

**Master Plan, Chapter 5, Option Analysis on Wastewater Agglomerations**

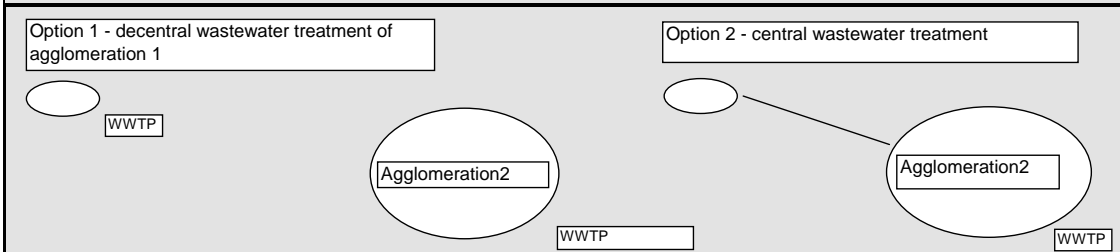
County: Mures

Agglomeration 1: RASTOLITA+ANDRENEASCA (group)

Agglomeration 2: GALAOAIA

Agglomeration 3: BORZIA

Agglomeration 4: IOD



		Option 1	Option 2
<b>Data Base</b>			
Size of agglomeration 1	[PE]	1.437	1.437
Size of agglomeration 2	[PE]	326	326
Size of agglomeration 3	[PE]	91	91
Size of agglomeration 4	[PE]	376	376
Size of agglomeration 1+2+3+4	[PE]		2.230
No. of WTP modules	[items]	4	
Specific wastewater amount	[l/cap x d]	80	80
Specific wastewater amount	[l/cap x d]	110	110
Infiltration rate	[%]	25	25
Wastewater amount of agglomeration 1	[m³/d]	144	
Wastewater amount of agglomeration 2	[m³/d]	33	
Wastewater amount of agglomeration 3	[m³/d]	9	
Wastewater amount of agglomeration 4	[m³/d]	38	
Wastewater amount of agglomeration 1+ 2+3+4	[m³/d]		223
<b>Connection details</b>			
Lenth of the transportation line	[m]	-	9.500
Kind of connection (g = by gravity, p = by pressure main)	[-]	-	P
Diameter of the transportation line	[mm]	-	250
Maximum difference in height Δh (only in case of pumping station)	[m]	-	10
<b>Costs</b>			
Specific price WWTP agglomeration 1 (according formula)	[€/PE]	250	-
Specific price WWTP agglomeration 2 (according formula)	[€/PE]	250	
Specific price WWTP agglomeration 3 (according formula)	[€/PE]	250	
Specific price WWTP agglomeration 4 (according formula)	[€/PE]	250	
Specific price WWTP agglomeration 1+2+3+4(according formula)	[€/PE]	-	250
Specific price transportation line (according Unit Price Data Base)	[€/m]	-	171
<b>I. Investment costs</b>			
<b>A. Civil works</b>			
(1.1) WWTP for agglomeration 1 (40 % of total costs)	[€]	158.700	-
(1.2) WWTP for agglomeration 2 (40 % of total costs)	[€]	47.600	
(1.3) WWTP for agglomeration 3 (40 % of total costs)	[€]	24.100	
(1.4) WWTP for agglomeration 4 (40 % of total costs)	[€]	52.600	
(2) WWTP for agglomeration (40 % of total costs)	[€]		238.000
(3) Pumping station agglomeration 1 (if necessary)	[€]	-	36.323
(4) Transportation line	[€]	-	1.619.750
(5) free	[€]		
(6) free	[€]		
(7) free	[€]		
(8) free	[€]		
(9) free	[€]		
(10) free	[€]		
Total costs civil works	[€]	283.000	1.894.073
Writting-off period	[years]	40	40
Cost of capital, average	[€/a]	7.075	47.352
	[%]	3	3
	[€/a]	8.490	56.822
<b>Annual costs civil works</b>	<b>[€/a]</b>	<b>15.565</b>	<b>104.174</b>

<b>B. Mechanical and electrical equipment</b>			
(1.1) WWTP for agglomeration 1 (60 % of total costs)	[€]	230.550	-
(1.2) WWTP for agglomeration 2 (60 % of total costs)	[€]	63.900	-
(1.3) WWTP for agglomeration 3 (60 % of total costs)	[€]	28.650	-
(1.4) WWTP for agglomeration 4 (60 % of total costs)	[€]	71.400	-
(2) WWTP for agglomeration (60% of total costs)	[€]	-	349.500
(3) Pumping station agglomeration 1 (if necessary)	[€]	-	3.700
(4) free	[€]		
(5) free	[€]		
(6) free	[€]		
(7) free	[€]		
(8) free	[€]		
(9) free	[€]		
(10) free	[€]		
Total costs mechanical and electrical equipment	[€]	394.500	353.200
Writting-off period	[years]	12	12
	[€/a]	32.875	29.433
Cost of capital, average	[%]	3	3
	[€/a]	11.835	10.596
<b>Annual costs mechanical and electrical equipment</b>	[€/a]	<b>44.710</b>	<b>40.029</b>
<b>Annual costs I. (Investment)</b>	[€/a]	<b>60.275</b>	<b>144.203</b>
<b>II. Maintenance / Repairs</b>			
in % of the mechanical and electrical equipment installed	[%/a]	4	4
<b>Annual costs II. (Maintenance / Repairs)</b>	[€/a]	<b>15.780</b>	<b>14.128</b>
<b>III. Labour costs</b>			
specific labour costs	[€/h]	5	5
annual expenses option 1 (2 full-time workers/module)	[h/a]	35.040	-
annual expenses option 2 (2 full-time workers)	[h/a]	-	8.760
<b>Annual costs III. (labour)</b>	[€/a]	<b>175.200</b>	<b>43.800</b>
<b>IV. Operation costs consumption</b>			
<b>A. Energy consumption</b>			
<b>A 1 - Option 1</b>			
<b>A 1.1 WWTP agglomeration 1</b>			
Wastewater amount of agglomeration 1	[m³/d]	144	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	0,94	-
Daily energy consumption WWTP agglomeration 1	[kWh/d]	136	-
<b>A 1.2 WWTP agglomeration 2</b>			
Wastewater amount of agglomeration 2	[m³/d]	33	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	1,93	-
Daily energy consumption WWTP agglomeration 2	[kWh/d]	63	-
<b>A 1.3 WWTP agglomeration 3</b>			
Wastewater amount of agglomeration 3	[m³/d]	9	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	2,35	-
Daily energy consumption WWTP agglomeration 3	[kWh/d]	21	-
<b>A 1.4 WWTP agglomeration 4</b>			
Wastewater amount of agglomeration 4	[m³/d]	38	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	1,89	-
Daily energy consumption WWTP agglomeration 4	[kWh/d]	71	-
<b>Total A 1</b>	<b>[kWh/d]</b>	<b>291</b>	
<b>A 2 - Option 2</b>			
<b>A 2.1 Pumping station agglomeration 1 (if necessary)</b>			
Wastewater amount of agglomeration 1	[m³/d]	-	42
Maximum difference in height Dh (only in case of pumping station)	[m]	-	10
Daily energy consumption pumping station agglomeration 1	[kWh/d]	-	2
<b>A 2.2 WWTP agglomeration 1+2</b>			
Specific price WWTP agglomeration 2 (according formula)	[m³/d]		223
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]		1,44
Daily energy consumption WWTP agglomeration 2	[kWh/d]		321
<b>Total A 1 - A 2</b>	<b>[kWh/d]</b>	<b>291</b>	<b>322</b>
Specific energy price	[netto €/kWh]	0,15	0,15
<b>Energy costs</b>	<b>[€/d]</b>	<b>44</b>	<b>48</b>

**B. Chemicals consumption**

The difference in the consumption of chemicals is neglectable.

**C. Sludge disposal**

The sludge amounts produced in both options is almost the same.

The difference in the sludge disposal costs is neglectable.

<b>Total IV.</b>	[€/d]	44	48
<b>Annual costs IV. (consumption)</b>	[€/a]	15.934	17.655
<b>Summary</b>			
Annual costs I. (Investment)	[€/a]	60.275	144.203
Annual costs II. (Maintenance / Repairs)	[€/a]	15.780	14.128
Annual costs III. (labour)	[€/a]	175.200	43.800
Annual costs IV. (consumption)	[€/a]	15.934	17.655
<b>Total annual costs</b>	[€/a]	267.189	219.786

Conclusion : according to the option analysis the Consultant proposed centralized solution to be followed.