GEODESIGN -

Bridging GIS and BIM in planning and designing Green Infrastructure

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2. Geodesign bridging GIS and BIM

- **GIS** has data models for representing geographic themes and surfaces
- GIS is strong in spatial data capture, management and analyses
- **BIM** involves the generation and management of digital representations of physical and functional characteristics of objects (object-oriented)
- BIM enables the virtual construction of a proposed project and facilitates the management of projects

- *GIS is strong in context analyses; BIM is strong in the detailed design and construction process – BUT there is a gap at the early idea-generating stage of the design process*

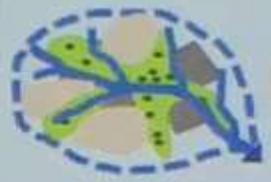
1. Definitions

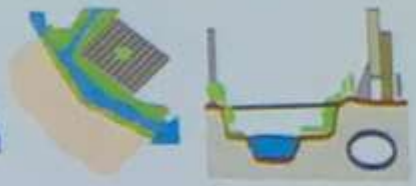
- **Geodesign**: "*a design and planning method which tightly couples the creation of design proposals with impact simulations informed by geographic contexts, systems thinking, and digital technology*"
- or in short: "***Geodesign** is changing geography by design*"

Steinitz, 2010

- Geodesign can bridge GIS and BIM through collaboration at the early stages of the design process

COLLABORATIVE NEGOTIATION AS A GEODESIGN METHOD

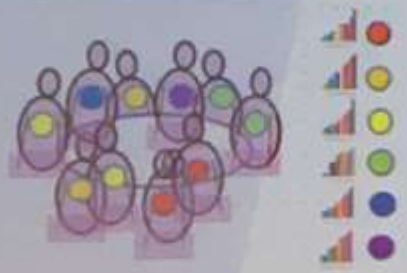




GEOGRAPHIC SCIENCES
SUPPLY-BASED
"DEFENSIVE" STRATEGIES

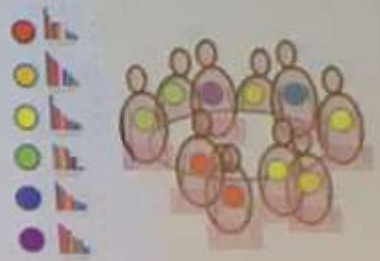
GEODESIGN IS COLLABORATION AND NEGOTIATION

DESIGN PROFESSIONS
DEMAND-BASED
"OFFENSIVE" STRATEGIES



INFORMATION TECHNOLOGISTS

THE PEOPLE OF THE PLACE



GIS ←----------→ GEODESIGN ←----------→ BIM

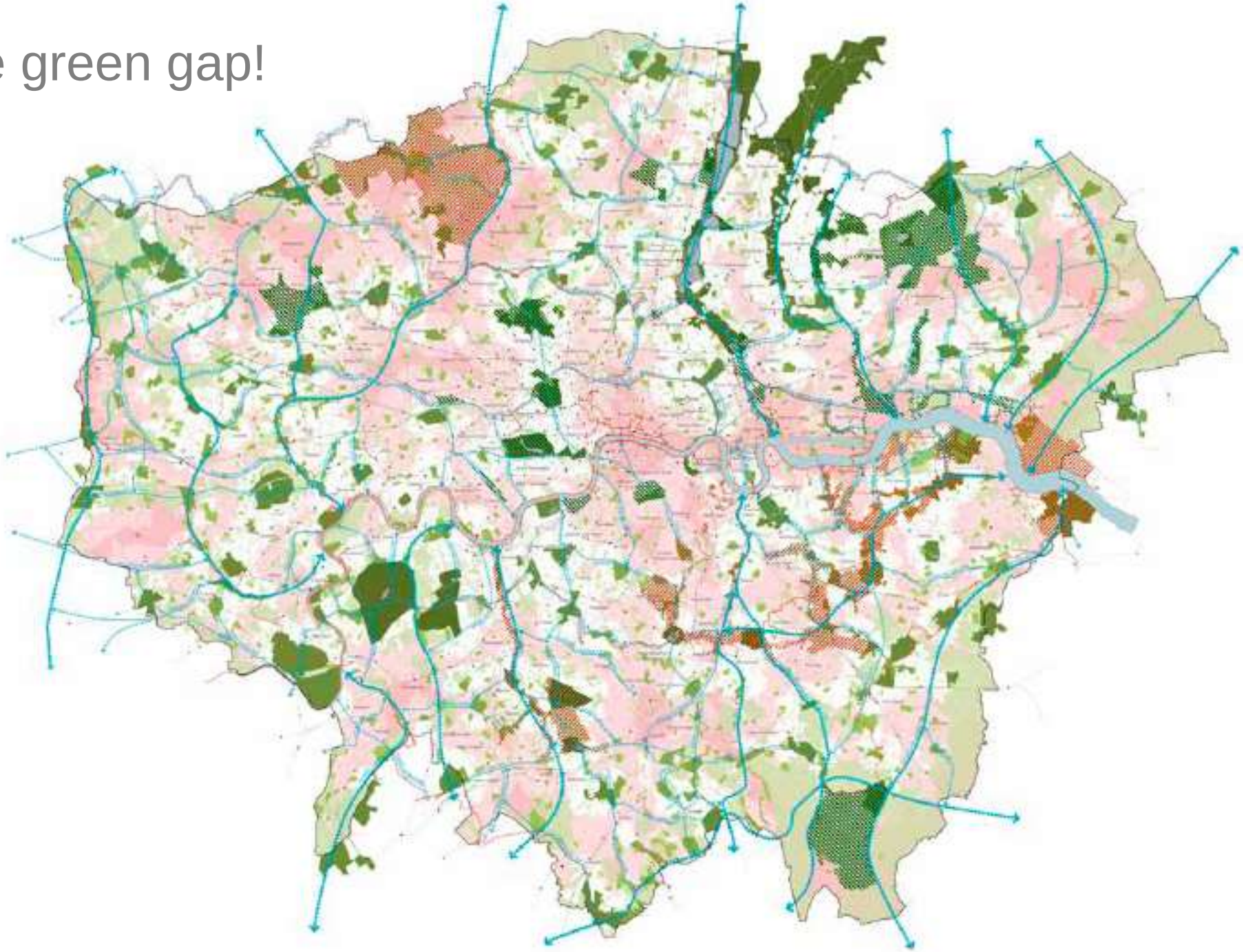
ALLOCATION
LONGER TERM MANAGEMENT

ORGANIZATION
STRATEGIC DESIGN

VISUALIZATION
SHORTER TERM MANAGEMENT

Steinitz, 2012

The green gap!



The All London Green Grid (The Mayor of London, 2015)

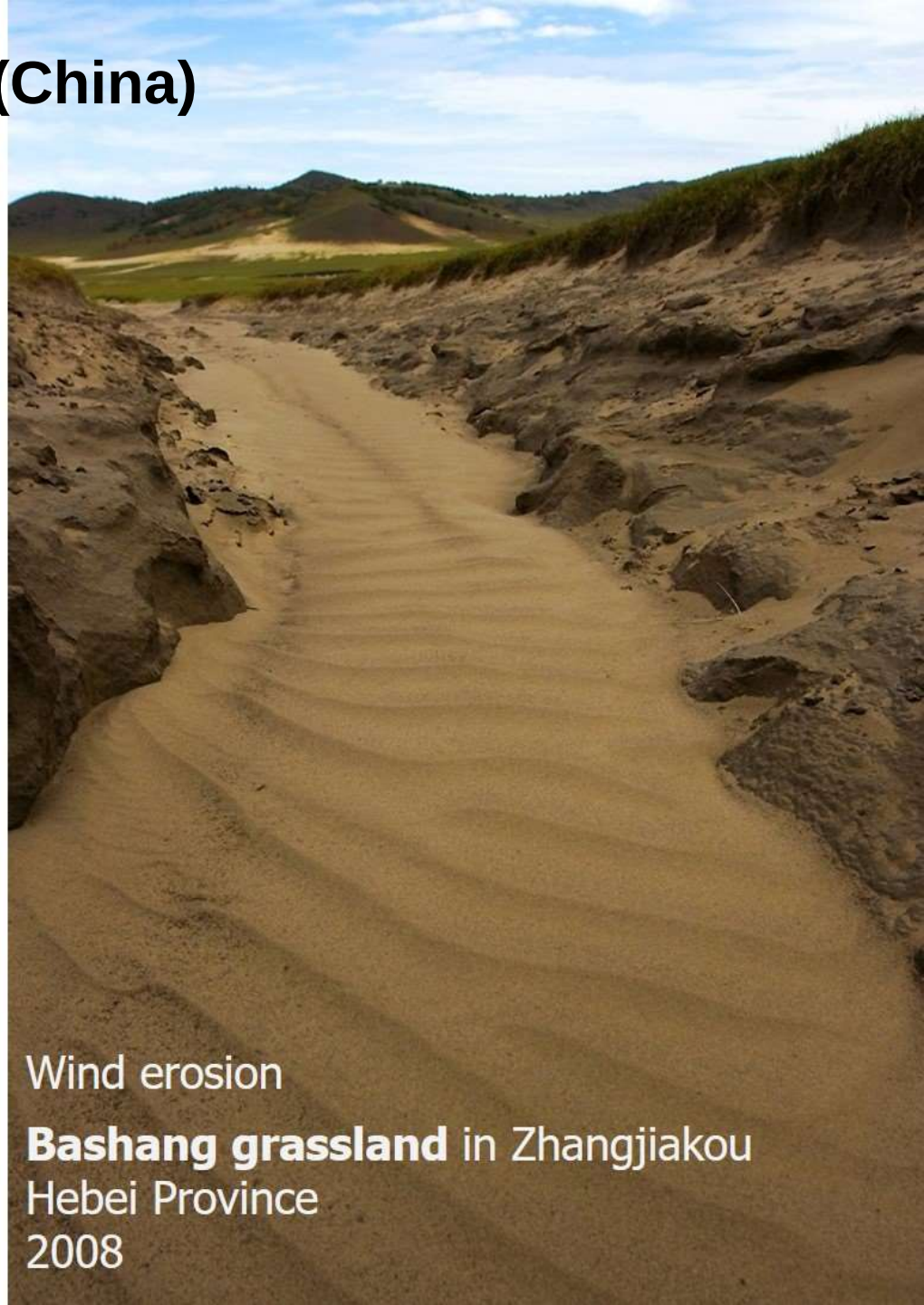
3. Case Study: Green Infrastructure Planning and Design

- **Green Infrastructure** is “a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services” (European Commission, 2013)
- Data: terrain, vegetation, hydrology, structures
- Scales: regional, city, neighbourhood/site

The All London Green Grid (The Mayor of London, 2015)

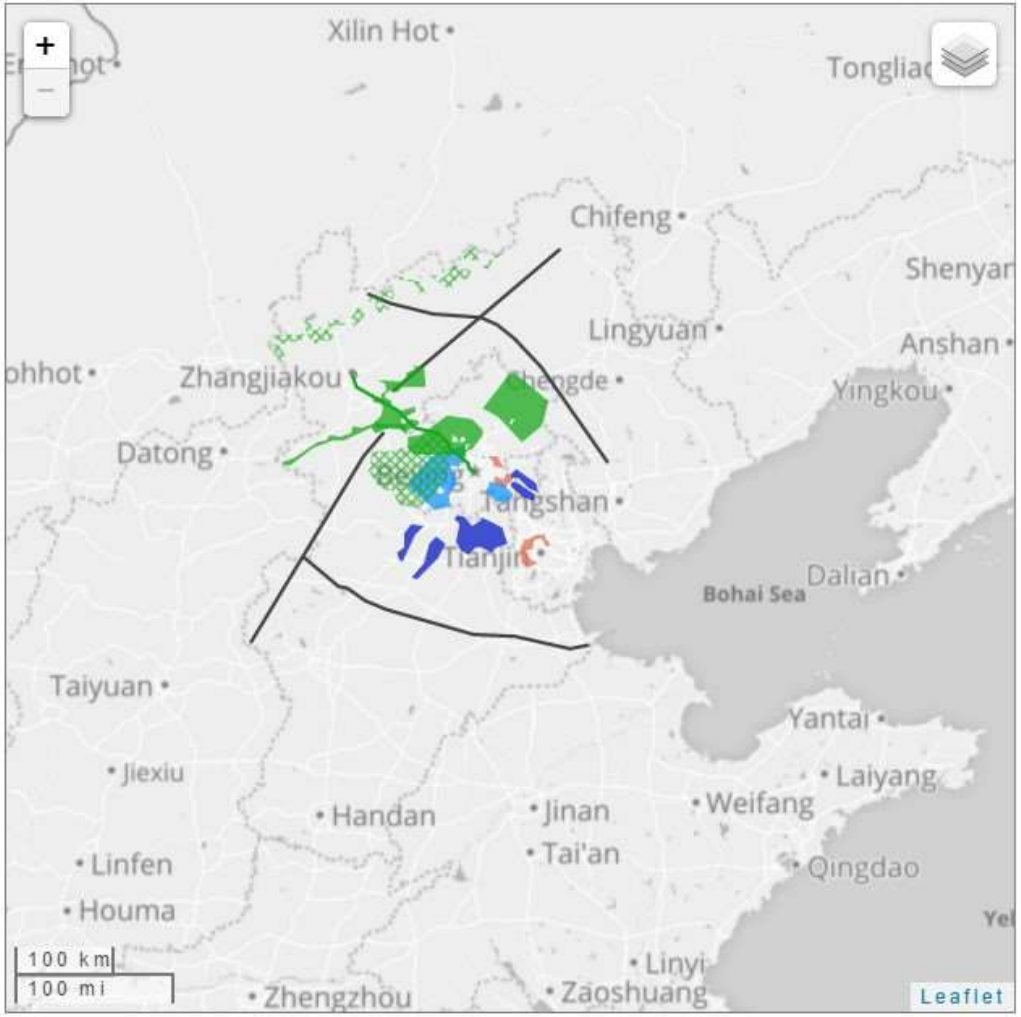
3.1 Regional Scale: Jinjinji Area (China)

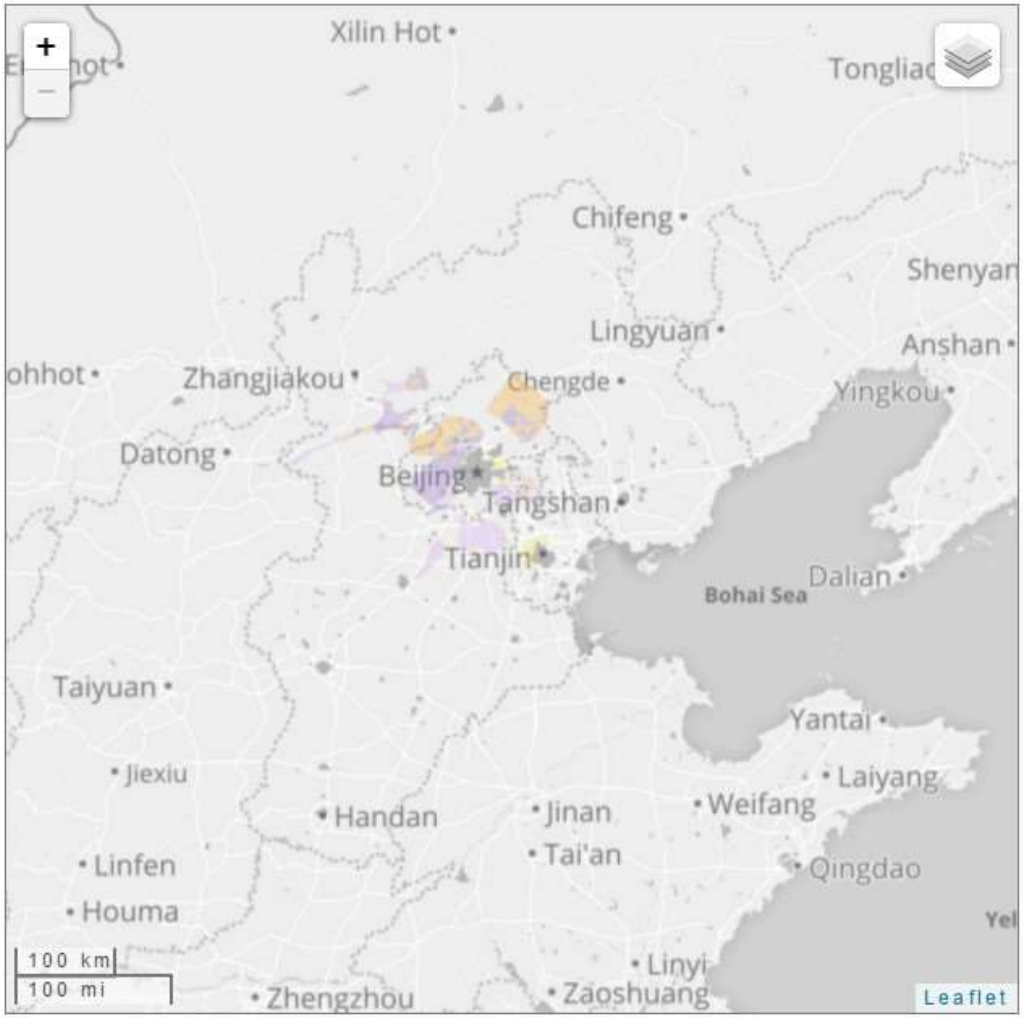
» Geodesign proposal for the provision of green infrastructure in the form of so called shelterbelt forests at a regional level in the Jingjinji area (Puyu Wang, 2016)



SYNTHESIS AND IMPACTS MAP

✔ Sync Maps





Most Negative Impact ■ ■ ■ ■ ■ ■ ■ Most Positive Impact

Impacts: ● System ○ Cross System

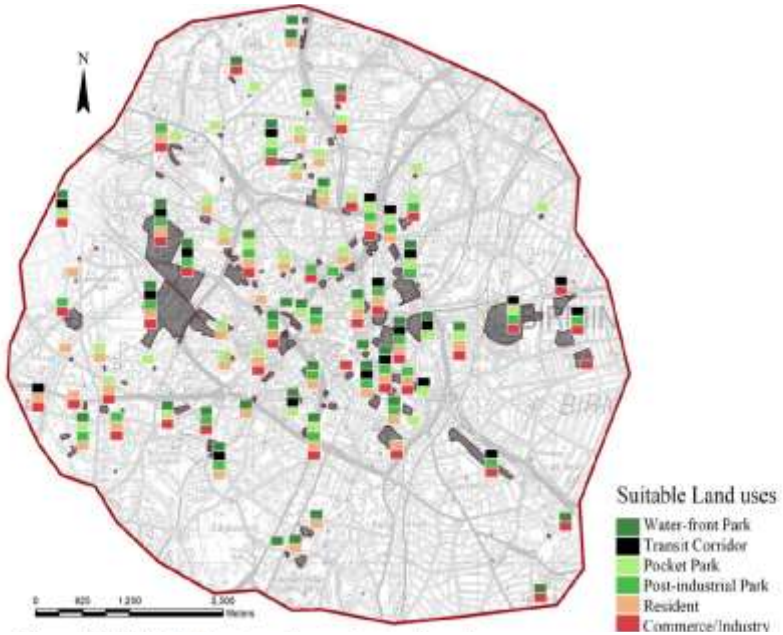
✔ ECO ✔ HYDRO ✔ COMIND ✔ HSG ✔ TRANS ✔ Constraints ☐

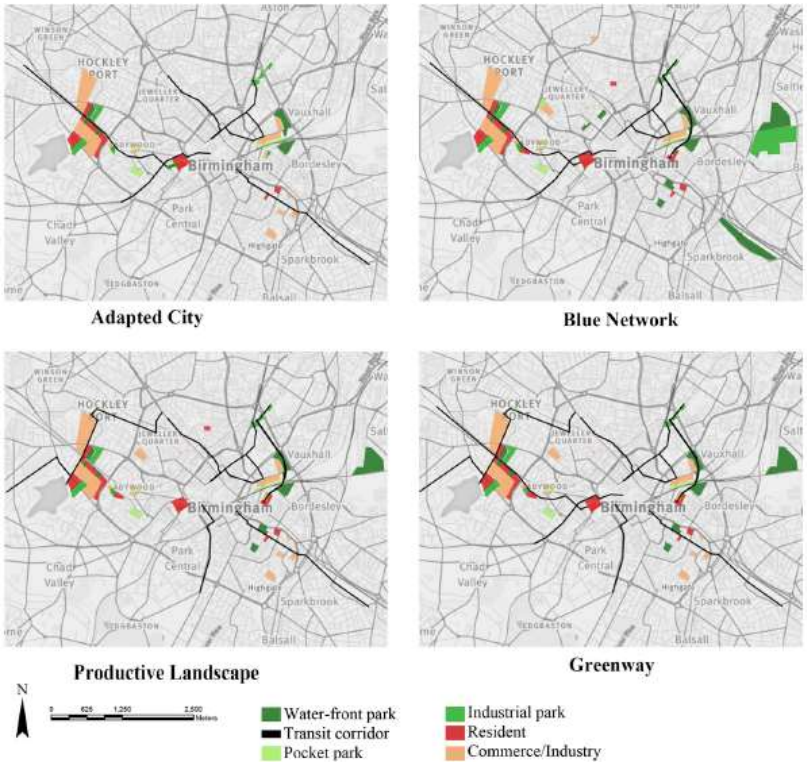
First Boundaries ☐ Second Boundaries

Online Geodesign platform:
www.geodesignhub.com

3.2 City Scale: Geodesigning a green network for Birmingham

- Suitability analyses of undeveloped areas in Birmingham for Green Infrastructure
- Designating different types of parks as well as residential, commerce/industry and transport zones (Lingshao Li, 2017)





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- Collaborative Design: Online participation in planning a green network for Birmingham
- (Lingshao Li, 2017)

3.3 Neighborhood/Site Scale: Sustainable Urban Drainage (SUDs)

» Workflow using UAVs to capture micro scale terrain for the design and construction of green roofs, living walls and Sustainable Urban Drainage (SUDs) (Chaoming Li, 2015)

KEEP
CLEAR

4. Discussion: Geodesigning Green Infrastructure

Scale	Region 1:100.000 – 1:500.000	City 1:25.000 – 1:100.000	Neighborhood/Site 1:500 – 1:25000
Data source	Satellite-based remote sensing	Plane-based remote sensing Topographic survey Crowdsourced data	UAV-based remote sensing Topographic survey
Tools	GIS-centred with Geodesign	GIS-centred with Geodesign and BIM projects	BIM-centred in a GIS/geodesign con-text

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