Constructed wetland in Vidrare, Bulgaria

Year of issue

2025

Summary

Women in Europe for a Common Future (WECF) implemented Bulgaria’s first constructed wetland in Vidrare (Pravets) to treat domestic wastewater from the St. Panteleimon home while building local capacity. The plant is a vertical subsurface-flow reed bed for ~80 PE, combining an 18 m³ two-chamber settling tank with intermittent pumping to a 266 m² planted sand filter split into two beds; treated effluent discharges to a nearby gully. Design: Otterwasser (DE) and Ecoproject (BG); works: Interstroy; funding: German Federal Environment Foundation (DBU). Construction ran Oct 2010–Apr 2011; the facility was officially inaugurated on 29 April 2011. O&M is handled by trained staff from the home; reported investment was about €45,000 (+≈10% for planning). The site has served as a national demonstration/education example and continues to be cited by Bulgarian authorities (e.g., Ramsar COP14 National Report, 2022).

Photo Gallery



Location

42.99305, 24.01

Project

NWRM

National ID

Bulgaria_06

Sector

Hydromorphology

Installation Date

2011-04

Implementation status

Completed

Contact

REC

Overview

Location of the project

St. Panteleimon residential home, ul. “Georgi Dimitrov” 1, 2166 Vidrare, Pravets Municipality, Sofia Province. Within the village, on the left (low) bank area of the Malki Iskar river; road access via the municipal route III-308 Kalugerovo–Vidrare–Djurovo, which connects to national road I-3 (E83).

Country

Bulgaria

NUTS2 Code

Югозападен (Yugozapaden)

Sponge measures implemented in the case study

Wetland restoration and management

Objectives

Raise awareness and build capacity among professionals and citizens on extensive/low-tech wastewater treatment (train the Home’s appointed operator; publish materials; hold a national seminar/visit).
Provide on-site treatment for the Home’s domestic wastewater (kitchen, toilets, laundry) to “improve the existing situation,” by installing a constructed wetland on the Home’s plot.

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility

NGO	Women in Europe for a Common Future (WECF)	Initiation of the measure	International ONG	Responsible
Local water authority	Pravets Municipality	Initiation of the measure	Co-funding	Responsible
Other	Ecoworld 2007 of Bulgaria	Initiation of the measure	—	Supporting
NGO	German Federal Environmental Fundation	Financing	—	—
Architects / Engineers	Otter Wasser	Determination of design details of the measure	Also instruction of staff for the maintenance of the constructed wetland	Supporting

Site Information

Climate Zone

Warm temperate moist

Precipitation

507.00 mm

Temperature (°C)

11.00 °C

Imperviousness

100.00 %

Elevation range

314 m

Slope range

5.0

WFD Ecological status

Moderate

WFD Chemical status

Good

Design and Implementation

Project scale

Micro

Project scale specifications

Site-specific, on-plot constructed wetland at the St. Panteleimon home in Vidrare (~80 PE), treating wastewater from a single institution within village bounds. It’s a localized intervention (design, construction, and O&M confined to one property), with no basin-wide planning or regional infrastructure—fully consistent with “Micro-scale” in your scheme.

Area subject to Land use change or Management/Practice change (ha)

0.04 ha

Size

0.07

Size unit

ha

Constraints

Presence of many underground cables and pipes, which had not been mentioned in previous documentation.

Favourable preconditions

Existing sewerage, gully and river as receiving water, slope in the yard and available space

Financing

Total cost

45000.00 €

Total cost information

Investment costs: excavation and piping(12000), per-treatment step (6000); Soil filter: liner(6000), grave and sand(7000), pipes (9500), pumps (4500)

Costs investment

45000.00 €

Costs operational information

The operation and maintenance costs depends on the local cost of energy and staff. Require time and energy supply: time 1.5h/week; energy 2kWh/d; sludge disposal 36m3/yr

Financing authorities

Authority name	Type of funding	Comments	Financing share
German Federal Environment Foundation	Other	DBU grant for the overall project (demo plant + training + conference + publications)	80%
Pravets Municipality	Local funds	—	20 %

Compensations

Non

Policy and Governance

Policy description

Ground water contamination due to untreated sewage discharge

Land ownership

The wetland was built in the yard of the St. Panteleimon home, which is part of Pravets Municipality → the land is municipal.

Policy targets

Pollutants Removal

Target remarks

Create Bulgaria’s first CW as a demonstrator that municipalities could replicate; make it visibly “attractive.”

Part of a wider plan

Non

Public consultation

Oui

Consultation activities

Activity stage	Activity type	Comments
Implementation phase	Seminar	November 19th, 2010; 25 participants; Related to the construction of the first constructed wetland in bulgaria
Implementation phase	National Conference	April 29th, 2011 in Gran Hotel Sofia; Presenting constructed wetlands as a sustainable and cost-effective wastewater treatment system

Has contractual arrangements

Non

Impacts and Monitoring

Monitoring System

Monitoring requirements

Self-monitoring consists of an operation diary, recording water consumption and visual discharge checks, plus effluent sampling at a frequency set by the water authority.

Monitoring parameters

The case study prescribes “sampling of the discharged water according to the regulations of the water authority” and does not fix a Vidrare-specific list; it references the EU Urban Waste Water Treatment Directive for typical compliance parameters (BOD_5, COD, suspended solids) and notes pathogen indicators can be reduced, while the design states nutrient removal was not required at Vidrare—so nutrients would only be monitored if the authority asked for them.

Maintenance

Maintenance requirements

Routine O&M is done on-site by an appointed staff member of the St. Panteleimon home (trained/instructed by Otterwasser), following a daily/weekly/annual plan.

Impact Assessment Methodology

Performance impact assessment method

Edge of Field/Plot

Performance impact estimation information

Difference between samples in inflow and outflow

Socio-economic Impacts

Direct benefits

Energy demand: operation listed as ~2 kWh/day for pumps (≈750 kWh/yr) = low-cost and low carbon emissions.
Public health / service quality

Biophysical impacts: Hydrology

Retained water

272.00

Retained water unit

m3/month

Increased water storage

272.00

Increased water storage unit

m3/month

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Positive impact-WQ improvement

Information on water quality overall

~70–90 % removal of BOD/COD/SS and 1–3-log pathogen reduction; nutrient removal was not a design requirement for Vidrare.

Soil quality overall improvements

Not relevant for this application

Biophysical impacts: Others

Ecosystem impact climate regulation

Not relevant for the specific application

Lessons Learned

Key lessons

Small, on-plot constructed wetlands work well as demonstrators. As the NWRM page notes, “Small scale constructed wetland for water treatment could be good demonstration of specific type of NWRM with direct economic and water quality benefits. Constructed wetlands are so far rarely used in spite of the successful pilot tests.” Vidrare confirms this adoption gap: the plant functions as a showcase more than a widely replicated model.

Early and hands-on capacity building is decisive. Training a named on-site operator, providing an operations diary, and agreeing simple daily/weekly/annual tasks made routine O&M feasible for a municipal care home with limited technical staff.

Permitting and administration are often the critical path. Time was spent aligning authorities with an unfamiliar technology; proactive engagement and clear responsibilities helped unlock approvals and clarify who monitors what, when.

Design details that prevent failure matter more than “optimal” performance tweaks. A robust pre-treatment, a fully lined VSSF bed, separation from stormwater, pumps with simple controls, and an emergency overflow plan reduced risks like hydraulic short-circuiting, rain ingress, or power-failure spills.

Expect and budget for minor “punch-list” corrections after start-up. Small fixes—drainage to keep runoff out, cleaning/adjusting outlet shafts, sealing—are normal and should be planned into commissioning, with roles shared between contractor and owner.

Economics favour low running costs over very low capex. With roughly €45k investment, ~1.5 h/week of labour and ~2 kWh/day electricity, the whole-life burden is modest for an institution-scale facility, making the solution attractive where operational simplicity is valued.

Evidence still needs structured monitoring. The case demonstrates likely improvements in effluent quality, but site-specific lab series are scarce; future replicas should lock in a simple, authority-aligned monitoring plan to generate data beyond visual checks.

Replication should target similar institutional settings. Municipal homes, schools, or small clusters with available yard space and a willing local operator are the sweet spot; nutrient polishing can be added only if the receiving context requires it.

Drivers

Driver type	Driver role	Comments
Organisation committed to it	Main driver	WECF NGO

Success factors

Success factor type	Success factor role	Comments
Financing possibilities	Main factor	In rural areas, there is a lack of financial, technical and staff resources, thus low-tech, cost-efficient and sustainable wastewater management systemas are needed
Attitude of relevant stakeholders	Secondary factor	—

Transferability

Highly transferable to small institutions with yard space and low-tech O&M needs. Key cautions: secure permits early; size for ~80 PE (or adapt); ensure robust pre-treatment; keep stormwater out; use a lined VSSF bed; appoint/train an on-site operator; plan simple monitoring and sludge disposal; check power reliability and receiving-water requirements (nutrient limits) before design.

Sources

Sources

Constructed Wetland in Bulgaria - Constructed Wetland Implementation for On-site Treatment of Domestic Wastewater of a Children´s Home combined with Capacity Building for Professionals

Constructed Wetlands: Sustainable Wastewater Treatment for Rural and Peri-Urban Communities in Bulgaria

Inauguration of the first constructed wetland in Bulgaria

Ramsar National Report to COP14 — Bulgaria

Constructed Wetlands — Sustainable and Cost-Effective Wastewater Treatment in Rural and Peri-Urban Areas (Bulgaria)

102 проекта ... „Посланици на здравето” 2017/2018 г.

Demonstration einer Pflanzenkläranlage in Bulgarien ... am Beispiel des Kinderheimes im Dorf Vidrare ... — Abschlussbericht (DBU-Projekt AZ 27250)