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NatUR-W

**Nature-based Urban Regeneration through Water:
Integrating the water cycle in urban renaturalization**

**Amaia Celaya Álvarez
and NatUR-W communication partner (AUTh)**

1. The Innovative Solution in a Nutshell

The NatUR-W project addresses urgent urban challenges in Lorca, Spain, by leveraging **Nature-Based Solutions** (NbS) to **combat energy poverty, climate change, and water scarcity**. The approach integrates full water-cycle management into urban regeneration through three core actions:

GreenThermoWall (GTW) retrofitting of three social housing blocks with sustainable bio-polyurethane insulation and living vegetation, reducing energy demand and carbon emissions in buildings.

Full rehabilitation of a heritage building (old prison) – including installation of the GTW system and a complete renovation – to create a cultural and community center that will contribute to the social and cultural regeneration of the neighborhood.

Creation of an Urban Forest (3,500 m²) on vacant urban land to provide bioclimatic cooling, recreational space, and ecosystem services. This includes renovating existing water reservoirs to ensure water self-sufficiency for irrigation and to provide cooling for the old prison and social housing.

MUA: Lorca City Council

Full title of the IA project:
Nature-based Urban Regeneration through Water: Integrating the water cycle in urban renaturalization

2. MUA's Vision of the Solution and Motivation

The Municipality of Lorca envisions **NatUR-W** as an innovative, integrated response to critical issues in the historic **Barrios Altos district**. This area faces extreme **summer heat, scarce water resources, and deteriorated housing and public spaces**. Indeed, over 60% of dwellings are in bad condition and about 50% of households cannot maintain minimum indoor heating during winter, reflecting stark social inequities exacerbated by environmental vulnerabilities. Fragmented public spaces and episodes of torrential rain followed by droughts urgently demand integrated solutions for sustainability and resilience.

Lorca's vision is to **leverage water-cycle management combined with NbS** to address these challenges in a holistic way. Integrating green infrastructure and water reuse into urban design aims to improve energy efficiency in social housing and expand accessible green areas. The planned interventions will improve living conditions (through better thermal comfort and flood mitigation), enhance biodiversity (via urban greening and habitat creation), and strengthen social cohesion for vulnerable groups (through community-centric facilities and cooler, more livable public spaces).

Water management proposal. Source: NatUR-W project

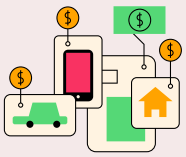
Local Challenges

- **Aging & inefficient housing stock**: Many buildings (incl. social housing) are dilapidated and lack proper insulation.
- **Environmental stresses**: The area endures very high summer temperatures and water scarcity.
- **Degraded public spaces:** Open spaces are fragmented, underutilized, and provide little shade or ecological value.
- **Socio-economic vulnerabilities:** Barrios Altos is a low-income neighborhood.

Desired Impact

- **Improved living conditions** with energy-efficient homes.
- **Greater access to green space –** a new urban forest and greened streets.
- **Increased urban resilience to climate change,** thanks to integrated water management and nature-based cooling that buffers extreme temperatures.
- **Enhanced biodiversity in the urban environment** through native vegetation.
- **Stronger social cohesion** as residents engage in co-creating and co-managing new community spaces.

Local Needs



- **Water-cycle integration:** Better management of stormwater and reuse of rainwater.
- **Greening and cooling:** Introduction of greenery (trees, vertical gardens, urban forest) to combat extreme heat.
- **Infrastructure revitalization:** Renovation of historic structures and housing with sustainable design.
- **Community amenities:** Safe, inclusive public spaces and community facilities.

3. Political Leadership at the MUA

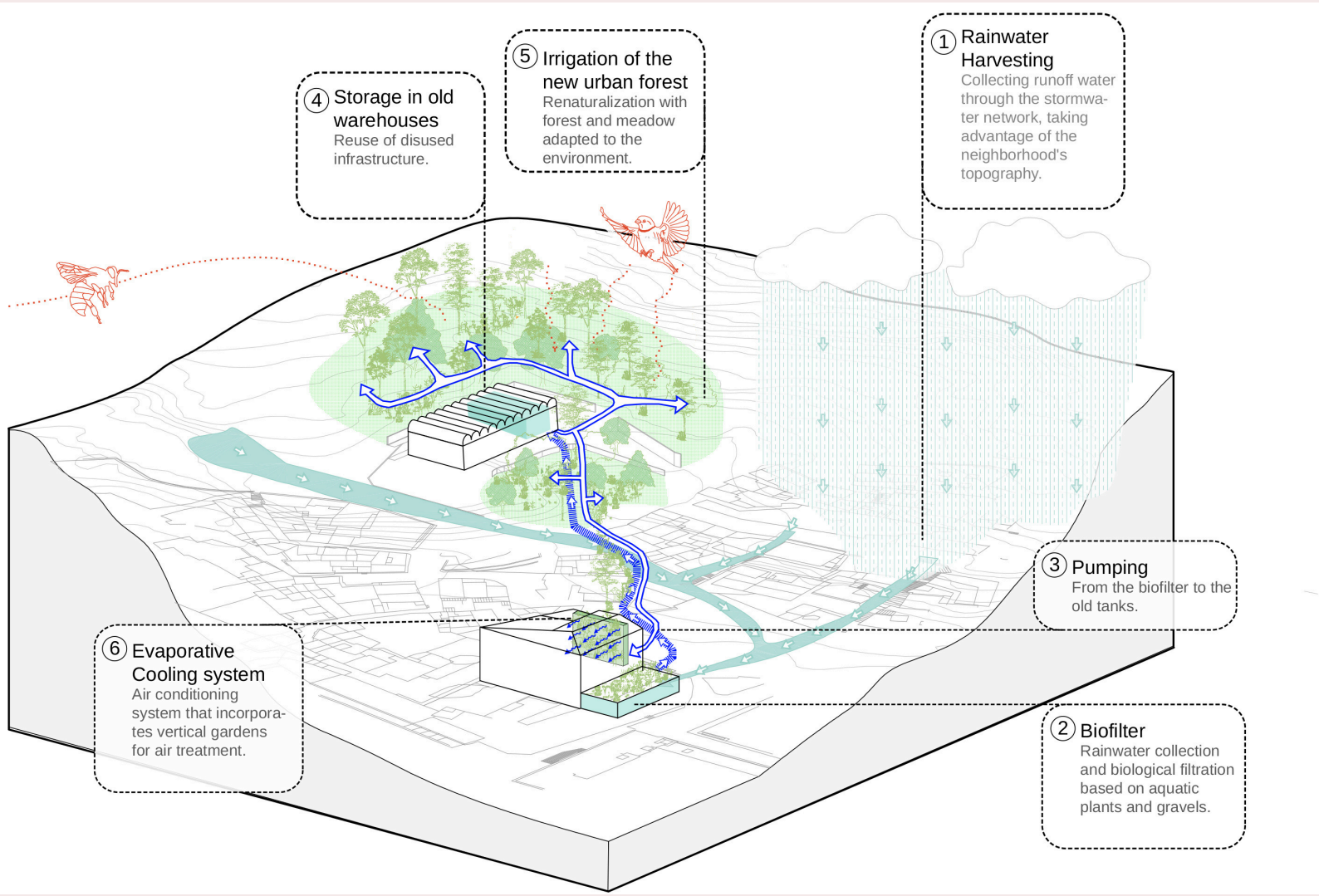
The **NatUR-W projec**t is firmly supported by the political leadership of Lorca. It is embedded in key municipal strategies such as the **Master Plan for the Historic Center and the Climate Action Plan** (PACES), and aligned with national and European priorities, including the Spanish Urban Agenda 2030 and the EU Green Deal.
The Mayor and City Council have been actively involved, ensuring cross-party backing and continuity. A dedicated European Programs Office has been established to translate political commitment into effective implementation.

Lorca's participation in national networks, such as Ciudades por el Clima and Red de Municipios por la Biodiversidad, further reflects its commitment to innovative, sustainable urban transformation.
This strong leadership framework guarantees that NatUR-W is politically anchored, strategically aligned, and institutionally supported for long-term success.

4.
Context

Barrios Altos is a historic hillside neighborhood adjacent to Lorca's medieval core, marked by decades of neglect and deterioration. **Over 60% of its buildings, including social housing, are in poor condition.** Public spaces are fragmented and lack greenery, offering little protection from heat or drought.
Infrastructure such as old water reservoirs has fallen into disrepair, undermining water management and climate resilience.

Despite these issues, Barrios Altos holds rich cultural value, with heritage buildings like the old prison slated for transformation into a community hub. This unique mix of environmental vulnerability and cultural potential makes **Barrios Altos an ideal site to demonstrate scalable Nature-Based Solutions**. NatUR-W aims to turn these challenges into opportunities for sustainable urban regeneration and community revitalization.



5. Stakeholder Ecosystems

Multi-actor stakeholder ecosystem following a quadruple-helix model.

- **Government:**

The Lorca City Council leads the project, providing political leadership, policy support, and resources.

- **Industry and Experts:**

Innovative enterprises and technical partners are engaged to implement and upscale the project's solutions. For instance, SBN Clima, a Spanish social enterprise, contributes expertise in NbS best practices and will help communicate scientific results to wider audiences. Companies like SingularGreen and INDRESMAT bring specialized know-how.

- **Civil Society:**

Local neighborhood associations, environmental NGOs, and cultural organizations represent the community's voice.

- **Academia:**

The Aristotle University of Thessaloniki (a knowledge partner) provides scientific support in NbS design, water-cycle management, and monitoring & evaluation.

In Lorca, the Social Council serves as a key participatory body that fosters citizen involvement in local governance. Its primary purpose is to ensure that public decisions, particularly those related to social, economic, and cultural issues, reflect the needs of the community. By including a diverse range of stakeholders—such as local associations, businesses, and social groups — the council helps ensure inclusivity and transparency in decision-making.

It works closely with the City Council to advise on policies, evaluate existing programs, and gather community input on important initiatives. Additionally, the council organizes consultations and public forums to engage residents, monitors local social issues, and promotes collaboration between the government and various sectors. Through these efforts, the Social Council of Lorca helps improve local governance, ensuring that policies are better aligned with the real needs of the people in the city.

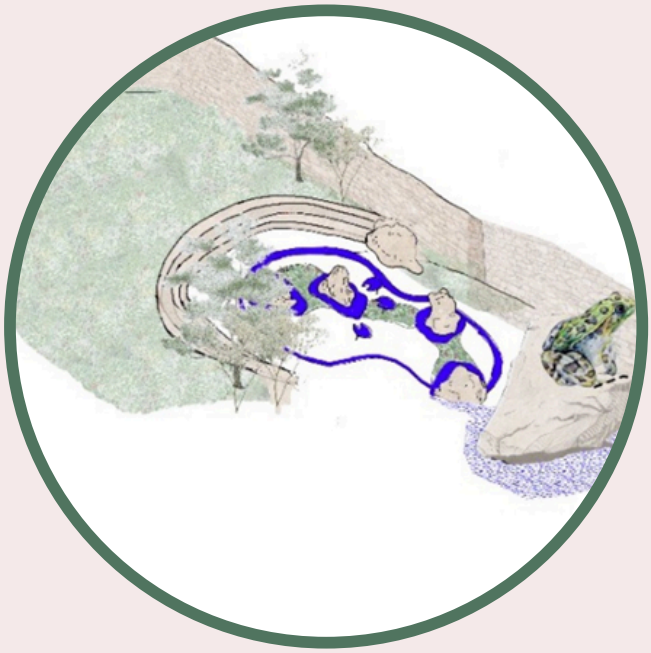
6.
Digital,Green,and Just Aspects of the Project

NatUR-W represents an innovative approach to urban regeneration by intertwining green, digital, and just (social) dimensions in its design:

Digital Aspects:
Smart technologies support transparency and efficiency. IoT sensors monitor environmental indicators (e.g., temperature, humidity, energy use), while digital platforms enable citizen science and real-time feedback. Drones may assist with inspection and installation, enhancing precision and reducing maintenance costs.

Green Aspects:
NatUR-W promotes climate resilience by integrating Nature-Based Solutions across the city. Social housing is upgraded with energy-efficient GreenThermoWall systems, and a 3,500 m² urban forest with native vegetation improves air quality, biodiversity, and urban cooling. Water reuse is central, with renovated reservoirs supplying irrigation and building cooling through a circular system.

Just-Transition Aspects:
The project directly addresses energy poverty and social exclusion by improving living conditions in vulnerable communities. The rehabilitated prison becomes a cultural and educational center, and green public spaces are made accessible to all. Residents are involved in co-design, training, and stewardship activities, ensuring inclusive benefits and long-term ownership.



7. Regulatory Frameworks

Implementing the NatUR-W project must meet and adhere to the wider range of regulatory frameworks covering planning regulations, environmental protection, building and construction, and innovation.

Land Use & Urban Planning:
All interventions align with Lorca's urban plans and the Spanish Urban Agenda 2030. Projects like the urban forest and reuse of the old prison follow land-use designations and are formally authorized by municipal authorities.

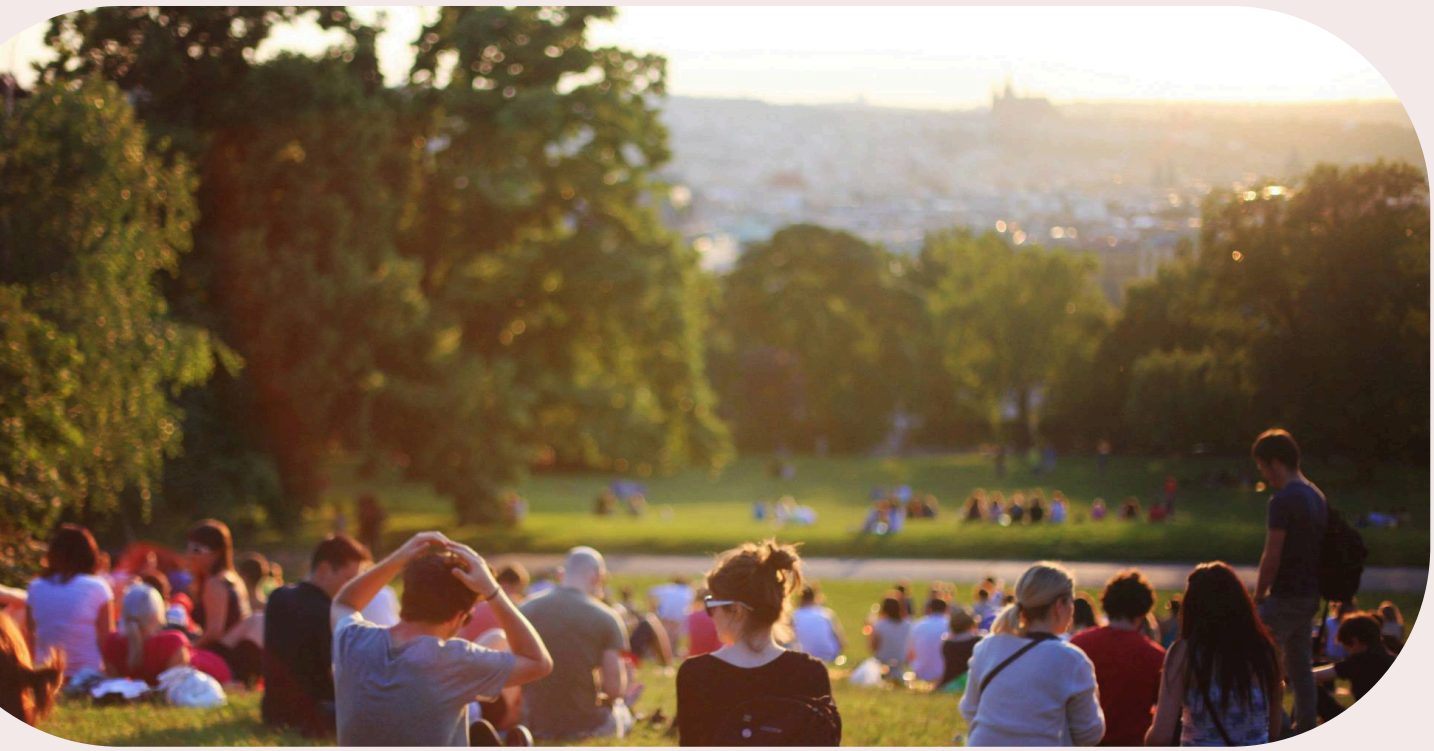
Building & Construction Regulations:
Retrofitting works, including GTW installations, comply with Spain's National Building Code and energy efficiency standards. Special approvals are secured for interventions on historic structures to ensure heritage conservation.

Environmental Protection and Impact Assessment:
The project will undergo any necessary Environmental Impact Assessments (EIAs) as required by regional law, especially for the creation of the urban forest and major land-use changes. These assessments evaluate the ecological effects of introducing NbS.

Technology and Innovation Regulations:
In deploying new technologies, NatUR-W respects data and safety laws. The use of drones for construction or monitoring will proceed only with proper authorization to comply with aviation regulations and privacy guidelines. Likewise, the digital monitoring systems will adhere to GDPR and national data protection laws. New materials used will have certifications under EU standards.

Public Space and Utilities Approvals: The transformation of public areas into green spaces or the installation of smart infrastructure will be coordinated with local authorities. This includes obtaining permits for planting on public land, agreements with utility companies if the project alters water or energy infrastructure, and ensuring long-term maintenance responsibility is clearly assigned for any new public installations.

By proactively navigating these regulatory frameworks, the project team ensures that **NatUR-W's innovative solutions are fully compliant and can be scaled or replicated in the future.** Early engagement with planning offices and legal experts has been part of the project development, so potential regulatory hurdles are addressed in advance – paving the way for a legally sound implementation of the NatUR-W interventions.



8. Management and Governance of the Solution

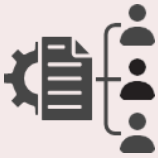
NatUR-W is managed and governed through a blended model that combines direct oversight by the Main Urban Authority (Lorca City Council) with delegated roles for project partners, all underpinned by participatory governance structures:

Management Model:
The project is coordinated by the Lorca City Council, which oversees planning, timelines, and compliance. Technical tasks are delegated to specialized partners: SingularGreen handles GTW systems and landscaping; INDRESMAT provides sustainable construction materials; Aristotle University supports monitoring and data analysis. A dedicated project team ensures alignment and quality, supported by regular coordination meetings.

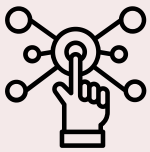
Governance Model:
NatUR-W follows a public-private partnership model with strong community participation. A multi-stakeholder board—bringing together municipal staff, residents, NGOs, academics, and private partners—guides decision-making and ensures local relevance. Co-creation workshops allow residents to contribute to design decisions, such as green space features or community center uses, fostering ownership and long-term commitment.

9. Resources Available

Successful implementation of NatUR-W is supported by a robust mix of financial, technical, human, and infrastructural resources mobilized by the MUA and its partners:



Administrative & Communication Resources:
The Municipality ensures strong project management capacity – assigning municipal staff to coordinate day-to-day operations, handle procurement, and monitor compliance with EU funding rules. An official communication strategy is in place, supported by the city's communications office and partner networks. This includes creating a project identity (branding, logos, info material), regular press releases, social media updates, and community meetings.



Digital Infrastructure & Expertise:
NatUR-W invests in modern equipment for data collection and management. This digital backbone ensures real-time feedback and informed adjustments during implementation.

Technical and Human Resources:
Implementation of the project activities involves the technical expertise of partners like **SingularGreen (NbS design) and INDRESMAT (sustainable materials)**. Planning, execution, and training activities are managed by personnel from Lorca City Council, supported by local and international specialists. The project includes **peer-to- peer learning** and capacity-building initiatives for municipal staff and community members.

Infrastructure and Construction Resources:
Construction teams and equipment for installing the GTW system are in place. Rehabilitation of water reservoirs and the creation of green spaces are available. Incorporating sustainable materials with bioclimatic design solutions ensures long-term functionality and environmental benefits.

Abandoned area to be regenerated, 2024 (photo by Claudia de Luca).

Financial Resources:
The project's budget is co-financed through a blend of European and local funding. It has secured funding under the European Regional Development Fund (ERDF), which covers 80% of eligible costs, demonstrating EU's backing of the initiative. The remaining 20% comes from local contributions, including the Lorca City Council's budget and possibly regional funds. Moreover, the project has attracted private sponsorships and in-kind contributions. A crowdfunding campaign is also planned to allow citizens to fund specific elements directly, furthering community investment in the outcome.

10. Sustainability of the Solution at the MUA

From the outset, the Lorca City Council has crafted a comprehensive plan to sustain and scale NatUR-W's benefits beyond the initial project timeline. This plan covers both financial continuity and institutional embedding to maintain the innovative solutions in the long run.

Financial Sustainability:
The municipality is committed to securing diverse funding streams to continue operations, maintenance, and future expansions of NatUR-W interventions.

- **Cohesion Policy Funds**

Entirely using the EU Cohesion Policy funds, such as ERDF and ESF, in future urban regeneration projects.

- **Private funding**

Maintenance and scaling-up of NbS are self-financed by project partners, such as SingularGreen and INDRESMAT.

- **National and Local Contributions**

Public funding is provided via the Spanish Urban Regeneration Plan and budgets of municipalities.

- **Crowdfunding**

Scaling up the crowdfunding platform for NbS created under the project to involve citizens and stakeholders directly in financing future green interventions.

- **EU and International Grants**

Funding is tapped through programs like LIFE, Horizon Europe, among others.

- **Self-Sustainability Mechanisms**

Incomes from eco-tourism and public cultural spaces (e.g., the Citizen University) will be reinvested in the sustainability of the project.

Staff and Institutional Sustainability

The MUA integrates the NatUR-W solutions into its long-term urban agenda, guaranteeing municipal teams for maintenance and upscaled NbS. Some of the key strategies related to staff will include:

- **Training municipal staff in the technical and operational aspects of NbS management.**
- **Shared responsibility in the management and maintenance of green infrastructure with private partnersand local stakeholders.**
- **Co-management of public spaces by community groups and citizen volunteers, including local stewardship.**

11.
Risks and Mitigation Measures

Implementing an innovative project like NatUR-W entails various risks at both strategic and project-management levels, which have been proactively identified with corresponding mitigation strategies:

Financial Risks:
Reliance on external funding (EU or national) introduces uncertainty—budgets could be cut or priorities shifted over time. The mitigation lies in the diversification of funding sources (as described in the sustainability plan): by mixing EU funds with local budget commitments, private co-financing, and community funding, NatUR-W is not dependent on any single source.

Political Risks:
Changes in political leadership or city priorities might undermine long-term support. To counter this, the project has sought cross-party support by highlighting NatUR-W's alignment with widely accepted agendas (economic revitalization, climate adaptation) and by delivering early visible benefits to build public support. Embedding the project in official city plans ensures that even if leadership changes, NatUR-W's continuity is somewhat institutionalized.

Policy and Regulatory Risks:
Changes in the legal or regulatory environment (for example, shifts in urban development laws, housing regulations, or environmental standards) could pose challenges. To mitigate this, NatUR-W has been aligned from the start with established frameworks (such as the Spanish Urban Agenda 2030 and Lorca's own approved plans).

Community Engagement Risks:
There is a risk of community resistance or apathy. Some residents might misunderstand the project's goals or fear negative impacts like gentrification or increased rents. The mitigation strategy focuses on transparent communication and inclusion.

Environmental and Technical Risks:
If not properly executed, NbS interventions could have unintended consequences. Thorough Environmental Impact Assessments and pilots guide the implementation to prevent harm to local ecosystems.

Implementation Delays:
Regulatory bottlenecks or procurement issues could slow down progress. A proactive monitoring system and internal communication processes help anticipate and manage potential delays.

Project Capacity:
Managing a multi-actor, NbS-focused project can be complex. NatUR-W addresses this with structured coordination plans, capacity-building for municipal staff, and support from external consultants.

Investment and Technology Risks:
Legal uncertainties (e.g., property rights) or use of untested technologies could present barriers. NatUR-W pre-secures property agreements and selects innovative but proven solutions to ensure operational feasibility and longevity.

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