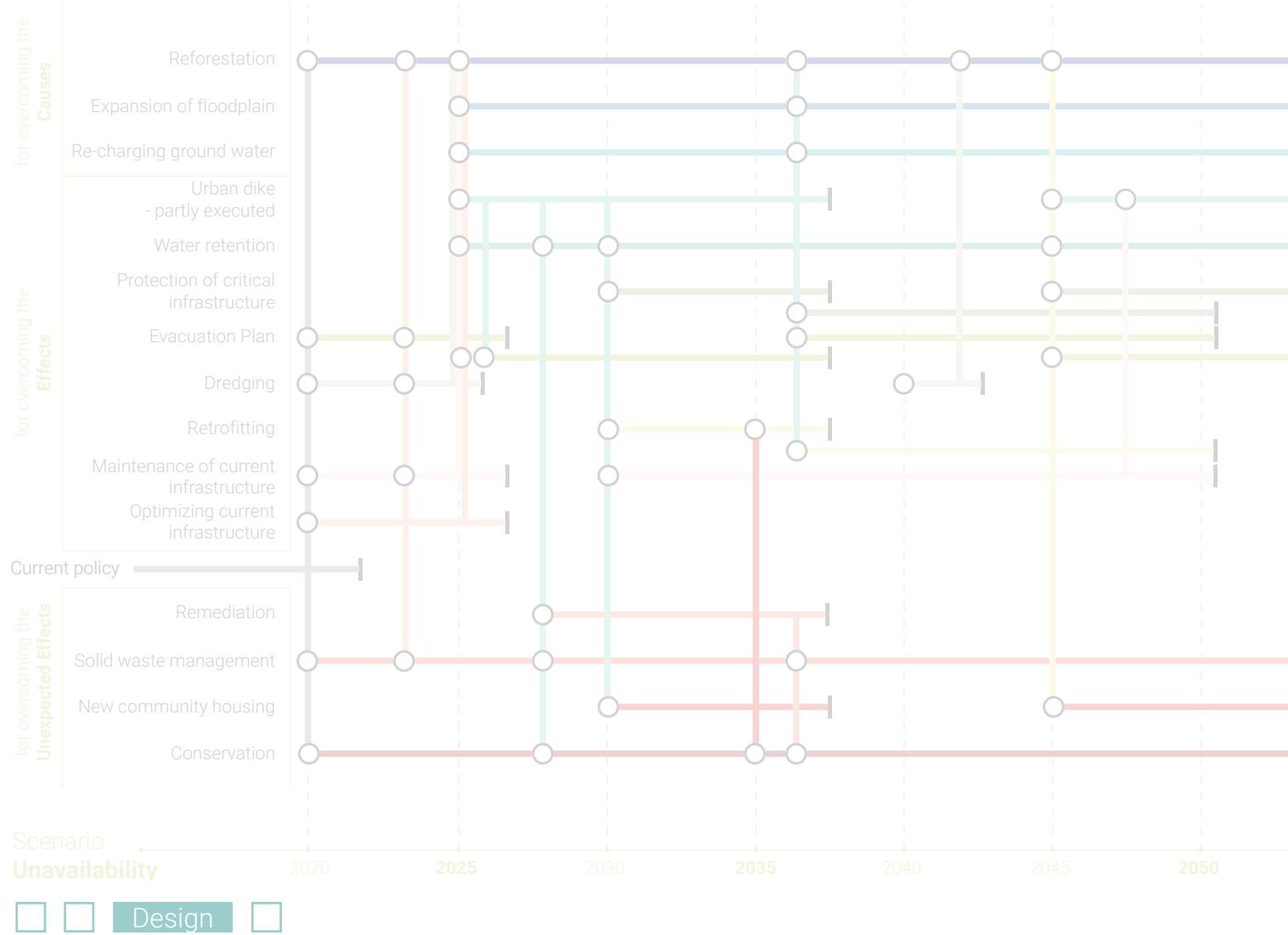
- Dealing with uncertainty
- Flexibility and adaptation in configuring new types of spatial conditions
- Accommodates future changes in the system
- Allows creating long term planning, thus avoiding lock-in situations
- Uses assembly of measures, which benefit from each other or replace one another

Dynamic Adaptive Policy Pathways

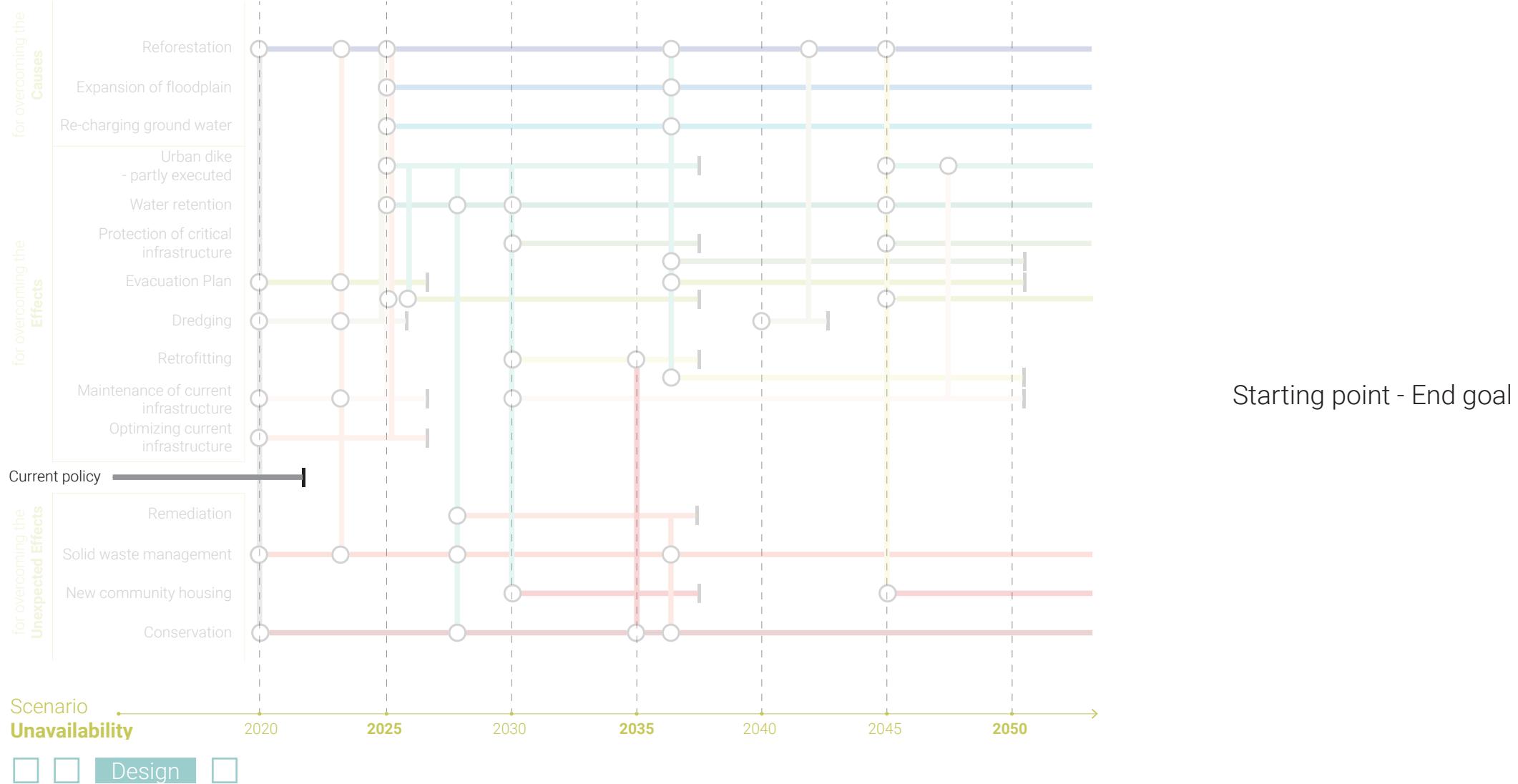


[...] the Indonesian Ministry of Public Works has established management planning for the Citarum watershed but, so far, management of this watershed has tended to be **only partially carried out** (only in certain sectors) owing to a **lack of mutual understanding among the relevant stakeholders**. It is likely that the **absence of common principles** that accommodate the interests of all parties is a factor behind this situation. In addition, **the relevant stakeholders do not as yet properly understand such notions as adopting an ecosystem (landscape) approach** as the basis for watershed rehabilitation. Water managers need to recognize more clearly that there are additional, but no less critical, issues beyond the watershed itself—issues of a sociological, ecological, and also political nature."

How does DAPP work?



How does DAPP work?



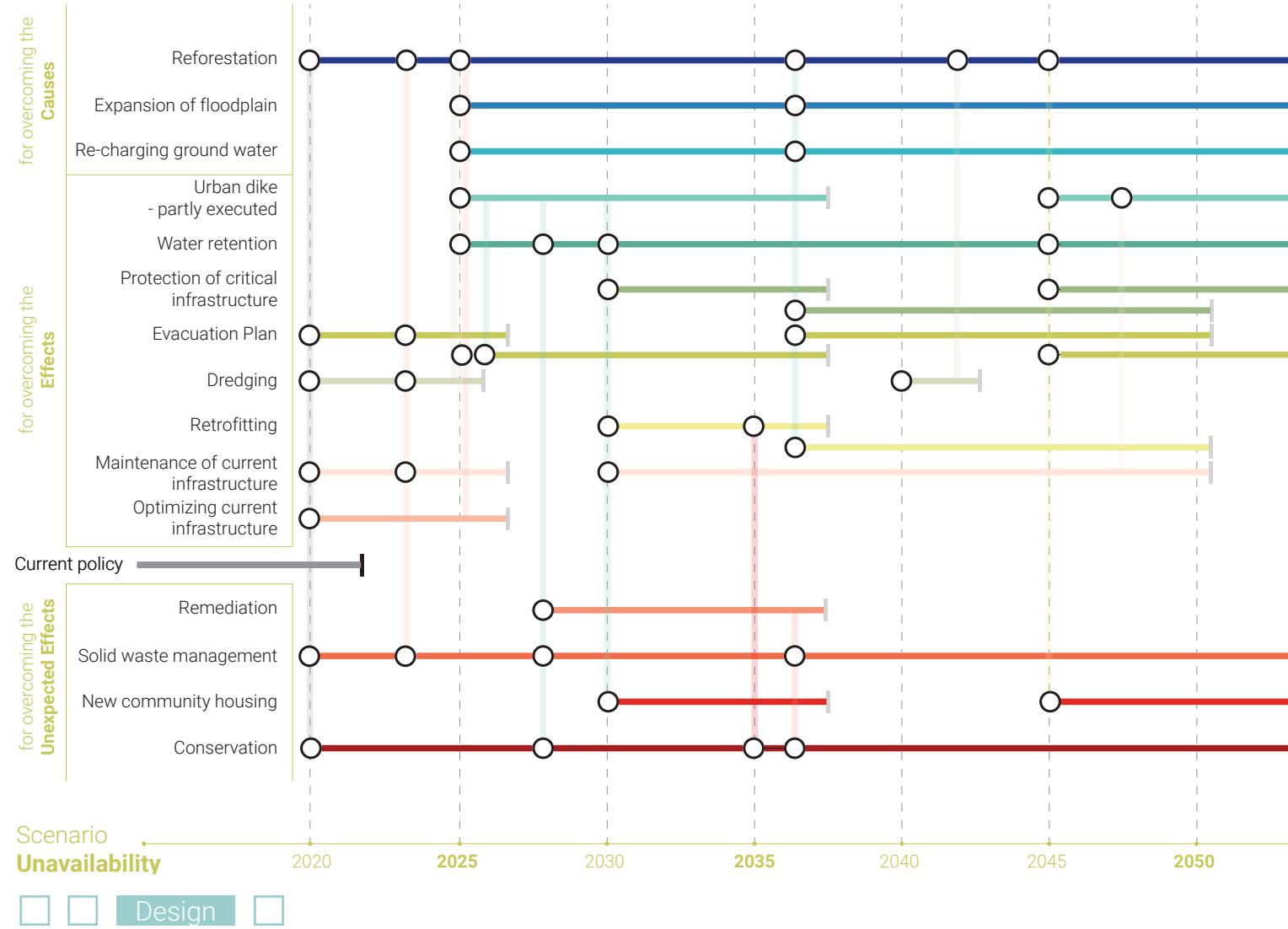
How does DAPP work?



Starting point - End goal

Actions

How does DAPP work?

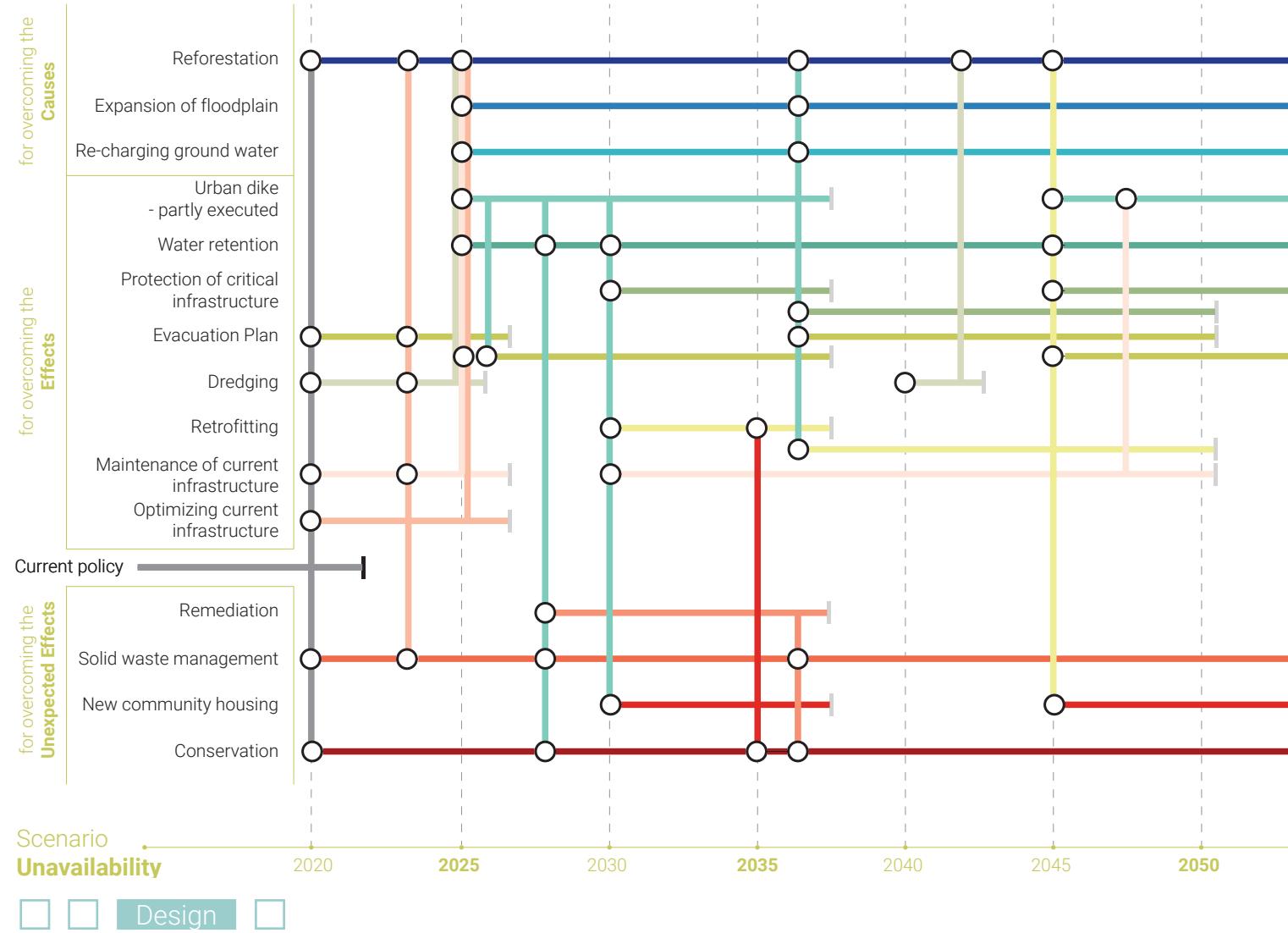


Starting point - End goal

Actions

Transfer Stations

How does DAPP work?

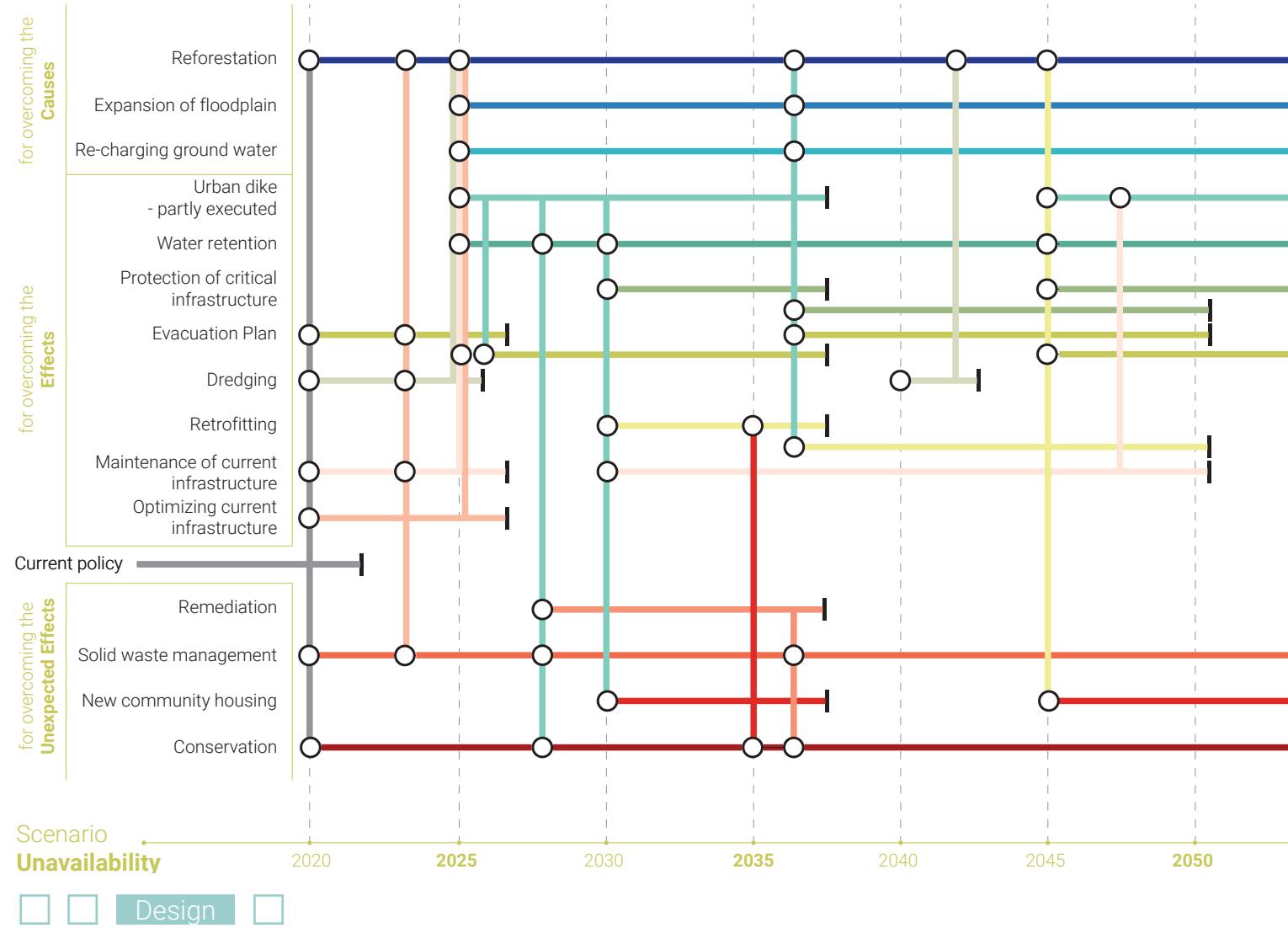


Starting point - End goal

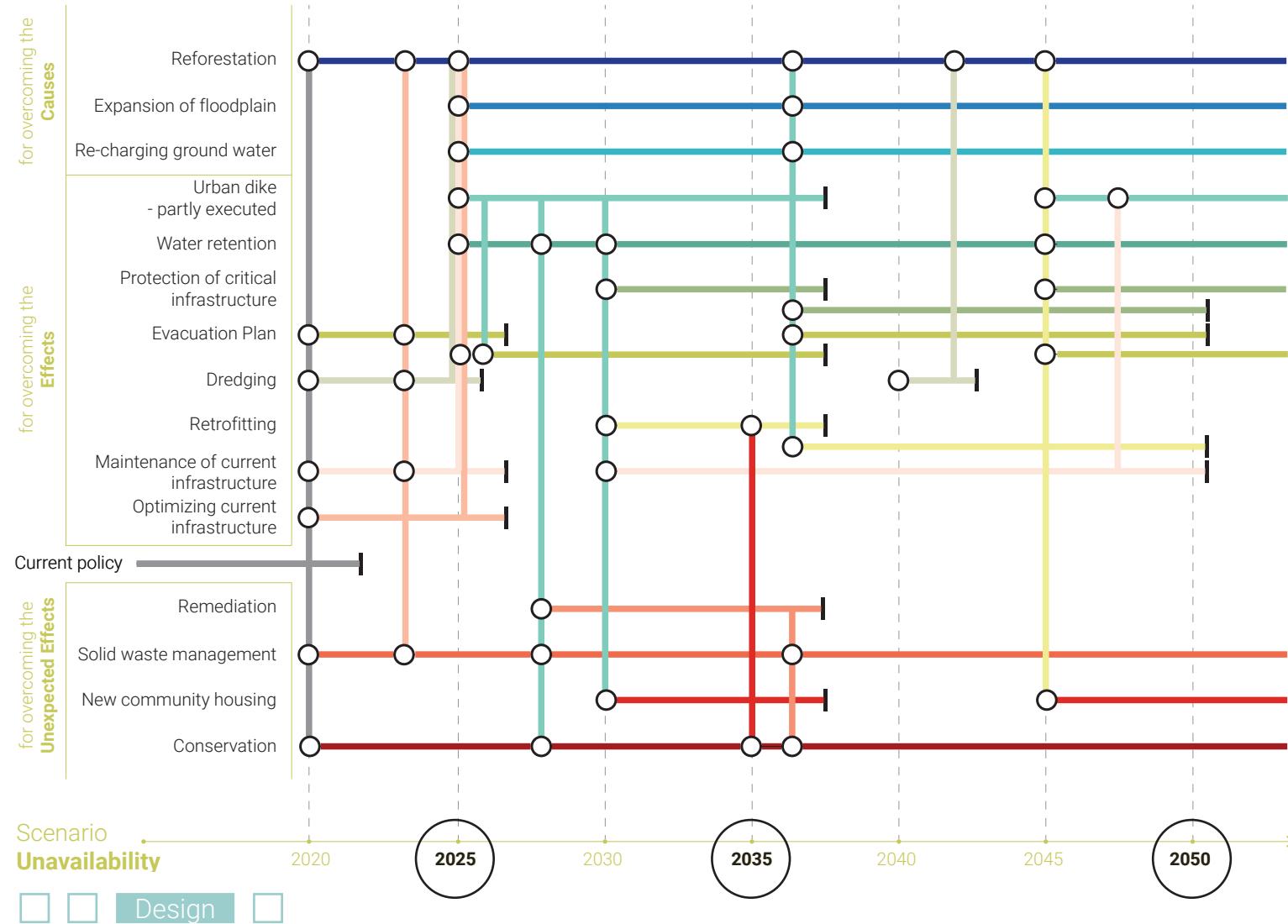
Actions

Transfer Stations

How does DAPP work?



How does DAPP work?



Starting point - End goal

Actions

Transfer Stations

Adaptation tipping points

Scenario tipping points

How does DAPP work?

- **Flood event on the first 5 year return period, resulting in damaged and destroyed properties.**
- Steady population growth and internal migration to urbanized areas.
- The current infrastructure and policy setting cannot sustain the changes in the systems, thus is not meeting the needs and objectives of the society.

- Climate change is gradually increasing temperatures creating higher possibilities for extreme rainfalls.
- **Population increases double in the metropolitan area, resulting in shortage of housing.**
- The significant changes in the systems terminate many undertaken actions due to incomplete defence and housing infrastructure.

- Extreme weather conditions continue, resulting in demand for more areas of water storage and delay.
- The rise in the urban population results in emerging informal settlements in vulnerable areas.
- **The changes in the systems are so big that if there is not a change in the scenario, the goal of the plan would not be reached.**

2025

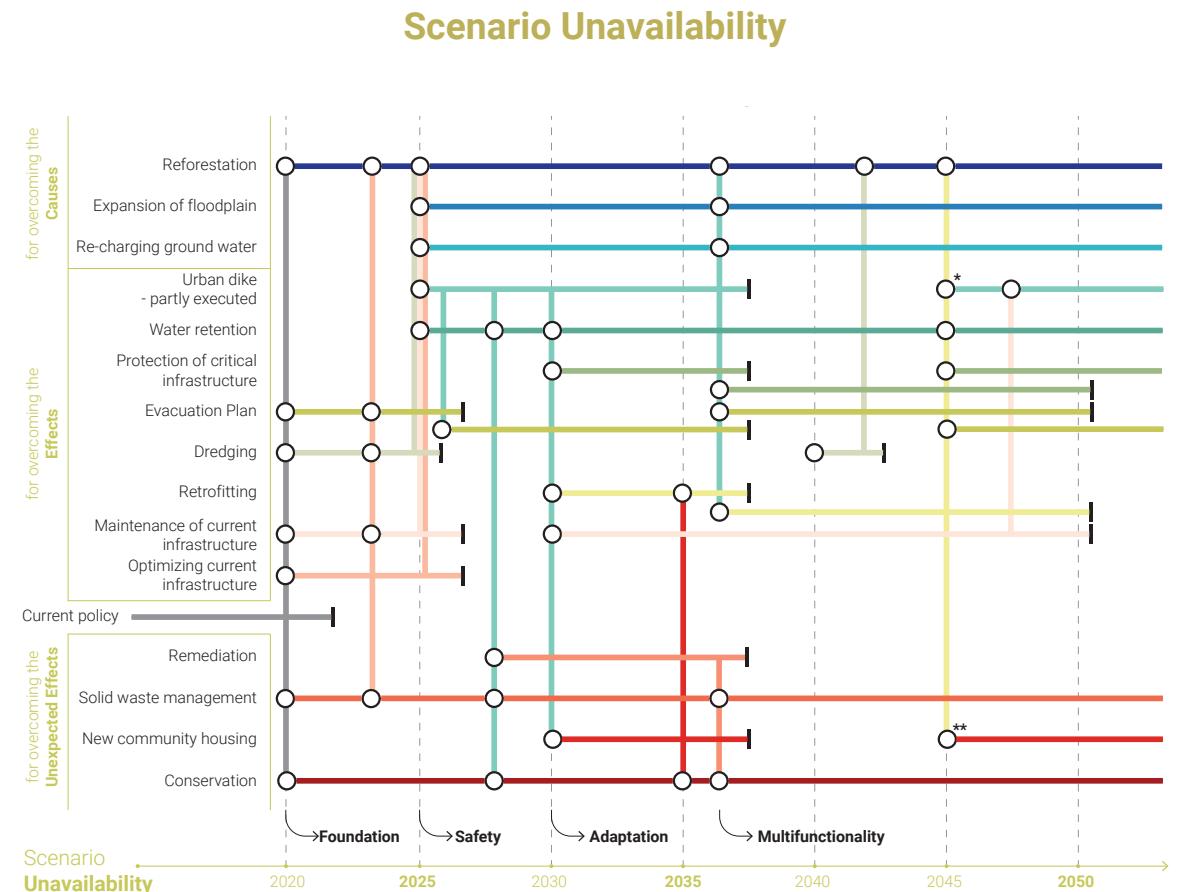
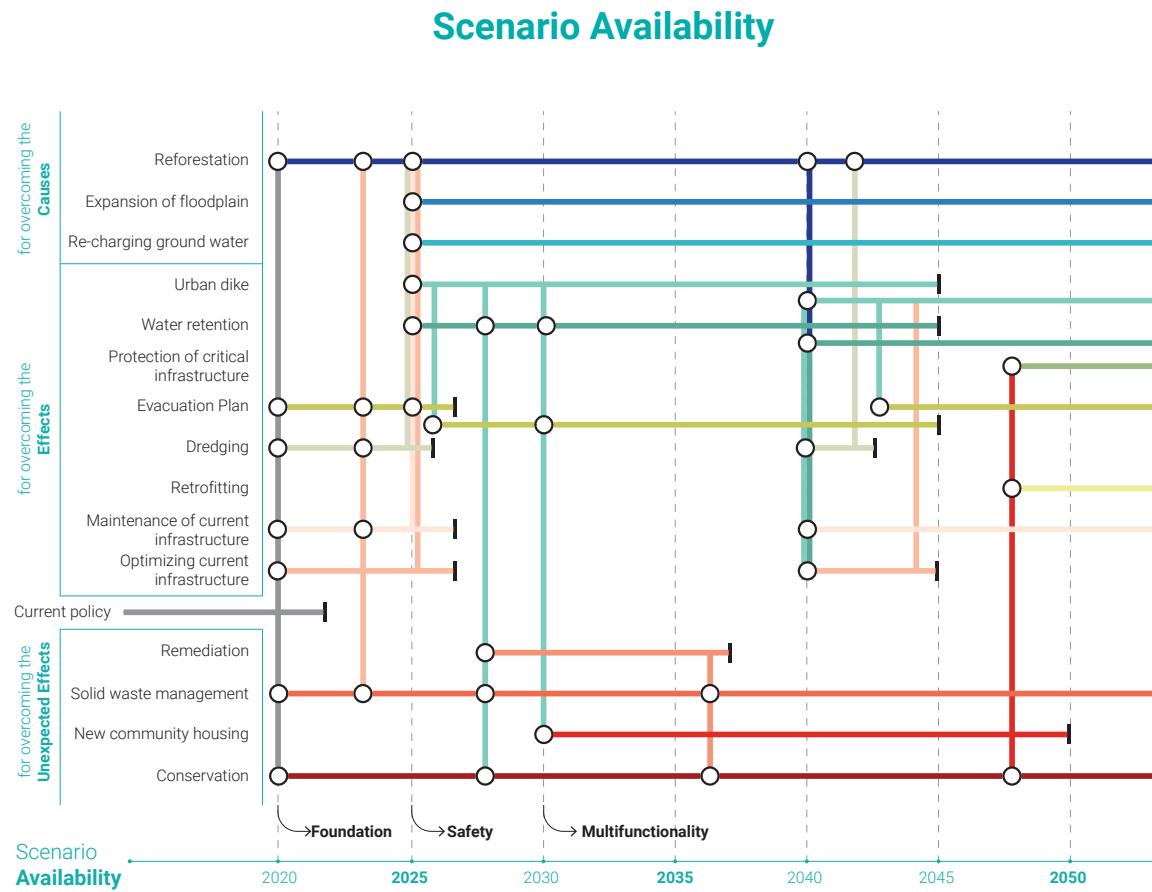
2035

2050

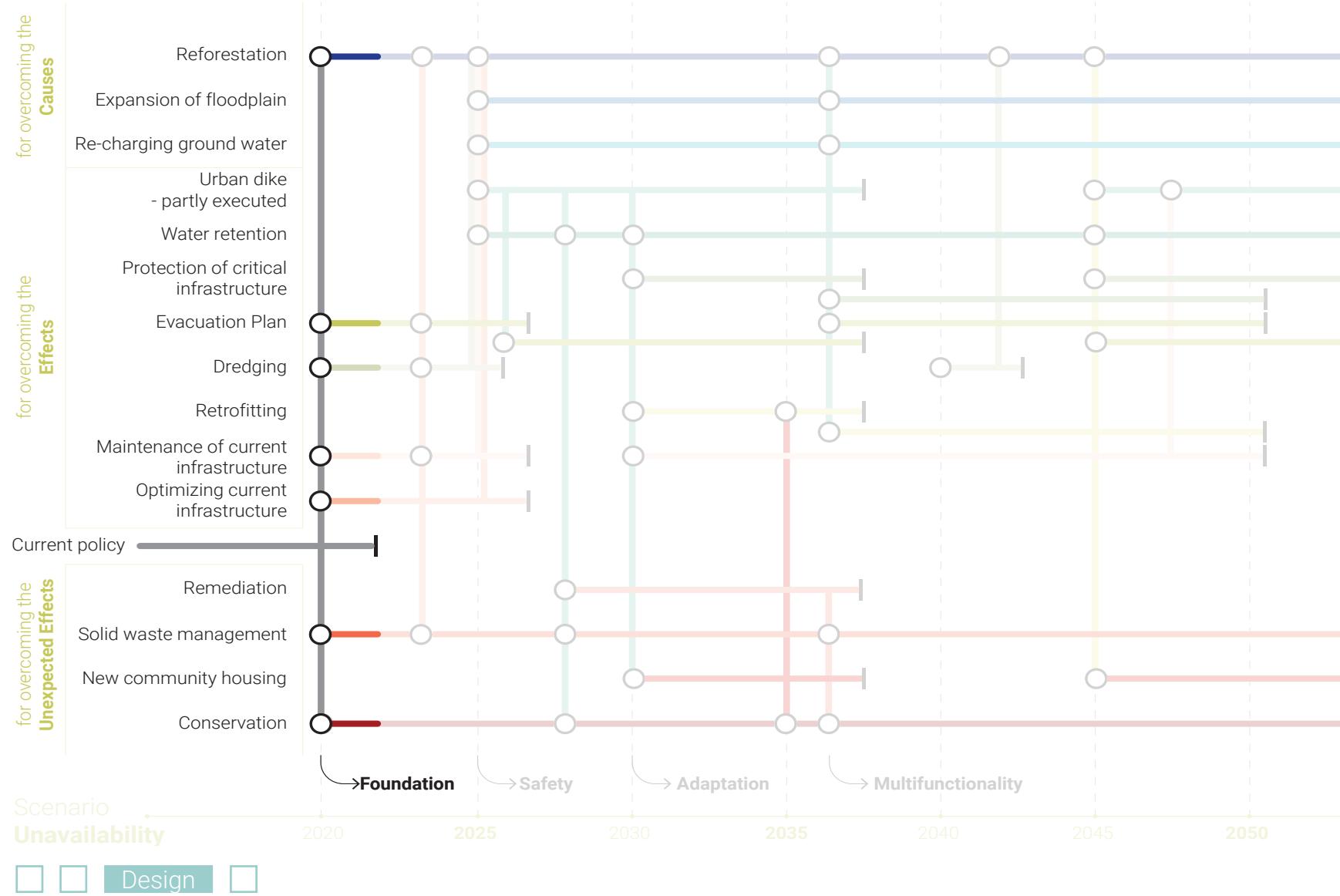
Scenario tipping points

Let's go on a ride!

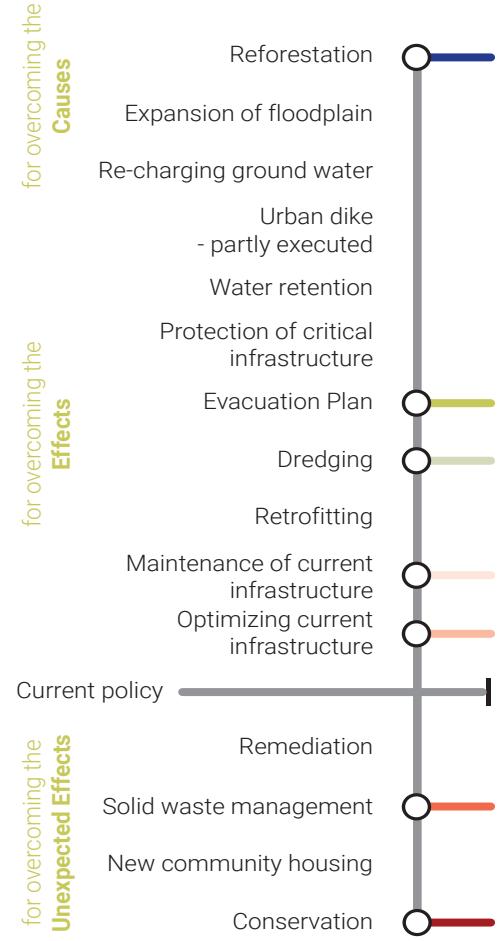
Scenarios



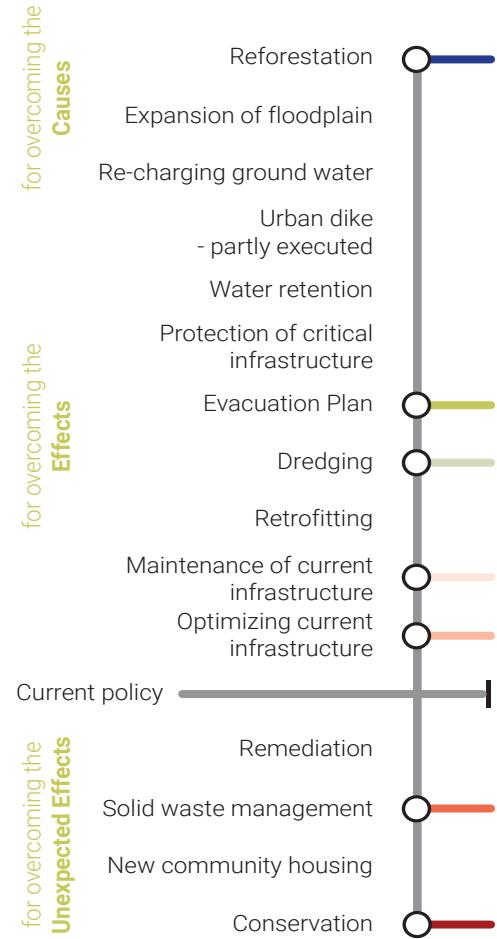
“Foundation”



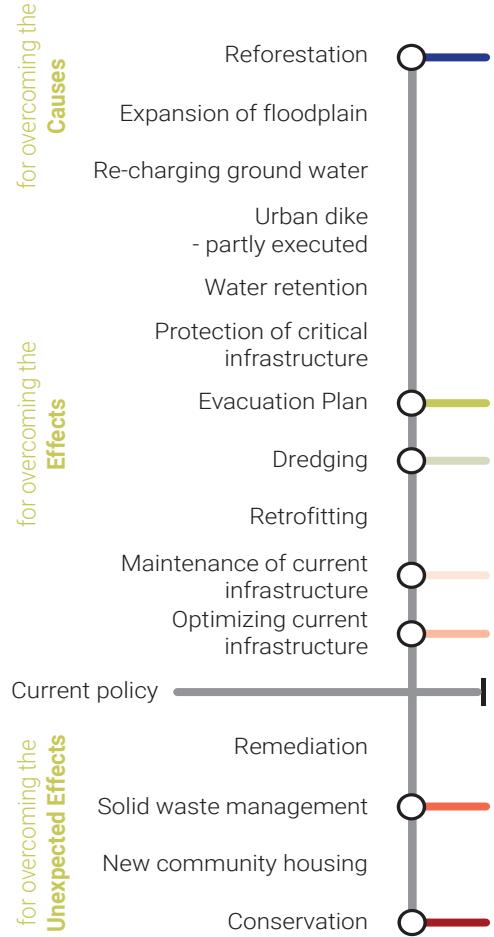
Analysis “Foundation”



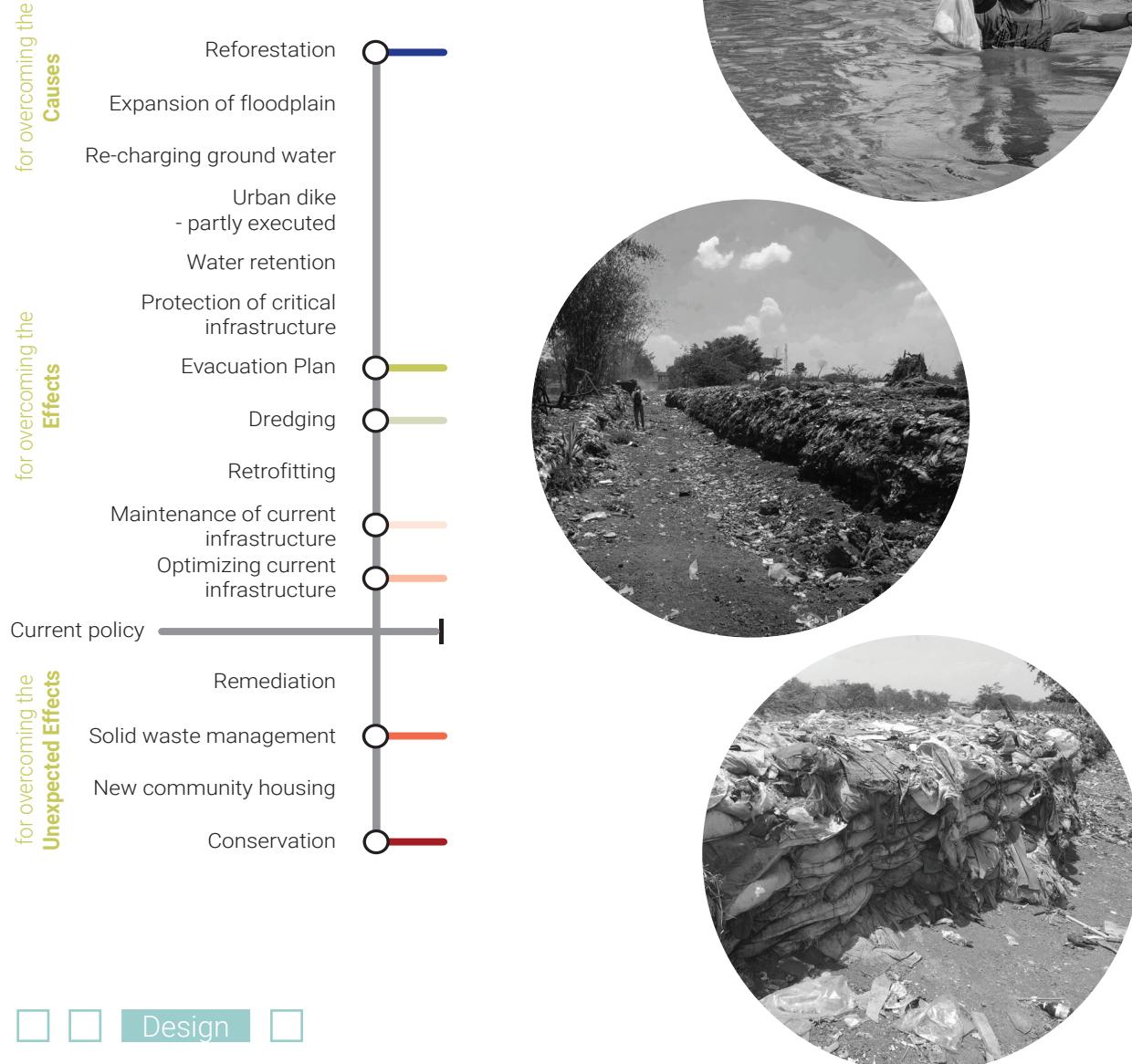
Analysis “Foundation”



Analysis “Foundation”



Analysis “Foundation”



Analysis “Foundation”

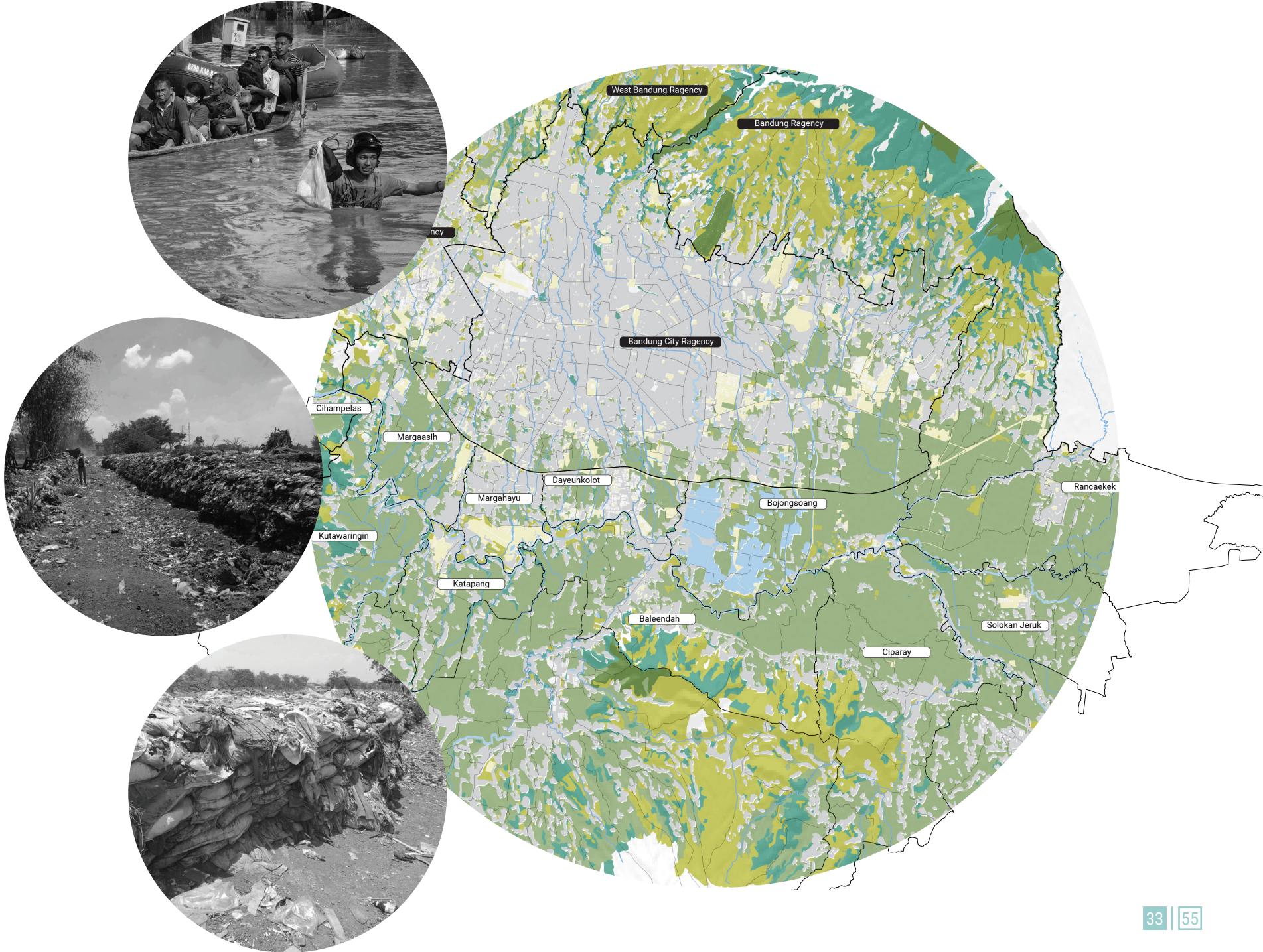
for overcoming the
Causes

- Reforestation
- Expansion of floodplain
- Re-charging ground water
- Urban dike
- partly executed
- Water retention
- Protection of critical infrastructure
- Evacuation Plan
- Dredging
- Retrofitting
- Maintenance of current infrastructure
- Optimizing current infrastructure

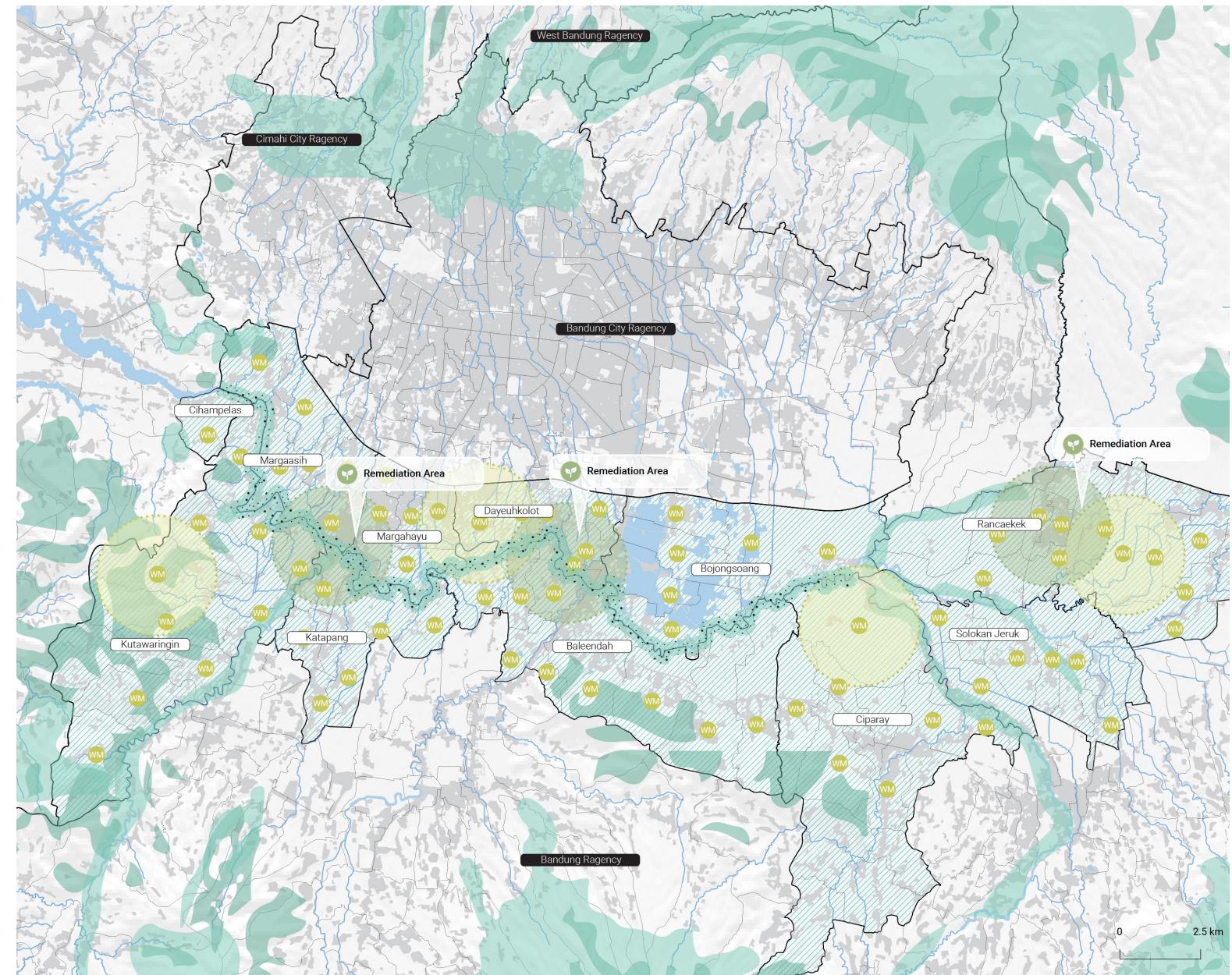
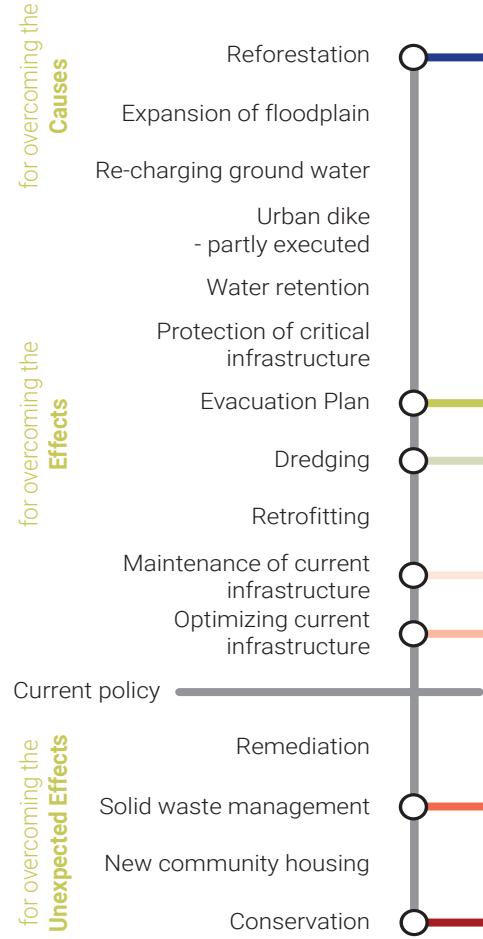
for overcoming the
Effects

- Current policy
- Remediation
- Solid waste management
- New community housing
- Conservation

□ □ Design □

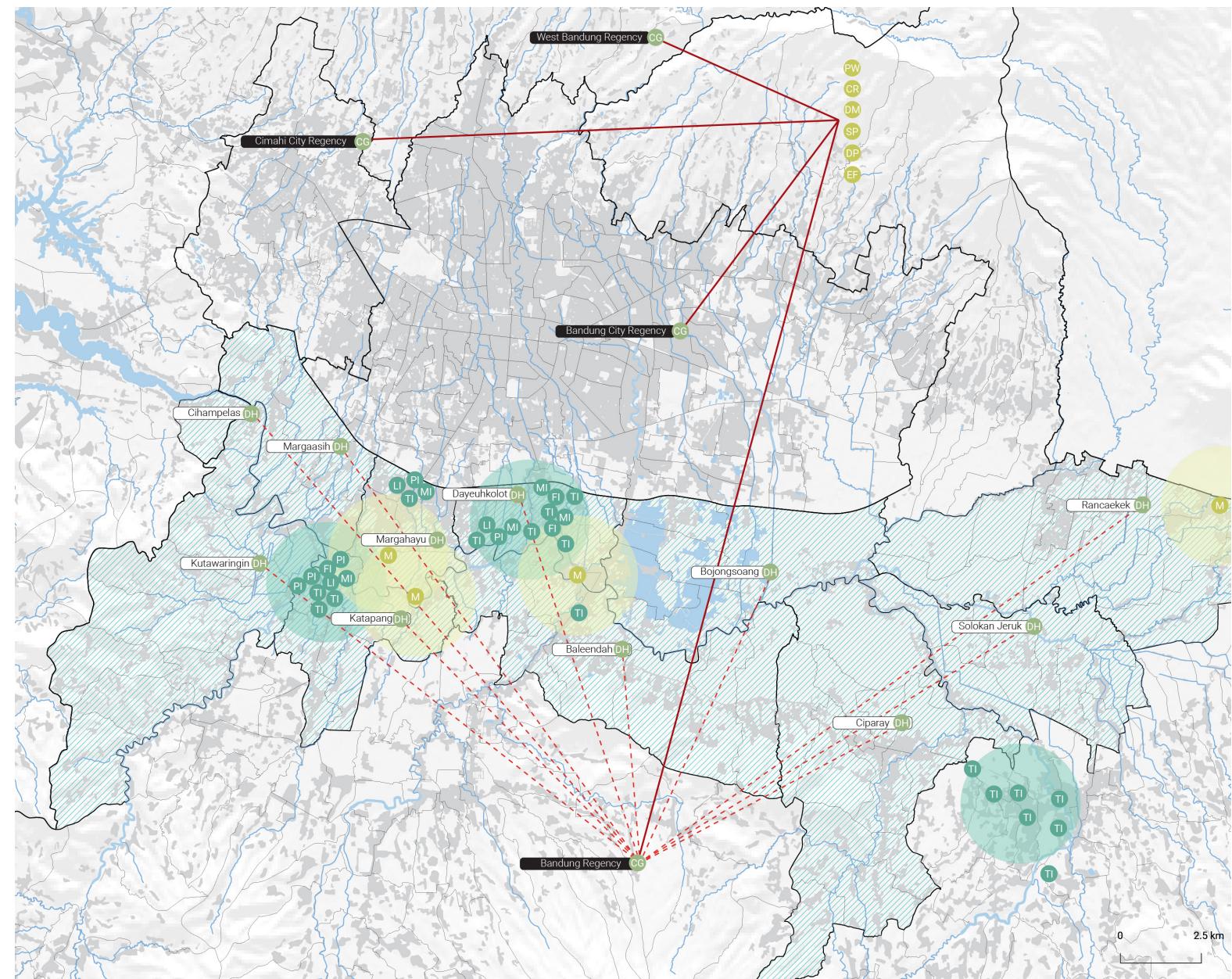
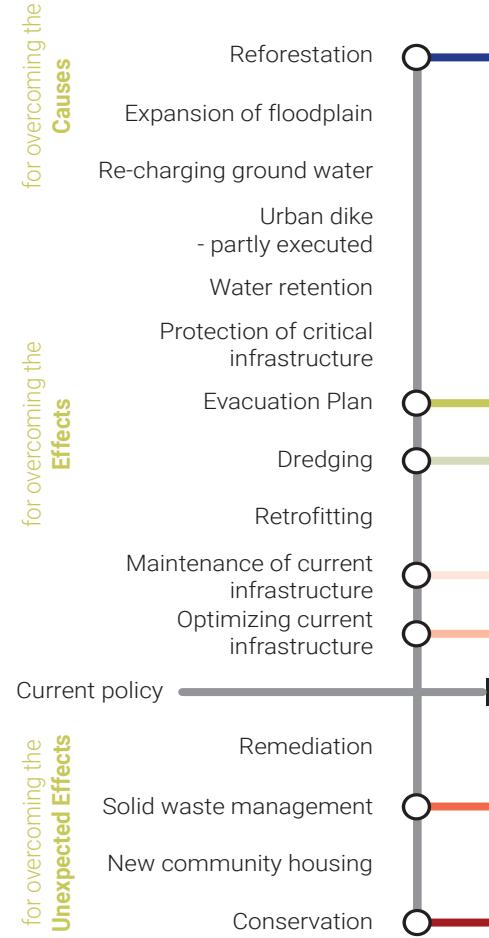


Spatial Perspective “Foundation”

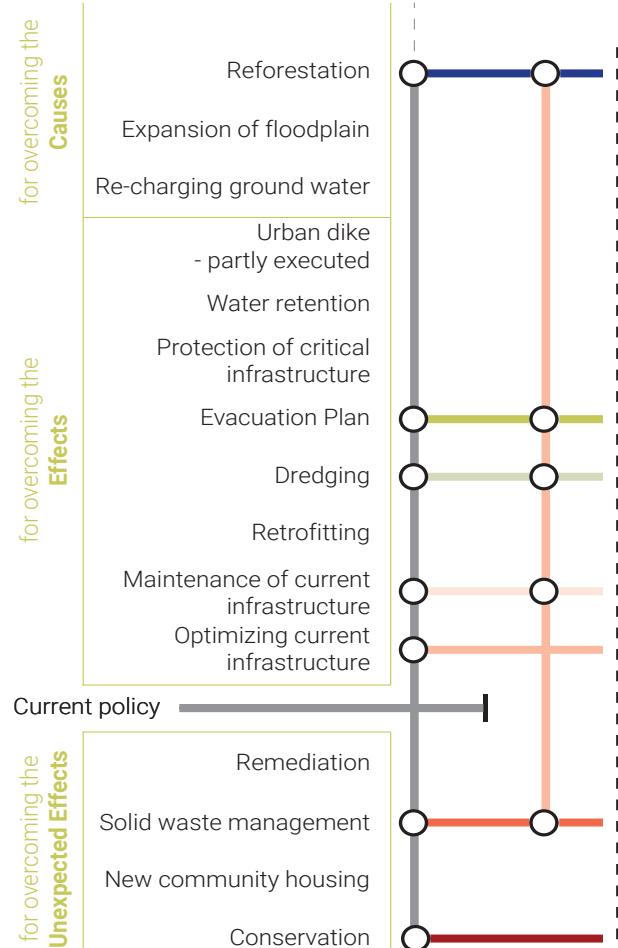


Stakeholder Involvement

“Foundation”

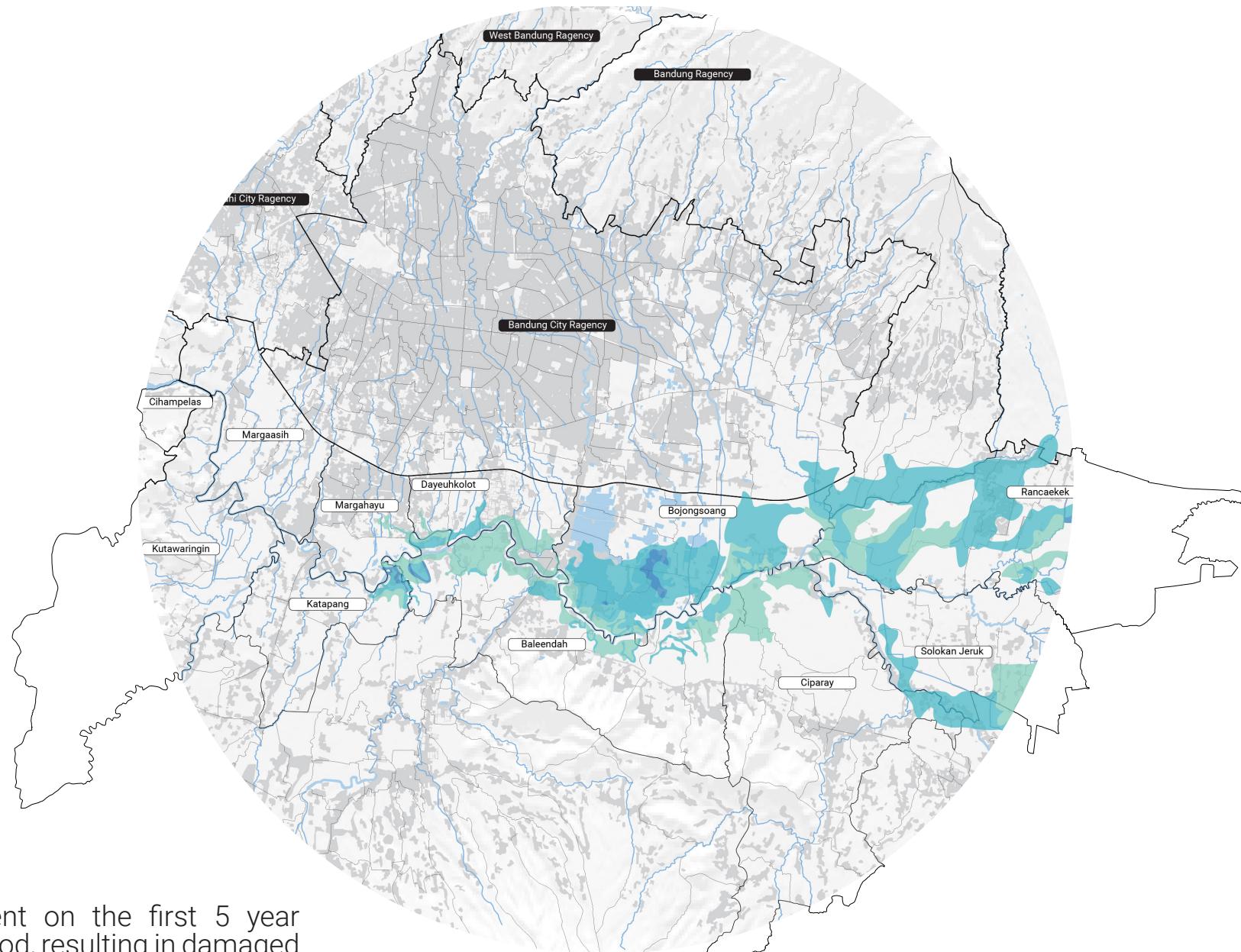


Tipping point 1

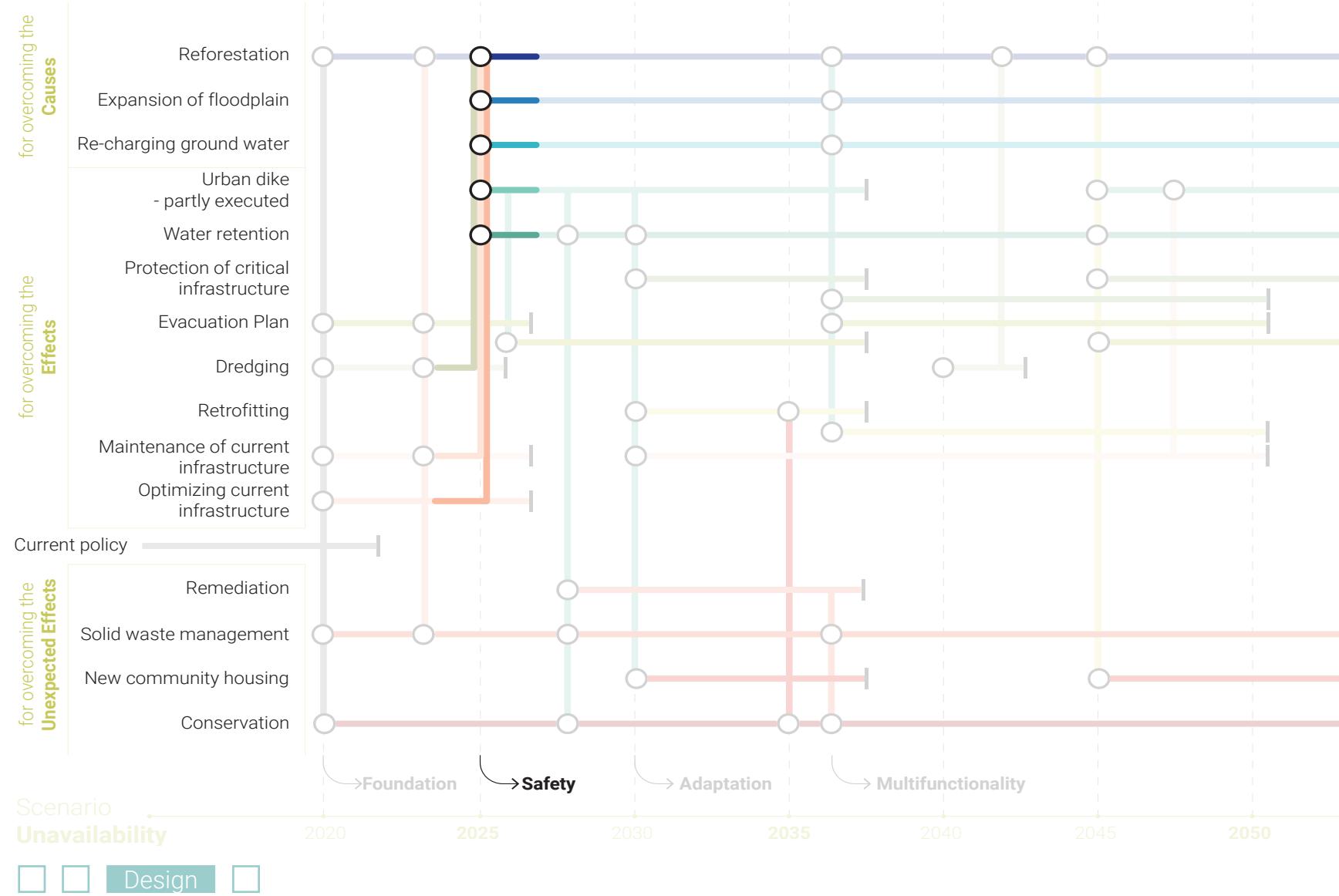


2025

Flood event on the first 5 year return period, resulting in damaged and destroyed properties.

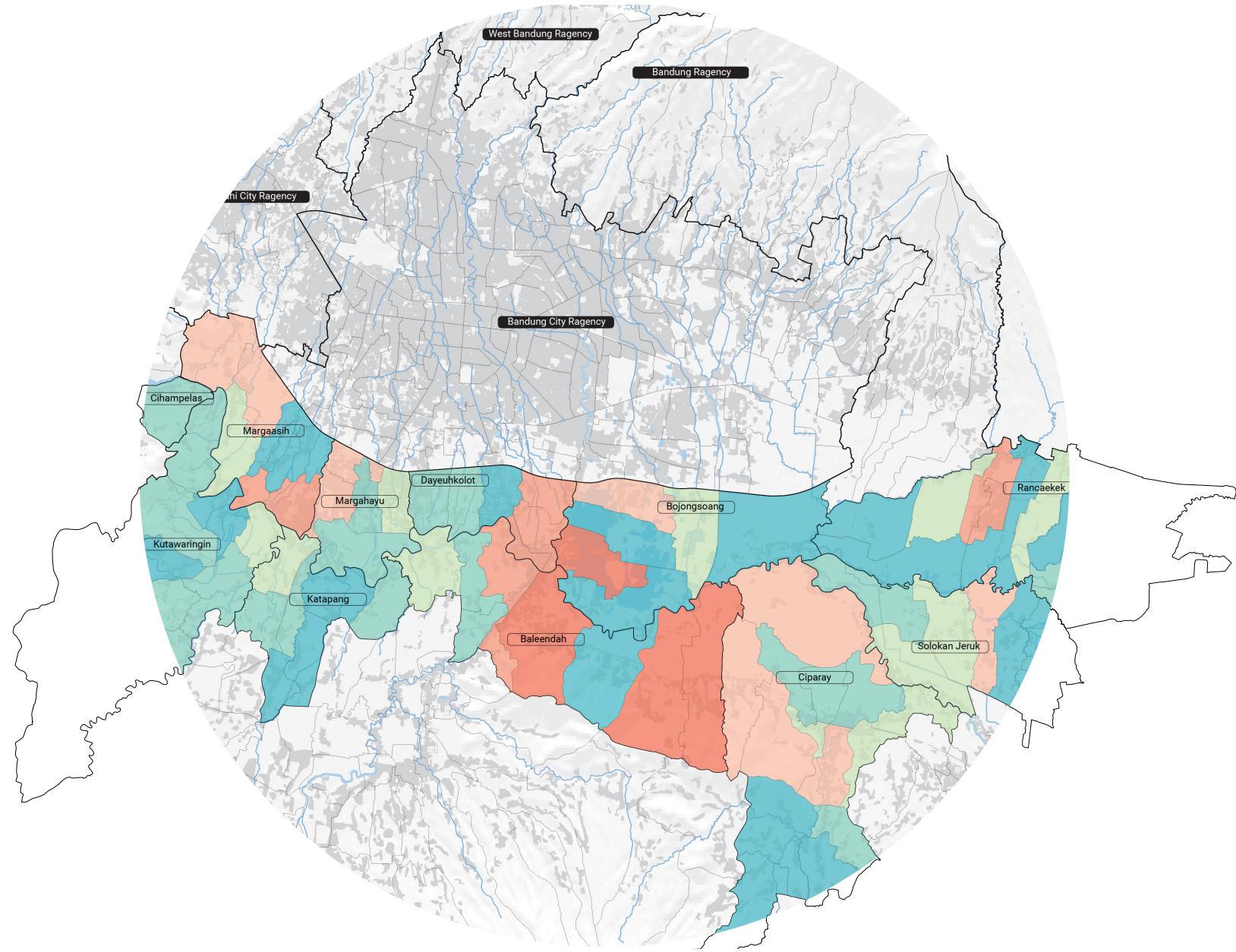


“Safety”



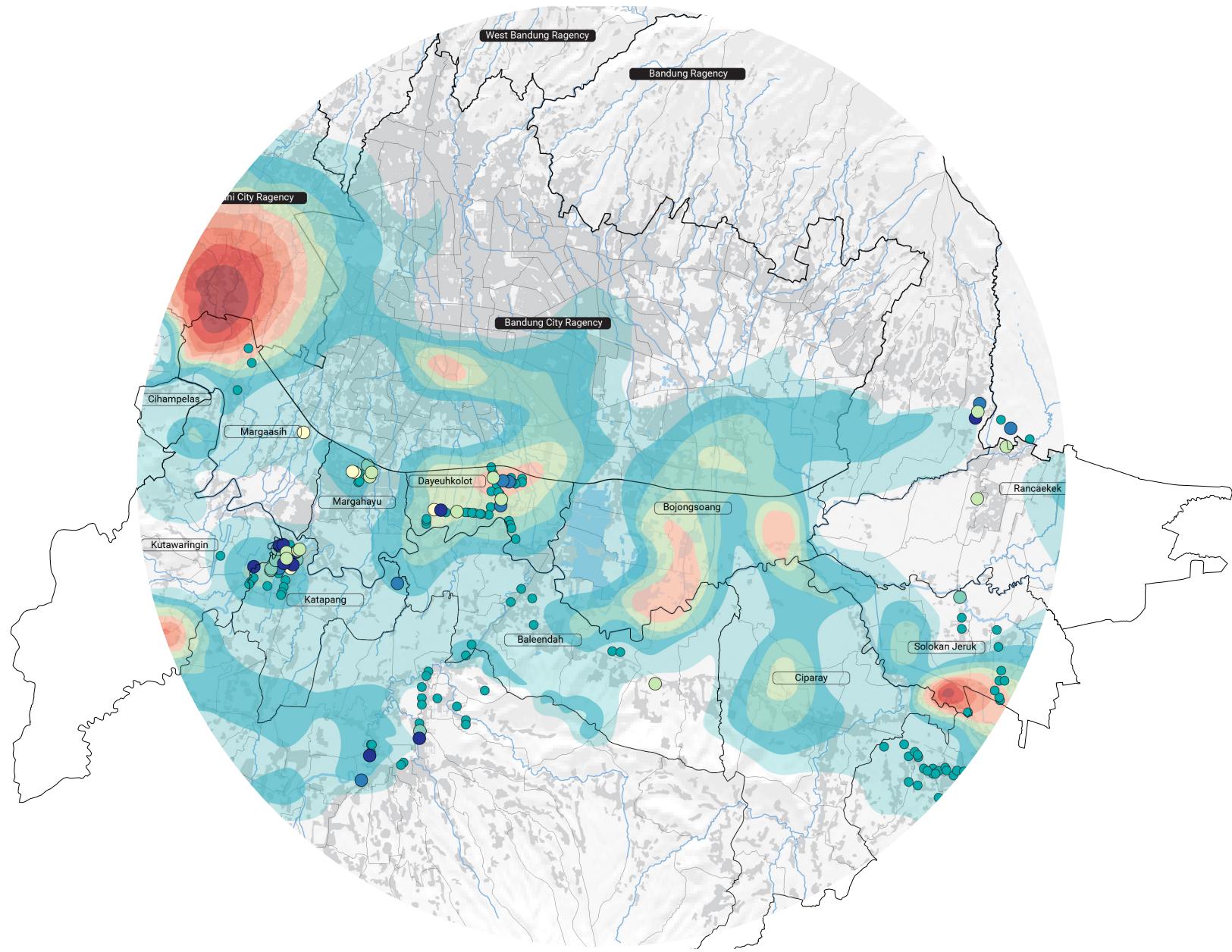
Analysis “Safety”

- for overcoming the **Causes**
- Reforestation
- Expansion of floodplain
- Re-charging ground water
- Urban dike
- partly executed
- Water retention
- Protection of critical infrastructure
- Evacuation Plan
- Dredging
- Retrofitting
- Maintenance of current infrastructure
- Optimizing current infrastructure
- Current policy
- Remediation
- Solid waste management
- New community housing
- Conservation



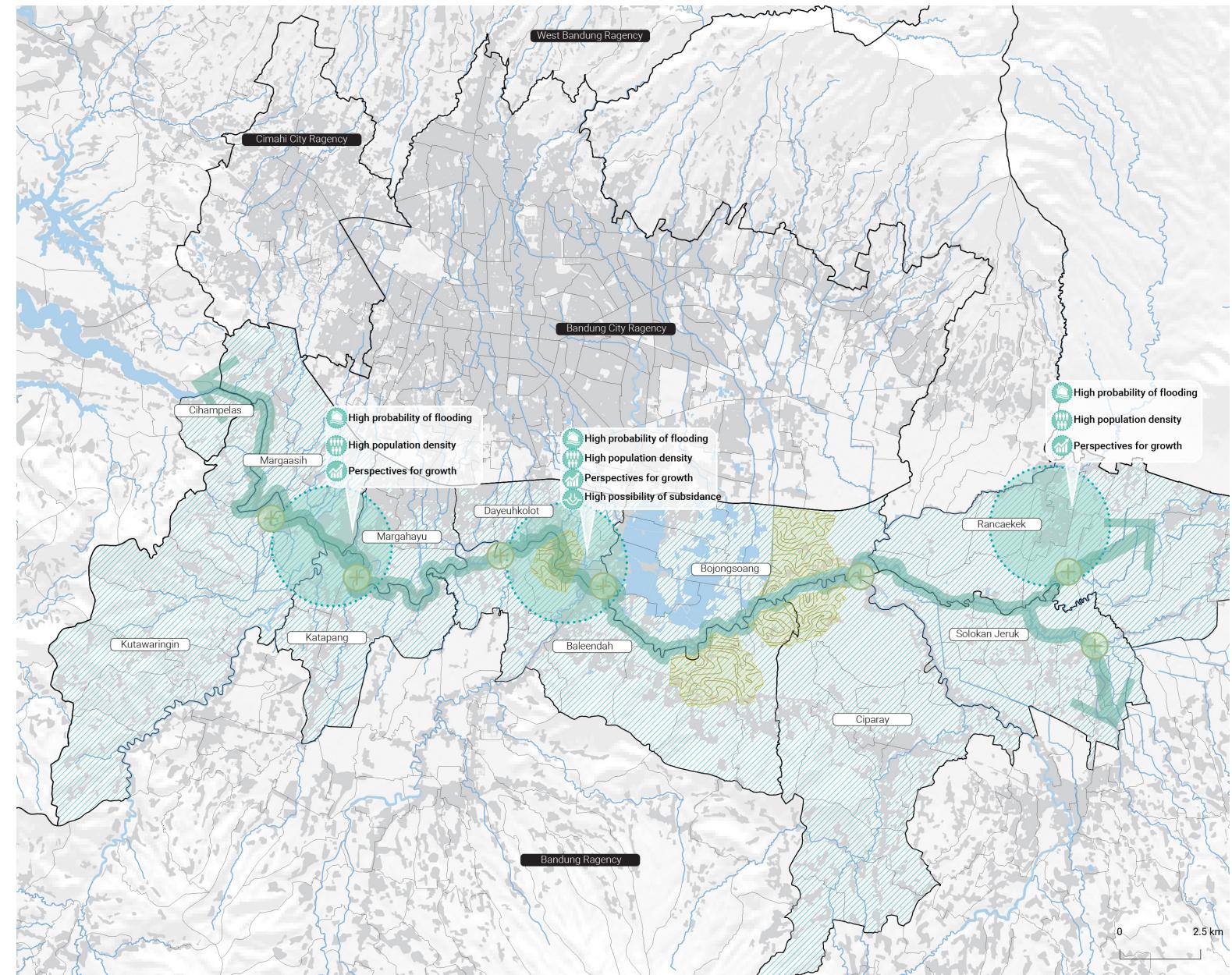
Analysis “Safety”

- for overcoming the Causes
 - Reforestation
 - Expansion of floodplain
 - Re-charging ground water
 - Urban dike - partly executed
 - Water retention
 - Protection of critical infrastructure
 - Evacuation Plan
 - Dredging
 - Retrofitting
 - Maintenance of current infrastructure
 - Optimizing current infrastructure
- for overcoming the Effects
 - Current policy
 - Remediation
 - Solid waste management
 - New community housing
 - Conservation
- for overcoming the Unexpected Effects



Spatial Perspective “Safety”

- for overcoming the **Causes**
- Reforestation
- Expansion of floodplain
- Re-charging ground water
- Urban dike
- partly executed
- Water retention
- Protection of critical infrastructure
- Evacuation Plan
- Dredging
- Retrofitting
- Maintenance of current infrastructure
- Optimizing current infrastructure
- Current policy
- Remediation
- Solid waste management
- New community housing
- Conservation



Design “Safety”

for overcoming the
Causes

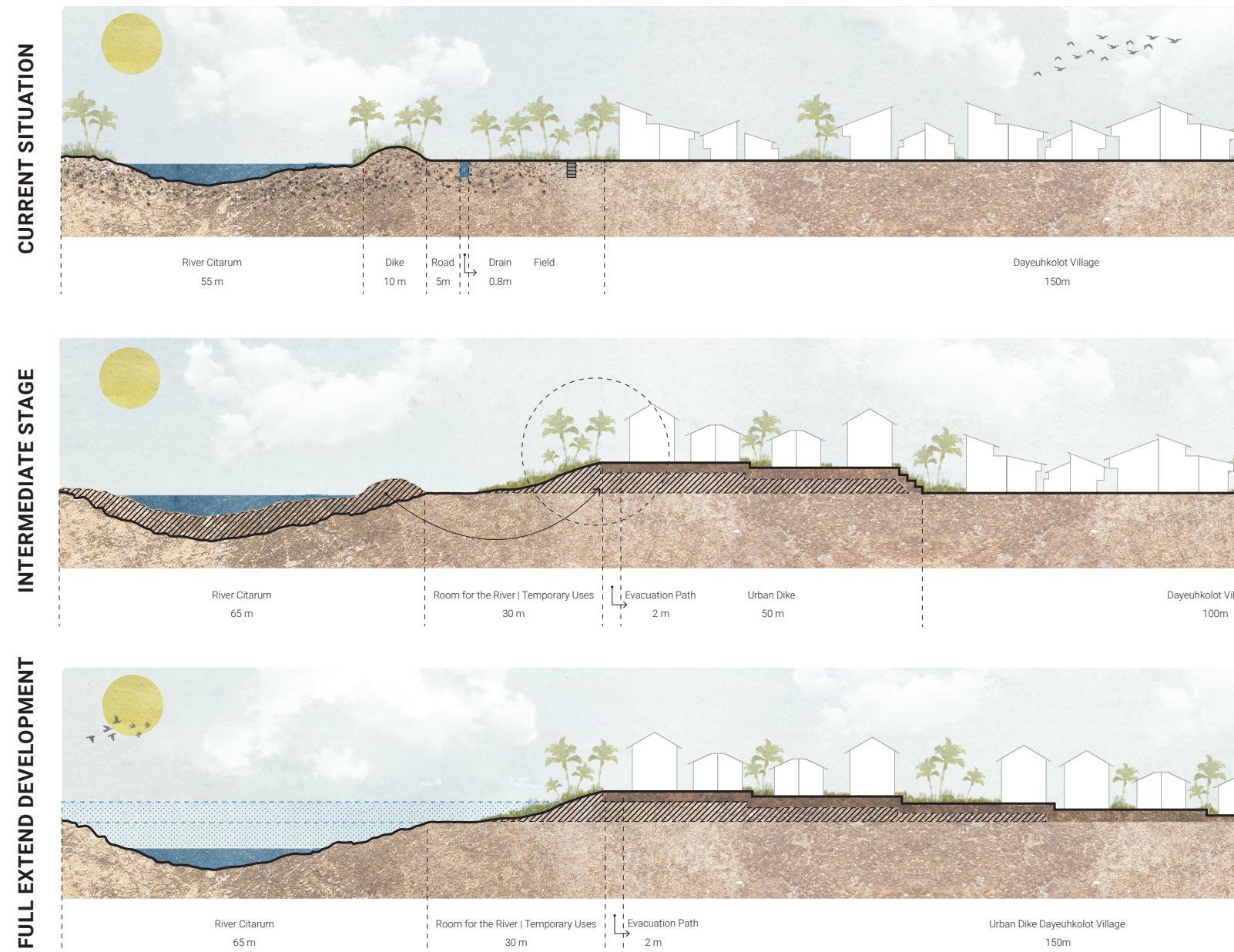
- Reforestation
- Expansion of floodplain
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- Water retention
- Protection of critical infrastructure
- Evacuation Plan
- Dredging
- Retrofitting
- Maintenance of current infrastructure
- Optimizing current infrastructure

for overcoming the
Effects

Current policy

- Remediation
- Solid waste management
- New community housing
- Conservation

for overcoming the
Unexpected Effects

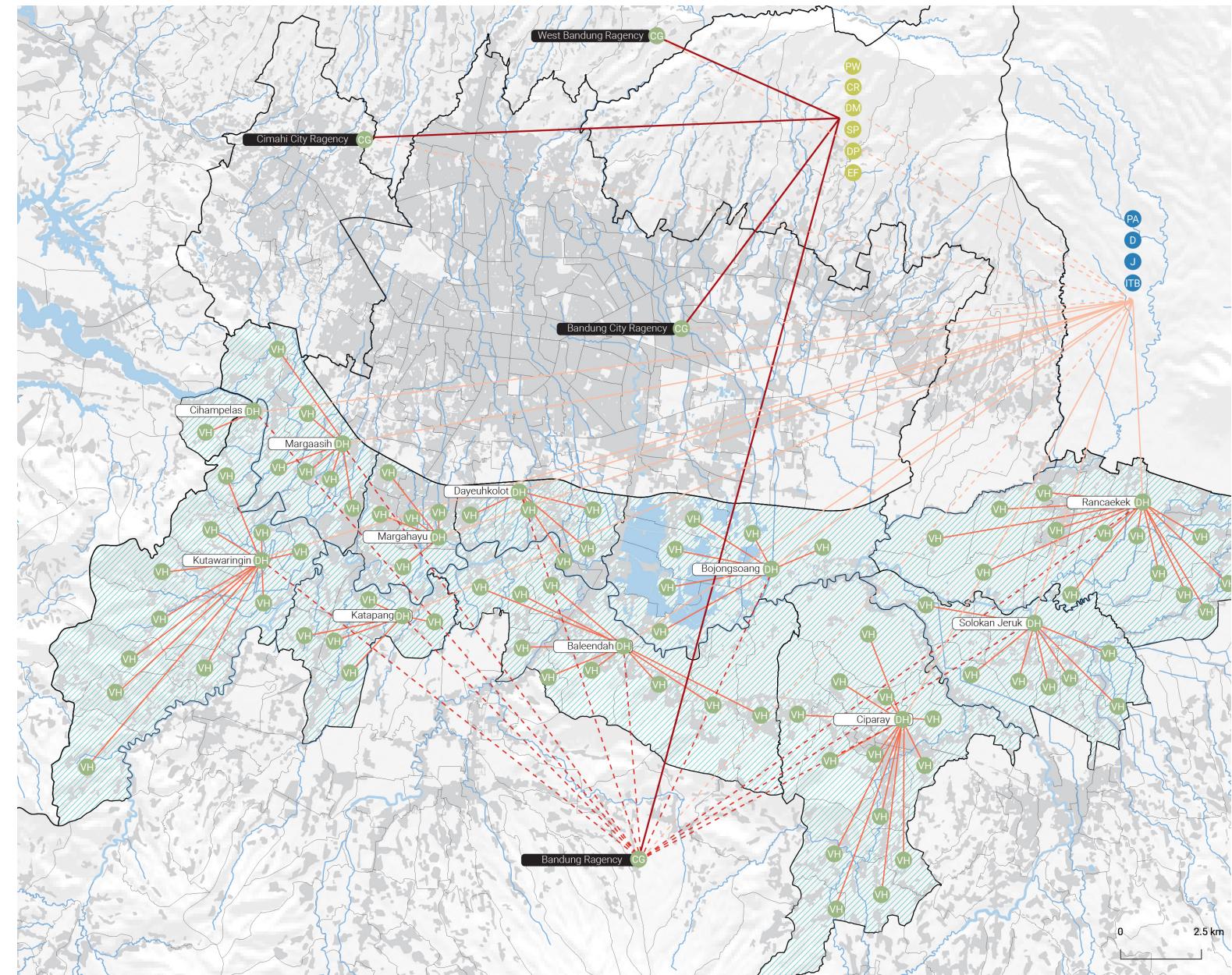
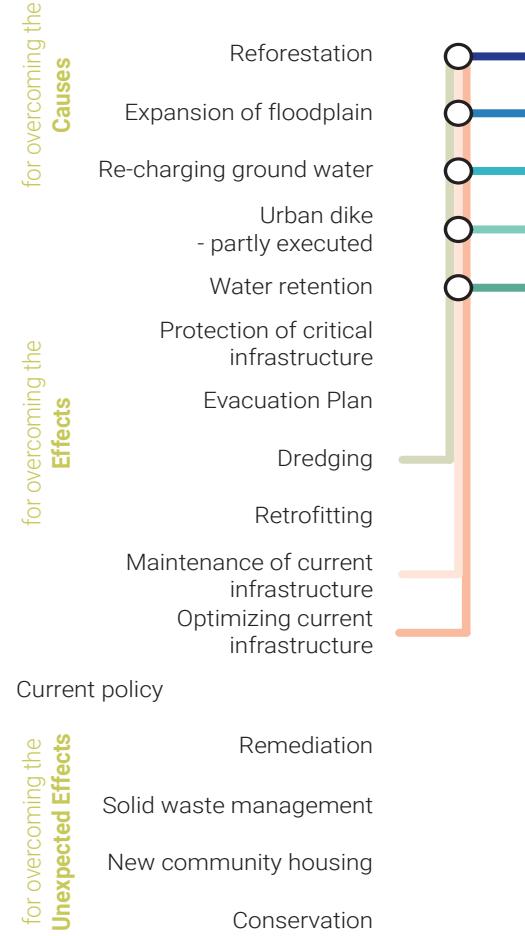


Impression "Urban Dike" "Safety"

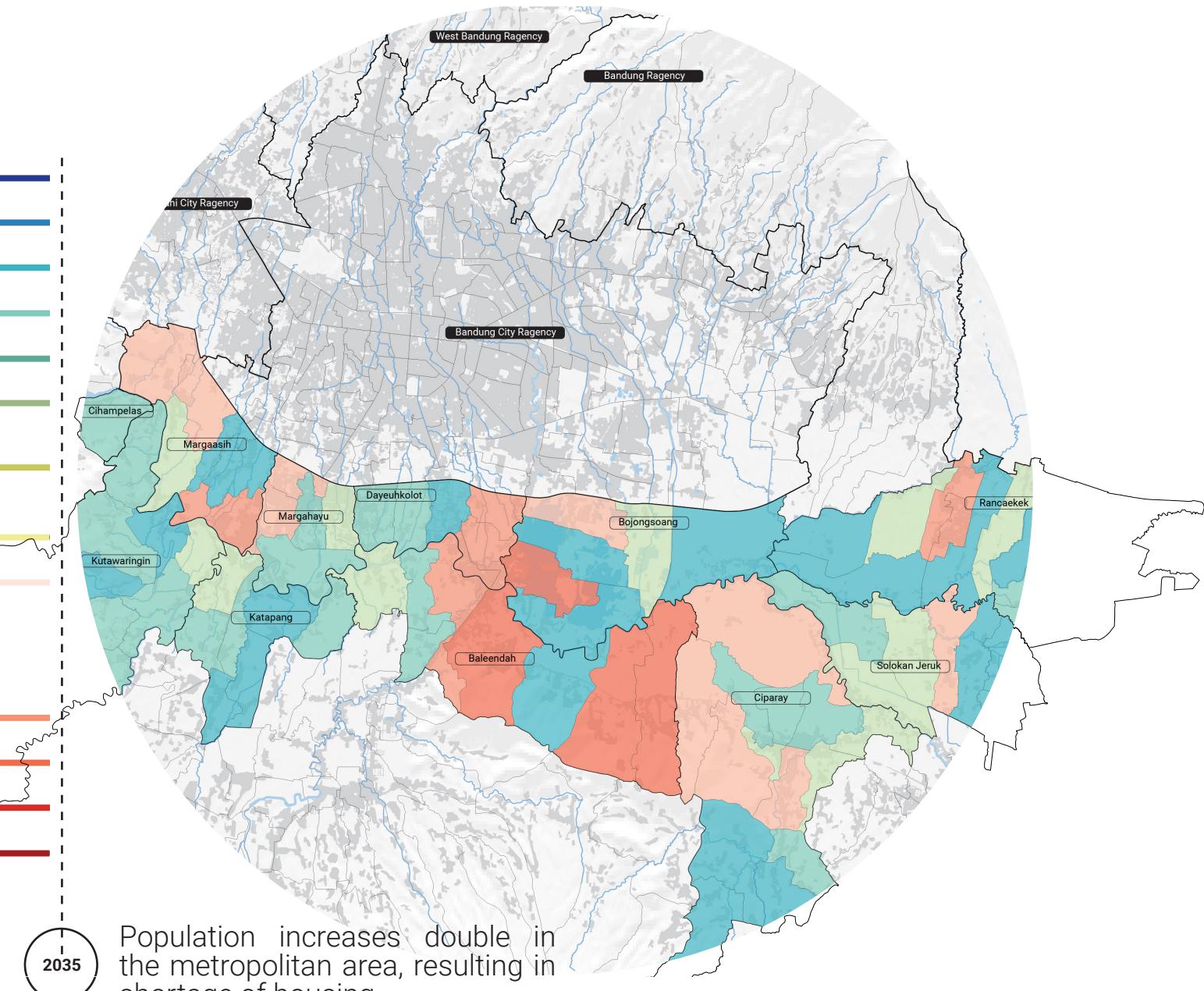
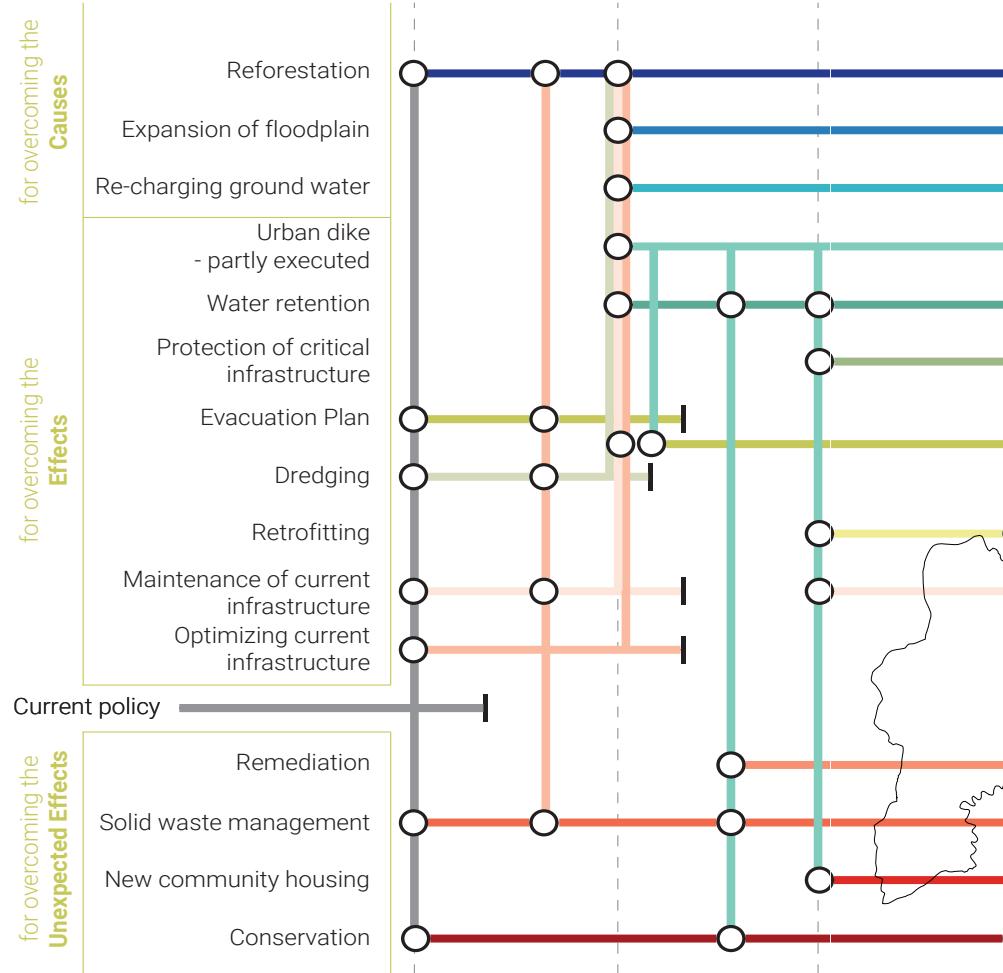


Stakeholder Involvement

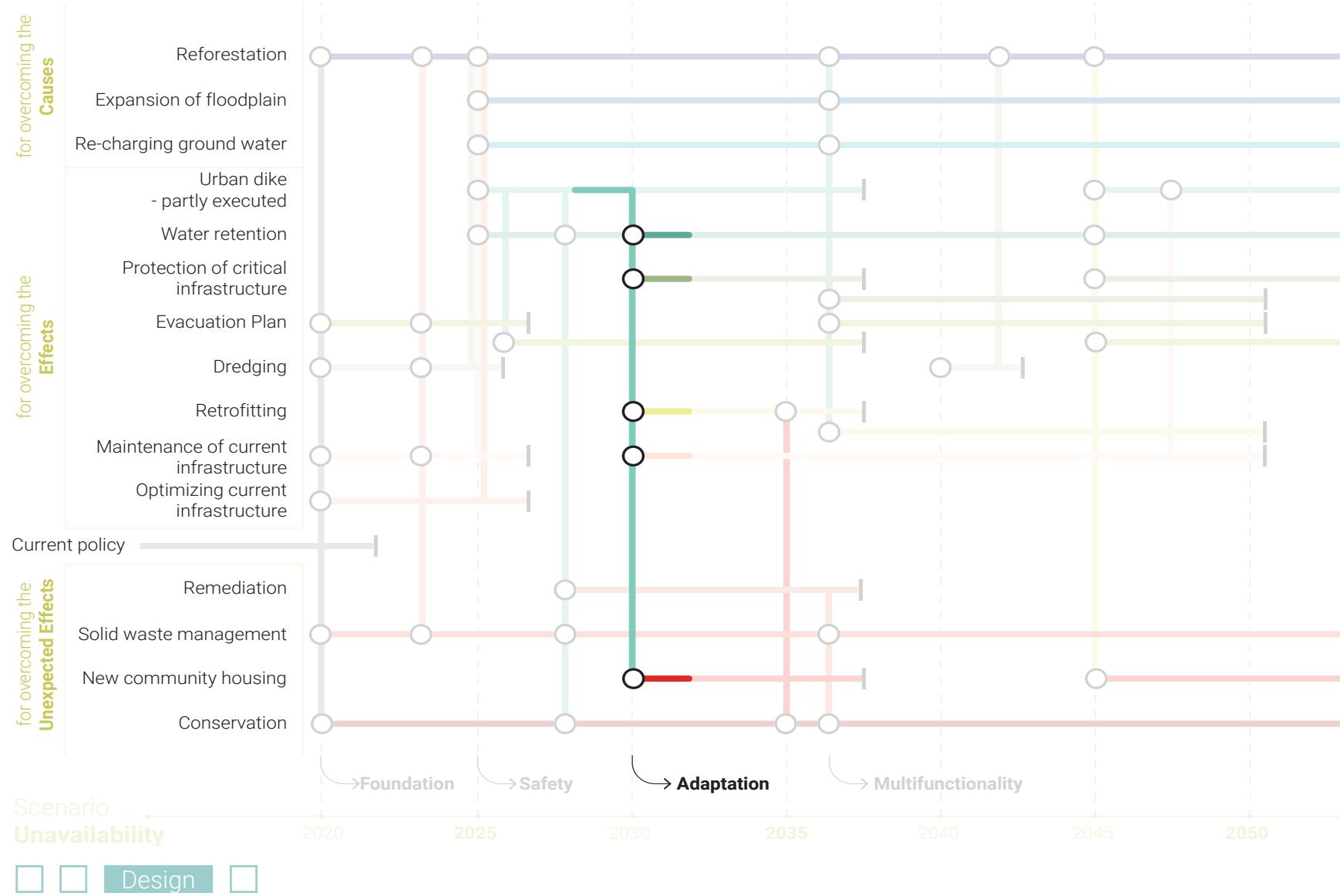
“Safety”



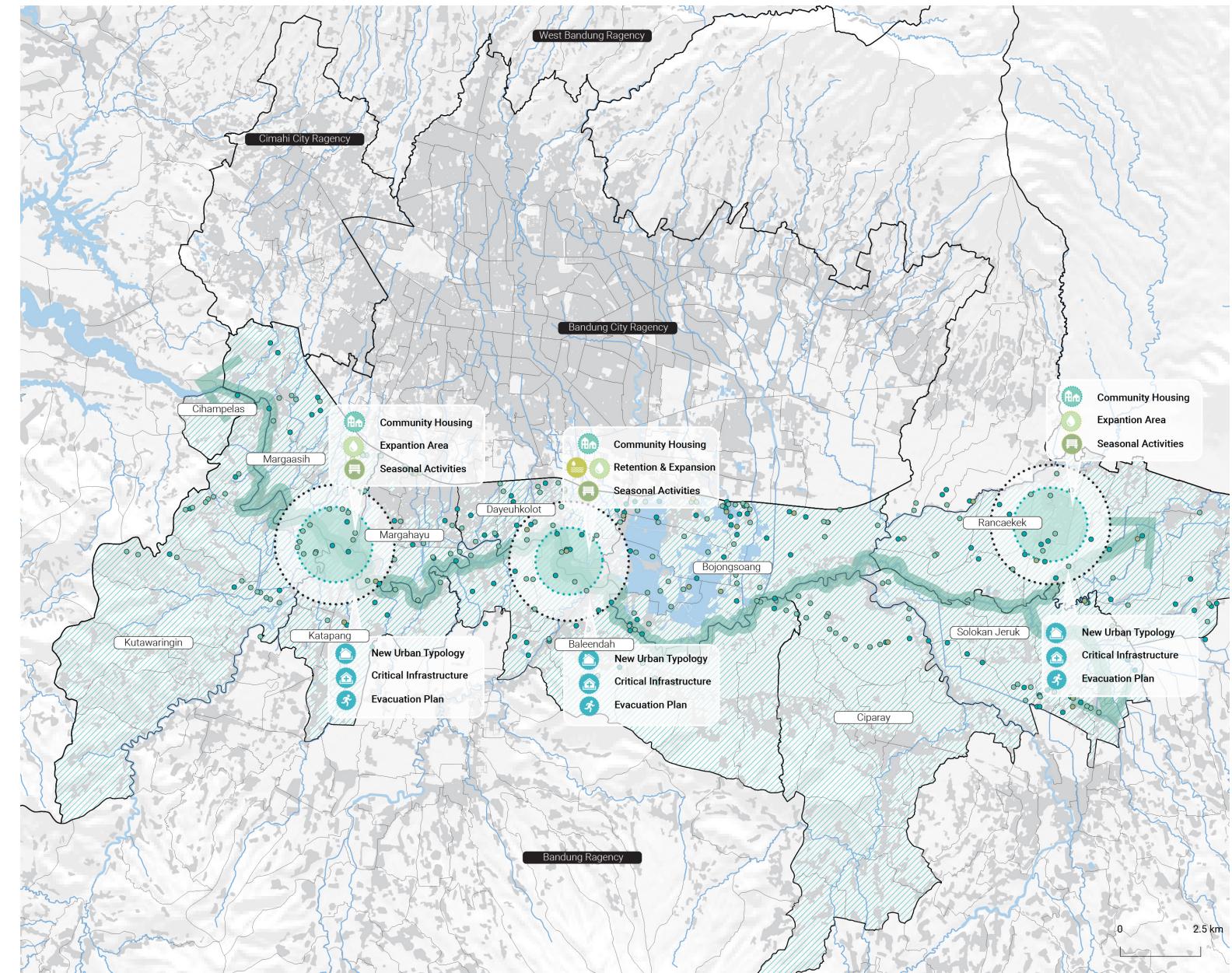
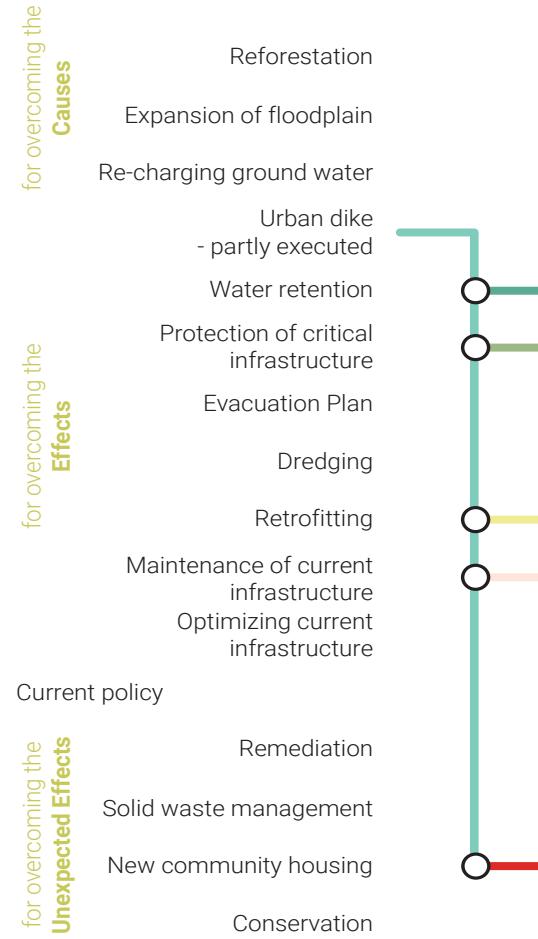
Tipping point 2



“Adaptation”

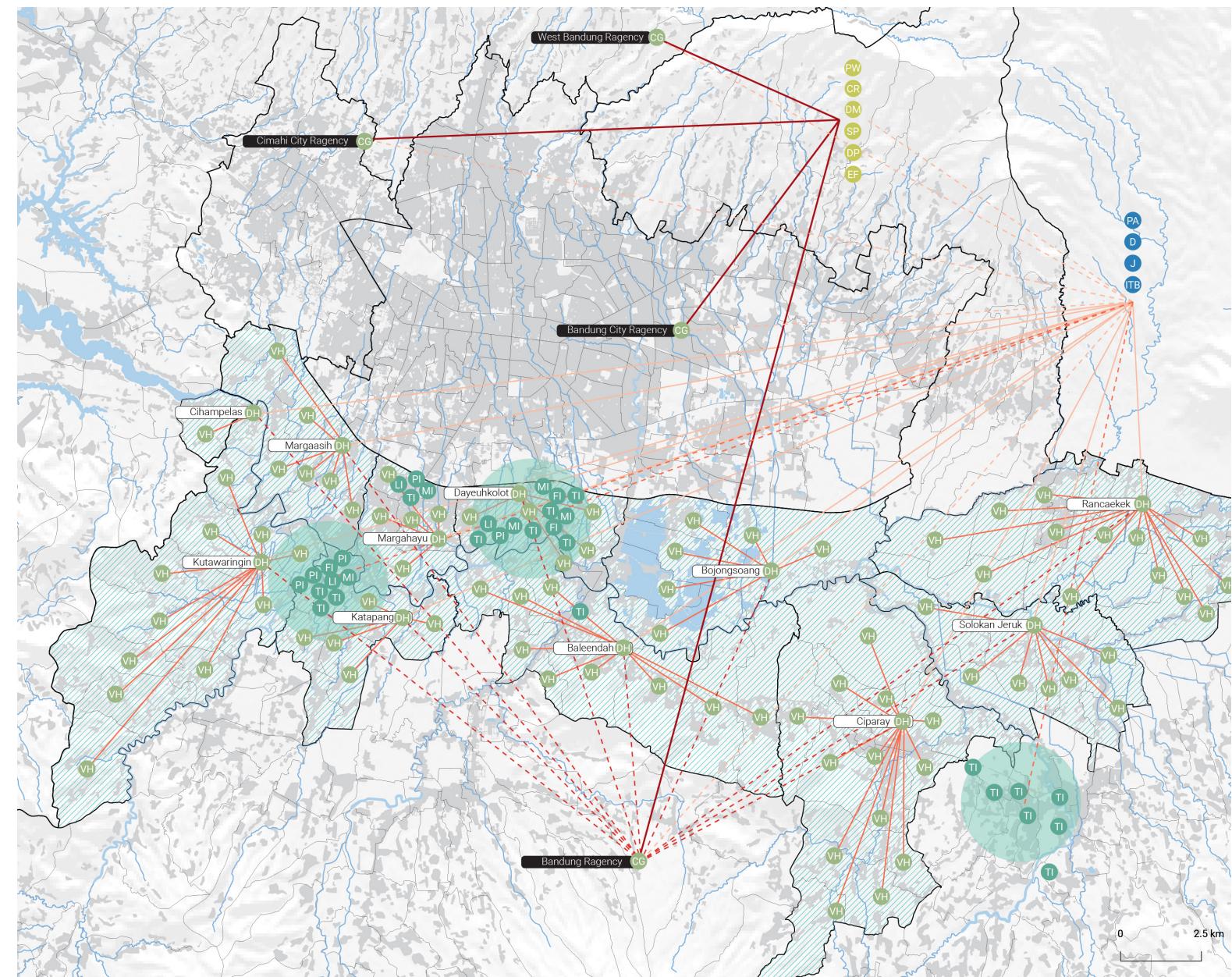
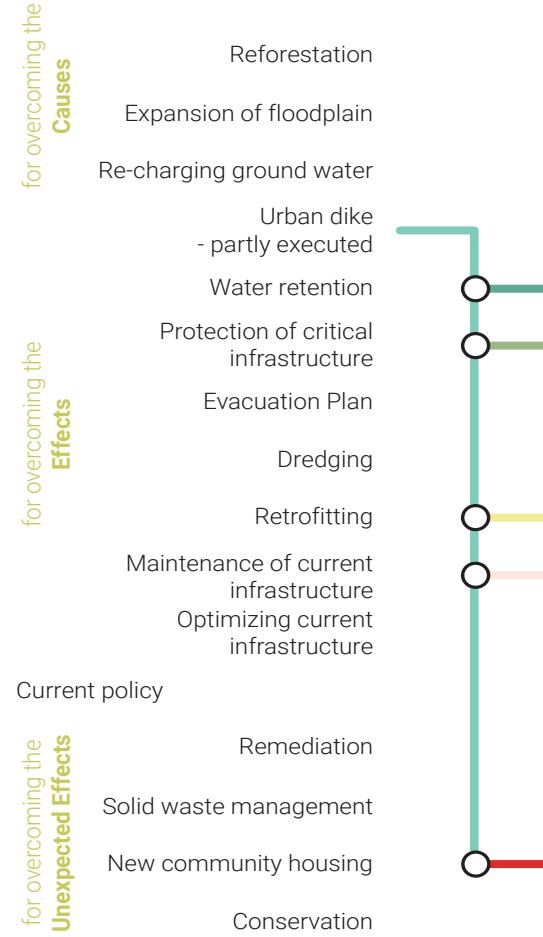


Spatial Perspective “Adaptation”

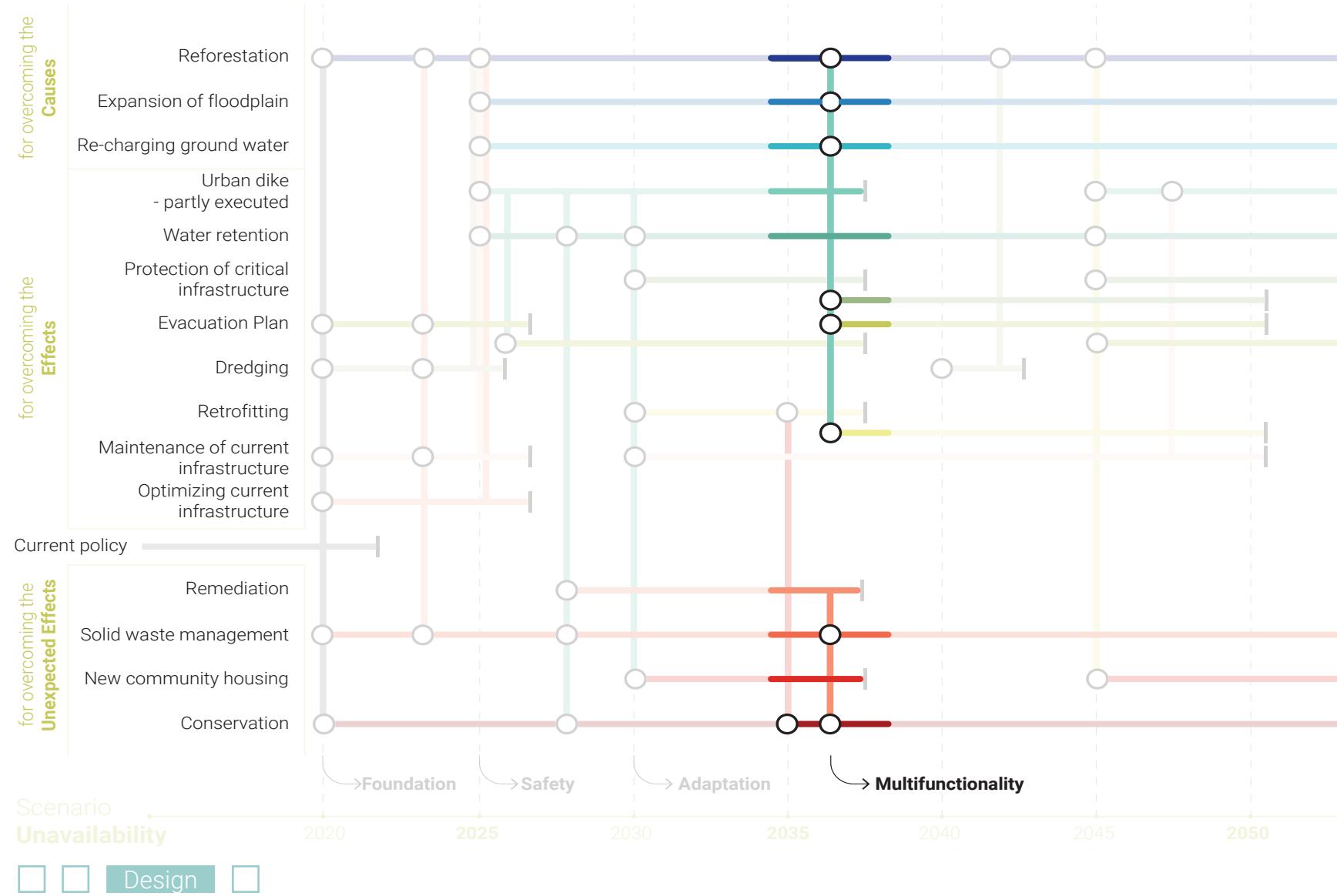


Stakeholder Involvement

“Adaptation”

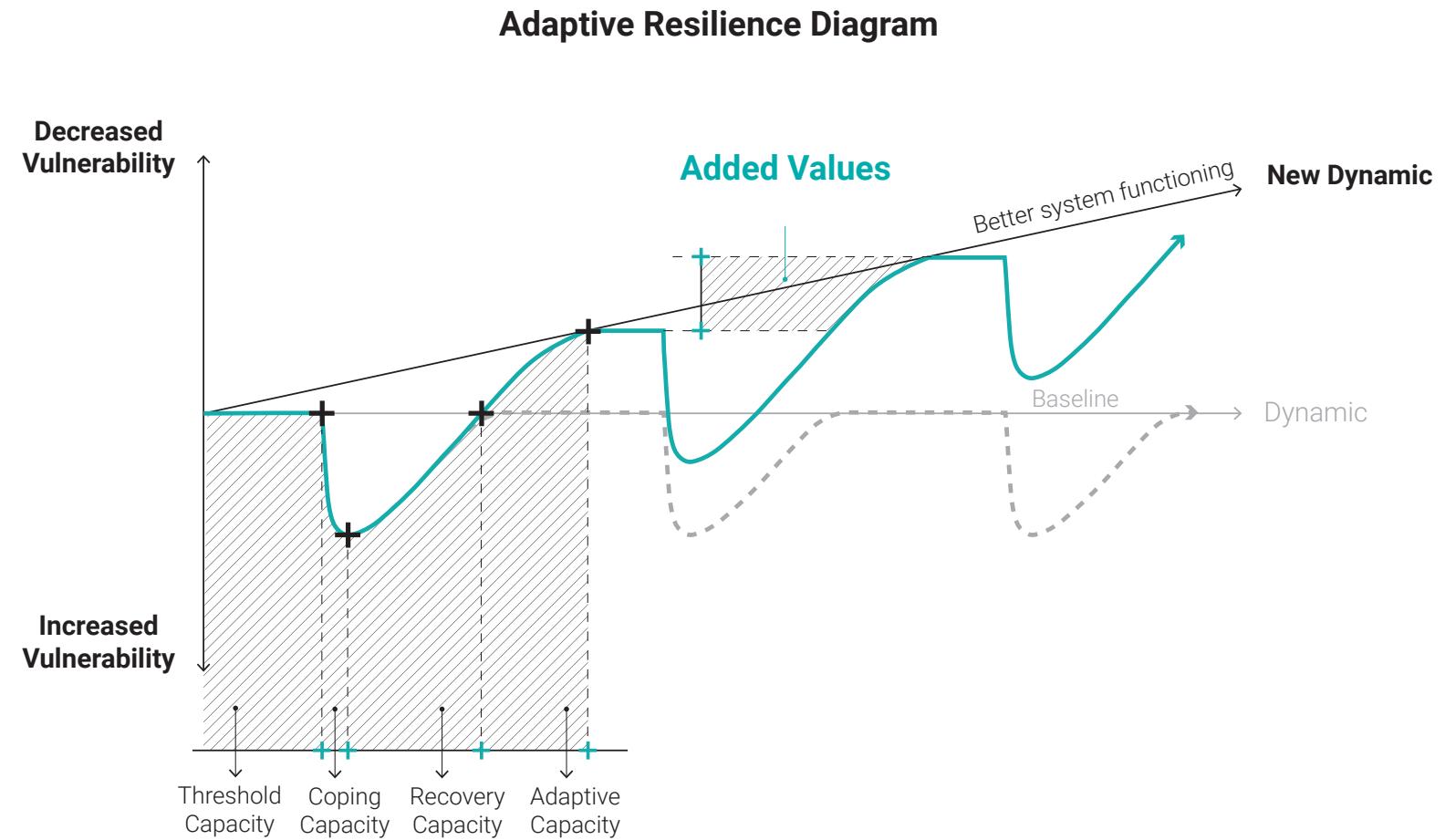
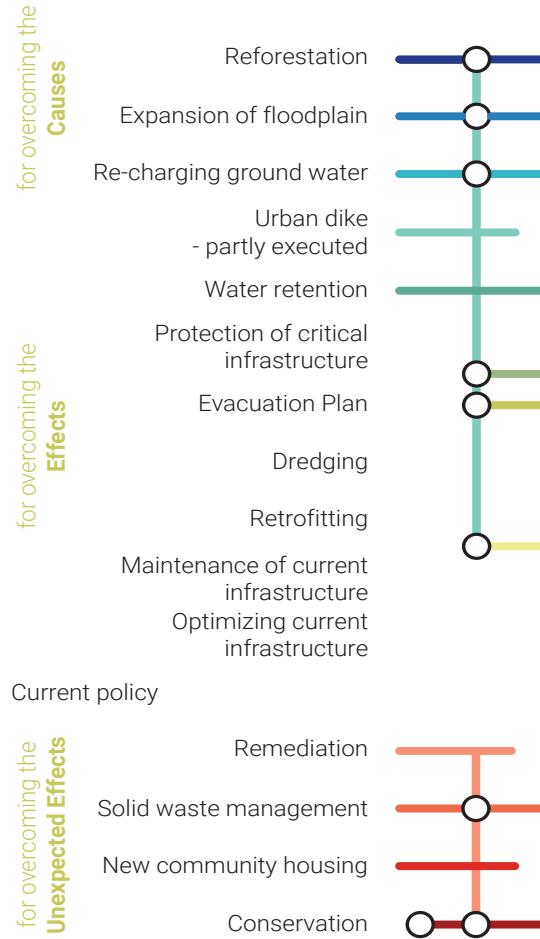


“Multifunctionality”



Analysis

“Multifunctionality”



Spatial Perspective

“Multifunctionality”

for overcoming the
Causes

- Reforestation
- Expansion of floodplain
- Re-charging ground water
- Urban dike
- partly executed
- Water retention
- Protection of critical
infrastructure
- Evacuation Plan
- Dredging
- Retrofitting

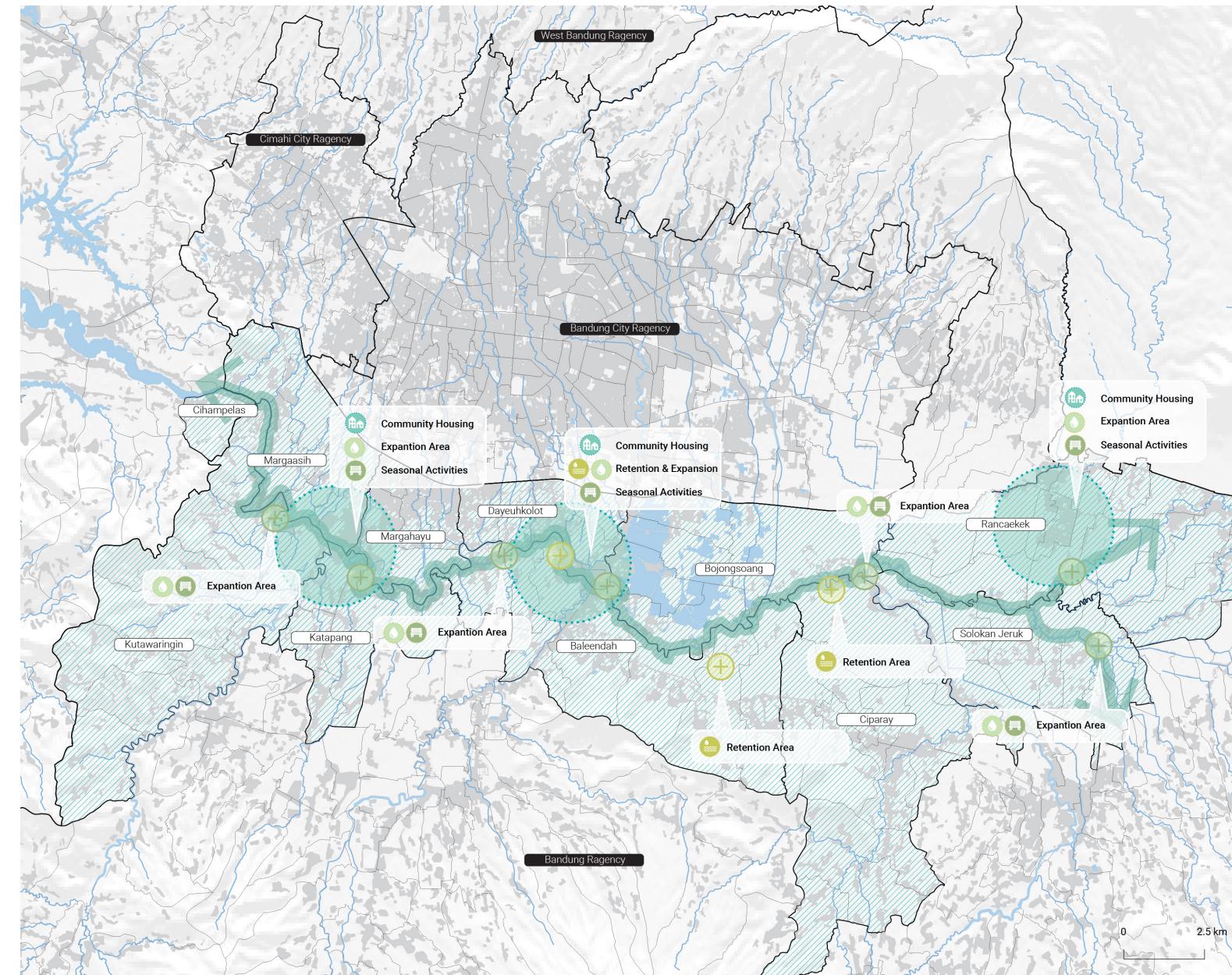
for overcoming the
Effects

- Maintenance of current
infrastructure
- Optimizing current
infrastructure

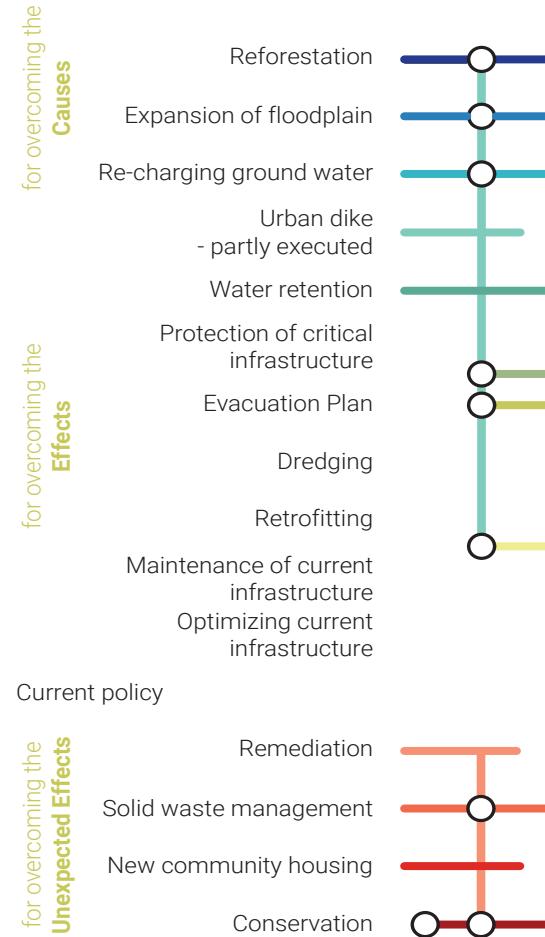
Current policy

- Remediation
- Solid waste management
- New community housing
- Conservation

for overcoming the
Unexpected Effects

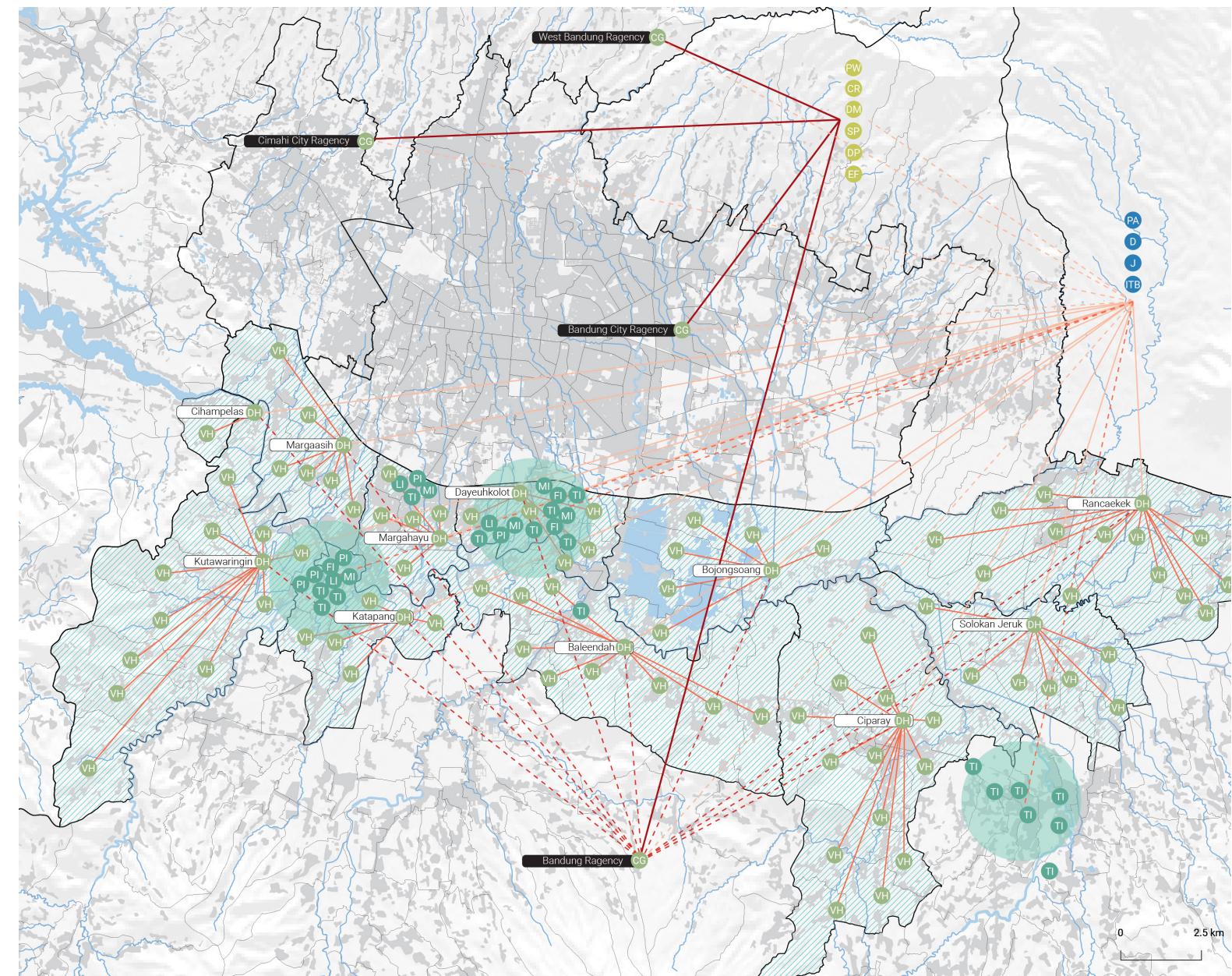
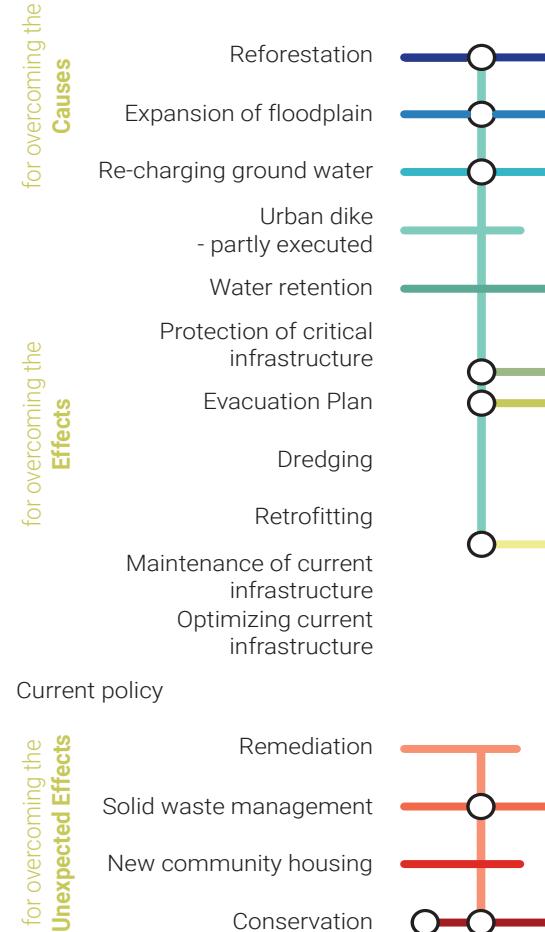


Impression "Room for the river" "Multifunctionality"

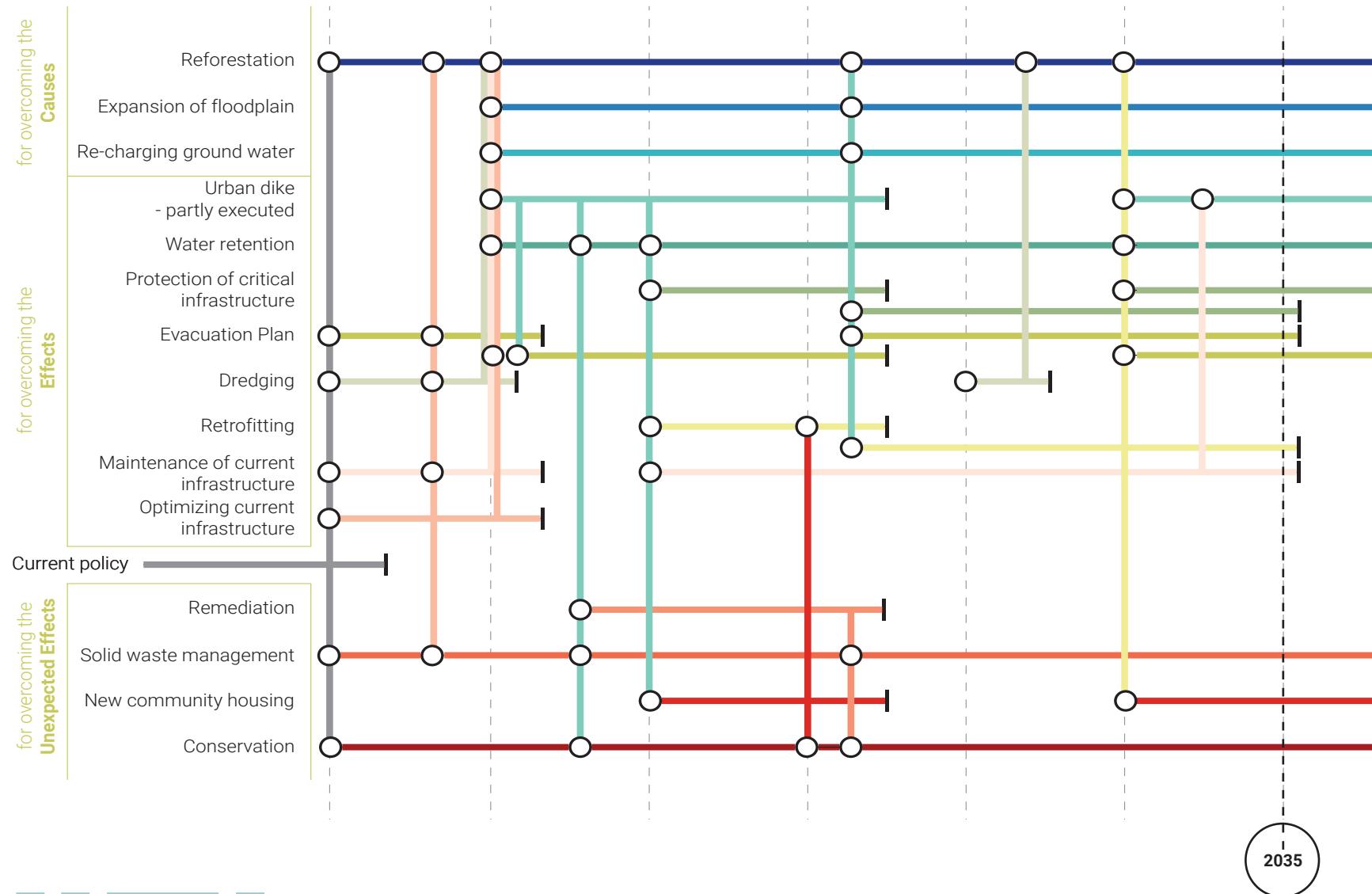


Stakeholder Involvement

“Multifunctionality”



Tipping point 3



- Extreme weather conditions continue, resulting in demand for more areas of water storage and delay.
- The rise in the urban population results in emerging informal settlements in vulnerable areas.
- **The changes in the systems are so big that if there is not a change in the scenario, there will be a need of an additional action "retreat".**

Conclusions and Discussion

- The project as a showcase
- Building on adaptive thinking
- Make planning and decision making conversational
- Create paths towards stakeholder involvement

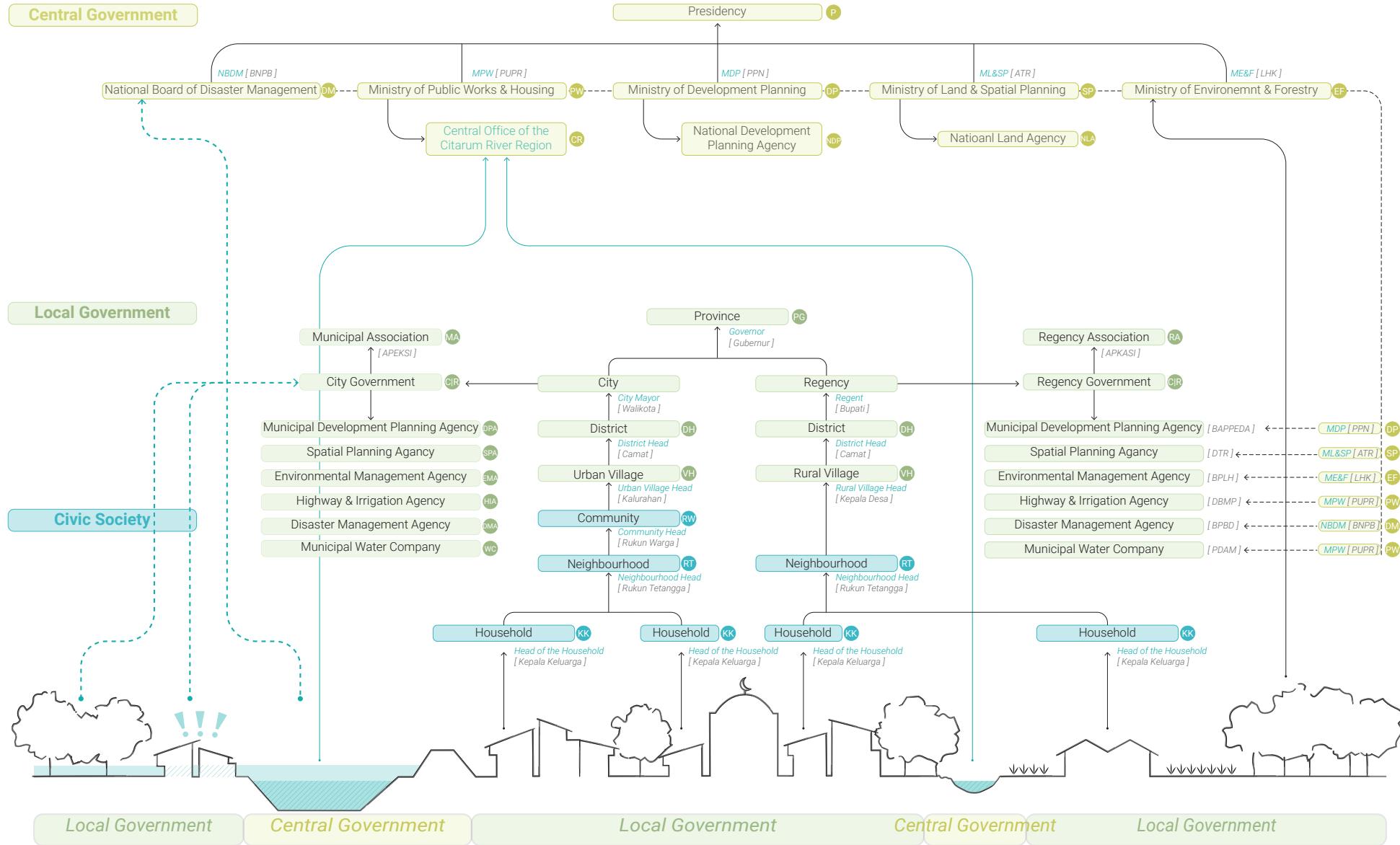


Thank you !

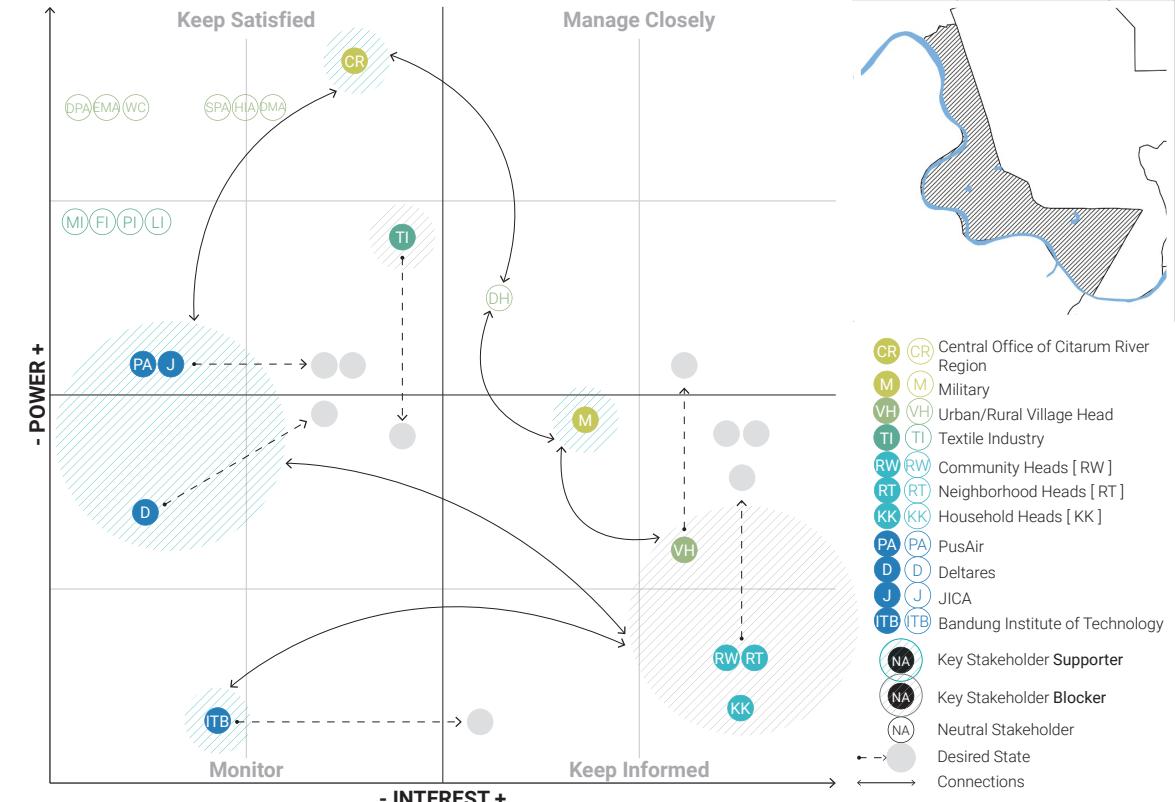
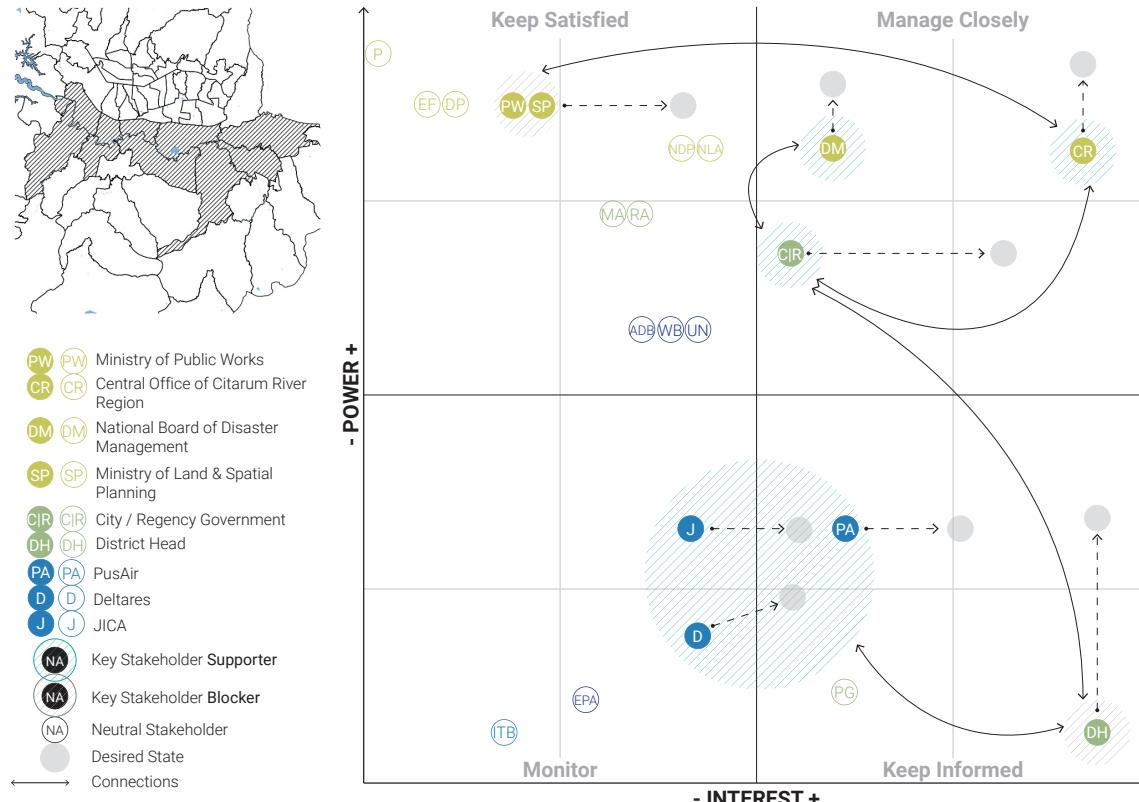
Terima kasih!

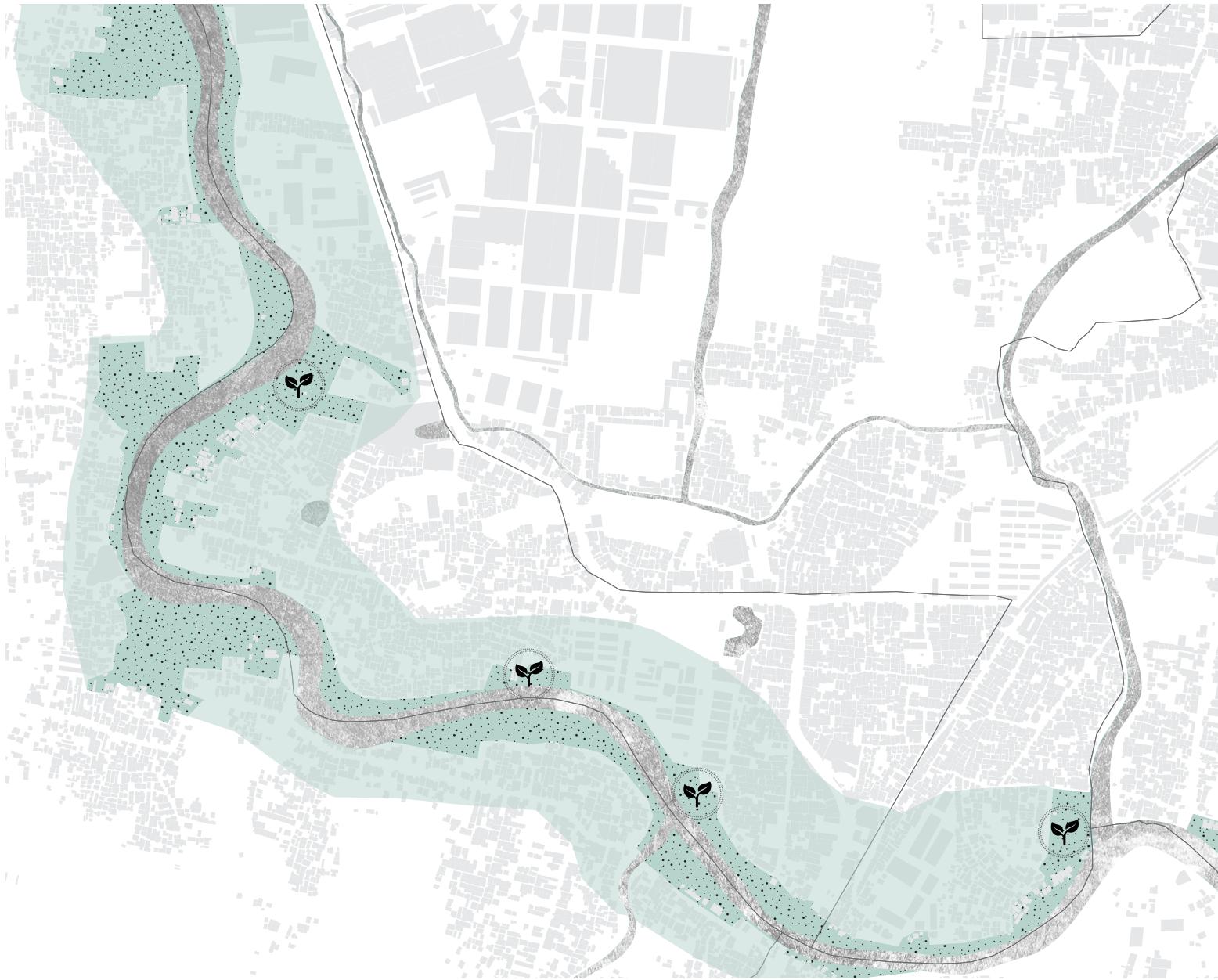


Stakeholder Analysis



Power - Interest Grid



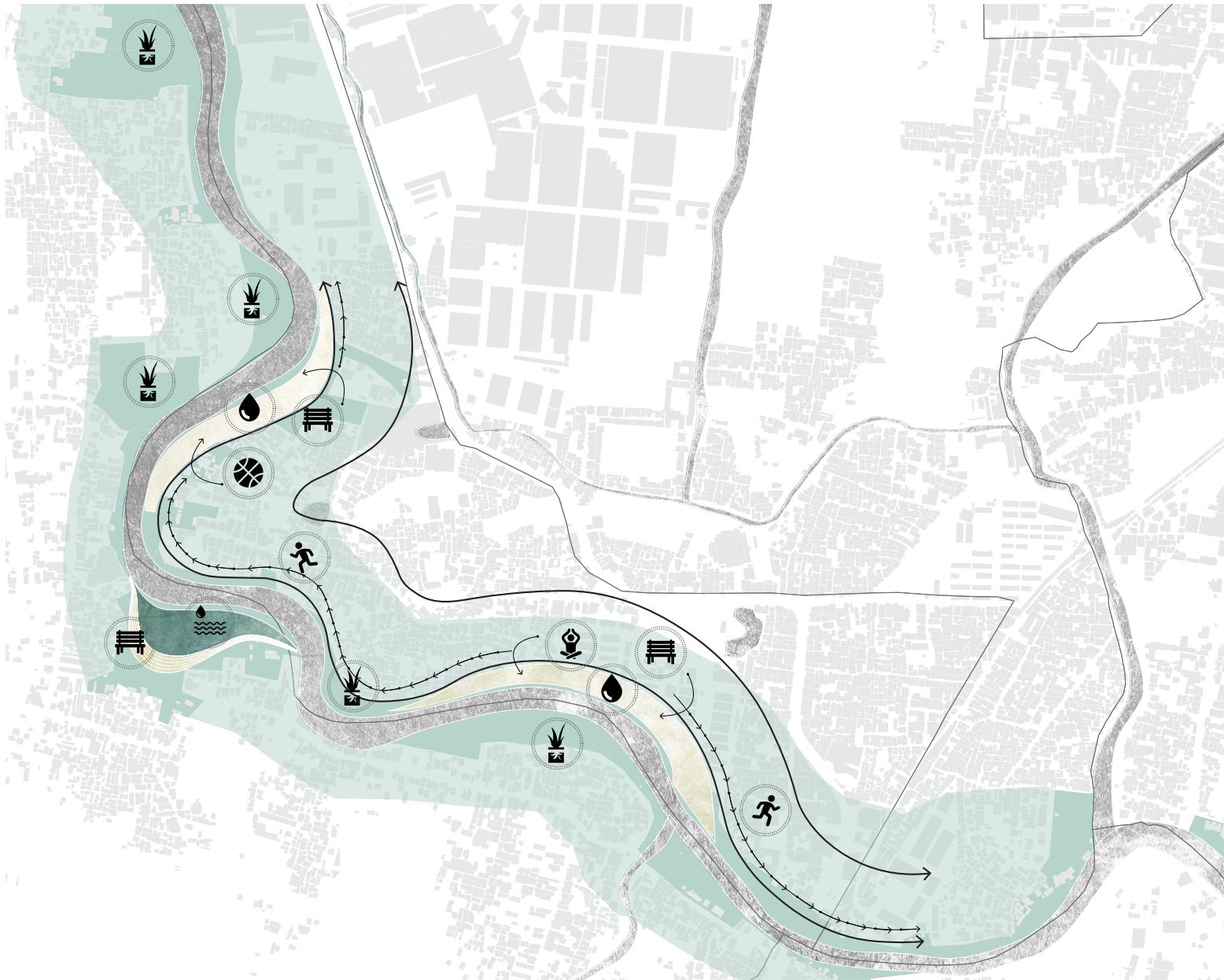


“Foundation”

Focusing on the **origin of the problem** by building upon **institutional preparedness** and **social involvement**

Legend

- Urbanized Areas
- Water Bodies
- Solid Waste Management
- Sand Cover
- Remediation Zones

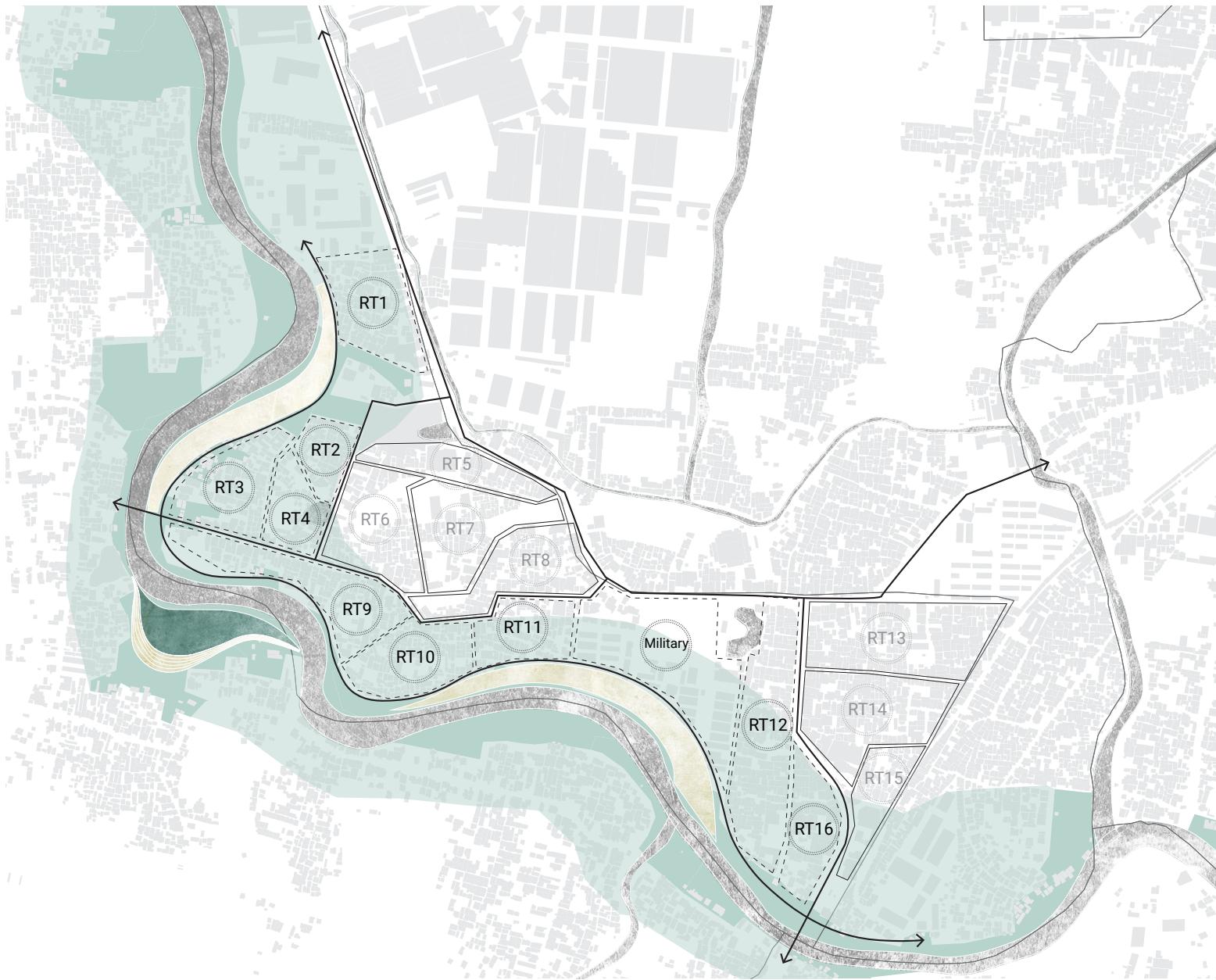


“Safety”

Creating **safe and healthy** urban environments
grounded in **local knowledge** and **professional
expertise**

Legend

- Urbanized Areas
- Water Bodies
- Urban Dike
- Retention Pond
- Purifying Plants
- Room for the River
- Temporary Park Area
- Temporary Activities
- Temporary Sport
- Evacuation Route



“Multifunctionality”

Establishing a **framework for the informality** by providing to the **basic human rights**