NATALIE

Accelerating and mainstreaming transformative NATure-bAsed solutions to enhance resiLIEnce to climate change for diverse bio-geographical European regions

Site selection criteria for implementation of constructed wetlands

15-05-2025

Latvia University of Life Sciences and Technologies (LBTU)

with contribution from Baltic Environmental Forum (BEF) and Zemgale Planning Region (ZPR)

Funded by the European Union

UK Research and Innovation

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

ZEMGALE PLANNING REGION

BEF LATVIA

Latvia University of Life Sciences and Technologies

CONSTRUCTED WETLANDS : SITE SELECTION CRITERIA



Knowledge transfer LV → LT – NATALIE Project

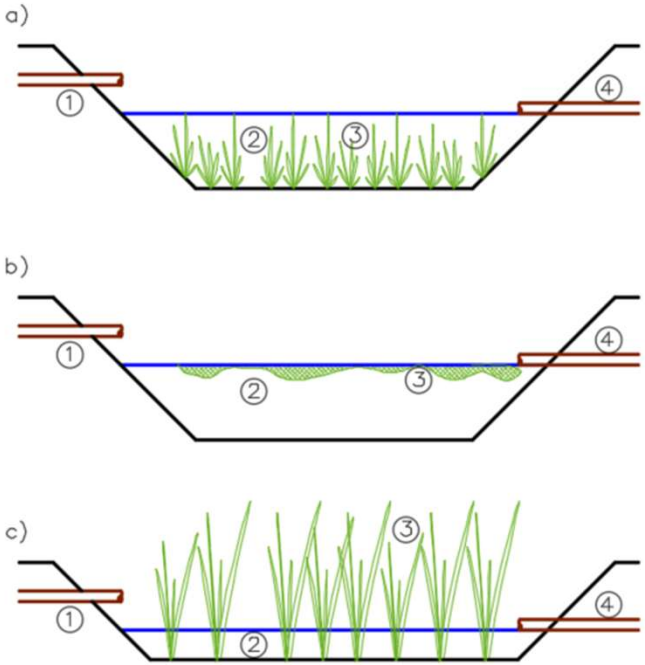
Engineered systems that mimic natural wetland processes for wastewater treatment.

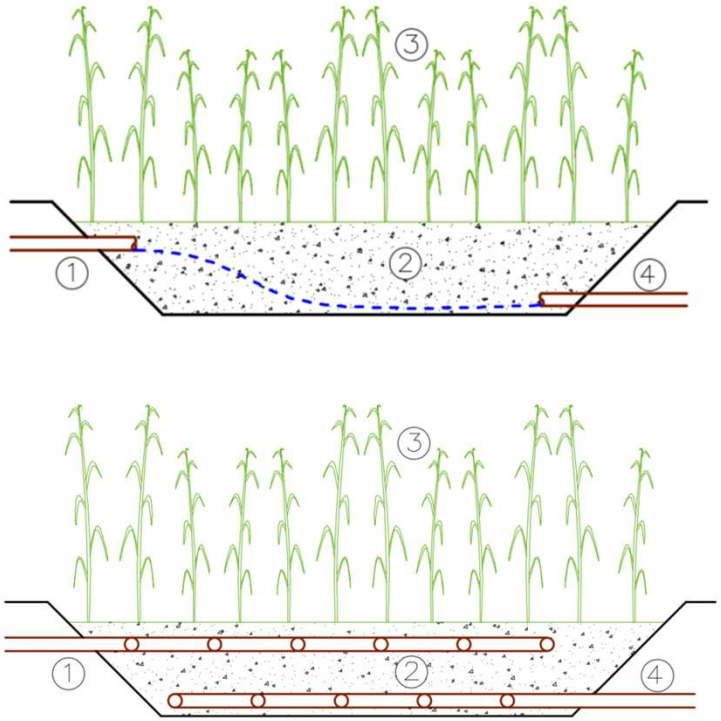
Treatment mechanisms:

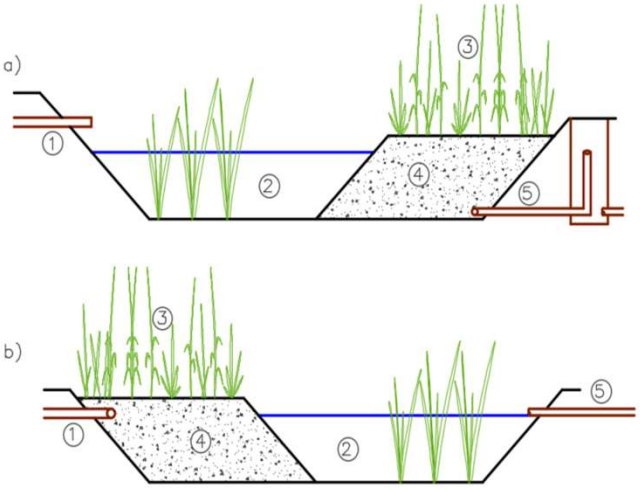
- Physical – sedimentation & filtration
- Chemical – adsorption & precipitation
- Biological – microbial degradation & plant uptake

Constructed wetland

Surface flow	Subsurface flow	Combined construction







NATALIE

DIFFEREN WASTEWATER SOURCE – DIFFERENT TREATMENT APPROACH

Domestic wastewater

Stormwater

Industrial wastewater

Agricultural runoff

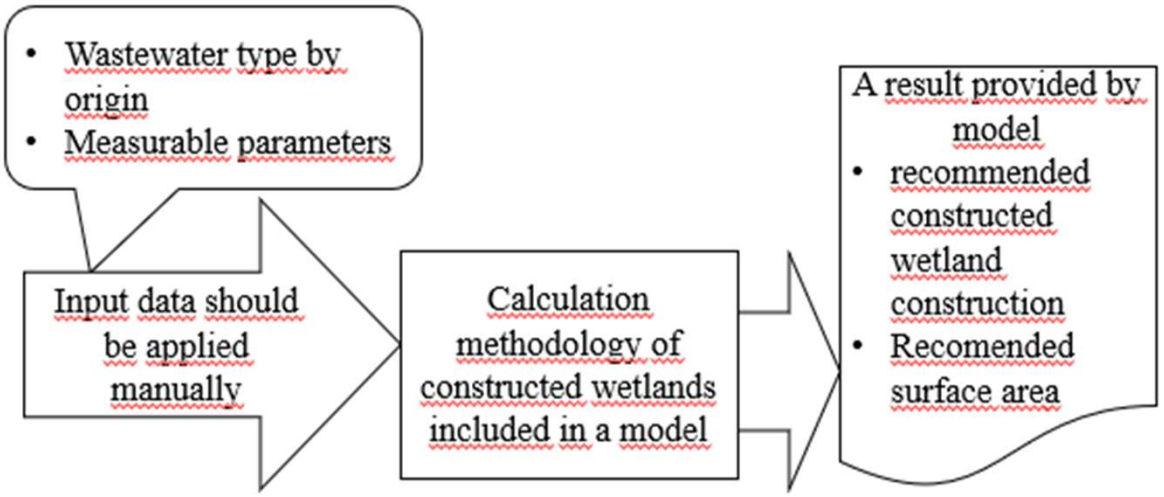
Benefits:

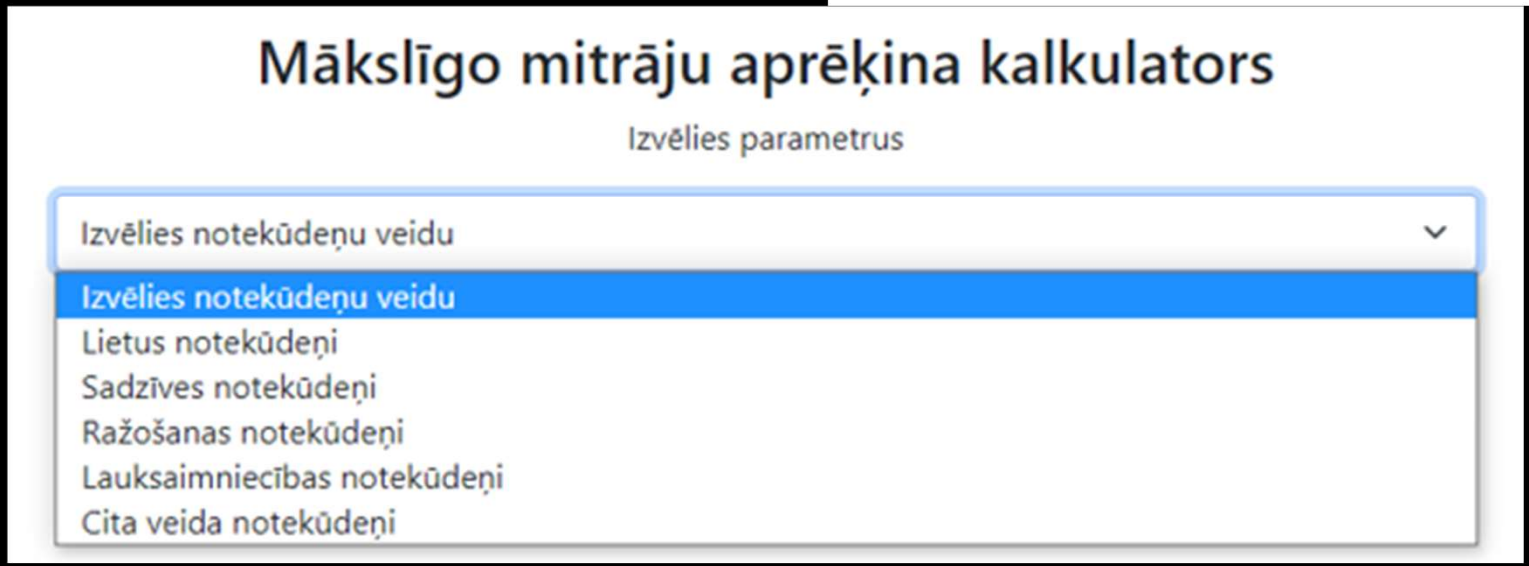
- Specialization and expertise.
- More efficient use of resources.
- Reduced burden on institutions.
- Opportunity to implement specialized solutions.
- Reduced risk of pollution.

Challenges:

- Complexity in coordination.
- Increased administrative costs.
- Difficulties in determining responsibility.
- Irrational allocation of resources.
- Lack of unified regulatory framework.
- Difficulties in long-term planning

Constructed wetland calculation tool





BaltCOP

Interreg
Co-funded by the European Union
Central Baltic Programme

CORE SITE SELECTION CRITERIA

Domestic wastewater treatment

Sites considered under the NATALIE Project should:

- Have a centralized collection system serving 70–150 PE
- Fail to meet BOD_5, COD, TSS, N_{tot} or P_{tot} standards
- Provide adequate land for CW installation
- Receive influent exceeding typical domestic limits; minimal stormwater inflow
- Have flow matching calculated water consumption

DATA NEEDED FOR FEASIBILITY & PRIORITIZATION

Key information to collect:

- WWTP address & ownership (mapping & coordination)
- Design vs. actual flow and load (m^3/d, PE, COD, BOD, TN, TP)
- Compliance status & available space for CW
- Priority ranking for reconstruction within NATALIE Project



NATALIE

Involvement of the municipalities

Object selection

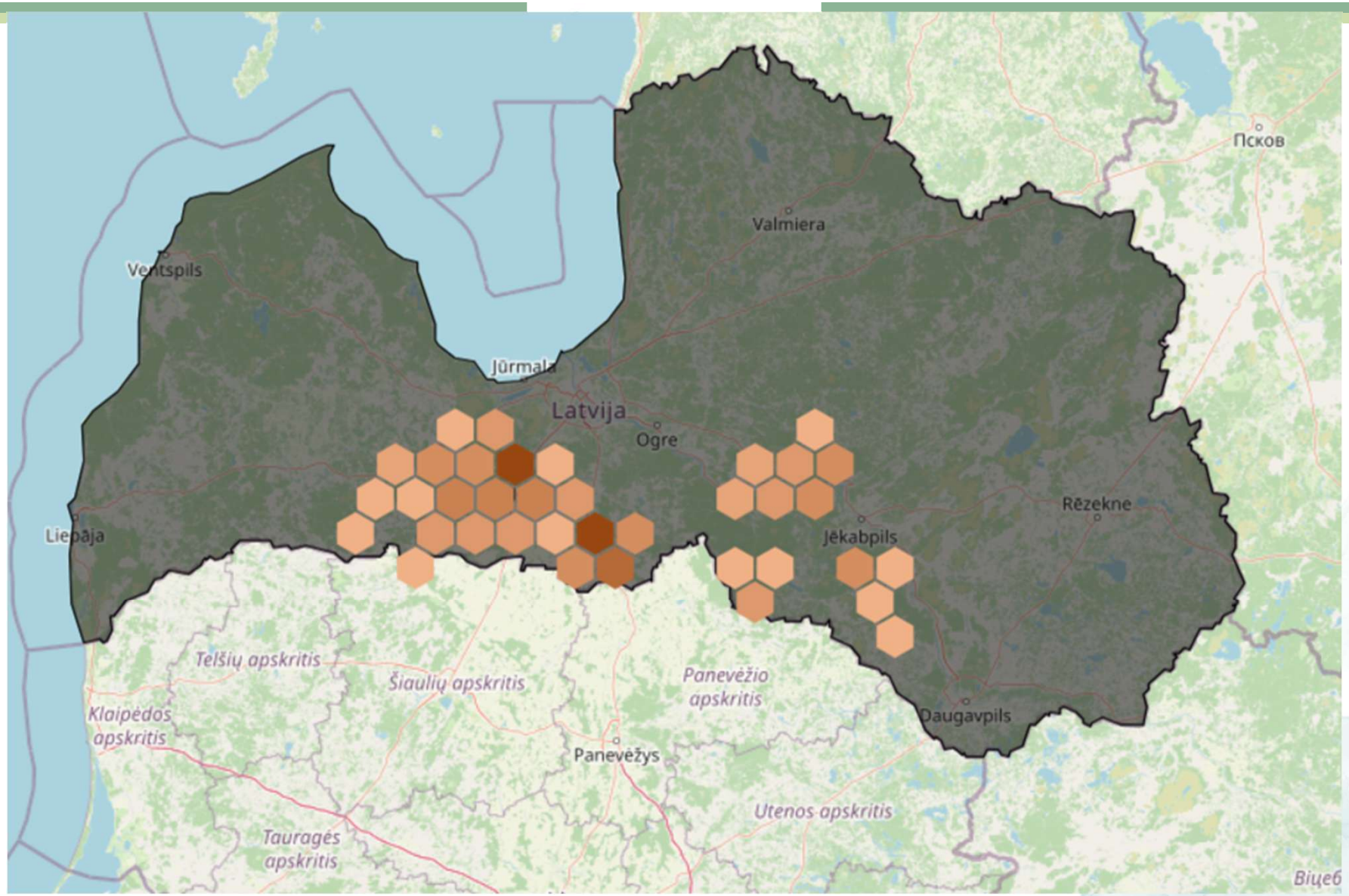
- Complete the questionnaire
- Evaluate the current situation, set priorities
- In-site meeting involving the respective WWTP managers if necessary

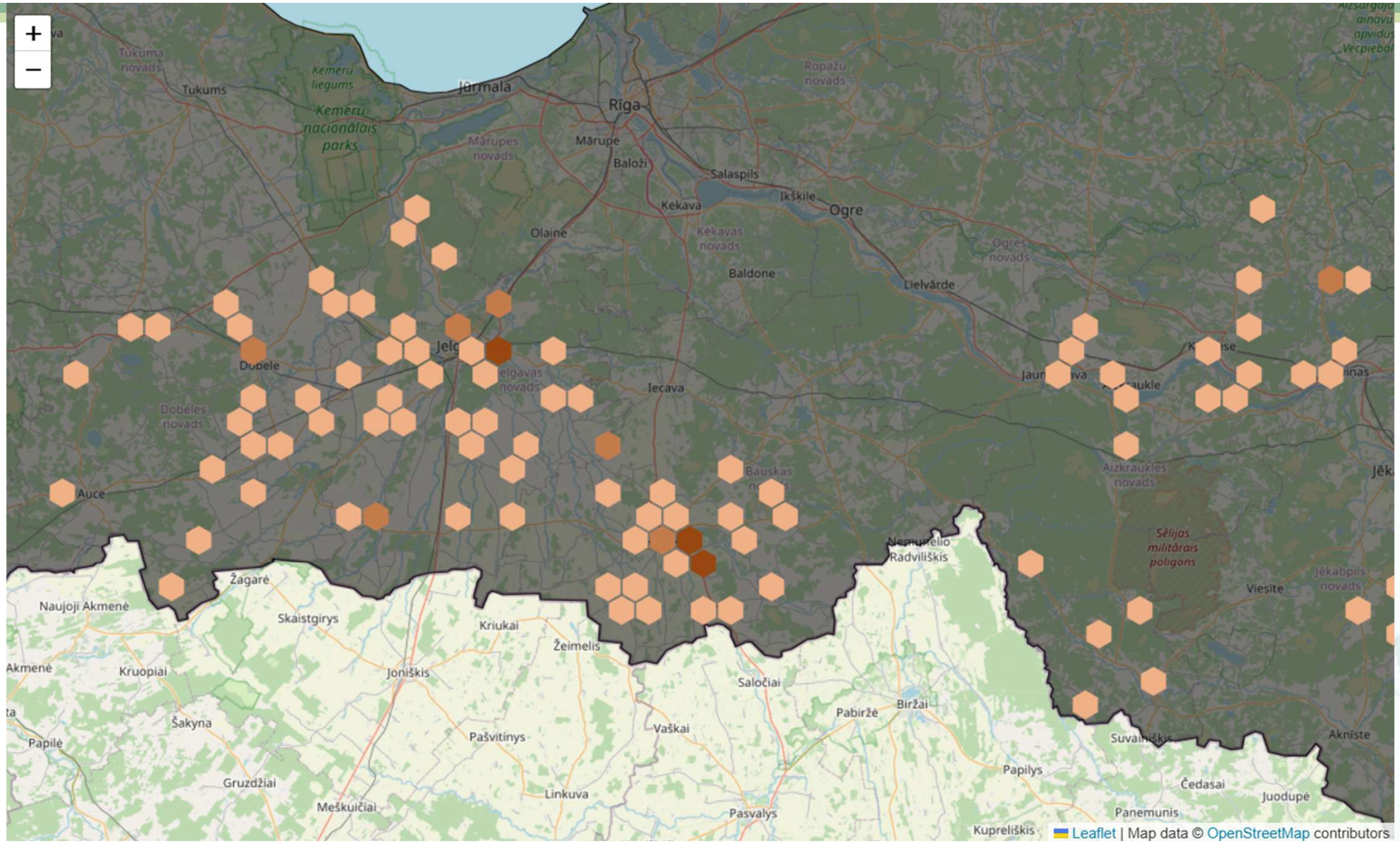
Building and construction

- Preparation of baseline data before design
- Coordination/approval of construction project solutions
- Participation in the construction project coordination process in BIS as the initiator
- Participation in the construction process as the initiator of construction

Exploitation

- A constructed wetland, like any other biological treatment facility, must be properly managed
- Operating rules will be included in the construction project documentation
- Permission to carry out efficiency monitoring of the constructed wetland during its operation


Псков
Valmiera
Ventspils
Jūrmala
Latvija
Ogre
Rēzekne
Jēkabpils
Liepāja
Telšių apskritis
Šiaulių apskritis
Panevėžio apskritis
Klaipėdos apskritis
Daugavpils
Panevėžys
Utenos apskritis
Tauragės apskritis


Tukuma novads
Tukums
Kemeru liegums
Kemeru nacionālais parks
Jūrmala
Rīga
Ropažu novads
Mārupes novads
Mārupe
Baloži
Salaspils
Ķekava
Ikšķile
Ogre
Olaine
Kekavas novads
Ogres novads
Baldone
Lielvārde
Dobele
Jelgavas novads
Iecava
Dobeles novads
Bauskas novads
Aizkraukles novads
Auce
Sēlijas militārais poligons
Radviliškis
Jēkabpils novads
Viesīte
Žagarė
Naujoji Akmenė
Skaistgirys
Kriukai
Žeimelis
Akmenė
Kruopiai
Joniškis
Saločiai
Pabiržė
Biržai
Šakyna
Pašvitinys
Vaškai
Papilė
Aknīste
Papilys
Gruzdžiai
Čedasai
Linkuva
Juodupė
Meškuičiai
Pasvalys
Panemunis
Kupreliškis
Leaflet | Map data © OpenStreetMap contributors

MONITORING IMPLEMENTATION

NBS PERFORMANCE INDICATOR	DESCRIPTION	REFERENCE	VARIABLES	DATA SOURCE	MONITORING (Y/N)
Water pollution with nutrients causing eutrophication	Water samples are collected and tested for the variables of interest to evaluate the performance of the existing constructed wetlands (4 wetlands – 3 surface flow and 1 subsurface flow) and will be collected after implementation of new constructed wetlands (2 wetlands).	Similar case studies, previous studies	NO_3-N, NH_4-N, TN, PO_4-P, TP, TSS, COD, BOD_5	Field work / monitoring	Y

Monitoring activities are carried out continuously.

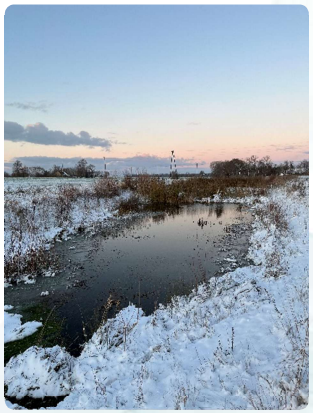
MONITORING IMPLEMENTATION

Monitoring of the existing and operational constructed wetlands

- Water sampling at the inlets and outlets of 4 existing constructed wetlands (CW):
  - surface flow CW «Mezaciruli»
  - surface flow CW «Ailes strauts»
  - surface flow CW «Vilcini-1»
  - subsurface flow CW «Mezaciruli»
- Parameters to monitor:
  - nitrate-nitrogen (NO_3-N),
  - ammonium-nitrogen (NH_4-N),
  - total nitrogen (TN),
  - orthophosphate-phosphorus (PO_4-P),
  - total phosphorus (TP),
  - suspended solids (SS).



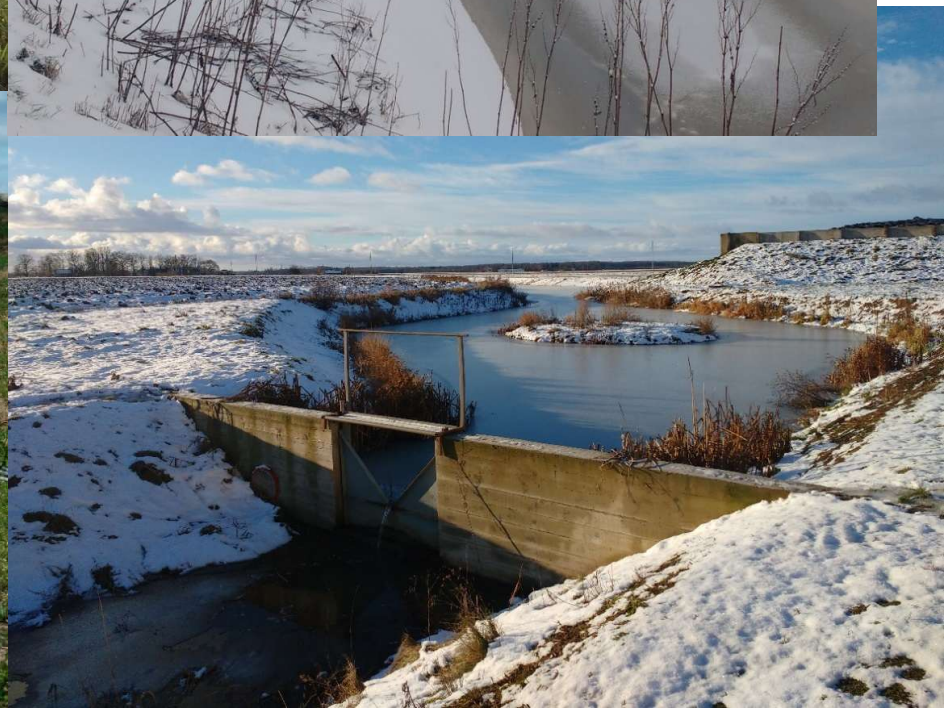












MONITORING IMPLEMENTATION

Monitoring of the existing and operational constructed wetlands

Parameter	pH	NO_3-N, mg l^{-1}	NH_4-N, mg l^{-1}	TN, mg l^{-1}	PO_4-P, mg l^{-1}	TP, mg l^{-1}	SS, mg l^{-1}
Surface flow CW «Mezaciruli» (2014-2024)							
Inflow	8.0	10.0	0.428	11.5	0.100	0.174	41.8
Outflow	8.1	8.5	0.326	9.8	0.082	0.119	35.8
Difference, %	1	**-15**	**-24**	**-15**	**-18**	**-32**	**-14**
Subsurface flow CW «Mezaciruli» (2014-2024)							
Inflow	7.2	2.2	7.703	15.1	5.846	7.105	99.1
Outflow	7.5	2.0	2.693	7.1	2.022	2.238	49.8
Difference, %	5	**-12**	**-65**	**-53**	**-65**	**-69**	**-50**
Surface flow CW «Vilcini-1» (2018-2024)							
Inflow	8.0	2.2	0.028	2.7	0.029	0.053	37.3
Outflow	8.0	2.2	0.035	2.7	0.029	0.053	29.7
Difference, %	0	1	24	0	**-1**	0	**-20**







MONITORING IMPLEMENTATION

NBS PERFORMANCE INDICATOR	DESCRIPTION	REFERENCE	VARIABLES	DATA SOURCE	MONITORING (Y/N)
Biodiversity	Species and biotopes on land and macrozoobenthos, phytobenthos and macrophytes in water will be evaluated to investigate the effects of 3 existing surface flow constructed wetlands in terms of increased or decreased number and composition of species within a defined area of impact.	Similar case studies, previous studies	Plant species and biotopes on land and macrozoobenthos, phytobenthos and macrophytes in water	Field work / monitoring Citizen science (possible also in the SL3)	Y
Biodiversity	Species and biotopes on land will be evaluated to investigate the effects of 2 new subsurface constructed wetlands in terms of increased or decreased number and composition of species within a defined area of impact.	Similar case studies, previous studies	Plant species and biotopes on land	Field work / monitoring Citizen science (possible also in the SL3)	Y

Monitoring campaigns will be carried out during the time period from May 2025 to October 2025.

NATALIE

Accelerating and mainstreaming transformative NATure-bAsed solutions to enhance resiLIEnce to climate change for diverse bio-geographical European regions

Thank you for your attention!

www.natalieproject.eu

@NatalieProject

natalieproject@oieau.fr

Funded by the European Union

UK Research and Innovation

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI