



Regenerative Stormwater Management: A Systems Thinking Approach

Josh Hodson



Proudly brought to you by Water New Zealand

Stormwater 2024
15–17 May | Takina Wellington Te Whanganui-a-Tara



Photo credit: Operarme



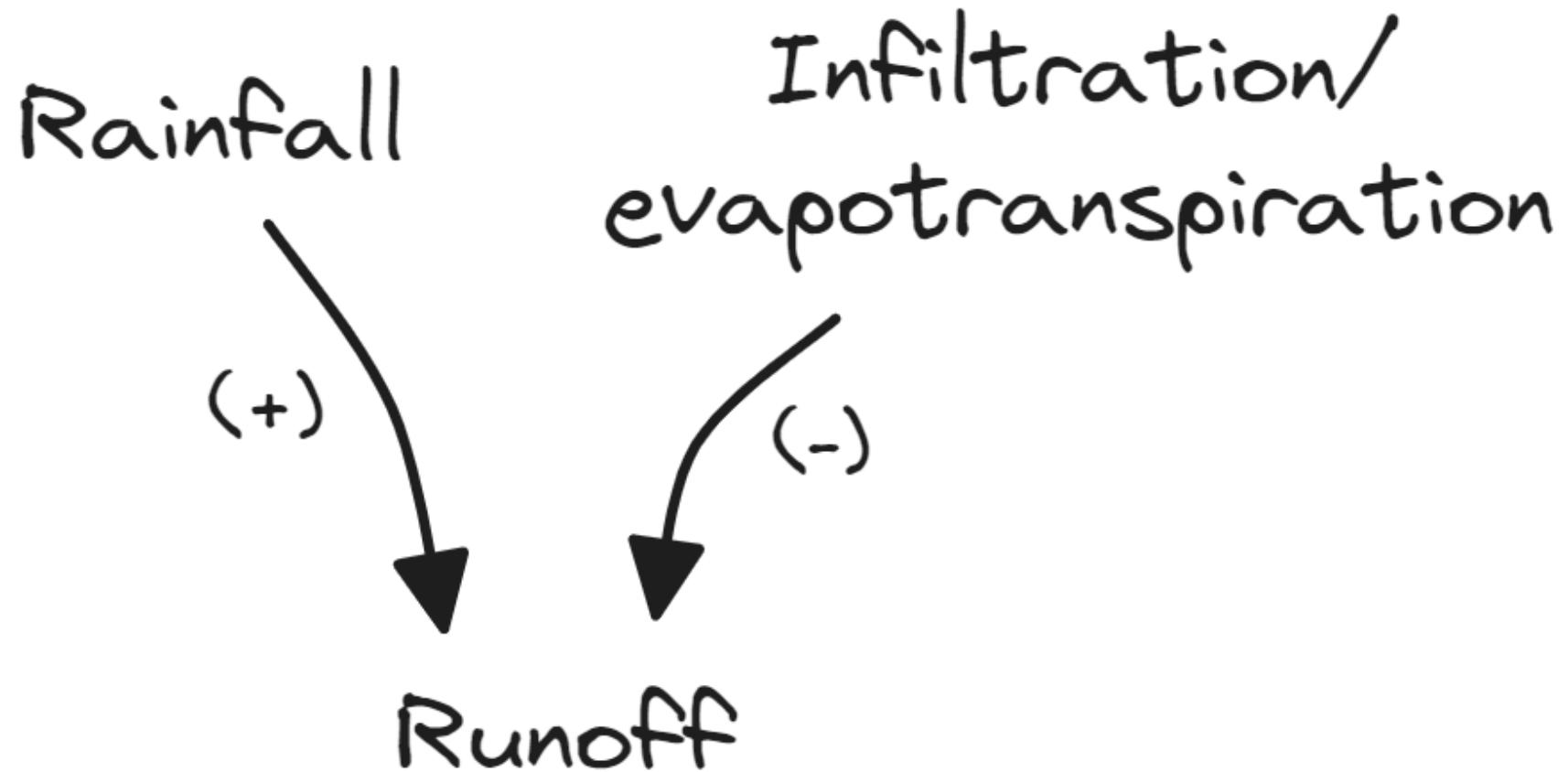
Linear thinking

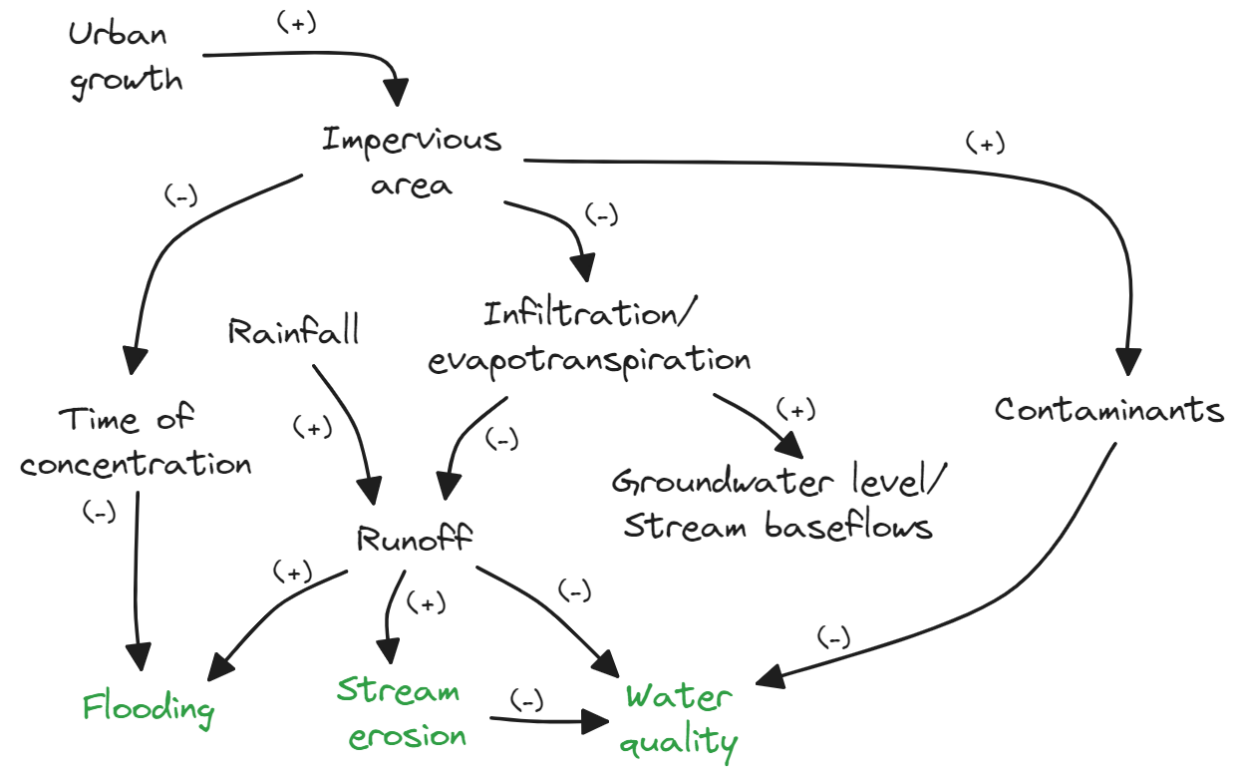


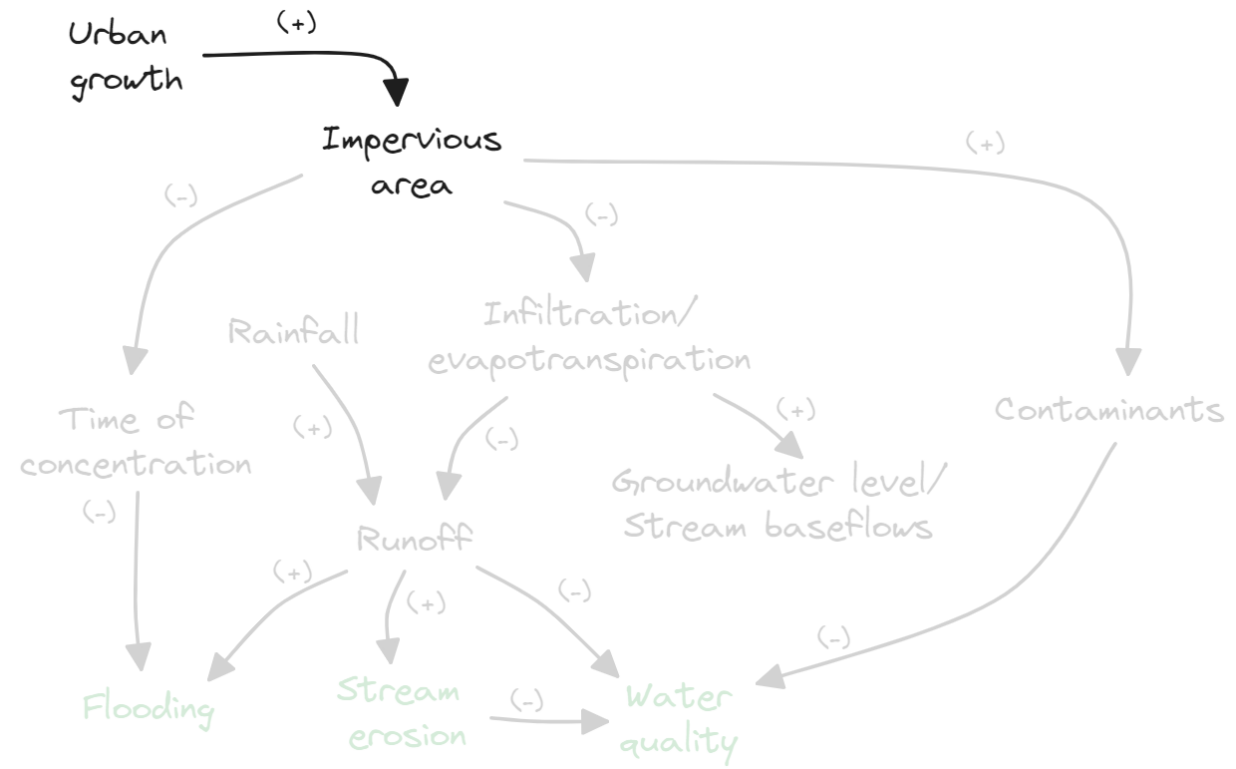
Systems thinking

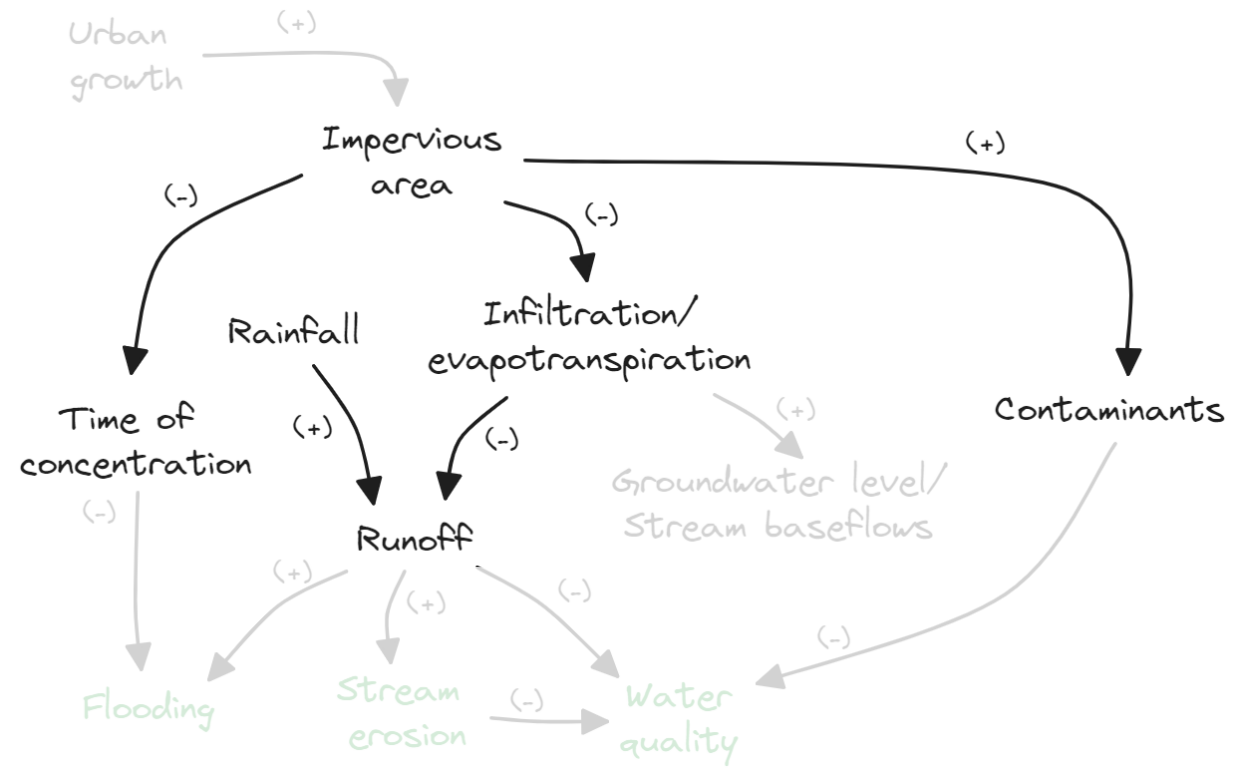
Systems thinking is a holistic approach to understanding and addressing problems by examining the interconnected relationships and dynamics within a system.

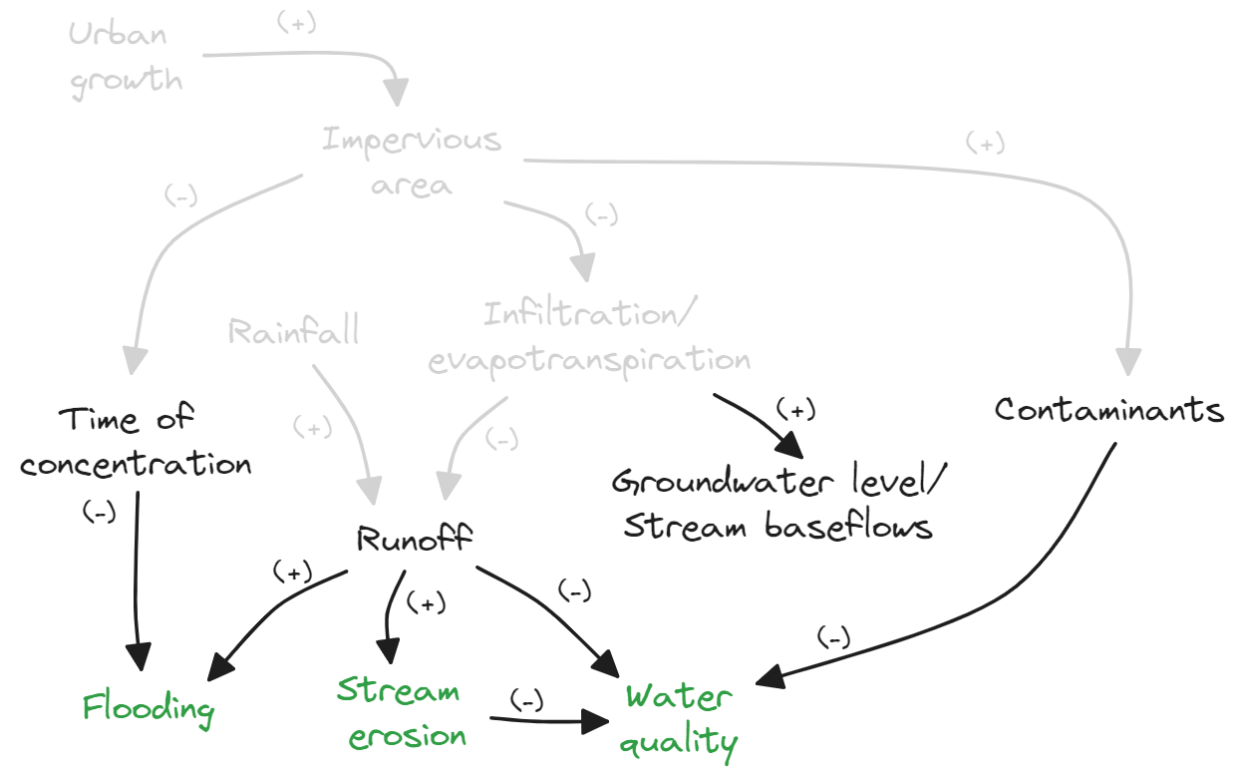
Causal loop diagrams

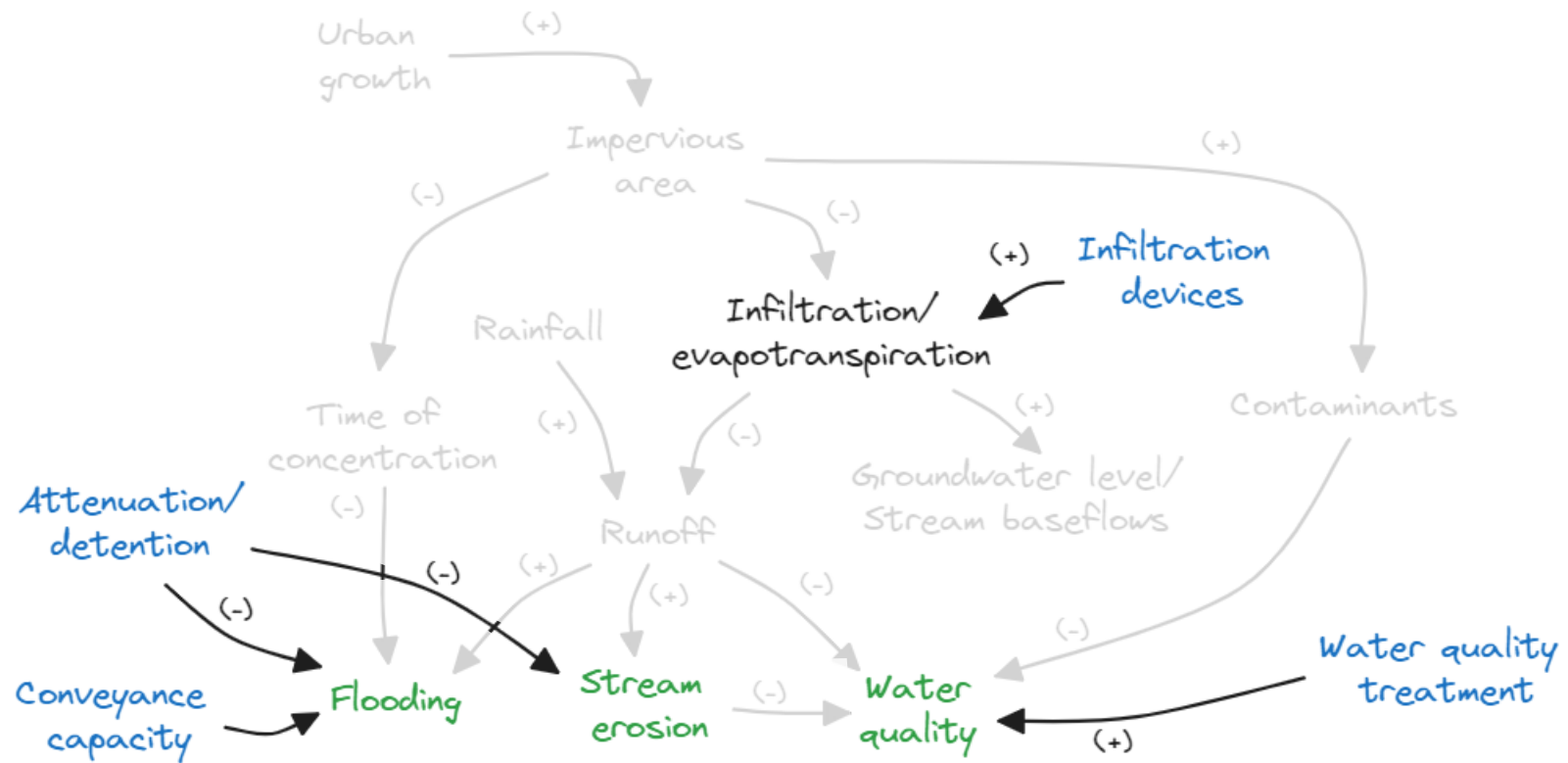


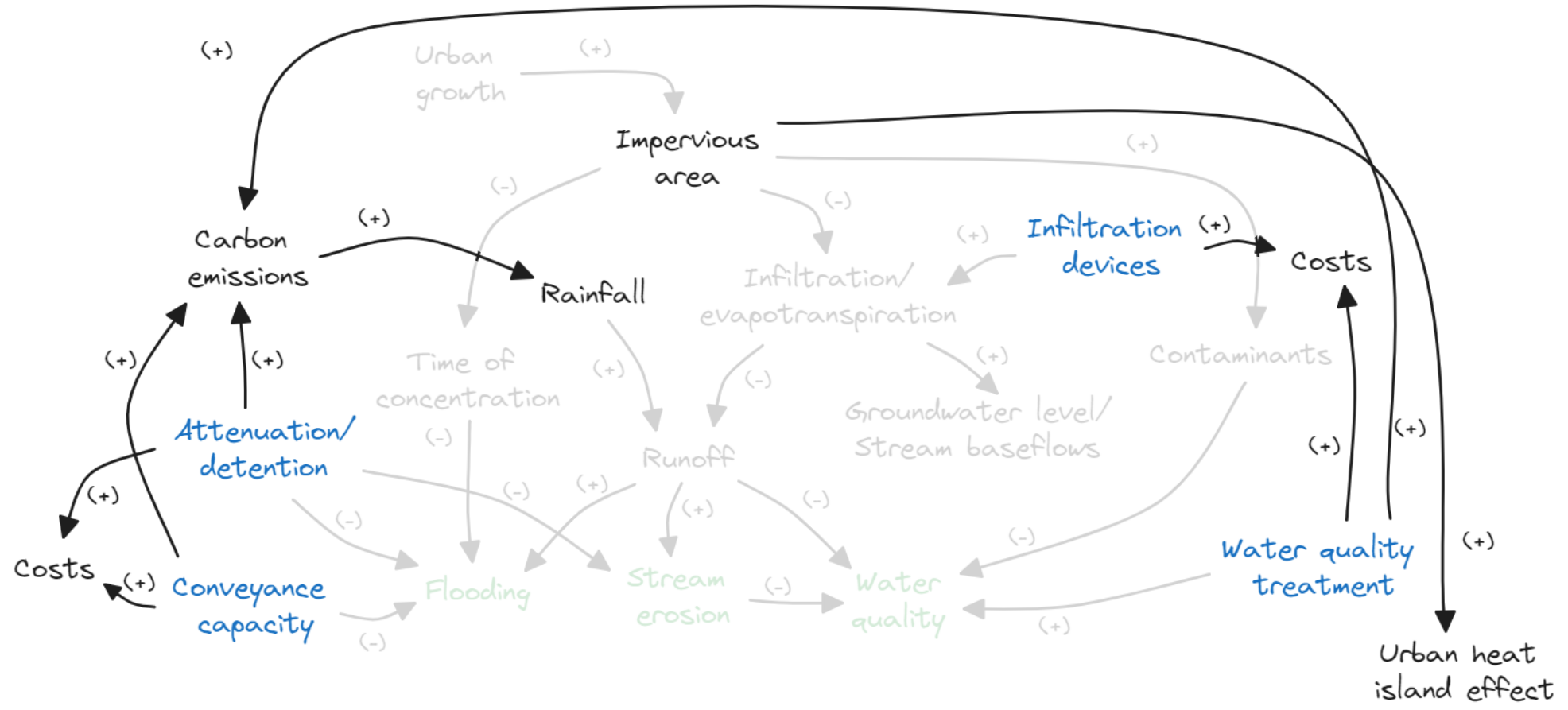


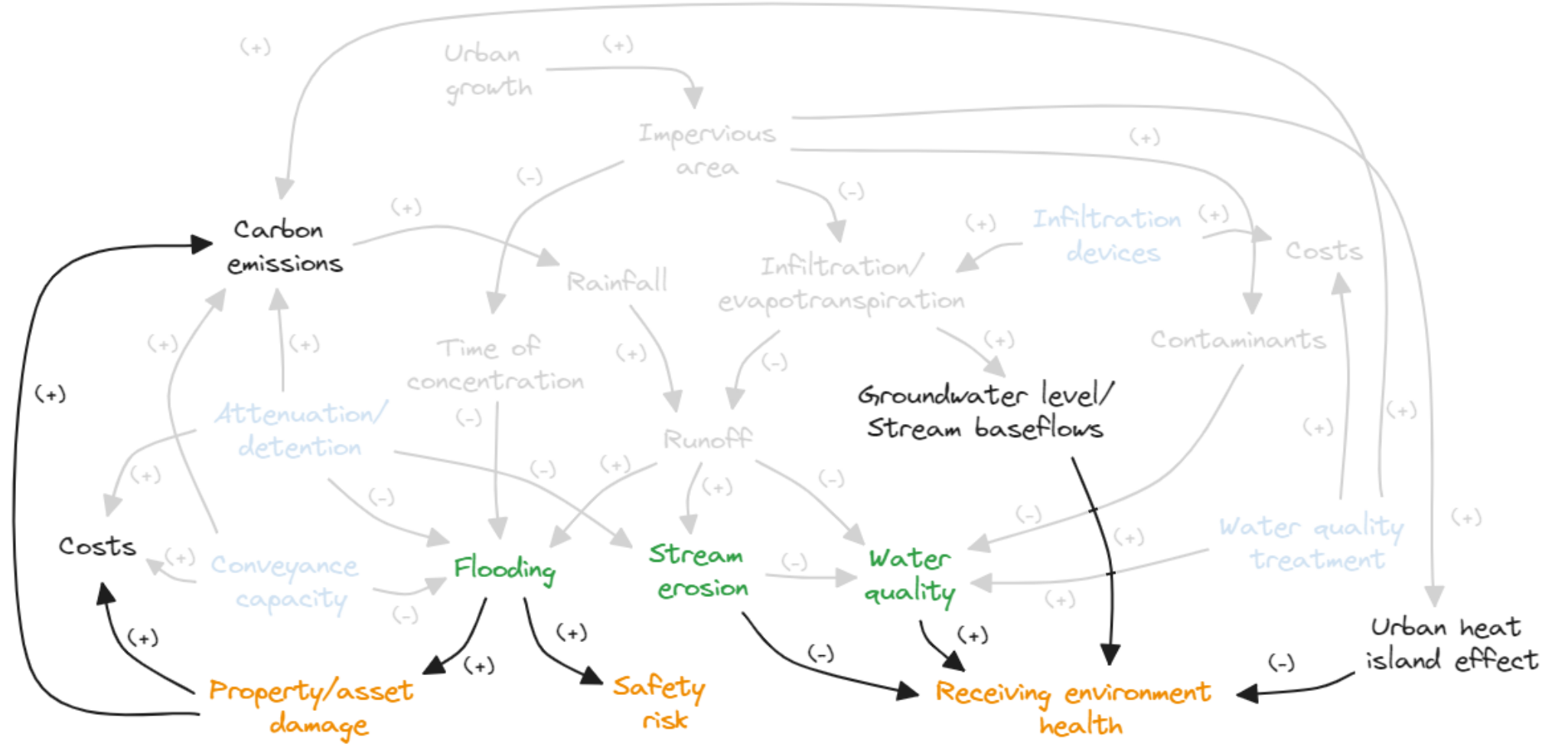


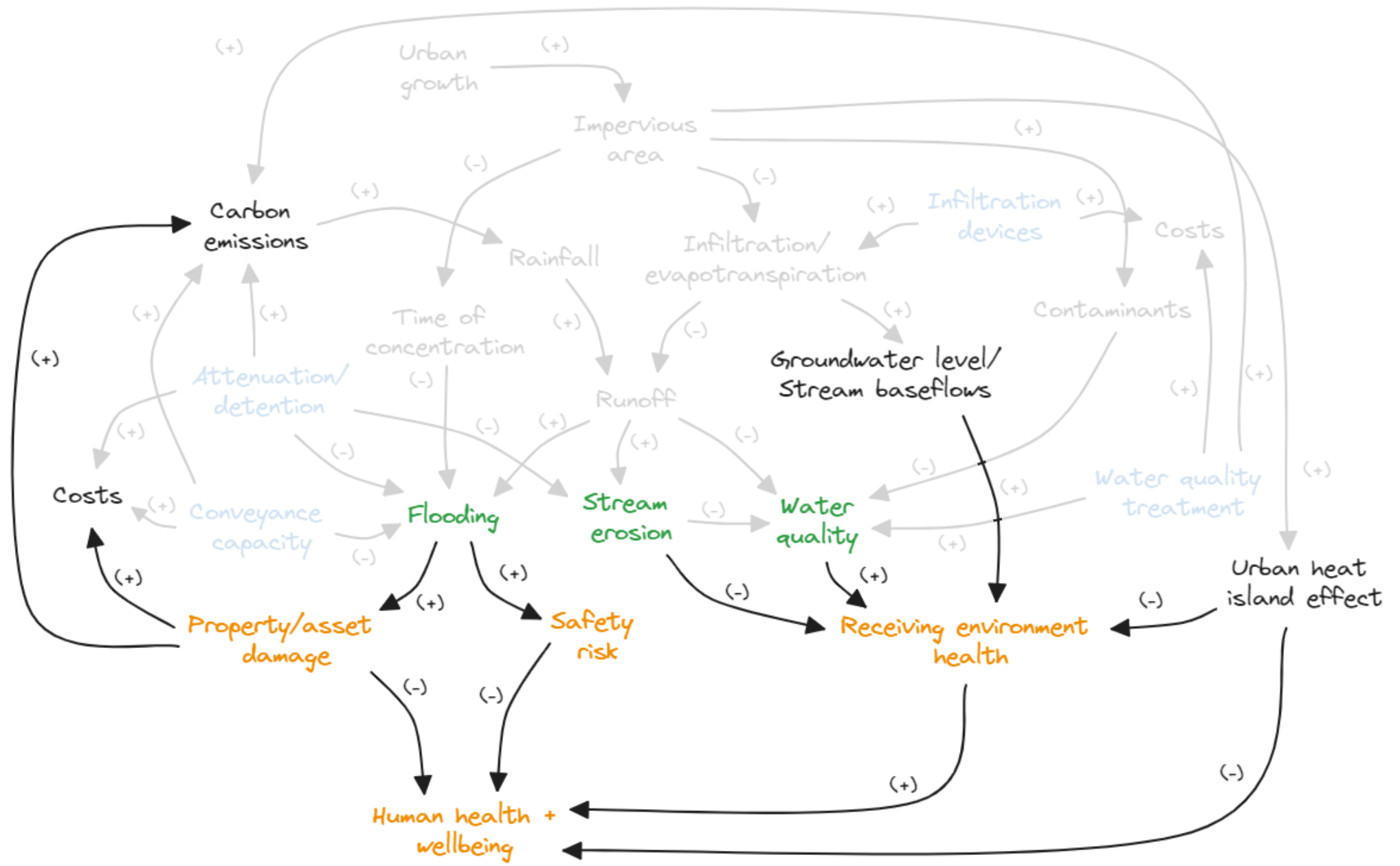


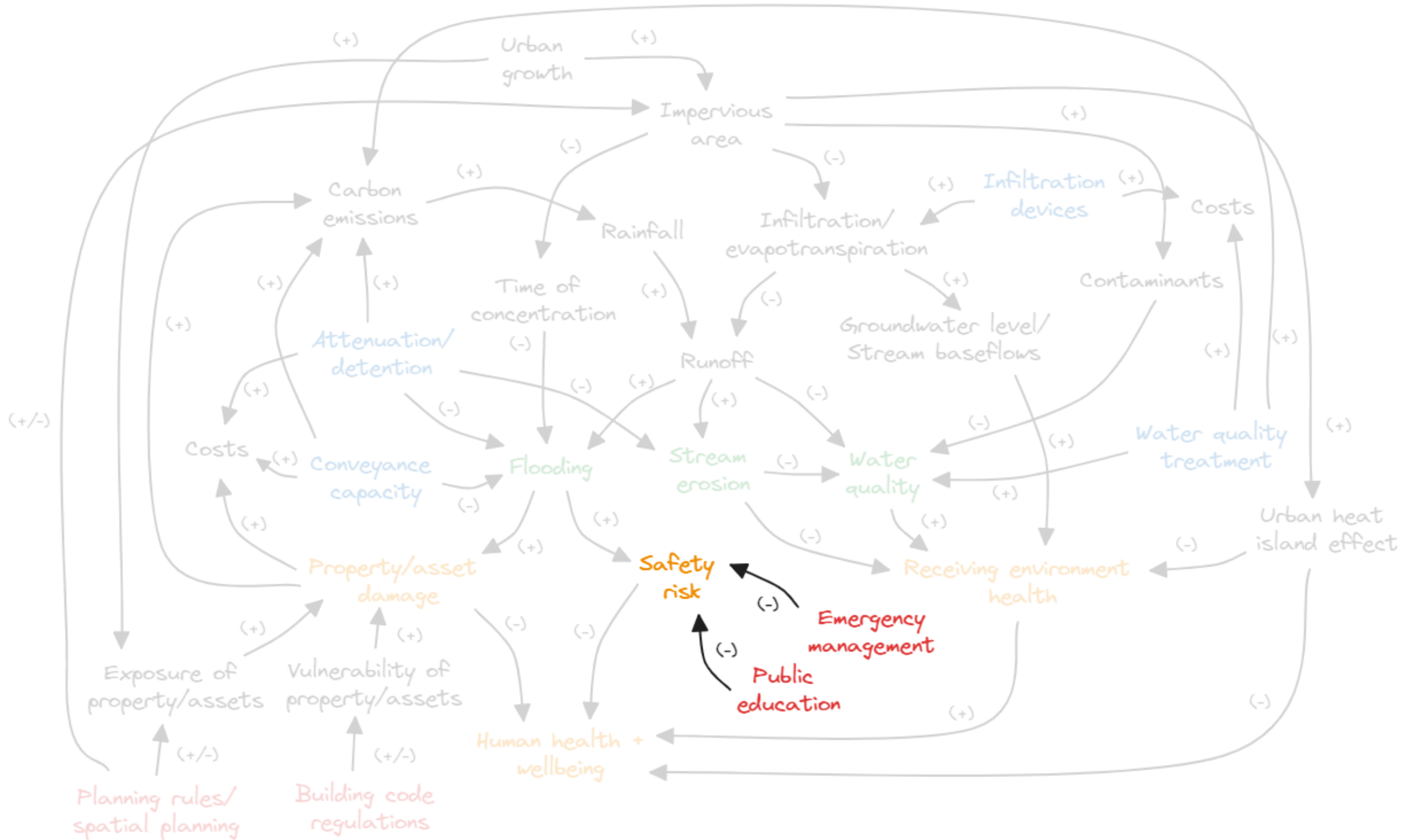


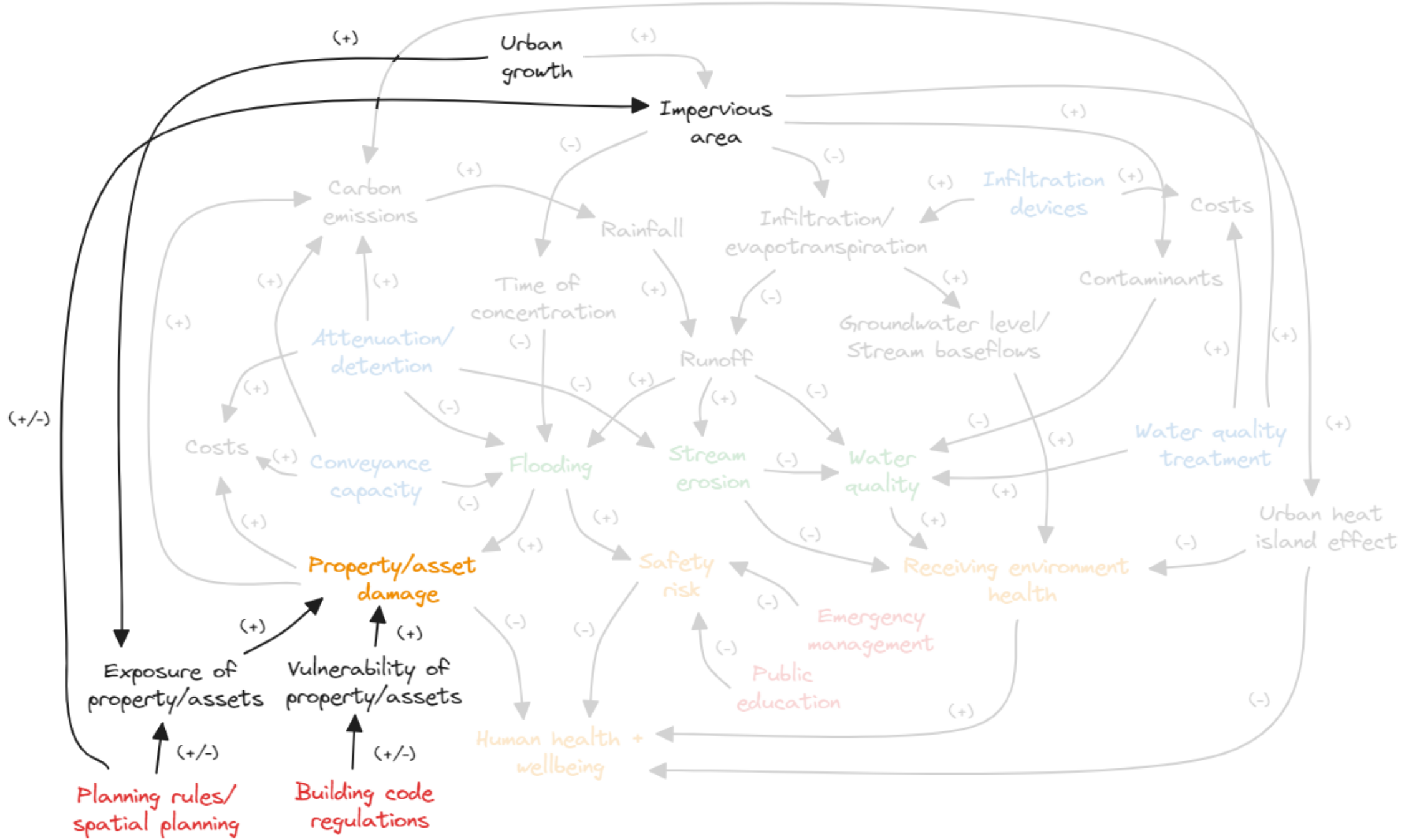


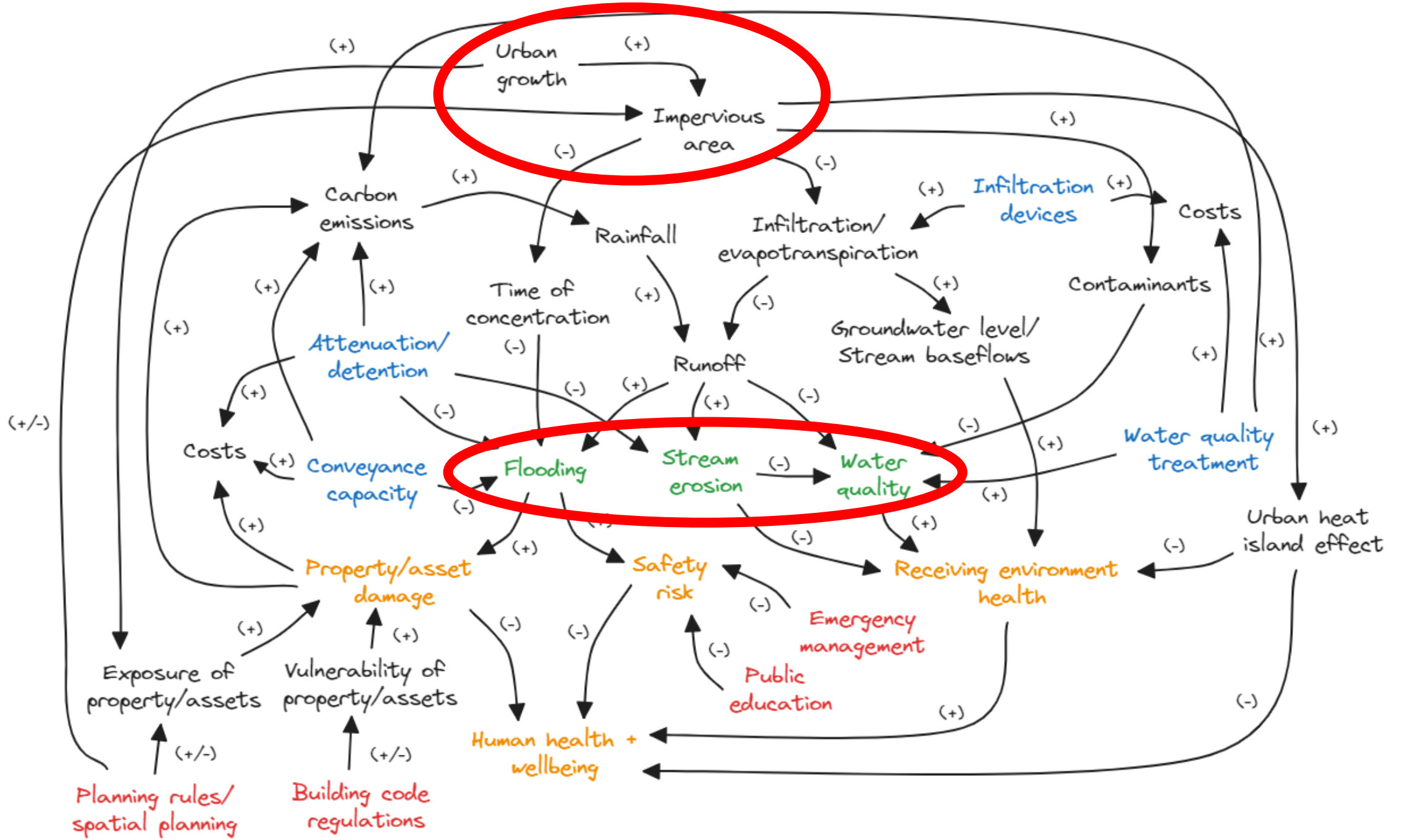












Sponge cities and WSUD are examples of systems thinking

- Integrated urban planning
- Broader objectives
- Nature based solutions
- Decentralised management
- Community engagement



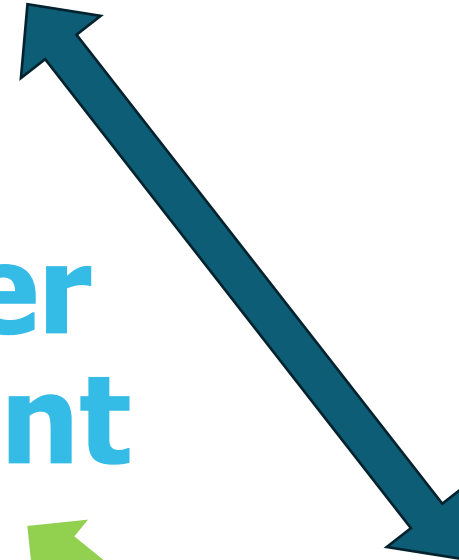
Photo credit: Thomas Schlijper

**Where
we build**

**Stormwater
management**

**What we
build**

**How we
move**



Where we build

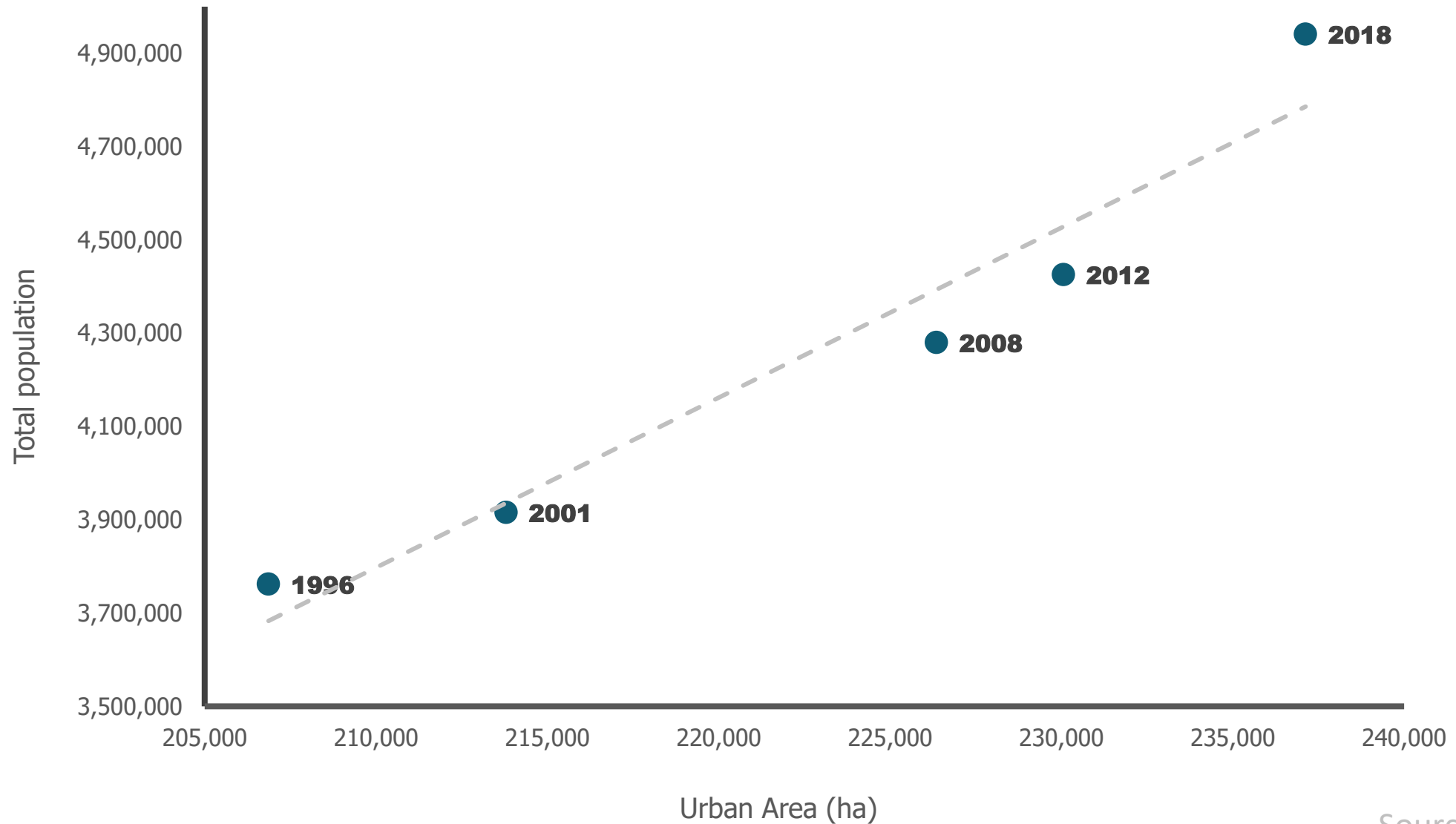


Greenfield



Intensification

Population vs Urban Area



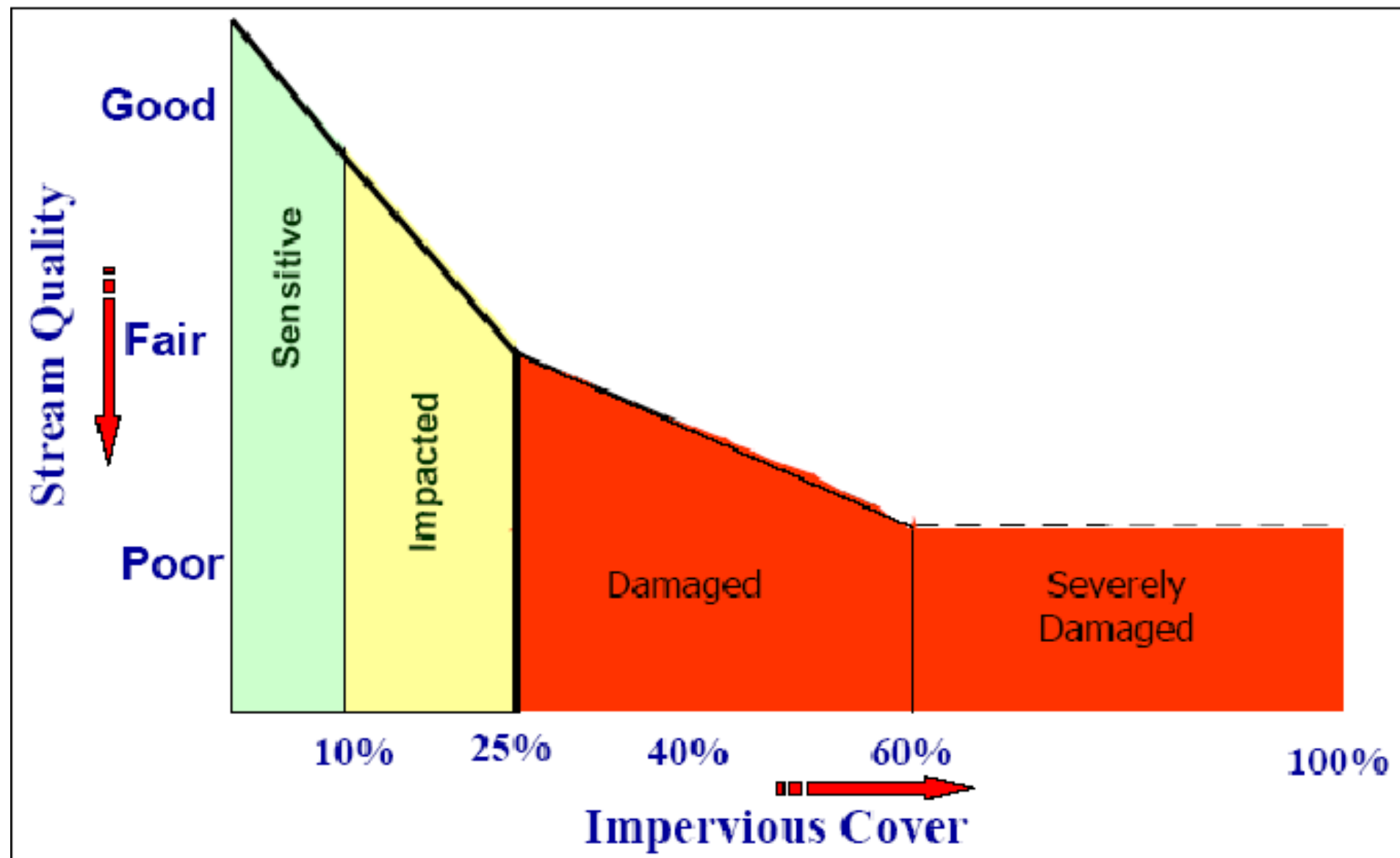
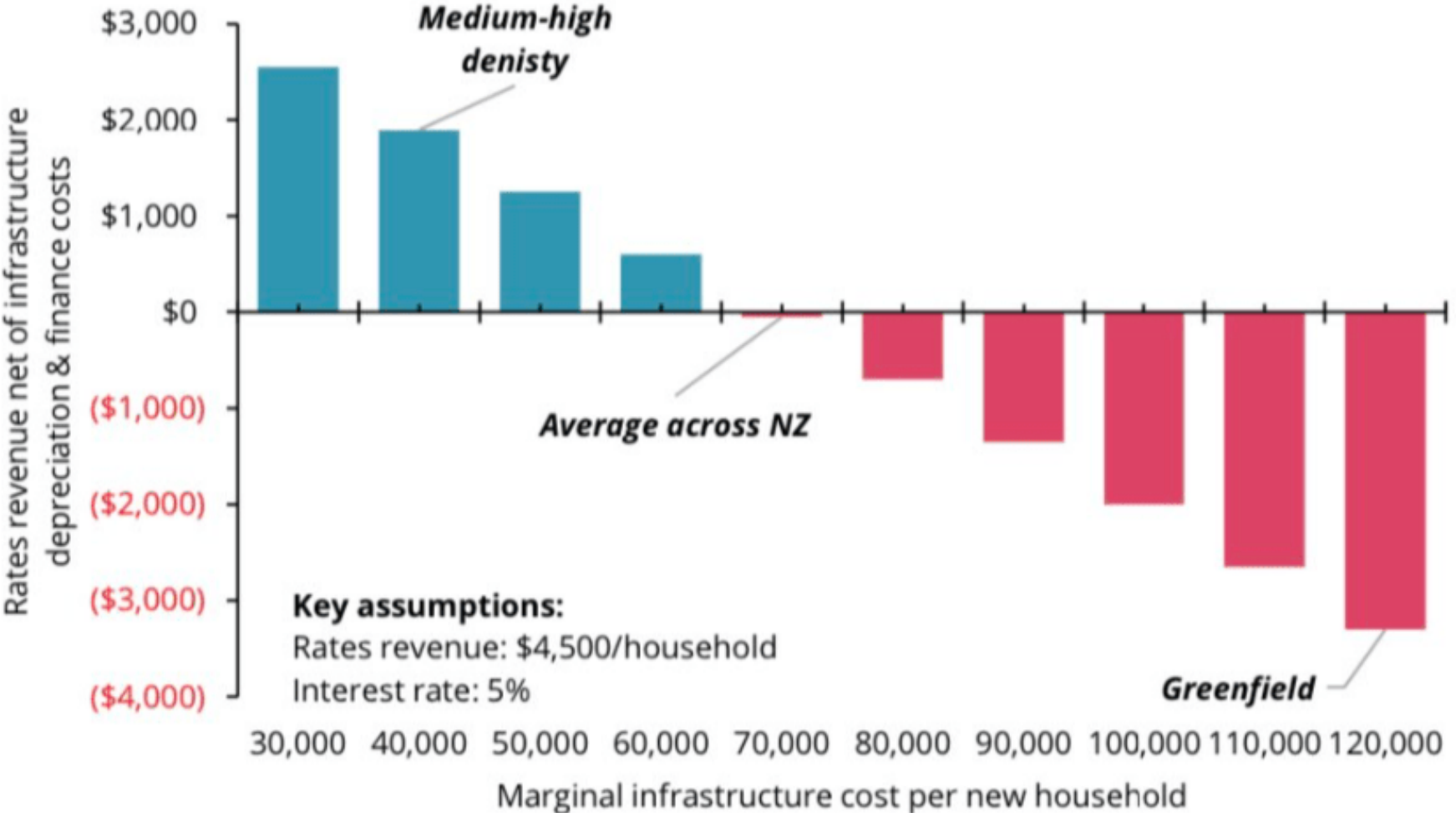


FIGURE 1: NET FISCAL IMPACT OF AN ADDITIONAL HOUSEHOLD, BY DENSITY



Source: Sense Partners



Sponge Cities
Can they help us survive
more intense rainfall?

A REPORT BY **KALI MERCIER**

August 2023



wsp

THE
Helen
Clark
FOUNDATION

**“Encourage upwards
development in
preference to
outwards sprawl and
infilling back yards, to
leave more green
space available to
absorb water”**



Source: Data from Martin et al. (2022b)

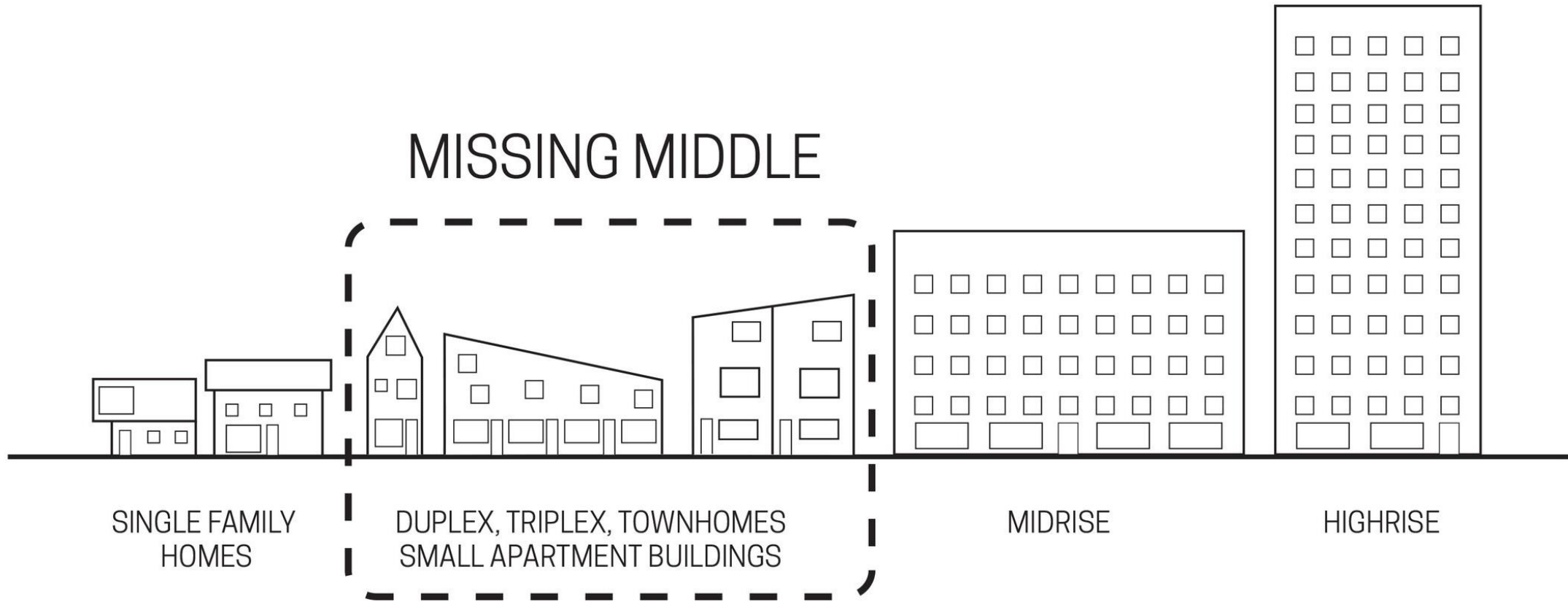
Are we building harder, hotter cities?

The vital importance of urban green spaces

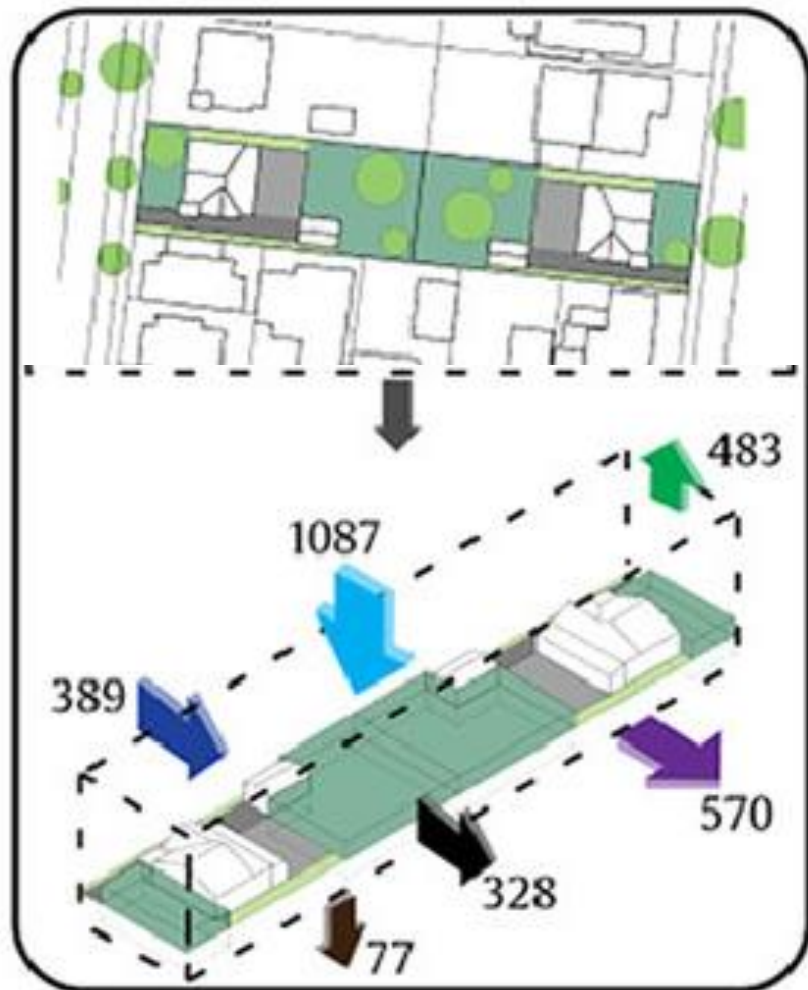
March 2023



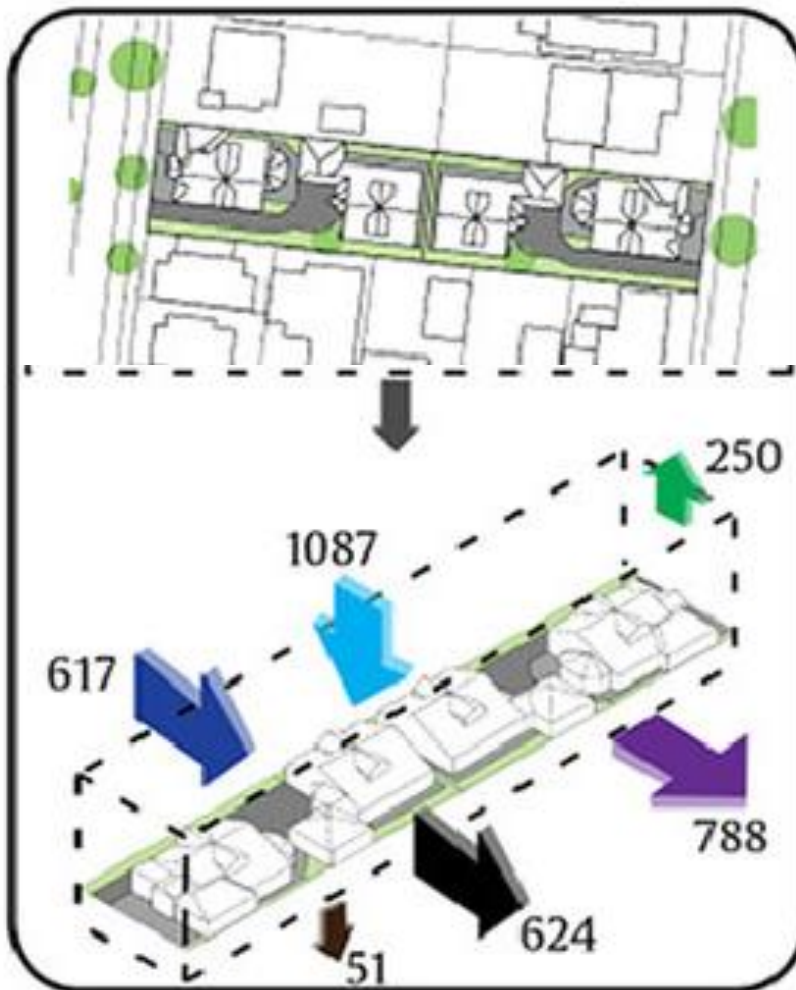
What we build



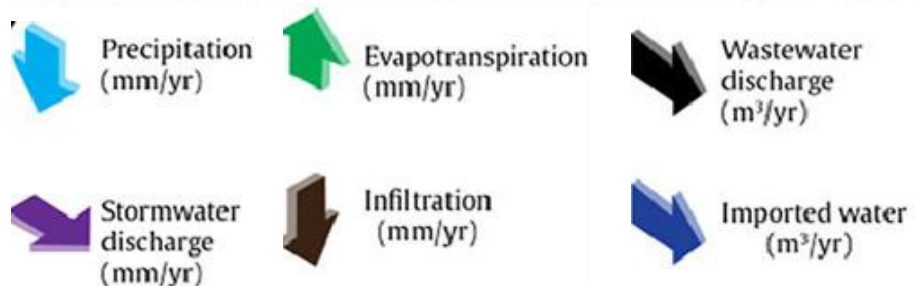
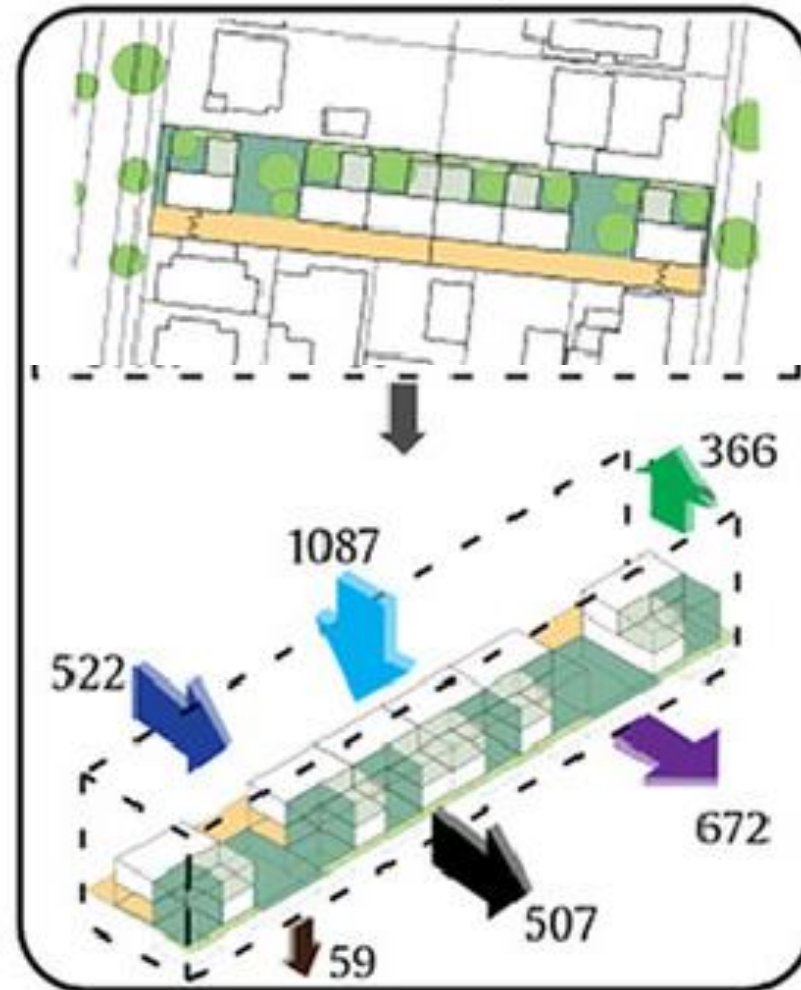
Existing (EX) conditions (before infill)



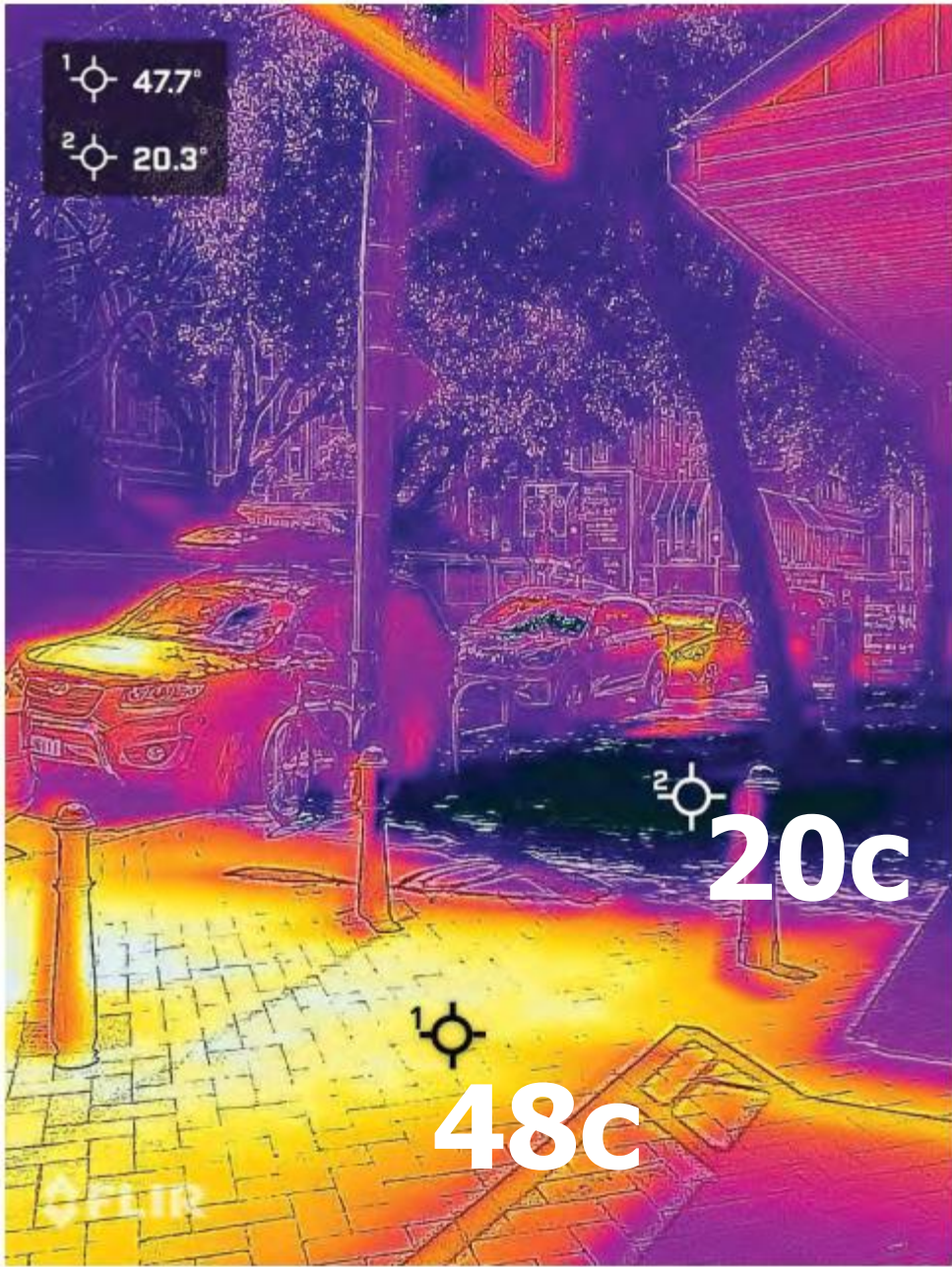
Business-as-usual infill development



Alternative infill development



Source: (Moravej et. al, 2022)



Source: Dr Ashley Broadbent, NIWA

Photo credit: gina kranendonk



Bernoulli Gardens, Hobsonville

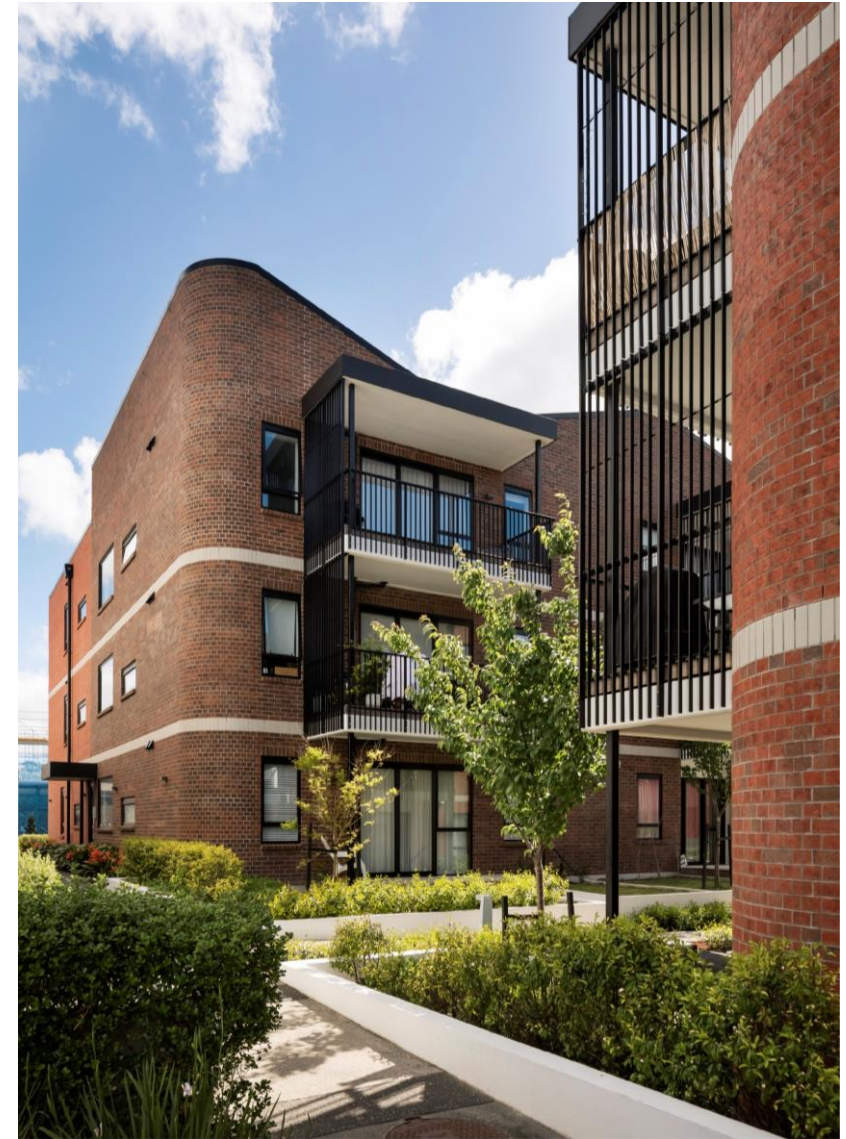


Photo credit: Ockham Residential

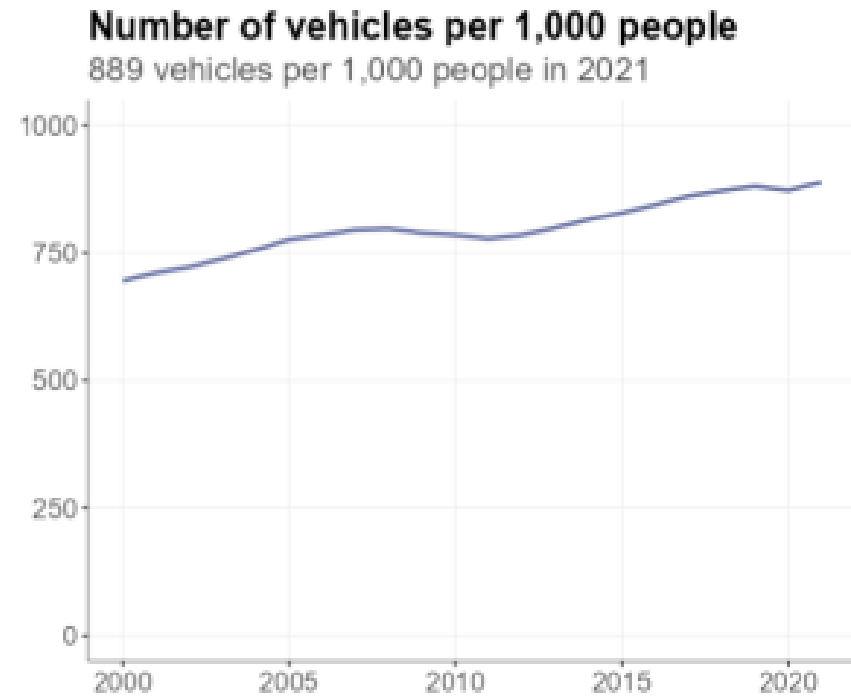
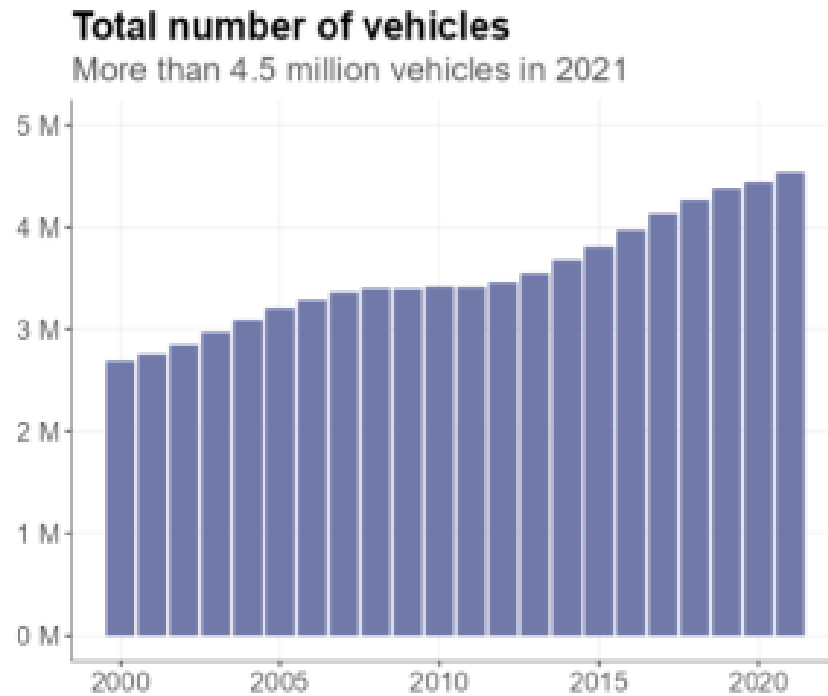
How we move

- **35% of impervious surfaces are roads**
- **60% of expenditure associated with pollution control is required because of cars**
- **6 billion kilograms of tire wear particles are discharged into the environment every year (4.7kg per capita per annum in the USA)**
- **78% of ocean microplastics are synthetic tire rubber**

Sheffield, UK



Photo credit: Nigel Dunnett

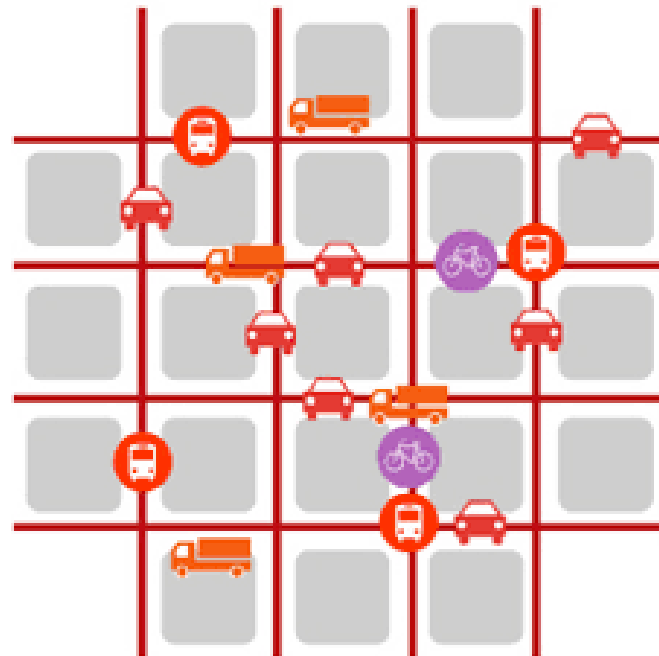


Ministry of Transport
Annual Motor Vehicle Fleet Statistics (2021)

Figure 1: Total number of road motor vehicles over time, and the number of vehicles per 1,000 people.

SUPERBLOCKS MODEL

Current Model



Superblocks Model

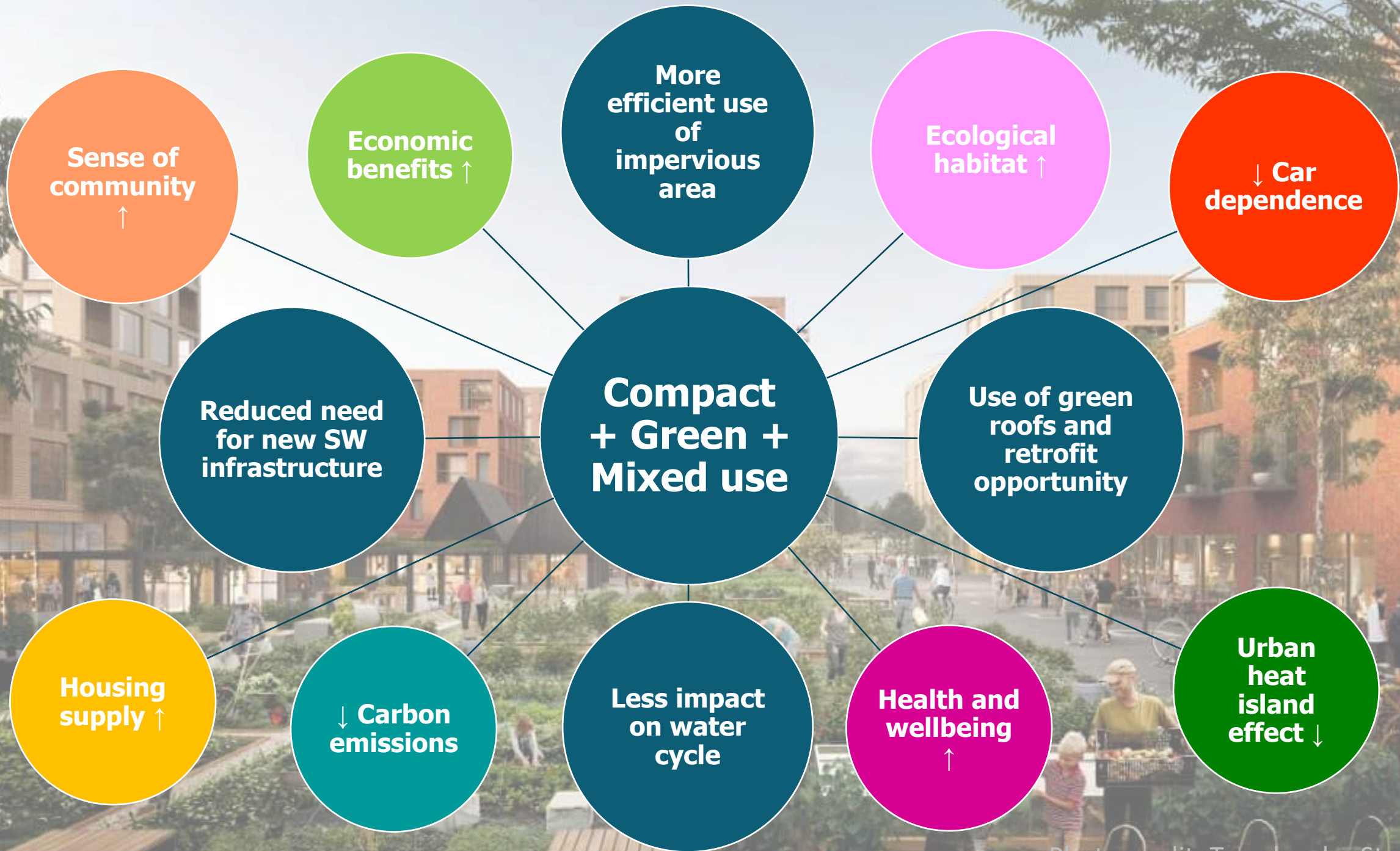


- | | | | | | |
|---|--|---|------------------------------|---|--|
|  | PUBLIC TRANSPORT NETWORK |  | PRIVATE VEHICLE PASSING |  | DUM PROXIMITY AREA |
|  | BICYCLES MAIN NETWORK (BIKE LANE) |  | RESIDENTS VEHICLES |  | ACCESS CONTROL |
|  | BICYCLES SIGNPOSTS (REVERSE DIRECTION) |  | URBAN SERVICES AND EMERGENCY |  | BASIC TRAFFIC NETWORK |
|  | FREE PASSAGE OF BICYCLES |  | DUM CARRIERS |  | SINGLE PLATFORM (PEDESTRIANS PRIORITY) |



Barcelona, Spain

Photo credit: Ajuntament de
Barcelona



“The size of the challenge is too large to fix by simply investing more.....Rather, we need to invest more as well as reduce demand, increase efficiency and do better integrated spatial planning.”

We cannot build our way out.”

‘New Zealand’s Infrastructure Challenge: Quantifying The Gap and Path To Close It’ Sense Partners 2021



Photo credit: Dumont Legrand Architectes, Biganos, 2018/1

Regenerative



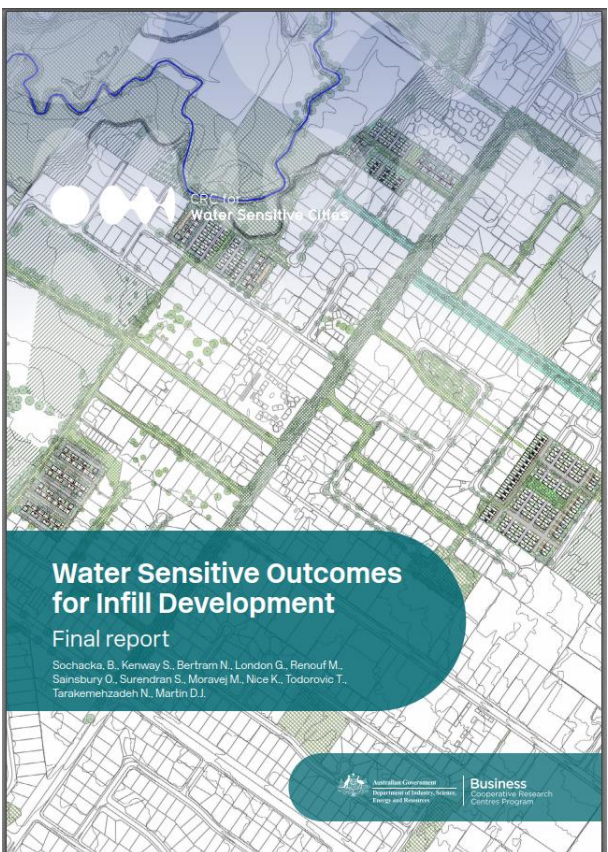
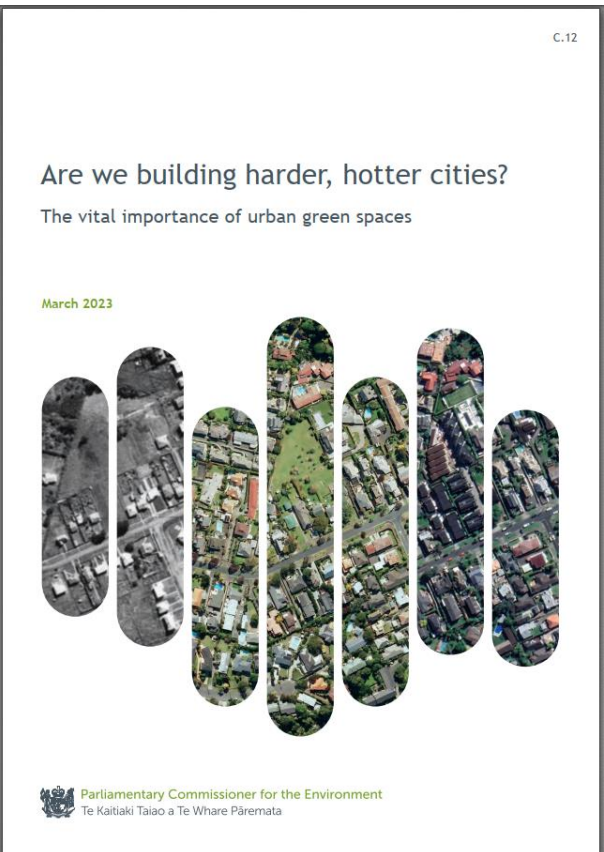
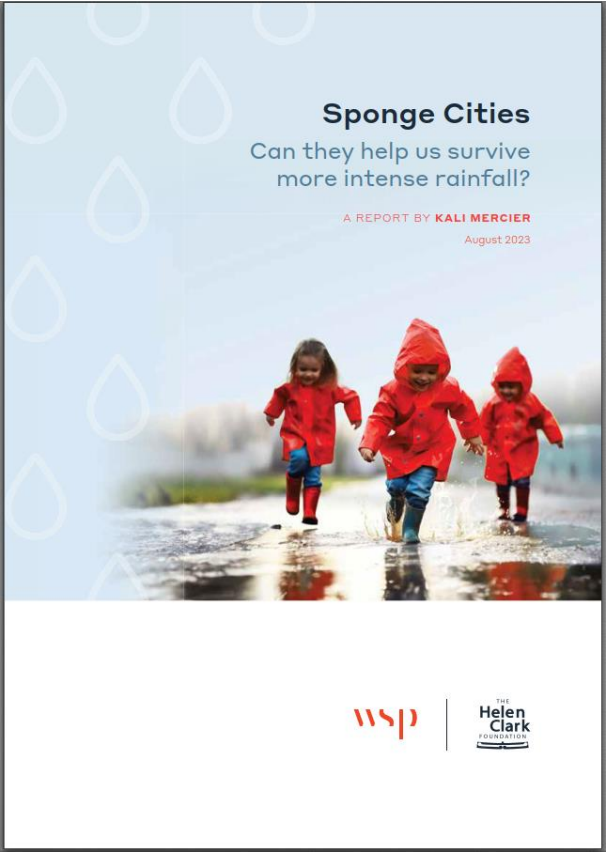
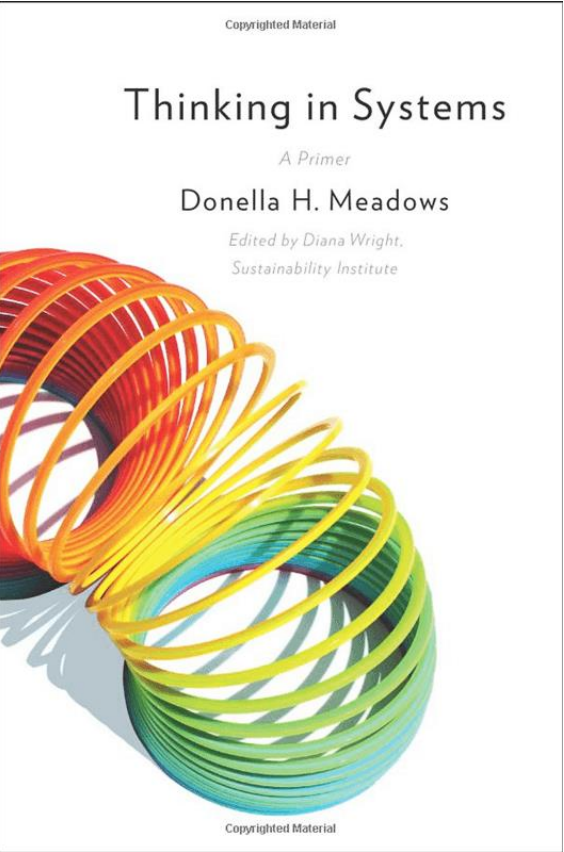
Photo credit: Evolta

Thank you!
Questions? Patai?

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Further reading





Cohaus, Greylynn

Photo credit: Adam Luxton