

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

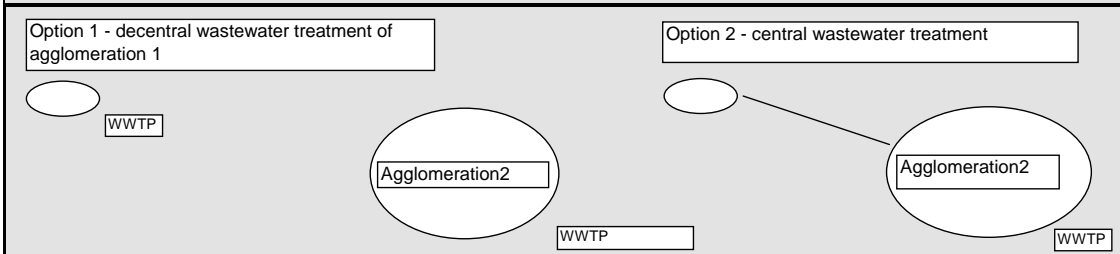
County: Mures

Agglomeration 1: ZAU DE CAMPIE+GAURA SANGERULUI (group)

Agglomeration 2: BOTEI

Agglomeration 3:

Agglomeration 4:



		Option 1	Option 2
<b>Data Base</b>			
Size of agglomeration 1	[PE]	2.978	2.978
Size of agglomeration 2	[PE]	157	157
Size of agglomeration 3	[PE]		0
Size of agglomeration 4	[PE]		0
Size of agglomeration 1+ 2	[PE]		3.135
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]	298	
Wastewater amount of agglomeration 2	[m³/d]	16	
Wastewater amount of agglomeration 3	[m³/d]	0	
Wastewater amount of agglomeration 4	[m³/d]	0	
Wastewater amount of agglomeration 1+ 2	[m³/d]		314
<b>Connection details</b>			
Lenth of the transportation line	[m]	-	3.000
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]	0	
Specific price WWTP agglomeration 4 (according formula)	[€/PE]	0	
Specific price WWTP agglomeration 1+2(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)	[€]	312.800	-
(1.2) WWTP for agglomeration 2 (40 % of total costs)	[€]	30.700	
(1.3) WWTP for agglomeration 3 (40 % of total costs)	[€]	0	
(1.4) WWTP for agglomeration 4 (40 % of total costs)	[€]	0	
(2) WWTP for agglomeration (40 % of total costs)	[€]		328.500
(3) Pumping station agglomeration 1 (if necessary)	[€]	-	36.323
(4) Transportation line	[€]	-	511.500
(5) free	[€]		
(6) free	[€]		
(7) free	[€]		
(8) free	[€]		
(9) free	[€]		
(10) free	[€]		
Total costs civil works	[€]	343.500	876.323
Writting-off period	[years]	40	40
Cost of capital, average	[€/a]	8.588	21.908
	[%]	3	3
	[€/a]	10.305	26.290
<b>Annual costs civil works</b>	<b>[€/a]</b>	<b>18.893</b>	<b>48.198</b>

<b>B. Mechanical and electrical equipment</b>			
(1.1) WWTP for agglomeration 1 (60 % of total costs)	[€]	461.700	-
(1.2) WWTP for agglomeration 2 (60 % of total costs)	[€]	38.550	
(1.3) WWTP for agglomeration 3 (60 % of total costs)	[€]	0	
(1.4) WWTP for agglomeration 4 (60 % of total costs)	[€]	0	
(2) WWTP for agglomeration (60% of total costs)	[€]	-	485.250
(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	[€]	500.250	488.950
Writting-off period	[years]	12	12
	[€/a]	41.688	40.746
Cost of capital, average	[%]	3	3
	[€/a]	15.008	14.669
<b>Annual costs mechanical and electrical equipment</b>	[€/a]	<b>56.695</b>	<b>55.414</b>
<b>Annual costs I. (Investment)</b>	[€/a]	<b>75.588</b>	<b>103.612</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>20.010</b>	<b>19.558</b>
<b>III. Labour costs</b>			
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
<b>Annual costs III. (labour)</b>	[€/a]	<b>87.600</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]	298	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	0,94	-
Daily energy consumption WWTP agglomeration 1	[kWh/d]	281	-
<b>A 1.2 WWTP agglomeration 2</b>			
Wastewater amount of agglomeration 2	[m³/d]	16	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	2,16	-
Daily energy consumption WWTP agglomeration 2	[kWh/d]	34	-
<b>A 1.3 WWTP agglomeration 3</b>			
Wastewater amount of agglomeration 3	[m³/d]	0	-
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]	0,00	-
Daily energy consumption WWTP agglomeration 3	[kWh/d]	0	-
<b>A 1.4 WWTP agglomeration 4</b>			
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 4	[kWh/d]	0	-
<b>Total A 1</b>	<b>[kWh/d]</b>	<b>315</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]	-	16
Maximum difference in height Dh (only in case of pumping station)	[m]	-	10
Daily energy consumption pumping station agglomeration 1	[kWh/d]	-	1
<b>A 2.2 WWTP agglomeration 1+2</b>			
Specific price WWTP agglomeration 2 (according formula)	[m³/d]		314
Specific energy consumption WWTP agglomeration 1 (acc. formula)	[kWh/m³]		1,36
Daily energy consumption WWTP agglomeration 2	[kWh/d]		428
<b>Total A 1 - A 2</b>	<b>[kWh/d]</b>	<b>315</b>	<b>428</b>
Specific energy price	[netto €/kWh]	0,15	0,15
<b>Energy costs</b>	<b>[€/d]</b>	<b>47</b>	<b>64</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]	47	64
<b>Annual costs IV. (consumption)</b>	[€/a]	17.262	23.459
<b>Summary</b>			
Annual costs I. (Investment)	[€/a]	75.588	103.612
Annual costs II. (Maintenance / Repairs)	[€/a]	20.010	19.558
Annual costs III. (labour)	[€/a]	87.600	43.800
Annual costs IV. (consumption)	[€/a]	17.262	23.459
<b>Total annual costs</b>	[€/a]	<b>200.459</b>	<b>190.429</b>

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