Action Completion Note

Luxembourg, Wednesday 08 March 2023 PJ/JASPERS/2023 - 2023-03267/ET/LC/jo

Country	Romania
Project	VASLUI COUNTY II - Water and Wastewater Infrastructure Investments for 2014-2020
Beneficiary	S.C. AQUAVAS S.A.
Operational Programme	Large Infrastructure Operational Programme (LIOP) 2014-2020
Priority Axis	Priority Axis 3 – Development of Environmental Infrastructure Using Effective Resource Management / Strategic Objective 2; – Increase of the level of wastewater collection and treatment as well as level of water supply available to the population
CCI Program No.	
JASPERS Project No.	2014 051 RO WAW WAT
Date of submission to EC	March 2023
Total project cost	EUR 548,490,703 (current prices, incl. VAT) of which EUR 135,050,256 is considered eligible for this Operational Programme and EUR 327,047,642 assumed to be eligible under the future 2021-2027 Operational Programme (the residual ineligible cost of EUR 86,392,804 relates only to VAT)
Grant Funding Requested	EU grant of EUR 107,905,155 (79.9% of eligible expenditure), under the 2014-2020 Operational Programme
Completion Note Prepared	March 2023

Signature and Date: 8th March 2023
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Note: This JASPERS Action Completion Note has been prepared on the date indicated above. In case the grant application is submitted significantly later than this date, the reader of this Note should be aware that some of the comments and opinions expressed may no longer be valid and that, accordingly, the Note may no longer be adequate for submission with the grant application (Pursuant to Article 7 of the Working Arrangements for JASPERS' intervention, the JASPERS Action Completion Note must be attached to each grant application submitted to the European Commission by the National Authority).

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Table of Contents

1 Project Description 8
1.1 Main Objectives and Project Scope 8
1.2 Project Beneficiary, Cost and Financing 10
2 Existing Situation 11
2.1 Water Supply Infrastructure and Services 11
2.2 Wastewater Infrastructure and Services 21
2.2.1 Wastewater collection – All systems 23
2.2.2 Wastewater treatment 23
2.3 Industrial Wastewater Discharge 24
2.4 Wastewater Sludge 25
3 Project Objectives 29
3.1 Strategic, Planning and Project Specific Objectives 29
3.2 Consistency with OP(s) and Expected Contribution to Priority Axis 29
3.3 Contribution to Socio-Economic Development 30
3.4 Measures to Ensure Optimal Utilization of the Project 30
4 Demand Analysis 32
4.1 Current Demand Analysis / Base Case 32
4.2 Future Demand Analysis 33
4.2.1 Demographic and Economic Projections 33
4.2.2 Demand Projections for Financial Appraisal 33
5 Options Analysis 34
5.1 Summary of the Water Supply Systems Options Analysis 35
5.2 Summary of the Wastewater Systems Options Analysis 47
5.3 Options Analysis for Wastewater Sludge 52
6 Technical Aspects 54
6.1 Technical Description 54
7 Project Costs 62
7.1 Investment Costs 62
7.2 Operational Costs 63
8 Financial and Economic Analysis 64
8.1 Financial Analysis 64
8.2 Financial Sustainability 67
8.3 Economic Analysis 68
8.4 Financing Plan 69
8.4.1. Eligible cost and EU contribution calculation 69
8.4.2. Sources of co-funding 70
8.4.3. Annual financing plan 70
9 State Aid 72
10 Institutional Capacity and Capability 75
10.1 Legal Capacity 75
10.2 Technical Capacity 75
10.3 Financial Capacity 76
10.4 Administrative and Project Management Capacity 76
11 Procurement and Implementation Schedule 77
11.1 Procurement Process 77
11.2 Implementation Schedule 77
11.3 Physical and Financial Indicators to Monitor Implementation 79
12 Risk Assessment 81
12.1 Project Risk Management Process 81
12.2 Risk Identification and Prevention/Mitigation Matrix 81
12.3 Sensitivity of Economic and Financial Analyses 82
13 Climate Change 83
13.1 Climate Policy 83
13.2 Climate Change Mitigation and Greenhouse Gas Emissions 84
13.3 Climate Change Adaptation and Resilience 85
14 JASPERS Contribution to the Project 90
14.1 Summary of JASPERS Input 90

14.2 Experts Involved 91
14.3 Documents Reviewed 91
14.4 Schedule of Meetings Held 91
14.5 Documentation submitted by JASPERS 92
15 Conclusions and Recommendations 92
15.1 Conclusions 92
15.1.1 Project Eligibility and Compliance 92
15.1.2 Technical 92
15.1.3 Practical Implementation 93
15.1.4 Operational Issues 93
15.1.5 Financial and Economic Issues 93
15.1.6 Environmental and climate change aspects 94
15.2 Recommendations 94
15.2.1 Technical and Implementation 94
15.2.2 Financial and Economic 95
15.2.3 Environmental and climate change aspects 95
15.3 Additional Considerations 96
Environmental Annex 97
Project Description 97

Glossary:

A	Ampere
AA	Appropriate Assessment
AF	Application Form (for funding)
ANRSC	National Regulatory Authority for Public Services
ATU	Administrative Territorial Unit
CBA	Cost Benefit Analysis
BOD	Biochemical Oxygen Demand at 5 days
CCRVA	Climate Change Risk and Vulnerability Assessment
CES	European Committee for Standardisation
CF	Cohesion Fund
CL	Works Contract
COD	Chemical Oxygen Demand
DBP	Disinfection by-product
DNP	Defects Notification Period
DS	Dry Substance
DSCR	Debt Service Cover Ratio
DUC	Dynamic Unitary Cost
DWTP	Drinking Water Treatment Plant
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPC	Environmental Protection Consent
EU	European Union
FS	Feasibility Study
GHG	Greenhouse Gas
GN	Guidance Note
GA	Water Facility (Romanian Gospodaria de Apa)
HZ	Hertz
IAS	Independent Adequate Solutions
ICA	Instrumentation, Control and Automatization
IDA (or ADI)	Intercommunity Development Association
IQR	Independent Quality Review
ISO	International Organization for Standardisation
ISPA	Instrument for Structural Policies for Pre-Accession
IVN	Volumetric Index of Sludge
JASPERS	Joint Assistance to Support Projects in European Regions
Kg	Kilogram
KV	Kilovolt
KW	Kilowatt
KWh	Kilowatt hour
KVA	Kilovolt Ampere
LOP	Large Infrastructure Operational Program

LED	Light Emitting Diode
LEPA	Local Environmental Protection Agency
mA	Miliampere
MB	Megabyte
MFE	Ministry of European Funds
mg/l	Milligram per litre
MMSC	Ministry of Environment and Climate Change
MP	Master Plan
MTS	Total Suspended Material
MUDP	Municipal Utilities Development Programme
mV	Millivolt
MW	Megawatt
NPD	National Development Plan
NOM	Natural Organic Matter
NPV	Net Present Value
NSI	National Institute of Statistic
NT	Total Nitrogen
NUTS	Nomenclature of Territorial Units for Statistics
NTS	Non-Technical Summary
OI	Intermediate Body
OD	Dissolved Oxygen
OJ	Official Journal
OP	Operational Programme
PE	Population Equivalent (also L.E.)
pH	Potential of Hydrogen ions
PIU	Project Implementation Unit
PS	Pumping Station
PT	Total Phosphorus
ROC	Regional Operating Company
SEPARD	Special Accession Programme for Agriculture and Rural Development
SAMTID	Infrastructure Development Programme for Small and Medium Towns
SEA	Strategic Environmental Assessment
SGEI	Service of General Economic Interest
SOP	Operational Programme Period 2007-2013
SR, STAS	Romanian Standard
TA	Technical Assistance
TDS	Total Dry Solids
THM	Trihalomethane
UM	Unit Measurement
UWWTD	Urban Wastewater Treatment Directive
V	Volt
WFD	Water Framework Directive
WSS	Water Supply System
WSZ	Water Supply Zone

WW	Wastewater
WWS	Wastewater System
WWTP	(Urban) Waste Water Treatment Plant

Preamble

It is understood that:

- The project under consideration by this Action Completion Note (ACN) will be phased between the 2014-2020 MFF and the 2021-2027 MFF. Hence, the eligibility of Phase 1 of the project will last until 31 Dec 2023, and will be financed under the 2014-2020 MFF. Phase 2 starts as of 1st Jan 2024 and shall be financed under the 2021-2027 MFF.
- The project's components implemented under Phase I will be subject to EU co-financing based on the financial advancement of the project by 31st Dec 2023.

It is noted that:

- At the time of ACN finalization the respective Romanian Sustainable Development Programme 2021-2027 (SDP 2021 – 2027) supporting individual components defined in the current project remains to be reflected in the guidelines for applicants.
- Phase 2 of the Project would be subject to formal modification/phasing notification procedure at a later stage.

Taking the above into consideration it is assumed that:

- The Romanian Government / Beneficiary is committed to guarantee funding for project components whose implementation will exceed the eligibility period of EU grant finance under the 2014-2020 MFF.
- There will be no conflict between individual project commitments for funding of Phase II as indicated in the current project documents and the finally adopted OP 2021-2027, particularly as regards eligibility for funding.
- The grant funding ratio (current funding gap) for the project under the 2021-2027 MFF remains at least the same as under the 2014-2020 MFF as per project documents assessed for this ACN.

The project itself and funding sources available for this project would need to be re-evaluated in case any of the assumptions above might not hold.

1 Project Description

1.1 Main Objectives and Project Scope

The project location is in Vaslui County, situated in the eastern part of Romania. The county's neighbours are in the north Iasi County, in the west Bacau County and in the south the Galati County (Figure 1). River Prut flows alongside the eastern part of the county and forms the border with Moldova.

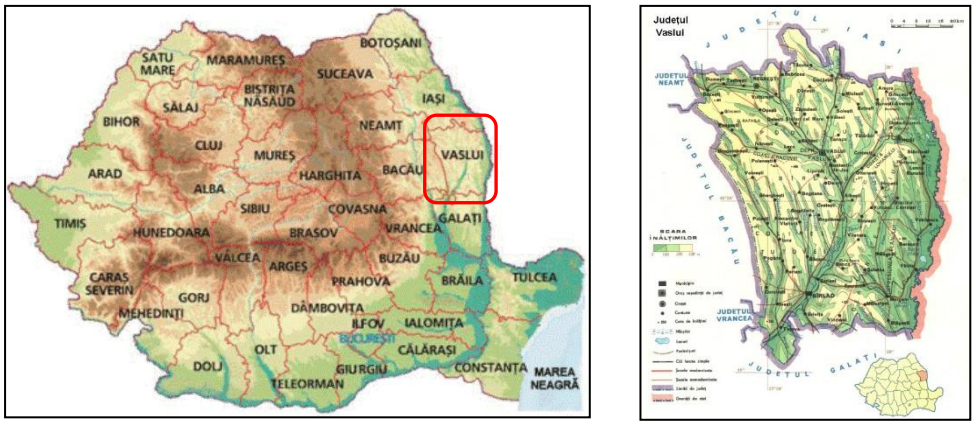


Figure 1 Project location

The county includes 3 municipalities, 2 towns and 86 communes.

The project area covers a total of 47 UATs of which 7 are already operated by Aquavas S.A. These are municipalities of Vaslui, Barlad, Husi; towns of Negresti and Murgeni; and communes of Muntenii de Jos and Lipovat. Other 40 UATs will join the ROC with the project. The population of the project area in 2018 is 249,612 (143,444 living in urban; 106,168 living in rural) inhabitants, representing 88% of the total population of the county.

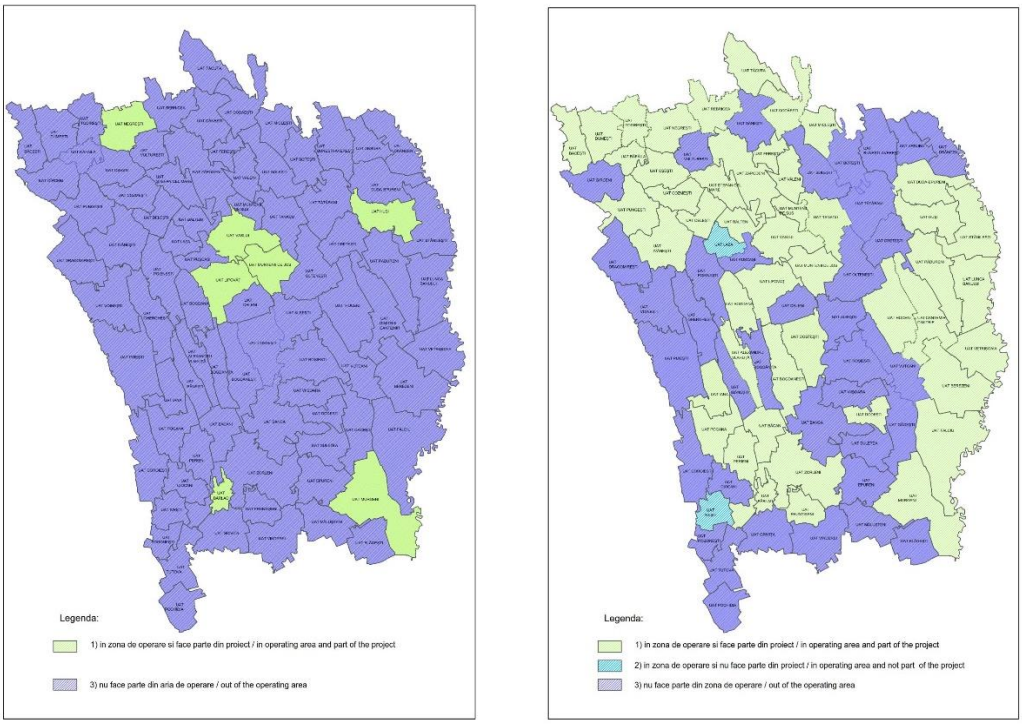


Figure 2 Aquavas S.A. operating area before and after the project

The Project proposes water investments targeting 16 Water Supply Systems and wastewater investments targeting 15 agglomerations out of which 5 are independent agglomerations and 10 are grouped in 4 clusters. In this respect, the proposed investments envisage extending the

service coverage for drinking water supply and wastewater collection and treatment, as well as addressing the deficiencies of the existing systems.

The project components proposed for the water supply systems aim at a most efficient and effective use of the available water sources. For wastewater systems, the proposed components are based on identifying the best discharging location from an environmental and economic point of view.

A) Water supply investments:

At present in several localities in ROC's area, water supply is either: i) non-compliant with the relevant standards, or ii) non-existent. The aim of the proposed investments is to ensure continuous access to compliant potable water in line with the applicable EU Directives.

The project proposals in relation to water supply include the following:

- Extension of underground water sources (35 boreholes)
- Construction of new water mains (375.06 km)
- Rehabilitation of water mains (2.68 km)
- New/Extension of DWTP (5 pcs)
- Rehabilitation of DWTP (1 pcs)
- Extension of water chlorination plants (58 pcs)
- Construction/extension of reservoirs (41 pcs)
- Rehabilitation of reservoirs (12 pcs)
- New pumping stations (124 pcs)
- Rehabilitation of pumping station (6 pcs)
- Construction/extension of distribution network (621.66 km)
- Rehabilitation of distribution network (46.15 km)

B) Wastewater investments:

The project proposals in relation to wastewater include the following:

- Extension/construction of sewerage network (326.54 km)
- Rehabilitation of sewerage network (27.54 km)
- New pumping stations (156 pcs)
- Rehabilitation of pumping stations (5 pcs)
- New wastewater rising pipes (76.57 km)
- Rehabilitation of wastewater rising pipes (2.1 km)
- Extension of WWTP (5 pcs)
- Rehabilitation of WWTP (3 pcs)

The level of water supply and wastewater services (before and after the project) is presented below.

Table 1 Level of water supply services in the Project area (Phase I + II) – 2026

	Population 2026	Before project				After project			
		Level of connectivity to WS service		Population with compliant WS service in acc. To Directive 98/83/EC		Level of service reached through LIOP Project		Population with compliant WS service in acc. to Directive 98/83/EC	
	No.	No.	%	No.	%		%	No.	%
Urban	131,863	128,698	94.6%	128,698	94.6%	131,734	99.9%	131,734	99.9%
Rural	97,589	46,191	45.9%	4,756	4.7%	97,249	99.7%	97,249	99.7%
Total	**229,452**	**174,889**	**73.9%**	**133,454**	**56.4%**	**228,983**	**99.8%**	**228,983**	**99.8%**
No of newly connected inhabitants through LIOP						**57,606 (18,318 in Phase I)**			
No of inhabitants benefitting better water quality (CO18)						**98,694 (38,962 in Phase I)**			

Table 2 Level of wastewater services in the Project area (Phase I + II) – 2026

	Total load generated	Before project				After project			
	2026	Level of wastewater collection		Load treated in a WWTP in compliance with Directive 91/271		Level of wastewater collection reached through LIOP Project		Load treated in a WWTP in compliance with Directive 91/271	
Agglomeration	**No.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
> 10,000 PE	149,662	143,077	93.2%	143,077	93.2%	149,559	99.9%	149,559	99.9%
2,000 PE –	46,830	8,527	18.3%	7,750	16.6%	46,643	99.6%	46,643	99.6%
Total	**196,492**	**151,604**	**75.8%**	**150,827**	**75.4%**	**196,202**	**99.85%**	**196,202**	**99.85%**
No of newly connected inhabitants						**40,610 (8,901 in Phase I)**			
No of newly connected PE						**42,842 (9,559 in Phase I)**			
No of PE benefitting better wastewater treatment (CO19)						**43,656 (9,559 in Phase I)**			

1.2 Project Beneficiary, Cost and Financing

The Project Beneficiary, AQUAVAS S.A. Vaslui is a public owned company (owned by the member ATUs of ADI APC-Vaslui), established for the provision of public water supply and wastewater services for Vaslui County (47 ATU, about 88% of the County). The company has 603 employees and produces an annual turnover of around EUR 12.1 million (2021).

The project has a total investment cost (in current prices) of EUR 462.1 million (excluding VAT of EUR 86.4 million). It is noted that the provision for the adjustment of the constant prices (end 2020 price level) to current prices is relatively high at around 55% when compared to previous levels. This reflects recent (and short-term forecast) developments in the construction market in Romania and is consistent with other recently submitted projects.

From the total cost, the investment costs for water supply are EUR 256.7 million (56%) and for wastewater EUR 205.4 million (44%) (see Section 7.1 for details). All project costs, with the exception of VAT payments, are treated as eligible.

Table 3 Project Costs (AF C.1)

Costs in Euro	Total	Ineligible	Eligible	% of Eligible
Planning/design fees	3,487,284	2,620,473	866,812	0.6%
Purchase of land	-	-	-	0.0%
Buildings / civil works	212,443,855	149,558,621	62,885,234	46.6%
Machinery / equipment	36,659,892	24,552,929	12,106,963	9.0%
Contingencies	26,226,136	18,407,195	7,818,941	5.8%
Adjustment of prices	163,612,241	117,512,619	46,099,623	34.1%
Technical Assistance	10,604,663	7,841,583	2,763,080	2.0%
Publicity	216,216	156,757	59,460	0.0%
Supervision	8,847,611	6,397,467	2,450,144	1.8%
Sub-total	**462,097,899**	**327,047,642**	**135,050,256**	**100.0%**
VAT	86,392,804	86,392,804	-	0.0%
TOTAL	**548,490,703**	**413,440,447**	**135,050,256**	**100.0%**

The project is to be phased over two programming periods, with those costs which are projected to arise after the end of this MFF period (31/12/2023) being deemed ineligible under LIOP 2014-20. These “second phase” costs are to be funded by the operational programme for the period 2021 – 2027.

The main cost components per Phases (excl. VAT) are:

Table 4 Project Costs per Phases

Cost item	OP 2014–20	OP 2021-27	Total
Planning and Design	866,812	2,620,473	3,487,284
Building, Construction, Plant, Machinery	74,992,197	174,111,550	249,103,747
Contingencies	7,818,941	18,407,195	26,226,136
Price Adjustment	46,099,623	117,512,619	163,612,241
Construction Supervision	2,450,144	6,397,467	8,847,611
Technical Assistance and Publicity	2,822,539	7,998,339	10,820,879
Total	135,050,256	327,047,642	462,097,899

Accordingly, the eligible project costs under the 2014-2020 programme (Phase 1) are estimated at €135.1 million (current prices).

Applying the flat rate net revenue of 6% and the grant funding provisions for this operational programme (85%) results in a Phase 1 financing plan:

- EU Contribution LIOP 2014 – 2020: €107.9 million (79.9% of eligible costs)
- National public contribution: €27.1 million (20.1% of eligible costs)

The source of the national public contribution is the contribution from the State Budget 13%, the local authorities contribution of 2%, and own contribution of the Beneficiary of 6%.

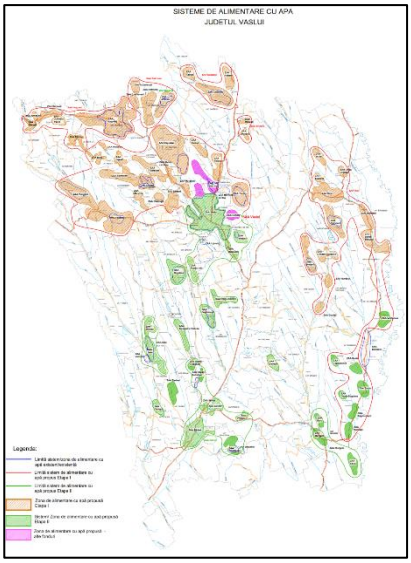
It is expected that the Romanian Government will guarantee funding for project components (Phase 2) whose implementation will exceed the eligibility period of EU grant finance under LIOP 2014-2020.

2 Existing Situation

2.1 Water Supply Infrastructure and Services

A detailed description of each existing WSS is available in Chapter 4 of the FS, which includes the following:

- analysis of the existing water sources in terms of quality, quantity and availability of water provided, including water balance;
- analysis of the current operating conditions;
- assessment of future water demand forecast;
- identification of deficiencies.



Following these analyses and assessments, measures to remediate or mitigate current deficiencies and future needs have been examined in the Options Analysis (Chapter 8 of the FS), by considering different technically and environmentally suitable solutions.

Currently, in the project area, even though 73.9% of the population is connected to water supply services, only 56.4% is receiving water services compliant with the Drinking Water Treatment Directive.

In the table below, the deficiencies for the 16 water supply systems in the project area are presented. The detailed description of deficiencies can be found in the Feasibility Study (Chapter 4) at the level of each WSS; a summary is included in Chapter 1 of the FS. Connection and compliance rates before the project include the effect of parallel investments (Volume I, Excel workbook - *Tabel deficiente_apa-Cap4-9*).

Table 5 List of deficiencies in water supply systems

VASLUI COUNTY	Localities			
	EXISTING		NON-EXISTING	Reasons for non-compliance
	Compliant	Non-compliant		
Zone/system				
Vaslui WSS Vaslui Bahnari Bacaoani Minjesti Lipovat Fundu Vaii Muntenii de Sus Tanacu Satu Nou Valeni Feresti Maraseni Zapodeni Balteni Chetresti Delesti Hirsova Stefan cel Mare Barzesti Cozmesti Osesti Padureni Buda Ivanesti Pungesti Connection rate: 74% Compliance rate: 62%	4	14	7	- WSZ Minjesti - The existing well does not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Minjesti water source shows exceedance of the permissible concentrations for NO_3, NO_2, conductivity and bacteria. - WSZ Muntenii de Sus - The existing well does not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Muntenii de Sus water source shows exceedance of the permissible limits for Fe and turbidity. - WSZ Tanacu – the existing water source (drains) do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Tanacu water source shows exceedance of the permissible limits for NH_4 and value below the limit of total hardness. - WSZ Valeni - The existing well does not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Valeni water source shows exceedance of the permissible limits for NH_4, chlorides, NO_3, conductivity, Na and value below the limit of total hardness. - WSZ Maraseni - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Maraseni water source shows exceedance of the permissible limits for As, sulphates, Na and value below the limit of total hardness. - WSZ Zapodeni - The existing water source (drains+1 well) does not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Zapodeni water source shows exceedance of the permissible limits for NH_4, Fe and Mn. - WSZ Balteni - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Balteni water source shows exceedance of the permissible limits for NO_3. - WSZ Chetresti - The existing well has no hydromechanical equipment's installed. - WSZ Delesti - The existing 2 wells were executed in 2007 and have never been commissioned. Both of the wells are not functional. Also the wells do not have the necessary capacity to deliver the required flow for the reference year. - WSZ Harsova - The existing 4 wells were executed in 2007 and have never been commissioned. All 4 wells are non-functional. Harsova water source shows exceedance of the permissible limits for sulphates and NO_3. - WSZ Stefan cel Mare - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Stefan cel Mare water source shows

VASLUI COUNTY	Localities			
	EXISTING		NON-EXISTING	Reasons for non-compliance
	Compliant	Non-compliant		
				exceedance of the permissible limits for sulphates, Na and value below the limit of total hardness. - WSZ Osesti - The existing wells show exceedance of the permissible limits for NH_4 and turbidity. - WSZ Padureni - The existing well does not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Padureni water source shows exceedance of the permissible limits for NH_4, permanganate index (oxidability), turbidity and Fe. - WSZ Buda - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Buda water source shows exceedance of the permissible limits for NH_4, NO_2 and Mn. - WSZ Ivanesti - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Ivanesti water source shows exceedance of the permissible limits for NH_4, NO_3, Fe and conductivity. - WSZ Pungesti - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Ivanesti water source shows exceedance of the permissible limits for NH_4 and oxidability. - Minjesti WTP - does not have the necessary capacity to deliver the required flow for the reference year. - Muntenii de Sus WTP - does not have the necessary capacity to deliver the required flow for the reference year. - Tanacu GA – no treatment facilities are in place, with the exception of chlorination units. The chlorination units do not have the necessary capacity to treat the required flow for the reference year. The treated water delivered to the consumers shows exceedance of the permissible limits for Fe, NO3 and turbidity. - Satu Nou WTP - does not have the necessary capacity to deliver the required flow for the reference year. The treated water delivered to the consumers shows exceedance of the permissible limits for NH4 and value below the limit of total hardness. - Valeni WTP - does not have the necessary capacity to deliver the required flow for the reference year. - Maraseni GA – no treatment facilities are in place, with the exception of chlorination units. The treated water delivered to the consumers shows exceedance of the permissible limits for As, sulphates, Na and value below the limit of total hardness. - Zapodeni WTP - does not have the necessary capacity to deliver the required flow for the reference year. The treated water delivered to the consumers shows exceedance of the permissible limits for NH4, Fe and Mn. - Balteni GA2 – no treatment facilities are in place, with the exception of chlorination units. The treated water delivered to the consumers shows exceedance of the permissible limits for NO_2. Balteni GA2 has no treatment facilities in place.

VASLUI COUNTY	Localities			
	EXISTING		NON-EXISTING	Reasons for non-compliance
	Compliant	Non-compliant		
				- Stefan cel Mare WTP - the treated water delivered to the consumers shows exceedance of the permissible limits for sulphates and Na and value below the limit of total hardness. - Osesti WTP – improper treatment process. The treated water delivered to the consumers shows exceedance of the permissible limits for sulphates and NH_4 and turbidity. - Padureni GA – no treatment facilities are in place, with the exception of chlorination units. The treated water delivered to the consumers shows exceedance of the permissible limits for NH_4, permanganate index (oxidability), turbidity and Fe. - Buda GA – no treatment facilities are in place, with the exception of a non-functional chlorination units. The chlorination unit does not have the necessary capacity to treat the required flow for the reference year 2048. The treated water delivered to the consumers shows exceedance of the permissible limits for NH_4, NO_2 and Mn. - Ivanesti GA – no treatment facilities are in place, with the exception of chlorination units. The treated water delivered to the consumers shows exceedance of the permissible limits for NO2 and bacteria. - Vaslui distribution system - poor condition of the distribution system. The assessment of the condition of pipes is presented in detail in Chapter 4 FS. The number of repairs, age and pipe material is used to determine the worst sections for which replacement is proposed. In case of the Vaslui distribution system, a systematic approach for condition rating is used (see Annex 2.1.1R SAA Vaslui reabilitari FS) to identify the worst sections and prioritize replacement. - Tanacu distribution system - According to the hydraulic modelling, sections of the existing network must be replaced with pipes with larger diameter in order to extend the distribution system to new areas. - Delesti, Harsova and Ivanesti distribution systems - there is insufficient or no connection rate to the existing network. - Buda distribution system – does not meet the technical conditions stipulated in NP133 (Romanian design norm) regarding the installation of fire hydrants. - The water supply networks do not cover the entire locality or no water supply system in place.
Husi WSS Husi Epureni Duda Valea Grecului Stanilesti Lunca Banului Padureni Dimitrie Cantemir Hurdugi	1	11	6	- WSZ Epureni – According to the water quality in the area, Epureni water source shows exceedance of the permissible limits for NO2, NH4, Fe, Mn and Na. - WSZ Duda – According to the water quality in the area, Duda water source shows exceedance of the permissible limits for NO2, NH4, Fe, Mn and Na. - WSZ Valea Grecului – According to the water quality in the area, Valea Grecului water source shows exceedance of the permissible limits for NO2, NH4, Fe, Mn and Na. - WSZ Stanilesti - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant.

VASLUI COUNTY	Localities			
	EXISTING		NON-EXISTING	Reasons for non-compliance
	Compliant	Non-compliant		
Gusitei Hoceni Vetrisoaia Falciu Bozia Copaceana Bogdanesti Odaia Bogdana Ranzesti Connection rate: 69% Compliance rate: 48%				4 out of 5 wells are currently non-functional (silted). Stanilesti water source shows exceedance of the permissible limits for NO2, NH4, Fe, Mn and Na. - WSZ Lunca Banului - The existing water source (drain + 1 well) does not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Lunca Banului water source shows exceedance of the permissible limits for NO2, Mn and Na. - WSZ Padureni - The existing water source (drain + 1 well) does not have the necessary capacity to deliver the required flow for the reference year 2048, water quality is non-compliant. Padureni water source shows exceedance of the permissible limits for NO2, free residual chlorine, turbidity and NH4. - WSZ Hurdugi - The existing well does not have the necessary capacity to deliver the required flow for the reference year 2048, water quality is non-compliant. Hurdugi water source shows exceedance of the permissible limits for NO2, and Na. - WSZ Gusitei - The existing wells do not have the necessary capacity to deliver the required flow for the reference year 2048, water quality is non-compliant. 3 out of 4 wells are currently non-functional (silted). Gusitei water source shows exceedance of the permissible limits for NO2 and value below the limit of total hardness. - WSZ Hoceni - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. 2 out of 3 wells are currently non-functional (silted). Hoceni water source shows exceedance of the permissible limits for Na, free residual chlorine and value below the limit of total hardness. - WSZ Vetrisoaia - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Vetrisoaia water source shows exceedance of the permissible limits for NH4, Na and value below the limit of total hardness. - WSZ Falciu - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. 3 out of 8 wells are currently non-functional. Falciu water source shows exceedance of the permissible limits for Bor, NH4, Na and value below the limit of total hardness. - WSZ Bogdanesti - 1 out of 3 wells is currently non-functional. Bogdanesti water source shows exceedance of the permissible limits for Bor, Na and NH4. - WSZ Ranzesti - 2 out of 3 wells are currently non-functional. Ranzesti water source shows exceedance of the permissible limits for Bor, Na and NH4. - Husi WTP - Structural deficits are reported for the settling tanks and sand filter plant. also degradation of hydromechanical equipment is observed.

VASLUI COUNTY	Localities			
	EXISTING		NON-EXISTING	Reasons for non-compliance
	Compliant	Non-compliant		
				- Falciu WTP - the treated water delivered to the consumers shows exceedance of the permissible limits for NH4, Bor and Na and value below the limit of total hardness. - For most of the WSZ's in this area, no treatment facilities are in place, with the exception of chlorination units in some zones. The treated water delivered to the consumers shows exceedance of the permissible limits for NH4, Fe, Mn, NO2, Na and value below the limit of total hardness. - Water tanks: undersized, not enough capacity for Gusitei, Hoceni and Vetrisoaia WSZ's. - Water tanks: advanced state of wear & tear (structural and electromechanical equipment) for Husi, Lunca Banului, Padureni and Bogdanesti WSZ's. - Husi transmission mains - poor condition of the transmission mains. The assessment of the condition of pipes is presented in detail in Chapter 4 FS. The number of repairs, age, pipe material and NRW values for the sections for which replacement is proposed are presented in Annex 2.1.2 R SAA Husi reabilitari FS). - Lunca Banului transmission main is clogged. - Padureni transmission main: house connections are made directly into the water main. - Husi (Poganesti) raw water pumping station: structural, hydromechanical and electrical damages are reported. Improper sanitary protection area - Husi distribution system - poor condition of the distribution system. The assessment of the condition of pipes is presented in detail in Chapter 4 FS. The number of repairs, age and pipe material is used to determine the worst sections for which replacement is proposed. In case of the Husi distribution system, a systematic approach for condition rating is used (see Annex 2.1.2 R SAA Husi reabilitari FS) to identify the worst sections and prioritize replacement. Also, according to the hydraulic modelling, sections of the existing network must be replaced with pipes with larger diameter in order to extend the distribution system to new areas. - The water supply networks do not cover the entire locality or no water supply system in place. - Lack of fire hydrants on existing distribution networks.
Negresti WSS Negresti Rafaila Dumesti Dumestii Vechi Armaseni Bacesti Connection rate: 47%	1	2	3	- WSZ Rafaila - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Rafaila water source shows exceedance of the permissible limits for NH4, NO2, Fe and Mn. - WSZ Bacesti - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Bacesti water source shows exceedance of the permissible limits for NH4, Fe and Mn. - Bacesti GA – no treatment facilities are in place, with the exception of a chlorination units. The chlorination unit does not have the necessary capacity to treat the required flow for the reference year. The treated water delivered to the consumers

VASLUI COUNTY	Localities			
	EXISTING		NON-EXISTING	Reasons for non-compliance
	Compliant	Non-compliant		
Compliance rate: 43%				shows exceedance of the permissible limits for NH4, Fe and Mn. - Water tanks: undersized, not enough capacity for Dumestii Vechi, Armaseni and Bacesti WSZ's. - The water supply networks do not cover the entire locality or no water supply system in place. - Missing SCADA systems for all WSS components.
Codaesti WSS Codaesti Pribesti Tacuta Connection rate: 22% Compliance rate: 0%	0	1	2	- WSZ Codaesti - The existing well does not have the necessary capacity to deliver the required flow for the reference year. - Undersized water mains - The water supply networks do not cover the entire locality or no water supply system in place. - Missing SCADA systems for all WSS components.
Rebricea WSS Rebricea Draxeni Craciunesti Tatomiresti Connection rate: 22% Compliance rate: 0%	0	3	1	- WSZ Rebricea - The existing underground water source (drains) does not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Rebricea water source shows exceedance of the permissible limits for NO3. - WSZ Draxeni - The existing underground water source (1 well) does not have the necessary capacity to deliver the required flow for the reference year 2048, water quality is non-compliant. Rebricea water source shows exceedance of the permissible limits for Mn. - Undersized water mains for Draxeni WSZ. - Rebricea WTP – improper treatment process. The treated water delivered to the consumers shows exceedance of the permissible limits for sulphates and NO3. - Draxeni GA - no treatment facilities are in place, with the exception of a chlorination units. The treated water delivered to the consumers shows exceedance of the permissible limits for Mn. - Water tanks: undersized, not enough capacity for Craciunesti WSZ. - The water supply networks do not cover the entire locality or no water supply system in place. - Missing SCADA systems for all WSS components.
Miclesti WSS Miclesti Popesti Connection rate: 100% Compliance rate: 0%	0	2	0	- WSZ Miclesti - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Miclesti water source shows exceedance of the permissible limits for sulphates, Fe and Mn. - WSZ Popesti - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Popesti water source shows exceedance of the permissible limits for sulphates, Mn, NH4 and Na. - Miclesti GA - no treatment facilities are in place, with the exception of an improper chlorination unit. The treated water delivered to the consumers shows exceedance of the permissible limits for sulphates, Fe and Mn.

VASLUI COUNTY	Localities			
	EXISTING		NON-EXISTING	Reasons for non-compliance
	Compliant	Non-compliant		
				- Popesti GA - no treatment facilities are in place, with the exception of a chlorination units. The treated water delivered to the consumers shows exceedance of the permissible limits for sulphates, Mn, NH4 and Na. - Missing SCADA systems for all WSS components.
Barlad WSS Barlad Simila Zorleni Popeni Fruntiseni Suseni-Vulpaseni Bacani-Baltateni Bacani Connection rate: 88% Compliance rate: 79%	1	5	2	- WSZ Simila - The existing underground water source (wells) shows exceedance of the permissible limits for Mn and value below the limit of total hardness. - WSZ Zorleni - The existing underground water source (wells) shows exceedance of the permissible limits for NO2 and value below the limit of total hardness. Also, part of the sanitary protection area is missing. - WSZ Popeni - The existing underground water source (wells) does not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Popeni water source shows exceedance of the permissible limits for NO3 and Mn. - WSZ Bacani - The existing underground water source (wells) shows exceedance of the permissible limits for NH4. - Simila, Zorleni, Popeni and Bacani GA - no treatment facilities are in place, with the exception of a chlorination unit. The treated water delivered to the consumers shows exceedance of the permissible limits for sulphates, NO2, NO3, NH4, Fe and Mn. - Water tanks: undersized, not enough capacity for Popesti and Fruntisani WSZ's. - Barlad distribution system - poor condition of the distribution system. The assessment of the condition of pipes is presented in detail in Chapter 4 FS. The number of repairs, age and pipe material is used to determine the worst sections for which replacement is proposed. In case of the Husi distribution system, a systematic approach for condition rating is used (see Annex 2.1.7.R SAA Barlad reabilitari FS) to identify the worst sections and prioritize replacement. - The water supply networks do not cover the entire locality or no water supply system in place. - Lack of fire hydrants on existing distribution networks.
Murgeni WSS Murgeni Raiu Carja Connection rate: 74% Compliance rate: 0%	0	3	0	- WSZ Murgeni - The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. 1 out of 5 wells is currently non-functional. Murgeni water source shows exceedance of the permissible limits for Na and value below the limit of total hardness. - WSZ Raiu - The existing well does not have the necessary capacity to deliver the required flow for the reference year 2048, water quality is non-compliant. Electromechanical equipment need to be replaced. Missing SCADA system. Raiu water source shows exceedance of the permissible limits for Na and value below the limit of total hardness.

VASLUI COUNTY	Localities			
	EXISTING		NON-EXISTING	Reasons for non-compliance
	Compliant	Non-compliant		
				- WSZ Carja - The existing wells do not have the necessary capacity to deliver the required flow for the reference year 2048, water quality is non-compliant. 1 out of 2 wells is currently non-functional. Carja water source shows exceedance of the permissible limits for Bor, NH4, Na and value below the limit of total hardness. - No treatment facilities are in place, with the exception of chlorination units. The treated water delivered to the consumers shows exceedance of the permissible limits for sulphates, Bor, NH4, and Na and value below the limit of total hardness. - Water tanks: undersized, advanced state of wear & tear, not enough capacity, no SCADA systems. - The water supply networks do not cover the entire locality. - Murgeni distribution system - poor condition of the distribution system. The assessment of the condition of pipes is presented in detail in Chapter 4 FS. The number of repairs, age and pipe material is used to determine the worst sections for which replacement is proposed. In case of the Murgeni distribution system, a systematic approach for condition rating is used (see Annex 2.1.8.R SAA Murgeni reabilitari FS) to identify the worst sections and prioritize replacement. Also, according to the hydraulic modelling, sections of the existing network must be replaced with pipes with larger diameter in order to extend the distribution system to new areas. - Missing SCADA systems for all WSS components
Bogdanesti WSS Bogdanesti Visinari Vladesti Connection rate: 47% Compliance rate: 0%	0	1	2	- The existing wells do not have the necessary capacity to deliver the required flow for the reference year, water quality is non-compliant. Bogdanesti water source shows exceedance of the permissible limits for NH4, Fe and Mn. - No treatment facilities are in place, with the exception of a chlorination unit. The treated water delivered to the consumers shows exceedance of the permissible limits for NH4, Fe and Mn. - Water tanks: undersized, advanced state of wear & tear, not enough capacity, no SCADA systems. - The water supply networks do not cover the entire Bogdanesti locality. No water distribution networks in Visinari and Vladesti locality. - Missing SCADA systems for all WSS components.
Dinga-Radesti WSS Dinga Radesti Puntiseni Parvesti Connection rate: 100% Compliance rate: 0%	0	4	0	- The existing well does not have the necessary capacity to deliver the required flow for the reference year. - Undersized water main - The UV disinfection unit does not have the necessary capacity to treat the required flow for the reference year. - Water tanks: undersized, not enough capacity. - Missing SCADA systems for all WSS components.

VASLUI COUNTY	Localities			
	EXISTING		NON-EXISTING	Reasons for non-compliance
	Compliant	Non-compliant		
Berezeni WSS Berezeni Satu Nou Connection rate: 100% Compliance rate: 100%	2	0	0	- Ongoing project – ensuring 100% compliance rate before LIOP project. - No investments proposed through LIOP.
Dodesti WSS Connection rate: 58% Compliance rate: 0%	0	1	0	- The existing wells do not have the necessary capacity to deliver the required flow for thereference year. 1 out of 2 wells is currently not-functional. - No disinfection facilities are in place. The treated water delivered to the consumers shows levels of free residual chlorine below the minimum permissible limit. - The water supply networks do not cover the entire locality. - Missing SCADA systems for all WSS components.
Alexandru Vlahuta WSS Alexandru Vlahuta Ghicani Connection rate: 92% Compliance rate: 0%	0	2	0	- The existing wells do not have the necessary capacity to deliver the required flow for the reference year. 1 out of 3 wells is currently non-functional. - No treatment facilities are in place, with the exception of an improper chlorination unit. The treated water delivered to the consumers is non-compliant. - The water supply networks do not cover the entire locality. - Missing SCADA systems for all WSS components.
Iana WSS Iana Halaresti Tomesti Vadurile Silistea Recea Connection rate: 53% Compliance rate: 0%	0	3	3	- The existing wells do not have the necessary capacity to deliver the required flow for the reference year. Each well falls within the radius of influence of the other two. - No treatment facilities are in place, with the exception of a non-functional chlorination unit. The water delivered to the consumers is non-compliant. - Water tanks: undersized, not enough capacity. - The water supply networks do not cover the entire locality. - Missing SCADA systems for all WSS components.
Bogdana WSS Bogdana Suceveni Verdes Connection rate: 38%	2	0	1	- The existing wells do not have the necessary capacity to deliver the required flow for the reference year. Each well falls within the radius of influence of the other two. - Insuficient capacity of the existing chlorination plant. - The water supply networks do not cover the entire area. - Missing SCADA systems for all WSS components.

VASLUI COUNTY	Localities			
	EXISTING		NON-EXISTING	Reasons for non-compliance
	Compliant	Non-compliant		
Compliance rate: 38%				
Perieni WSS Connection rate: 64% Compliance rate: 0%	0	1	0	- One of the two underground water sources does not have the necessary capacity to deliver the required flow during dry season. - Ongoing PNDL project includes new boreholes, pump stations, chlorination unit, reservoir and some 350 house connections. - There is insufficient connection rate to the existing network.

The supplied potable water does not comply with the requirements of the Drinking Water Directive and there are reports of insufficient quantities and quality. On this basis, and within the project's area, most of the existing water supply systems are seen as non-compliant and therefore, improvement measures are proposed.

2.2 Wastewater Infrastructure and Services

The Project area includes 15 agglomerations: 3 above 10,000 PE and 12 agglomerations between 2,000-10,000 PE.

- **Above 10,000 PE:** Vaslui, Husi and Barlad. 93.22% of the load generated in the agglomerations above 10,000 PE is collected, and treated in WWTPs in compliance with the Directive 91/271.

- **2,000 PE - 10,000 PE:** Valeni, Lunca Banului, Negresti, Dumesti, Zorleni, Popeni, Murgeni, Berezeni, Falciu, Vetrisoaia, Iana, Perieni.

  Only 27.29% of the load generated in the agglomerations above 10,000 PE is collected, and treated in WWTPs in compliance with the Directive 91/271, with the exception of Murgeni agglomeration (811 PE of non-compliance).

  Compliance rates are stated in the table below.

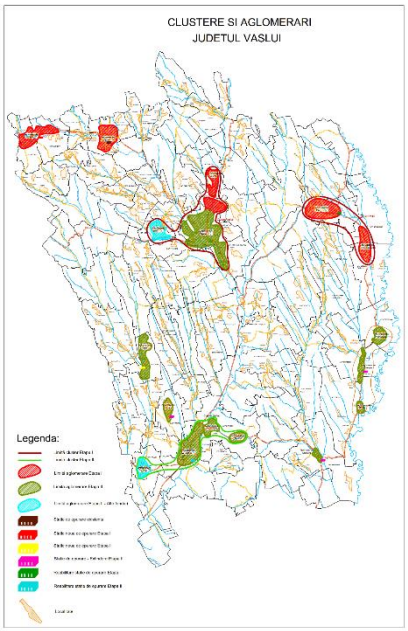


Table 6 Wastewater systems/agglomerations

Wastewater system	Agglomeration	Localities included	PE per agglomeration	Total PE in Cluster	Maximum P.E. per agglomeration in 2026-2048 period		Compliance rate
			2026	2026			(%)
Cluster Vaslui	Vaslui	Vaslui	68,423	74,903	68,423	74,903	91.09%
		Moara Grecilor					
		Brodoc					
		Rediu					

Wastewater system	Agglomeration	Localities included	PE per agglomeration	Total PE in Cluster	Maximum P.E. per agglomeration in 2026-2048 period		Compliance rate
			2026	2026			(%)
		Viișoara					
		Muntenii de Jos					
		Bacaoani					
		Muntenii de Sus					
		Satu Nou					
	Valeni	Valeni	4,004		4,004		0.00%
		Moara Domneasca					
	Laza**	Laza	2,476		2,476		100.00%
		Sauca					
Cluster Husi	Husi	Husi	26,262	31,088	26,262	31,088	93.26%
	Lunca Banului	Stanilesti	4,826		4,826		0.00%
		Lunca Banului					
		Otetoaia					
	Negresti	Dumesti	5,359	5,359	5,359	5,359	80.04%
		Armaseni					
		Bacesti					
	Dumesti	Dumesti	4,220	4,220	4,220	4,220	0.00%
		Armaseni					
		Bacesti					
Cluster Barlad	Barlad	Barlad	54,977	63,750	54,977	63,750	95.87%
		Livada					
		Simila					
	Zorleni	Zorleni	4,220		4,220		49.72%
	Popeni	Popeni	2,370		2,370		0.00%
	Ivesti**	Ivesti	2,183		2,183		100.00%
	Murgeni	Murgeni	3,457	3,457	3,457	3,457	0.00%
Cluster Berezeni	Berezeni	Berezeni	3,198	3,198	3,198	3,198	0.00%
		Satu Nou					
	Falciu	Falciu	2,019	2,019	2,019	2,019	23.06%
	Vetrisoaia	Vetrisoaia	2,459	2,459	2,459	2,459	0.00%
	Iana	Iana	3,211	3,211	3,211	3,211	0.00%
		Silistea					
		Recea					
		Halaresti					
	Perieni	Perieni	2,828	2,828	2,828	2,828	16.18%

** It should be noted that Laza and Ivesti agglomerations (>2000 PE) are planning parallel investments via state/local budget and commit to be compliant by the end of the LIOP project. No works are included under LIOP for these two agglomerations, but they are part of clusters included in the project area.

2.2.1 Wastewater collection – All systems

Insufficient collection rate:

The current situation is described in detail in Chapter 4 of the FS. A summary table specifying connection rates and level of compliant treatment in 2023 and 2026 (with and without the project) is shown in Chapter 1.2.6, 1.2.7 *and in Annex 2 Apa, 2.1 Studiu de balanta apei*.

2.2.2 Wastewater treatment

- Vaslui agglomeration (68,423 PE)
  Vaslui city discharges to existing Vaslui WWTP (85,623 PE). The plant has been rehabilitated and modernized via SOP funds. Effluent parameters comply with EC UWWTD.
  Muntenii de Jos locality discharges to Muntenii de Jos WWTP (500 PE), which is non-compliant. Bacaoani locality discharges to Bacaoani WWTP (300 PE), which is non-functional and non-compliant.
- Valeni agglomeration (4,004 PE)
  Valeni locality has no wastewater network or treatment plant.
- Husi agglomeration (26,262 PE)
- Husi town discharges to existing Husi WWTP (35,000 PE). The plant has been rehabilitated and modernized via SOP funds. Effluent parameters comply with EC UWWTD 91/271/EEC.
- Lunca Banului agglomeration (4,826 PE)
  Lunca Banului locality has no wastewater network or treatment plant.
- Negresti agglomeration (5,359 PE)
  Negresti town has wastewater network and an ongoing SOP Phased project for the rehabilitation/modernization of the WWTP (7,350 PE). Commissioning date: Feb 2023
- Dumesti agglomeration (4,220 PE)
  Dumesti locality has no wastewater network or treatment plant.
- Barlad agglomeration (54,977 PE)
  Barlad town discharges to existing Barlad WWTP (77,698 PE). The plant has been rehabilitated and modernized via SOP funds. Effluent parameters comply with EC UWWTD 91/271/EEC.
  Simila locality will discharge to Simila WWTP (581 PE), recently commissioned (Nov 2022) PNDL project.
- Zorleni agglomeration (4,220 PE)
  Zorleni locality will discharge to Zorleni WWTP (1,560 PE), which is an on-going AFIR project. Commissioning date: Feb 2023
- Popeni agglomeration (2,370 PE)
  Popeni locality has no wastewater network or treatment plant.
- Murgeni agglomeration (3,457 PE)
  Murgeni locality discharges to Murgeni WWTP (2,200 PE), which is non-compliant, effluent parameters do not comply with EC UWWTD 91/271/EEC.
- Berezeni agglomeration (3,198 PE)
  Berezeni locality will discharge to existing Berezeni WWTP (1,545 PE), which is not functional, due to lack of house connections to the wastewater network.
- Falciu agglomeration (2,019 PE)
  Falciu locality discharges to Falciu WWTP (1,813 PE), which is non-compliant, effluent parameters do not comply with EC UWWTD 91/271/EEC.
- Vetrisoaia agglomeration (2,459 PE)
  Vetrisoaia locality has no wastewater network or treatment plant.
- Iana agglomeration (3,211 PE)
  Iana agglomeration has no wastewater network or treatment plant.
- Perieni agglomeration (2,828 PE)
  Perieni locality will discharge to Perieni WWTP (1,350 PE), which is non-compliant due to stricter discharge parameters requested by Apele Romane (N=7 mg/l, P=0.4 mg/l).

2.3 Industrial Wastewater Discharge

Currently, AQUAVAS operational area is composed from Vaslui City, Barlad City, Husi City, Negresti Town and Murgeni Town. Most of the economic agents are acting in commercial activities with small exceptions.

AQUAVAS is monitoring the quality of the wastewater on the inlet of the wastewater treatment plants. A database including type of activities of industrial agents and wastewater volumes (m^3/month) is presented in Chapter 5. The most important industrial agents are present below.

The most important industrial agents from Vaslui City are presented below. Organicly rich industries such as dairy, textile production, poultry slaughterhouse, oilseed processing; they all have pre-treatment facilities, ensuring the limit values are met for the quality indicators of wastewater discharged into the sewer network of the operator.

No	Industrial agents	Activity profile	Wastewater volumes (measured or estimated) m^3/month
1	SC VASTEX SA VASLUI	Textile production	7,150
2	SC ILVAS SA VASLUI	Dairy industry	2,500
3	SC PANCAR-PROD SRL	Textile production	184
4	SC SAFIR SRL – ABATOR PASARI	Bird slaughterhouse	9,063
5	SC CONFECTII VASLUI SA	Textile production	1,120
6	PENITENCIAR VASLUI	Penitentiary	8,000
7	SC ULEROM SA FABRICA	Food industry, oilseed processing	4,708
8	SC AUSTRIA JUICE ROMANIA SRL (Agrana Juice)	Production of juices from fruits and vegetables	1,122

The most important industrial agents from Husi City are presented below. Organicly rich alcohol production facility has pre-treatment, ensuring the limit values are met for the quality indicators of wastewater discharged into the sewer network of the operator.

No	Industrial agents	Activity profile	Wastewater volumes (measured or estimated) m^3/month
1	SC PROD-CYP IMPEX SRL	Meat production and preservation	379
2	SC ENACHE MORARIT SRL	Cultivation of cereals	296
3	SC PETAL SA	Manufacture of machinery for extraction and construction	323
4	SC VINCON SA	Manufacture of alcoholic beverages	464

The most important industrial agents from Barlad City and Murgeni Town are presented below. SC Rulmenti has a pre-treatment facility and low organic load.

No	Industrial agents	Activity profile	Wastewater volumes (measured or estimated) m^3/month
1	SC RULMENTI S.A	Production of bearings	27,651
2	SC FEPA S.A	Industrial machines and equipment	2,802
3	UM 01458	Defence	3,407
4	SPITALUL MUNICIPAL DE URGENTA ELENA BELDIMAN - PUT NORD	Hospital	1,483
5	SPITALUL MUNICIPAL DE URGENTA ELENA BELDIMAN - SECTIA PEDIATRIE I, II	Hospital	785

No	Industrial agents	Activity profile	Wastewater volumes (measured or estimated) m^3/month
6	SPITALUL MUNICIPAL DE URGENTA ELENA BELDIMAN - SECTIA PSIHIATRIE TBC	Hospital	932
7	LICEUL TEORETIC M. EMINESCU	High school	858
8	SC NEFROMED DIALYSIS CENTERS SRL	Health centre	697
9	SC CONFECTII-PUT	Textile industry	614
10	SC IRIS COMPANY S.A. BUCURESTI - PANIFICATIE 1+MOARA	Mill and bakery	590

Currently, there are no major issues regarding industrial wastewater discharge to sewage systems that are operated by the ROC. New contracts with economical agents will be signed, that will include new clauses to ensure that the polluter pays principle is applied for the project.

2.4 Wastewater Sludge

The sludge produced in the existing WWTPs operated by the ROC is currently dried to 22-24% DS and mainly sent to cover waste landfills sites. Although permits for agricultural use were obtained, up to date, no action has been taken to spread the sludge from the sewage treatment plants on the agricultural lands. The need for a long-term solution for the period after 2020 is reported as the main deficiency.

The future sludge management plan includes partial drying using a drying plant installed at Vaslui WWTP, with final disposal at Tasca Cement Factory (energy recovery), and partial agricultural use.

A letter of intent from Heidelberg Cement Romania (Jan 2023) can be found in Annex 6 of the FS. Sludge will be received by the cement factory with 90% DS. The co-processing fee is 0-5 euro/tonne.

Estimated sludge volumes are presented in chapter 6 of the FS (Table 7). The volumes of sludge from each WWTP is estimated according to the design data.

The options analysed and the proposed solution for sludge management are presented under Section 5.3 of the ACN.

Table 7 Estimated sludge quantities in WWTPs (t DS/year)

			2024	2025	2026	2030	2035	2040	2048
1	Vaslui WWTP (85,623 PE)	PE	72546	72012	74800	72093	68710	65326	59912
		tonnes DS/year	1006	999	1037	1000	953	906	831
		tonnes/year (24%DS)	4193	4162	4323	4166	3971	3775	3462
		m^3/year	4738	4703	4885	4708	4487	4266	3913
2	Barlad WWTP (77,968 PE)	PE	55769	58719	61668	59236	56196	53156	48292
		tonnes DS/year	774	814	855	822	779	737	670
		tonnes/year (24%DS)	3223	3393	3564	3423	3248	3072	2791
		m^3/year	3642	3835	4027	3868	3670	3471	3154
3	Husi WWTP (35,000 PE)	PE	31735	31412	31088	29896	28406	26916	24532
		tonnes DS/year	521	516	511	491	467	442	403
		tonnes/year (24%DS)	2369	2345	2321	2232	2121	2010	1832
		m^3/year	2677	2650	2623	2522	2396	2271	2070
4	Iana WWTP (3,149 PE)	PE	0	0	3149	3025	2870	2716	2468
		tonnes DS/year	0	0	52	50	47	45	41
		tonnes/year (24%DS)	0	0	235	226	214	203	184
		m^3/year	0	0	266	255	242	229	208
5	Berezeni WWTP (7,601 PE)	PE	1124	1124	7601	7305	6934	6564	5971
		tonnes DS/year	18	18	125	120	114	108	98
		tonnes/year (24%DS)	84	84	567	545	518	490	446
		m^3/year	95	95	641	616	585	554	504
6	Murgeni WWTP (3,407 PE)	PE	769	769	3407	3277	3114	2951	2690
		tonnes DS/year	13	13	56	54	51	48	44
		tonnes/year (24%DS)	57	57	254	245	232	220	201

			2024	2025	2026	2030	2035	2040	2048
		m^3/year	65	65	287	276	263	249	227
7	Perieni WWTP (2,828 PE)	PE	455	455	2828	2717	2578	2440	2218
		tonnes DS/year	7	7	46	45	42	40	36
		tonnes/year (24%DS)	34	34	211	203	193	182	166
		m^3/year	38	38	239	229	218	206	187
8	Dumesti WWTP (4,310 PE)	PE	4310	4265	4220	4053	3844	3635	3300
		tonnes DS/year	71	70	69	67	63	60	54
		tonnes/year (24%DS)	322	318	315	303	287	271	246
		m^3/year	364	360	356	342	324	307	278
9	Negresti WWTP (7,350 PE)	PE	5471	5415	5359	5151	4891	4632	4216
		tonnes DS/year	90	89	88	85	80	76	69
		tonnes/year (24%DS)	408	404	400	385	365	346	315
		m^3/year	462	457	452	435	413	391	356
10	Bacani WWTP	PE	650	650	650	650	650	650	650
		tonnes DS/year	11	11	11	11	11	11	11
		tonnes/year (24%DS)	49	49	49	49	49	49	49
		m^3/year	55	55	55	55	55	55	55
11	Laza WWTP	PE	383	383	0	0	0	0	0
		tonnes DS/year	6	6	0	0	0	0	0
		tonnes/year (24%DS)	29	29	0	0	0	0	0
		m^3/year	32	32	0	0	0	0	0
12	Muntenii de Jos WWTP (500 PE)	PE	137	137	0	0	0	0	0
		tonnes DS/year	2	2	0	0	0	0	0
		tonnes/year (24%DS)	10	10	0	0	0	0	0
		m^3/year	12	12	0	0	0	0	0

			2024	2025	2026	2030	2035	2040	2048
13	Bacaoani WWTP (300 PE)	PE	145	145	0	0	0	0	0
		tonnes DS/year	2	2	0	0	0	0	0
		tonnes/year (24%DS)	11	11	0	0	0	0	0
		m^3/year	12	12	0	0	0	0	0
14	Zorleni WWTP (2,400 PE)	PE	0	1560	1560	1560	1560	1560	1560
		tonnes DS/year	0	26	26	26	26	26	26
		tonnes/year (24%DS)	0	116	116	116	116	116	116
		m^3/year	0	132	132	132	132	132	132
15	Simila WWTP (750 PE)	PE	0	581	581	581	581	581	581
		tonnes DS/year	0	10	10	10	10	10	10
		tonnes/year (24%DS)	0	43	43	43	43	43	43
		m^3/year	0	49	49	49	49	49	49
	TOTAL	PE	173,495	177,627	196,911	189,544	180,334	171,127	156,390
		tonnes DS/year	2,522	2,584	2,886	2,778	2,643	2,508	2,292
		tonnes/year (22%-24%DS)	**10,789**	**11,056**	**12,399**	**11,936**	**11,357**	**10,778**	**9,851**
		m^3/year	**12,191**	**12,494**	**14,011**	**13,488**	**12,833**	**12,179**	**11,131**

3 Project Objectives

3.1 Strategic, Planning and Project Specific Objectives

The overall objective for the project is to continue the local development strategy for the Country's water and wastewater sector, in order to comply with the provisions of the European acquis and to comply with the commitments assumed through the environmental sector, in the context of the operational programme for 2014 – 2020 (AP 3 POIM/OT 6). The specific objectives of the Project are (within the operational area of the Beneficiary):

- Ensuring access of the public to water supply services in accordance with the Drinking Water Directive (DWD).
- Increasing the level of collection and treatment of wastewater in accordance with the Urban Wastewater Treatment Directive (UWWTD).
- Ensuring continued achievement of good water status in accordance with the Water Framework Directive.
- Improving the level of sludge management in all WWTP and DWTPs in the County.

JASPERS Comments

The obligations for adequate water and wastewater services are clearly defined and the objectives are compliant with Directive obligations. The project largely aims at the expansion and improvement of the efficiency of the operations of water supply and wastewater collection and treatment, which will ensure compliance to the requirements of the relevant EU Directives (98/83/EC and 91/271/EEC) and all other Regulations and national legislation in force.

No significant outstanding issues

3.2 Consistency with OP(s) and Expected Contribution to Priority Axis

The Project is consistent with the Large Infrastructure Operational Programme (LIOP), Priority Axis 3 "Development of environment infrastructure in terms of efficient management of resources, Specific Objective 3.2 "To increase the collection and treatment of urban waste water, and to ensure the supply of drinking water to the population". The project is also included in the List of major Projects financed through LIOP.

Table 8 Output indicators

Name of indicator	*Unit*	*Target value for the project*	*OP Target*	*Target year*
CO18: Water supply: Additional population served by improved water supply	*Persons*	**Total (2026): 98,694** 57,606 newly connected, 41,088 water quality and supply security improvements **Total (2023): 38,962** 18,318 newly connected, 20,644 water quality and supply security improvements	*3,300,000*	*2023*
CO19: Wastewater treatment: Additional population served by improved wastewater treatment	*Population equivalent*	**Total: 43,656 (2026)** 42,842 newly connected, 814 improved treatment **Total: 9,559 (2023)** 9,559 newly connected	1,870,000	2023

A detailed calculation of CO18 and CO19 indicators is provided in the annexes to the Application Form.

JASPERS Comments

The objectives and components of the project are seen as compatible with the defined investment priorities (6) set out in the Operational Programme and hence are seen as eligible for financial support from the Cohesion Fund.

The presented CO18 and CO19 indicators are consistent across the project documents and appear to be realistic and justified.

No significant outstanding issues

3.3 Contribution to Socio-Economic Development

The project contributes to socio-economic development, as a result of the following:

- Improved access to quality drinking water services and wastewater collection and treatment services in terms of availability, reliability and quality of service;
- Improved quality of underground and surface water bodies;
- Expected economic growth and overall development of the area;
- Resource savings;
- Improved hygiene and health of the population; by ensuring their access to quality drinking water supply as well as wastewater collection and treatment, the risk of illness of the population in the project area will be decreased and their quality of life will be improved;
- Creation of jobs during the implementation of the Project, the execution of works and the operation phase: (101 permanent new jobs and 500 temporary jobs during construction).

JASPERS Comments

The project will have a clear positive contribution to socio-economic development through improved and reliable water supply and wastewater services. Reduced pollution of underground and surface water bodies will have a positive impact on the environment, public health and finally on the commercial development of the region. The project activities should reduce barriers for commercial development and enable additional jobs and income to be generated.

The AF section B.4.3 mentions 101 new permanent jobs created although in the CBA this is assumed as 62. This discrepancy is not significant for the assessment of the project and might be clarified between the MA and the EC services.

No significant outstanding issues

3.4 Measures to Ensure Optimal Utilization of the Project

The Beneficiary has previous experience in implementing and operating projects of similar nature, benefiting from projects financed from European funds for investments or increasing of institutional capacity.

Based on the previous experience of accessing and using European funds, the regional operator is structured to allow the allocation of human resources in order to manage EU projects.

As a beneficiary of SOP 2007-2013 project, a project implementation unit (PIU) has been established within the company in which 26 permanent employees with responsibilities in project preparation and management work. In order to strengthen the PIU's capacity to implement the project, two technical assistance for project management and supervision of the execution of works will be contracted.

Given the increase of the operating area of the ROC and the new infrastructure that will be operated, apart from the PIU, the operating staff will have an active role in the implementation phase of the project. Based on the ROC's estimate, 78 additional personnel will be required to supplement the existing personnel.

Important support for strengthening and improving technical and operational capacity will come through the TA service contract (part of LIOP project), which will consider the development of strategies and action plans that are absolutely necessary for: protecting water sources, efficient management of water network losses and infiltration / exfiltration to / from sewerage, industrial wastewater, sludge management, asset management, but also management assurance, through modern and efficient management systems (GIS; hydraulic modelling, SCADA).

The project is shown to optimise system operations as follows:

- Resource efficiency: The choice of water sources was made in a sustainable way, with the identification of solutions that do not lead to overexploitation of resources. Rehabilitation works on water supply systems will help reduce losses and thus the efficient use of resources, as well as a measure of adaptation to the effects of climate change.
- Replacement of water supply pipes will lead to more reliable supply insuring the necessary flow and pressure to the consumers, while providing compliant health safe drinking water; replacement of hydraulic dysfunctional sewers.
- Integration of new assets into the new SCADA environment and purchase of additional machinery, smart water meters, leak detection and CCTV equipment will support the sustainable operation. This will also allow a more strategic approach to system maintenance and replacement to be made.
- Sufficient operating and maintenance costs have been considered for the financial analysis and tariff considerations allowing a sustainable operation of the system.
- Extension and pipe replacement: costs for service connections up to the property border are included in the budget.
- Further development of an organisational structure that will allow for a better management of the operational activities to be carried out at the local level and the major activities and expert services to be carried out at the regional level.
- Facilitating the implementation of the strategy and action plan developed for sludge management, waste management, industrial wastewater management and water protection/
- Strengthening the ability of the ROC to efficiently manage the modern water and wastewater systems.

JASPERS Comments

The measures described within the Application Documents to optimise operational efficiencies and to ensure the optimal utilisation of the project include:

- The measures envisaged effectively strengthen the operational efficiency of the project and are clearly defined and seen as plausible.
- Legislation requires users to connect to the water supply and sewerage system where they exist so the risk of inefficient use of the assets is considered low.
- A rational O&M plan has been prepared for all assets, presenting the costs of the major water and wastewater components up until the end of the operational period. The purchase of necessary O&M equipment to cover operational needs, the measures to increase staff efficiency as well as the enhancement of the SCADA system are considered reasonable for ensuring the optimal utilisation of the infrastructure in the operational phase.

The measures described to optimise operational efficiencies are seen plausible and justified. It is expected that the investments in water supply will substantially improve the quality and reliability of water and wastewater services and as such lead to improved customer satisfaction and reduced operational costs.

No significant outstanding issues

4 Demand Analysis

4.1 Current Demand Analysis / Base Case

Total annual billed consumption in the water supply area of the Regional Operator has risen slightly over the last three years (2019-2021), from 5.5 to 5.8 million m^3/a, mainly due to a slow rise in connection rate. Of this, about 23% is estimated as non-domestic, whereas average consumption for domestic consumers is also stable in the range 100-103 l/c/d. Note that about 58% of the population served are considered in "urban" areas, and connection for the residual "rural" areas starts from 2023, with lower foreseen consumption rates, initially around 75-80 l/c/d.

Similar outcomes are seen for the wastewater, although note that the supply area is smaller, amounting to about 73% of the population than that of the water supply area.

The historic water and wastewater volumes and main indicators are shown in the table below:

Table 9 Historical water and wastewater demand

Category	Unit	2019	2020	2021
Population, water service area	no.	246,696	244,126	244,557
Population connected (water supply)	no.	113,314	117,160	121,006
Connection rate (water supply)	%	45.9%	48.0%	50.1%
Per capita water consumption	l/c/d	100	103	103
Domestic water consumption	m^3/year	4,129,898	4,407,363	4,552,043
Non-domestic water consumption	m^3/year	1,357,898	1,277,481	1,270,150
Total water sales (invoiced)	m^3/year	5,487,796	5,684,844	5,822,193
Total water production	m^3/year	12,777,727	12,464,473	12,091,520
Population, wastewater service area	no.	180,639	178,757	176,876
Population connected (wastewater)	no.	95,831	102,726	109,621
Connection rate (wastewater)	%	53.1%	57.5%	62.0%
Per capita wastewater consumption	l/c/d	103	103	103
Domestic wastewater consumption	m^3/year	3,597,071	3,847,568	4,105,813
Non-domestic wastewater consumption	m^3/year	3,107,908	2,735,708	3,230,360
Total wastewater (invoiced)	m^3/year	6,704,979	6,583,276	7,336,173
Total wastewater treated	m^3/year	11,911,995	11,858,491	12,679,587

It is foreseen that further increase in both domestic and non-domestic consumption will be achieved in the 2022-2023 period mainly due to additional connections through the phased SOP investments.

4.2 Future Demand Analysis

The future demand projections follow a conventional approach with forecasts made of key factors including population growth, specific household consumption, connection rates, non-household sales, non-revenue water, stormwater and infiltrations. The future demand in both project scenarios is impacted both by: 1) the SOP project and its phased components (implemented up to 2023); and 2) new investments from the current project (shown as operational in 2024-2026).

4.2.1 Demographic and Economic Projections

Over the last three years, population in the service zone of the Regional Operator shows an annual decline of about 1% per annum. This forecast is projected to continue at -1% to -1.2% pa, throughout the projection period, resulting in an overall decline in population of around 28%. This is consistent with official forecasts by the National Institute of Statistics ("Proiectarea populatiei Romaniei in profil territorial la orizontul 2060"), as relevant to Vaslui.

4.2.2 Demand Projections for Financial Appraisal

Domestic consumption

Domestic water consumption is forecast as a function of the projected population decline and an expected eventual increase in per capita demand. Average specific household consumption is expected to decrease in 2026 to around 91 l/c/d due partly to price elasticity of demand, but also as a result of new connections to more "rural" areas, which are foreseen to have a lower initial consumption. By 2035, average consumption has returned to 99 l/c/d, similar to current levels, and after which, income elasticity is the driving force causing an estimated demand of 112 l/c/d by 2050. The forecast flow of domestic wastewater builds on that for the water demand, with the similar underlying assumptions. Actual wastewater consumption appears slightly higher than water, reflecting that the smaller service area is focused on higher income areas.

Non-domestic consumption

Non-domestic water consumption projections assume a project related increase of about 16% for water and 5% for wastewater in the years 2023-2026, but thereafter decline at a rate of 0.7% per annum, being a slightly lower decline than that of population forecast, which is the driving factor, slightly offset by some expected growth in GDP. From 2026, non-domestic consumption is expected a rate of about 20% of total water billed.

The forecasted water and wastewater volumes and main indicators as included in Chapter 7 of the FS and the financial model are shown in the table below:

Table 10 Future water and wastewater demand

		2026	2035	2050
Population, water service area	no.	229,134	208,935	175,353
Population connected (water)	no.	228,789	208,621	175,090
Connection rate (water)	%	99.8%	99.8%	99.8%
Per capita water consumption	lcd	91	99	112
Domestic water consumption	m^3/year	7,570,886	7,509,798	7,161,544
Non-domestic water consumption	m^3/year	1,807,016	1,688,183	1,490,483
Total water (invoiced)	m^3/year	9,377,902	9,197,981	8,652,027
Total water production	m^3/year	13,549,455	14,228,840	14,924,106
Population, wastewater service area	no.	167,759	153,148	128,854

Population connected (wastewater)	no.	166,012	152,015	128,616
Connection rate (wastewater)	%	99.0%	99.3%	99.8%
Per capita wastewater consumption	lcd	94	102	116
Domestic wastewater consumption	m^3/year	5,687,025	5,656,455	5,425,867
Non-domestic wastewater consumption	m^3/year	2,886,791	2,714,878	2,428,798
Total wastewater (invoiced)	m^3/year	8,573,816	8,371,333	7,854,664
Total wastewater treated	m^3/year	14,362,640	15,518,876	16,964,802

JASPERS Comments

Demographic projections

Overall, the forecasted population decline of about 28%, at county level, over the reference period is regarded as plausible, following recent trends and coherent with National Institute of Statistics (INS) projections. Vaslui is a relatively under-developed area on the border with the Republic of Moldova and is expected to suffer ongoing loss of population to regional centres, such as Iasi, as well as Bucharest and the wider EU.

Current and future demand analysis

The project documentation provides sufficient information for the existing demand and connectivity levels, as a basis for projections for both for domestic and non-domestic users. Per capita average household demand is within the expected ranges (starting 100 l/c/d, ending 112 l/c/d) and is forecast using reasonable price and income elasticity factors. Non-domestic demand, at about 20% of the invoiced quantities, is also within expected ranges for an area with limited industrial activity. Non-domestic demand also declines, but at a lower rate, allowing for some impact of forecast rising GDP.

It is noted that the new connections stated in the AF as being due to Phase 1 are not shown in the model until 2024 (being CO18 newly connected of about 18,300 and CO19 of about 9,500). Either this is a conservative assumption for the model, or more likely it is not intentional and the new connections should impact in 2023. Early (by one year) impact of the connections would only marginally improve sustainability and would not materially impact any other financial indicator.

No significant outstanding issues

5 Options Analysis

The solutions proposed in the Project are based on an Options Analysis (OA). A combination of cost considerations and an analysis of technical, operational, environmental, climate change impact and resilience of alternative options have been applied to identify the most appropriate investments to be included in the proposed project. The option selection was made taking into account all these criteria and especially the Net Present Value calculated for each option.

OA has been carried out for the two main components of the project: water supply systems (WSS) and wastewater systems. The detailed OA is presented in Chapter 8 of the FS and its supporting annexes.

5.1 Summary of the Water Supply Systems Options Analysis

To establish the options to be analysed for the WSS/WSZs, the existing water sources were assessed in relation to water quality, water quantity (long-term availability according to future water demand) and vulnerability to any potential accidental pollution. Hydrogeological studies were performed for these assessments to try to identify new water sources needed to ensure current and future demand, and to establish new WSS/WSZs in the localities where, at present, no such system exists.

For each locality, different technical solutions to supply the needed quality and quantity of water to meet future demand were compared (on the basis of their first investment and O&M costs). In this context; 'centralised' (regional) option versus a 'decentralised' (local) option are compared. The detailed calculations (Excel files) for each WSS/WSZ options analysis is presented in Annex 8.1 of the FS.

In line with deficiencies identified in Chapter 4 of the FS, there are 16 WSS/WSZs that need improvements for compliance. Alternative options were analysed for all WSSs included in the project.

A summary table for the strategic options assessed including investment costs, operating costs and NPV values at 4% discount rate is presented in Table 11. Please take into account that the investment cost does not reflect the exact investment. It only compares the different elements of the options. At options analysis stage, the investment components that are the same in both options are not reflected to the costs. Separately, the technological OA is carried out for treatment plants and least-cost solutions are selected.

Note: The selected option (least-cost solution) is highlighted in Table 11.

Table 11 Summary of WSS Options Analysis

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
1	Vaslui WSS – Minjesti WSZ	Centralized – Connection to Vaslui WSZ	255,173	18,648	443,593
		Decentralized – Extension of underground water source & local treatment (1 DWTP)	599,039	45,592	1,134,307
2	Vaslui WSS – Fundu Vaii WSZ	Centralized – Connection to Vaslui WSZ	368,946	21,533	563,200
		Decentralized – Construction of underground source & local treatment (1 DWTP)	752,622	63,851	1,509,001
3	Vaslui WSS – Bogdana WSS	Centralized – Connection to Vaslui WSZ	643,383	50,992	1,192,977
		Decentralized – Extension of underground water source	406,306	28,135	762,071
4	Vaslui WSS – Fundu Vaii WSZ connection to Vaslui	Centralized – Connection to Vaslui WSZ	368,946	21,533	563,200
		Centralized – Connection to Bogdana WSS	504,949	31,830	786,830

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
	WSS or Bogdana WSS				
5	Vaslui WSS – Tanacu and Benesti localities	Centralized – Construction of underground source & local treatment (1 DWTP) in Benesti	1,113,577	84,159	2,067,785
		Decentralized - Construction of underground source in Benesti, extension of underground water source in Tanacu & local treatment (2 DWTPs) in Tanacu and Benesti	1,528,560	102,702	2,723,606
6	Vaslui WSS – Valeni WSS and Feresti	Decentralized - Construction of underground source in Feresti, extension of underground water source in Valeni & local treatment (2 DWTPs) in Feresti and Valeni	2,262,839	360,652	6,507,223
		Centralized – Connection of Feresti to Valeni WSS, with extension of underground water source in Valeni & local treatment (1 DWTP) in Valeni	2,035,827	368,568	6,363,563
7	Vaslui WSS – Muntenii de Sus WSZ and Satu Nou WSZ	Decentralized - Extension of underground water sources in Muntenii de Sus and Satu Nou & local treatment (2 DWTPs)	880,978	70,585	1,706,650
		Centralized – Connection of Muntenii de Sus and Satu Nou WSZ's to Vaslui WSS	320,282	39,458	770,624
8	Vaslui WSS – Tanacu WSZ	Decentralized - Extension of underground water sources & local treatment (1 DWTP)	1,433,859	108,017	2,626,267
		Centralized – Connection of Tanacu WSZ to Vaslui WSS	689,574	65,857	1,400,365
9	Vaslui WSS – Valeni WSZ and Feresti WSZ	Decentralized - Extension of underground water source & local treatment (1 DWTP)	2,725,401	418,824	7,551,096
		Centralized – Connection of Valeni and Feresti WSZ's to Vaslui WSS	1,871,872	127,111	3,075,169
10		Centralized – Connection of Bahnari WSZ to Vaslui WSS	255,198	18,072	440,410

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
	Vaslui WSS – Bahnari locality	Decentralized - Construction of underground source & local treatment (1 DWTP) in Bahnari	681,477	60.041	1,385,066
11	Vaslui WSS – Maraseni WSZ and Zapodeni WSZ	Centralized – Connection of Maraseni and Zapodeni WSZ's to Vaslui WSS	1,364,674	71,581	1,888,461
		Decentralized - Extension of underground water sources in Maraseni and Zapodeni & local treatment (2 DWTPs)	1,766,104	319,529	5,596,734
12	Vaslui WSS – Stefan cel Mare WSZ and Barzesti WSZ	Centralized – Connection of Stefan cel Mare and Barzesti WSZ's to Vaslui WSS	2,233,189	106,145	2,985,824
		Decentralized - Extension of underground water source & local treatment (1 DWTP) in Stefan cel Mare	2,702,104	213,872	4,833,693
13	Vaslui WSS – Balteni WSZ and Chetresti WSZ	Centralized – Connection of Balteni and Chetresti WSZ's to Vaslui WSS	2,808,729	125,071	3,699,598
		Decentralized - Extension of underground water sources in Balteni and Chetresti & local treatment (2 DWTPs)	3,488,858	245,462	5,937,192
14	Vaslui WSS – Delesti WSZ and Harsova WSZ	Centralized – Connection of Delesti and Harsova WSZ's to Vaslui WSS	3,752,891	172,822	5,032,051
		Decentralized - Extension of underground water sources in Delesti and Harsova & local treatment (2 DWTPs)	3,995,192	305,521	7,087,535
15	Vaslui WSS – Cozmesti WSZ	Centralized – Connection of Cozmesti WSZ to Vaslui WSS	4,511,300	225,863	6,282,688
		Decentralized - Construction of underground source & local treatment (1 DWTP) in Cozmesti	4,820,684	300,675	7,612,536
16	Vaslui WSS – Osesti WSZ	Centralized – Connection of Osesti WSZ to Vaslui WSS	4,969,021	255,671	6,922,790
		Decentralized - Extension of underground water source & local treatment (1 DWTP) in Osesti	4,957,048	288,449	7,482,636
17		Centralized – Connection of Padureni WSZ to Vaslui WSS	5,049,309	272,527	7,214,997

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
	Vaslui WSS – Padureni WSZ	Decentralized - Extension of underground water source & local treatment (1 DWTP) in Padureni	5,567,220	325,604	8,464,563
18	Vaslui WSS – Buda WSZ	Centralized – Connection of Buda WSZ to Vaslui WSS	5,464,084	315,258	8,169,107
		Decentralized - Extension of underground water source & local treatment (1 DWTP) in Buda	5,701,189	362,894	9,058,984
19	Vaslui WSS – Rafaila WSZ	Centralized – Connection of Rafaila WSZ to Vaslui WSS	6,452,934	355,814	9,399,169
		Centralized – Connection of Rafaila WSZ to Negresti WSS	6,043,838	347,141	9,047,479
20	Vaslui WSS – Ivanesti WSZ and Pungesti WSZ	Decentralized - Construction of underground water sources in Ivanesti and Pungesti & local treatment (2 DWTPs)	1,633,317	367,860	6,153,177
		Centralized – Extension underground water sources in Pungesti & local treatment (1 DWTPs); connect Ivanesti to Pungesti	2,155,299	244,982	4,844,530
21	Vaslui WSS – Connect Ivanesti/Pungesti WSZ to Vaslui WSS	Decentralized – Extension underground water sources in Pungesti & local treatment (1 DWTPs); connect Ivanesti to Pungesti	2,155,299	244,982	4,844,530
		Centralized – Connection of Ivanesti/Pungesti WSZ to Vaslui WSS	2,090,119	88,861	2,662,204
		Centralized – Connection of Ivanesti/Pungesti WSZ to Secuieni WSS, Bacau County	4,895,522	764,937	13,098,515
22	Vaslui WSS – Laza WSZ	Decentralized – Extension underground water sources in Laza & local treatment (1 DWTPs)	561,823	73,839	1,492,773
		Centralized – Connection of Laza WSZ to Vaslui WSS	601,914	49,506	1,639,552
23	Husi WSS – connection of Epureni	Decentralized – Individual underground water sources & local treatment (3 DWTPs)	1,913,783	306,423	5,697,060

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
	WSZ, Duda WSZ and Valea Grecului WSZ	Centralized – Connection of Epureni WSZ, Duda WSZ and Valea Grecului WSZ to Husi WSS	1,159,297	65,186	1,700,433
24	Husi WSS – connection of Stanilesti WSZ and Lunca Banului WSZ	Decentralized – Individual underground water sources & local treatment (2 DWTPs)	676,261	248,542	3,907,975
		Centralized – Connection of Stanilesti WSZ to Lunca Banului WSS - underground water source & local treatment (1 DWTPs)	1,700,316	228,313	4,381,534
		Centralized – Connection of Stanilesti WSZ and Lunca Banului WSZ to Husi WSS	949,379	78,014	1,688,129
25	Husi WSS – connection of Falciu WSZ	Centralized – Connection of Bozia, Copaceanca, Bogdanesti and Ranzesti to Falciu WSS - underground water source & local treatment (1 DWTPs)	2,878,685	249,910	5,474,859
		Mixed – Individual underground water sources & local treatment (2 DWTPs) for Falciu (Falciu, Bozia, Copaceana) and Bogdanesti (Bogdanesti, Odaia Bogdana, Ranzesti)	2,813,052	276,724	5,855,853
26	Husi WSS – connection of Falciu WSZ to Murgeni WSS	Decentralized - Extension of underground water sources in Falciu and Carja & local treatment (2 DWTPs)	3,430,879	334,368	6,921,172
		Centralized – Connection of Falciu and Carja to Murgeni WSS – extension of underground water source & local treatment (1 DWTP)	4,190,931	220,031	5,990,145
		Centralized – Construction of new surface water intake from Prut River for Falciu and Carja & new local treatment (1 DWTP)	4,052,681	231,351	6,011,813
27	Husi WSS – connection of Falciu WSS to Elan lake water	Decentralized – Extension of existing water sources and treatment (DWTPs) to supply Tupilati, Peicani, Murgeni, Raiu, Carja, Falciu	5,675,926	553,306	12,447,479

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
	source versus connection to Murgeni WSS	Centralized – connection to new surface water source (Posta Elan Lake) to supply Tupilati, Peicani, Murgeni, Raiu, Carja, Falciu	8,991,274	395,595	11,901,893
		Mixed – extension of Murgeni water source and treatment to supply Murgeni, Raiu, Carja and Falciu and extension of existing water sources and treatments for supply of Tupilati and Peicani	5,357,055	359,069	8,745,026
		Centralized – Extension of Murgeni water source and treatment to supply Tupilati, Peicani, Murgeni, Raiu, Carja, Falciu	6,391,475	388,974	9,825,878
28	Husi WSS – connection of Falciu WSS to Barlad WSS or Husi WSS versus connection to Murgeni WSS	Decentralized - Extension of existing water sources and treatment (DWTPs) for WSS Husi – Lunca Banului, WSS Vetrisoaia, WSS Murgeni – Raiu – Carja – Falciu and WSS Barlad – Zorleni – Simila - Popeni	7,408,489	545,191	12,628,769
		Centralized - Extension of existing water sources and treatment (DWTPs) for WSS Husi – Stanilesti - Lunca Banului – Vetrisoaia - Falciu, WSS Murgeni – Raiu – Carja and WSS Barlad – Zorleni – Simila - Popeni	8,819,646	369,036	11,207,096
		Centralized - Extension of existing water sources and treatment (DWTPs) for WSS Husi – Stanilesti - Lunca Banului, WSS Vetrisoaia and WSS Barlad – Zorleni – Simila – Popeni - Murgeni – Raiu – Carja - Falciu	9,782,150	408,904	12,353,277
29	Husi WSS – connection of Husi WSS, Falciu WSS, Murgeni WSS, Berezeni WSS,	Decentralized - Extension of existing water sources and treatment (DWTPs) for WSS Husi – Stanilesti - Lunca Banului, WSS Vetrisoaia, WSS Berezeni and WSS Murgeni – Raiu – Carja - Falciu	6,497,459	477,416	11,134,004
		Centralized - Extension of existing water sources and treatment (DWTPs) for WSS Husi – Stanilesti - Lunca Banului, WSS Vetrisoaia -	7,053,594	409,611	10,742,282

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
	Vetrisoaia WSS	Berezeni and WSS Murgeni – Raiu – Carja - Falciu			
		Centralized - Extension of existing water sources and treatment (DWTPs) for WSS Husi – Stanilesti - Lunca Banului, WSS Murgeni – Raiu – Carja - Falciu - Vetrisoaia and WSS Berezeni	6,963,040	417,118	10,612,591
		Centralized - Extension of existing water sources and treatment (DWTPs) for WSS Husi – Stanilesti - Lunca Banului – Vetrisoaia - Falciu, WSS Murgeni – Raiu – Carja and WSS Berezeni	7,863,887	335,530	10,120,636
		Centralized - Extension of existing water sources and treatment (DWTPs) for WSS Husi – Stanilesti - Lunca Banului, WSS Vetrisoaia - Falciu, WSS Murgeni – Raiu – Carja and WSS Berezeni	7,322,964	560,002	12,851,122
30	Husi WSS – Dimitrie Cantemir area (Grumezoa, Urlati, Plotonesti, Hurdugi and Gusitei)	Decentralized - Extension of existing water sources and treatment (3 DWTPs) for WSS Dimitrie Cantemir - Grumezoaia – Urlati - Plutonesti, WSS Hurdugi and WSS Gusitei	1,977,956	164,820	5,812,636
		Centralized - Extension of existing water source and treatment (1 DWTP) for WSS Dimitrie Cantemir - Grumezoaia – Urlati – Plutonesti - Hurdugi - Gusitei	2,020,871	112,062	2,920,941
31	Husi WSS – Hoceni area (Hoceni, Siscani and Tomsa)	Decentralized – supply of WSS Hoceni and WSS Siscani from individual water sources.	1,741,518	160,799	3,657,086
		Centralized – supply of Hoceni, Siscani and Tomsa from Hoceni water source	1,044,939	113,835	2,430,948
32	Husi WSS – Padureni area	Decentralized – supply of WSS Padureni, WSS Rusca and WSS Leosti (Leosti-Davidesti-Capotesti) from individual sources	1,531,660	60,826	6,514,964
		Centralized – supply of WSS Padureni (Padureni-Rusca-Leosti-	1,399,213	100,649	2,506,009

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
		Davidesti-Capotesti) from Padureni water source			
		Centralized – connection of WSZ Padureni (Padureni-Rusca-Leosti-Davidesti-Capotesti) to Husi WSS	436,241	47,324	1,477,756
33	Husi WSS – Dimitrie Cantemir, Hurdugi and gusitei area	Decentralized – supply of WSS Dimitrie Cantemir form individual source	2,457,112	148,901	3,944,159
		Centralized – connection of Dimitrie Cantemir, Hurdugi and Gusitei to Husi WSS	2,375,239	105,691	3,087,515
34	Husi WSS – Hoceni area	Decentralized – supply of WSS Hoceni form individual source	3,420,178	220,770	5,199,638
		Centralized – connection of WSZ Hoceni to Husi WSS	2,699,967	143,521	3,820,968
35	Negresti WSS – Bacesti and Dumesti areas	Centralized – construction of new underground water source and DWTP in Dumesti	1,546,653	125,477	2,971,236
		Decentralized – supply of Bacesti WSS and Dumesti WSS from individual sources	1,280,981	184,271	3,398,970
36	Negresti WSS – connection of Bacesti and Dumesti areas to Negresti WSS	Centralized – connection of Dumesti WSS and Rafaila WSS to Negresti WSS	359,649	92,985	1,462,010
		Decentralized – individual water source for Dumesti WSS	1,546,653	125,477	2,971,236
37	Codaesti WSS	Centralized – new underground water source in Pribesti and new DWTP	2,496,609	263,711	5,462,257
		Decentralized – new underground water sources for Pribesti and Tacuta and extension of Codaesti water source for Codaesti and Rediu Galian	2,906,080	231,825	5,560,596
38	Connection of Codaesti WSS and	Decentralized – individual water sources for Codaesti WSS and Miclesti WSS	19,861,638	574,646	22,196,955

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
	Miclesti WSS to Timisesti-Iasi WSS	Centralized – connection of Pribesti, Codaesti, Tacuta, Miclesti and Popesti to WSS Timisesti-Iasi	20,339,820	649,112	23,165,112
		Centralized – connection of Codaesti and Miclesti to Solesti WSS with new DWTP	20,056,106	661,405	23,196,573
		Mixed – connection of Codaesti to ND 300 mm proposed transmission main from WSS Timisesti-Iasi and individual water source for Miclesti WSS	20,256,324	589,213	22,542,321
		Mixed – connection of Codaesti to ND 250 mm proposed transmission main from WSS Timisesti-Iasi and individual water source for Miclesti WSS	20,185,937	592,221	22,540,890
39	Rebricea WSS	Centralized – supply of Rebricea WSS from extension of Draxeni underground water source with new DWTP	681,125	86,528	1,727,387
		Decentralized – extension of individual underground water sources and treatment (2 DWTP's) for Rebricea and Draxeni	991,786	125,193	2,527,332
40	Connection of Rebricea WSS to Timisesti-Iasi WSS	Decentralized – supply of Rebricea WSS from extension of Draxeni underground water source with new DWTP	8,624,000	231,825	9,409,089
		Centralized – supply of WSZ Rebricea, WSZ Draxeni, WSZ Craciunesti and WSZ Tatomiresti from Timisesti-Iasi WSS	9,182,378	330,272	10,905,440
41	Miclesti WSS	Centralized – extension of Miclesti water source and new DWTP and chlorination plant for Popesti	990,185	70,027	1,796,047
		Decentralized – extension of Miclesti water source and new DWTP's in Miclesti and Popesti	1,136,423	151,237	2,990,029
42	Barlad WSS – Bacani WSZ	Centralized – new water source and DWTP in Baltateni for the entire system	1,436,272	115,206	2,663,881
		Decentralized – new water source in Baltateni, new water source in	1,885,568	230,903	4,619,346

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
		Suseni-Vulpaseni and new DWTP in Bacani			
		Mixed – new water source in Baltateni + transmission main to GA Bacani and new water source in Suseni-Vulpaseni and new DWTP in Bacani	1,787,762	49,876	3,669,589
		Centralized – connect the entire WSZ to Barlad WSS	1,569,024	52,916	1,833,100
		Centralized – new water source and DWTP in Alexandru Vlahuta for the entire system	2,090,866	60,812	2,408,172
		Centralized – new water source and DWTP in Perieni for the entire system	2,817,396	77,862	3,054,277
43	Barlad WSS – Fruntisani WSZ	Decentralized – extension of water source and new DWTP for Fruntiseni WSZ	551,645	73,338	1,424,905
		Centralized – connect Fruntiseni WSZ to Barlad WSS	968,696	35,669	1,173,251
44	Barlad WSS – Zorleni WSZ	Centralized – connect Zorleni WSZ to Barlad WSS	1,223,574	57,884	1,610,521
		Decentralized – individual water sources and DWTP's	1,634,129	252,933	4,704,079
		Mixed – connect Simila and Zorleni to Barlad WSS and existing DWTP at Popeni	1,240,467	106,961	2,376,592
45	Barlad WSS – Ivesti WSZ	Decentralized – individual existing water source and DWTP in Satul Nou	551,976	60,972	1,286,635
		Centralized – connect Ivesti WSZ to Barlad WSS	1,327,088	40,140	1,452,458
46	Murgeni WSS	Decentralised – extension of Murgeni, Carja and Raiu water sources	1,809,994	284,255	5,266,059
		Mixed – extension of Murgeni water source for Murgeni and Carja and extension of Raiu water source for Raiu	1,903,994	226,987	4,334,541
		Centralized – connect Carja and Raiu to Murgeni WSS, with	2,043,723	175,279	3,905,710

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
		extension of Murgeni water source and DWTP			
47	Bogdanesti WSS	Centralized – extension of Bogdanesti water source to supply Bogdanesti, Orgoiesti and Buda	1,126,339	28,120	1,961,741
		Decentralized – 1 WSS for Bogdanesti-Visinari-Vladesti and 1 WSS for Buda-Orgoiesti	874,774	70,356	1,684,160
		Decentralized – 1 WSS from Dinga water source to supply Bogdanesti-Visinari-Vladesti and 1 WSS for Buda-Orgoiesti	1,294,534	55,686	1,749,159
		Decentralized – 1 WSS from Dinga water source to supply Bogdanesti-Visinari-Vladesti and 1 WSS for Buda-Orgoiesti	1,258,699	56,135	1,750,953
48	Dodesti WSS	Decentralized – extension of existing water sources in Dodesti and Urdesti, chlorination plant in Dodesti and DWTP in Urdesti	767,860	75,671	1,661,643
		Centralized – extension of Dodesti water source and chlorination plant in Dodesti	690,227	48,448	1,119,159
49	Iana WSS	Decentralized – extension of Iana water source for Vadurile, Halaresti and Tomesti. Extension of Silistea-Recea water source in Iana, new water source in Silistea, new chlorination plant for WSS Iana and WSS Silistea-Recea	674,194	72,415	1,478,931
		Centralized – extension of Iana water source to supply Iana, Halaresti, Vadurile, Silistea-Recea, Tomesti	707,240	59,057	1,339,656
50	Murgeni WSS – connection to Beresti WSS (Galati County)	Decentralized – individual water source for Murgeni WSS	For this system, no NPV calculation was made, as Beresti WSS is 29.9 km away. Also, there are at last 200 m level difference between the two systems, which means at least 2 pumping stations.		
		Centralized – connection of Murgeni WSS to Beresti WSS (Galati County)			
51	Fruntiseni WSS –	Centralized – connection of Fruntiseni WSS to Barlad WSS	For this system, no NPV calculation was made, as Beresti WSS is 16.5 km away.		

OA	WSS/WSZ	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
	connection to Beresti WSS (Galati County)	Centralized – connection of Fruntiseni WSS to Beresti WSS (Galati County)	Also, there are 172 m level difference between the two systems, which means at least 2 pumping stations.		

Also, option analysis as do nothing versus rehab is carried out for the total of 46.15 km rehabilitation component in four cities (Vaslui, Barlad, Husi and Murgeni). Detailed excel files and NPV calculations are presented under Annex 8.3 of the FS.

JASPERS Comments

Given the described deficiencies, objectives and proposed technical solutions, the presented option analysis is considered as sufficient to ensure that the chosen solutions are acceptable. CAPEX and OPEX are within expectations and the range of options is sufficiently comprehensive.

A risk assessment considering climate change, environmental and social factors is included in the option analysis. A reasoned argument is put forward for the selected option. Within this general statement, the following comments are of note concerning the individual aspect of the presented analysis:

- Vaslui WSS: The aim of this detailed OA exercise is to find the most cost-efficient solution between Vaslui WSS and neighbouring WSSs. In other words, to find the cut-off point between the localities demonstrating which centralized system they should join. Minjesti, Fundu Vaii, Muntenii de Sus, Satu Nou, Tanacu, Valeni, Feresti, Balteni, Chetresti, Delesti, Harsova, Cozmesti, Osesti, Padureni, Buda, Ivanesti/Pungesti: Connecting to Vaslui DWTP has lower operational costs and lower NPV values. The Rafaila locality will join Negresti WSS that has a lower NPV. Bogdana has a compliant water source, therefore it will be a stand-alone system. The Fundu Vaii locality has a lower NPV when connecting to Vaslui's centralized system when compared to the Bogdana system. The Pungesti and Ivanesti localities have lower NPVs when connecting to Vaslui's centralized system when compared to the Secuieni system in Bacau County (37.8 km).

- Husi – Murgeni – Barlad WSS: Epureni, Duda, Valea Grecului, Stanilesti, Lunca Banului, Padureni, Hoceni: Connecting to the Husi DWTP has lower operational costs and lower NPV values. The Falciu WSZ (Bogdanesti, Ranzesti, Copaceanca and Bozia) cannot be fed from the Murgeni WSS due to a lack of underground water quantity. Feeding Murgeni WSS and Falciu WSZ from the Prut river has been analysed in Annex 8.1.36 and has not resulted as the least-cost solution. The strategic OA for the Barlad, Murgeni, Falciu and Husi systems (Annex 8.1.38 and 8.1.38-c) has as the least-cost solution of Falciu WSZ connecting to Husi central system.

- Codaesti - Miclesti WSS: 5 options are analysed including supplying the localities from Ciorteni (Iasi) or from the Solesti water source (3.8 km away from Popesti). A

decentralized solution is the winning option with lower CAPEX and OPEX (Annex 8.1.50).

- Barlad WSS: Connecting to Barlad DWTP has lower operational costs and lower NPV values for Bacani, Fruntiseni and Zorleni WSZs.

- The energy cost in the OPEX is based on a baseline unit cost of EUR 0.1 per kWh. However, due to the recent price increase in the energy market, the options analysis that have close NPVs have been selected (9 of them) and the analysis is re-run with EUR 0.27 per kWh. The least-cost solution has not changed. This is seen as reasonable.

- There are network rehabilitation proposals for Vaslui (19.05 km), Barlad (22.42 km), Husi (2.92 km) and Murgeni (1.26 km). A proper options analysis is carried out as do nothing versus rehabilitation scenarios, along with prioritizion of rehabilitation proposals via multi-criteria analysis (Annex 2.1.17). This is considered reasonable.

No significant outstanding issues

5.2 Summary of the Wastewater Systems Options Analysis

Alternative options were analysed for 12 out of 15 agglomerations included in the project. These 12 agglomerations are assessed under 8 groups for the OA. Three additional options were assessed for discharge points for Berezeni and Murgeni WWTPs, with different discharge parameters. A summary table for the options assessed including investment costs, operating costs and NPV values at 4% discount rate is presented in Table 12 below. It should be taken into account that the incremental investment costs do not reflect the exact total investment. It only compares the different elements of the options.

The detailed calculations (Excel files) for each agglomeration/cluster options analysis is presented in Annex 8.2 of the FS. At the options analysis stage, the investment components that are same in both options are not reflected to the costs.

The selected option (least-cost solution) is highlighted.

Table 12 Summary of Wastewater Systems Options Analysis

OA	Agglomeration/ Cluster	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
1	Valeni agglomeration	Decentralized – New WWTP in Valeni (4,088 PE)	1,954,999	138,737	3,722,546
		Centralized – Send the load (4,088 PE) to Vaslui WWTP	95,237	64,948	884,965
2	Laza agglomeration	Decentralized – Extension of WWTP in Laza (2,159 PE)	1,278,565	104,795	2,692,936
		Centralized – Send the load (2,159 PE) to Vaslui WWTP, through Rediu sewage system	529,675	44,875	955,645

OA	Agglomeration/ Cluster	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
3	Ivesti agglomeration	Decentralized – New WWTP in Ivesti (2,183 PE)	1,491,966	117,578	3,028,709
		Centralized – Send the load (2,183 PE) to Barlad WWTP	2,018,912	61,624	2,195,068
4	Zorleni agglomeration Popeni agglomeration	Decentralized – Extension of Zorleni WWTP (to 4,220 LE) and construction of Popeni WWTP (2,370 PE)	2,834,099	225,556	5,817,059
		Centralized – send the load from Popeni agglomeration to Zorleni and extension of Zorleni WWTP (to 6,590 PE)	2,273,867	172,796	4,379,868
		Centralized – send the load from Zorleni and Popeni agglomerations to Barlad WWTP	664,103	100,294	1,741,292
5	Lunca Banului agglomeration	Centralized – Send the load from Lunca Banului agglomeration to Husi WWTP	957,795	130,499	2,316,625
		Decentralized – New WWTP in Lunca Banului (4,929 PE)	2,536,367	153,013	4,301,903
6	Perieni agglomeration	Decentralized – Extension and upgrade of Perieni WWTP to tertiary treatment (to 2,828 PE)	1,532,248	79,690	2,636,979
		Centralized – send the total load from Perieni to Barlad WWTP	2,142,359	114,218	2,984,474
		Mixed – Rehabilitation of Perieni WWTP (1,350 PE) to tertiary treatment and send the remaining load (1,677 PE) to Barlad WWTP	2,251,045	74,142	3,707,084
7	Dumesti agglomeration	Decentralized – New WWTP in Dumesti (4,310 PE)	2,149,895	157,719	4,178,722
		Centralized – send the load from Dumesti agglomeration to Negresti WWTP and extension of Negresti WWTP (from 7,350 PE to 9,782 PE)	2,716,037	147,975	4,297,630

OA	Agglomeration/ Cluster	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
8	Berezeni Cluster Berezeni agglomeration Falciu agglomeration Vetrisoaia agglomeration Murgeni agglomeration	Decentralized – New WWTP in Vetrisoaia (2,459 PE), extension of Berezeni WWTP (from 1,548 PE to 3,198 PE), new Falciu WWTP (1,944 PE) and new Murgeni WWTP (3,407 PE)	8,988,437	464,301	14,373,929
		Mixed – send the load from Vetrisoaia and Berezeni agglomerations to new Falciu WWTP (6,477 PE) and new Murgeni WWTP (3,407 PE)	7,975,465	273,324	10,653,937
		Mixed – send the load from Vetrisoaia and Falciu agglomerations to Berezeni WWTP (extension up to 7,601 PE) and new Murgeni WWTP (3,407 PE)	6,844,706	308,199	10,295,479
		Centralized -- send the load from Vetrisoaia, Murgeni and Berezeni agglomerations to new Falciu WWTP (9,884 PE)	9,224,815	249,352	10,751,931
9	Berezeni Cluster – discharge point of Berezeni WWTP	Extension of Berezeni WWTP (up to 7,601 PE) and discharge to existing emissary with more stringent discharge parameters	2,186,320	173,212	4,521,471
		Extension of Berezeni WWTP (up to 7,601 PE) and discharge to new water body – Prut River (3.6 km away)	2,793,159	169,415	4,802,997
10	Murgeni agglomeration – discharge point of Murgeni WWTP (local or Prut river)	Construction of Murgeni WWTP (3,407 PE) and discharge to local emissary with more stringent discharge parameters	1,841,761	97,490	3,162,383
		Construction of Murgeni WWTP (3,407 PE) and discharge to Prut River (8.9 km away)	2,296,758	104,905	3,540,434
11	Murgeni agglomeration – discharge point	Construction of Murgeni WWTP (3,407 PE) and discharge to local emissary	1,841,761	97,490	3,162,383

OA	Agglomeration/ Cluster	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
	of Murgeni WWTP (local river or Elan river)	with more stringent discharge parameters.			
		Construction of Murgeni WWTP (3,407 PE) and discharge to Elan River (4.1 km away)	2,086,219	91,287	3,179,469

Also, an option analysis as comparing *do nothing versus rehabilitation* is carried out for a total length of 27.54 km of rehabilitation components in four cities (Vaslui, Barlad, Husi and Negresti). Detailed excel files and NPV calculations are presented under Annex 8.3 of the FS.

Additionally, a technological OA is carried out for three new treatment plants and least-cost solutions are selected. A summary table for the options assessed including NPV values at 4% discount rate for investment costs and operating costs is presented in Table 13.

Table 13 Summary of WWTP Technology - Options Analysis

OA	WWTP	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
1	Dumesti WWTP	Option 1 – Biological treatment – continuous flow	2,005,864	153,190	3,962,740
		Option 3 – Biological treatment – SBR	2,107,247	179,604	4,388,470
		Option 3 – Biological treatment – hybrid MBBR	1,930,445	186,004	4,317,221
		Option 4 – Biological treatment – MBR	2,048,181	182,066	4,457,266
2	Murgeni WWTP	Option 1 – Biological treatment – continuous flow	1.841.761	97.490	3,126,959
		Option 3 – Biological treatment – SBR	1,901,933	126,839	3,545,611
		Option 3 – Biological treatment – hybrid MBBR	1,677,913	131,068	3,415,808
		Option 4 – Biological treatment – MBR	1,819,653	113,862	3,376,337
3	Iana WWTP	Option 1 – Biological treatment – continuous flow	1,976,705	141,745	3,763,359
		Option 3 – Biological treatment – SBR	2,036,238	166,993	4,131,336
		Option 3 – Biological treatment – hybrid MBBR	1,724,431	170,223	3,921,984

OA	WWTP	Options Assessed	Investment Cost €	Operating Cost €/year	NPV 4% Discount Rate
		Option 4 – Biological treatment – MBR	1,947,168	156,867	3,990,651

JASPERS Comments

Similar as for Water Supply, the presented option analysis is generally considered as sufficient to ensure that the chosen solutions are acceptable. The following is noted concerning the individual aspect of the presented assessment:

- Valeni agglomeration, Laza agglomeration - Vaslui Cluster: The centralized solution with discharge to the Vaslui WWTP has the lowest operational costs and lowest NPV values. The Laza agglomeration will connect to the Vaslui WWTP via other funds. There is enough capacity to take over the load.

- Ivesti agglomeration, Zorleni agglomeration, Popeni agglomeration - Barlad Cluster: The centralized solution with discharge to Barlad WWTP has the lowest operational costs and lowest NPV values. The existing Barlad WWTP has enough capacity to take over the whole load from these three agglomerations. The Ivesti agglomeration will connect to the Barlad WWTP via other funds.

- Perieni agglomeration: An existing WWTP in Perieni (1,350 PE) was built with local funds; however, it is non-compliant due to non-conformance with discharge parameters applicable to the sensitive receiving water body. Even though it is an agglomeration below 10,000 PE; the official letter from Apele Romane, dated March 2021, requests for more stringent effluent parameters (N=7 mg/l, P=0.4 mg/l). The letter is annexed to the FS. The nearest existing WWTP (Barlad) is approx. 11.9 km away and 4 pumping stations and rising mains would be needed. The decentralised solution is the preferred solution.

- Dumesti agglomeration: The nearest existing WWTP (Negresti) is approx. 10.6 km away and an extension of the existing Negresti WWTP would be needed. Hence, the OA suggests the decentralised solution as the preferred solution.

- Berezeni Cluster: The least-cost solution results when the Vetrisoaia, Berezeni and Falciu agglomerations discharge tothe Berezeni WWTP that will be extended and with the Murgeni WWTP to be a stand-alone plant. Option 3 wins over Option 2 due to less CAPEX (EUR 1.1 M in total) needed for the treatment plant and a smaller diameter pipe (200 mm) to transfer the Falciu load to Berezeni instead of transferring the Berezeni and Vetrisoaia load to Falciu (400 mm). Since the Berezeni WWTP is existing and will be only extended, it is EUR 0.5 M cheaper than building a new one in Falciu. The CAPEX difference in the wastewater collector is EUR 0.6 M.

  An additional OA is carried out in order to find the optimal discharge point. The current discharge point is into a smaller water body with stringent discharge parameters (N=9 mg/l, P=0.9 mg/l) that is required by Apele Romane. Discharge to the Prut River, with a

3.6 km collector is analysed in Option 2. Even though the Prut River is a bigger water body, it is declared a sensitive area; therefore, Apele Romane requires tertiary treatment for the discharge (official letter dated September 2021). Discharge to the existing point is the least-cost solution. Similarly, two schemes of different discharge points are analysed for Murgeni WWTP. Likewise, the least-cost solution is analysed as the discharge to the existing local water body.

- The OA for sewerage network rehabilitation and technology of the WWTPs is overall considered reasonable.

- The energy cost in the OPEX is based on a baseline unit cost of EUR 0.1 per kWh. However, due to the recent price increase in the energy market, the options analysis that have close NPVs have been selected (3 of clusters and 3 of WWTP technologies) and the analysis is re-run with EUR 0.27 per kWh. The least-cost solution has not changed. This is seen as acceptable.

No significant outstanding issues

5.3 Options Analysis for Wastewater Sludge

For an efficient management of sludge in the medium and long term, 7 strategic options were identified:

- ***Option 1:*** Thermal drying in a pyrolysis plant (89.8%), installed at the Vaslui WWTP and agricultural use (10.2%) for the sludge from Iana WWTP, Berezeni WWTP, Perieni WWTP, Murgeni WWTP
- ***Option 2:*** Thermal drying in a pyrolysis plant (89.7%), installed at the Barlad WWTP and agricultural use (10.3%) for the sludge from Berezeni WWTP, Dumesti WWTP, Negresti WWTP
- ***Option 3:*** Thermal drying in a pyrolysis plant (100%), installed at the Vaslui WWTP
- ***Option 4:*** Thermal dryingat the Vaslui WWTP (100%, 1.8 t/h evaporated water) up to 90%DS and energy recovery through co-processing in the Heidelberg Tasca Cement Factory, Neamt County
- ***Option 5:*** Thermal drying at the Vaslui WWTP (63.6%, 1.8 t/h evaporated water) for Vaslui and Barlad WWTP sludge, up to 90%DS and energy recovery through co-processing in the Heidelberg Tasca Cement Factory, Neamt County and agricultural use (36.4%) for the remaining sludge from all other WWTPs
- ***Option 6***: Thermal drying in a pyrolysis plant (63.6%), installed at the Vaslui WWTP and agricultural use (36.4%) for the sludge from Berezeni WWTP, Dumesti WWTP, Negresti WWTP
- ***Option 7:*** Thermal drying at the Vaslui WWTP (63.6%, 1 t/h evaporated water) for Vaslui and Barlad WWTP sludge up to 90%DS and energy recovery through co-processing in Heidelberg Tasca Cement Factory, Neamt County and agricultural use (36.4%) for the remaining sludge from all other WWTPs.

A CAPEX comparison for the options is presented below.

CAPEX	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
Pyrolysis plant	8,053,489	8,053,489	8,863,839	-	-	6,517,734	-

Sludge transport equipment	268,000	277,000	304,000	464,000	267,000	267,000	274,000
Thermal Drying Plant, incl platforms, storage, scraper and air filtration	-	-	-	4,480,050	4,577,050	-	3,952,150
Total	**8,321,489**	**8,330,489**	**9,167,839**	**4,944,050**	**4,844,050**	**6,784,734**	**4,226,150**

The OPEX comparison for the options is presented below.

O&M	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
Pyrolysis plant	622,114	629,247	589,859	-	-	442,487	-
Agriculture	10,840	11,344	-	-	54,624	38,203	54,624
Thermal Drying Plant				692,422	369,359	-	479,136
Total	**632,954**	**640,591**	**589,859**	**692,422**	**423,983**	**480,690**	**443,873**

The NPV at 4% CAPEX+OPEX comparison for the options is presented below.

CAPEX	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
NPV at 4% CAPEX+OPEX	16,926,873	16,996,946	17,086,058	14,384,178	10,603,890	13,215,979	11,494,879

Considering investment and operating expenditures, Option 5 (Thermal drying in Vaslui WWTP - 63.6%, 1.8 t/h evaporated water, up to 90%DS and agricultural use - 36.4%) has a lower NPV than that for the other 6 options. Option 5 and Option 7 are the same except the capacity of the sludge dryer. Option 7 has a smaller dryer that has less CAPEX (EUR 2.9 M) however needs to work longer hours resulting in a higher OPEX and NPV.

A multicriterial analysis was done, taking into account: technical criteria, economic criteria, environmental criteria and social criteria.

Table 14 Multicriterial analysis matrix for proposed sludge disposal scenarios

Option	Availability of the solution in the region	Environmental criteria	Technical criteria	Social criteria	Legal constraints	TOTAL
Option 1	5	3	3	4	3	18
Option 2	5	3	3	4	3	18
Option 3	5	3	3	4	3	18
Option 4	4	5	4	5	4	22
Option 5	3	4	4	4	4	19
Option 6	4	3	3	3	3	16
Option 7	3	4	4	4	4	19

According to the above matrix, Option 4, option 5 and option 7 are the best options. Considering the result of the NPV analysis, the winning option is Option 5 - Thermal drying in Vaslui WWTP (63.6%, 1.8 t/h evaporated water) up to 90%DS and energy recovery through co-processing in Heidelberg Tasca Cement Factory, Neamt County and agricultural use (36.4%) from Husi WWTP, Iana WWTP, Berezeni WWTP, Perieni WWTP, Murgeni WWTP, Dumesti WWTP, Zorleni WWTP, Simila WWTP, Negresti WWTP.

JASPERS Comments

The presented assessment is considered as sufficient to ensure that the chosen solution (Option 5) is acceptable. The following comments are of note concerning the individual aspects.

The potential use of sludge in agriculture has been appropiately assessed. With limited willingness of local farmers to use sludge in agriculture and the uncertainty of acceptance, the chosen combined approach of sludge disposal in agriculture (36%) and the cement factory (64%) seems acceptable.

The future sludge management plan includes partial drying using a drying plant installed at Vaslui WWTP (receiving sludge from Vaslui and Barlad WWTPs) at a CAPEX of EUR 3.5 M, with final disposal at the Heidelberg Tasca Cement Factory (162 km away), and partial agricultural use. The energy cost in the OPEX is based on a baseline unit cost of EUR 0.27 per kWh. This is seen as reasonable.

A letter of intent from the Heidelberg Tasca Cement Factory is included in Annex 6 of the FS (letter dated January 2023). Sludge will be received by the cement factory with 90% DS and a minimum calorific value of 9 GJ/tonne. The co-processing fee is 0-5 EUR/t.

No significant outstanding issues

6 Technical Aspects

6.1 Technical Description

A detailed description for each locality can be found in Chapter 9 of the FS. The overview maps are presented under Volume III – Drawings – I. General layout plans Vaslui County provided a good overview about the proposed measures and the layout of the systems.

A) Water Supply Systems

Proposed water supply investments aim to ensure continuous drinking water supply of high quality to the population in localities of the County, which are grouped in 16 water supply systems based on the availability and quality of the surface/underground water source, the treatability water study conducted and the investment and the operation and maintenances costs calculated. In Table 15, a summary of WSS investments proposed at the regional level are broken down into main components.

Table 15 WSS Investments proposed at the level of the Project

Project Component		Unit	Total Quantity
Underground water source	Rehabilitation	borehole	-
	New	borehole	35
Water Main	Rehabilitation	km	2.68
	New/Extension	km	375.06
Drinking Water Treatment Plant	Modernization	no	1
	New/Extension	no	5
Chlorination Plants	Modernization	no	-
	New/Extension	no	58
Pumping Station	Modernization	no	6
	New/Extension	no	124
Reservoirs	Rehabilitation	no	12
	New	no	41
Distribution Network	Rehabilitation	km	46.15
	New/Extension	km	621.66
Service connections	Rehabilitation	no	2,622
	New	no	24,590
SCADA system	Regional	no	4

5 new/extension DWTPs and 1 existing DWTPs with modernization proposals are listed in Table 16 including their capacities (smallest to largest) and investment costs (extracted from Annex 5 – Deviz general). The costs don't include design, technical assistance and other costs.

Table 16 Drinking Water Treatment Plants

	DWTP – New/extension	Capacity (l/s)	Cost EUR (constant)	EUR/ (l/s)		DWTP – Modernization/ rehabilitation	Capacity (l/s)	Cost EUR (constant)	EUR/ (l/s)
1	Bogdanesti (extension)	4.05	416,971	102,956	1	Husi	200	1,148,484	5,742
2	Miclesti (extension)	5.08	675,738	133,019					
3	Draxeni-Rebricea (extension)	9.9	691,413	69,840					
4	Codaesti-Pribesti (new)	12.33	1,229,331	99,702					
5	Murgeni (extension)	17.38	991,545	57,051					

Sample unit costs which were used in determining the project costs are given in Table 17. The base costs of material were established from supplier quotations. All costs are constant prices excluding VAT. The unit costs below include all costs for excavation, crossings, backfilling, bedding, pavement, but do not include service connections.

Table 17 Unitary Costs for Water Supply Systems (in constant prices)

Item	Dimension	Unit Cost
HDPE water pipework *New*	PN10, OD 110	60-99 EUR/m
	PN10, OD 125	66-103 EUR/m
	PN10, OD 140	61-107 EUR/m
	PN10, OD 160	65-124 EUR/m
	PN10 OD 200	79-131 EUR/m
HDPE water pipework *Rehabilitation*	PN10, OD 110	81-122 EUR/m
	PN10 OD 160	99-144 EUR/m
	PN10 OD 200 (asphalt only)	165 EUR/m
	PN10 OD 400	478-515 EUR/m
House connections	New	724 EUR/pcs
	Rehabilitation	789 EUR/pcs
Reservoirs	100 m^3	52,000 EUR/pcs
	200 m^3	84,300 EUR/pcs
	300 m^3	100,550 EUR/pcs
	600 m^3	146,000 EUR/pcs

Note: min/max range for 100% Greenfield / 100% concrete

A breakdown of the main project water supply components, total investment cost, specific unit cost per capita are presented in Table 18. It should be noted that the investment costs included in the table are constant prices relating to Chapter 4 of “Deviz General”. It excludes inflation rates, contingencies, design costs, tests, publicity, technical assistance and supervision.

Table 18 Main Project Components and Investment Costs for Water Supply Systems

No.	UAT	Underground water source (boreholes)		Water Main		Pumping Station		Drinking Water Treatment Plant		Chlorination Plants		Reservoirs		Distribution Network		Number of newly connected population	Investment Cost for network extensions*	Total investment cost *	Specific unit cost
				km										km			EUR	EUR	EUR/capita
		New/ Extend	Rehab	New/ Extend	Rehab	New/ Extend	Rehab.	New/ Extend	Rehab	New/ Extend	Rehab.	New/ Extend	Rehab	New/ Extend	Rehab.				
1	Barlad			1.77										4.96	22.42	588	614,085	8,524,918	1,044
2	Perieni					1								4.71		1,404	335,952	694,951	239
3	Zorleni					2				1		1		11.51		2,771	1,030,040	2,416,478	372
4	Fruntiseni					1				1		1		11.44		789	922,808	1,377,125	1,170
5	Murgeni	4		18.61		2		1		2			2	9.83	1.27	1,062	744,172	3,517,642	701
6	Falciu			28.80		4				5		2	1	13.50		922	1,006,105	3,846,443	1,091
7	Berezeni															-	-	-	-
8	Vetrisoaia			0.30			1			1		1	1	10.20		1,191	695,551	1,176,367	584
9	Dodesti	2		1.50						1		1		6.20		517	424,202	985,879	821
10	Bogdanesti	2		0.60		1		1				1	1	10.84		585	646,608	1,502,344	1,105
11	Costesti	2		0.70						1		1				-	-	344,494	-
12	Husi				2.68		3		1				3	9.03	2.92	1,566	923,035	4,282,994	589
13	Duda-Epureni			15.25		3				3				30.40		3,766	2,152,697	4,813,575	572
14	Stanilesti									1				6.30		1,140	492,358	873,322	432
15	Lunca Banului					1				1		1	1	5.64		1,001	371,375	788,429	371
16	Padureni					4				1		1	1	21.66		1,467	1,543,324	2,439,982	1,052
17	Dimitrie Cantemir					1				3		2		23.20		1,997	1,864,015	3,003,080	933
18	Hoceni					2				1		1		12.92		560	754,686	1,509,619	1,348
19	Vaslui													6.11	19.05	467	532,025	4,831,477	1,139
20	Muntenii de Jos			3.57		5	1			1		1		18.54		1,623	1,233,480	2,326,606	760
21	Lipovat			5.49		2				1		1		8.29		749	576,756	1,424,657	770
22	Zapodeni					2				1		1		37.68		1,517	2,049,763	3,773,745	1,351
23	Muntenii de Sus									2		1				-	-	197,909	-
24	Tanacu									1		1		22.45		692	931,123	2,105,936	1,346
25	Valeni					3				1		1		31.15		3,196	1,959,377	3,070,697	613
26	Feresti					1				1		1		16.73		1,731	1,220,104	1,911,838	705
27	Codaesti	10		8.45		3		1		1		1		24.72		2,489	1,520,018	4,941,287	611

No.	UAT	Underground water source (boreholes)		Water Main		Pumping Station		Drinking Water Treatment Plant		Chlorination Plants		Reservoirs		Distribution Network		Number of newly connected population	Investment Cost for network extensions*	Total investment cost *	Specific unit cost
				km															
		New/ Extend	Rehab	New/ Extend	Rehab	New/ Extend	Rehab.	New/ Extend	Rehab	New/ Extend	Rehab.	New/ Extend	Rehab	New/ Extend	Rehab.		EUR	EUR	EUR/capita
														km					
28	Tacuta			3.87		2				1		1		8.99		706	535,855	1,248,756	759
29	Rebricea	4		5.28				1		2		3		11.89		876	803,546	2,491,608	917
30	Negresti					4								20.42	0.49	1,570	1,504,276	2,152,121	958
31	Todiresti					1								5.51		628	385,220	584,739	613
32	Rafaila					2				1				12.14		1,167	880,795	1,296,108	755
33	Dumesti					4				2		2		35.80		2,862	2,377,375	3,920,342	831
34	Bacesti			4.73		5				2		2		9.61		2,179	655,438	2,008,981	301
35	Miclesti	4		4.26		1		1		1						-	-	1,176,552	-
36	Pungesti					3				1		1		12.10		1,533	687,575	1,420,653	449
37	Stefan cel Mare					5				3		1		26.43		1,496	2,014,523	3,211,583	1,347
38	Balteni									1						-	-	120,388	-
39	Delesti					3				2		1		14.16		1,904	1,069,627	2,017,225	562
40	Cozmesti					5				1		1		31.41		1,914	2,391,776	3,511,550	1,250
41	Osesti					1	1			3		1	2	2.23		121	141,854	681,099	1,172
42	Pogana					1								5.68		693	403,241	582,803	582
43	Iana	3		7.60		2				2		2		12.91		1,209	979,611	2,246,581	810
44	Bacani									2		4		14.73		1,653	1,129,920	2,040,036	684
45	Bogdana	2		0.41						1				4.88		562	356,276	722,347	634
46	Alexandru Vlahuta	2		0.50						1				0.69		62	62,432	270,104	1,007
47	Ivanesti					12				1		1		34.10		2,681	2,177,263	3,876,849	812
48	County Council G-01			79.56		6										-	-		-
49	County Council G-02			63.60		7										-	-	24,274,848	-
50	County Council G-03			120.22		19										-	-		-
TOTAL		**35**	**0**	**375.07**	**2.68**	**124**	**6**	**5**	**1**	**58**	**0**	**41**	**12**	**621.66**	**46.15**	**57,606**	**43,100,262**	**126,537,067**	**748**

*Investment costs included in the table are constant prices relating to “Chapter 4” of the “Deviz General”. It excludes inflation rates, contingencies, design costs, tests, publicity, technical assistance and other costs.

B) Wastewater Systems

The project includes 15 agglomerations out of which 5 independent agglomerations and 10 grouped in 4 clusters. The proposed wastewater investments comprise the following main components:

Table 19 Wastewater Investments proposed at the level of the Project

Project Component		Unit	Total Quantity
Sewerage Network	Rehabilitation	km	27.54
	New/extension	km	326.54
Rising Main	Rehabilitation	km	2.10
	New/extension	km	76.57
Pumping Station	Rehabilitation	no	5
	New/extension	no	156
Wastewater Treatment Plant	Rehabilitation	no	3
	New/extension	no	5
Service connections	Rehabilitation	no	1,570
	New/extension	no	15,683
SCADA System	Regional	no	4

They are listed in Table 20 including the total costs and unit cost per PE. Investment costs included in the table are constant prices relating to Chapter 4 of “Deviz General”. It excludes inflation rates, contingencies, design costs, publicity, technical assistance and other costs.

Table 20 Wastewater Treatment Plants (in constant prices)

WWTP	Existing Capacity	Capacity proposed through LIOP	Total Capacity	Investment Cost	Unit Cost
	PE	PE	PE	EUR	EUR/PE
NEW/EXTENTION					
Iana	-	3,149	3,149	2,073,522	658
Dumesti	-	4,310	4,310	2,121,381	492
Perieni*	1,350	1,478	2,828	1,591,402	563
Murgeni*	2,200	1,207	3,407	1,930,132	567
Berezeni	1,548	6,053	7,601	2,298,270	380
REHABILITATION					
Husi	35,000	-	35,000	407,062	
Barlad	77,968	-	77,968	328,345	
Vaslui	85,623	-	85,623	354,292	
EXISTING					
Muntenii de Jos**	500	-	0	They will be demolished.	

WWTP	Existing Capacity	Capacity proposed through LIOP	Total Capacity	Investment Cost	Unit Cost
	PE	PE	PE	EUR	EUR/PE
Bacaoani**	300	-	0		
Falciu**	1,813	-	0		
UNDER CONSTRUCTION – OTHER FUNDS					
Negresti	7,350		7,350	SOP Phased – commissioning date: Feb 2023	
Simila	581		581	PNDL – commissioning date: Nov 2022	
Zorleni	1,560		1,560	AFIR - commissioning date: Feb 2023	

* Investment cost includes rehab/upgrade works for the existing capacity.

** Existing WWTPs that will be decommissioned.

Sample unit costs which were used in determining the project costs are given in Table 21. The base costs of material were established from supplier quotations. All costs are constant prices excluding VAT. The unit costs below include all costs for excavation, backfilling, bedding, pavement, but do not include service connections.

Table 21 Unitary Costs for Wastewater Systems (in constant prices)

Item	Dimension	Unit Cost
Gravity sewer, PVC *New*	DN 250	96-199 EUR/m
	DN 300	127-199 EUR/m
	DN 400	141 EUR/m
Gravity sewer, PVC *Rehabilitation*	DN 250	160-240 EUR/m
	DN 315 (asphalt only)	260 EUR/m
	DN 400 (asphalt only)	292 EUR/m
Gravity sewer, GRP *Rehabilitation*	DN 500	296-369 EUR/m
Gravity sewer, Ceramic *Rehabilitation*	DN 1000 (asphalt only)	1,093 EUR/m
House connection	DN 160	622 EUR/pcs
	DN 200	697 EUR/pcs

Note: min/max range for 100% Greenfield / 100% asphalt, installation depth sewers 2 – 3 m

Breakdown of the main project wastewater components, total investment cost, specific unit costs per capita are presented in Table 22. It should be noted that the investment costs included in the table are constant prices relating to Chapter 4 of “Deviz General”. It excludes inflation rates, contingencies, design costs, tests, publicity, technical assistance and supervision.

Table 22 Aggregated Unit Costs for Wastewater Systems

No.	UAT	Sewerage networks		Pumping Station		Rising mains		WWTP		Number of newly connected inhabitants	Investment Cost for network extensions*	Total investment cost *	Specific unit cost
		km				km					EUR	EUR	EUR/PE
		New/ Extend	Rehab	New/ Extend	Rehab.	New/ Extend	Rehab	New/ Extend	Rehab				
1	Barlad	3.31	14.297	1		0.37			1	616	580,963	7,587,983	943
2	Perieni	13.69		13		3.28		1		2,740	1,960,136	4,958,163	715
3	Zorleni	55.55		20		14.07				4,931	7,582,269	9,860,242	1,538
4	Murgeni	6.11		4	1	1.41		1		2,401	716,015	3,541,343	298
5	Falciu	23.91		6	1	6.52				1,436	3,053,230	3,930,613	2,126
6	Berezeni	30.89		6		0.35		1		3,092	3,635,471	7,086,342	1,176
7	Vetrisoaia	31.28		7		7.78				2,391	3,895,418	4,656,608	1,629
8	Husi	3.38	0.25	7	3	0.72	0.25		1	1,566	337,812	1,229,159	216
9	Stanilesti	27.23		13		10.06				2,355	3,586,475	4,939,723	1,523
10	Lunca Banului	22.41		2		2.40				2,358	3,644,860	4,419,545	1,546
11	Vaslui	7.87	14.174	5		1.12	1.85		1	556	1,501,439	6,706,460	2,700
12	Muntenii de Jos	20.58		11		4.92				1,871	2,500,378	3,387,444	1,336
13	Muntenii de Sus	28.92		8		5.07				2,379	4,434,400	5,572,357	1,864
14	Valeni	41.32		16		3.95				3,679	7,051,235	8,811,327	1,917
15	Negresti	10.57	0.921	3		2.17				1,035	1,347,555	1,982,262	1,302
16	Dumesti	27.16		9		4.34		1		1,747	2,926,180	6,014,779	1,675
17	Bacesti	19.86		13		4.35				2,402	2,517,053	3,765,526	1,048
18	Iana	29.08		12		3.72		1		3,055	3,921,660	7,329,555	1,284
19	Vaslui County Council									-	-	11,593,421	-
TOTAL		**403.12**	**29.64**	**156**	**5**	**76.57**	**2.10**	**5**	**3**	**40,610**	**55,192,549**	**107,372,852**	**1,359**

*Investment costs included in the table are constant prices relating to “Chapter 4” of the “Deviz General”. It excludes inflation rates, contingencies, design costs, tests, publicity, technical assistance and other costs.

JASPERS Comments

The proposed dimensioning of the networks and sizing of the treatment plants are considered acceptable against the projected demand. The average extension length per connection is around 25 meters for water supply and 26 meters for wastewater. Most of the localities are in rural area, therefore this shows that the areas selected for extensions are sufficiently concentrated.

Extensions: The average unit cost of EUR 70 per meter (water) and EUR 137 per meter (wastewater) without service connections is seen as reasonable. It has been verified by the Beneficiary that majority of the extensions are under greenfield which reflects the fact that for many pipe sections re-instatement of road surfaces in asphalt is not required.

Based on 2021 costs, the specific unit cost per capita is in the range of 239 - 1,351 EUR/capita (water) and 298 - 2,700 EUR/capita (wastewater). It considers on UAT level the entire costs of the local networks (without the service connections). All extensions are below the defined thresholds except 4 UATs in water supply and 1 UAT in wastewater. The highest UATs are marginally (8%) above the threshold that was set in 2018. Considering inflation and corresponding increases in the costs, this is seen as reasonable. The result of the assessment is presented in Annex 7.2 and 7.3 of the FS for each UAT.

Rehabilitation: There is a 46.15 km rehabilitation proposal for the water network and 27.54 km rehabilitation for the sewerage network. Sufficient evidence for the proposed reconstruction works has been provided to justify the measures. The average unit cost is EUR 229 (water) and EUR 348 (wastewater) per metre excluding service connections. With rehabilitation proposals mainly being under asphalt and for bigger diameters in Barlad and Vaslui UATs (Dn 200-400 mm for water and Dn 315-1000 mm for wastewater), the cost is reasonable.

Transmission Mains: the average unit cost of EUR 84/m (water) is seen as reasonable for the chosen diameter range. Water mains are in the diameter range of 75-180 mm. The unit cost reflects the fact that they have small diameters and for many pipe sections re-instatement of road surfaces in asphalt is not required.

Reservoirs: The average unit costs are EUR 425 per m^3. With storage mainly having between 200 and 300 m^3 for each facility, the unit costs are seen as reasonable.

WWTPs: The costs applied are seen as reasonable.

Sludge Management: According to Deviz General, a sludge dryer proposed in Vaslui WWTP has a total cost of EUR 3.8 M. It is planned that this dryer shall receive sludge from the Vaslui and Barlad WWTPs (163,600 PE capacity). The dryer has a capacity of 8,000 t/yr (1.8 t/hr evaporation rate). Considering the high evaporation rate of the dryer, the costs are within the expected range for the region and sector.

No significant outstanding issues

7 Project Costs

7.1 Investment Costs

Project investment costs (in current prices, excluding VAT), along with the breakdown of the overall investment into respective water and wastewater components are summarised in the table below:

Table 23 Project investment costs

Investment cost	U.M	Total	Total water supply	Total wastewater
Planning and design	EUR	3,487,284	1,936,905	1,550,379
Land purchase	EUR	-	-	-
Building and Construction	EUR	212,443,855	122,485,793	89,958,063
Plant and machinery	EUR	36,659,892	15,871,250	20,788,642
Contingencies	EUR	26,226,136	14,566,503	11,659,632
Price adjustment (if applicable)	EUR	163,612,241	90,873,406	72,738,836
Publicity	EUR	216,216	120,091	96,125
Supervision during construction	EUR	8,847,611	4,914,134	3,933,477
Technical assistance	EUR	10,604,663	5,890,035	4,714,628
Total	**EUR**	**462,097,899**	**256,658,117**	**205,439,782**

The total project cost (in current prices, excluding VAT) is € 462.1 million and includes direct investments (planning and design fees, land purchase, building and construction and plant and machinery) plus contingencies and supporting investment costs (technical assistance, publicity, construction supervision). Total water supply investments amount to € 256.7 million (55.5%) and wastewater investments add up to 205.4 million (44.5%). A detailed breakdown of the investment cost is presented in the bill of quantities in Annex 5 spreadsheet Deviz General to the FS.

Planning and design fees (including support for organisation of procurement procedures) add up to € 3.5 million. Construction works represents € 212.4 million and mechanical and electrical works amount to € 36.7 million. Technical contingencies are set at a level of € 26.2 million, i.e. approximately 10% of direct investments. Price adjustment is based on base cost as at end 2020 / start 2021 prices indexed by actual/forecast inflation as set out in latest semi-annual (Autumn 2022) official forecast.

All of the costs presented above are considered eligible.

7.2 Operational Costs

Taking a base year of 2023 for operating costs in order to exclude the incremental costs of SOP1 and comparing to those of 2026, when the LIOP project is assumed fully implemented, shows a rise in costs from EUR 16.5m to EUR 25.2m. The base operating costs are taken and projected from the existing situation with allowances made for the future change in volumes for variable costs and general escalation in real terms of unit costs.

Incremental operating costs of about EUR 3.3 million for water and EUR 2.2 million for wastewater are expected in 2026, the first year of full operation, being comprised the following main elements:

- Additional electricity consumption of about 9.6 million kWh/a with an average price of EUR 0.29/kWh, comprising around EUR 3.0 million per annum. Electricity price is forecast to rise from about EUR 0.12/kWh in 2022 to EUR 0.18/kWh in 2023 and EUR 0.29/kWh in 2026, being an estimate of the market price in the first full year beyond the expiry of the recently adopted cap on prices as applied to water utilities;
- Additional maintenance costs as percentage of asset investment values (1% of civil works and pipes and 2% in mechanical and electrical works), amounting to EUR 2.5 million per annum;

Further impacts on operating costs over the reference period include:

- Ongoing real increase in staff costs at 2.3% per annum (i.e. above inflation) to allow for an

expected real increase in salary levels (estimated at 65% of forecast GDP growth);

- Ongoing real increase in materials, maintenance and other costs at 1% and in electricity costs at 1.5% per annum.

JASPERS comments

Operating cost forecasts are based on the existing fixed and variable costs of the Regional Operator with allowances for change in volumes and general real terms price escalation. The additional costs as a result of the investments, inclusive of adequate maintenance cost, are correctly factored into the projections.

No significant outstanding issues

8 Financial and Economic Analysis

8.1 Financial Analysis

8.1.1. Methodology used in the analysis

The analysis is undertaken in constant prices, over a 30 year reference period (6 years of construction and 24 years of operation) and applying a 4% financial discount rate. The methodology follows the incremental approach, with the "with project" scenario taken as projection of the current situation plus the additional investments.

Following a national decision based on Article 61(3)(a) of Regulation 1303/2013 a fixed rate "Funding Gap" of 94% is applied. JASPERS understands that this rate is based on a study commissioned by the ministry of European Funds and validated by the Romanian Audit Authority (in June 2019) in consultation with DG-REGIO and that it is specific to projects in the water and wastewater sector. Notwithstanding, the model still shows a "with" and "without" project, in order to calculate other required financial ratios, especially FNPV/FIRR as well as economic returns. Therefore the results of discounted cash flow have been calculated and are shown below, even though they are not used for Funding Gap calculation.

Table 24 Calculation of the discounted net revenues (whole project)

Revenue and cost categories		**NPV at 4.0%**
Revenues	EUR	175,365,981
O&M costs	EUR	(116,875,767)
Replacement costs	EUR	(31,463,223)
Residual value of investments	EUR	8,779,299
Discounted net revenues (DNR)	**EUR**	**35,806,289**

8.1.2. Operating costs

Incremental operating and maintenance costs are defined as the difference between "with" and "without" project scenarios, with the methodology and corresponding figures explained in 7.2 above.

Additionally, replacement investments of EUR 17.1 million are provided with a 10 year replacement cycle and a further EUR 31.0 million with a 15 year replacement cycle i.e. useful life assumed for plant and machinery following depreciation rates used.

8.1.3. Recovery of depreciation and residual value

Depreciation rates for the new project assets results in a yearly incremental depreciation provision of EUR 8.8 million from 2027 onwards, which is equivalent to a weighted useful life for the project assets of 46 years. These are added on top of the deprecation charge for existing assets of EUR

2.7 million. Analysis of the assets' types and their respective estimated useful lives is shown in the table below:

Table 25 Project assets by type and useful life

Water and wastewater investments	Investments (EUR)	Useful life years	Annual depreciations
Water mains and networks	121,535,494	60	2,025,592
Waste water networks	94,884,340	50	1,897,687
Treatment plant and pumping stations	38,138,535	25-40	1,248,545
Plant and machinery	43,927,288	10-15	3,639,440

The proposed tariffs are not able to cover the full amount of cumulative depreciations (existing, SOP and project assets) in the beginning of the reference period. A rising proportion of depreciation is included within the tariff with the long-term objective of achieving full coverage of depreciation as required by the national water sector guidelines (not later than in 30 years of full operation of the assets).

Cost recovery reaches 44% of depreciation in 2026, but falls slightly to 26% in 2027 due to the extra operating cost from completion of the new assets of the second phase. The average coverage of depreciations (at operator level) over the operating period is 53% with a value of 100% in the final year of the reference period (2051). These last two values appear to be compliant with the minimum required levels of respectively 40% and 80% set out in the Romanian National Water Sector CBA Guidelines.

Depreciation recovery through EBITDA in the "without project" scenario shows a very similar profile, but slightlky higher level than the "with" project, also reaching 100% in the final year of projections, being 2051.

It is noted that no revenues or costs from other activities are taken either into the forecasts of EBDITA or the tariff calculations for the purposes of reaching full cost recovery.

Further, it is also shown that the extent and timing of depreciation coverage allows for continued operator sustainability see Section 8.2 below.

A graphical representation of the depreciation recovery in the "with project" scenario is presented below:

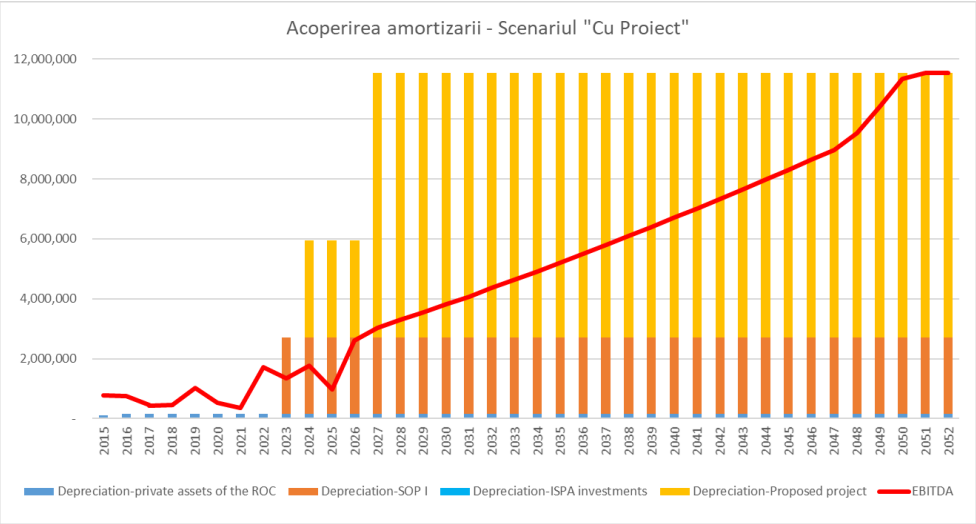


Figure 3 Depreciation coverage through EBITDA

The residual value is estimated at EUR 28.5 million (discounted value of EUR 8.8 million). This is based on an estimate of the discounted value of projected future cash flows generated by the project assets over their remaining estimated useful life.

8.1.4. Tariffs and affordability

A) Tariffs

According to the project documentation and the financial model, the following assumptions have been used for the purpose of tariff estimation.

- A unified tariff has been applied and charged to all user groups (domestic and non-domestic) within the operations area of the project;
- Tariffs are currently around 2.5% of household income, but are forecast to rise to 3.0% in 2025, being above the minimum required of 2.5%.
- Tariffs continue to rise in small increments throughout the remaining horizon of the projections.
- In the "without project" tariffs show a differential of about -0.5% relative to the affordability in the "with".

Water supply and wastewater collection and treatment tariffs are calculated and charged separately. Setting tariffs in the model is a manual process keeping a view to the overall constraints of rising towards full cost recovery whilst keeping within reasonable affordability constraints. Thus after initial tariff increases over the five years 2023-2027 (roughly 37% for water and 89% for waste water), tariffs continue to rise at about 2.5% per annum from 2028 onwards.

Table 26 Tariffs in the project scenarios (EUR/m^3)

		2022	**2024**	**2027**	**2051**
With project scenario	Water	1.35	1.48	1.85	3.35
	Wastewater	0.75	1.14	1.42	2.61
	Combined	2.10	2.62	3.27	5.96
Without project scenario	Water	1.35	1.42	1.62	2.66
	Wastewater	0.75	1.09	1.22	1.99
	Combined	2.10	2.51	2.84	4.65
Difference	Combined	0.0%	4.6%	15.2%	28.5%

The year-to-year "with project" tariff increases up to the first year of operations (2023-2027) are shown below.

Table 27 Tariff increases during project implementation

Tariff increases	2023	2024	2025	**2026**	**2027**
Water	3.0%	3.5%	7.0%	11.0%	5.0%
Wastewater	25.0%	20.0%	5.0%	10.0%	8.5%

B) Affordability

The applied tariff policy in the "with project" scenario is estimated to increase the cost of water and wastewater services into the range 3.0% to 3.5% of the average household income.

A commonly applied approach in calculating household income at county level was used for the base year 2021. Average household disposable income at national level of EUR 822 was subsequently corrected with a factor reflecting the relative wealth of Vaslui county at 83.4%.

The real growth in household income is forecast at an average of 2.3% per annum being linked to the long-term projected real GDP growth by a factor of 65% as past experience shows that not all GDP growth is reflected in household income. The forecast allows for additional tariff increases in

real terms so that full incremental depreciation is covered, with relatively small incremental impact on affordability.

JASPERS Comments

Methodology used in the analysis
Overall, the general approach followed for undertaking the financial appraisal is considered correct with the analysis provided on utility bases and supplemented on project basis. A reference period of 30 years has been used with a financial discount rate of 4%. Following a national decision based on Article 61(3)(a) of Regulation 1303/2013 a fixed rate "Funding Gap" of 94% is applied. JASPERS understands that this rate is based on a study commissioned by the ministry of European Funds and validated by the Romanian Audit Authority (in June 2019) in consultation with DG-REGIO and that it is specific to projects in the water and wastewater sector.

Recovery of depreciations
Depreciation rates for project assets result in yearly incremental depreciation provisions of EUR 8.8 million. Full recovery of depreciation in the tariff is achieved in the last year of projections. The average coverage of depreciations (at operator level) over the reference period (2022-2051) is 54% with a value of 100% in the final year of the reference period (2051). These figures appear to be compliant with the minimum required levels of respectively 40% and 80% set out in the Romanian National Water Sector CBA Guidelines.

Tariffs and affordability
A single unified tariff has been applied and charged to all user groups within the operations area of the project. Water supply and wastewater collection and treatment tariffs are calculated separately and charged separately. Tariff levels recover full operating and maintenance costs and increasing depreciation provisions from the relevant asset base and this results in affordability at around 3.0% of household income and then with marginal stepwise further increases throughout the projection period, all being above the minimum required threshold of 2.5%.

No significant outstanding issues

8.2 Financial Sustainability

The project is projected to realise the following financial returns.

Table 28 Financial performance indicators

	Without Community Assistance (FRR/C)	**With Community Assistance (FRR/K)**
Financial IRR	-5.25%	2.74%
Net present value (EUR)	-229,400,538	-7,569,582

Financial sustainability analysis is undertaken in undiscounted real term figures both on a project and system levels. A non-collection ratio of 2% is reflected indirectly by means of changes in the working capital.

At a project level, replacement investments on 10 year lifetime assets of EUR 6.3m and EUR 10.8m are planned in 2033 and 2036 respectively and on 15 year lifetime assets of EUR 11.4 and EUR 19.6m in 2038 and 2041 respectively. The project accumulates cash upto 2032 of EUR 9.0m and could afford to finance the first replacement, out of this. However, it is assumed that the

replacements are financed by debt, whereas the debt service resulting is financed by project cashflows. On this basis cumulative cashflow continues to increase to EUR 25m and even further.

More importantly, as the project investments fall within the existing system of the regional operator, it is important to demonstrate that the service provider itself is also sustainable keeping in mind its financial position inclusive of the impact of debt from previous major investments as well as their respective forecast replacement cost needs. This requires the analysis of the cash flow of the full "with project" scenario.

In addition to the project replacements, the regional operator will also need further replacements on SOP project assets estimated at EUR12.2m and to have a 15 year lifetime first falling due in 2036. It is feasible and therefore assumed that these replacements and funded out of cash generated and therefore no further debt is taken out. Annual cash surplus rises to around EUR 3m in 2033 and stabilises around this level, whereas cumulative cash remains positive. This allows for a worse case DSCR of 1.54 in 2039, following the debt taken out for replacement the previous year. The average DSCR in the critical years 2037-2040 is 1.70.

JASPERS Comments

The need for grant financial support is shown with the project realising both a negative FRR/C and FRR/K.

At a project level, tariffs and resulting revenues are not sufficient to generate enough cash to fully finance project replacements and debt financing is needed to keep cumulative cash flow positive. It has been demonstrated that subsequent project cash flow is adequate to ensure respective debt service coverage and this approach has been considered acceptable.

For the sake of consistency, at a company level, the same proportion of replacement cost is shown as debt financed (i.e. as in the case of the project level cash flow), although the operator would be able to largely meet such needs out of its own cash flow without taking debt. In any event, debt service coverage indicators are satisfactorily and in accordance with commonly accepted financial covenants.

No significant outstanding issues

8.3 Economic Analysis

The economic evaluation has been undertaken over a 30 year reference period using a 5% social discount rate and shows the project achieving the following economic indicators:

- Economic internal rate of return 9.1%
- Economic net present value € 178.3 million
- Benefit-Cost ratio 1.64

Project economic costs comprise investment costs, including initial investment costs, plus incremental replacement cost with a net present value of € 177.3m (64% of the overall economic costs) and discounted incremental operating costs (corrected for shadow wage of unskilled labour) of € 100.7 million (36%).

In producing the economic costs, the following adjustments and assumptions have been applied:

- non-skilled labour component of the opering cost is adjusted with a coefficient for financial cost of 0.62, derived from the standard formula (1 – salary related taxes) * (1 – regional unemployment rate). All labour costs have been included as unskilled labour which is considered unrealistic but has no material impact;

The net present value of economic benefits is € 456.4 million with benefits derived from:

- Uninterrupted and improved access to compliant drinking water with a discounted value of € 174.2 million (38.2% of the total benefits), calculated by means of the following assumptions: the full value of the benefit (€ 195 / household, 2014 value) has been applied to the newly connected households.
- User environmental benefits from improved quality of water bodies (use and non-use values) of € 52.6 m (11.5% of the total benefits). The benefit is calculated on the basis of the number of the newly connected households and uses a figure of € 26.5 / person (2014 value).
- Cost savings for households newly connected to the water supply system that will no longer rely on the use of private wells with a net present value of € 125.9 m (27.6% of the total benefits). The benefit is estimated on the basis of the newly connected households and uses a 2014 value of € 406 / household.
- Cost savings for consumers newly connected to the wastewater system due to the reduced cost for maintaining septic tanks with a net present value of € 97.8 million (21.4% of the total benefits). The benefit is calculated on the basis of the newly connected households and a 2014 value of the benefit of € 448 / household.
- Reduced CO_2 emissions with an overall net present value of € 5.8 million (1.2% of the total benefits). The incremental volume (8,617 tonnes/year from 2024 and a further 1,450 from 2027) is established on the basis of the following categories – operation of the WWTP, energy consumption for operating the water and wastewater networks and thermal drying, sludge transportation, emissions from gas consumption of slugde drying.
- Valuation of CO_2 is in accordance with Romania Water Sector CBA Guide for 2014-2020.

The detailed assumptions for the economic analysis are presented in 3.3.2 of the CBA report.

JASPERS Comments

The results of the economic analysis show the project to satisfy economic viability criteria with the overall approach considered reasonable.

The economic costs are calculated as the sum of investment, replacement and operating costs with some conversion factors to account for transfer payments and shadow wages.

The quantified economic benefits are considered reasonable and typical of the wastewater projects.

No significant outstanding issues

8.4 Financing Plan

8.4.1. Eligible cost and EU contribution calculation

The project is intended to be phased over to MFFs, 2014-2020 and 2021-2027. Based on the implementation schedule, it is foreseen that the part of the project, works executed and invoiced before the end of 2023, will amount to EUR 135.1 m (excluding VAT) or approximately 29.2% of total project costs. The remaining proportion of the project costs of EUR 327.0 m, goes beyond 2023 and shall be phased to the next programming period.

All costs under the first part are considered eligible (except VAT), whereas costs under the residual are considered ineligible for the purpose of this application. The VAT of EUR 86.4m is considered ineligible.

A flat rate net revenue percentage of 6% has been applied to the eligible costs as per Article 61(3)(a) of Regulation (EU) 1303/2013. After the application of the 85% of the co-financing rate for the priority axis the EU contribution has been established at EUR 107.9m (79.9% of the eligible costs).

8.4.2. Sources of co-funding

Detailed financing structure and sources of financing has been established for the first part of the project. A maximum of 85% of the total eligible cost, after taking into account the requirements set out in Article 61(3)(a) of Regulation (EU) 1303/2013 (outside of a flat rate net revenue percentage of 6% which will be funded by the Beneficiary), will be funded by the EU. The remaining 15% will be covered by i) the State budget (13%) and ii) local authorities (2%), in accordance with the Romanian national rules for co-financing for LIOP and the relevant priority axis.

Table 35 Financing structure

Financing structure		EUR	%
Eligible costs (Phase I)	EU grant	107,905,155	79.90%
	State budget	16,503,141	12.22%
	Local budgets	2,538,945	1.88%
	Regional operator (loan)	8,103,015	6.00%
Total eligible costs		**135,050,256**	**100.00%**
Non-eligible costs (Phase II)	2021-2027 MFF	327,047,642	
Non-eligible VAT (recoverable)	Regional operator	86,392,804	
Total project costs		**548,490,703**	

The cash flow projections show that the operator can afford the required loan and both EIB and EBRD have shown their willingness and ability to lend to Romanian water sector operators in similar conditions (e.g. EIB in Alba Iulia and EBRD in Constanta). However, no detailed information concerning the loan is provided in the Application Form.

The national project implementation mechanism envisages reimbursement of all payments incurred by the Beneficiary, including the VAT despite being a non-eligible cost. Once the VAT recovery procedure is later fulfilled, the value of the VAT is returned to the state. This procedure is put in place to assist the beneficiaries in the process of implementation and avoid the use of expensive bridging loans.

As regards the phased part of the project, there is a statement in G.1.1 of the Application Form indicating that it will be financed 2021-2027 MFF. No further details have been provided but the assumptions used in the financial model indicate that financing structure and sources of co-funding are considered to be identical as for the first part of the project.

8.4.3. Annual financing plan

The indicative annual plan of the expenditures to be declared to the Commission (financial indicator for monitoring progress) as per section G.1.2 of the Application Form is presented below. This represents (for the first part of the project until 2023) eligible cost after taking into account of the requirements set out in Article 61 of Regulation (EU) No 1303/2013 ie Eligible Cost x 94% (where 94% = Funding Gap Rate)

Table 39 Annual financing plan: Eligible Expenditure

	2023	Total
EUR	126,947,241	**126,947,241**
%	100.00%	**100.00%**

An annual financing plan for the residual phased investments has not been presented.

JASPERS Comments

As regards the assumptions made for the financing plan, the following can be noted for the first part of the project (up to 2023):

- Eligibility rules
  - The project proposed respects the eligibility rules of article 2.1 (a) of the CF Regulation (1300/2013).
  - The project proposed for support is within the scope of the relevant Thematic Objective and Investment Priority as defined in article 4 of the CF Regulation (1300/2013).
  - The project proposed is a major project and will not be physically completed or fully implemented before the application for funding is submitted according to eligibility conditions under CPR Regulation (1303/2013).
- EU contribution calculation
  - Following a national decision based on Article 61(3)(a) of Regulation (EU) No 1303/2013 a flat rate net revenue percentage of 6% was applied for all projects in the water and waste water sector. The Operational Programme defines a maximum contribution from the EU funds within the priority axis at 85% of the eligible expenses. Therefore, the community contribution for the project was set at EUR 107.9 million or 79.9% of eligible expenditures.
- Financing Plan
  - The financing plan is considered methodologically adequate.
  - In considering the financing plan, attention should also be given to the following:
    - The Application Form includes provisions for potential price adjustments in Table C.1 of EUR 163.6 million or 34.1% of total project costs. This accounts for the prolonged project implementation until the end of 2029 taking into account costs allocation over the years and official forecast for inflation indices (construction price index – Autumn 2022).
    - The financing plan foresees 10% contingencies (as an addition to the construction/equipment cost) for unexpected events.
- Local financing contribution
  - The Beneficiary stated that local financing support has already been substantially secured (local authorities contributions);
  - The Beneficiary's scope for securing additional financing facilities to secure debt financing of the project as well as any potential needs to bridge cost overruns and grant disbursement delays seems likely to be confirmed;
  - The Beneficiary's ability to manage contract payments, including VAT, towards contractors given the national project implementation mechanism envisaging full reimbursement of all payments incurred by the Beneficiary seems to be secured.

As regards the assumptions made for the financing plan, the following can be noted for the residual phased part of the project:

- All project costs related to the residual (going beyond 2023) are considered ineligible for the purpose of this application;
- Based on the statement in G.1.1 of the Application Form it is assumed that Romanian Government is committed to guarantee funding for project components whose implementation will exceed the eligibility period of EU grant finance under the 2014-2020 MFF and will finance Phase II of the project under 2021-2027 MFF.

- Eligibility rules for 2021-2027 have not been established yet; it is assumed that all project components under Phase II as indicated in the current project documents will be eligible for funding under the finally adopted OP 2021-2027.
- Although the financing structure as well as sources of co-funding for the residual part of the project have not yet been confirmed, it is assumed (following financial model assumptions) that the grant funding ratio as well as national and local contribution for the project under the 2021-2027 MFF remains the same as under the 2014-2020 MFF as per project documents assessed for this ACN.

Overall, the financing plan appears numerically correctly calculated and is in line with the expected payment profile. A reasonable justification is provided concerning the availability of national and municipal co-financing for current application.

With regard to the residual financing needs (beyond 2023), ordinarily the absence of clear indications of the sources of financing and a robust guarantee of availability of finance for the components of the project to be funded outside the current operational programme would be deemed to be a Significant Outstanding Issue. However, it is understood that this specific concern is currently subject to resolution by the European Commission in cooperation with the Managing Authority, and therefore is not to be considered as Outstanding in the overall context of the project approval process at this stage. However, it is expected that all the above mentioned assumptions of the financing plan for the second part will be confirmed not later than when a modification of the underlying project proposal will be processed under the 2021-2027 regulatory framework.

No significant outstanding issues

9 State Aid

According to the information provided in the Application Form, the project is not considered being subject to State Aid regulations. Therefore, Romanian authorities have neither pursued an EC notification for the project nor adopted an SGEI framework for this type of projects in general.

The Romanian authorities consider that in general, granting of resources for the water and waste water infrastructure, including new construction as well as modernisation and rehabilitation of an existing infrastructure, does not involve State Aid. The main argument is that due to the lack of competition in the market there is no risk of market distortion.

In this respect, in order to conclude about the project and to grant the financial support, the following general and sector specific issues need to be taken into account:

a. The public water supply and sewerage service is regulated at both, national level, by a general law on public utilities and a specific law for water and waste water services (the Service), which confers powers to a national regulatory authority (ANRSC), as well as at local level, by municipalities individually or combined into a municipal association for regional services, known as an Intercommunity Development Association (IDA).

b. According to the Romanian laws mentioned above, the Service is set up and organized as an exclusive competence of the local authorities (municipalities), which are also obliged to organize the Service within their geographical areas.

c. The special powers granted to the municipalities, include the following:

   - The freedom to decide on an institutional and organizational set-up that will secure a reliable and sustainable Service;
   - The authority to control the service provider (operator) in terms of compliance of the activities performed whether the operator is a privately owned company or an in-house operator;

- The power to adopt local regulations for the Service, which are mandatory whether the operator is a private owned company or an in-house operator;
- The authority to approve the tariffs for the Service.

d. The national regulatory authority's (ANRSC) competences include:
   - Granting the licenses for the operators to provide water and sewerage services, taking into account that:
     - water and waste water activities cannot be carried out without a license;
     - a license can only be obtained by an operator with the necessary technical capability to conduct business;
     - the license is granted for a specific range of activities under the Services provided and within a specifically defined geographical area;
   - Adopting the general frame for the local regulations for the Service, including the framework methodology regarding the establishment, the adjustment and the modification of tariffs for the Service;
   - Controlling the activity of the operators in terms of compliance with the license;
   - The endorsement/approval of tariffs.

e. The main characteristics of the institutional and organisational set up of the water and waste water services are typically that the municipality retains ownership of the assets and the operator is responsible for the proper maintenance of the assets and service provision, under the terms of a Delegation Contract. The municipality receives a concession fee for the continued renovation of the asses, but this is paid back to the operator into a designated account (MRD fund) for the purposes of asset maintenance, replacement and development.

f. There are currently 43 Regional Operators. Operator is contracted through an association of municipalities (IDA) to perform the Services. In the case that the Services are outsourced to a private operator, there must be an open tender for a market price that duly remunerates the public investment. This is currently only the case for two large Operators, being Bucharest and Ploiesti.

g. Outside of the Regional Operators, there still remains a large number of small municipally owned local operators. They are estimated to cover around 10% of the country's population in total. However, such operators are excluded from the eligibility for EU financing, to incentivise local authorities to join into already established Regional Operators.

h. Regarding a potential competition on the water and waste water market the following aspects need to be taken into consideration:
   - The water and waste water market is not liberalised and is regulated e.g. granting licences, setting the rules and conditions for services provisions, approving tariffs;
   - The local markets of water and waste water services provision is closed to competition. An entry on the local market / geographic area of a new player, where at least one player is already present, is excluded. An operating licence would not be granted to that new player as this would go against the rules applicable to the provision of water and wastewater services on the local level;
   - Furthermore, geographic boundaries of different local markets for water and wastewater services do not and will not overlap. As a result, there is one player per local market holding an operating licence (for provision of water and/or wastewater services on that particular geographical market);
   - The entity holding a licence and operating water and waste water assets is the only one providing water and/or waste water services to final customers with the use of defined assets in a defined geographic area;

- In case the company operates in more than one geographic area it needs to be granted a license by all municipalities involved to operate in their respective areas.

i. On the issue of a potential distortion of competition on markets other than water and waste water, the following need to be taken into account:

- In case the water and waste water company is active on other markets open to competition, separate accounts are put in place refraining from and allowing the verification of possible cross-subsidization between different markets;
- According to the rules applicable to water and wastewater market in Romania, the beneficiary's activity on that market will have no impact on other competitive markets, and in particular on the way the prices are set in those competitive markets;
- Tariffs are calculated according to the law on tariff setting which explicitly defines the costs that can be included in the tariffs which can only be costs related to the provision of water and waste water service;
- The tariff proposal must be submitted to the municipality for approval and in case there are any justified doubts, the municipality has a right to reject the tariffs proposed and request a revision.

Therefore, in case of the Romanian water and waste water companies, the application of Article 107.1 TFEU could be excluded on the following instances:

- The water companies hold exclusive rights in the local water market so the water market of their operation is closed to completion; thus no risk of distortion of competition exists;
- In case the operation (e.g. concession) of infrastructure or services is outsourced it needs to be assigned through an open tender for a market price that duly remunerates the public investment. At a market-conforming or cost-covering price the service provider active downstream may therefore not derive an economic advantage from the operation of the infrastructure, and State aid rules do not apply (i.e. because there is no "economic advantage");
- If the water company is active on other markets there are regulations in place enforcing separate accounts being implemented and preventing any potential cross subsidisation thereby securing that the granting of resources for the water and wastewater infrastructure will have no impact on other competitive markets;
- Private financing in the sector is limited and currently restricted only to two main Municipalities in the Country.

JASPERS Comments

The project documentation states that State Aid is not applicable in this case, in line with Guidance provided by the Managing Authority. JASPERS would not object to this conclusion given the arguments as summarised below:

- Enterprise provides a Public Service Obligation, with obligations clearly defined;
- No competition for services;
- Enterprise is fully publicly owned with regulated tariffs and subject to benchmarking to ensure reasonableness;
- Operator is restricted to areas specifically assigned to it through a Delegation of Service Contract and is not allowed to cross subsidy other services.

The following key arguments support the conclusion that State aid is not applicable in this case:

- There is no direct competition regarding the infrastructure: the public beneficiary (owning a right to and operating the assets) holds a service monopoly on the water and waste water management in the area;

- Private financing is insignificant in the sector and the Member State concerned;
- The infrastructure is not designed to selectively favour a specific undertaking or sector but provides benefits for society at large;

In addition, the supporting documents:

- Demonstrate sufficiently that the other revenues shown in the CBA model are a result only of supporting activities related to the provision of water and wastewater services.;
- Clearly specify that the Regional Operator does not generate revenues from any other activities not directly linked to the provision of water and wastewater services.
- Provide sufficient evidence that the water sector revenues can be considered fully ring-fenced without the need of establishing separate accounts.

The ultimate decision on State aid is taken on a case-by-case basis by the EC (DG-COMP) and the full responsibility for compliance with State aid rules lies with the Romanian authorities. In this respect, the National Competition Council has confirmed in the letter dated 9 December 2016 that the investments concerned water and wastewater sector do not involve the application of State Aid.

No significant outstanding issues

10 Institutional Capacity and Capability

Chapter 11 of the Feasibility Study presents a detailed institutional analysis, supplemented by copies of all relevant documentation in the Annexes of the Study, notably Appendix 4/III AI/03 Annexes/A.ADI.

10.1 Legal Capacity

The project Beneficiary is SC AQUAVAS S.A. Vaslui (Water and Sewerage Company). The company was established as a Regional Operator in 2007, operating on the basis of a direct contract of entrustment granted by ADI APC-Vaslui, in compliance with the in-house rule.

The shareholding of AQUAVAS S.A. Vaslui consists exclusively of members of the ADI APC-Vaslui, made up of ATUs in the Vaslui County in which the company operates, thus being a publicly funded public interest company. The Water Inter-Community Development Association currently has 76 associate members.

AQUAVAS S.A. Vaslui acts on the basis of the Service Management Delegation Contract, whereby the ATUs in the area of operation exercise over OR control similar to that exercised over its own departments.

10.2 Technical Capacity

The Company is currently responsible for service provision to an area with approximately 123,992 inhabitants (9 ATUs) and due to the project implementation the ROC area will extends up to 47 ATUs respective 249,612 inhabitants (88% of the Vaslui County).

Currently (2021 year) it employs 603 people with anticipated employment of 732 in 2026.

Although it is a relatively small operator it will rapidly developed in the next 3 years, consolidating the services in the operational area (gradually taking over infrastructure and service provision in the municipalities belonging to IDA). Full consolidation of services is foreseen in 2026 when the project and parallel investments are to be completed.

The company has been developing a body of skilled technical personnel, including a well-established project implementation unit as discussed below.

The infrastructure management and maintenance capacity of the company will be further enhanced by project investments in monitoring (metering, SCADA, laboratory), oversight (IT controls, GIS) and operational maintenance equipment as well as by the specialised trainings provided to the staff.

10.3 Financial Capacity

The financial capacity of the operator is presented in more detail in Chapter 11 of the FS and in the CBA.

Table 29 Financial indicators in 2017-2021

Indicator € million	2017	2018	2019	2020
Revenues	9.492	11.214	11.927	12.134
EBITDA	0.459	1.035	1.105	1.112

The financial sustainability (See section 8.2 above) will be ensured by the implementation of agreed (near term) and planned (longer term) tariff increases.

10.4 Administrative and Project Management Capacity

The Beneficiary will be in charge of the project implementation. The supervision of works will be carried out by a consultant to be contracted by the Beneficiary in accordance with public procurement legislation.

The Company has been developing its capacities in project management and investments implementation over the last years by expanding its service area and implementing the investments financed through EU sources (ISPA, SOP Env). The Company successfully established and operated Project Implementation Units (PIU) for both of these projects, and has more recently established a PIU for the current project.

Decision no. 5 of 27.04.2021 establishes the Implementation Unit of the Regional Project for the Development of Water and Wastewater Infrastructure in Vaslui county in 2014-2020 and approves the Organigram of the Project Implementation Department. Of the 26 posts in the organisational set-up, 3 are currently occupied. Further contract officers will be appointed.

The qualifications and experience of the appointed staff are demonstrated by the CVs included in the application package.

PIU will be supported by the Technical Assistance consultant to be contracted under the project.

The above-mentioned institutional set-up will be continued after the project is implemented. No changes to the present institutional structure are expected.

JASPERS Comments

The legal capacity of the Company to undertake the project and the subsequent operation of the infrastructure and equipment is clearly demonstrated in the project documentation.

The technical capacity of the operator is sufficient to operate and maintain the project assets. Training in the operation and maintenance of some new equipment will be required.

The additional equipment purchased under the project will further enhance the technical capacity of the Company.

The ROC is a small company compared to the water sector in Romania and continues to improve its financial capacity. The significant increases of tariffs planned in 2023-2026 will secure the financial sustainability of the operator and allow for sufficient cash flow to be generated to finance operations as well as to contract and service the debt for co-financing the investments.

The Company already has experience in the implementation of similar projects and has captured this experience in the new PIU for this project. Accordingly, the PIU does not require specific technical assistance.

No significant outstanding issues

11 Procurement and Implementation Schedule

The procurement and implementation process is described in detail in Chapter 13 of the Feasibility Study and attached documentation.

The project will not be completed by 31st December 2023 and therefore is a phased project with the first phase being undertaken through the Operational Programme 2014 – 2020 and the second phase to be undertaken through the Operational Programme 2021 – 2027.

11.1 Procurement Process

The acquisition strategy aims to ensure the best value for money, efficiency and effectiveness of those that are appropriate to the project requirements and have the ability to continually improve performance, while providing the best possible implementation of the contracts within the permissible time period.

To implement the project, AQUAVAS S.A. will perform public procurement for:

- Works contracts - "Project & Construction" (Yellow FIDIC Book);
- Works contracts - "Construction" type (Red FIDIC Book);
- Service contracts for TA for project management, contracts supervision, and the annual financial project audit;
- Supply contract for operational equipment.

For the contracts to be awarded, the open tender procedure will be used, according to the Law no. 99/2016.

The implementation plan proposes the implementation of 13 works contracts, 3 service contracts and 2 supply contracts, broken down as in Table 30.

Table 30 Type and Number of Contracts

Contract type	Number	Value Euro (constant prices)
Works contracts - build	8	166,981,525
Works contracts - design and build	5	74,367,921
Service contracts	3	14,198,942
Supply contracts	2	10,143,093

11.2 Implementation Schedule

The implementation schedule indicates project commencement in 2023, indicating that procurement procedures for 7 of the works contracts (CL-G02, CL-G03, CL-G04, CL-R03, CL-R05, CL-R06, CL-R07) have been launched and 1 services contract (CS-S3) has been signed. All the contracts will extend beyond the OP 2014-2020 closure deadline of 31/12/2023. All of the works contracts shall be completed in 2024 – 2026, with the defect notification periods running to 2027 - 2029. An implementation schedule for the project is presented in Table 31.

Table 31 Implementation Plan

Contract code	Contract / Activity	Contract value (Euro - constant)	Duration (months) (excluding DNP period)	Launch Date	Commencement date	Finish date	DNP end	DNP Period (from finish date)
VS-CS-S1	TA for Project Management and Supervision of Works	13,371,668	78	Feb 2023	July 2023	Dec 2029	N/A	N/A
VS-CS-S2	Project financial audit	270,250	78	Feb 2023	June 2023	Nov 2029	N/A	N/A
VS-CS-S3	Project Design Technical Assistance according to Law 10/1995	557,024	45	signed contract	Jan 2023	Sept 2026	N/A	N/A
VS-CL-G01	Water sources, transmission mains, water treatment plants for Barlad, Perieni, Zorleni, Fruntiseni, Murgeni, Falciu, Berezeni, Vetrisoaia, Dodesti, Bogdanesti, Costesti, Bogdana, Alex. Vlahuta, Iana, Pogana, Bacani, Vaslui, Muntenii de Jos and Lipovat	20,416,992	36	April 2023	Oct 2023	Sept 2026	Sept 2029	36
VS-CL-G02	Water sources, transmission mains, water treatment plants for Husi, Duda Epureni, Stanilesti, Lunca Banului, Padureni, Dimitrie Cantemir, Hoceni, Negresti, Todiresti, Rafaila, Dumesti, Bacesti, Rebricea, Tacuta, Codaesti and Miclesti	19,276,990	24	CN1038456/ 24.03.2022 Cancelled Relaunch Jan 2023	Aug 2023	July 2025	July 2028	36
VS-CL-G03	Water sources, transmission mains, water treatment plants for Zapodeni, Muntenii de Sus, Tanacu, Valeni, Feresti, Stefan cel Mare, Balteni, Delesti, Cozmesti, Osesti, Pungesti, Ivanesti	16,958,322	24	CN1040624/ 23.03.2022 Cancelled Relaunch Jan 2023	Aug 2023	Aug 2025	Aug 2028	36
VS-CL-G04	Wastewater treatment plants for Husi, Vaslui, Dumesti and Codaesti	8,675,674	24	CN1040627/ 23.03.2022 Cancelled Relaunch Jan 2023	Aug 2023	Aug 2025	Aug 2028	36
VS-CL-G05	Wastewater treatment plants for Barlad, Perieni, Murgeni, Berezeni, Iana and Falciu	9,039,944	36	April 2023	Oct 2023	Sept 2026	Sept 2029	36
VS-CL-R01	Extension and rehabilitation of water and wastewater networks in Barlad, Perieni, Zorleni and Fruntiseni ATU's	33,129,104	36	April 2023	Oct 2023	Sept 2026	Sept 2029	36
VS-CL-R02	Extension and rehabilitation of water and wastewater networks in Murgeni, Falciu, Berezeni, Vetrisoaia, Dodesti,	20,354,885	36	April 2023	Oct 2023	Sept 2026	Sept 2029	36

Contract code	Contract / Activity	Contract value (Euro - constant)	Duration (months) (excluding DNP period)	Launch Date	Commencement date	Finish date	DNP end	DNP Period (from finish date)
	Bogdanesti and Costesti ATU's							
VS-CL-R03	Extension and rehabilitation of water and wastewater networks in Husi, Duda Epureni, Stanilesti, Lunca Banului, Padureni, Dimitrie Cantemir and Hoceni ATU's	24,525,762	20	CN1038456/ 13.01.2022	Feb 2023	Sept 2024	Sept 2027	36
VS-CL-R04	Extension and rehabilitation of water and wastewater networks in Vaslui, Muntenii de Jos and Lipovat ATU's	17,609,004	36	April 2023	Oct 2023	Sept 2026	Sept 2029	36
VS-CL-R05	Extension and rehabilitation of water and wastewater networks in Muntenii de Sus, Tanacu, Valeni and Feresti ATU's	21,332,009	20	CN1037846/ 22.12.2021	Feb 2023	Sept 2024	Sept 2027	36
VS-CL-R06	Extension and rehabilitation of water and wastewater networks in Negresti, Todiresti, Rafaila, Dumesti, Bacesti, Rebricea, Tacuta and Codaesti ATU's	23,022,896	18	CN1040422/ 19.03.2022	March 2023	Aug 2024	Aug 2027	36
VS-CL-R07	Extension and rehabilitation of water and wastewater networks in Stefan cel Mare, Zapodeni, Delesti, Cozmesti, Osesti, Pungesti and Ivanesti ATU's	17,251,667	20	CN1038180/ 01.01.2022	March 2023	Oct 2024	Oct 2027	36
VS-CL-R08	Extension and rehabilitation of water and wastewater networks in Bogdana, Alexandru Vlahuta, Iana, Pogana, Bacani and Perieni ATU's	9,756,199	36	April 2023	Oct 2023	Sept 2026	Sept 2029	36
VS-F1	Procurement of operational and maintenance equipment	8,039,873	12	Feb 2023	July 2023	June 2024	June 2026	24
VS-F2	Supply and install central SCADA System	2,103,220	30	July 2023	June 2024	Nov 2026	Nov 2028	24

11.3 Physical and Financial Indicators to Monitor Implementation

The headline indicators for the project are specified cumulatively for the end of each Phase.

ID	Project Indicators	UM	Phase 1	Phase 2
	Immediate output indicators (compulsory)			
CO18	Water supply: Additional population benefiting from improved water supply services	people	**38,962**	**98,694**
CO19	Wastewater treatment: Additional equivalent	p.e.	**9,559**	**43,656**

ID	Project Indicators	UM	Phase 1	Phase 2
	population benefiting from improved wastewater treatment services			

The main physical indicators are also specified.

ID	Project Indicators	UM	Phase 1	Phase 2	Total
2S70	Drinking water distribution network (new)	km	321.71	299.95	621.66
2S71	Drinking water distribution network (rehabilitated)	km	3.41	42.74	46.15
2S72	Main trunks (new)	km	132.64	242.43	375.06
2S73	Main trunks (rehabilitated)	km	2.68	-	2.68
2S74	Sewer network (new), excluding wastewater rising pipes	km	77.68	248.86	326.54
2S75	Sewer network (rehab), excluding wastewater rising pipes	km	0.92	26.62	27.54
2S77	Water storage tanks	pcs	18	35	53
2S78	Water treatment plants, including chlorination stations (58)	pcs	22	42	64
2S79	Wastewater Treatment Plants serving agglomerations above 10,000 PE	pcs	2	1	3
2S80	Wastewater Treatment Plants serving agglomerations under 10,000 PE	pcs	-	5	5

The schedule for achievement of the main physical indicators is specified as a cumulative percentage for the duration of the project.

Year	2023	2024	2025	2026
Indicator	2S117	2S118	2S119	2S120
%	36.73	71.46	88.89	100

JASPERS Comments

The procurement strategy is well developed and represents a reasonable balance between the number, size and specificity of contracts. The use of a single contract for both network elements (WS and WW) is sensible and efficient.

Up to date information on the procurement plan is given below. Cancelled tenders due to ineligibility of the bidders and are planned to be relaunched in Jan 2023.

CS-S3: contract signed in Jan 2023, with expenditure under 2023

CL - R03, R05: contracts signed in Feb 2023, with expenditure under 2023

CL – G02, G03, G04: Cancelled due to the ineligibility of the bidders, relaunched Feb 2023

CL - R06, R07: Final stage of evaluation, planned to be signed in Feb 2023.

The existing situation is in line with the proposed Implementation Plan. A Gantt chart can be found in Annex 5 – Contracte_Vaslui_r05.

Estimated construction rates (e.g. m of sewer per annum) are shown below. This construction rate appears moderately intense however it can be acceptable since the proposed water and wastewater pipes are in the same trench. Bidders that are close to contract signature expressed 40-45 m/d/team construction rate in their offer, with a commitment of 5-6 teams working in parallel. Additionally, the Beneficiary shared daily progress reports for the ongoing works in the area (SOP phased) that demonstrate high construction rates; 70 m/d/team (HDPE Dn 110) and 55 m/d/team (PVC Dn250).

km per annum	2023	Total Phase I	2024	2025	2026	Total Phase I+II
Water network (new)	321,71	321,71	183,69	54,26	62,00	621,66

Water network (rehab)	3,41	3,41	10,68	14,96	17,10	46,15
Water Mains (new)	132,64	132,64	130,37	52,29	59,76	375,07
Water Mains (rehab)	2,68	2,68	0,00	0,00	0,00	2,68
Sewerage network (new)	98,03	98,03	138,39	77,79	88,91	403,12
Sewerage network (rehab)	1,17	1,17	7,12	9,96	11,39	29,64

Whilst the planned works should be achievable within the specified period, the possibility is not excluded that Phase 1 implementation of project works materialises slower than currently foreseen. The ROC would be well advised to prepare a contingency plan (technical, financial, etc.) for the possibility that a larger expected investment portion is implemented after 2023. Defect notification periods have been included and are of a suitable duration.

The physical indicators for the project reflect the proposed infrastructure and equipment specified in the project.

No significant outstanding issues

12 Risk Assessment

12.1 Project Risk Management Process

The documentation includes a qualitative risk assessment of the project. It determines relevant risks, examines their probability, severity and impact and proposes mitigation measures together with the responsible entities. All the 18 risks required in connection with demand, design, land acquisition, administrative / procurement, construction, operational, financial, regulatory and other have been analysed.

The risks related to climate change, adaptation and mitigation needs, disaster resilience and those related to ensuring that the investments are resilient to climate change are considered in the section on Climate Change of the Action Completion Note

12.2 Risk Identification and Prevention/Mitigation Matrix

A project risk matrix is referred to in Section G.3 of the Application Form and can be found in Section 6 of the CBA Report Annex. The Risk Identification and Mitigation Matrix has been developed by assigning to each risk identified a risk probability ranging from highly unlikely to highly likely (A-E), considering the impact it will have on the project ranging from a lack of to a catastrophic impact (I-V). Following the logic of the risk matrix, an assessment of the overall risk associated with a specific risk factor (combination of probability and impact) has been done assigning a level of overall risk ranging from reduced to very high. A summary of the Risk Matrix is presented below with all identified risks (1-18) assigned. The main risks are formulated in the same way as identified in Annex III of Commission Implementing Regulation 2015/207.

Impact / Probability	**I**	**II**	**III**	**IV**	**V**
A	2,5,6,13,14,17	8,9,18			
B		7			3,4
C			1,11,12,16		
D			10	15	
E					

The overall risk level identified as high or very high (before mitigation) is related to the following events:

- High (orange colour) – (3) Inadequate surveys and investigations (4) Inadequate design cost estimates (10) Delays in awarding contracts
- Very high (red colour) – (15) Tariff increases slower than predicted.

Mitigation and prevention measures have been analysed and presented for all risks and the residual risks has been assessed. The measures for the higher impact risks, identified above, are as follows:

- Inadequate surveys and investigations; (Measure) Dertailed investiagtions carried out as part of FS; (Residual risk) Low;
- Inadequate design cost estimates; (Measure) Costs estimated based on current market conditions, Regional Operator and Local Authority will underwrite cost overruns; (Residual risk) Low;
- Project cost overruns and delays in construction; (Measure) Appropriate time delays are build into procurement plan. PIU has experience and will be supported by TA: (Residual risk) Medium;
- Tariff increases slower than predicted; (Measure) Communicating the tariff strategy to and agreeing with the local authorities as main decision makers during project preparation and approval; (Residual risk) Medium.

JASPERS Comments

The qualitative risk assessment was undertaken in line with the Commission Implementing Regulation 2015/207. It determines the risks on the basis of probability and consequences. The range of risk items identified at the different stages of the project cycle is considered sufficiently comprehensive; reasonable mitigation measures have been proposed and the residual risk has been evaluated.

No significant outstanding issues

12.3 Sensitivity of Economic and Financial Analyses

A classical sensitivity analysis of the financial and economic viability of the project has been undertaken identifying the critical variables and their switching points.

The following key variables were tested for 1% variation resulting in 1% changes in either the financial or economic performance indicators:

- Level of tariffs/revenues – critical for FNPV;
- Demographic projections – critical for ENPV;
- Connection rate to water - critical for FNPV and ENPV;
- Connection rate to wastewater – critical for ENPV:
- Per capita consumption – critical for FNPV:
- Investment cost – critical for FNPV and ENPV;
- Operating & Maintenance cost – critical for ENPV;
- Relative CO_2 emissions – not critical
- “Access to drinking water” benefit – critical for ENPV

- "Improvement of water bodies" benefit – not critical
- Cost saving to customers - private well – not critical
- Cost saving to customers - sewage disposal – not critical

For the critical variables the switching values were calculated as follows:

Table 32 Critical variables and switching values

Critical variable	FNPV	ENPV
Level of revenues	42% increase of revenues would turn the negative FNPV to 0	Not applicable
Demographic projections (Yearly population growth)	Not critical	30% decrease would turn the positive ENPV to 0
Connection Rate (Water)	89% increase of revenues would turn the negative FNPV to 0	10% decrease would turn the positive ENPV to 0
Connection Rate (Wastewater)	Not critical	37% decrease would turn the positive ENPV to 0
Per Capita Consumption	59% increase of revenues would turn the negative FNPV to 0	Not applicable
Investment cost	68% decrease would turn the negative FNPV to 0	51% increase would turn the positive ENPV to 0
Overall value of operation and maintenance cost	Not critical	34% increase would turn the positive ENPV to 0
Access to drinking water	Not applicable	73% decrease would turn the positive ENPV to 0

JASPERS Comments

The sensitivity analysis has been undertaken in accordance with the requirements specified in the EU's CBA Guidelines. Appropriate variables have been tested, which allows for the identification of specific risks relevant to the project.

With regards to the economic analysis, the results (high switching values in general) highlight the robustness of the economic viability of the project under the stated assumptions.

With regards to the financial analysis, the project is sensitive to changes in revenues and investment cost. These aspects have been addressed in the risk analysis and appropriate mitigation measure have been identified to reduce the residual risk.

No significant outstanding issues

13 Climate Change

13.1 Climate Policy

The National Strategy on Climate Change and Economic Growth Based on Low Carbon Emissions for the Period 2016 – 2020 and the National Action Plan to implement this strategy are the main policy documents in Romania, which address both climate change mitigation and adaptation. The strategy was adopted by Government Decision no 739 of 20 October 2016.

The Strategy aims at implementing the Paris Agreement as well as the EU 2020 Strategy by reaffirming the following targets until 2020:

- 20% reduction of GHG emissions;
- 24% energy production from renewable resources;
- 20% increase of energy efficiency.

The relevant EU 2020 Strategy targets are also reflected in the Romanian Large Infrastructure Operational Programme 2014-2020[1].

The project is seen as compliant with the 2020 targets as established by the National Strategy. This is demonstrated in Chapter 12.2 of the FS and in Section F.8 of the AF, where the resilience of the project to relevant climate change risks and the measures to reduce GHG emissions are presented.

According to JASPERS review, the project is relevant to the following measures from the National Strategy: efficient use of water resources through the implementation of measures for improvement of the efficiency of drinking water treatment and distribution, including significant reduction of water losses, water metering, etc.

Section B.2.1 of the AF associates the project costs to the following category intervention codes under Annex I of the Commission Implementing Regulation 215/2014.

Table 33 Project intervention codes

Code	Categories of intervention	Coefficient of support to climate objectives
021	Water management and drinking water conservation (including river basin management, water supply, specific climate change adaptation measures, district and consumer metering, charging systems and leak reduction)	40%
022	Waste water treatment	0%

According to LIOP, the intervention codes 021 and 022 are applicable for projects under Priority axis 3 – Development of environmental infrastructure[2].

The amount of EU Funds considered to be spent on climate change, which is equal to the 40% of the EU co-financing share for the measures falling under intervention category 021 under Commission Implementing Regulation (EU) No 215/2014, is EUR 27.942.632 (Section F.8.1 of the AF). The AF does not provide clarifications to which drinking water measures this amount relates.

13.2 Climate Change Mitigation and Greenhouse Gas Emissions

The carbon footprint of the project has been calculated in line with the EIB Methodology (version 11.2 of February 2022). The results show the following:

- Phase 1: 2024: reduction of GHG by 8617,12 t CO_2e/year, namely 26,5% compared to the before the project scenario (2023);

[1] Link to the Large Infrastructure Operational Programme: http://www.fonduri-ue.ro/poim-2014

[2] When negotiating LIOP, intervention category code 021 (from Annex I of 215/2014) was retained as applicable intervention field for traditional water supply investments and for water management related investments under LIOP (and intervention code 020 was not introduced to LIOP). The EC confirmed in April 2017 that Romania is free to choose between both codes as far as water supply is concerned. It is assumed that a rebalancing of climate contributions by water supply investments to LIOP targets could be pursued at some later stage, should this be considered necessary by the relevant parties.

- Phase 2: 2026: reduction of GHG by 10067,05 t CO_2e/year, namely 31,02% compared to the before the project scenario (2023).

The project carbon footprint is adequately presented in the AF, the CBA and in Chapter 12.2.B of the FS.

13.3 Climate Change Adaptation and Resilience

During the preparation of the project, a CCVRA was carried out by applying the methodology under the Non-Paper Guidelines for Project Managers: Making Vulnerable Investments Climate Resilient developed by DG Climate Action of the European Commission.

The assessment approach/methodology as presented in Chapter 12.2.A of the FS is considered adequate.

The CCVRA was based on reliable sources of information including:

- River Basin Management Plan (RBMP) for Prut-Barlad River Basin 2016-2021;
- Flood Risk Management Plan (FRMP) for Prut-Barlad River Basin 2016-2021;
- Law 575/2001 on the adoption of National Plan for the National Territory, Section Va – Natural Risk Zones;
- Plan for analysis and coverage to risks in Vaslui county, issued by the Emergency Inspectorate in 2015 and 2019;
- National Institute of Hydrology and Water Management;
- National Meteorological Agency.

The CCVRA was carried out separately for the drinking and wastewater components and for Prut and Barlad river basins. The project was split into the following components:

Grouping	Components
Inputs	• raw materials/materials (water, chemicals)
	• human resources
	• energy
Assets	• boreholes for water supply
	• surface water intakes
	• main trunks
	• treatment and storage facilities and installations
	• distribution networks
	• sewage networks
	• purification stations
	• pumping stations
Processes	• water intakes
	• treatment, transport and distribution of driking water, including maintenance activities;
	• collection, transport, treatment of wastewater, discharge of treated effluent, including maintenance activities
Outputs	• quality and quantity of raw/drinking water
	• quality and quantity of the treated effluent discharged into natural receivers
Interdependencies	• future economic growth
	• comfort of the population

	• working and living conditions of the employees
	• downstream uses
	• quality/quantity of water courses
	• tourism
	• population increases/decreases
	• biodiversity
	• possibility of insurance and the continuity of electricity supply
	• electricity consumption
	• access roads
	• future needs/demands, etc.

The CCVRA covers other natural risks, like earthquakes, to which the water and wastewater infrastructure is prone.

The Sensitvity, Exposure and Vulnerability assessments are carried out for 14 climate hazards. Thresholds are set for the Sensitivity and Exposure assessments with scores from 0 to 3. The Exposure assessment is carried for the current (2020s) and for the future (2050s) situation.

The results of the **Vulnerability assessment** could be summarised as follows:

- **River Basin Prut**

Component	Current high vulnerability (2020s)	Current medium vulnerability (2020s)	Future high vulnerability (2050s)	Future medium vulnerability (2050s)
Drinking water component	Extreme precipitations	Extreme termperatures	Extreme termperatures	Increage of average annual temperatures
	Strong storms	Floods	Extreme precipitations	Modification of the average precitpitation regime
	Drought	Landslides	Strong storms	Earthquakes
	Soil erosion	Earthquakes	Drought	Manmade fires
	Wild fires	Manmade fires	Floods	
			Landslides	
			Soil erosion	
			Wild fires	
Wastewater component	Extreme precipitations	Extreme termperatures	Extreme termperatures	Increage of average annual temperatures
	Strong storms	Floods	Extreme precipitations	Modification of the average precitpitation regime
	Drought	Landslides	Strong storms	Earthquakes
	Soil erosion	Earthquakes	Drought	Manmade fires
	Wild fires	Manmade fires	Floods	
			Landslides	
			Soil erosion	
			Wild fires	

- **River Basin Barlad**

Component	Current high vulnerability (2020s)	Current medium vulnerability (2020s)	Future high vulnerability (2050s)	Future medium vulnerability (2050s)
Drinking water component	Extreme precipitations	Extreme termperatures	Extreme termperatures	Increage of average annual temperatures
	Strong storms	Earthquakes	Extreme precipitations	Modification of the average precitpitation regime
	Drought	Manmade fires	Strong storms	Earthquakes
	Floods		Drought	Manmade fires
	Landslides		Floods	
	Soil erosion		Landslides	
	Wild fires		Soil erosion	
			Wild fires	
Wastewater component	Extreme precipitations	Extreme termperatures	Extreme termperatures	Increage of average annual temperatures
	Strong storms	Earthquakes	Extreme precipitations	Modification of the average precitpitation regime
	Drought	Manmade fires	Strong storms	Earthquakes
	Floods		Drought	Manmade fires
	Landslides		Floods	
	Soil erosion		Landslides	
	Wild fires		Soil erosion	
			Wild fires	

The Risk assessment was carried out for all the above climate hazards for which the investments show high or medium vulnerability. In addition, average wind speed and humidity were added to the assessment, although they are assessed as being of low vulnerability. Thresholds are set for the Severity and Probability assessments with scores from 1 to 5. The Risk assessment is carried for the current (2020s) and for the future (2050s) situation separately for the Prut and Barlad river basins.

The results of the **Risk assessment** could be summarised as follows:

- **River Basin Prut**

Component	Current high risk (2020s)	Current medium risk(2020s)	Future high risk (2050s)	Future medium risk (2050s)
Drinking water component	Extreme precipitations	Extreme termperatures	Increage of average annual temperatures	Modification of the average precitpitation regime
	Drought	Strong storms	Extreme termperatures	Earthquakes
	Soil erosion	Floods	Extreme precipitations	Manmade fires

Component	Current high risk (2020s)	Current medium risk(2020s)	Future high risk (2050s)	Future medium risk (2050s)
	Wild fires	Landslides	Strong storms	
		Earthquakes	Drought	
		Manmade fires	Floods	
			Landslides	
			Soil erosion	
			Wild fires	
Wastewater component	Extreme precipitations	Extreme termperatures	Increage of average annual temperatures	Modification of the average precitpitation regime
	Drought	Strong storms	Extreme termperatures	Earthquakes
	Soil erosion	Floods	Extreme precipitations	Manmade fires
	Wild fires	Landslides	Strong storms	
		Earthquakes	Drought	
			Floods	
			Landslides	
			Soil erosion	
		Manmade fires	Wild fires	

- **River Basin Barlad**

Component	Current high risk (2020s)	Current medium risk(2020s)	Future high risk (2050s)	Future medium risk (2050s)
Drinking water component	Extreme precipitations	Extreme termperatures	Increage of average annual temperatures	Modification of the average precitpitation regime
	Strong storms	Earthquakes		Earthquakes
	Drought	Manmade fires	Extreme termperatures	Manmade fires
	Floods		Extreme precipitations	
	Landslides		Strong storms	
	Soil erosion		Drought	
	Wild fires		Floods	
			Landslides	
			Soil erosion	
			Wild fires	
Wastewater component	Extreme precipitations	Extreme termperatures	Increage of average annual temperatures	Modification of the average precitpitation regime
	Strong storms	Strong storms	Extreme termperatures	Earthquakes
	Drought	Floods	Extreme precipitations	Manmade fires
	Floods	Landslides	Strong storms	
		Earthquakes	Drought	

Component	Current high risk (2020s)	Current medium risk(2020s)	Future high risk (2050s)	Future medium risk (2050s)
			Floods	
			Landslides	
			Soil erosion	
	Landslides	Manmade fires	Wild fires	
	Soil erosion			
	Wild fires			

Design and soft adaptation measures are proposed for each of the above risks to ensure a reduced residual risk (Chapter 9.1.5 and 12.2.5 of the FS and Section F.8.3 of the AF), e.g.:

- Ensuring alternative water sources;
- Selection of water sources that could ensure minimum 98% simultaneously with the assurance of potable water storage capacities;
- Intake of water from the lower levels of lakes;
- Reduction of water losses in the distribution system through replacement of poorly functioning pipes;
- Limitation of water uses other than for drinking water supply during periods with low debits;
- Planning of new treatment facilities;
- Ensuring compliance with the foundation solutions adapted to the geotechnical category specific to the area where the project's objectives are located;
- Planning constructive measures to ensure optimal treatment processes;
- Extension/rehabilitation of existing treatment facilities;
- Rehabilitation of storage reservoirs;
- Planning of new storage facilities;
- Placing the investments by taking into account the specificities of the area;
- Placing of the investments outside the flooded areas or where necessary, lifting the investments above the flood level;
- Placing of the investments outside areas prone to landslides, where possible;
- Proving electricity generators to ensure continuous supply;
- Ensuring that the WWTP operate as designed to produce compliant effluent;
- Monitoring of the drinking water quality at the sources and of the water bodies during unfavourable metefrological conditions;
- Installation of SCADA;
- Providing hydrants for fire-fighting;
- Compliance with the applicable construction standards;
- Training of the personnel, etc.

The measures will be a responsibility of the Regional Operator, who can delegate their implementation to the future contractor or other bodies, where relevant.

All costs for the implementation of the adaptation measures are already included in the overall project costs.

The adaptation measures are integrated in the project as proposed for EU co-financing, which is evident from Chapter 9 and 12 of the FS and from Section F.8.3 of the AF.

JASPERS is of the understanding that the conclusions of the CCVRA will form an integral part of the EIA Report for the project which is currently on-going.

JASPERS Comments

The AF and the supporting documents provide adequate information with regards to the national climate change mitigation and adaptation policy. With regards to the application of the intervention category code (020 vs. 021) under Annex I of the Commission Implementing Regulation 215/2014, JASPERS notes that the matter will be addressed at the level of LIOP between Romania and the European Commission, as deemed appropriate.

JASPERS notes that the issue of the applicable category intervention codes will be addressed at the level of LIOP between Romania and the European Commission, as deemed appropriate.

As at this stage /section F.8.1 of the AF does not provide details about the drinking water investment it is not possible for verify if the amount of EUR 27.942.632 is correct.

The project carbon footprint is calculated in line with the latest version of the EIB Methodology and is well presented in the project application package.

The CCVRA is based on sound data and the methodology is considered adequate and well presented in the project documents. The approach to identifying adaptation measures in view of improving the project's resilience to climate change-related risks is seen as adequate. However, the assessment and its results have not been confirmed by the competent EIA authorities yet.

Significant outstanding issues:

- **It is noted that as the EIA procedure for the project has not been completed yet and thus the results of the CCVRA have not been verified and confirmed by a competent authority.**

Recommendations

- Please consider presenting in Section F.8.1 of the AF which drinking water measures that are considered covered by the amount of EUR 27.942.632.
- The results of the carbon footprint calculation should be included in the EIA Report in line with Annex IV(4) of the Revised EIA Directive before it is submitted to the competent authorities.
- In view of ensuring compliance with Annex IV(4) of the Revised EIA Directive, please also consider including the CCVRA or at least its conclusions in the EIA Report so that the competent authorities can verify and confirm the necessary adaptation measures. In case that the competent authority imposes additional adaptation measures, these need to be integrated in the project, which should be evident from Chapter 9 of the FS.

14 JASPERS Contribution to the Project

14.1 Summary of JASPERS Input

The kickoff meeting between JASPERS and the Beneficiary and its consultants was held in 2019 and JASPERS has supported the project since throughout the period until February 2023.

Advice and support has been provided in respect of:

- Technical, including in particular
    - Characterisation of the existing situation and associated analysis
    - Projections of infrastructure conditions
    - Options Analysis

- Specification and presentation of proposed project measures
- Optimisation of technical solutions and measures proposed
- Ensuring compliant and sustainable service provision

- Financial and Economic including in particular
  - Demand projections
  - Macroeconomic projections
  - Financial analysis
  - Strenghtening of the financial sustainability of the Beneficiary, including achievement of full cost recovery while maintaining affordable tariff strategy
  - Ensuring economic viability of the project
- Environment and Climate Change including in particular
  - Appropriate assessments and compliance with the Habitats and Birds Directives
  - Compliance with Water Framework Directive
  - Climate mitigation calculations and climate vulnerability assessment

Value Added: The many interactions between JASPERS and the national stakeholders have improved the technical and economic competence of the Romanian stakeholders regarding the European Union procedures and requirements in respect of project preparation and implementation. Raising awareness of the long term sustainability requirements, optimisation of the project scope resulting in overall investment savings estimated at EUR 14.3 million in constant prices.

In addition to proper justification of project measures, specific attention was given to project phasing.

14.2 Experts Involved

The following experts have been involved:

Task Manager	Leyla CELEBIOGLU	Water Engineer	l.celebioglu@eib.org
Team members	Ken VALENTINE	Senior Economist	k.valentine@eib.org
	Lubomila POPOVA	EIA Specialist	l.popova@eib.org

14.3 Documents Reviewed

The following documents have been reviewed in the following project related documents:

- Draft Feasibility Study – November 2019
- Updated versions of individual chapters – numerous through 2020-2023
- Fully revised final application package – February 2023

14.4 Schedule of Meetings Held

Numerous meetings were held as well as regular and ad-hoc correspondence throughout 2019 – 2023. Due to the restrictions imposed due to COVID-19 on travelling and meeting, most of the meetings in 2020-2022 were held “electronically” using Skype, Teams or Webex.

14.5 Documentation submitted by JASPERS

Date	Note	Purpose
Jan 2020	Guidance Note 1	Comments on the FS and supporting documents
Dec 2020	Guidance Note 2	Compliance with the Revised EIA Directive, the EU nature Directives and with the Water Framework Directive. Quality of the Climate Change Adaptation, Vulnerability and Risk Assessment
Dec 2020	Guidance Note 3	Comments on general, technical and financial issues
Jan 2021	Guidance Note 4	Compliance with the Revised EIA Directive, the EU nature Directives and with the Water Framework Directive. Quality of the Climate Change Adaptation, Vulnerability and Risk Assessment
June 2021	Guidance Note 5	Quality of the Appropriate Assessment Screening as presented in the excel template
March 2022	Working Notes	Comments on engineering assessment of water and wastewater proposals
March 2022	Guidance Note 6	Coherence of the SSCOs defined nationally for the Natura 2000 sites identified with the respective SDFs
March 2022	Guidance Note 7	Quality of the draft EIA and AA Reports
Oct 2022	Guidance Note 8	Quality of the environmental impacts assessments

15 Conclusions and Recommendations

15.1 Conclusions

15.1.1 Project Eligibility and Compliance

The objectives and components of the project are seen as compatible with the underlying philosophy and requirements of the Operational Program and hence are seen as eligible for financial support from the Cohesion Fund.

The project aims to achieve compliance with the national and EU legislation in the fields of drinking water, wastewater collection, wastewater treatment and sludge disposal, as well as increasing the efficiency of the systems of service provision.

The proposed extension in service coverage and wastewater treatment processes will ensure comprehensive coverage with compliant services in the project area.

15.1.2 Technical

The project documentation clearly presents the existing situation for water supply and wastewater services infrastructure and operation. From this, the key deficiencies and non-compliances are derived and characterized, with detailed information being presented on the connection and the compliance rates separately.

The options analyses have been undertaken to determine an optimal approach to the resolution of these deficiencies, taking also into account applicable constraints such as sustainability of water use, sensitivity of recipient waters and land access issues. The assumptions are reasonable, costs are within expectations and the range of options is sufficiently comprehensive. In all cases the chosen option represents a cost efficient solution and is well chosen.

The proposed measures are seen as adequately assessed, reasonable and justified. The main engineering solutions put forward are consistent with the (i) identified needs and (ii) national and international practices. The engineering design follows the requirements of the respective Romanian regulations, which are harmonized to a great extent with relevant EC Standards.

The average length per new connection is around 25 meters for water supply and 26 meters for wastewater. The extensions are within the defined thresholds. This shows that the areas selected for extensions are sufficiently concentrated. Saying that, only 4 UATs in water supply and 1 UAT in

wastewater are marginally (max 8%) beyond the thresholds. Considering inflation and corresponding increases in the costs, it is seen as reasonable.

The specific unit costs applied in constant terms are reasonable and within the expected range for that period. It is of note that large cost escalation is occurring in the Romanian (and European) construction sector. Appropriate account of this phenomenon has been taken through the application of a (comparatively high) forecast for the sector specific inflation factor; this is resulting in a high Current to Constant prices ratio of 1.55 for the project as a whole.

15.1.3 Practical Implementation

The Company has demonstrated the necessary capabilities for the implementation of a project of this type and size, including legal rights, technical capacity and financial strength.

The proposed procurement strategy is well developed and represents a reasonably optimized balance in terms of contract numbers and sizes. The procurement timetable appears ambitious and needs to be monitored closely in order to being implemented on time. Whilst the planned works could be achievable within the specified period, the posibility is not excluded that Phase 1 implementation of project works materisalises slower than currently foreseen. The ROC would be well advised to prepare a contingency plan (technical, financial, etc.) for the possibility that a larger expected investment portion is implemented after 2023.

15.1.4 Operational Issues

The technical capacity of the operator is sufficient to operate and maintain the vast majority of the project assets.

The proposed investments for SCADA includes an in-depth assessment of needs, the procurement and installation of missing field control devices, and also the connection of the already existing installations with the new systems. Incorporation of digital technologies into operations is the first step towards digital control and automation of the systems and is fully supported. Combined with more sensors and other intelligent equipment in the future, this will ultimately not only improve pro-active asset management, but also increase the utility`s ability to adapt operations to changing climate.

15.1.5 Financial and Economic Issues

Overall, the general approach followed for the financial analysis is considered correct with the analysis provided on a utility basis and supplemented on a project basis.

The forecasted tariff levels reach recovery of operating cost and depreciation from the final year of the reference period (2051) and thereafter.

The costs of water and wastewater services rise to around 3.0% of the forecast average disposable household income and then with marginal stepwise further increases throughout the projection period, all being above the minimum required threshold of 2.5%

The need for grant financial support is shown with the project realising both negative FRR/C and FRR/K.

On a project level, tariffs and resulting incremental revenues are sufficient to generate enough cash to internally finance a large part of project asset replacements, nevertheless debt financing has been foreseen. The generated cash flow appears to be sufficient to finance current operations as well as contract necessary debt financing and subsequently service the debt.

It can therefore be concluded that the project satisfies the financial viability and sustainability criteria and meets the EC requirements as referred to in Article 101 of Regulation (EU) No 1303/2013 and Annex III to Commission Implementing Regulation (EU) No 207/2015.

The identified quantified economic costs benefits are considered reasonable, being typical for water and wastewater projects. The economic analysis is consistent with applicable National guidelines. Therefore, it is concluded that the project satisfies the economic viability criteria and meets the EC requirements as referred to in Article 101 of Regulation (EU) No 1303/2013.

Overall, the financing plan appears numerically correctly calculated and is in line with the expected payment profile. A reasonable justification is provided concerning the availability of national and municipal co-financing for Phase I.

The assumptions as set out in the preamble to this Note are critical for the financing of Phase II and thus for the successful conclusion of the project as a whole.

15.1.6 Environmental and climate change aspects

The environmental impacts assessments procedures have not been completed yet.

The AF and the supporting documents provide adequate information with regards to the national climate change mitigation and adaptation policy. With regards to the application of the intervention category code (020 vs. 021) under Annex I of the Commission Implementing Regulation 215/2014, JASPERS notes that the matter will be addressed at the level of LIOP between Romania and the European Commission, as deemed appropriate.

JASPERS notes that the issue of applicable category intervention codes will be addressed at the level of LIOP between Romania and the European Commission, as deemed appropriate.

As at this stage, section F.8.1 of the AF does not provide details about the drinking water investment; it is therefore not possible to confirm the amount of EUR 27.942.632 is correct.

The project carbon footprint is calculated in line with the latest version of the EIB Methodology and is well presented in the project application package.

The CCVRA is based on sound data and the methodology is considered adequate and well presented in the project documents. The approach to identifying adaptation measures in view of improving the project's resilience to climate change-related risks is seen as adequate. However, the assessment and its results have not been confirmed by the competent EIA authorities yet.

15.2 Recommendations

15.2.1 Technical and Implementation

It is recommended, in accordance with good practice, that the measures set out in the project documentation are fully implemented:

- Construction method: Trenchless installation could result in a cost advantage over open trench installation. It is therefore recommended to allow/consider trenchless methods as alternatives in specific cases. The final construction method should remain open during the tendering period.
- Contract monitoring by the PIU with particular emphasis on monitoring of implementation progress (physical and financial indicators) throughout the project and particularly in the early stages in order to ensure that the "actual" project implementation progress prior to 31/12/2023 can be accurately reported and suitable modifications can be made as

required.

- The promoter should prepare a contingency plan for managing the possibility that construction works take of slower than expected and an even larger investment portion of the project might be implemented after 2023.
- Construction supervision is overseen to ensure that adequate design and construction standards are applied in practice and adhered to.
- The criteria established for “design and execute” (yellow book) are fully and strictly applied during tender evaluation in order to minimize the risk of claims and/or financial corrections. This includes an evaluation of the tenders considering investment costs and operational costs.
- Ensure that the project implementation unit (PIU) remains suitably staffed during the tendering, construction, defects liability and contract closing period.

15.2.2 Financial and Economic

It is recommended that:

- i) Local co-financing is in place and that ii) the necessary steps are taken to establish the projected introduction of a water and wastewater tariff that reflects polluter pays principles. The proposed tariff policy shall be carefully monitored and strictly implemented and, if necessary, should be revised in order to ensure the operational sustainability of the utility.
- Future tariff adjustments need to be planned and agreed to ensure cost recovery at a specific service level (and separately for water and wastewater) in line with the usual tariff regulatory framework.
- Clear mitigation measures for low income customers need to be ensured such that all households have affordable access and the revenue stream of the Company is not significantly impacted by uncollectable invoices.
- Financing provisions for Phase II need to be established and confirmed at the earliest possible time, noting that:

✓ All project costs related to Phase II (going beyond 2023) are considered ineligible for the purpose of this application;

✓ Based on the statement in G.1.1 of the Application Form it is assumed that the Romanian Government i) is committed to guarantee funding for project components whose implementation will exceed the eligibility period of EU grant finance under the 2014-2020 MFF and ii) will finance Phase II of the project under the 2021-2027 MFF.

✓ Eligibility rules for 2021-2027 have not been established yet. It is assumed that all project components under Phase II as indicated in the current project documents will be eligible for funding under the finally adopted OP 2021-2027.

✓ Although financing structure as well as sources of co-funding for Phase II of the project have not been confirmed yet, it is assumed (following financial model assumptions) that the grant funding ratio as well as national and local contribution for the Phase II of the project under the 2021-2027 MFF remains at least the same as under the 2014-2020 MFF as per project documents assessed for this ACN.

- Financing for Phase II be confirmed not later than when formal modification of the underlying project proposal will be processed under 2021-2027 regulatory framework.

15.2.3 Environmental and climate change aspects

- Before submission of the project for approval for EU co-financing: the environmental impact assessments should be completed and reported in the Application Form and in the Feasibility Study. Special attention should be paid to the prevention and mitigation measures to be imposed by the competent authorities which should be fully integrated in the project as proposed for the implementation. The same applies to any measures

imposed by the competent authorities to ensure the resilience of the project to climate or other natural disasters risks.

- Consider presenting in Section F.8.1 of the AF which drinking water measures that are considered covered by the amount of EUR 27.942.632.
- The results of the carbon footprint calculation should be included in the EIA Report in line with Annex IV(4) of the Revised EIA Directive before it is submitted to the competent authorities.
- In view of ensuring compliance with Annex IV(4) of the Revised EIA Directive, it is well-advised to also consider including the CCVRA or at least its conclusions in the EIA Report so that the competent authorities can verify and confirm the necessary adaptation measures. In case that the competent authority imposes additional adaptation measures, these need to be integrated in the project, which should be evident from Chapter 9 of the FS.

15.3 Additional Considerations

None

Environmental Annex

Project Description

Project Number: **2014 051 RO WAW WAT**
Project Name: **Vaslui County II - water and wastewater infrastructure investments for 2014-2020**
Country: **ROMANIA**

The project location is in Vaslui County, situated in the eastern part of Romania. The county's neighbours are in the north Iasi County, in the west Bacau County and in the south the Galati County. River Prut flows alongside the eastern part of the county and forms the border with Moldova.

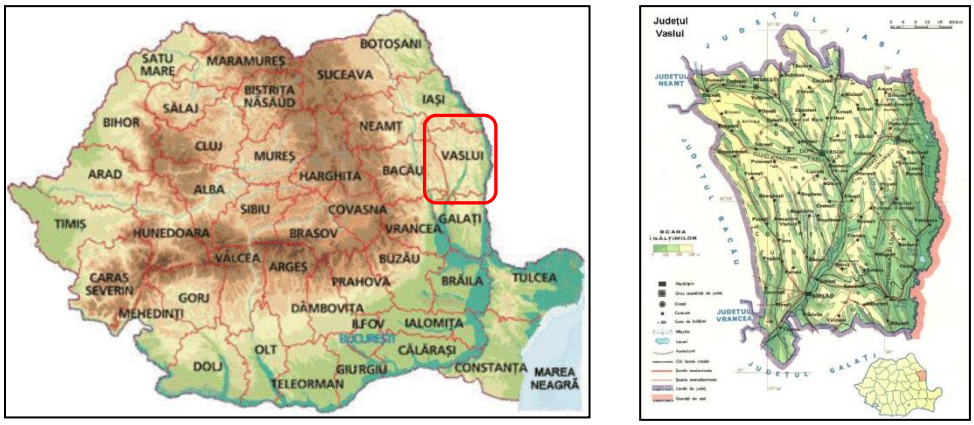


Figure 4 Project location

The county includes 3 municipalities, 2 towns and 86 communes.

The project area covers a total of 47 UATs of which 7 are already operated by Aquavas S.A. These are municipalities of Vaslui, Barlad, Husi; towns of Negresti and Murgeni; and communes of Muntenii de Jos and Lipovat. The population of the project area in 2018 is 249,612 (143,444 living in urban; 106,168 living in rural) inhabitants, representing 88% of the total population of the county.

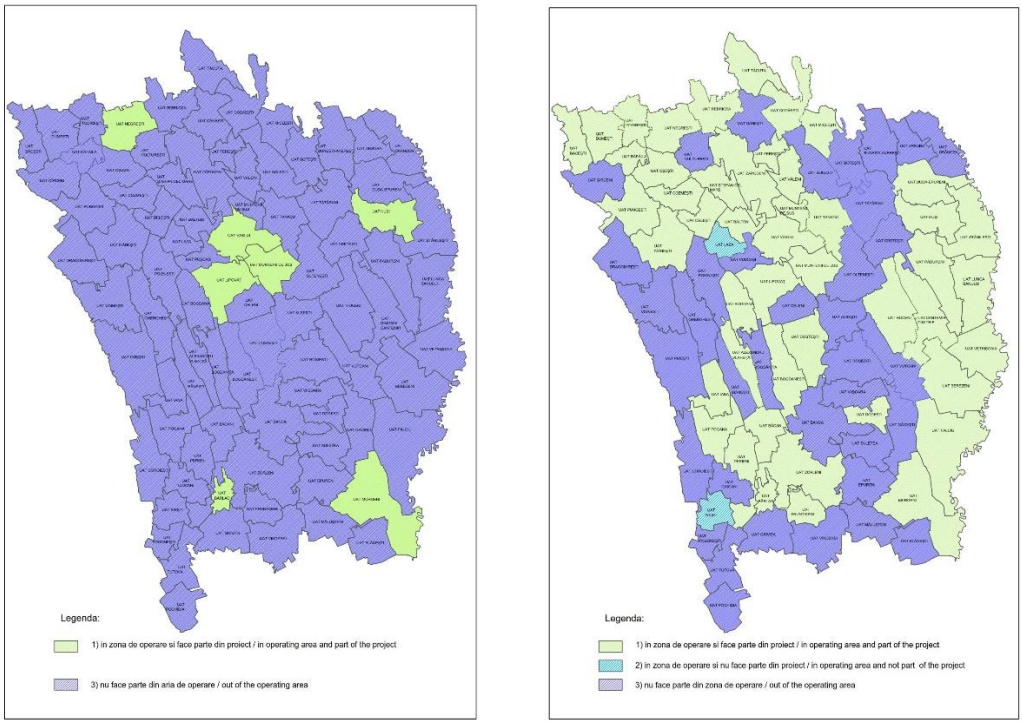


Figure 5 Aquavas S.A. operating area before and after the project

The Project proposes water investments targeting 16 Water Supply Systems and wastewater investments targeting 15 agglomerations out of which 5 independent agglomerations and 10 grouped in 4 clusters. In this respect, the proposed investments envisage extending the service coverage for drinking water supply and wastewater collection and treatment, as well as addressing the deficiencies of the existing systems.

The project components proposed for the water supply systems are based on the most efficient and effective use of the available water sources. For wastewater systems, the proposed components are based on identifying the best discharging location from an environmental and economic point of view.

C) Water supply investments:

At present in several localities in ROC's area, water supply is either: i) non-compliant with the relevant standards, or ii) non-existent. The aim of the proposed investments is to ensure continuous access to compliant potable water in line with the applicable EU Directives.

The project proposals in relation to water supply include the following:

- Extension of underground water sources (35 boreholes)
- Construction of new water mains (375.06 km)
- Rehabilitation of water mains (2.68 km)
- New/Extension of DWTP (5 pcs)
- Rehabilitation of DWTP (1 pcs)
- Extension of water chlorination plants (58 pcs)
- Construction/extension of reservoirs (41 pcs)
- Rehabilitation of reservoirs (12 pcs)
- New pumping stations (124 pcs)
- Rehabilitation of pumping station (6 pcs)
- Construction/extension of distribution network (621.66 km)
- Rehabilitation of distribution network (46.15 km)

D) Wastewater investments:

The project proposals in relation to wastewater include the following:

- Extension/construction of sewerage network (326.54 km)
- Rehabilitation of sewerage network (27.54 km)
- New pumping stations (156 pcs)
- Rehabilitation of pumping stations (5 pcs)
- New wastewater rising pipes (76.57 km)
- Rehabilitation of wastewater rising pipes (2.1 km)
- Extension of WWTP (5 pcs)
- Rehabilitation of WWTP (3 pcs)

The level of water supply and wastewater services (before and after the project) is presented below.

Table 34 Level of water supply services in the Project area (Phase I + II) – 2026

	Population	Before project				After project			
	2026	Level of connectivity to WS service		Population with compliant WS service in acc. To Directive 98/83/EC		Level of service reached through LIOP Project		Population with compliant WS service in acc. to Directive 98/83/EC	
	No.	No.	%	No.	%		%	No.	%
Urban	131,863	128,698	94.6%	128,698	94.6%	131,734	99.9%	131,734	99.9%
Rural	97,589	46,191	45.9%	4,756	4.7%	97,249	99.7%	97,249	99.7%
Total	**229,452**	**174,889**	**73.9%**	**133,454**	**56.4%**	**228,983**	**99.8%**	**228,983**	**99.8%**
No of newly connected inhabitants through LIOP						**57,606 (18,318 in Phase I)**			
No of inhabitants benefitting better water quality (CO18)						**98,694 (38,962 in Phase I)**			

Table 35 Level of wastewater services in the Project area (Phase I + II) – 2026

	Total load generated	Before project				After project			
	2026	Level of wastewater collection		Load treated in a WWTP in compliance with Directive 91/271		Level of wastewater collection reached through LIOP Project		Load treated in a WWTP in compliance with Directive 91/271	
Agglomeration	No.	No.	%	No.	%	No.	%	No.	%
> 10,000 PE	149,662	143,077	93.2%	143,077	93.2%	149,559	99.9%	149,559	99.9%
2,000 PE –	46,830	8,527	18.3%	7,750	16.6%	46,643	99.6%	46,643	99.6%
Total	**196,492**	**151,604**	**75.8%**	**150,827**	**75.4%**	**196,202**	**99.85%**	**196,202**	**99.85%**
No of newly connected inhabitants						**40,610 (8,901 in Phase I)**			
No of newly connected PE						**42,842 (9,559 in Phase I)**			
No of PE benefitting better wastewater treatment (CO19)						**43,656 (9,559 in Phase I)**			

JASPERS Comments

Due to the fact that the environmental impact assessments for the project have not been completed yet, JASPERS is not preparing the Environmental Annex.

In addition, JASPERS notes that the European Commission is currently inquiring into the application of Article 4(4) and 6(1) of the Habitats Directive in Romania.

***Significant outstanding issues*:**

The environmental impact assessments for the project have not been completed yet.

Recommendations

Before submission of the project for approval for EU co-financing the environmental impact assessments should be completed and reported in the Application Form and in the Feasibility Study.

Special attention should be paid to the prevention and mitigation measures to be imposed by the competent authorities which should be fully integrated in the project as proposed for the implementation.

The same applies to any measures imposed by the competent authorities to ensure the resilience of the project to climate or other natural disasters risks.