

Master Plan, Chapter 5, Option Analysis on Wastewater Agglomerations

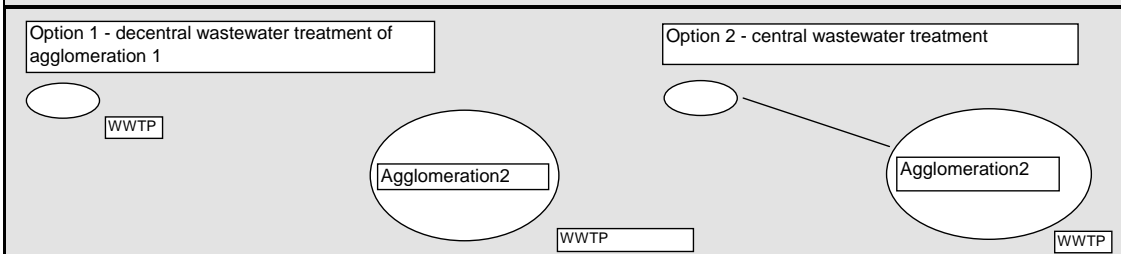
County: Mures

Agglomeration 1: SAES

Agglomeration 2: VULCAN

Agglomeration 3: DAIA

Agglomeration 4: APOLD



		Option 1	Option 2
Data Base			
Size of agglomeration 1	[PE]	1.196	1.196
Size of agglomeration 2	[PE]	109	109
Size of agglomeration 3	[PE]	557	557
Size of agglomeration 4	[PE]	861	861
Size of agglomeration 1+2+3+4	[PE]		2.723
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]	120	
Wastewater amount of agglomeration 2	[m³/d]	11	
Wastewater amount of agglomeration 3	[m³/d]	56	
Wastewater amount of agglomeration 4	[m³/d]	86	
Wastewater amount of agglomeration 1+ 2+3+4	[m³/d]		272
Connection details			
Lenth of the transportation line	[m]	-	14.500
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
Costs			
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
I. Investment costs			
A. Civil works			
(1.1) WWTP for agglomeration 1 (40 % of total costs)	[€]	134.600	-
(1.2) WWTP for agglomeration 2 (40 % of total costs)	[€]	25.900	
(1.3) WWTP for agglomeration 3 (40 % of total costs)	[€]	70.700	
(1.4) WWTP for agglomeration 4 (40 % of total costs)	[€]	101.100	
(2) WWTP for agglomeration (40 % of total costs)	[€]		287.300
(3) Pumping station agglomeration 1 (if necessary)	[€]	-	36.323
(4) Transportation line	[€]	-	2.472.250
(5) free	[€]		
(6) free	[€]		
(7) free	[€]		
(8) free	[€]		
(9) free	[€]		
(10) free	[€]		
Total costs civil works	[€]	332.300	2.795.873
Writting-off period	[years]	40	40
Cost of capital, average	[€/a]	8.308	69.897
	[%]	3	3
	[€/a]	9.969	83.876
Annual costs civil works	[€/a]	18.277	153.773

B. Mechanical and electrical equipment			
(1.1) WWTP for agglomeration 1 (60 % of total costs)	[€]	194.400	-
(1.2) WWTP for agglomeration 2 (60 % of total costs)	[€]	31.350	-
(1.3) WWTP for agglomeration 3 (60 % of total costs)	[€]	98.550	-
(1.4) WWTP for agglomeration 4 (60 % of total costs)	[€]	144.150	-
(2) WWTP for agglomeration (60% of total costs)	[€]	-	423.450
(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	[€]	468.450	427.150
Writting-off period	[years]	12	12
	[€/a]	39.038	35.596
Cost of capital, average	[%]	3	3
	[€/a]	14.054	12.815
Annual costs mechanical and electrical equipment	[€/a]	53.091	48.410
Annual costs I. (Investment)	[€/a]	71.368	202.183
II. Maintenance / Repairs			
in % of the mechanical and electrical equipment installed	[%/a]	4	4
Annual costs II. (Maintenance / Repairs)	[€/a]	18.738	17.086
III. Labour costs			
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
Annual costs III. (labour)	[€/a]	175.200	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]	120	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	0,94	-
Daily energy consumption WWTP agglomeration 1	[kWh/d]	113	-
A 1.2 WWTP agglomeration 2			
Wastewater amount of agglomeration 2	[m³/d]	11	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	2,28	-
Daily energy consumption WWTP agglomeration 2	[kWh/d]	25	-
A 1.3 WWTP agglomeration 3			
Wastewater amount of agglomeration 3	[m³/d]	56	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	1,78	-
Daily energy consumption WWTP agglomeration 3	[kWh/d]	99	-
A 1.4 WWTP agglomeration 4			
Wastewater amount of agglomeration 4	[m³/d]	86	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	1,66	-
Daily energy consumption WWTP agglomeration 4	[kWh/d]	143	-
Total A 1	[kWh/d]	380	
A 2 - Option 2			
A 2.1 Pumping station agglomeration 1 (if necessary)			
Wastewater amount of agglomeration 1	[m³/d]	-	67
Maximum difference in height Dh (only in case of pumping station)	[m]	-	10
Daily energy consumption pumping station agglomeration 1	[kWh/d]	-	3
A 2.2 WWTP agglomeration 1+2+3+4			
Specific price WWTP agglomeration 2 (according formula)	[m³/d]		272
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]		1,39
Daily energy consumption WWTP agglomeration 2	[kWh/d]		380
Total A 1 - A 2	[kWh/d]	380	383
Specific energy price	[netto €/kWh]	0,15	0,15
Energy costs	[€/d]	57	57

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]	57	57
Annual costs IV. (consumption)	[€/a]	20.810	20.952
Summary			
Annual costs I. (Investment)	[€/a]	71.368	202.183
Annual costs II. (Maintenance / Repairs)	[€/a]	18.738	17.086
Annual costs III. (labour)	[€/a]	175.200	43.800
Annual costs IV. (consumption)	[€/a]	20.810	20.952
Total annual costs	[€/a]	286.116	284.021

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