

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

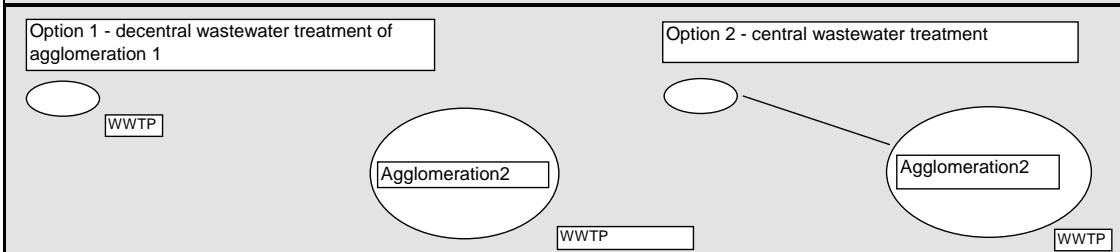
County: Mures

Agglomeration 1: CRACIUNESTI

Agglomeration 2: TRIMIOARA+CANTA (group)

Agglomeration 3: CORNESTI

Agglomeration 4: STEJERIS



		Option 1	Option 2
<b>Data Base</b>			
Size of agglomeration 1	[PE]	2.700	2.700
Size of agglomeration 2	[PE]	535	535
Size of agglomeration 3	[PE]	916	916
Size of agglomeration 4	[PE]	355	355
Size of agglomeration 1+ 2+3+4	[PE]		4.506
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]	270	
Wastewater amount of agglomeration 2	[m³/d]	54	
Wastewater amount of agglomeration 3	[m³/d]	92	
Wastewater amount of agglomeration 4	[m³/d]	36	
Wastewater amount of agglomeration 1+ 2+3+4	[m³/d]		451
<b>Connection details</b>			
Lenth of the transportation line	[m]	-	5.000
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)	[€]	285.000	-
(1.2) WWTP for agglomeration 2 (40 % of total costs)	[€]	68.500	
(1.3) WWTP for agglomeration 3 (40 % of total costs)	[€]	106.600	
(1.4) WWTP for agglomeration 4 (40 % of total costs)	[€]	50.500	
(2) WWTP for agglomeration (40 % of total costs)	[€]		465.600
(3) Pumping station agglomeration 1 (if necessary)	[€]	-	36.323
(4) Transportation line	[€]	-	852.500
(5) free	[€]		
(6) free	[€]		
(7) free	[€]		
(8) free	[€]		
(9) free	[€]		
(10) free	[€]		
Total costs civil works	[€]	510.600	1.354.423
Writting-off period	[years]	40	40
Cost of capital, average	[€/a]	12.765	33.861
	[%]	3	3
	[€/a]	15.318	40.633
<b>Annual costs civil works</b>	<b>[€/a]</b>	<b>28.083</b>	<b>74.493</b>

<b>B. Mechanical and electrical equipment</b>			
(1.1) WWTP for agglomeration 1 (60 % of total costs)	[€]	420.000	-
(1.2) WWTP for agglomeration 2 (60 % of total costs)	[€]	95.250	-
(1.3) WWTP for agglomeration 3 (60 % of total costs)	[€]	152.400	-
(1.4) WWTP for agglomeration 4 (60 % of total costs)	[€]	68.250	-
(2) WWTP for agglomeration (60% of total costs)	[€]	-	690.900
(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	[€]	735.900	694.600
Writting-off period	[years]	12	12
	[€/a]	61.325	57.883
Cost of capital, average	[%]	3	3
	[€/a]	22.077	20.838
<b>Annual costs mechanical and electrical equipment</b>	[€/a]	<b>83.402</b>	<b>78.721</b>
<b>Annual costs I. (Investment)</b>	[€/a]	<b>111.485</b>	<b>153.215</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>29.436</b>	<b>27.784</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]	270	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	0,94	-
Daily energy consumption WWTP agglomeration 1	[kWh/d]	255	-
<b>A 1.2 WWTP agglomeration 2</b>			
Wastewater amount of agglomeration 2	[m³/d]	54	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	1,79	-
Daily energy consumption WWTP agglomeration 2	[kWh/d]	96	-
<b>A 1.3 WWTP agglomeration 3</b>			
Wastewater amount of agglomeration 3	[m³/d]	92	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	1,65	-
Daily energy consumption WWTP agglomeration 3	[kWh/d]	151	-
<b>A 1.4 WWTP agglomeration 4</b>			
Wastewater amount of agglomeration 4	[m³/d]	36	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	1,90	-
Daily energy consumption WWTP agglomeration 4	[kWh/d]	68	-
<b>Total A 1</b>	<b>[kWh/d]</b>	<b>569</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]	-	145
Maximum difference in height Dh (only in case of pumping station)	[m]	-	10
Daily energy consumption pumping station agglomeration 1	[kWh/d]	-	7
<b>A 2.2 WWTP agglomeration 1+2+3+4</b>			
Specific price WWTP agglomeration 2 (according formula)	[m³/d]		451
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]		1,29
Daily energy consumption WWTP agglomeration 2	[kWh/d]		582
<b>Total A 1 - A 2</b>	<b>[kWh/d]</b>	<b>569</b>	<b>588</b>
Specific energy price	[netto €/kWh]	0,15	0,15
<b>Energy costs</b>	<b>[€/d]</b>	<b>85</b>	<b>88</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]	85	88
<b>Annual costs IV. (consumption)</b>	[€/a]	31.171	32.205
<b>Summary</b>			
Annual costs I. (Investment)	[€/a]	111.485	153.215
Annual costs II. (Maintenance / Repairs)	[€/a]	29.436	27.784
Annual costs III. (labour)	[€/a]	175.200	43.800
Annual costs IV. (consumption)	[€/a]	31.171	32.205
<b>Total annual costs</b>	[€/a]	<b>347.292</b>	<b>257.003</b>

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