



Development of Project Document for Nature-Based Solutions for Wastewater Treatment in the Drin River Basin

General Project Overview

Dr Fabio Masi, PhD

4th Regional Nexus Roundtable in South-East Europe, 26/07/2022

Iridra Srl

via A. La Marmora 51, 50121 Firenze

Tel. 055470729 Fax 055475593

www.iridra.com masi@iridra.com



University of Natural Resources
and Life Sciences, Vienna

Prof. Lavdim Ormanaj

Iris pseudacorus

Project objective

Drin river basin

To prepare a full **Project Document**, with the support of two local experienced professionals, for the implementation of Nature-Based Solutions for Wastewater Treatment in two small/medium settlements in the **Drin River Basin**:

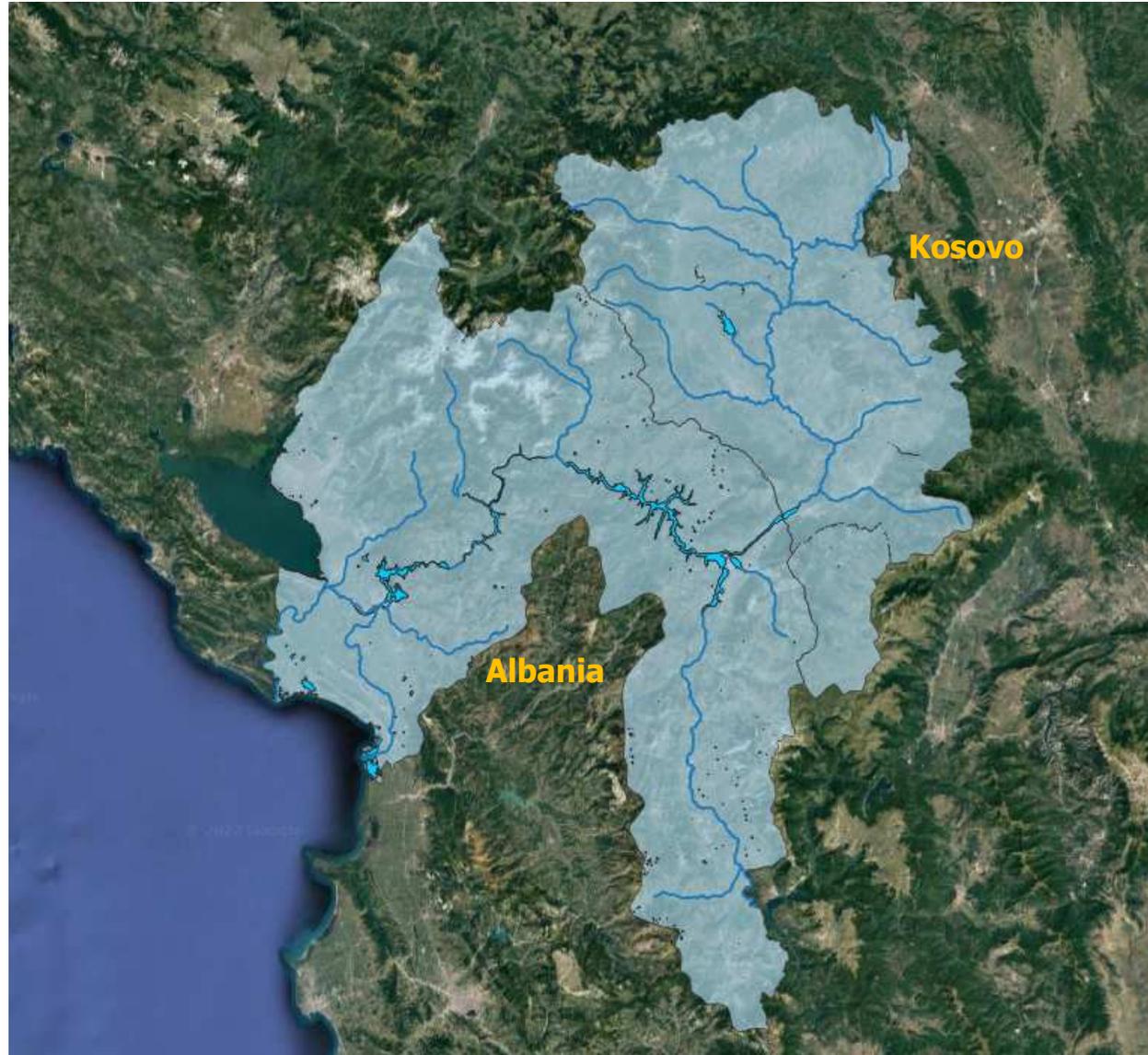
Albania

Kosovo

Iris pseudacorus

Project objective

Drin river basin



Iris pseudacorus

Project approach

Methodology and tasks

Task 1: Policy review, identification of stakeholders and potential financing sources, finalisation of structure of Project Document – **Inception Report**

Task 2: Consultations and development of **Concept Note**

Task 3: Development of the full **Project Document**, of **Techno-economic Note** and of a **Note on Potential financing and partnership mobilisation**

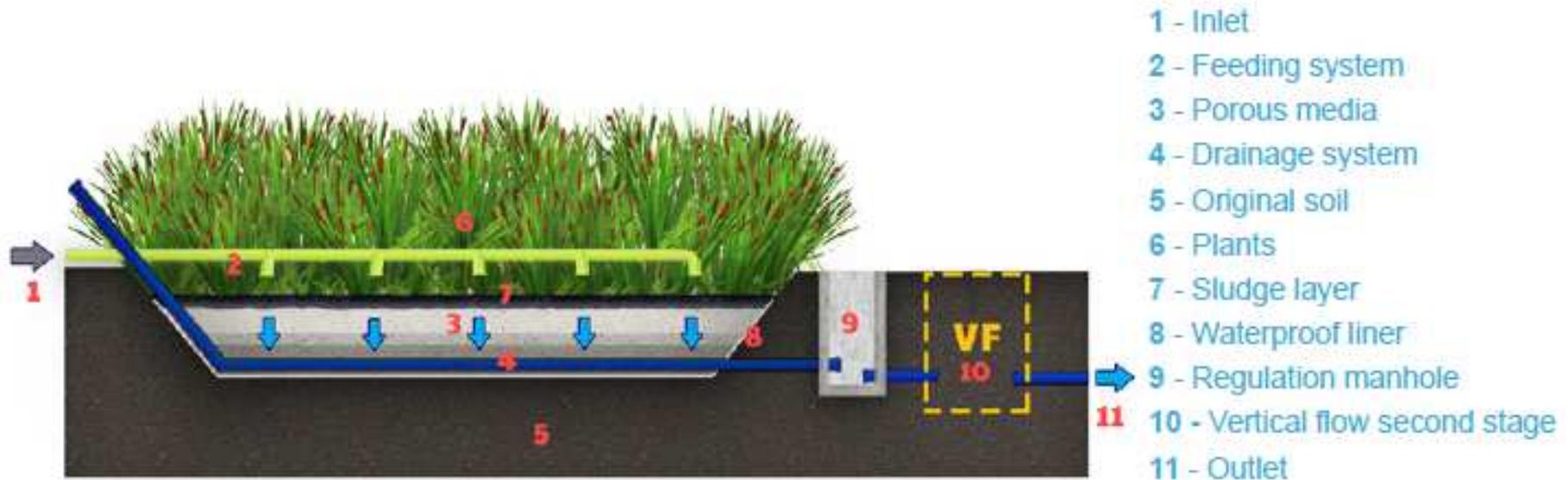


Iris pseudacorus

Project approach

Task 1 – Inception Report

NBS Screening: maximizing the Nexus potential



Iris pseudacorus

Project approach

Task 1 – Inception Report

NBS Screening: maximizing the Nexus potential

*CW WWTP of Castelluccio
di Norcia
(Italy, design IRIDRA)*



Iris pseudacorus

Project approach

Task 2 – Concept Note

1. Identification of the **locations** (one in Albania and one in Kosovo)
2. Identification of the stakeholders' **needs and expectations**



Data collection

Screening

Site visit



2 workshops



Iris pseudacorus

Project approach

Task 2 – Concept Note – Albania

Stakeholder workshop – 21th April, Tirana



Iris pseudacorus

Project approach

Task 2 – Concept Note – Albania

Selected site: Shtiqen (Kukes)



Iris pseudacorus

Project approach

Task 2 – Concept Note – Albania

Selected site: Shtiqen (Kukes)

- 5300 inhabitants
- No Sewerage
- 4 small settlements (Shtiqen, Koder Lume, Krenze, Gjallicë)
- Possibility to propose semi-centralised or decentralised NBS
- Positive feedback on Food-Energy-Nexus potential



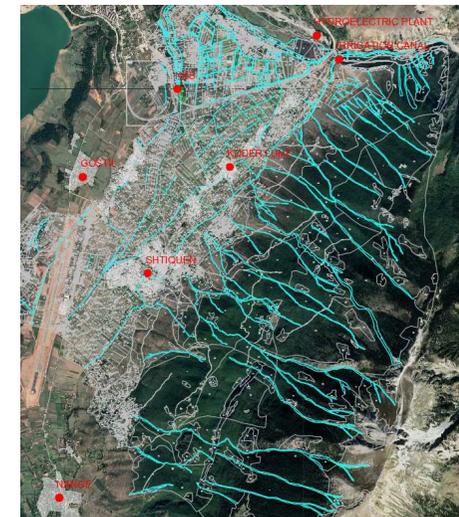
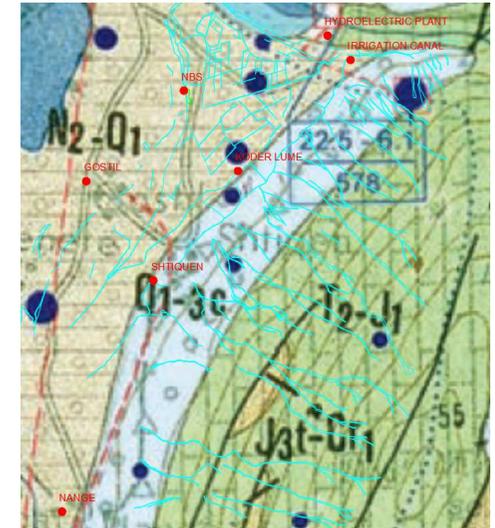
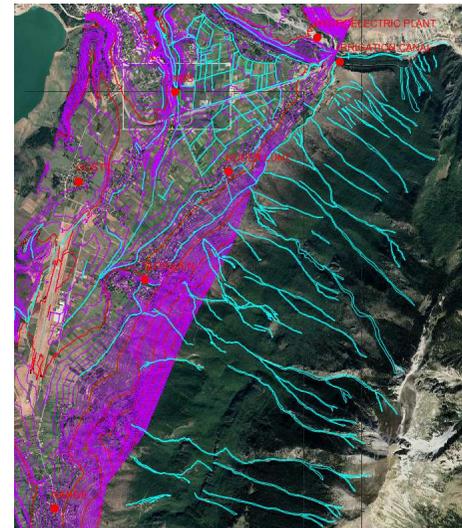
Iris pseudacorus

Project approach

Task 2 – Concept Note – Albania

Selected site: Shtiqen (Kukes)

- Position of the villages
- Elevation curves
- Channel network
- Geological maps
- Cadastre
- Surface of irrigation land



Iris pseudacorus

Project approach

Task 2 – Concept Note – Kosovo

Stakeholder workshop – 5th May, Prishtina



Prof. Lavdim Ormanaj

Iris pseudacorus

Project approach

Task 2 – Concept Note – Kosovo

Selected site: Raushiq (Peja)



Prof. Lavdim Ormanaj

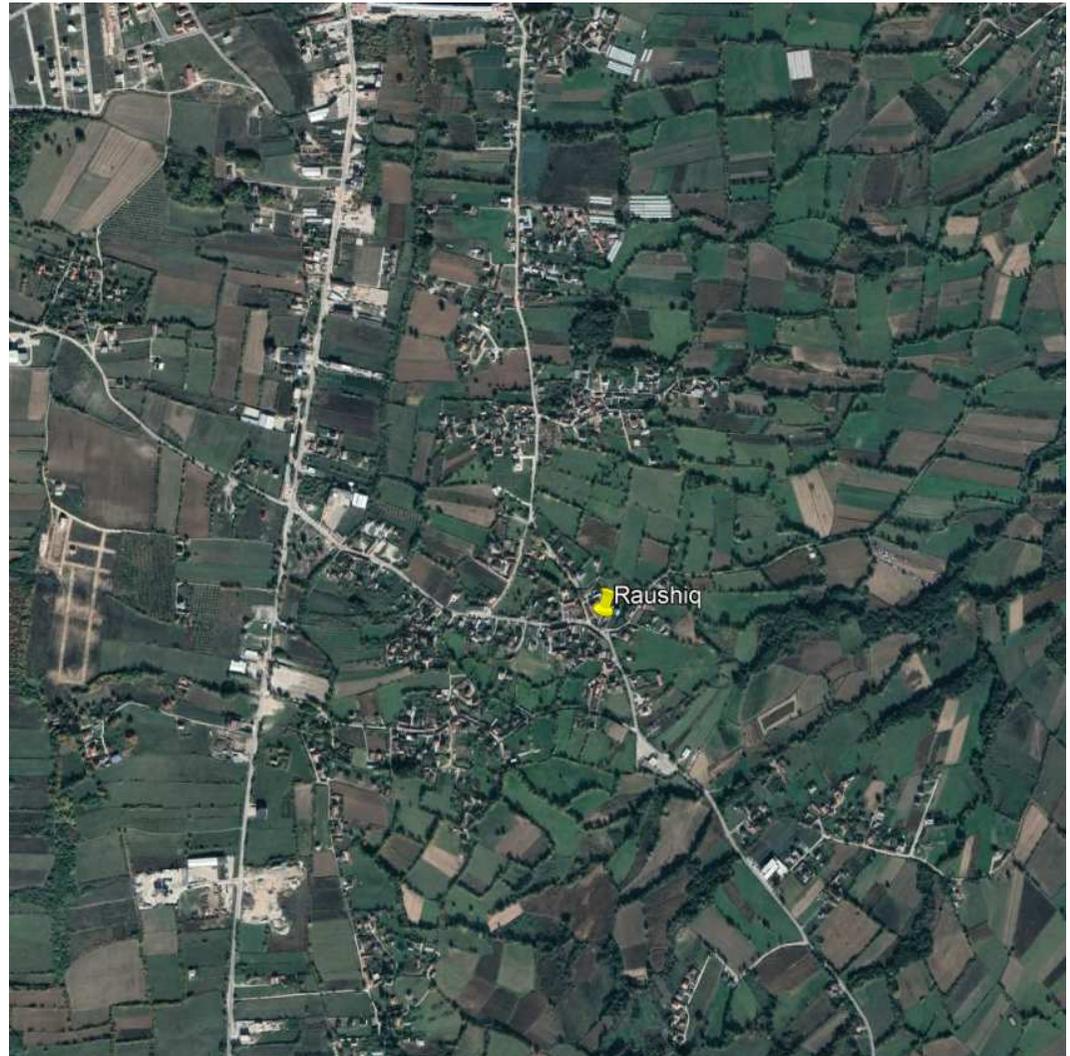
Iris pseudacorus

Project approach

Task 2 – Concept Note – Kosovo

Selected site: Raushiq (Peja)

- 320 houses, 1660 inhabitants (max)
- Existing Sewerage
- No willing to collect to centralised sewer with pumps
- Positive feedback on Food-Energy-Nexus potential
- High interest of Peja municipality in decentralised NBS



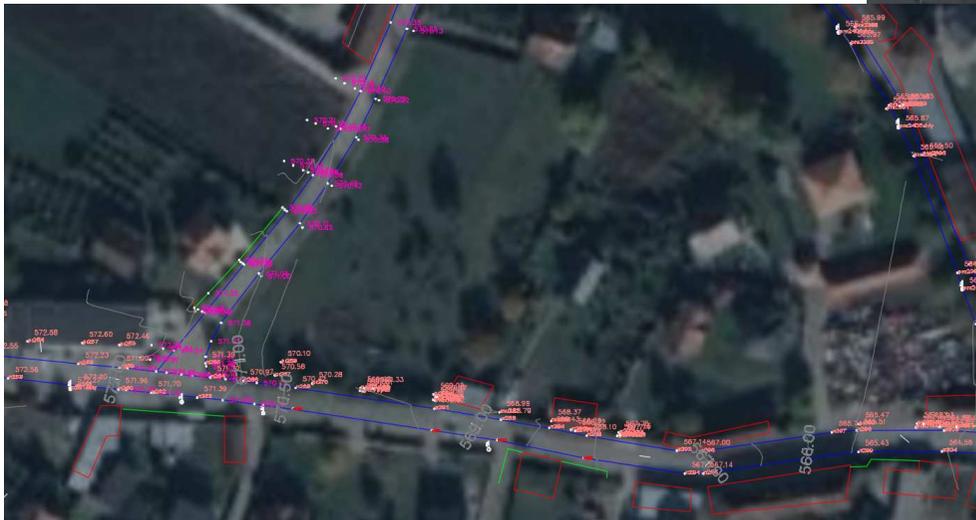
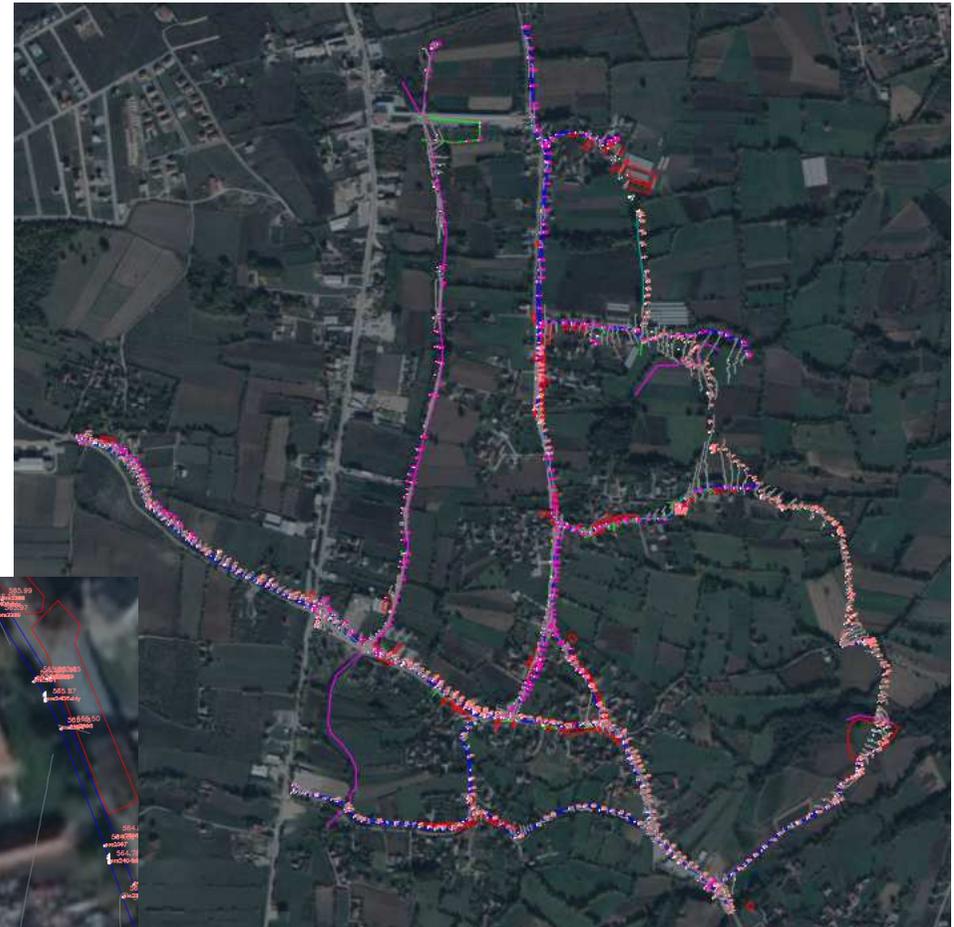
Iris pseudacorus

Project approach

Task 2 – Concept Note – Kosovo

Selected site: Raushiq (Peja)

- Elevation curves
- Elevation survey
- Sewage network
- Geological maps
- Cadastre
- Channel network



Iris pseudacorus

Project approach

Task 2 – Concept Note

Deliverable D2



Development of a Project Document for the Implementation of Nature-Based Solutions for Wastewater Treatment in two Rural Areas in the Drin River Basin

In the framework of the project

"Promoting the Sustainable Management of Natural Resources in South-eastern Europe, Through the Use of the Nexus Approach"

funded by the Austrian Development Agency (ADA),
implemented by the Global Water Partnership-Mediterranean (GWP-Med),
in partnership with the United Nations Economic Commission for Europe (UNECE)

Concept Note (Deliverable D2)

Date: May 2022

Revision: no. 0

Written by:

Dr. Eng. Anacleto Rizzo, Prof. Dr. Lavdim Osmanaj, M.Sc.E.
Elisabeta Poci

Client: The Mediterranean Information Office for

Environment Culture and Sustainable Development MIO
ECSDE (contract 7 GWP-Med/2022)

Revised by: Dr. Fabio Masi

Additional experts of the team

M.E. Riccardo Bresciani, Dr. Eng. Anacleto Rizzo, M.Sc.E. Arbana Kola, M.E. Elton Hasana, Dr. Guenter Langergraber,
Dr. Florian Kretschmer, Prof. Dr. Thomas Ertl, Dr. Roza Allabashi

Realized by:



Via La Marmorata, 51 – 50121, Firenze (Italia)
Tel. +39 055470729 Fax +39 055475593
www.irdra.com

With the support of:



University of Natural Resources
and Life Sciences, Vienna

Iris pseudacorus

Project approach

Task 3 – Techno-economic Note

Type/technology of the **nature-based solution** to be designed



Multi Criteria Analysis (MCA)

Costs/Benefits	Objectives/criteria	Indicators
Social Pros/contras	Acceptability (including risk of mosquitos)	High/medium/low*
	Need of qualified personnel	High/medium/low*
Environmental Pros/contras	Landscape integration	High/medium/low*
	Nutrient recovery	Recovery of N and P (Kg/year)
	Energy recovery	MJ/year
	On-site renewable energy	MJ/year
	Greenhouse gas emissions	CO2 equivalent (Kg/year)
	Support to biodiversity	High/medium/low*
Costs	CAPEX	€/m2
	OPEX	€/year

Iris pseudacorus

Project approach

Task 3 – Techno-economic Note

Multi Criteria Analysis - MCA

Criteria	Attributes	Indicators	Value function
Social	Administrative burden	Ownership of the land	Type: ordinal (discrete) 0 - private 1 - prevalently private 2 - public/private 3 - prevalently public 4 - public
Food	Crop	Freedom to select crop to be fertigated with treated ww	Type: ordinal (discrete) 0 - only discharge 1 - Class D 2 - Class C 3 - Class B 4 - Class A
Energy	Electricity demand	kWh/year	Type: cardinal
	Renewable energy production	On-site renewable energy (hydropower)	Type: ordinal (discrete) 0 - no reuse of ww 1 - reuse of ww
Water	Water saving	Tap/river water use for irrigation	Type: ordinal (discrete) 0 - no reuse of ww

Total Attribute					
Centralized					Decentralized
C	C	C	C	C	D
Discharge FRB + HF	Class A FRB + VF + sand filter+UV	Class B FRB + HF + sand filter+UV	Class C FRB + HF + sand filter+UV	Class D FRB + HF + FWS	Discharge HF
0.45	0.44	0.55	0.53	0.38	0.42

				Indicator					
				Centralized					Decentralized
Criteria	Attribute	Indicator/definition	Metric type and intervals	C	C	C	C	C	D
				Discharge FRB + HF	Class A FRB + VF + sand filter+UV	Class B FRB + HF + sand filter+UV	Class C FRB + VF + sand filter+UV	Class D FRB + HF + FWS	Discharge HF
Social	Administrative burden	Ownership of the land	Type: ordinal (discrete) 0 - private 1 - prevalently private 2 - public/private 3 - prevalently public 4 - public	3	2	2	2	1	0
Food	Crop	Freedom to select crop to be fertigated with treated ww	Type: ordinal (discrete) 0 - only discharge 1 - Class D 2 - Class C 3 - Class B 4 - Class A	0	4	3	2	1	0
Energy	Electricity demand	kWh/year	Type: cardinal	5331.92	15995.76	10663.84	10663.84	10663.84	5331.92
	Renewable energy production	On-site renewable energy (hydropower)	Type: ordinal (discrete) 0 - no reuse of ww 1 - reuse of ww	0	1	1	1	1	0

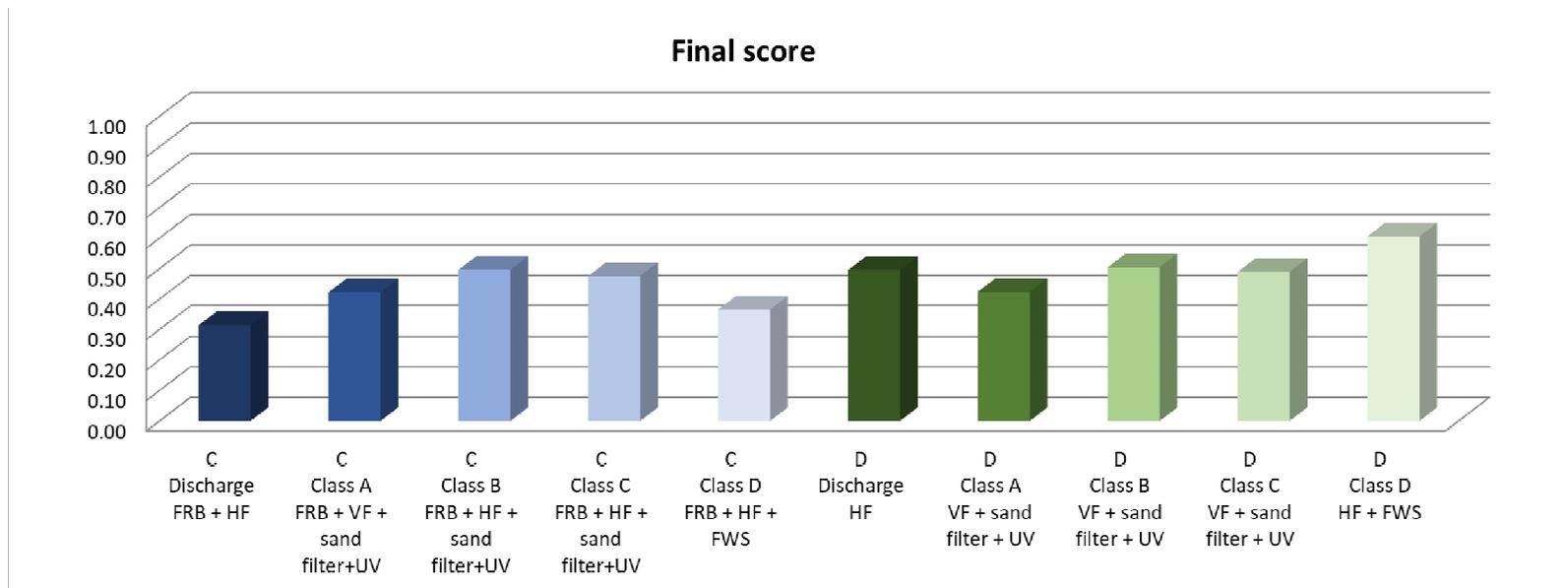
Iris pseudacorus

Project approach

Task 3 – Techno-economic Note

MCA – ALBANIA

	Discharge	Class A	Class B	Class C	Class D
Centralized	0.31	0.42	0.48	0.46	0.37
Decentralized	0.49	0.42	0.49	0.48	0.61



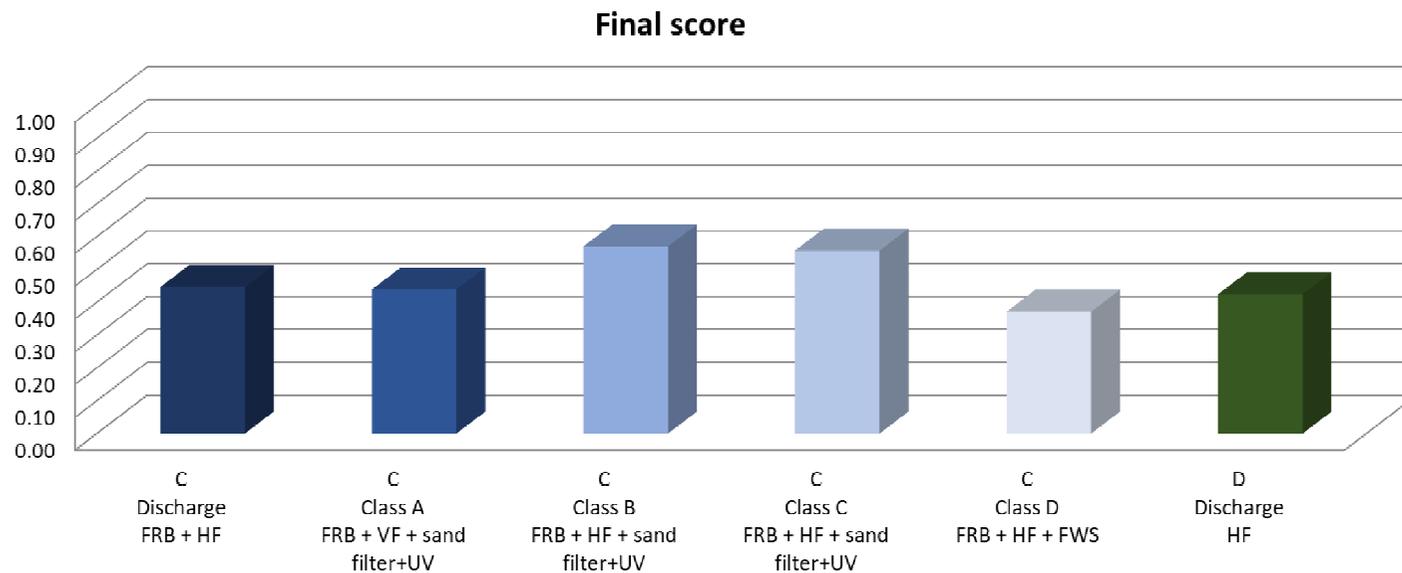
Iris pseudacorus

Project approach

Task 3 – Techno-economic Note

MCA – KOSOVO

Alternative 1.1 Discharge	Alternative 1.2 Class A	Alternative 1.3 Class B	Alternative 1.4 Class C	Alternative 1.5 Class D	Alternative 2.1 Discharge
0.45	0.44	0.55	0.53	0.38	0.42



Iris pseudacorus

Project approach

Task 3 – Techno-economic Note

Information on:

- Laws and regulations in Albania and Kosovo
- Basic drawings of the treatment plant
- Technical information (materials, plants, energy consumption, ...)
- O&M instructions
- Potential for **nutrient recovery**
- Potential for **energy recovery**
- Cost-benefit analysis
- Requirements for Environmental Impact Assessment

Iris pseudacorus

Project approach

Task 3 – Note on Potential financing and partnership mobilisation

- Identification of potential sources and instruments of financing
- Review and listing of national funding mechanisms/institutions that exist in the respective countries



Meeting with donors/IFIs/agencies



Iris pseudacorus

Project approach

Task 3 – Project Document

Collection of the products of all the activities:

- Information on the two chosen locations
- Description of the NBS technology selected
- Technical and economic characteristics of the proposed NBS
- Annexes



Iris pseudacorus

Project approach

Task 3 – Project Document

NBS technology selected - ALBANIA

FRB + VF

Treatment scheme (2.4 m²/PE):

- Preliminary treatment
- Pumping station
- 1st stage: French Reed bed (FRB) 4000 m²
- 2nd stage: Vertical subsurface flow wetland (VF) 4000 m²
- Discharge (BOD₅ < 25 mg/L, TSS < 60 mg/L, COD < 125 mg/L)
- **Gross area: 16000 m²**

Iris pseudacorus

Project approach

Task 3 – Project Document

NBS technology selected - ALBANIA



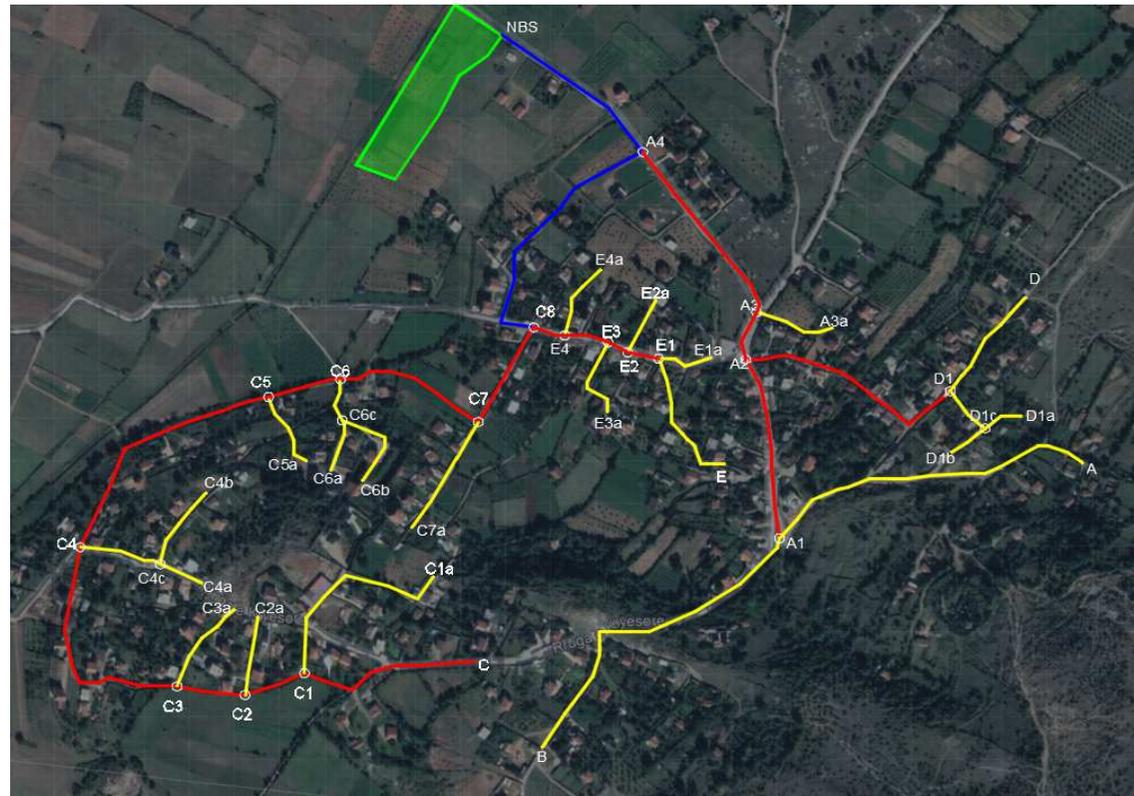
SHTIQEN - decentralised	
ALTERNATIVE 2.1	
Works	1,297,903.39 €
	26,078.21
O&M	€/year
	0.20 €/m ³ /year

Iris pseudacorus

Project approach

Task 3 – Project Document

NBS technology selected - ALBANIA



SHTIQEN sewer network	
Diameters	160 – 250 mm
Total length	5602 m
Piping cost	510,670.48 €
Manholes	112
Manholes cost	44,816.24 €
TOTAL COST	555,486.72 €

Iris pseudacorus

Project approach

Task 3 – Project Document

NBS technology selected - KOSOVO

FRB + VF

Treatment scheme (2.41 m²/PE):

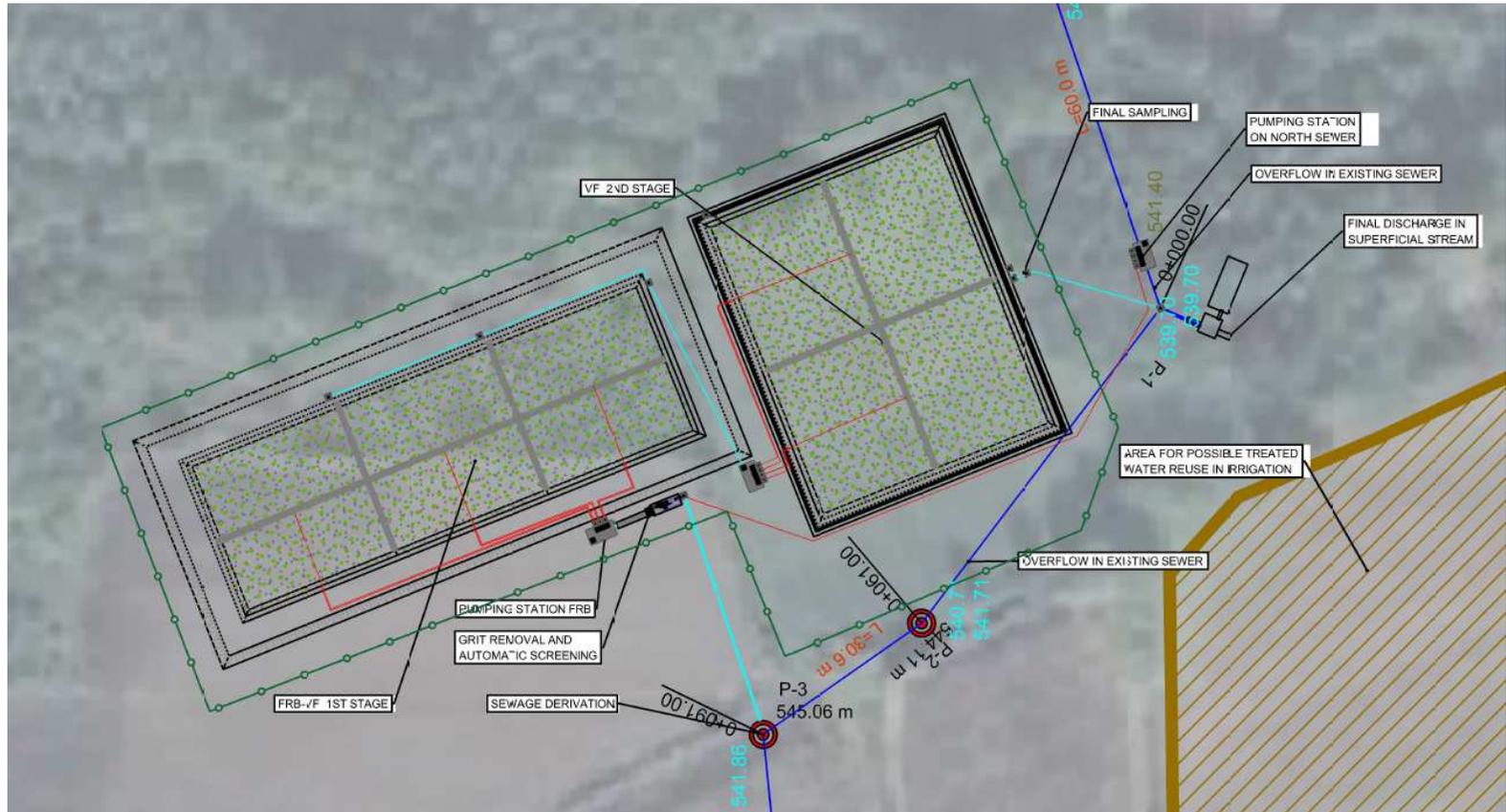
- Preliminary treatment
- Pumping station
- 1st stage: French Reed bed (FRB) 2000 m²
- 2nd stage: Vertical subsurface flow wetland (VF) 2000 m²
- Discharge (BOD₅ < 25 mg/L, TSS < 60 mg/L, COD < 125 mg/L)
- **Gross area: 8000 m²**

Iris pseudacorus

Project approach

Task 3 – Project Document

NBS technology selected - KOSOVO

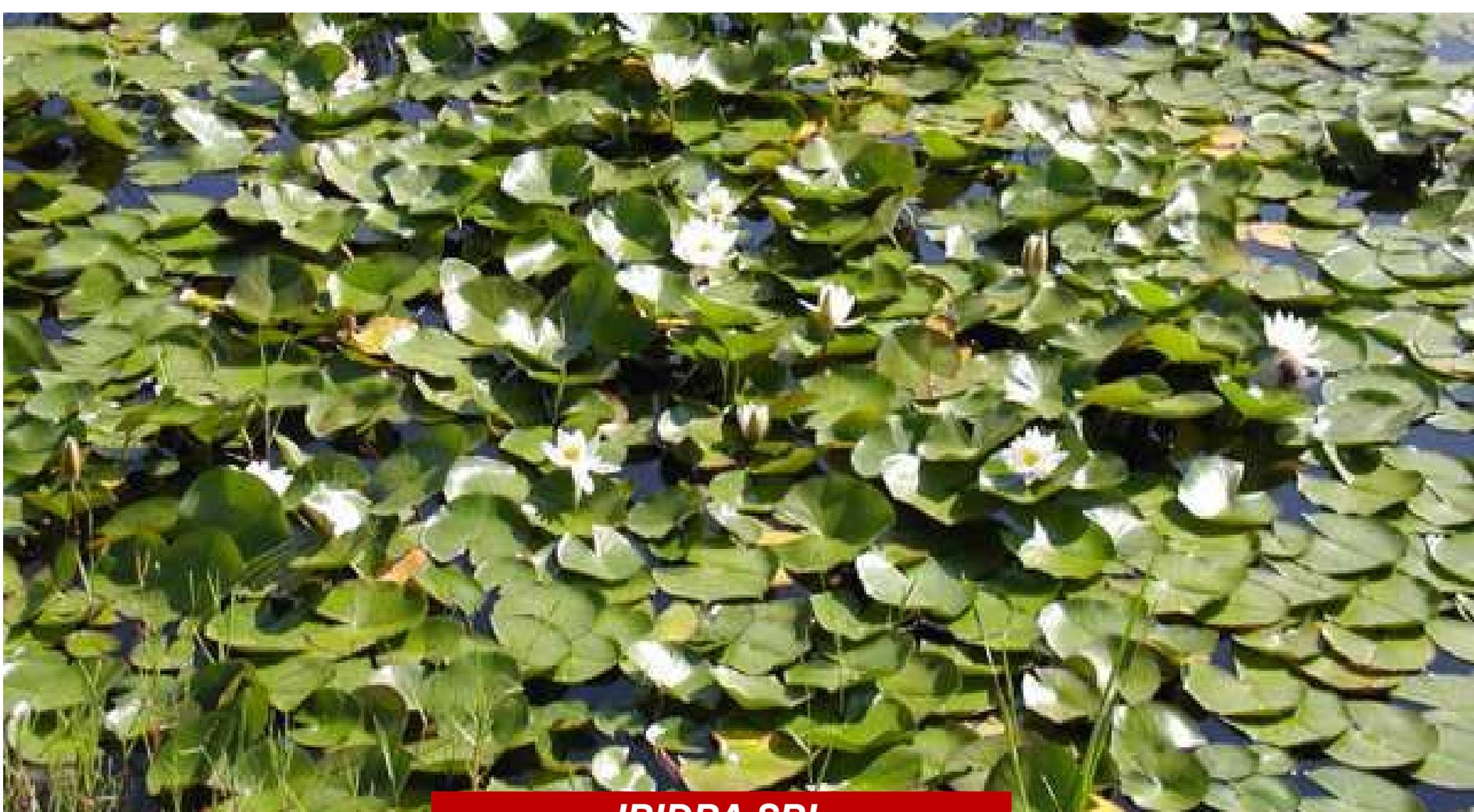


RAUSHIQ - decentralised

ALTERNATIVE 2.1

Works	740,952 €
O&M	15,151 €/year
	0.28 €/m ³ /year

Iris pseudacorus



IRIDRA SRL

THANKS FOR THE ATTENTION

PhD Env Sci., Fabio Masi

via A. La Marmora 51, 50121 Firenze

Tel. 055470729 Fax 055475593

www.igidra.com masi@igidra.com

