



## URBAN GreenUP

### **D1.12: First Stage. Integration and articulation of the methodology**

#### ***WP 1 , T 1.10***

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Authors: Magdalena Rozanska (ACC ING)

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03	Jose Feroso Domínguez	CARTIF	04 January 2019
03	Alicia Villazan Cabero	VLL	09 January 2019
03	Juliet Staples	LIV	11 January 2019
03	Thami Croeser	RMI	14 January 2019
03	Kaan Emir	DEM	14 January 2019
04	Kaan Emir	DEM	14 January 2019
04	Thami Croeser	RMI	15 January 2019
04	Isabel Sanchez Iniguez De la Torre	VLL	15 January 2019
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05	Kaan Emir	DEM	17 January 2019
05	Esther San José Carreras	CARTIF	17 January 2019
05	Isabel Sanchez Iniguez De la Torre	VLL	17 January 2019
06	Magdalena Rozanska, Ana Contreras Escribano	ACC ING	28 January 2019
07	Nuria García Raúl Sánchez	CARTIF	29 January 2019
07	Magdalena Rozanska	ACC ING	31 January 2019



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## 0 Abstract

The aim of this report is to provide a useful guide to the URBAN GreenUP methodology for the Re-naturing Urban Planning concept (RUP). It incorporates urban planning aspects directly related with NBS as a part of the Sustainable Urban Planning (SUP), to support the direct implementation of one or a set of NBS in a specific area of the city to address also specific challenges in a more effective way.

The document explains the URBAN GreenUP methodology principles and presents the methodology bases and focus. In continuation, it provides the methodology specific concepts definition and includes the descriptions of the main URBAN GreenUP methodology processes. All the processes, in natural way linked between each other, works to get the main objective on city Re-Naturing with NBS. The links between the different processes, in form of in/out-puts documents, processes, tools, have been organised into singular methodology workflow. Finally, the methodology diagrams are complementing the explanation of the different relations between all methodology components drafted.

**\*The report to the URBAN GreenUP methodology is going to be continuously updated with new project outcomes related to the methodology, delivering at the end of the project the document fully described by methodology phases, processes, report and questionnaire annexes, and corresponding tools.**

**\*At this stage of the project (M20), the report D1.12 draft version corresponds only to the base description of the holistic methodology structure and to the main relations between their components. The first analysis, once validated according to the validation rules established in D1.15 (M20), the second stage extended report version presented in (M40). The final version, externally validated (M40), established at the end of the project concluding with all details to the URBAN GreenUP methodology (M60).**





# 1 Introduction

## 1.1 What is the URBAN GreenUP methodology?

Since the main project targets are the climate change mitigation and the efficient water management, URBAN GreenUP pretends to deliver a systematic strategy to reach high level of impacts by means of the use of the Nature Based Solutions. URBAN GreenUP aims at the development of an integrated methodology to support the Urban Planning of NBS as a powerful strategy to fight against the climate change and improve the capabilities of the cities to manage the use of water and associated risk.

## 1.2 What are the objectives of the URBAN GreenUP methodology?

URBAN GreenUP introduces the concept of Renaturing Urban Planning, which incorporates the urban planning aspects directly related with the nature-based solution as a part of Sustainable Urban Planning. In parallel, URBAN GreenUP will deliver a procedure to support the direct implementation of one or a set of NBS in a specific area or the city to address also specific challenges in a more effective way.

Public authorities considered in principle as the main final users of this methodology, but URBAN GreenUP addresses the process of planning and implementation of NBS as a complex problem. The social aspects are considered one of the main keys; economic issues are addressed from the point of view of the market, fostering the creation of good business cases to solve the general lack of budget of the public administration. To achieve good influences, a co-creation approach adopted in the definition of the methodology, from the definition and design of the technical solutions to the final assessment.



Figure 1.1: GreenUP methodology process objectives

The specific methodology process has been included in the methodology global process and workflow. Following the common processes of the cities to engage citizens in the transformation of the city and other planned innovative strategies to achieve the involvement of relevant stakeholders, as local companies, academia, representatives of the industrial and commercial sectors, ensuring the maximum level of acceptability and adequacy of the results.

Besides the co-creation process, a deep action of identification of the society insight about the NBS implementation is being deployed, considering social acceptance as a key to the politicians and a need to save money and reach better impacts, on the other hand, achieving in parallel the creation of an innovative business scenario for nature based solutions.

The results of the method, on one side a RUP, fully integrated in the city urban planning and land use planning, and the specification of a set of NBS to mitigate one or several climate change challenges, ready to the tendering process.

### 1.3 How the methodology structure is?

Urban GreenUP methodology is developed as a modular procedure. In order to achieve an usable method, a step-by-step procedure has been already proposed. The first procedure will obtain results the RUP and the second one will achieve a tender specification document.

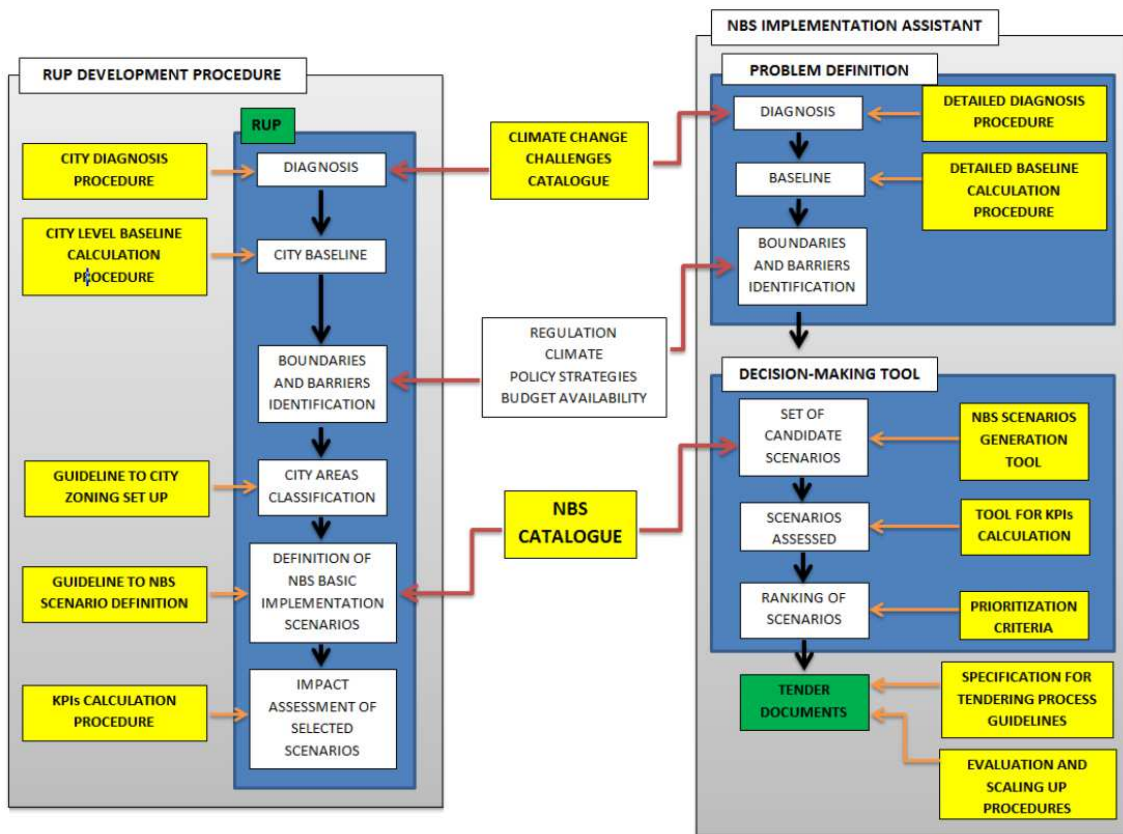


Figure 1.2: Block diagram of the URBAN GreenUP methodology

White blocks are the steps, yellow ones are modules and green blocks are the main methodology outputs as initially planned. Blue blocks are sets of blocks that have a joint mean, as the RUP or decision-making tool.

The RUP development procedure consists of deploying of sub-sequence stages, supported by several modules. The main processes are Diagnosis, problems and challenges identification; Calculation of the city baseline; Identification of boundaries and barriers; Classification of city areas; Definition of the basis NBS (and associated scenarios of integration) to be implemented

according to the challenges identified and Pre-assessment of the impacts on the basis of predefined KPIs.

### 1.4 Methodology Internal Development Links

The methodology will be a result of continuous development process, that is divided in different stages, from the sketch initial and conceptual one to the detailed and descriptive one.

That process will consider different project development phases, first focusing on the demonstration tasks and real problems occurred in implementation, analysing them and comparing with the global methodology procedures generated, at the end specifying the last with the particularities and lessons learnt ending with the holistic concept.

At first Stage, the first diagram to the methodology is being proposed, taking into account its different components to be developed (WP1). The components at this phase are, NBS Catalogue (T1.1), CC Catalogue (T1.2), and Guide on Barriers and Opportunities (T1.5), linking them strategically to the rest of the methodology concepts like Actuation Zone, Evaluation Method, Social, Legal, and some Replication and Scaling up aspects from the rest of the WP1 tasks. The results of the analysis are included in the present document D1.12.

At Second Stage, in continuation of the D1.12 with the aim of extending and improving of it, specifying the rest of the components on Diagnosis and Baseline (T1.3), Guide on Barriers and Opportunities (T1.4), City Zoning (T1.5), NBS Scenarios (T1.6), Tendering Process (T1.7), Co-creation and Co-developments (T1.9), are included into the results of D1.13 (extended D1.12).

At Third and Last Stage, the total integration of all previous components with the last Replication one (T 1.8), delivering results in D1.14 (extended D1.13).

In parallel, the validation procedures developed, presented consequently in D1.15 at first stage, and D1.16 at the second one.

Link to the other activities of the project:

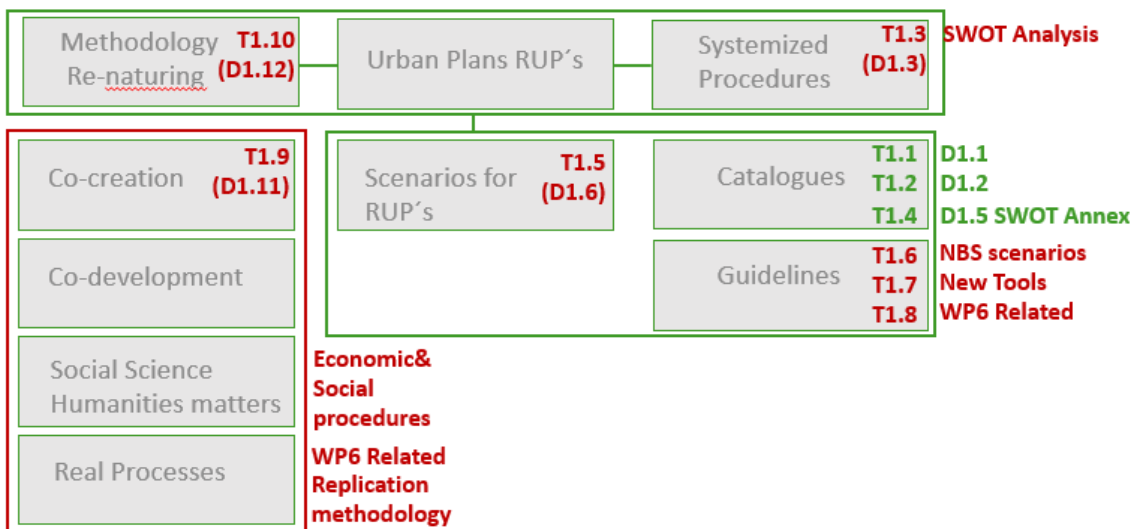


Figure 1.3: URBAN GreenUP methodology structure

## 1.5 Methodology Concepts Definition

**Re-naturing City Methodology** – methodology for supporting the Re-naturing of the cities and/or areas, that will include new concepts as Re-naturing Urban Plans RUPs that will let embrace the climate change challenges.

**NBS – Nature Base Solutions** - can provide a multitude of benefits that influence human health, lifestyle and well-being, can improve air quality, minimize heatwaves, act as carbon stores, help on mitigation of climate change, reduce flooding disasters overcoming the adaptation to climate change and be an important habitat for wildlife.

**RUP – Re-naturing Urban Plans** – which incorporates the urban planning aspects directly related with nature-based solutions as major strategy to fight against climate change. It will be part of the Sustainable Urban Planning and totally integrated with the urban strategy for dealing with the main city challenges.

**Methodology Component** – All components needed for methodology developments, those could be activities, but also, catalogues, guides, decisions.

**Methodology Processes** – methodology activities that analyse/ define/ evaluate the methodology concept, and create corresponding outputs, in many cases, basing also on inputs from different activities.

**Methodology Procedure** – methodology output related to the systemized step-by-step activity for Re-naturing Methodology Implementation.

**Input** – Information coming from other project processes, or external, not developed in the project but needed for methodology definition.

**Output** – Information created in a project process, could be an input to other project process.

**Work Flow** – relation among different project processes and components. It also indicates the correct direction of the methodology implementation.



## 2 URBAN GreenUP methodology main components

### 2.1 Methodology Integrated Analysis & Diagnosis

#### 2.1.1 NBS Catalogue Specification

The target of this methodology process is the definition of the Catalogue of Nature Base Solutions (NBS) specific for a particular City. In consequence, this will allow the definition of different City NBS scenarios, to evaluate them and to define its viability and impact to improve the behaviour of the city regarding the Climate Change Challenges. The objective of the process is to identify those NBS solutions, supporting city/area different criteria, characteristics, problems, challenges, budget, social issues, climate, previous experiences, etc. Those analyses continues into the next processes on Climate Challenges Specifications and Barriers and Boundaries Definition. Finally, and after the complementing analysis processes, the best options to NBS are going to be introduced in the development of a City RUP (Re-naturing Plan).

Process Component: NBS Catalogue
Process Action: Definition of the Catalogue of Nature Base Solutions (NBS) City specific

The URBAN GreenUP NBS Catalogue, as a base generic catalogue used for this process, includes all possible characteristic of each NBS identified (technical, economic, environmental, and social). The features considered into the catalogue allows the description of the impact of the NBS technology since economic, environmental, social and aesthetical issues, indicating also the potential scale of value for each Climate Challenges described in deep into URBAN GreenUP CC Catalogue. Following, the CC Catalogue links them to the specific KPIs (Key Performance Indicators) to be taken into account in the potential implementation, for its measurement of the behaviour and the correct maintenance. The Catalogue indicates also in brief the process in implementation and the stakeholders that take part on it.

Table 2.1: Example on the NBS Card info edition from “URBAN GreenUP NBS Catalogue”.

Title:

<b>Name of the NBS</b>	Main challenge	Urban GreenUp category.
------------------------	----------------	-------------------------

Description:

<b>TECHNICAL DESCRIPTION</b> Information about the materials, the construction...	<b>GRAPHIC DETAIL</b> Graphic information: photo, diagram... some drawing that provides clear information about the solution.
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Challenge table: Here you could consult all the challenges that the NBS gets.

Challenge	Description	Experience / Study	Challenge Scale	Valuation
Type of challenge	General description about how the NBS gets the challenge	Values from studies or experiences that show how the NBS gets the challenge.	This concept indicates the area where the positive effects of the NBS have been noticed. The values are: R=Regional / M=Metropolitan / U=Urban S=Street / B=Building.	Simple chart to measure incidence



<p><b>IMPLANTATION:</b> Soft/Medium/Hard</p> <p>Degree of intervention in the environment. It takes into account the modifications that the environment suffers, when we incorporate the NBS, and the possible disadvantages of removing it in the future.</p> <ul style="list-style-type: none"> <li>• Soft: The NBS don't create important modifications in the environment.</li> <li>• Medium: The NBS creates some modifications in the environment.</li> <li>• Hard: The NBS creates a lot of modifications in the environment.</li> </ul>	<p><b>AMORTISATION:</b> Short term/Medium term/long term/no amortization</p> <p>Period of recovery of the initial economic investment of the NBS.</p> <ul style="list-style-type: none"> <li>• Short term: 0 – 10 years</li> <li>• Medium term: 10 – 20 years</li> <li>• Long term: 20 – 50 years</li> <li>• No amortization</li> </ul>
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### 2.1.2 Climate Challenges Catalogue Specification

The target of this methodology process is to elaborate a Climate Change Challenge Catalogue (CC Catalogue) specific for a particular City. In consequence, this will allow the definition of the different City CC Scenarios, thanks to the standardized method, linking them directly with the NBS pre-selected. In continuation, the information will allow an easy diagnostic of the city.

<p><b>Process Component:</b> CC Catalogue</p> <p><b>Process Action:</b> Definition of the Catalogue of Climate Change Challenge (CC) City specific</p>
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The URBAN GreenUP Climate Change Challenge Catalogue (CC), as a base generic catalogue and data source used for this process, includes the parametrisation of the each challenge previously identified by the bibliography as well as any other challenge to be identified during the research process. The different items will be included in the database classified hierarchically in Challenges and Sub-challenges.

The role of the user will be twofold. A **qualitative** aspect, in which user must choose no more than 10 different challenges, detailing sub-challenges if necessary. The other side will be **quantitative**, and in it, the user must assign a weight or quantitative importance to each of the selected challenges.

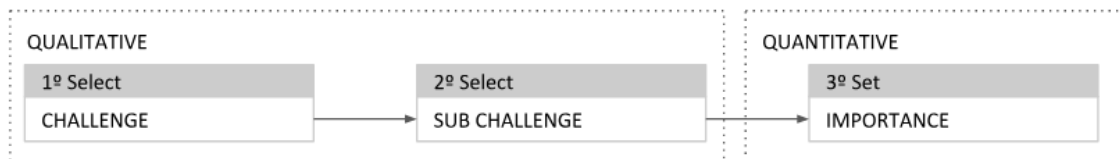


Figure 2.1: The parametrisation considers the qualitative and quantitative techniques

The relational database will allow the user to choose the challenge firstly, and then, from a list referring to the chosen challenge, to choose the sub-challenge. Thus, the available options will be limited improving the usability. The relational list as shown below.

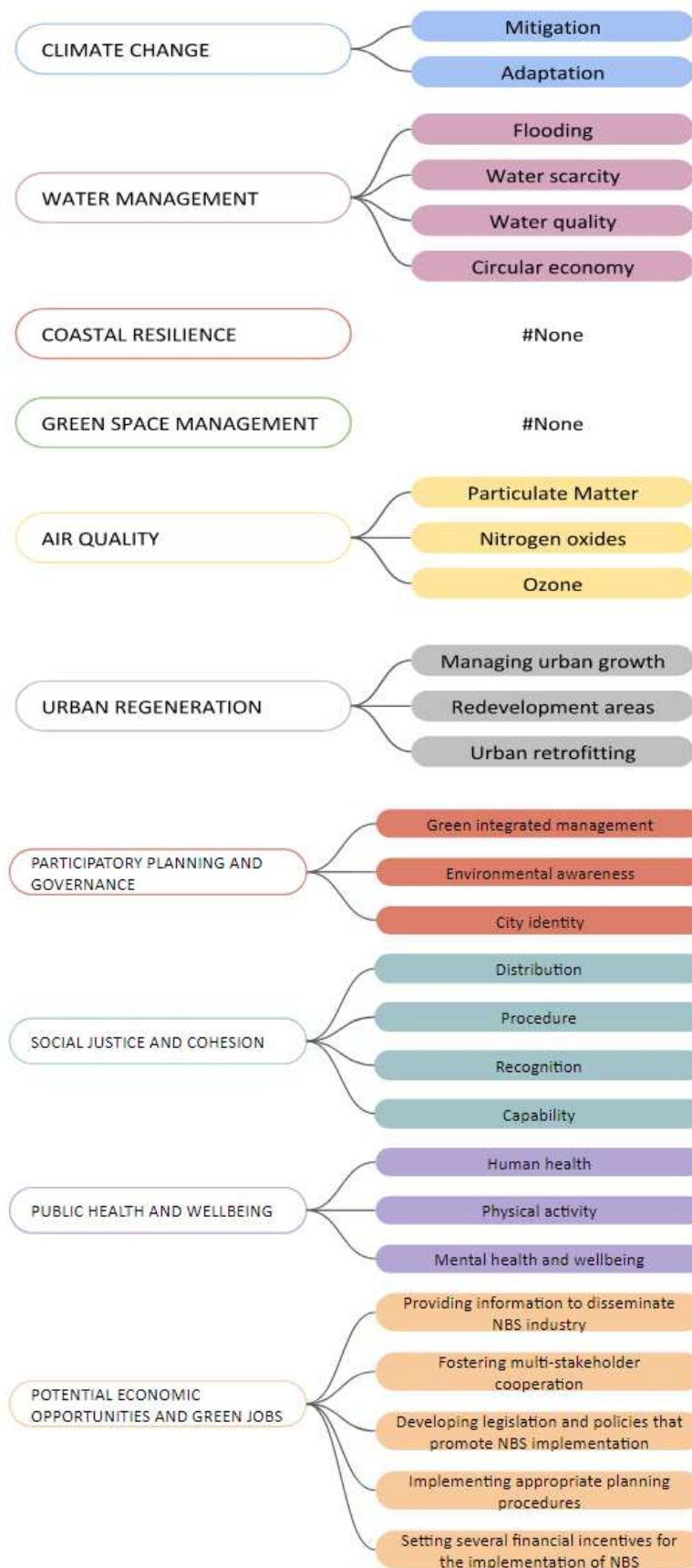


Figure 2.2: The parametrization factors that influence each challenge.

For each of the chosen elements, the system will assign an internal identification code that will be used for the calculation and selection of results.

In the case of the coastal resilience challenge, it is included in the list but will not be evaluated, as it does not have a calculation base. It is proposed that the system refers the user to an external link providing more information.

Regarding the allocation of weights, the user will have to distribute a total of 100 points among all the chosen challenges. If the sum of the weights differs from this value, the tool must indicate the error to the user.

### 2.1.3 Barriers & Boundaries Guide and (Pre) Analysis

The objective of this methodology process is to analyse the Barriers and Boundaries, but also the Opportunities Guide specific for a particular City. In consequence, the information will allow an easy diagnosis of the city, driving to the selection of the City CC Scenarios with (pre) selected NBS. This step is crucial during the previous analysis process, as defining the potential limits for some implementations at the early beginning and accuracy of the NBS proposed, as same indicating the steps needed to be taken to potentially overcome the obstacles and increase the potential of success for the RUP's planning.

**Process Component:** Barriers & Boundaries Guide

**Process Action:** Analysis of the CC Scenarios with NBS (pre) selected vs potential Barriers& Boundaries City specific

The URBAN GreenUP Guide to Barriers& Boundaries, as a base guide to analyse the obstacles, but also the opportunities from NBS integration, includes the barriers and boundaries at different levels: Regulation, climate, policy strategies, budget availability, technical or social issues etc. The systematic procedures used in the identification of the barriers and boundaries, can be replicated into the same city process, thanks to the identified questionnaires.

The potential barriers and boundaries for integration of the NBS have been clustered into the following categories for further examination:

- Political barriers
- Technical barriers
- Legal / Organizational barriers
- Social / Cultural barriers
- Financial barriers

One of the main barriers under political barriers category is the disconnection between short-term actions and long-term goals that is often a result of a number of factors including:

- Coordination between departments of the local public administration.
- Political interests in electoral campaign periods.
- Interventions construction in the short term with visible results in the long term.
- Slow periods for public tendering processes.





Discontinuity between short-term actions and long-term plans is another political barrier and related to the following factors:

- Frequent changes in local authority or other governing administration.
- Disconnect of governance with national policy.
- Disconnect of governance locally.
- Austerity and funding cuts.

Revisions of the long-term strategic plans of the city are also taken into consideration as a political barrier for implementation of NBS.

There are two subcategories under technical barriers. One of them is the Infrastructural challenges, which are related to:

- Current technical/operational practices of city governments.
- Buildings structural overcapacity to support the weight of green infrastructure.
- The existence of construction companies with demonstrated experience in NBS construction in the local environment.
- Arboreal and plant interventions technical barriers.

The other subcategory is the location of the interventions in the urban space and it includes the barriers:

- Lack of space in the urban environment.
- Difficulties finding suitable places in the urban space.

For the legal and organizational barriers; the legal barriers to implement NBS in open spaces or urban city areas can include: Compliance with local basic legislation, land ownership, lease agreements, covenants, local permits for construction work, rights of way, maintenance and duty of care, possible lack of ordinances and local regulations, public private collaboration. Organizational barriers can include: Departmental / Institutional silos, Vertical/Horizontal Hierarchy, work culture, lack or absence of a capacity for organizational learning, lack of engagement with programs.

In terms of social and cultural barriers there are 8 main barriers to action for NBS which can be listed as:

- Knowledge Gaps - Fear of the Unknown
- Lack of Awareness
- Green Gentrification and Social Inclusiveness
- Paradigm of Growth
- For the financial barriers, two subcategories listed to investigate the barriers in more details and these are:
  - Perception of Eco Services Valuation
  - Public Private Partnership



### 2.1.4 Diagnosis and Baseline Calculation Procedure

The objective of this methodology process is the definition of a systematic procedure that allows getting a detailed city/area diagnosis in respect to the climate change challenges (pre) selected for a city, but also barriers and boundaries for corresponding NBS indicated.

In consequence, it is defined the process on evaluation of the city/area current situation, as well as the impact in the city of a RUP or specific NBS implementation. Finally, the (pre) City Urban Plans RUP is created. The process is divided in two parts, city and area diagnosis procedure and city baseline calculation procedure.

**Process Component:** Diagnosis and Baseline Calculation Procedure

**Process Action:** Analysis of the CC Scenarios with NBS (pre) selected vs potential Barriers& Boundaries City specific proposing the (pre) City Urban Plans RUP and its Baseline Calculation.

The URBAN GreenUP Methodology procedures described, as a base guide to analyse this process, includes:

- The definition of the procedure that allows a detailed city diagnosis, of the city/area since the climate change challenge, including KPIs allowing evaluation of the current situation of the city/area. The analysis takes into account the categorization of the KPIs developed in the project.
- The definition of the procedure to identify the baseline of city/area, where will take into account the KPIs developed. The procedure allows not only to get a baseline, but also, to take into account the diagnosis for the current situation, which allow detect the NBS that could be able to solve or mitigate the problems identified, and generate RUPs. This procedure also allows the comparison of the baseline with different RUP scenarios or the introduction of a specific NBS letting know the impact of each of them.

Table 2.2: SWOT analysis bases integrated to the diagnosis process

INTERNAL	Strengths	Weaknesses	Analysis on NBS proposed to the CITY
	<ul style="list-style-type: none"> <li>• Strengths of the City according to the potential NBS integration</li> </ul>	<ul style="list-style-type: none"> <li>• Weaknesses of the City according to the potential NBS integration</li> </ul>	
EXTERNAL	Opportunities	Threats	
	<ul style="list-style-type: none"> <li>• Opportunities on City political, technical, legal, social, and financial ...supporting NBS integration</li> </ul>	<ul style="list-style-type: none"> <li>• Threats on City barriers political, technical, legal, social, and financial ...to be considered in NBS integration</li> </ul>	



Table 2.3: SWOT analysis method integrated to the diagnosis process

INTERNAL EXTERNAL	STRENGTHS	WEAKNESSES	Analysis to the NBS integration process
OPPORTUNITIES	<b>TO MANTAIN STRENGTS</b>  ¿How to exploit in maximum the strengths?	<b>TO EXPLORE OPORTUNITIES</b>  ¿How to get advantage from every opportunity?	
THREATS	<b>TO FACE THE THREATS</b>  ¿How to solve/avoid all threats?	<b>TO SOLVE ALL DEBILITIES</b>  ¿How to solve debilities, how to use opportunities?	

Depending on the different city situation (political, technical, legal, social, and financial) as well as different NBS characteristic and needs, we will have to consider some influential advantages and disadvantages of their potential integration. Some NBS strategies will work better in some situations, being unnecessary until damaging the functioning in others. To classify them better and thus better define the best RUP solutions, a SWOT analysis scheme on Strengths, Weaknesses, Opportunities, and Threats is selected. The process will help in easy and quick diagnosis of the city, but also to classify better the NBS according to different city results obtained. This methodology allows to analyse the problem from the point of view of the different influential positive and negative factors.



## 2.2 Methodology Planning & Implementation

### 2.2.1 Actuation Zone Guide and Analysis

The objective of this methodology process is to define the Guideline that will help in the development of the zoning rules specific for a particular City. The process is based on the diagnosis procedures, developed into the previous process.

In consequence, the information will allow the different kind of zone definition, getting as result, a multipurpose zoning that can be visualized through a GIS tool.

**Process Component:** Actuation Zone Guide

**Process Action:** Analysis and visualisation of the CC Scenarios with NBS (pre) selected through a GIS tool.

The URBAN GreenUP Guide to Actuation Zone, as a base guide to analyse the city zoning, taking into account the aspects on climate change challenge, the city/area diagnosis, the results of the baseline definition and the barriers and boundaries identified.

The approach taking into account the possible sub-actions:

- Focussing on a number of individual climate change risk categories it is possible to identify and map locations within a city that are either already or likely to experience adverse climate change impacts in relation to a number of identified themes e.g. flooding, poor health, loss of biodiversity etc.
- A small number of the most relevant and contributory GIS information layers for each individual climate change risk will be agreed and layered over a baseline map of the city. Many of the proposed GIS layers have already been used or have been listed in the earlier city diagnosis work under Task 3.1 (Diagnosis: Detailed assessment and prioritisation of environmental challenge).
- The visualisation provided by mapping multiple information layers for a single climate change risk such as flooding will highlight locations across the city where contributory GIS layers overlap and recognise these locations as being the most vulnerable to that specific climate change risk.
- This procedure can then be repeated for other climate change risks and themes to create a map that displays areas and hotspots for both single and multiple climate change risks; providing a multi-purpose zoning tool visualised through a GIS tool.
- Using this thematic approach to zone the city by different climate change risk categories, it is then possible to use the Urban GreenUP CC catalogue developed under Task 1.2 (Climate Change Challenge Catalogue) to help identify the most appropriate and effective type of NBS that can be implemented to help mitigate predicted impacts.

An example of the climate change themes/risks and the possible contributory GIS layers are shown below.



Table 2.4: Layer to GIS according to Climate Change Challenges

Climate Theme/Risk	Change	Contributory GIS Layers
Health		child obesity/adult obesity/heart disease/mental health/deprivation
Flood		pluvial/fluvial/water quality/deprivation
Air quality		heat stress/PM/NOx/SOx/deprivation
Temperature		Greenspace typology/others
Biodiversity/greenspace		LNR maps/species mapping and dispersal/green corridors
Connectivity		green corridors/active transport/gateways and routes
Regeneration		gateways and routes/deprivation/various others

Using this approach and colour coding different GIS layers it should be possible to layer different GIS information and build up a coloured map of the city which highlights areas most vulnerable to future climate change impacts. It is expected that this map will mirror and confirm some of the ad hoc data and existing knowledge about the city.

Table 2.5: Expected results to GIS layers according to Climate Change Challenges

Climate Theme/Stress	Change	Expected results
Health		NBS solutions to assist with health are likely to be best located in wards across the city, which display high levels of deprivation, have low levels of green space and are poorly connected and unlikely to attract regeneration initiatives. These areas are likely to be in the North of the city and some peripheral city centre locations.
Flood		NBS solutions to assist with surface water flooding are likely to correspond to geographical low spots, older sewer systems, lie adjacent to open waterways and include areas of recent rapid development that correspond with a loss of green space. The flood risk areas for the city are well known and it is likely that residential areas close to/neighbouring Churchdown ward and along Thornhead and Netherley Brook will be highlighted.
Air quality		NBS solutions to assist with air quality issues are likely to be highlighted along key arterial roads and around parts of the city centre e.g. sites adjacent to taxi ranks, bus stations, complex highway junctions with traffic control systems.
Temperature		NBS solutions to help tackle the heat island effect are most likely to be identified within the hard surfaced civic squares that lack



	vegetation and on wide, exposed stretches of land and infrastructure that lack tree cover and open water.
Biodiversity/greenspace	Areas lacking biodiversity are likely to be in the inner city and close to areas of dense development, especially where connectivity is poor and there are no green corridor or habitat stepping stones.
Connectivity	A number of key green routes have been identified that link parks and some open spaces and it is expected that connectivity of the loop line (outer city centre periphery) will be clearly defined, along with other regularly used routes that connect key places of interest.
Regeneration	NBS for regeneration is most likely to be beneficially located at gateway locations and in locations where economic development is planned.

### 2.2.2 Evaluation Method for NBS Scenarios

The objective of this methodology process is to define the principles of the Evaluation Method for NBS Scenarios generated, and to apply the correct KPIs prioritization criteria during the design and implementation process. The process, based on the diagnosis procedures developed into the previous process, in addition takes into account the social, economic and more specific technical criteria.

The information will allow the calculation of the KPI's corresponding NBS, and the evaluation of them considering the prioritization criteria. In consequence, the level reached with respect to the targets defined and the baseline calculation will be identified, allowing get the impact result of the implementation of the different scenarios, as well as defining of the ranking of them.

**Process Component:** Evaluation Method for NBS Scenarios

**Process Action:** Analysis and evaluation method proposal to the CC Scenarios with NBS (pre) selected.

The URBAN GreenUP NBS generation tool, as a base guide to evaluate different city NBS Scenarios, made up by the selection of one or several NBS alternatives previously identified, working in an integrated way solving various problems.

User's inputs will be translated to outputs through calculation matrices modules. These matrices will evaluate the relationship of the NBS with respect to the challenges and to the barriers and limits.

#### Matrix 1: NBS vs Challenges

Double entry matrix, which evaluates from 0 to 7 the impact of each NBS in reference to each challenge and sub-challenge. Thus, given an NBS and a challenge, a value of 0 means that the NBS does not create any kind of impact on the challenge; a value of 1 means that the NBS has a low impact on the challenge. A value of 7 means that the NBS creates a high impact on the challenge. Initially, negative impacts for the NBS are not considered.



In order to elaborate the calculation matrix, information provided from NBS and CC Catalogue will be used. Collaboration would be useful between the partners in charge of carrying out the NBS cards for the configuration of the matrix.

The selection of challenges and assignment of weights made by the user will pass through the matrix obtaining a score for each NBS. Then, NBS with the highest score suggested as outputs.

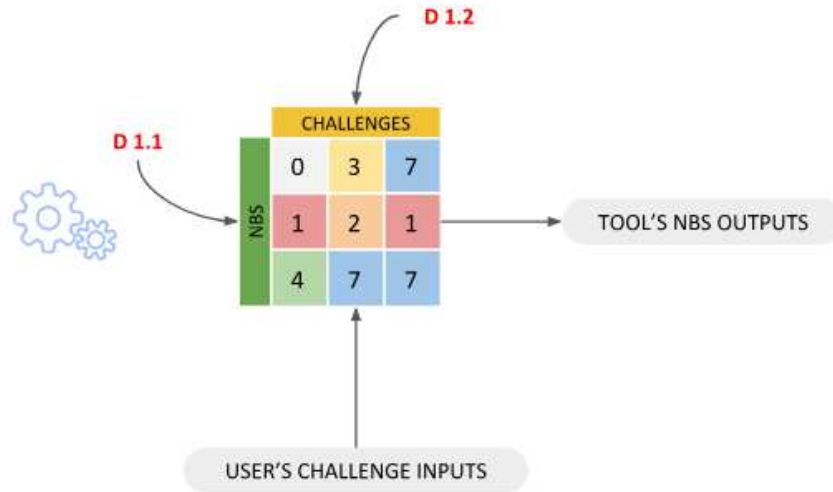


Figure 2.3: The Matrix NBS vs Challenges

**NBS vs Barriers and boundaries**

A double entry matrix made to evaluate the impact of the limits and barriers on the NBS. This matrix based on the information of Barriers and boundaries process identification and subsequent Guide on that.

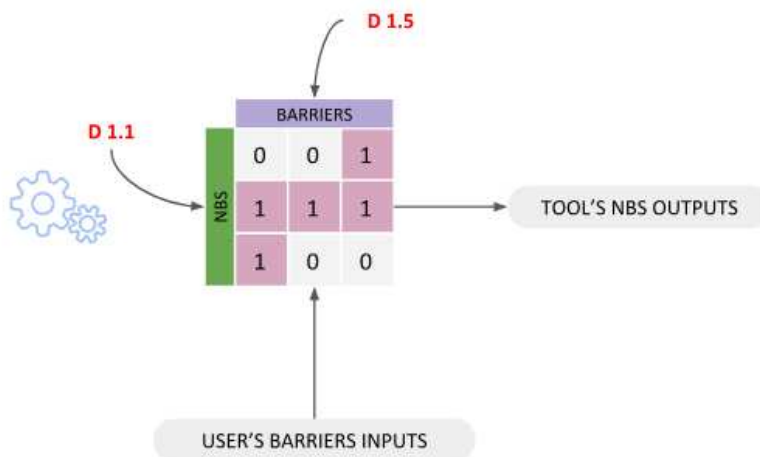


Figure 2.4: The Matrix NBS vs Barriers

### 2.2.3 Legal Aspects Guide Specification

The objective of this methodology process is to define the guideline that help in all the processes related to the legal aspects. The main of the process on tendering, defining all parameters, specification and documents that has to be taken into account, which allows the correct implementation of the RUP in all the stages that make up the process and articulate the different stakeholders that will take part on it.

**Process Component:** Legal Aspects Specification

**Process Action:** Analysis and definition of the legal context that restricts the implementation of the City Urban Plan RUP with NBS selected as best options.

The URBAN GreenUP Legal Aspects Guide, as a base guide to evaluate different legal peculiarities, considering different administrative processes, to assist in the implementation of NBS in an effective way.

The guide to the process bases on two fundamental content aspects:

- Implementing legislation at different levels. The basic aspects of the legislation at the highest level identified. This will help the cities to remember all the aspects that they must consider in the renaturation of the city.
- Understand the general public tendering process for the construction of works, supplies or services, for the implementation of the NBS in cities. This content based on the Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC<sup>2</sup>, likewise general procurement process document.

A document of general methodology cannot include particular cases of cities that are front-runner or followers in the URBAN GreenUP project. However, when selecting the general application legislation, the particular experiences of the project cities are been considered. Furthermore, particular situations considered, as study cases for possible replication to any city in the world, at least in the surroundings of the URBAN GreenUP cities: Latin America, Europe, Middle East and Southeast Asian.

#### Legislative framework

The application legislation to establish RUPs and implement NBS selected for each city at different levels: local, regional, national and supranational. The cities must know the implementing legislation at all levels as a preliminary step before beginning the definition of their needs, according to their identified challenges.

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<sup>2</sup> <https://eur-lex.europa.eu/eli/dir/2014/24/oj>





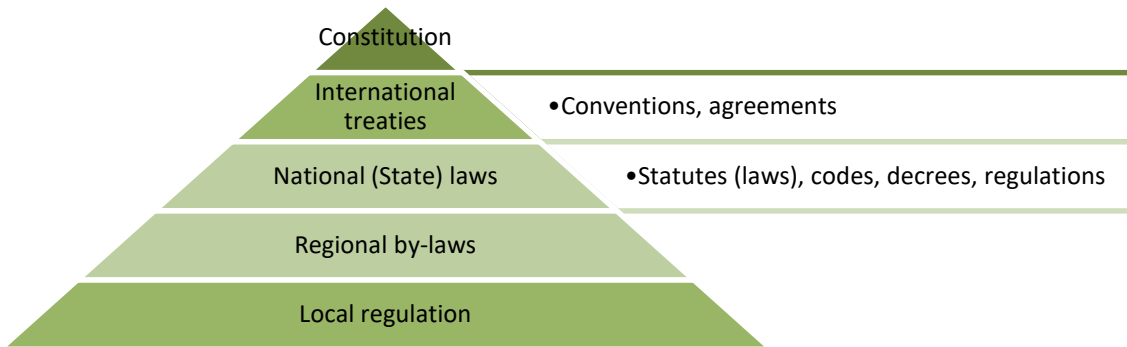


Figure 2.5: The Laws pyramid for GreenUP

Applicable laws that refer to the RUPs and implementation of NBS can include the following categories: urban planning, construction and architecture, heritage, environment, biodiversity, health and safety, management of resources such as water or energy and public procurement, among others.

**Public procurement process**

This section presents the main results of the URBAN GreenUP legal guide, the Guidelines to tendering process specification, whose target is to develop a guideline that will help the cities in the process of tendering. Likewise includes the definition of the standard public procurement process, key objectives, principles, main stages, documents and potential barriers.

Public procurement may be defined as the Governments’ activity of purchasing the goods and services which it needs to carry out its functions. Public procurement process is followed to implement the NBS in the cities.

Public procurement process comprises 5 key stages:



Figure 2.6: Stages in the standard public procurement process for URBAN GreenUP

- Preparation and planning: Includes Scope or work, Project plans, Procurement method and planning, Budget, Market studies and Public hearing info.
- Initiation (tender): Includes Documents preparation, Specifications, Line items, Publication (advertising), Requisition, and Enquiries.
- Evaluation of tenders: Includes Submission of tenders, Selection of tenderers, Bid evaluation process and Assess.
- Award: Includes Details of Award, Bidder information and Values.
- Contract implementation: Includes Contract formation, Amendment, Values, Contract Administration, Project updates, Completion info.

Procurement is divided into three broad categories, whose approach is largely different: (a) Goods, (b) Works, and (c) Services. NBS are regulated mainly by works contracts.

The procurement and contract administration process are prone to risks, which may deliver in negative consequences for the public administration and the tenderer. That way, the risks could be treated as potential barriers.

Potential barriers initially identified include delays in the different stages, money wasted, time lost, complaints from tenderers or legal actions. The risks can be handled by implementing preventive actions.

#### 2.2.4 Engagement Strategy & Social Aspects Guide

The objective of this methodology process is to define the Science to practice engagement strategy, to deliver trans-disciplinary and community based stakeholder engagement and to include social sciences and humanities best-practices in the co-design, co-development and co-implementation of the City Projects NBS.

The engagement-oriented program focuses on the social benefits of engaging with nature, biodiversity and green spaces in cities. Key elements of this program are the development and execution of BioBlitz type activities in which citizens are encouraged to observe, document and provide feedback on the biodiversity and other ecological elements present in the project's NBSs.

**Process Component:** Engagement Strategy & Social Aspects Guide

**Process Action:** Analysis and evaluation of the City Engagement Strategy into the implementation of the City Urban Plan RUP with NBS selected as best options.

The URBAN GreenUP Engagement Strategy Guide, as a base guide to evaluate different city ways of co-design and co-developments, gives examples on commitments upfront to identify all relevant stakeholders and community members, and how actively engage them, facilitate the establishment of a "Practitioners steering committee", and generate pathways leading to the establishment of both research-oriented and engagement-oriented Citizen Science programs.

One of the outputs is a generic template for a 'NBS Engagement Strategy' that cities can customise, drawing on global experience in engagement and NBS delivery to reflect best practices.

This strategy will guide cities in working with their communities to prepare a RUP, from inception to implementation and monitoring. The strategy will seek to ensure involvement of the general public as well as practitioners in relevant related disciplines.

The strategy will include a process to identify stakeholders, form them into one or more committees, and guide them in processes of co-design, co-development and co-implementation. Research and project-oriented engagement streams will be key in this strategy.

The strategy template will help establish structures to leverage the experience of stakeholder committees to identify and overcome key barriers, drawing on learnings from other processes of the methodology.



Citizens can play a role in research to support RUP development, as well as ongoing monitoring of RUP success; it is important that these programs are carefully selected and tailored for local contexts. The template strategy will offer guidance and best practice examples to develop locally-appropriate citizen science programs. The template will also offer broader guidance and case studies on helping people connect with the natural values they find important.

We propose to offer a basic template and guidance text. Cities wishing to test the template may opt to try it to assist us in refining a final template.

## 2.3 Methodology Evaluation & Replication

### 2.3.1 Evaluation & Replication Aspects Guide Specification

The objective of this methodology process is to define the principles of the Evaluation Method for NBS Scenarios once implemented, and to apply the results obtained from the KPIs monitoring to maintenance process.

The procedure allows the continues monitoring of the NBS integrated into the City Urban Plans RUP and its evaluation, Scaling UP and replication to the other City Zones, Districts, Cities.

**Process Component:** Evaluation Method for NBS Scenarios once implemented

**Process Action:** Analysis and evaluation method proposal to the CC Scenarios with NBS selected and implemented.

The URBAN GreenUP Evaluation Method Procedures Guide, as a base guide to evaluate different city NBS Scenarios, is made up by the selection of one or several NBS alternatives previously identified, working in an integrated way solving various problems.

Selecting the right NBS for a city is a very important part of a RUP. There are big differences between cities in Europe, and around the world. An NBS that is very successful in one city may completely fail in another.

Understanding how a city may replicate NBS that have been successful in other cities requires a good grasp of the factors that make NBS suitable for different contexts. We have conceptualised three key suitability criteria for replication, as conceptualised below:

- Cities have different organisational strengths and weaknesses, and different NBS place different demands on those NBS. Important factors like political support, legislation and organisational integration are vital determinants of what NBS are suitable.
- Cities also have different challenges that they are facing. A city facing heat island effects and flooding may require very different NBS to a city that is seeking to deliver urban renewal and improve the health and wellbeing of its residents.
- Finally, each city will have different abilities to pay for the construction and maintenance of new NBS.





Figure 2.7: Key factors determining NBS replication potential

By using URBAN GreenUP tools created, cities can determine which NBS may be most suitable to replicate. They may also wish to note opportunities to improve their capabilities or identify new ways to fund greening.

Resources will be prepared to facilitate replication analysis.

A characterisation report template has been prepared to enable cities to characterise their specific contexts, in terms of important variables like climate, organisational traits and built form. The replication methodology is developed from the analysis framework drawing from cluster analysis of the best suitable NBS for certain characterizations of urban pressures and its indicators. The characterization reports from participating cities (front runners and followers) will be cluster with common driving pressure, social and natural conditions that entail the implementation of NBS to address the driving pressures. Together with the situational institutional conditions of each cluster the analysis framework will produce recommendations of the proper NBS implementation and replication in other cities with similar condition. An analysis framework for the cluster of driving pressures mapping with corresponding NBS under the enabling conditions will be produced and documented with certain key indicators for the proper replication of the demonstrated NBS or NBS catalogue developed under this project.

In addition to the template, one or more analytical tools will be prepared to facilitate testing of capabilities and matching of NBS to desired impacts. The tool(s) will help cities understand their strengths and weaknesses, and recommend NBS that align with their needs and organisational capabilities.

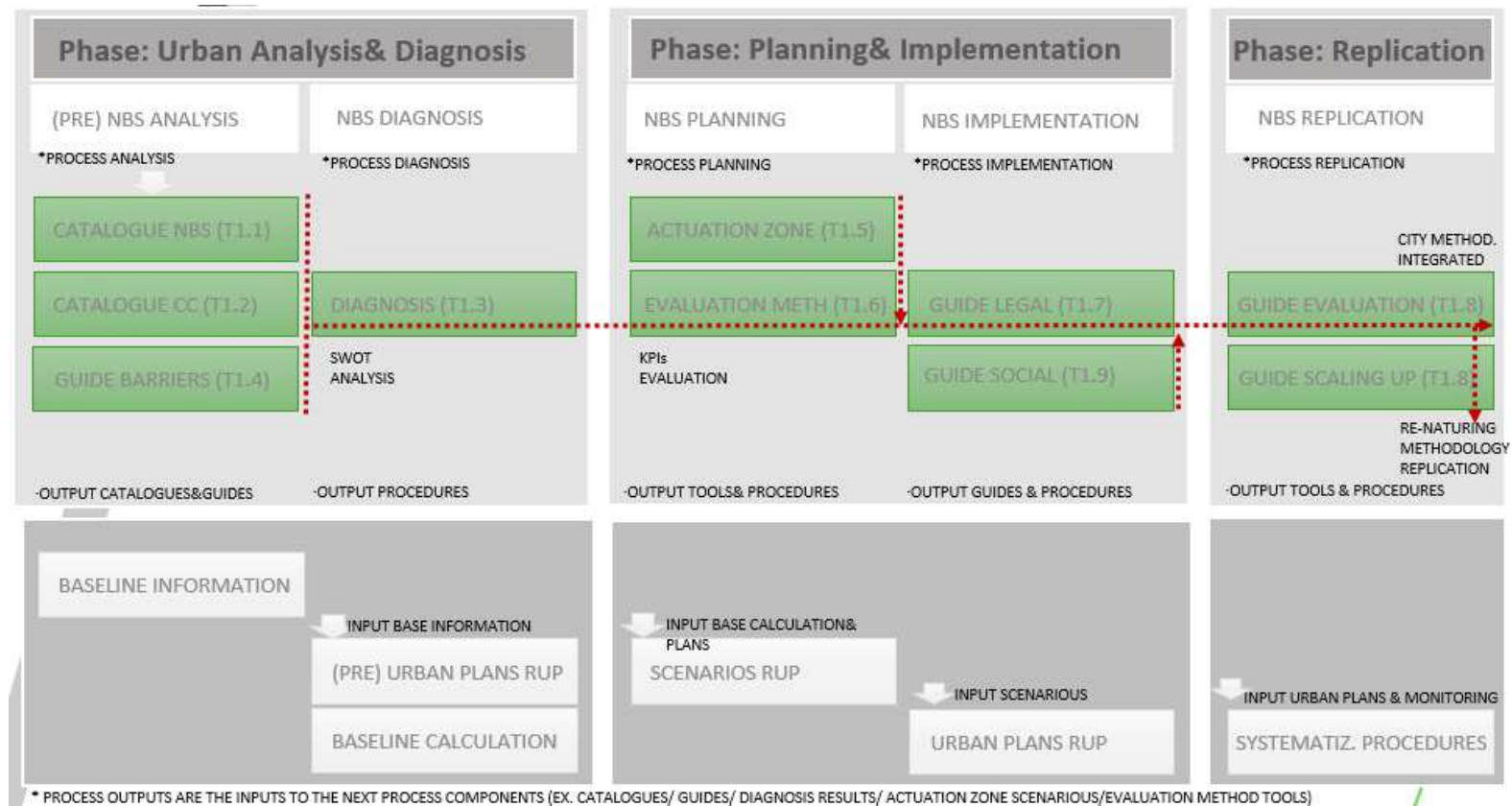
The viability of the scaling up, will be identified according to how, “Credible, Relevant, with relative advantage over existing practices , Easy to adopt, Compatible and Able to be tested” the methodology is.

### 3 URBAN GreenUP Methodology Diagrams

#### 3.1 Methodology Process Articulation

Methodology scheme by phases, its components, processes, main outputs to the RUP planning definition.

Table 3.1: Graph to the methodology main components



### 3.2 Methodology Work Flow In/Out-puts

List of inputs and outputs to the methodology processes:

#### I Phase: Urban Analysis and Diagnosis

Table 3.2: List of List of In/Out-puts to the Urban Analysis& Diagnosis

						ACTIONS BY PHASE& PROCESS WORK FLOW									
Process	Components	INPUTs <i>*needed for process</i>		OUTPUTs <i>*obtained from process</i>	Phase Process	I		II			III				
						1.1	1.2	1.4	1.3	1.5	1.6	1.7	1.8		
<b>I Phase: Urban Analysis&amp; Diagnosis</b>						Urban Analysis& Diagnosis									
<b>I.I (PRE) NBS ANALYSIS</b>						(PRE) ANALYSIS									
1.1	Catalogue NBS	· GreenUP Catalogue NBS	Base Info	· <b>City Catalogue NBS (possible city options)</b>	City Guide	OU 1.2									
1.2	Catalogue CC	· GreenUP Catalogue CC · Values for matrix NBS vs Challenge list		· City Catalogue CC · <b>Relation matrix NBS &amp; CC</b>	City Guide	IN 1.1	OU 1.4								
1.4	Barriers& Boundaries	· City Catalogue NBS · City Catalogue CC · Relation matrix NBS & CC · GreenUP Barriers& Boundaries · GreenUP Overcoming Barriers Experiences · GreenUP ESA Methodology (WP7)		· City Barriers & Boundaries analysis (Questionary and SWOT Annex ) · City Proposal Barriers Overcoming · City Barriers& Boundaries for NBS list · <b>City Catalogue NBS (best city options)</b>	City Guide, SWOT annex	IN 1.1 IN WP7	IN 1.2	OU 1.3							
<b>I.II NBS DIAGNOSIS</b>						NBS DIAGNOSIS									
1.3	Diagnosis	· (Pre) Selected NBS · (Pre) Selected CC · (Pre) Analysed Barriers& Boundaries NBS · City Proposal Barriers Overcoming	City Guides	· SWOT analysis for RUP · City CC Scenarios with NBS (best options) · Prioritization criteria for NBS (its KPIs) · <b>(Pre) City Urban Plans RUP</b> · <b>City Baseline Calculation (KPIs)</b>	City Plan & Baseline for RUP, Procedures			IN 1.4	OU 1.4/1.5						



II Phase: Planning and Implementation

Table 3.3: List of List of In/Out-puts to the processes to the Urban Planning& Implementation part1

Process	Components	INPUTs <i>*needed for process</i>	OUTPUTs <i>*obtained from process</i>	Phase Process	ACTIONS BY PHASE& PROCESS WORK FLOW										
					I 1.1	1.2	1.4	II 1.3	1.5	1.6	1.7	III 1.8			
<b>II Phase: Planning&amp; Implementation</b>					Planning& Implementation										
<b>II.I NBS PLANNING</b>					NBS PLANNING										
1.5	Actuation Zone	<ul style="list-style-type: none"> <li>GreenUP Actuation Zone Guide</li> <li>City Baseline Map for considering barriers and `pinch points` for NBS selected</li> <li>City Historical Data for indentifying of key relevant data sets available in matrix with CC considered</li> <li>City Zonning by different themes of interest</li> </ul>	City guides, GIS data layers	<ul style="list-style-type: none"> <li>City Baseline Map for NBS implementation</li> <li>City Key relevant data sets in matrix with CC (in different variants, sets, multiple/ singular CC ...)</li> <li>City Mitigation Map for NBS (by phases)</li> </ul>	City Maps (GIS data sets), Procedures				IN 1.3 IN Ext Service (Mappin g, Legal)	OU 1.6					
1.6	Evaluation Method	<ul style="list-style-type: none"> <li>(Pre) City Urban Plans RUP</li> <li>City Baseline Calculation (KPIs )</li> <li>GreenUP NBS scenarios tool</li> <li>GreenUP KPIs calculation tool for different scenarios</li> <li>KPIs Selected for Monitoring (WP5)</li> </ul>	Evaluation Tools	<ul style="list-style-type: none"> <li>City Scenarios RUP (best options)</li> <li>City Urban Plans RUP (for impact evaluation)</li> <li>Priorization criteria for KPIs (RUP mantainance)</li> </ul>	City Plans RUP, Procedures				IN 1.3 IN WP5	IN 1.5	OU 1.7				



Table 3.4: List of List of In/Out-puts to the processes to the Urban Planning& Implementation part2

Process	Components	INPUTS *needed for process	OUTPUTs *obtained from process	Phase Process	ACTIONS BY PHASE& PROCESS WORK FLOW												
					I 1.1	1.2	1.4	1.3	II 1.5	1.6	1.7	III 1.8					
<b>II Phase: Planning&amp; Implementation</b>					Planning& Implementation												
<b>II.II NBS IMPLEMENTATION</b>					NBS IMPLEMENTATION												
1.7	Guide Legal (Public procurement, Tenders, Contracts Implementations)	<ul style="list-style-type: none"> <li>Urban GreenUP Guidelines to the tendering process specification</li> <li><b>Construction Project:</b> description of works, drawings, budget, justification of regulatory compliance</li> <li><b>Construction project approval</b> by different technical areas of City Council</li> <li>Local administrative and financial requirements</li> <li>Technical and administrative tender specifications</li> <li>Award criteria</li> <li>Approval of contract documents</li> <li>Offers from bidder</li> <li>Evaluation of submitted offers</li> <li>Formalisation of the contract</li> <li>Execution of works</li> </ul>	Projects, Reports, Certificate s Guides, Other	<ul style="list-style-type: none"> <li><b>City Guidelines to the tendering process specification</b></li> <li><b>Project approval by different technical areas of City Council</b></li> <li>Technical and administrative Tender specifications</li> <li>Award Criteria</li> <li>Publication of Tendering</li> <li>Evaluation of submitted offers</li> <li>Best tender selection and approval</li> <li>Publication and notification of works</li> <li>Formalisation of the contract</li> <li>Execution of works</li> <li>Periodic certification of completion of works</li> <li>As-built documents</li> </ul>	Projects, Reports, Decisions, Other											IN1.6/IN 1.9 (?) OU1.8 IN Ext Service (Design, Authorities)	
1.9	Guide Social	<ul style="list-style-type: none"> <li>URBAN GreenUP Engagement Strategy Guide</li> <li>City Scenarios RUP</li> <li>City Urban Plans RUP</li> </ul>	Projects, Guides	<ul style="list-style-type: none"> <li>Questionary to Urban Plans RUP</li> <li>City Engagement Strategy Guide</li> <li><b>Public vote to Scenarios for RUP&amp; Replication</b></li> <li><b>Public vote to Evaluation</b></li> </ul>	Projects, Guides												IN1.6/ OU1.8 In Ext Service (Social)





III Phase: Replication

Table 3.5: List of In/Out-puts to the Urban Replication

Process	Components	INPUTS *needed for process	OUTPUTS *obtained from process	Phase Process	ACTIONS BY PHASE& PROCESS WORK FLOW																	
					I 1.1	1.2	1.4	1.3	II 1.5	1.6	1.7	III 1.8										
<b>III Phase: Replication</b>					Replication																	
<b>III.I NBS REPLICATION</b>					NBS REPLICATION																	
1.8	Guide Evaluation	<ul style="list-style-type: none"> <li>Urban Plans RUP</li> <li>KPIs Monitored and Evaluated for RUP</li> <li>Public Vote to RUP scenarios &amp; replication</li> </ul>	Projects, Procedures	<ul style="list-style-type: none"> <li><b>Urban Plans RUP Reporting</b></li> </ul>	Projects, Procedures																	
1.8	Guide SkalingUp	<ul style="list-style-type: none"> <li>City Selected NBS</li> <li>City Selected CC</li> <li>City Analysed Barriers&amp; Boundaries NBS</li> <li>City Proposal Barriers Overcoming</li> <li>City KPIs Selected for Monitoring</li> <li>City Mitigation Map for NBS (by phases)</li> <li>Urban Plans RUP Reporting</li> <li>Characterisation Template</li> <li>Model for Replication</li> </ul>		<ul style="list-style-type: none"> <li><b>Scenarios RUP Replication</b></li> <li>Priorization criteria for RUP Replication</li> <li><b>Urban Plans RUP Replication</b></li> <li><b>Systematized Procedures RUP</b></li> </ul>																		



## 4 Conclusions

The URBAN GreenUP methodology, for supporting the Re-naturing of the cities and/or areas, will include new concepts as Re-naturing Urban Plans RUPs that will let embrace the climate change challenges. It will be included throughout the methodology, all the Social Science Humanities matters, as well as, the generation of a procedure to make possible co-creation and co-development. New tools will be generated supporting the methodological process, as catalogues, guidelines or systemized procedures that will help in the generation of RUPs scenarios and its evaluation. The methodology will be tested both by partners of the project and for external stakeholders, that could be included in a methodological real processes, in order to be able to fix the different parts that make up the process, articulate them and scaling up it, generating an useful, replicable and exploitable methodology both within Europe and beyond.

For this complex process, different phases of development are considered. At this first stage (M20), the first diagram to the methodology process is proposed. It takes into account its different components developed (as described in WP1). The components at this phase are, NBS Catalogue (T1.1), CC Catalogue (T1.2), and Guide on Barriers and Opportunities (T1.5), linking them strategically to the rest of the methodology concepts like Actuation Zone, Evaluation Method, Social, Legal, and some Replication and Scaling up aspects from the rest of the WP1 tasks.

At this stage, the methodology implementation phases are proposed and different components of methodology organised below each of them:

- **Phase on Urban Analysis and Diagnosis**, with corresponding process on City Diagnosis and (pre) Urban RUP Plans and its Baseline calculation, alimeted by the main methodology components on Catalogue of NBS, Catalogue CC, and Guide to the City Barriers and Boundaries. At this stage, the base city situation for possible implementation of the NBS should be clear and base strategic lines of actuation proposed.
- **Phase on Urban Planning and Implementation**, with corresponding processes on NBS Planning on City NBS scenarios definition and its Evaluation, followed by the Implementation Process, supported by Legal Guides in reference to Tendering processes and Social Guides on citizen's involvement to NBS implementation. At this stage the definitive Urban Plans RUP are delivered.
- **Phase on Urban Replication**, supported by guide evaluation and guide to scaling up, delivering the systemized procedures for replication. At this stage, the monitoring of the implemented strategies is relevant to determine the accuracy of the methodology proposed and in case of need to propose the correcting measures.

The methodology workflow, between different phases and its processes and other components, is proposed. The inputs and outputs to each methodology process are defined, and briefly drafted their contents. The Catalogue on NBS and Catalogue to CC is fully defined, as well the Guide to the Barriers and Boundaries are proposed. Still need to be drafted the procedure to the process, which will alimtet the future analysis on urban diagnosis SWOT based.



## 5 Links and References

Table 5.1: List of Methodology Links and References

LINKS AND REFERENCES IMPORTANT TO THE PROCESS	
Keywords	Barriers on NBS, Risks & Opportunities, Boundaries on NBS
Links and references	<ul style="list-style-type: none"> <li>Expert Workshop on Nature-based solutions to climate change mitigation and adaptation in urban areas and their rural surroundings (Isle of Vilm, 10. - 11. March 2015)</li> <li>Lohr et al. 2004, Kirkpatrick et al. 2013, Kronenberg 2015</li> </ul> <p>Kabisch, N., et al. 2016. Nature-based solutions to climate change mitigation and adaptation in urban areas: perspectives on indicators, knowledge gaps, barriers, and opportunities for action. <i>Ecology and Society</i> 21(2):39</p>
Keywords	Public procurement, tendering process, public administration, contract
	<p><a href="http://www.oecd.org/gov/public-procurement/">http://www.oecd.org/gov/public-procurement/</a></p> <p><a href="https://uncitral.un.org/">https://uncitral.un.org/</a></p> <p><a href="https://eur-lex.europa.eu/eli/dir/2014/24/oj">https://eur-lex.europa.eu/eli/dir/2014/24/oj</a></p>

