

Master Plan, Chapter 5, Option Analysis on Wastewater Agglomerations

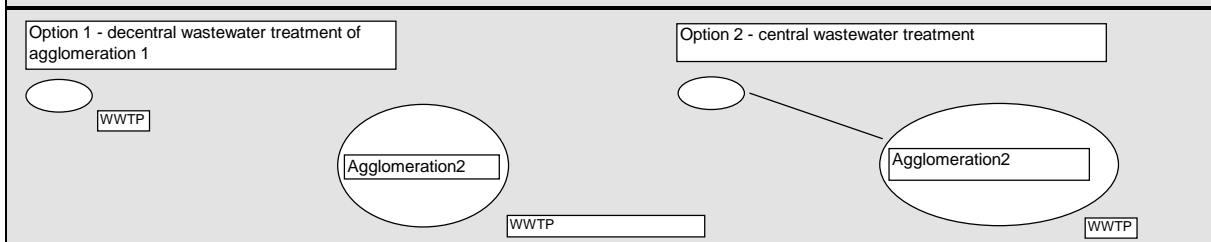
County: Mures

Agglomeration 1: SIGHISOARA

Agglomeration 2: AUREL VLAICU

Agglomeration 3: ALBESTI

Agglomeration 4: BOIU+TOPA



		Option 1	Option 2
Data Base			
Size of agglomeration 1	[PE]	34.552	34.552
Size of agglomeration 2	[PE]	98	98
Size of agglomeration 3	[PE]	3.370	3.370
Size of agglomeration 4	[PE]	1.883	1.883
Size of agglomeration 1+ 2+3+4	[PE]		39.903
No. of WTP modules	[items]	3	
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]	4.751	
Wastewater amount of agglomeration 2	[m³/d]	10	
Wastewater amount of agglomeration 3	[m³/d]	337	
Wastewater amount of agglomeration 4	[m³/d]	188	
Wastewater amount of agglomeration 1+ 2+3+4	[m³/d]		5.286
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]	247	-
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]	-	233
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)	[€]	3.412.715	-
(1.2) WWTP for agglomeration 2 (40 % of total costs)	[€]	24.800	
(1.3) WWTP for agglomeration 3 (40 % of total costs)	[€]	352.000	
(1.4) WWTP for agglomeration 4 (40 % of total costs)	[€]	203.300	
(2) WWTP for agglomeration (40 % of total costs)	[€]		3.711.132
(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	[€]	3.992.815	6.793.355
Writing-off period	[years]	40	40
	[€/a]	99.820	169.834
Cost of capital, average	[%]	3	3
	[€/a]	119.784	203.801
Annual costs civil works	[€/a]	219.605	373.635

B. Mechanical and electrical equipment			
(1.1) WWTP for agglomeration 1 (60 % of total costs)	[€]	5.119.073	-
(1.2) WWTP for agglomeration 2 (60 % of total costs)	[€]	29.700	-
(1.3) WWTP for agglomeration 3 (60 % of total costs)	[€]	520.500	-
(1.4) WWTP for agglomeration 4 (60 % of total costs)	[€]	297.450	-
(2) WWTP for agglomeration (60% of total costs)	[€]	-	5.566.697
(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	[€]	5.966.723	5.570.397
Writing-off period	[years]	12	12
Cost of capital, average	[€/a]	497.227	464.200
	[%]	3	3
	[€/a]	179.002	167.112
Annual costs mechanical and electrical equipment	[€/a]	676.229	631.312
Annual costs I. (Investment)	[€/a]	895.833	1.004.946
II. Maintenance / Repairs			
in % of the mechanical and electrical equipment installed	[%/a]	4	4
Annual costs II. (Maintenance / Repairs)	[€/a]	238.669	222.816
III. Labour costs			
specific labour costs	[€/h]	5	5
annual expenses option 1 (2 full-time workers/module)	[h/a]	26.280	-
annual expenses option 2 (2 full-time workers)	[h/a]	-	8.760
Annual costs III. (labour)	[€/a]	131.400	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]	4.751	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	0,94	-
Daily energy consumption WWTP agglomeration 1	[kWh/d]	4.489	-
A 1.2 WWTP agglomeration 2			
Wastewater amount of agglomeration 2	[m³/d]	10	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	2,32	-
Daily energy consumption WWTP agglomeration 2	[kWh/d]	23	-
A 1.3 WWTP agglomeration 1			
Wastewater amount of agglomeration 3	[m³/d]	337	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	1,89	-
Daily energy consumption WWTP agglomeration 1	[kWh/d]	637	-
A 1.4 WWTP agglomeration 2			
Wastewater amount of agglomeration 4	[m³/d]	188	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	1,57	-
Daily energy consumption WWTP agglomeration 2	[kWh/d]	296	-
Total A 1	[kWh/d]	5.445	
A 2 - Option 2			
A 2.1 Pumping station agglomeration 1 (if necessary)			
Wastewater amount of agglomeration 1	[m³/d]	-	347
Maximum difference in height Dh (only in case of pumping station)	[m]	-	10
Daily energy consumption pumping station agglomeration 1	[kWh/d]	-	16
A 2.2 WWTP agglomeration 1+2+3+4			
Specific price WWTP agglomeration 2 (according formula)	[m³/d]		5.286
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]		0,92
Daily energy consumption WWTP agglomeration 2	[kWh/d]		4.886
Total A 1 - A 2	[kWh/d]	5.445	4.902
Specific energy price	[netto €/kWh]	0,15	0,15
Energy costs	[€/d]	817	735

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]	817	735
Annual costs IV. (consumption)	[€/a]	298.105	268.374

Summary

Annual costs I. (Investment)	[€/a]	895.833	1.004.946
Annual costs II. (Maintenance / Repairs)	[€/a]	238.669	222.816
Annual costs III. (labour)	[€/a]	131.400	43.800
Annual costs IV. (consumption)	[€/a]	298.105	268.374
Total annual costs	[€/a]	1.564.007	1.539.936

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