

Master Plan, Chapter 5, Option Analysis on Wastewater Agglomerations

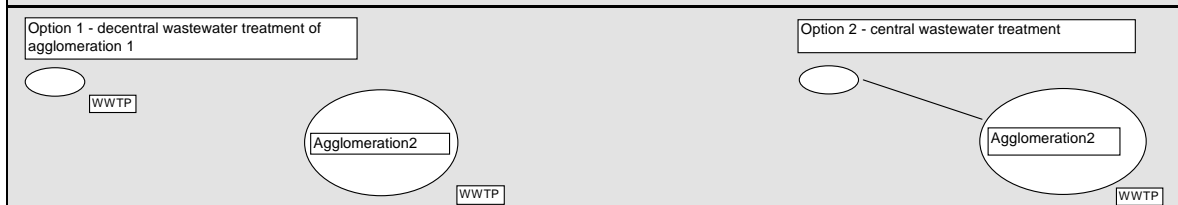
County: Mures

Agglomeration 1: LUDUS

Agglomeration 2: BOGATA

Agglomeration 3:

Agglomeration 4:



| | | Option 1 | Option 2 |
|---|--------------|----------------|----------------|
| Data Base | | | |
| Size of agglomeration 1 | [PE] | 17.650 | 17.650 |
| Size of agglomeration 2 | [PE] | 1.609 | 1.609 |
| Size of agglomeration 3 | [PE] | 0 | 0 |
| Size of agglomeration 4 | [PE] | 0 | 0 |
| Size of agglomeration 1+ 2 | [PE] | | 19.259 |
| No. of WTP modules | [items] | 1 | |
| 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] | 2.427 | |
| Wastewater amount of agglomeration 2 | [m³/d] | 161 | |
| Wastewater amount of agglomeration 3 | [m³/d] | 0 | |
| Wastewater amount of agglomeration 4 | [m³/d] | 0 | |
| Wastewater amount of agglomeration 1+ 2 | [m³/d] | | 2.588 |
| Connection details | | | |
| Lenth of the transportation line | [m] | - | 1.000 |
| 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 |
| Costs | | | |
| Specific price WWTP agglomeration 1 (according formula) | [€/PE] | 327 | - |
| 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] | - | 315 |
| 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) | [€] | 2.308.106 | - |
| (1.2) WWTP for agglomeration 2 (40 % of total costs) | [€] | 175.900 | |
| (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) | [€] | | 2.428.369 |
| (3) Pumping station agglomeration 1 (if necessary) | [€] | - | 36.323 |
| (4) Transportation line | [€] | - | 170.500 |
| (5) free | [€] | | |
| (6) free | [€] | | |
| (7) free | [€] | | |
| (8) free | [€] | | |
| (9) free | [€] | | |
| (10) free | [€] | | |
| Total costs civil works | [€] | 2.484.006 | 2.635.192 |
| Writing-off period | [years] | 40 | 40 |
| Cost of capital, average | [€/a] | 62.100 | 65.880 |
| | [%] | 3 | 3 |
| | [€/a] | 74.520 | 79.056 |
| Annual costs civil works | [€/a] | 136.620 | 144.936 |
| B. Mechanical and electrical equipment | | | |
| (1.1) WWTP for agglomeration 1 (60 % of total costs) | [€] | 3.462.159 | - |
| (1.2) WWTP for agglomeration 2 (60 % of total costs) | [€] | 256.350 | |
| (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) | [€] | - | 3.642.554 |
| (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 | [€] | 3.718.509 | 3.646.254 |
| Writing-off period | [years] | 12 | 12 |
| Cost of capital, average | [€/a] | 309.876 | 303.854 |
| | [%] | 3 | 3 |
| | [€/a] | 111.555 | 109.388 |
| Annual costs mechanical and electrical equipment | [€/a] | 421.431 | 413.242 |

| | | | |
|--|----------------|----------------|----------------|
| Annual costs I. (Investment) | [€/a] | 558.051 | 558.178 |
| II. Maintenance / Repairs | | | |
| in % of the mechanical and electrical equipment installed | [%/a] | 4 | 4 |
| Annual costs II. (Maintenance / Repairs) | [€/a] | 148.740 | 145.850 |
| III. Labour costs | | | |
| specific labour costs | [€/h] | 5 | 5 |
| annual expenses option 1 (2 full-time workers/module) | [h/a] | 8.760 | - |
| annual expenses option 2 (2 full-time workers) | [h/a] | - | 8.760 |
| Annual costs III. (labour) | [€/a] | 43.800 | 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] | 2.427 | - |
| Specific energy consumption WWTP agglomeration 1 (acc. formula) | [kWh/m³] | 1,05 | - |
| Daily energy consumption WWTP agglomeration 1 | [kWh/d] | 2.542 | - |
| A 1.2 WWTP agglomeration 2 | | | |
| Wastewater amount of agglomeration 2 | [m³/d] | 161 | - |
| Specific energy consumption WWTP agglomeration 1 (acc. formula) | [kWh/m³] | 1,51 | - |
| Daily energy consumption WWTP agglomeration 2 | [kWh/d] | 243 | - |
| A 1.3 WWTP agglomeration 1 | | | |
| 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 1 | [kWh/d] | 0 | - |
| 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] | 2.785 | |
| A 2 - Option 2 | | | |
| A 2.1 Pumping station agglomeration 1 (if necessary) | | | |
| Wastewater amount of agglomeration 1 | [m³/d] | - | 161 |
| Maximum difference in height Dh (only in case of pumping station) | [m] | - | 10 |
| Daily energy consumption pumping station agglomeration 1 | [kWh/d] | - | 7 |
| A 2.2 WWTP agglomeration 1+2 | | | |
| Specific price WWTP agglomeration 2 (according formula) | [m³/d] | | 2.588 |
| Specific energy consumption WWTP agglomeration 1 (acc. formula) | [kWh/m³] | | 1,03 |
| Daily energy consumption WWTP agglomeration 2 | [kWh/d] | | 2.674 |
| Total A 1 - A 2 | [kWh/d] | 2.785 | 2.682 |
| Specific energy price | [netto €/kWh] | 0,15 | 0,15 |
| Energy costs | [€/d] | 418 | 402 |
| 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] | 418 | 402 |
| Annual costs IV. (consumption) | [€/a] | 152.468 | 146.813 |
| Summary | | | |
| Annual costs I. (Investment) | [€/a] | 558.051 | 558.178 |
| Annual costs II. (Maintenance / Repairs) | [€/a] | 148.740 | 145.850 |
| Annual costs III. (labour) | [€/a] | 43.800 | 43.800 |
| Annual costs IV. (consumption) | [€/a] | 152.468 | 146.813 |
| Total annual costs | [€/a] | 903.060 | 894.641 |
| Conclusion : according to the option analysis the Consultant proposed centralized solution to be followed. | | | |