WES-BCA

Training module 5:

Key decision and implementation considerations for flood and stormwater adaptation measures structured by Area

23 April 2026

Setting up an NBS project: from theory to practice, covering regulatory, financial and social aspects.

Presented by:
Mr Mino Eric, Director, UT-SEMIDE
Mr Elrik Du Saillant Du Luc, Project manager, UT-SEMIDE

Funded by the European Union

SÉCHERESSE

INONDATIONS

CANICULE

PÉNURIE D'EAU

PERTE DE BIODIVERSITÉ

INTERVENTIONS AQUATIQUES

AMÉNAGEMENTS DU TERRITOIRE

ACTION POUR LA BIODIVERSITÉ

UNITÉS SPATIALES

INTERVENTIONS SUR LES SOLS

UNITÉS TECHNOLOGIQUES

CLIMAT

SOCIÉTÉ

BIODIVERSITÉ

ÉCONOMIE

SANTÉ

CONSULTANTS

But how can we address this in a practical way?

- Which operational site should be chosen?
- What preliminary data should be taken into account?
- Is there a policy framework to consider?
- What strategies and actions should be considered?
- How much will it cost? Who will cover the costs?
- Is funding available?
- Should other stakeholders be involved? Which ones?
- Is there any maintenance to plan ?

Funded by the European Union

Selecting the intervention site

Where can we act ?

- A location where there is a proven risk
- A location identified by an organization as being in critical condition
- A location where users have submitted a genuine request for intervention
- Taking action in both urban and rural areas

Example: The city of Marseille - France

Third-largest city in France

Located on the Mediterranean coast

More than 855 thousand inhabitants

➔ Regularly suffers deadly floods

➔ Deterioration of roads and buildings

➔ Overburdened waste collection and treatment systems

➔ Significant marine pollution

Other considerations in site selection

- Land availability and spatial scale
- Land status: public / private
- Spatial scale and size
  - ➢ Ideally, work on a watershed
  - ➢ It depends on a number of factors in each individual case
- Current use of the site
  - ➢ Agricultural land
  - ➢ Public space / roadway
  - ➢ Natural area

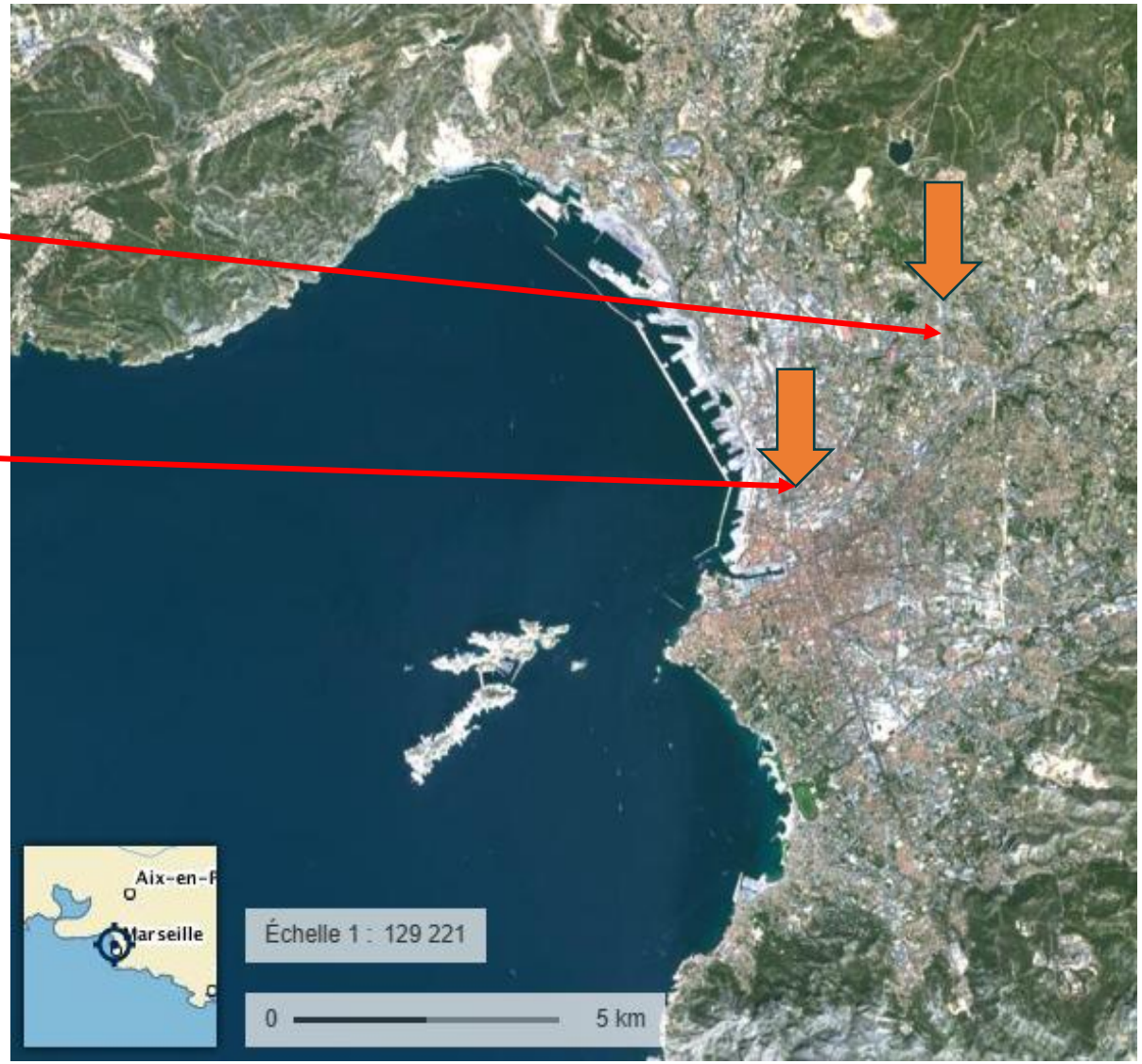
Example: The University of Aix Marseille choice ➔ Private Space

2 campuses identified:

- Saint Jérôme
  - ➢ 19,4 ha, 4500 students
  - ➢ Suburban area
- Saint Charles
  - ➢ 4,5 ha, 6000 students
  - ➢ Highly dense urban area

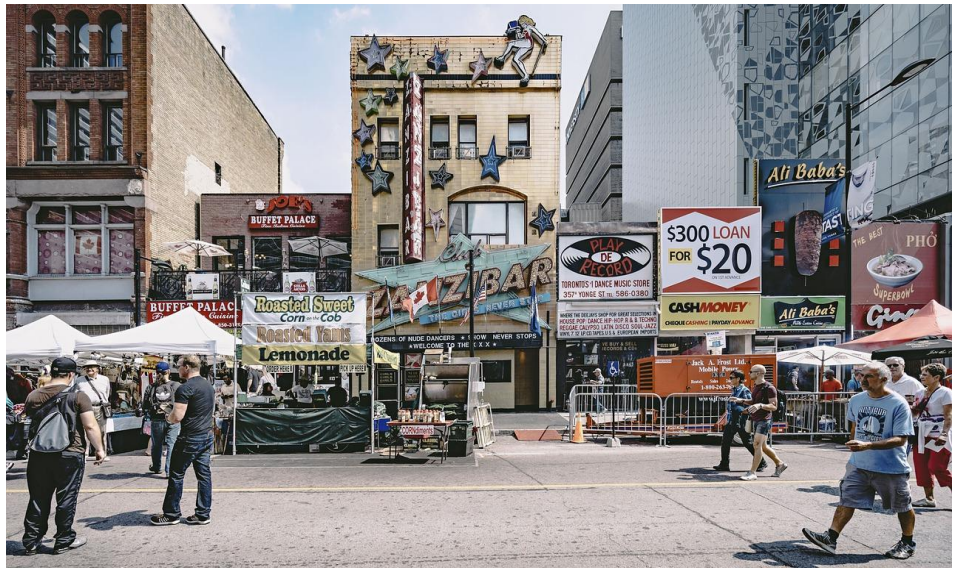
University = private land

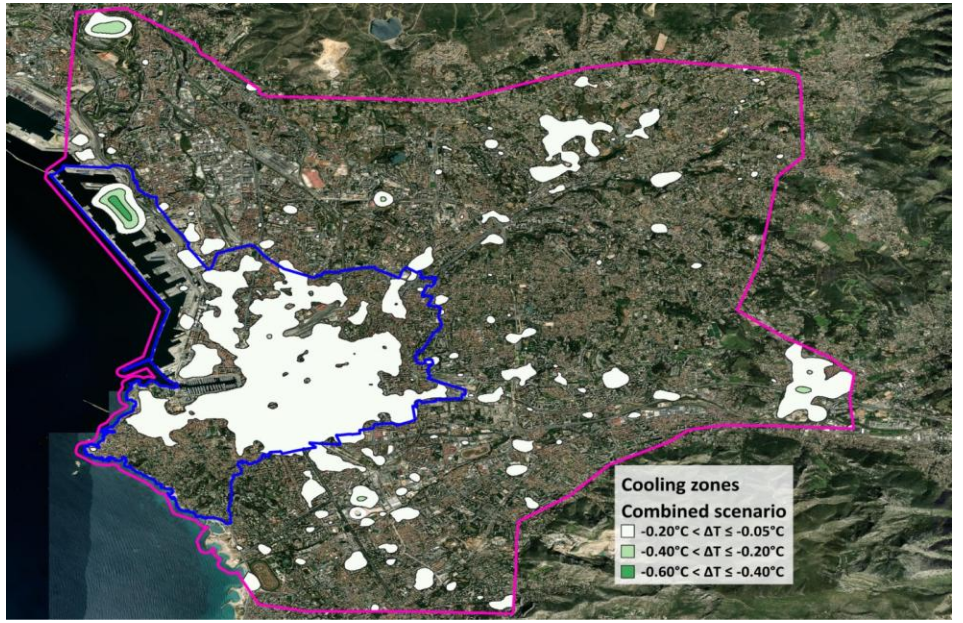
- ➢ Ease of obtaining permits
- ➢ Quick implementation due to few stakeholders
- ➢ Ease in selecting operators



Data to be collected in advance

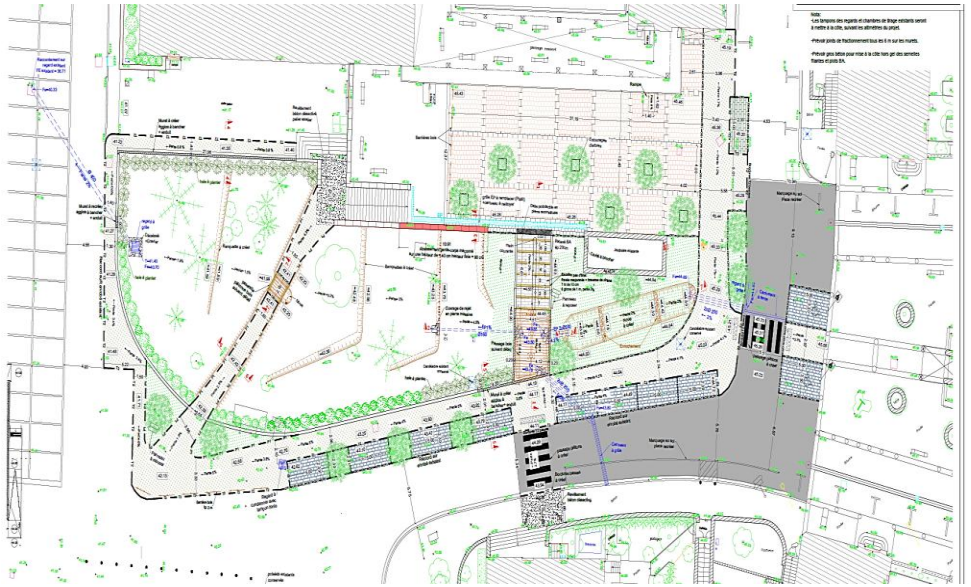
- Challenges encountered
  - ➢ Floods, droughts, urban heatspots...
- Current use of the site
  - ➢ Variable foot traffic in the area
- User feedback
  - ➢ Need for transformation, acceptance of the work
- Comprehensive cartographic analysis
  - ➢ Ownership, utility networks, urban plan, digital elevation model, topography, geology
- Availability of prior data
  - ➢ Regional databases, urban maps…





Example: The case of university campuses = Private property

- Major flooding
  - ➢ Overload of the collection network
- Heat islands in summer
  - ➢ Excessive energy consumption and user discomfort
- Highly frequented site during the day
  - ➢ But no visitors from June to September
- Request from users to address the vegetation at the sites (students and employees)
- Private property with available mapping data



Example: City of Catania in Sicily, Italy = Public space

Modification of a major roundabout in the city center:

- Longer and more complex administrative processing times
- Coordination of numerous stakeholders
- Compliance with public procurement regulations
- Need to close traffic for a long period
- Aesthetic appeal = public acceptance

Funded by the European Union

The policy framework

Consider:

- The local land use plan
- The Flood Risk Management Plan
- Climate Change Adaptation Plan
- Local/National Environmental Strategies
- Metropolitan/Municipal Strategies
- Regional/national strategies, e.g.
- “Zero Land Sealing” in France

Funded by the European Union

Example: Aix Marseille Métropole unsealing strategy

AXIS 1: Building a Permeable City

Promote better **coordination and operational integration of unsealing** into projects by public and private actors operating within the metropolitan area

- *Bringing the map to life*
- *Coordinating efforts to reduce impervious surfaces in the metropolitan area*
- *Supporting and assisting project leaders*

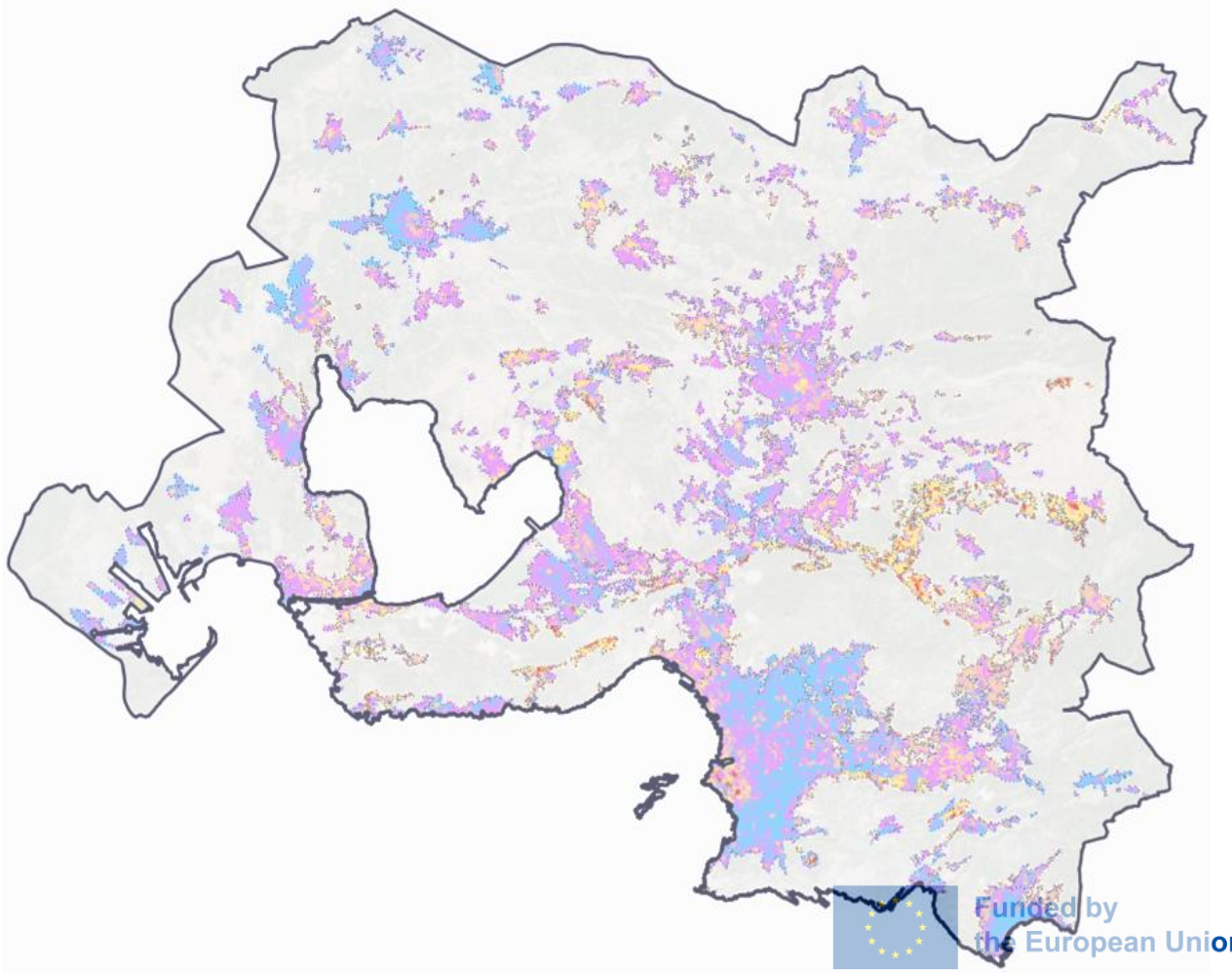
AXIS 2 : Financial leverage

Structure financial support for unsealing

AXIS 3 : Regulatory Leverage

Adapting and evolving the regulatory framework to encourage builders and developers to undertake de-impermeabilization

250 km² with unsealing potential ranged from necessary to highly desirable



LDK CONSULTANTS S.A.

Funded by the European Union

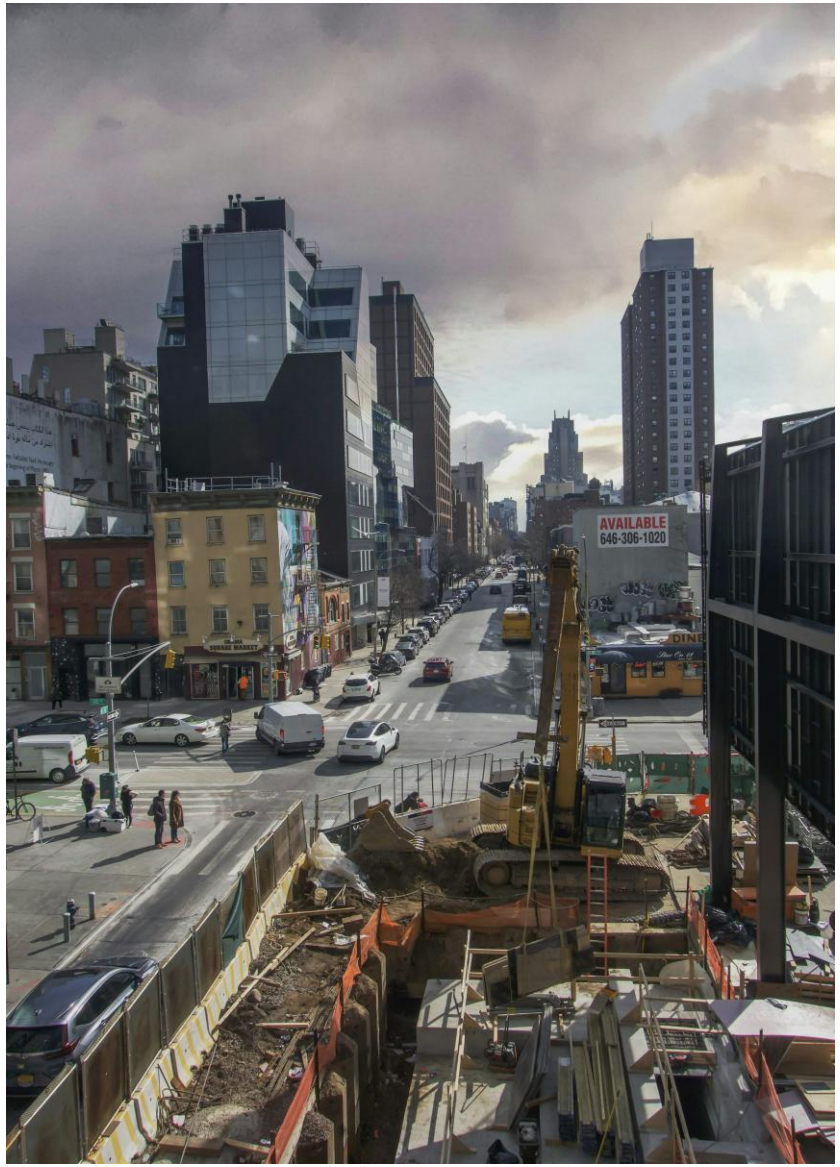
Practical considerations

Take into account existing or ongoing projects:

- Will the project affect a downstream site, or will it be affected by another upstream?
- Does the project conflict with an action that has already been planned?

Need for information gathering upstream and downstream in terms of timing:

- Future of the site and its use
- Neighborhood development
- Changes in the regulatory framework
- Changes in local policies



Example: The expansion of Saint Charles Station in Marseille

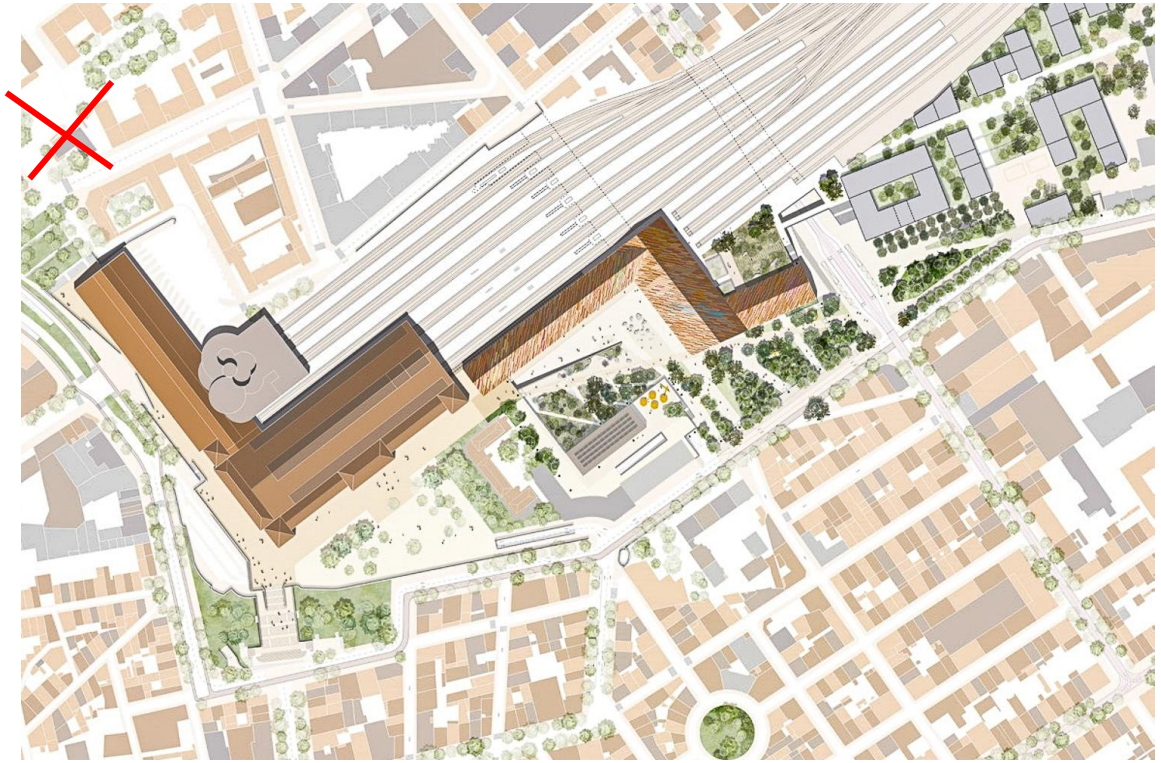
Major demolition and expansion work on the

Marseille railway station

Site located at 100m from the transformed campus

Creation of a 26-meter-deep pit

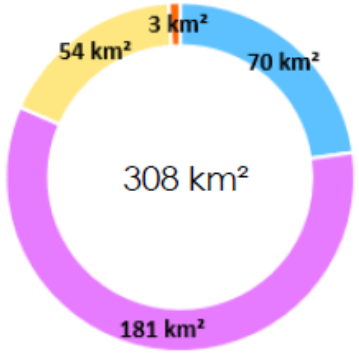
- ➢ Impact on the water table
- ➢ Space requirements for the area
- ➔ Need to coordinate with the site owner and exchange data



Funded by the European Union

Example: Project to Map the unsealing Potential

- **Évaluer et cartographier les zones susceptibles d'être « désimperméabilisées »**
- **Proposer une feuille de route** pour la mise en œuvre de la désimperméabilisation dans les prochaines années sur le territoire métropolitain
- Territoire métropolitain : 3 150 km²
- **Zone d'étude : 625 km² correspondant à la zone urbanisée métropolitaine (#20%)**
- **308 km² susceptible d'être désimperméabilisé**
- **80% de la superficie identifiée est concernée par une désimperméabilisation nécessaire à fortement souhaitée**

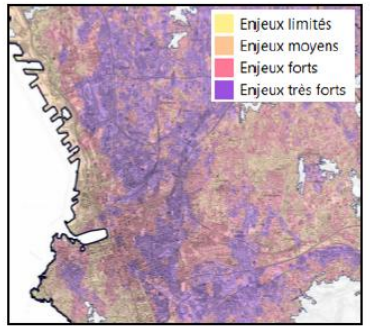


Désimperméabilisation nécessaire
Désimperméabilisation fortement souhaitée
Potentiel de désimperméabilisation à confirmer
Potentiel de désimperméabilisation limité

DIAGNOSTIC DU POTENTIEL DE DÉSIMPERMÉABILISATION

Méthodologie

ENJEUX



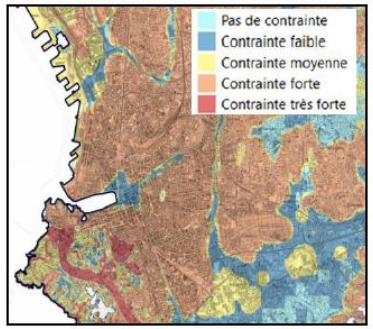
Quels bénéfices/motivations à agir ?

PRIORITE

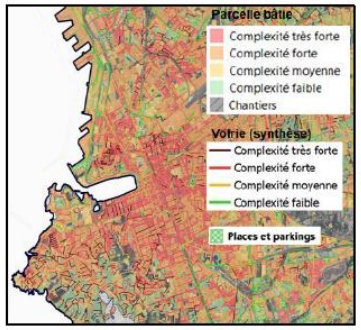
- Réduction des surverses unitaires au milieu récepteur
- Réduction des désordres pluviaux
- Préservation des milieux récepteurs superficiels
- Amélioration de la qualité des zones de baignade
- Préservation de la ressource en eau souterraine
- Préservation des zones humides
- Lutte contre les îlots de chaleur urbains

CONTRAINTES

Infiltration des eaux pluviales



Complexité technique



Facilité de mise en œuvre ?

FAISABILITE

- Aptitude du sous-sol à l'infiltration
- Pente
- Aléa retrait-gonflement argiles
- Aléa remontée de nappe
- Aléa mouvement de terrain
- Présence cavités souterraines
- Présence sols pollués
- Périmètres protection captages
- Présence infrastructures souterraines
- Espaces bâtis : typologie, emprise au sol
- Voiries : largeur, pente, proximité bâti

Enjeux très forts	8
Enjeux forts	6
Enjeux moyens	4
Enjeux limités	2

+

Pas de contrainte	4
Contrainte faible	3
Contrainte moyenne	2
Contrainte forte	1
Contrainte très forte	0

+

Complexité faible	8
Complexité moyenne	6
Complexité forte	4
Complexité très forte	2

Estimate the cost of the work

Indicative cost considerations (categories of low/medium/high costs and main cost factors)

Consider the total cost, not just the construction work

➔ Work + Monitoring + Maintenance

Taking the schedule into account, including permit acquisition

and unavoidable administrative delays

Determine the scope of work based on cost and funding available

Obtain multiple quotes

Funded by the European Union

Example: the marked difference between the two Marseille campuses

Campus Saint Jérôme	Campus Saint Charles
Suburban	Downtown
Easy access for construction vehicles	Difficult access for construction vehicles
Ample parking	Limited parking
Unlisted buildings	Listed buildings
Flexible construction period	Mandatory construction period (summer)
Private property= no permit required	
Mandatory maintenance of green spaces must be factored into the costs	

➔ Cost of the work is twice as high for Saint Charles!

Funded by the European Union

Identify funding sources

Identify the different levels of funding and the possibilities:

- Local
- Regional
- National
- International

Consider private and public-private hybrid funding

Don’t hesitate to open up your initiatives to secure funding (scientific monitoring, citizen science, etc.)

Identify and even quantify the potential benefits

➔ Helps justify the funding request

Example: Sources of funding in France

- University's own funds
- Metropolitan grant
- Regional funding
- River Basin Agency funding
- National funding
- Green Fund
- External Private Funds
- Public and Private Banks
- European Funds
  - Horizon Europe CARDIMED
  - Interreg, Prima, etc.
  - Feder Funds

Example: infiltrate and limit network saturation

Study conducted at the Marseille demonstration site

Balance of construction costs vs. avoided costs

Infiltrating rainwater on-site:

- Reduces the strain on collection systems
- Reduces the maintenance costs of treatment infrastructure
- Limits marine pollution

Quantitative economic benefits

Policy benefits politiques ➔ contributions to strategies that justify funding

Map stakeholders

Identify all stakeholders related to the project and the planned interventions

Think broadly and leave no one out

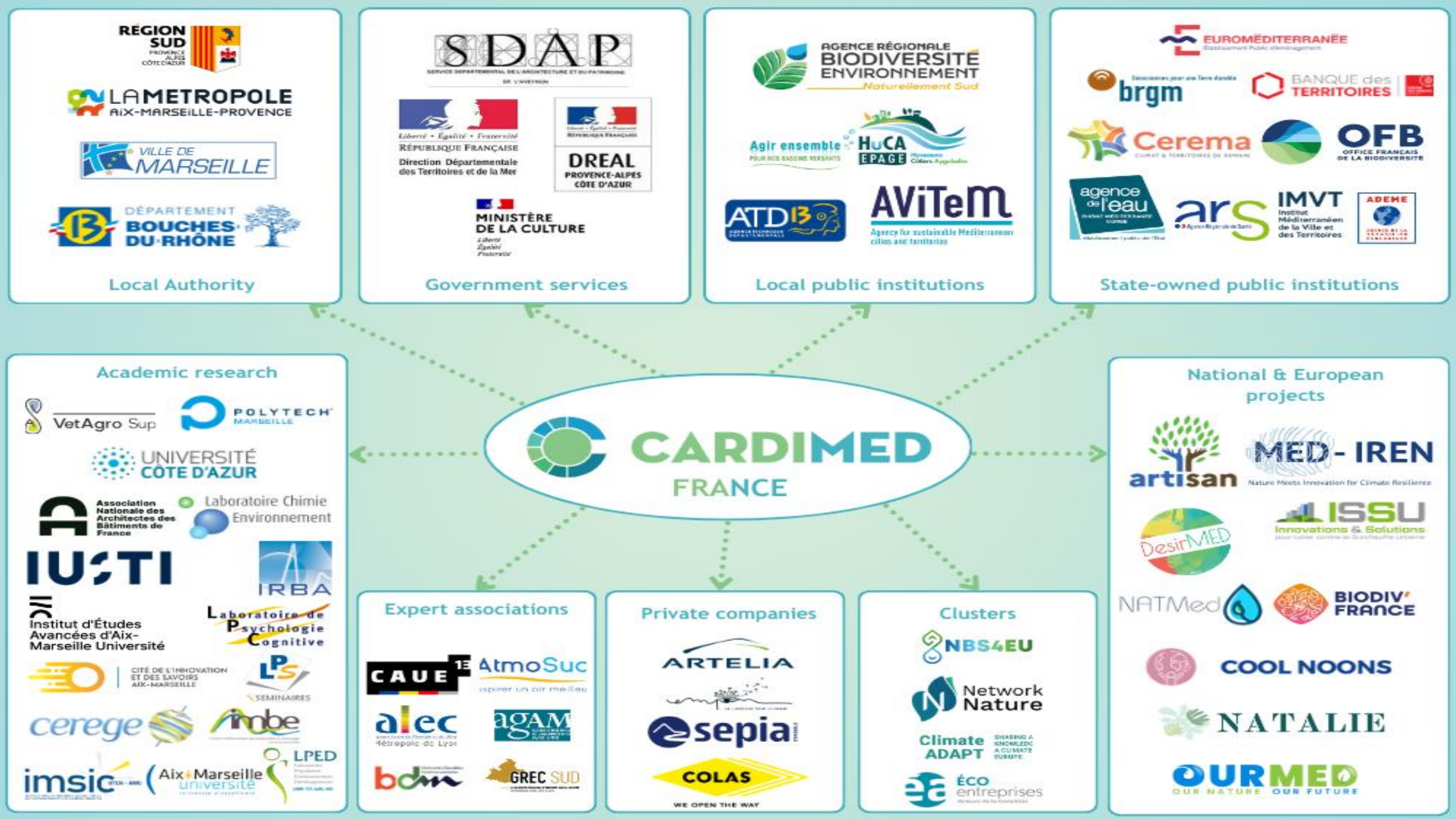
Include users in the discussion and planning

Consider grouping stakeholders by category or role

Analyze the influence and interests of stakeholders in the project to define a communication strategy

Analyze the governance aspects of the project and identify each person's responsibilities and capabilities.

Funded by the European Union


Local Authority
RÉGION SUD PROVENCE ALPES CÔTE D'AZUR
LA METROPOLE AIX-MARSEILLE-PROVENCE
VILLE DE MARSEILLE
DÉPARTEMENT BOUCHES-DU-RHÔNE
Government services
SDAP
SERVICE DÉPARTEMENTAL DE L'ARCHITECTURE ET DU PATRIMOINE DE L'AVEYRON
Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
Direction Départementale des Territoires et de la Mer
DREAL PROVENCE-ALPES CÔTE D'AZUR
MINISTÈRE DE LA CULTURE
Local public institutions
AGENCE RÉGIONALE BIODIVERSITÉ ENVIRONNEMENT
Naturellement Sud
Agir ensemble pour nos bassins versants
HuCA EPAGE
ATD 13
AViTeM
Agency for sustainable Mediterranean cities and territories
State-owned public institutions
EUROMÉDITERRANÉE
brgm
BANQUE des TERRITOIRES
Cerema
OFB OFFICE FRANÇAIS DE LA BIODIVERSITÉ
agence de l'eau
ars Agence Régionale de Santé
IMVT Institut Méditerranéen de la Ville et des Territoires
ADEME
Academic research
VetAgro Sup
POLYTECH MARSEILLE
UNIVERSITÉ CÔTE D'AZUR
Association Nationale des Architectes des Bâtiments de France
Laboratoire Chimie Environnement
IUSTI
IRBA
Institut d'Études Avancées d'Aix-Marseille Université
Laboratoire de Psychologie Cognitive
CITÉ DE L'INNOVATION ET DES SAVOIRS AIX-MARSEILLE
LPS SEMINAIRES
cerege
imbe
imsic
Aix+Marseille université
LPED
CARDIMED FRANCE
Expert associations
CAUE 13
AtmoSuc
inspirer un air meilleur
alec Métropole de Lyon
agAM
bdm
GREC SUD
Private companies
ARTELIA
sepia
COLAS
WE OPEN THE WAY
Clusters
NBS4EU
Network Nature
Climate ADAPT
ÉCO entreprises
National & European projects
artisan
MED-IREN
Nature Meets Innovation for Climate Resilience
DesirMED
ISSU Innovations & Solutions
NATMed
BIODIV' FRANCE
COOL NOONS
NATALIE
OURMED
OUR NATURE OUR FUTURE

Engage local stakeholders

Contact the various site users and local stakeholders to involve them in the initiative ➔ **Co-creation**

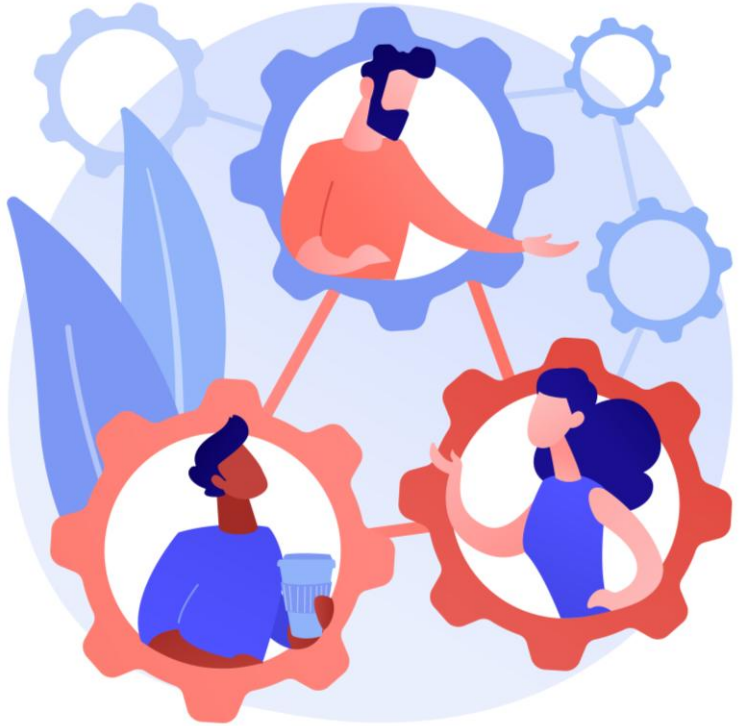
Organize discussion sessions, gather user needs, and propose possible solutions to address them

Ensure no community is left out to maximize adoption of the implemented solutions

Maintain the stakeholders informed about decisions and the project's progress

Organize regular in-person meetings (annually)

Involve users in maintaining the site ➔ Participatory projects



Example: Mowing the Saint Jérome Campus

Key insights on the co-creation aspect

Lack of internal communication regarding the project and failure to involve the site maintenance staff

Mowing of all shrubs planted on the site

Loss of biodiversity and falling behind on project KPIs

➔ Importance of involving all stakeholders early on of the project in all aspects

➔ Importance of incorporating maintenance parameters into the project design

Identify experts

Identify project management professionals as well as experts in risk and environmental assessment

Identify professionals who are knowledgeable about and trained in NBS

Seek advice from national/regional professional networks

Seek feedback from organizations that have already implemented NBS

Ensure site supervision with a foreman trained in NBS

Obtain multiple quotes by incorporating different types of solutions

Example: The needs of training for the professional community

The implementation of NBS is a new concept that differs from routine work

There is a critical need to build closer ties with official training organizations and develop NBS training programs (CNFPT)

Organization of networking events for professionals and share feedback on their experiences

Need to explain the rationale behind these changes in practice using concrete examples

Fundamentally review workers' methods of work, both in theory and in practice

Need for professionals to understand the importance of NBS so they can adopt them and integrate them into their action plan

Take potential risks into account

Keep in mind that the project may encounter various types of

Challenges ➔ Need to plan ahead

- Funding not allocated
- Issues regarding land ownership and use
- Lack of understanding of the stakeholders and their responsibilities in the project
- Project managers not trained in the use of NBS
- Failure to include monitoring sites in the area
- Conflicts over land use during and after construction
- Maintenance not included in the budget

Example: Saint Jérôme - a functional site but not optimal

Poorly designed water runoff for infiltration:

- Curbs that are too high for water to drain
- Edging not properly chiseled
- Slope still too steep, causing runoff
- Ground level off the path too high; no drainage possible

Failure to account for the need for scientific monitoring and lack of a suitable site for installing sensors

Consider maintenance of the site

Infrastructure maintenance must be considered and planned

at the same time as the project is being set up.

Depending on the work involved, consider:

- Watering the plants after planting
- Maintenance of the tree-lined area and management of yard waste, if any
- Any mechanical work required in the event of heavy rain (removal of debris, etc.)
- Related staffing needs

Example: Plant mortality on the Saint Jerôme campus

Feedback illustrating poor site maintenance management

Lack of watering in August for trees planted in March

➔ 5% of trees found to be dead dry

Need to establish a site maintenance schedule covering upkeep, watering, and monitoring

Consider monitoring to identify what works

Monitoring of parameters affected by the developments:

- Temperature
- Soil permeability
- Volume of infiltrated water
- Plant diversity
- Site visitation

Helps justify future development initiatives

Justifies current or future funding

Encourages replication of initiatives

Example: Scientific monitoring of Marseille campuses

- Temperature
- Rainfall
- Humidity
- VOCs, PM10, PM2.5
- Flora diversity
- Soil analysis (RTE)
- Water infiltration rate
- Mesofauna
- Groundwater level
- Groundwater temperature
- Soil pollution

All monitoring activities are conducted by local researchers and their students as part of their training.

Highlighting the actions taken

Promote the actions carried out to:

- Raise awareness of your project and the NBS
- Justify funding
- Share practical knowledge about NBS

By what means:

- Public/scientific articles
- Seminars / Conferences
- Guided tours / On-site workshops
- Citizen science
- Interviews / Podcasts
- Social media / Videos / Publications

Example: Why not a comic book?

So, what are the instructions?

Identify the challenges and the appropriate NBS to address them

Dare to test experimental and diverse solutions

Find the right funding (regional/national/project-based)

Bring together local stakeholders to co-create the project

Dare to renew the local economic model (new jobs)

Act thoughtfully, taking into account benefits and co-benefits

Go further and develop a monitoring plan (long-term impact)

Combine solutions and scale them up.

Promote the success !

WES-BCA
Water and Environment Support - Biodiversity and Climate Action
in the Neighbourhood South region

Thank you for your attention!

LDK CONSULTANTS S.A.

Funded by the European Union