City-centered approach to catalyze nature-based solutions through the EU Regenerative Urban Lighthouse for pollution alleviation and regenerative development

UPSURGE INNOVATIONS TO SUPPORT NBS STRATEGIC PLANNING TO ENABLE REGENERATIVE TRANSITIONS IN CITIES

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REGENERATIVE INDEX

- The notion of Regenerative Index is linked to the meaning of anthropogenic regenerative index, i.e., to something that man creates in order to help nature in re-establishing a natural balance in areas that were previously (anthropogenically) destroyed to the extent that nature cannot regenerate quickly enough on its own.
- Human activity disrupts nature's ability to regenerate → need for regenerative actions
- Regenerative Index measures the degree to which an area supports environmental
- regeneration
- Scale 1–10 → e.g., 3,4 = 34% toward natural balance
- Annual measurement → accounts for seasonal variation
- Diagnostic & motivational tool → supports evidence-based decisions and
- continuous improvement
- Integration into spatial planning practice → monitoring tool for regenerative
- urban transformation, measuring the territorial consequences of planning policies

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REGENERATIVE INDEX

Seven domains assessed independently:

- Air quality & pollutants
- spatial structure
- LandUrban properties & land designation
- Regenerative governance approaches
- Ecosystem services & biodiversity
- Participatory development & social impact
- Gender sensitivity consideration

Weighted average = final Regenerative Index score

1 Air Quality

Valuation Factors
Ozone (O_3)
Nitrogen dioxid (NO_2)
Sulfur dioxid (SO_2)
Particles <10 mm (PM_{10})
Particles <2,5 mm ($PM_{2.5}$)

2 Urban Environment

Valuation Factors
Factor of green areas
Factor of population density
Factor of accessibility to public space
Factor of sustainable mobility

3 Land Properties

Valuation Factors
Factor of watter retention capacity
Factor of degraded areas
Factor of recarbonisation

4 Regenerative Management

Valuation Factors
Green areas
Tree vegetation
CO_2 emissions (separate calculation)

5 State of ecosystem services and biodiversity

(partially taken into account for factors 1, 2, 3, 4 and 6)

6 Participatory Development

Survey among citizens => common table

7 Gender Sensitivity

Survey among citizens => common table

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REGENERATIVE INDEX

- The matrix of evaluation domains and their weights depends on the importance of each evaluation domain in terms of the following impacts and effects of regeneration:

i. Impact on health,
ii. Impact on costs,
iii. Impact on the well-being of users of the regenerated area,
iv. Impact on the quality of life of users of the regenerated area,
v. Possibility of implementation,
vi. Impact on the environment during regeneration interventions,
vii. Impact on the environment after regeneration,
viii. Impact on the development opportunities of the regenerated area,
ix. Impact on land value,
x. Impact on the organization of the area.

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REGENERATIVE INDEX

- A model has been established to determine and calculate the weight (in Excel). A sample is given in the figure below:

Air quality with associated air pollutants and their impact on health

	high negative impact			Neutral			high positive impact	Influence:
Impactful domains:	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	
Costs								*-2*
Health								*2*
User well-being								*3*
Quality of life of users								*2*
possibility of implementation								*-1*
environmental impacts when carrying out regeneration								*0*
environmental impacts after regeneration								*3*
Development prospects								*1*
Land value								*1*
tidiness of the place								*1*
							Influence factor:	***1,3333***

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REGENERATIVE INDEX

Katowice's Regenerative Index score: 7,95

	Areas of assessment	Weighting		Processing additive
1	Air quality with associated air pollutants and their impact on health	1,3333333	9,6	0,1429
2	Arrangement of the urban environment – green areas, density, earth-enclosed areas, level of sustainable mobility	1,3333333	7,1	0,1429
3	Properties and land characterisation - water retention capacity, extent and status of degraded areas, soil condition with untapped recarbonisation potential	1,1	6	0,1429
4	Regenerative management approaches - spatial planning, ratio of investments in green areas to brown areas, definition of green urban areas	1,2666667	9	0,1429
5	State of ecosystem services and biodiversity,	0,95	0	0
6	Participatory development and social impact	1,0333333	4,93	0,1429
7	Consideration of sexual sensitivity	1	5,77	0,1429
			7,1	0,8571
	REGENERATIVE INDEX:		7,95714	

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URBAN INSETTING PROTOCOLS

- Urban Insetting Protocols will be elaborated as cities individual regenerative policy action plans that will drive their redevelopment with targeted actions, the success and progress of which will be continuously monitored with the Regenerative Index.
- 1ST PART: ENVIRONMENTAL ASSESSMENT: conducted mainly by the Regenerative Index calculation (each cities' Regenerative Index scores for each of the Regenerative Index indicative areas ((sub)factors) will be presented and assessed)
- 2ND PART: proposal of actions and measures addressing cities' specific situations and key challenges to generate integral net positive impact on all criteria

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URBAN INSETTING PROTOCOLS

STEPS OF DEVELOPING 7 URBAN INSETTING PROTOCOLS:

1. • Development of Instructions for data preparation and Regenerative Index calculation (Annex 2 of the D6.6)
2. • Development of Questionnaire covering the Regenerative Index‘s assessment of 7 indicative areas (Annex 1 of the D6.7)
3. • 7 cities conducting Regenerative Index calculation and filling in the questionnaire
4. • Development of the structure of the Urban Insetting protocols (based on the areas of the assessment set in Regenerative Index/proposal)
5. • Assessment of 7 partner cities‘s environmental and related policy status (based on step 3), identifying issues and problems in the city and gaps & demands related to policy frameworks
6. • Consultations with 7 cities on the proposed actions, measures and policy recommendations (incl. timelines and estimated costs) to generate integral net positive impact on all criteria
7. • Finalization of 7 Urban Insetting Protocols
8. • Input to exploitation (WP7) and dissemination (WP8)

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URBAN INSETTING PROTOCOLS

Framework for Urban Insetting Protocols:

- Determination of Urban Insetting Protocols' substantive (strategic and operational) goals by thematic areas

	Strategic goals	Operational Goals
Air Quality	• Improved air quality to a level without excessive concentrations of pollutants	• Ambient air quality monitoring • Air quality maintainance and improvement
Urban Environment Management	• Sustainable urban structure	• Quality and connected green urban areas/green infrastructure for all citizens • Public space accesssibility • Sustainable mobility
Land Properties	• Increased provision of soil's ecosystem services	• Sustainable land use • Soil carbon enhancement
Regenerative Management Approaches	• Urban Greening	• Regenerative spatial planning • Increased ability to capture anthropogenic CO2 in urban areas
Ecosystem Services and Biodiversity	• Improved biodiversity and ecosystem services	• Nature and biodiversity protection and restoration • Establishment of management system for public green spaces, urban forests and natural values of local importance
Participatory Development and Social Impact	• Inclusive urban regeneration	• Participatory regenerative urban planning • Participatory regenerative management of the urban environment
Gender Sensitivity Consideration	• Gender equality	• Provision of equal opportunities and rigths for all people, regardless of gender and sexual orientation • Provision of social (living and working) conditions according to the characteristics of the different genders

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URBAN INSETTING PROTOCOLS

- Proposed monitoring of the achievement of Urban Insetting protocol's goals and its implementation and evaluation of implemented measures:
  - yearly Regenerative Index calculations
  - updates or upgrades of measures according to the achieved realization in the annual implementation of the Urban Insetting Protocol

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REGENERATIVE SPATIAL PLANNING POLICY RECOMMENDATIONS

- Commitment to integrating regenerative spatial planning approaches into spatial planning instruments.
- All spatial plans have a strategic as well as a regulatory dimension.
- UGI and NBS are considered as measures contributing to mitigating environmental issues in various theme (sector)- specific territorial strategies/plans complementary addressing spatial development.

Type of Measure	Spatial Plan/City	Binding Measure
Minimum Green Space Requirements	BP18 Spatial Plan	Minimum 35% green space for high- and low-density residential areas; 10–25% for institutional uses; 20% for local centres.
	Maribor Spatial Plan (OPN MOM)	At least 50% of open living space must be green; minimum 15 m² of open living space per apartment (half as playground); permeable paving recommended.
	Breda Green Compass (Zoning Plan - Environmental Plan)	20–35% of surface area in new developments must be public green space; minimum proportion of 'living' green areas required.
Replacement of Lost Green Space	Belfast City LDP 2035 (Policy OS1)	Presumption against loss of open space; redevelopment only if substantial community benefits outweigh loss; no detriment to overall green infrastructure allowed.
	BP18 Spatial Plan	Reduction of public green space must be compensated by new public green spaces or green roofs.
	Breda Green Compass (Zoning Plan - Environmental Plan)	Compensation principle requiring greenery replacement according to the type and function of green removed.
Tree Protection and Replacement	Belfast City LDP 2035 (Policy TRE1)	Presumption in favour of retaining valuable trees; replacement planting mandatory if removal is unavoidable; aim for net tree gain.
	BP18 Spatial Plan & Local Decree on Tree Protection	Special protection for trees; felling only allowed with expert confirmation; mandatory replacement; procedures and penalties regulated.
Mandatory Tree Planting	BP18 Spatial Plan	Tree lines must be planted along roads, in public spaces; at least one large-canopy tree per 100 m² of minimum green area; promotion of roof gardens.
	Maribor Spatial Plan (OPN MOM)	At least 20 trees/ha planted on cultivated land (30/ha in special areas); increased by 50% in the green belt; one tree per 4 parking spaces; preservation and renewal of tree avenues; mandatory planting along roads with side green strips.

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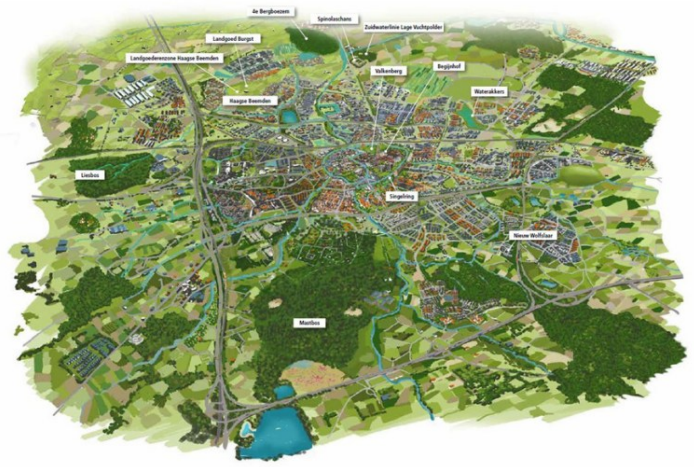
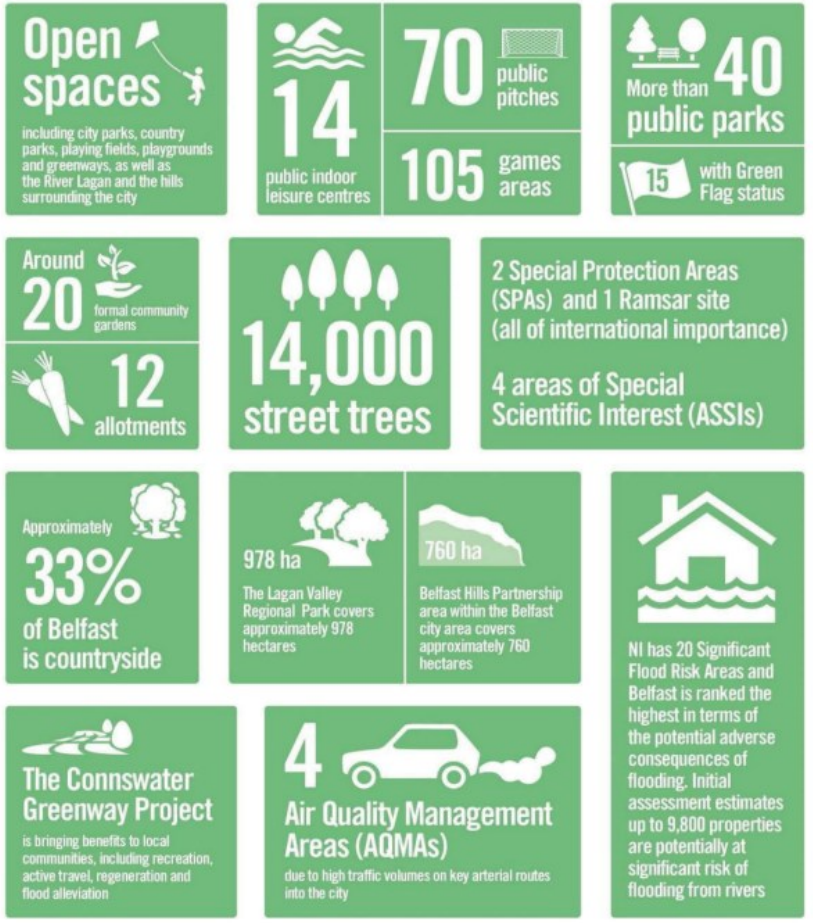
REGENERATIVE SPATIAL PLANNING POLICY RECOMMENDATIONS

- P.R.1: Strengthen the Regenerative Strategic and Visionary Dimension of Urban Spatial Planning and Territorial Governance.
- P.R.2: Ensure a Strong Link Between Regenerative Visions, Strategies and Regulation.
- P.R.3: Strengthen the Integration of Regenerative Sectoral Policies





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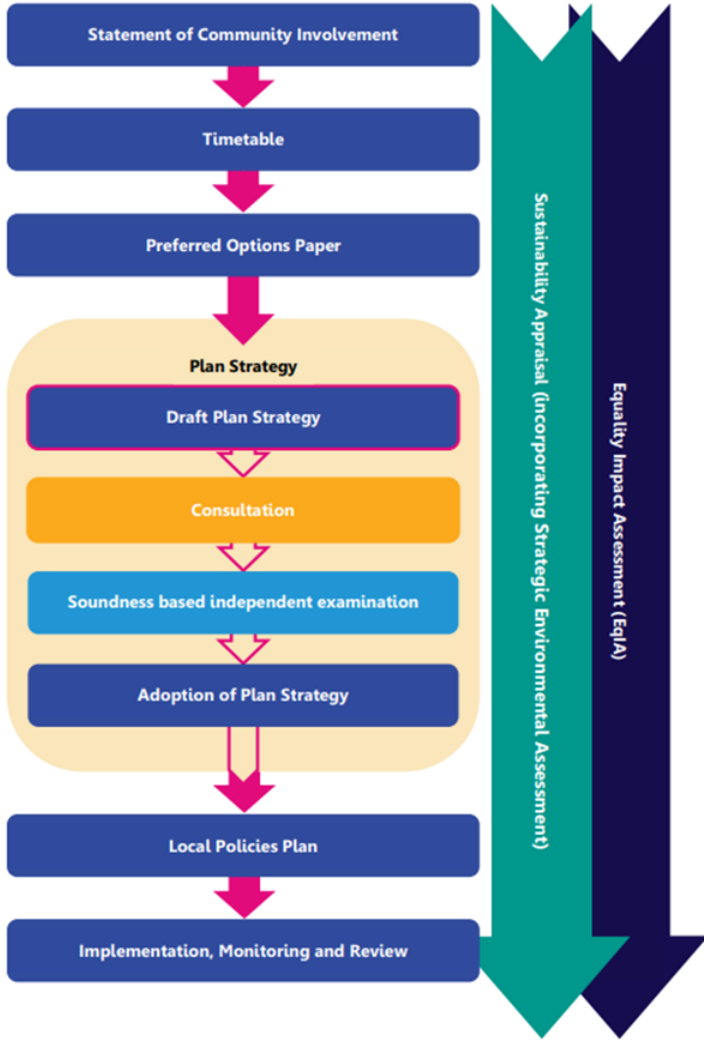
REGENERATIVE SPATIAL PLANNING POLICY RECOMMENDATIONS

- P.R.4: Plan Regenerative Cities
- P.R.5: Increase Adaptability of Planning Instruments
- P.R.6: Strengthen the Monitoring of Regenerative Developments



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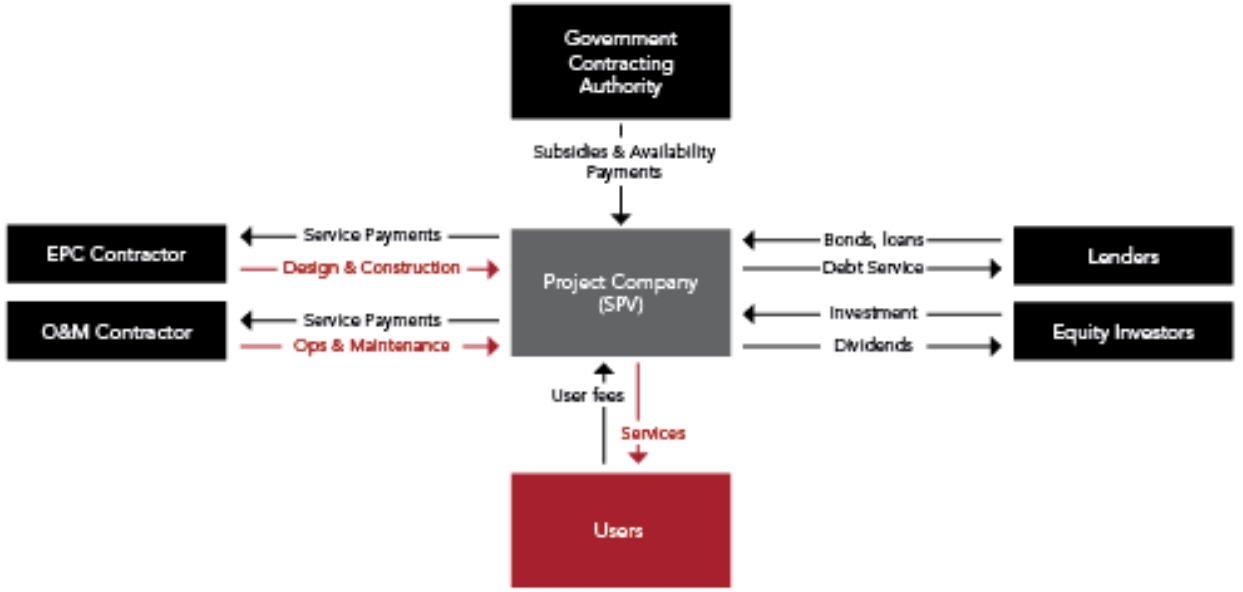
INNOVATIVE NBS PARTNERSHIPS AND COLLABORATION MODELS

The World Bank's definition of Public–Private Partnership (PPP):

A long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility and remuneration is linked to performance.

The types of PPPs vary according to three basic parameters:

- The type of asset involved
- The functions for which the private party is responsible
- Payment mechanism



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INNOVATIVE NBS PARTNERSHIPS AND COLLABORATION MODELS

FINANCING OPTION	SHORT DESRIPTION
GREEN BARTER	Businesses develop and/or maintain green space in exchange for a formalised right to use the values of those spaces for business purposes and profits. **Example:** In Lodz, Poland, developers of a new residential area, driven by the potential of improving the neighbourhood image and increasing the value of their property, suggested to clear and rehabilitate the nearby park to compensate for the removed trees to build the new area. This initiative was approved by the municipality of Lodz and the temporary public-private agreement was made. However, the ownership, as well as the subsequent maintenance of the said green space belong to the municipality of Lodz.
Business Improvement District (BID)	BID implies financing and managing improvements to commercial and industrial environments based on the consent by a majority of businesses who accept an additional levy. The municipality carries out the desired infrastructure improvements. **Example:** The BID in Eindhoven includes the entire city centre of Eindhoven. The income collected from the tax in the BID area is collected and managed by an independent association. It is spent on the local initiatives based on the proposals submitted by the local business community members. The BID is mobilising local producers, retail chains and real estate owners and provides financial support for bottom-up urban greening initiatives.
Mobilising investment from municipal enterprises/utilities	Municipal enterprises are businesses owned by local governments that provide services and typically generate revenue for local communities (e.g. utility companies). Municipalities and municipal companies might want to co-invest in interventions that support achieving their strategic and political goals.

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E.A.4 – Innovative PPPs

FINANCING OPTION	SHORT DESRIPTION
Contractual PPPs	Design-Build-Finance-Operate (DBFO): - functions transferred to the private sector as captured by contract name; - payment source: government or user pays. Build-Operate-Transfer (BOT),Build-Own-Operate-Transfer (BOOT), Build-Transfer-Operate (BTO): - captures legal ownership and control of the project assets: Under a BOT project, the private company owns the project assets until they are transferred at the end of the contract. BOOT is often used interchangeably with BOT. In contrast, a BTO contract, asset ownership is transferred once construction is complete. - functions transferred to the private sector: Typically, design, build,finance, maintain, and some or all operations. Under some definitions, BOT or BTO may not include private finance, whereas BOOT always includes private finance. - payment source: government or user pays.
Institutionalised PPPs	The establishment of an entity held jointly by the public partner and the private partner (through an entity where public and private sectors jointly participate or through private sector buying). The joint entity thus has the responsibility of ensuring the delivery of work or service for the benefit of the public.
Special assessment district (SAD)	A designated district, whose constituents accept a fee on the full value of a property in return for a specific public improvement that could include NBS.
Tax increment financing (TIF)	Method of financing a project or development in a designated geographic area based on the anticipated increase in property tax assessed on the increase in property value due to a development project implemented in that area.
Partnerships encouraged by external funding programmes	Initial public-private cooperation concept developed as part of the donor-funded project (e.g. EU funding) that eventually becomes self-sufficient and can support NBS financing efforts beyond the lifespan of the donor-funded project.

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City-centered approach to catalyze nature-based solutions through the EU Regenerative Urban Lighthouse for pollution alleviation and regenerative development

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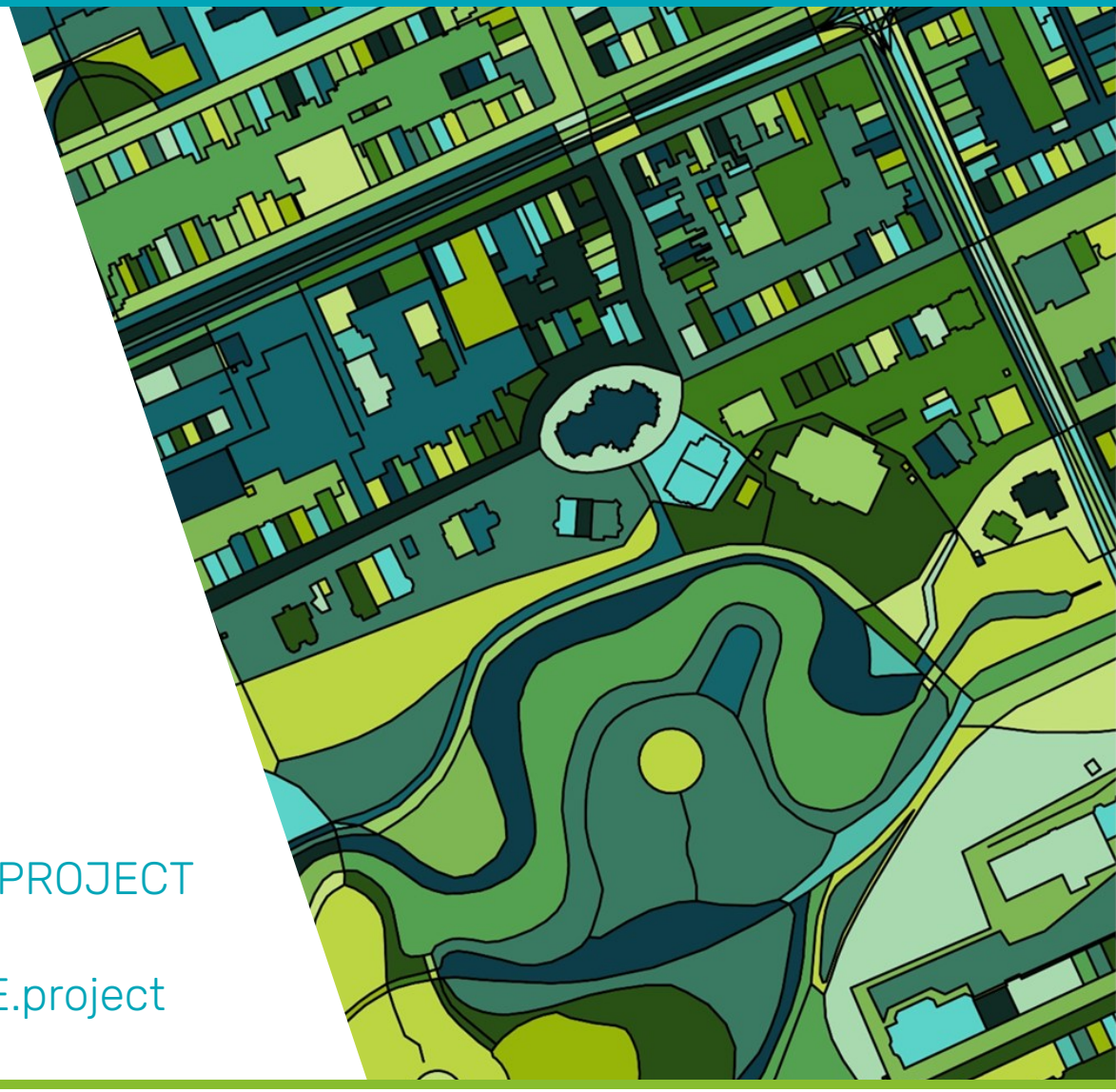

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