URBREATH [101139711]

Systemic Integration of Transformative Technical and Nature-based Solutions to Improve Climate Neutrality of European Cities and Regions and tackle Climate Change: the URBreath Approach

D6.4 Specific institutional and technical NBS framework - V1

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Document description	This document details the first version of the specific institutional and technical framework for implementing Nature-Based Solutions (NBS) within the URBREATH project. It outlines the methodology and planning for three series of workshops—co-creation, validation, and final assessment—that will be used to develop city-specific roadmaps. Acknowledging its dynamic nature, this deliverable will be subject to two revisions during the project's lifecycle (M30 and M48) to document the completed roadmaps.

Document Revision History

Version	Date	Modifications Introduced	
		Modification Reason	Modified by
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0.2	31.7.2025	Draft version	LC
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2.1	28.8.2025	Final version ready for submission	LC

Disclaimer

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List of Terms and Abbreviations

Abbreviation	Definition
FRC	Frontrunner City
M	Month
NBS	Nature Based Solution
WP	Work Package
T	Task

Executive Summary

This deliverable, D6.4, establishes the institutional and technical framework for implementing Nature-Based Solutions (NBS) in the four URBREATH Frontrunner Cities (FRCs). As a key output of Work Package 6 (WP6) and Task 6.2, it provides the essential template and methodology for developing the roadmaps needed to launch these NBS projects. This foundational work will enable subsequent deliverables (D6.5 at M30 and D6.6 at M48) to present the fully customized, city-specific roadmaps.

The document serves as a critical link between the co-created NBS scenarios from WP5 and local planning and implementation activities. The insights and lessons learned from this implementation will be transferred to Work Package 7 (WP7) to enable the future replication and upscaling of successful NBS.

The report is structured as a guide for the upcoming phases:

- **Chapter 2** introduces the core institutional and technical requirements that form the basis of the NBS framework template.
- **Chapter 3** outlines the methodology for detailing a practical roadmap of requirements for each city, including specific actions, responsible actors, and timelines for completion.
- **Chapter 4** documents the planned methodology and schedule for the workshops that will be used to co-define the technical and institutional requirements and validate the customized city-specific roadmaps.

In essence, D6.4 provides the core tools and methodology for developing and validating the full NBS framework and implementation roadmaps, which will be applied in the four URBREATH FRCs and documented in two subsequent deliverables.

1 Introduction

1.1 Scope and goal of this deliverable

This deliverable, D6.4, is the first in a series of three documents dedicated to establishing the institutional and technical framework for implementing Nature-Based Solutions (NBSs) in the four URBREATH Frontrunner Cities (FRCs)[1]. The primary goal is to provide both a framework and commented roadmap template, as well as the methodological basis for future work.

This document serves two key purposes:

- **To define the framework**: It provides a comprehensive template for defining the institutional and technical requirements necessary for successfully implementing NBS projects.

- **To outline the methodology**: It details the methodology and planning for the co-creation and validation workshops. These workshops will be used to engage key stakeholders, such as city officials, community groups, and technical experts, and to co-define the specific, city-level roadmaps that will be documented in later deliverables (D6.5 and D6.6).

1.2 Task 6.2 in relation to other WP6 tasks

Work Package 6 (WP6) is comprised of four tasks whose objectives are summarized below. Task 6.2 plays a central role by integrating outputs from Task 6.1 (NBS implementation plans and monitoring) to develop city-specific roadmaps. These roadmaps are essential for supporting the preparation for intervention (T6.3) and the actual deployment of NBS (T6.4).

T6.1 - NBS sites implementation plans and monitoring

- Create concrete plans for the implementation of the selected Nature-Based Solutions, including specific actions and costs.
- Define a monitoring plan to track progress and measure the achievement of desired outcomes.
- Provide direct input for the NBS implementation roadmap (T7.5) and subsequent validation campaigns.

T6.2 - Customisation of the specific institutional and technical NBS framework

- Co-define the institutional and technical requirements for NBS implementation with stakeholders.
- Develop city-specific roadmaps detailing actions, actors, and timelines.
- Validate the roadmaps through expert and participant workshops.
- Assess the framework's effectiveness to inform the final "Roadmap for Regeneration" (T7.5).

[1] Cluj-Napoca, Leuven, Madrid, and Tallinn.

T6.3 - Procurement and cities preparation for intervention (M12-M48)

- Apply a collaborative procurement framework (output from T7.3) for urban greening solutions.
- Elaborate an NBS procurement report for each demo site.
- Document the outcomes, barriers, and service providers' feedback on procuring site-specific NBS.

T6.4 - Deployment of the selected interventions (M12-M48)

- Implement and operate the selected pilot sites.
- Adjust pilot configurations based on stakeholder feedback and monitoring KPIs.
- Document the implementation process and lessons learned.
- Address training and procurement needs for NBS maintenance contracts.

1.3 Connection of Task 6.2 with other WP activities

Work Package 6 (WP6) is central to the project's practical implementation. It acts as a bridge, connecting the conceptual and technical work from earlier work packages with lessons learned that will inform future project activities.

Key Connections

WP6 acts as a central integrator, using various inputs to produce valuable outputs for the rest of the project:

- **Inputs**: The co-created NBS from Work Package 5 provides the core focus for implementation. Planning and monitoring activities rely on technical data and tools from Work Packages 3 and 4, which together form the project's toolbox.

- **Outputs**: The conclusions and lessons learned from the real-life implementation and monitoring in WP6 serve as a direct input for Work Package 7. Specifically, the final assessment of the frameworks in Task 6.2 will contribute to the "Roadmap for Regeneration and Climate Neutral Cities" (T7.5).

2 Institutional and Technical Framework Template for Nature-Based Solutions

This chapter outlines the complete framework template, which is the main output of Task 6.2 (ref. to section 1.1). This template provides a structured and comprehensive approach for defining the requirements necessary to implement Nature-Based Solutions (NBS) in the four Frontrunner Cities. It is organized into two main macro-categories:

1. Institutional Requirements
2. Technical Requirements.

This document serves as a guide, a foundation for developing the city-specific roadmaps. The template itself (Table 1) will be populated with city-specific data through co-creation workshops and documented in two later deliverables (D6.5 and D6.6). The following sections elaborate on the key meso-categories that comprise each macro-category. The eight meso-categories identified (for per each macro-category) aim to cover all the essential aspects of a NBS project, from strategic alignment to long-term maintenance.

2.1 Institutional Requirements

This section of the framework addresses the non-technical aspects of NBS implementation, ensuring that each intervention is strategically supported by the correct policies, governance structures, and financial mechanisms. These requirements are essential for the long-term viability and social acceptance of the NBS.

a. **Policy and Strategic Alignment**: This category evaluates how the proposed NBS aligns with existing and future local, regional, and national policies. It identifies synergies with urban planning documents, climate change adaptation strategies, biodiversity action plans, and other relevant sustainability goals. The objective is to ensure the NBS is not an isolated project but an integral part of the city's broader strategic vision.

b. **Organizational Capacity and Governance**: This category defines the governance structure for the NBS project. It identifies all key actors and stakeholders, including city officials, community representatives, private sector partners, and researchers. It specifies roles, responsibilities, decision-making processes, and communication channels. This ensures a clear chain of command and effective collaboration throughout the project lifecycle, from planning to long-term maintenance.

c. **Legal and Regulatory Framework**: This category outlines the legal permissions, regulations, and formal agreements required for the NBS implementation. It includes an analysis of land use regulations, zoning laws, environmental permits, and any necessary contracts or agreements

with property owners or maintenance partners. Defining this framework is critical to prevent legal barriers and ensure the project proceeds smoothly and is legally compliant.

d. **Financial and Budgetary Framework**: This category details the financial plan for the NBS. It identifies all potential funding sources (e.g., EU grants, public budgets, private investment) and outlines the project's budget, including costs for design, procurement, implementation, and long-term maintenance. It can also include an analysis of the project's economic viability and a plan for financial sustainability beyond the project's lifespan.

2.2 Technical Requirements

This section of the framework focuses on the physical and functional aspects of the NBS. These requirements ensure that the solutions are technically sound, effective at addressing specific urban challenges, and designed for successful implementation and long-term management.

a. **Needs Assessment and Problem Definition**: This foundational category defines the specific urban challenges that the NBS is intended to address. It involves assessing the pilot site to identify issues such as urban heat island effect, flooding, air pollution, or biodiversity loss. A clear problem definition ensures that the NBS is a targeted and effective solution.

b. **Site Assessment and Suitability Analysis**: This category outlines the technical evaluation of the proposed implementation site. It involves analysing site-specific data such as soil type, topography, hydrology, and existing infrastructure. This analysis ensures the site is technically suitable for the chosen NBS and helps to optimize its design for maximum impact.

c. **NBS Design and Specification Standards**: This category provides the technical specifications for the NBS itself. It includes design principles, material standards, plant selection criteria (e.g., native species, drought-resistant varieties), and detailed construction guidelines. These standards guarantee a high-quality and consistent implementation across all pilot sites, while still allowing for local customization.

d. **Maintenance and Management Requirements**: This category defines the long-term operational and maintenance plan for the NBS. It specifies the required tasks, their frequency, and the actors responsible for them (e.g., city maintenance departments, community groups). This ensures the NBS remains functional and continues to provide its intended benefits over its full lifespan.

2.3 Framework Summary: Macro-Categories and Data Sources

The following table summarizes the complete framework template, detailing the meso-categories for both institutional and technical requirements along with the input of data from other WP tasks and related deliverables, as available at the present date, M20.

As a reading key, the green cells are the data sources already available, while the yellow ones underline the need for data integration through workshops with the four FRCs (ref to Chapter 4).

Table 1: Key Elements and Data Inputs for the NBS Framework Template

Macro-Category	Meso-Category	Source of Data
1. Institutional Requirements	a. Policy and Strategic Alignment	Task 2.2 - Designing Adaptive Pathways for Hybrid Infrastructure Deployment
		Task 2.4 - Use Case Scenarios and Baselines
	b. Organizational Capacity and Governance	Task 5.3 - Local Living Labs
		Task 7.3 - Development of Urban Greening Investment Plans for Lighthouse Cities
	c. Legal and Regulatory Framework	*Data to be collected through workshops with the FRCs*
	d. Financial and Budgetary Framework	Task 7.3 - Development of Urban Greening Investment Plans for Frontrunner Cities
2. Technical Requirements	a. Site Assessment and Suitability Analysis	*Data to be collected through workshops with the FRCs*
	b. Needs Assessment and Problem Definition	Task 2.4 - Use Case Scenarios and Baselines
		Task 5.6 - Performance Evaluation and Impact Assessment
	c. NBS Design and Specification Standards	Task 5.3 - Local Living Labs
		Task 6.1 - NBS Sites Implementation Plans and Monitoring
		Data to be collected through workshops with the FRCs
	d. Maintenance and Management Requirements	T5.6 - Performance Evaluation and Impact Assessment
		T6.3 - Procurement and Cities Preparation for Intervention
		T6.4 - Deployment of the Selected Interventions

As output from the screening of Table 1 above, the requirements that are most needed for data integration are summarized below:

- 1.c Legal and Regulatory Framework
- 2.a Site Assessment and Suitability Analysis
- 2.c NBS Design and Specification Standards
- 2.d Maintenance and Management Requirements.

To conclude, the framework will be defined and validated through a series of workshops (ref. to Chapter 4). The specific requirements that need more data integration will be the focus of the co-creation workshops, which will be followed by validation workshops to confirm the entire framework and the requirements identified.

3 Moving from Framework to City-Specific Commented Roadmap

This chapter details the methodology for translating the institutional and technical NBS framework presented in Chapter 2 into a commented roadmap of requirements for each of the four Frontrunner Cities (FRCs). The primary goal is to provide a clear, actionable plan that specifies the detailed actions to be undertaken, identifies the key actors responsible for their implementation, and sets a timing for their completion. This process transforms the high-level template into a city-specific tool to guide the successful implementation of the NBS scenario selected.

3.1 Methodology for Developing the Commented Roadmap

The commented roadmap is developed by applying the institutional and technical framework to each FRC through a collaborative process. The methodology is designed to ensure that all requirements identified are contextualized to the specific needs of each city. The process follows a systematic approach which is made up of key five steps:

1. **Data Integration**: For each meso-category in the NBS Framework created (ref. to Sections 2.3), e.g., "Policy and Strategic Alignment," "NBS Design and Specification Standards", relevant data is integrated from the existing available data sources, mainly from WP2, WP5, WP6, and WP7, and from the FRCs themselves, by organizing four workshops (one per each Frontrunner City).

2. **Action Definition**: The eight abstract requirements identified and agreed are broken down into a series of detailed, concrete actions. Each action is a specific step required to meet the overarching requirement.

3. **Key Actor Assignment**: For each defined action, the key actor(s) or team responsible for its implementation is identified. This ensures clear ownership and accountability.

4. **Timeline and Milestones**: A realistic timeline is established for the completion of each action. This helps in project planning and monitoring progress, aligning the work with the project's overall schedule.

5. **Documentation and Commentary**: The entire roadmap is documented with detailed comments that explain the rationale behind each action and any specific considerations for the local context. This provides a clear record of the decision-making process.

3.2 Generic Roadmap Template

The following table is a commented roadmap template that includes all eight institutional and technical requirements which constitute the NBS Framework template (ref. to Section 2.3). The information provided is illustrative and works as an example of how this commented roadmap should be like. Starting from this template, Cluj-Napoca, Leuven, Madrid, and Tallinn (the FRCs) should customize it and fill it out with specific data and details, based also on the Plan of Works developed by Task 6.1 for each of the four Frontrunner Cities.

Table 2: Generic Template for Customizing City-Specific NBS Implementation Roadmaps

Requirement	Action	Actors	Timeline	Commentary
1.a Policy and Strategic Alignment	Secure official endorsement of the NBS project from the relevant city department or council. Present the project's goals and benefits to relevant local and regional policy committees.	City Authority (e.g., Council or Planning Dept.), URBREATH Project Coordinator.	To be established by each city in agreement with the Plan of Works	Formal endorsement is critical for securing political support and ensuring project alignment with local governance and strategic objectives. This also helps in integrating the NBS into official policy documents.
1.b Organizational Capacity and Governance	Establish a joint working group with key city departments and local community representatives. Define roles, responsibilities, and a clear decision-making process for the working group.	City Authority (e.g., Urban Planning Dept.), URBREATH Project Management.		This ensures clear ownership and provides a structured platform for collaborative decision-making throughout the project lifecycle.
1.c Legal and Regulatory Framework	Conduct a legal review of local land-use and environmental regulations to obtain necessary permits. Draft and finalize formal agreements with landowners or public space managers.	City Authority (e.g., Legal Dept., Environmental Agency).		This formal review prevents regulatory barriers and ensures the project proceeds smoothly and is legally compliant. Agreements with landowners are crucial for access and long-term security.
1.d Financial and Budgetary Framework	Define and secure the long-term budget for NBS maintenance and management beyond the project's grant period. Explore and apply for additional funding opportunities (e.g., city-specific grants, private	City Authority (e.g., Finance Dept.), URBREATH Project Management.		Securing a dedicated budget is crucial for the long-term sustainability of the NBS and ensures the continuity of its intended benefits. Exploring additional funding sources supports upscaling and replication.

	sponsorship) for upscaling.			
2.a Site Assessment and Suitability Analysis	Conduct a site-specific analysis of soil, hydrology, and existing infrastructure at the proposed location. Use digital twin models (WP4) to simulate and assess the environmental impact of the proposed NBS design.	City Authority (e.g., Public Works Dept.), Technical Experts (e.g., URBREATH partner from WP3).		This analysis ensures the site is technically suitable for the chosen NBS and helps to optimize its design for maximum impact and effectiveness. Using digital twins provides a robust, data-driven assessment.
2.b Needs Assessment and Problem Definition	Finalize the problem definition for the pilot site based on citizen workshops and baseline data. Develop a set of Key Performance Indicators (KPIs) to measure the success of the NBS in addressing the defined problem.	City Authority (e.g., Urban Planning Dept.), Community Representatives, URBREATH Research Team.		A clear, co-defined problem statement ensures the NBS is a targeted and effective solution that addresses the real-world issues of the local community. KPIs are essential for measuring the project's impact.
2.c NBS Design and Specification Standards	Finalize the plant selection, technical drawings, and specifications for the urban greening intervention. Establish a quality control plan for construction and materials to be used by contractors.	City Authority (e.g., Parks and Gardens Dept.), Technical Experts (e.g., URBREATH partner from WP3), Design Team.		The specifications will be based on project standards and adapted to local construction regulations, guaranteeing high-quality and compliant implementation. A quality control plan is vital for ensuring long-term durability.
2.d Maintenance and Management Requirements	Develop a detailed maintenance plan with tasks, frequency, and responsible parties for the completed NBS. Establish a training program for city maintenance staff and community volunteers on how to manage the NBS.	City Authority (e.g., Maintenance Dept.), Community Volunteers.		A clear plan ensures the NBS remains functional and continues to provide its intended benefits over its full lifespan. Training ensures that the maintenance team has the necessary skills for the innovative solutions.

4 Planning and Methodology of Workshops

This chapter details the methodology and planning for three series of workshops:

1. Four co-creation workshops
2. Four validation workshops
3. Four final workshops

The approach is designed to be highly participatory, ensuring that all institutional and technical requirements are co-defined with both the city pilots and key local stakeholders from the city environments before being formally validated, and assessed eventually.

4.1 Co-creation Workshops

The primary objective of these first series of four workshops (one per FRC) is to collaboratively identify, agree upon, and customize the institutional and technical requirements. Building upon the NBS framework template developed, these sessions are where the project will gather specific, detailed data from the cities to fill the gaps and develop the commented roadmaps.

The methodology for these workshops follows a systematic approach:

1. **Pre-drafting of Requirements:** Based on the data and information already available from other project Work Packages (as referenced in Chapter 2), the project team will pre-draft a list of institutional and technical requirements for each FRC. This provides a structured starting point for discussion and ensures the workshops are focused and productive.

2. **Workshop Implementation:** Four dedicated workshops, one per FRC, will be organized between Month 22 and Month 24. These sessions will bring together local stakeholders and decision-makers to collectively review the pre-drafted requirements, confirm their relevance, and identify any new or additional requirements specific to their urban context.

3. **Output:** The outcome of each co-creation workshop will be a completed and commented roadmap - one for each FRC - that outlines institutional and technical requirements. This document will specify the detailed actions to be undertaken, identify the key actors in charge of their implementation, and establish a timeline for completion.

These outputs will populate the deliverable 6.5, which represents the second version of this document and will be submitted at M30, which means June 2026.

4.2 Validation and Final Workshops

Following the co-creation phase, the roadmaps will undergo a rigorous validation process to ensure their accuracy and feasibility, focusing particularly on technical feasibility, budgetary realism, and strategic alignment.

1. **Validation Workshops**: Four validation workshops will be held with experts in the NBS field and the same Living Lab participants. These sessions are specifically designed to officially confirm the roadmaps before they are released for implementation. The experts will review the details and confirm the technical and strategic soundness of the documented requirements and planned actions.

2. **Final Assessment Workshops**: At the conclusion of Work Package 6, four final workshops (one per city) will be organized to assess the effectiveness of the set-up frameworks against the actions that have been implemented. This process will be crucial for eliciting lessons learned from the real-life experience and will directly contribute to the "Roadmap for Regeneration and Climate Neutral Cities" (T7.5).

These outcomes will populate the third version of this deliverable, namely D6.6, which is due at M48 (December 2027). Additionally, the synthesis of lessons learned will produce a set of best practices and successful methodologies, a tangible output that will be transferred to Work Package 7.

5 Conclusions

This deliverable, D6.4, serves as the foundational document for establishing a comprehensive framework for Nature-Based Solutions implementation. It successfully provides a structured, commented template that integrates both institutional and technical requirements, and an illustrative example of how it should be applied to turn the provided NBS framework into a city-specific commented roadmap.

The core achievement of this first version is the definition of a clear methodology and plan for the project's upcoming co-creation, validation, and final workshops. By outlining these processes, this document ensures that the roadmaps for each of the four Frontrunner Cities will be developed in a systematic and participatory manner.

The output of these efforts—the detailed, city-specific roadmaps—will be captured in subsequent versions of this deliverable (D6.5 and D6.6). This phased approach ensures the NBS framework is a living document that evolves with real-world data and stakeholder feedback. The successful application of this methodology will be essential for contributing to the "Roadmap for Regeneration and Climate Neutral Cities" (T7.5) and for informing WP7's efforts on replication and upscale.

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