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## Drinking water, sewage and wastewater treatment improvement in Caras-Severin county

Man Teodor Eugen<sup>1</sup> Tămas Mariana<sup>1</sup> Petrescu Dan  
Stana Octavian<sup>1</sup>

**Abstract:** Starting with 2005, Aquacaras is the regional operating company for the water and sewerage system in the Caras-Severin County. For major investment programmes, Aquacaras applied for external funds. The water-sewerage master plan has a value of 107.779,61 Euro for the phase 1, an implementation period to 2015 and propose the Cohesion Fund as a financing source. The Cohesion Fund, available through the Environmental Sectorial Operational Programme represents the main financing source for the urban and rural localities.

**Keywords:** Aquacaras, European Union, Cohesion Fund, water-sewerage master plan.

subordinated to the 8 local councils, by signing the Concession Contract with each town.

SD AQUACARAȘ SA aims to increase the accessibility of Caras-Severin county population to water supply and wastewater treatment, with values represented by the quality and timeliness of interventions to meet customer requirements and ensure a cleaner environment and healthier life for the County dwellers.

The company has implemented an integrated quality management, environment, health and safety (ISO 9001, ISO 14001, OHSAS 18001).

### 1. INTRODUCTION

SC AQUACARAȘ SA was established in 21.10.2004 by associating Caras-Severin County Council and local municipal councils Resita and Caransebes and local town councils: Anina, Herculane, Bocsă, Moldova New, Oravita and Otelu Rosu, aiming for creating an unique operator in the county with activity objectives "Water collection, treatment and distribution code CAEN 3600" and "Wastewater collection and treatment code CAEN 3700".

Strategic objectives for achieving the company mission, consisting of extension of service and ensure quality services are as follows:

- Infrastructure modernization (drinking water and sewage networks, treatment plants and water treatment);
- Development of a system to efficiently communicate with customers to ensure rapid circulation of information;
- Development of training programs for staff;
- Household efficient use of water by initiating programs of education / awareness
- Reduction of energy, resources, raw materials to minimize losses; Continuous improvement of services by planning and providing services that anticipate customers' needs and expectations at a reasonable cost.

The company, with 8 branches without legal personality operates effectively from 01.05.2005 on acquisition of two activities from the entities

### 2. SUSTAINABLE DEVELOPMENT

For major investment programmes, Aquacaras applied for external funds.

Currently the county is running a project financed by ISPA program, which is implemented in accordance with EC Regulation nr.1164/1994 establishing the Cohesion Fund.

The project goal (ISPA measure no. 2005/RO/16/P/PE/003) consists in "improving water supply systems, sewerage and wastewater treatment in Caras - Severin, Romania" to fulfill the obligations regarding the acquis

of environment in these areas.

The specific objectives of the project are:

Water component:

- o European drinking water standards are met
- o Improved security of water supply system;
- o reducing physical water losses

Wastewater component:

- o compliance with European standard of urban waste water treatment;
- o compliance with European environmental standard;
- o river pollution reducing
- o infiltration reducing;
- o documentation preparing to implement phase II of the investment;

The total project value is EUR 65,773,311.17.

The project is divided into six contracts: a technical assistance contract, an agreement to purchase specific equipment for investigation valuing 660,000 euros and four works contracts:

<sup>1</sup> "Politehnica" University of Timisoara, George Enescu Street, no.1/A, RO-300022, Timisoara, e-mail address: eugen@zavoi.ro

1. Rehabilitation of Wastewater Treatment of Resita, amounting to EUR 13,668,629.16;
2. Rehabilitation of water treatment and construction / rehabilitation of pumping stations Resita in amount of EUR 16,428,249.36;
3. Rehabilitation and extension of water and wastewater network in Resita in amount of EUR 18,442,122.83;
4. Rehabilitation of water networks in the towns Anina Herculane, Bocsa, Caransebes, Moldova Noua, Oravita and Otelu Rosu in amount of EUR 11,105,105.82.

### 3. WATER - SEWERAGE MASTER PLAN FOR THE CARAS-SEVERIN COUNTY

Through HCJ nr.119/26.08.2009, the Master Plan was approved for the project "Improvement of water supply, sewerage and wastewater treatment in Caras-Severin" prepared under ISPA Measure 2005/RO/16/P/PE / 003. The Master Plan represents the investment program for 30 years, in the water supply and sanitation sector in Caras-Severin, justifies and prioritizes investment projects needed to achieve the compliance with EC directives, plans and strategies of regional and county area.

The Consultant was a consortium up by Louis Berger SAS, DHV B.V. and Safege Consulting Engineers.

The Master Plan has two components:

- water supply (intake, treatment and distribution),
- sewerage (collection, treatment and discharge of wastewater).

In order to achieve compliance with the European standards requirements and agreed deadlines, at the level of the Master Plan were identified priority measures, on which the Caras-Severin County should focus:

- the full coverage of the county with water supply measures is a must in order to achieve the required connection rates.
- for wastewater collection and treatment, it is necessary to consider localities with more than 2,000 p.e. to achieve the necessary connection rates (44% of population is living in rural areas).
- development of the water supply and wastewater systems for the agglomerations including relevant localities.
- continue on the rehabilitation of existing systems/assets in the big localities;

The proposed measures for investments will have an positive impact on the environment, acting in several ways, directly or indirectly, namely: pollution reduction and water quality improvement, reduction of the soil and diffuse pollution, facilitating the adaptation to the climate changes and facilitating soil protection against the erosion by water and wind, protection and improvement of the functions of the terrestrial and aquatic ecosystems against the anthropogenic degradation, of habitat fragmentation and land reclamation, preservation of the natural diversity of fauna, flora and habitats in protected areas

and potential Natura 2000 areas, facilitating of human health improvement through implementation of measures for pollution prevention, limitation of use of exhaustible natural resources.

Summary of Investment values proposed for Caras-Severin is presented in Table no.1

Table 1 Summary of Investment values proposed for Caras-Severin County

Services	Total	Phase 1	Phase 2	Other Phases
Total Water	233.744,43	36.866,42	111.055,62	85.822,38
Total Wastewater	408.761,93	70.913,19	217.444,80	120.403,95
<b>TOTAL</b>	<b>642.506,36</b>	<b>107.779,61</b>	<b>328.500,42</b>	<b>206.226,33</b>

### 4. PRIORITY INFRASTRUCTURE INVESTMENT PROGRAMME

In order to identify the investments to be included in the short-term list, the followings requirements were taken into consideration:

- the need to comply with the Accession Treaty, and the conformity plans;
- obligation to implement the compulsory measures (ex.: the reduction of the infiltrations into the sewerage network and the reduction of the dilution of households water for the design of the wastewater treatment plants and the reduction of the water losses in the distribution networks for the design of the treatment, pumping, storage capacities) ensure the economical support of the investment on long term basis.

In Table no.2 below, there are centralized priority investment values for Cohesion Fund phase distributed both for drinking water and wastewater.

Priority Investments Plan -Projects for Cohesion Fund (developed in Feasibility Study stage) for each town is presented in Table no.3-10.

Table 2 Summary of Cohesion Fund Investment values proposed for Caras-Severin County

Agglomeration	Phase 1 - Net Investment Costs (without reinvestments)		
	Total	Water Supply Investments	Wastewater Investments
1	2	3	4
Resita	12227220,40	3960691,00	8266529,40
Caransebes	16508097,15	4119963,15	12388134,00
Bocsa	13130014,35	3530013,35	9600001,00
Otelu Rosu	14129106,30	4804349,30	9324757,00
Moldova Noua	12864940,85	4346516,85	8518424,00
Oravita	7773.44,72	1938978,72	5834566,00
Baile Herculane	9360925,00	3147458,00	6213467,00
Anina	10780305,90	4961201,60	5819.04,30
<b>Total Cohesion Fund</b>	<b>96774154,67</b>	<b>30809171,97</b>	<b>65964982,70</b>

Table 3 Priority Investments Plan Resița

<i>Resița</i>	<i>Quantity</i>
Rehabilitation of "Sodol" Springs Source, including sanitary protection area	1
New chlorination units at Sodol Spring Source	1
New water main Dn 125 PE, to reservoir in Driglovat	1,80 km
New water main Dn 125 PE, to reservoir in Moniom	1,265 km
Undercrossing Doman Creek	200 m
New water main Dn 125 PE, to reservoir in Secu + Cuptoare	7,02 km
Rehabilitation of transmission main - civil works for tunnel reinforcement	0,651 km
New pumping station for Valea Domanului district (Butovat street), Secu; Moniom, Șerova, Cilnic	5
Rehabilitation Moroasa I reservoirs (2x350 m <sup>3</sup> + 2x200 m <sup>3</sup> ) including civil, M&E, SCADA, flowmeters, sanitary protection, connection pipe Dn250 PS to reservoirs	600 mc
Rehabilitation Lunca Barzavei reservoirs (2x3000 m <sup>3</sup> ) including civil, M&E, SCADA, flowmeters, sanitary protection, energy supply	6000 mc
Rehabilitation Moroasa II PS and Caraiman priming reservoir 40 m <sup>3</sup>	2 pieces
Rehabilitation Opeltz PS priming reservoir 100 m <sup>3</sup>	1 piece
New reservoir 100 m <sup>3</sup> in Poiana Golului district, Secu, Griglovat, Doman	4 pieces
Rehabilitation of the existing distribution network in Resița /	2,00 km
Extension of distribution network in Resița (including Calnic, Terova)	20,00 km
House connection for Resița, Calnic, Terova, Moniom, Doman	2181
Extension of distribution network in Moniom district	3,485 km
Extension of distribution network in Doman district	4,95 km
Upgrading WWTP to tertiary treatment and sludge treatment facilities (at cluster level, excluding Secu agglomeration)	123895 PE
New main collector Doman - existing main collector in Valea Domanului	1,265 km
New PS Moniom to WWTP Resița	1 piece
Extension tertiary sewers network, Dn 250, including house connections, Resița, Calnic, Terova, Moniom and Doman	28,335 km
<b>Total costs - Resița</b>	
<b>Phase 1 Source of Financing Cohesion Fund</b>	
<b>15.334.078,47 Euro</b>	

Table 4 Priority Investments Plan Caransebes

<i>Caransebes</i>	<i>Quantity</i>
Rehabilitation of the existing DWTP (including new settling tanks, filtration, M&E, SCADA, water-meter)	1
Replacement of the existing network ND 110	0,462km
Replacement of the existing network ND 200 - 250	0,521km
Replacement of the existing network ND 400	0,505km
Extension of distribution network in Caransebes	5 km
New house connection in Caransebes	340
New WWTP, tertiary treatment, designed for 42206 PE (design flow 200 l/s)	42206 PE
Extension main collector	0,5 km
Extension sewers network, ND 250	13,99 km
Extension wastewater network	6 km
New house connections	1870
<b>Total costs- Caransebes</b>	
<b>Phase 1 Source of Financing Cohesion Fund</b>	
<b>14.582.318,00 Euro</b>	

Table 5 Priority Investments Plan Anina

<i>Anina</i>	<i>Quantity</i>
Rehabilitation of Buhui chatchment - canalization of Certej spring, improving catchment at the outlet of the mining gallery, sanitary protection area	30 l/s
STAP noua Buhui, capacitate 3.200 m <sup>3</sup> /zi (inclusiv bazine de decantare, filtrare directa nisip-antracit, tratare namol, dezinfectare cu hipoclorit de sodiu, lucrari M&E, works, flowmeters, SCADA system)	3200 m <sup>3</sup> /d
New transmission main Dn 150 DWTP Buhui - Maial Rez, Buhui-Casa Elevului, Dealul Crucii-Bradet	7,54 km
New PS1 located in DWTP, Dealul Crucii	2
Rehabilitation of Buhui Oras Nou reservoir (1x2500 m <sup>3</sup> ) including civil, M&E, SCADA, flowmeters, sanitary protection, energy supply	2500 mc
Rehabilitation of Dealul Crucii reservoir (1x180 m <sup>3</sup> )	180 mc
Extension of distribution network	12 km
New house connection in Anina	630
<b>Total costs- Anina</b>	
<b>Phase 1 Source of Financing Cohesion Fund</b>	
<b>9.654.514,60 Euro</b>	

Table 6 Priority Investments Plan Baile Herculane

<i>Baile Herculane</i>	<i>Quantity</i>
New DWTP (capacity 432 m <sup>3</sup> /h) - refurbishment of buildings, hardness correction, new sodium hypochlorite facility, M&E works, flowmeters, sludge treatment	10368 mc/d
Rehabilitation of transmission main facilities (manholes, including valves)	3
Rehabilitation of Plant reservoir (1x1500 m <sup>3</sup> ) including civil, M&E, SCADA, flowmeters, sanitary protection	2000 mc
Extension of distribution network	4 km
New house connection in Baile Herculane	131
New WWTP with tertiary treatment	11.452 PE
Rehabilitation of the main collector, ND 500	2,649 km
Extension sewers network, ND 250 - Baile Herculane, Pecinisca	5,60 km
Replacement of existing sewers network ND 300	4,8 km
New house connections	383
<b>Total costs - Baile Herculane Phase 1 Source of Financing Cohesion Fund 8.958.291,00 Euro</b>	

Table no 7 Project priority investments Bocsa

<i>Bocsa</i>	<i>Quantity</i>
Rehabilitation of existing well catchment field (including new cabin, completely M&E, sanitary protection area) - phase 1 (F1 to F4), phase 2 (F5 to F8)	4
New DWTP for a capacity of 6.500 m <sup>3</sup> /d (including building, new reservoir of 400 m <sup>3</sup> , pumping station, M&E works)	6500 mc/d
New raw water collection pipes ND 200 - 250 (wells F1, F2, F3, F4)	1,4 km
New PS for Bocsa Montana area	1
New reservoir in Bocsa Montana	500 mc
Extension of distribution network in Bocsa Romana, Bocsa Vasiova and partially Bocsa Montana	12,245 km
New house connection in Bocsa	906
New WWTP, tertiary treatment, designed for 21388 PE	21388 PE
Extension main collector ND 800	4, 82 km
Extindere retea cartierul Bocsa Romana	17, 400 km
New intermediate PS	2
Extension sewers network, ND 250	12,245 km
New house connections	906
<b>Total costs- Bocsa Phase 1 Source of Financing Cohesion Fund 12.589.132,35 Euro</b>	

Table.8 Priority Investments Plan Moldova Nouă

<i>Moldova Noua</i>	<i>Quantity</i>
Rehabilitation of wells (F8,F12,F16), including civil and M&E works	3
New sanitary protection works for wells (F1 to F20) and collecting well	21
New chlorination units at the old sources of Moldova Noua and at the reservoirs	2+4
New principal transmission main Dn 160 PE, from reservoirs 2x1000 m <sup>3</sup> in Moldova Veche to existing reservoir in Moldova Noua	4,5 km
New transmission main Dn 110 PE, for north valley area and for est valley area in Moldova Noua (Pn 16)	4,9 km+4,9 km
New water main Dn 200 PE, in Moldova Veche	0,24 km
New water main Dn 160 PE, in Moldova Veche	1,825 km
New water main Dn 125 PE, in Moldova Veche	1,2 km
New transfer pumping station placed at Moldova Veche reservoirs 2x1000 m <sup>3</sup>	15 l/s
New pumping station at Moldova Noua existing reservoir 1000 m <sup>3</sup> (2+1 pumps) for north and east valleys	14 l/s
2 New reservoir 100 m <sup>3</sup> in Moldova Noua	100 mc
Extension of distribution network in Moldova Noua and Moldova Veche	10,24 +6,6 Km
House connection for Moldova Noua and Moldova Veche	690+602
New WWTP, tertiary treatment, placed in Moldova Veche, designed for 15910 PE (peak flow 57,2 l/s), including Macesti	15910 PE
Extension main collector, pressure flow, Dn 250, Moldova Veche to WWTP	1,76 km
New main interceptor sewer, Dn 250, 300,350,400 Moldova Veche	0,96 km
New main interceptor sewer, Dn 250, 300, Moldova Noua	1,08 km
New main pumping station, main collector to WWTP	1
Extension secondary sewers network, Dn 250, including house connections - Moldova Veche	3,35 km
Extension secondary sewers network, Dn 250, including house connections - Moldova Noua	14,14 km
New house connections (including fats)	1285
<b>Total costs – Moldova Nouă Phase 1 Source of Financing Cohesion Fund 12.072.910,85 Euro</b>	

Table 9 Priority Investments Plan Oravita

<i>Oravita</i>	<i>Quantity</i>
Rehabilitation of transmission main ND 250 Simion spring - Reservoir 750 m <sup>3</sup>	7,5 km
Rehabilitation of reservoir R2, R3 Ciclova (2x750 m <sup>3</sup> )	1500 mc
Rehabilitation of reservoir R1 (1x100 m <sup>3</sup> ) including civil, M&E, SCADA, flowmeters, sanitary protection, energy supply	100 mc
Replacement of the existing network ND 110 (azbestos), ND 125-150, ND 250	2,661 km
New house connection	315
Extension of distribution network	5 km

New WWTP , tertiary treatment (including Brosteni agglomeration)	13688 PE
Rehabilitation of the main collector, ND 300 - 500 -1000	3,5 km
Extension sewers network, ND 250 - Oravita	8 km
New house connections	80
<b>Total costs – Oravița Phase 1 Source of Financing Cohesion Fund 7.674.004,72 Euro</b>	

Table 10 Priority Investments Plan Oțelu Rosu

<i>Oțelu Rosu</i>	<i>Quantity</i>
New DWTP for a capacity of 4.200 m <sup>3</sup> /d	4200 mc/d
New transmission main ND 315, ND 250, ND 160 Oțelu Rosu town	9,705 km
New Booster PS located in DWTP	1
New reservoir located in DWTP	2500 mc
Replacement of the existing azbocement network ND 110–200, ND 200-250, ND 300	4,47 km
Extension of distribution network	7,4 km
New house connection	1307
New WWTP with tertiary treatment for Oțelu Rosu, Glimboca, Voislova	16781 PE
Extension main collector ND 400	0,133 km
New pressure main collector ND 110 PE, ND 315 PE	1,55 km
New PS 1 (Oțelu Rosu zone 1 ) and PS 2 (Oțelu Rosu zone 2 )	2
Extension sewers network, ND 250 - Oțelu Rosu	17,574 km
New house connections	1575
<b>Total costs – Oțelu Rosu Phase 1 Source of Financing Cohesion Fund 12.882.786,30 Euro</b>	

## 5. INVESTMENT PLANNING LONG TERM

After this project is finalized from the Cohesion Fund (Phase 1), Aquacaras will apply for new grants in order to improve the water and sewerage infrastructure for the commune bigger than 2,000 inhabitants from the Caras-Severin County (Phase 2) in order to respect Romania's Adhesion Treaty to the EU. Further on, the water and sewerage infrastructure from all commune and villages of the county will be improved.

The scope of the long term investment plan is to present the long term measures to 2038 needed to achieve the following:

- Deficiencies elimination, rehabilitation and extension of the water supply and wastewater systems, according to the commitments undertaken by Romania;
- Compliance with the standards regarding the water supply and wastewater systems. Have been analyzed the network part, as well as the treatment part;

- Reducing the operational costs up to an affordable level;
- Improvement of the health and safety conditions.

The Long Term Investment Plan / Caras-Severin County Investments in phases and source of financing is presented in Table no.11.

Table 11 The Long Term Investment Plan

Total Costs (Euro)	Phase 1*	Phase 2	Next Phases	Source of Financing	
	2007-2015	2016-2018	2019 - 2037	CF	Other
<b>Grand Total</b>	107779,61	328500,42	206226,33	96974,15	545532,20
<b>Total WS</b>	36866,42	111055,62	85822,38	30809,17	202935,26
<b>Total WW</b>	70913,19	217444,80	120403,95	66164,98	342596,95

## 6. CONCLUSIONS

This Master Plan document has provided a roadmap for compliance with the Accession Agreement for Caras-Severin County. In order to comply with the conditionalities regarding the water and wastewater infrastructure, major investments are necessary at the level of the Caras-Severin County, investments which considerably exceed the financial capacities of the majority of the local authorities.

The Cohesion Fund, available through the Environmental Sectorial Operational Programme represents the main financing source for the localities included within the investment list.

In the short term the Master Plan has provided a detailed list of projects that can be used for the Phase 1 application for the Cohesion Fund.

## REFERENCES:

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