

Master Plan, Chapter 5, Option Analysis on Wastewater Agglomerations

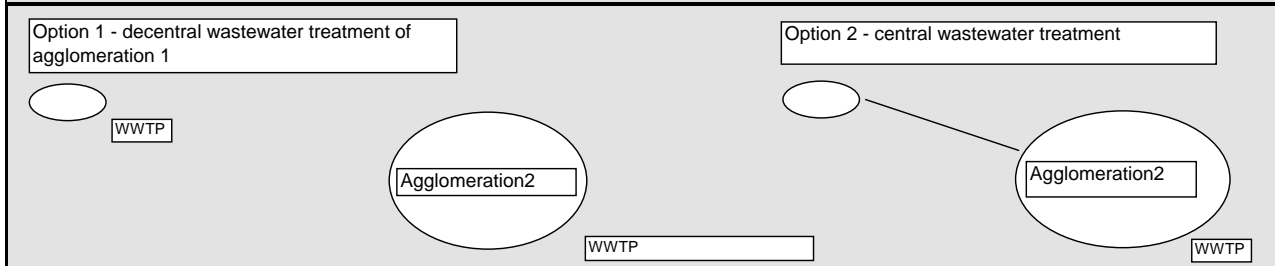
County: Mures

Agglomeration 1: TARNAVENI+BOTORCA+BOBOHALMA (group)

Agglomeration 2: ADAMUS+CORNESI+CRAIESTI+DAMBAU (group)

Agglomeration 3: GANESTI

Agglomeration 4:



		Option 1	Option 2
Data Base			
Size of agglomeration 1	[PE]	27.323	27.323
Size of agglomeration 2	[PE]	6.135	6.135
Size of agglomeration 3	[PE]	3.875	3.875
Size of agglomeration 4	[PE]	0	0
Size of agglomeration 1+ 2+3	[PE]		37.333
No. of WTP modules	[items]	2	
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]	3.757	
Wastewater amount of agglomeration 2	[m³/d]	614	
Wastewater amount of agglomeration 3	[m³/d]	388	
Wastewater amount of agglomeration 4	[m³/d]	0	
Wastewater amount of agglomeration 1 + 2+3	[m³/d]		4.758
Connection details			
Lenth of the transportation line	[m]	-	13.000
Kind of connection (g = by gravity, p = by pressure main)	[-]	-	P
Diameter of the transportation line	[mm]	-	400
Maximum difference in height Δh (only in case of pumping station)	[m]	-	10
Costs			
Specific price WWTP agglomeration 1 (according formula)	[€/PE]	272	-
Specific price WWTP agglomeration 2 (according formula)	[€/PE]	508	
Specific price WWTP agglomeration 3 (according formula)	[€/PE]	250	
Specific price WWTP agglomeration 4 (according formula)	[€/PE]	0	
Specific price WWTP agglomeration 1+2+3 (according formula)	[€/PE]	-	239
Specific price transportation line (according Unit Price Data Base)	[€/m]	-	234
I. Investment costs			
A. Civil works			
(1.1) WWTP for agglomeration 1 (40 % of total costs)	[€]	2.976.787	-
(1.2) WWTP for agglomeration 2 (40 % of total costs)	[€]	1.247.575	
(1.3) WWTP for agglomeration 3 (40 % of total costs)	[€]	402.500	
(1.4) WWTP for agglomeration 4 (40 % of total costs)	[€]	0	
(2) WWTP for agglomeration (40 % of total costs)	[€]		3.570.043
(3) Pumping station agglomeration 1 (if necessary)	[€]	-	36.323
(4) Transportation line	[€]	-	3.045.900
(5) free	[€]		
(6) free	[€]		
(7) free	[€]		
(8) free	[€]		
(9) free	[€]		
(10) free	[€]		
Total costs civil works	[€]	4.626.862	6.652.266
Writting-off period	[years]	40	40
Cost of capital, average	[€/a]	115.672	166.307
	[%]	3	3
	[€/a]	138.806	199.568
Annual costs civil works	[€/a]	254.477	365.875

B. Mechanical and electrical equipment			
(1.1) WWTP for agglomeration 1 (60 % of total costs)	[€]	4.465.180	-
(1.2) WWTP for agglomeration 2 (60 % of total costs)	[€]	1.871.362	
(1.3) WWTP for agglomeration 3 (60 % of total costs)	[€]	596.250	
(1.4) WWTP for agglomeration 4 (60 % of total costs)	[€]	0	
(2) WWTP for agglomeration (60% of total costs)	[€]	-	5.355.064
(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	[€]	6.932.793	5.358.764
Writting-off period	[years]	12	12
	[€/a]	577.733	446.564
Cost of capital, average	[%]	3	3
	[€/a]	207.984	160.763
Annual costs mechanical and electrical equipment	[€/a]	785.716	607.327
Annual costs I. (Investment)			
	[€/a]	1.040.194	973.201
II. Maintenance / Repairs			
in % of the mechanical and electrical equipment installed	[%/a]	4	4
Annual costs II. (Maintenance / Repairs)	[€/a]	277.312	214.351
III. Labour costs			
specific labour costs	[€/h]	5	5
annual expenses option 1 (2 full-time workers/module)	[h/a]	17.520	-
annual expenses option 2 (2 full-time workers)	[h/a]	-	8.760
Annual costs III. (labour)	[€/a]	87.600	43.800
IV. Operation costs consumption			
A. Energy consumption			
A 1 - Option 1			
A 1.1 WWTP agglomeration 1			
Wastewater amount of agglomeration 1	[m³/d]	3.757	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	0,98	-
Daily energy consumption WWTP agglomeration 1	[kWh/d]	3.680	-
A 1.2 WWTP agglomeration 2			
Wastewater amount of agglomeration 2	[m³/d]	614	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	1,23	-
Daily energy consumption WWTP agglomeration 2	[kWh/d]	755	-
A 1.3 WWTP agglomeration 1			
Wastewater amount of agglomeration 3	[m³/d]	388	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	1,32	-
Daily energy consumption WWTP agglomeration 1	[kWh/d]	512	-
A 1.4 WWTP agglomeration 2			
Wastewater amount of agglomeration 4	[m³/d]	0	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	0,00	-
Daily energy consumption WWTP agglomeration 2	[kWh/d]	0	-
Total A 1	[kWh/d]	4.947	
A 2 - Option 2			
A 2.1 Pumping station agglomeration 1 (if necessary)			
Wastewater amount of agglomeration 1	[m³/d]	-	1.001
Maximum difference in height Dh (only in case of pumping station)	[m]	-	10
Daily energy consumption pumping station agglomeration 1	[kWh/d]	-	45
A 2.2 WWTP agglomeration 1+2+3			
Specific price WWTP agglomeration 2 (according formula)	[m³/d]		4.758
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]		0,93
Daily energy consumption WWTP agglomeration 2	[kWh/d]		4.443
Total A 1 - A 2	[kWh/d]	4.947	4.488
Specific energy price	[netto €/kWh]	0,15	0,15
Energy costs	[€/d]	742	673

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.

Total IV.	[€/d]	742	673
Annual costs IV. (consumption)	[€/a]	270.858	245.742

Summary

Annual costs I. (Investment)	[€/a]	1.040.194	973.201
Annual costs II. (Maintenance / Repairs)	[€/a]	277.312	214.351
Annual costs III. (labour)	[€/a]	87.600	43.800
Annual costs IV. (consumption)	[€/a]	270.858	245.742
Total annual costs	[€/a]	1.675.964	1.477.094

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