

ASK THE EXPERTS

Wastewater Treatment : Energy Efficiency and Financing Models
09.06.2022

Energy efficient wastewater pumping solutions



**African Water
Association**

GAPWAS
German-African Partnership for Water and Sanitation

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**German Water
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Wilo has 15 main production sites and more than 80 production and sales companies on site.

BUILDING SERVICES



WATER MANAGEMENT



INDUSTRY



Energy efficient wastewater pumping solutions

Waterstone Housing Development – Empageni, South Africa

In 2016 the Empangheni municipality began a greenfield project to develop low cost and first time buyer housing. This presented a problem of how to handle the waste water from the homes.



Initial Problem/ challenge

- Initially this was a greenfield project with no development. One of the main hurdles the consultants had to overcome was that the ideal place to put the pump station was next to a wetland however due to environmental protection concrete sumps were not to be accepted.
- As with all sewage stations, there was a great emphasis placed on **reliability** and **energy efficiency**.

General wastewater challenges



The continuous increase in the cost of water (water meters) and the advance in household technologies (toilets with reduced water consumption, highly efficient washing machines, dishwashers) – had an unexpected effect on the “structure” of wastewater.



Same 1m³ of sewage has now more solids than 10 or 20 years ago. Additionally, in the last years, we have seen a fast increase in the wet wipes content in wastewater, which are highly dangerous to the pumps.



In the same time, cost of energy and workforce is increasing all over the world.



This is posing a challenge to water operators and to pump producers, as follows:



Pumps must run with high efficiency **and** high reliability



Water companies cannot easily increase the price of water, to reflect the investment in new technologies and increasing of costs

Solution deployed

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

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- Complete prefabricated solid separation pumping station
- Internal diameter 3600mm
- Wall thickness 200 mm
- Installation time : **1 day!**

Solution deployed

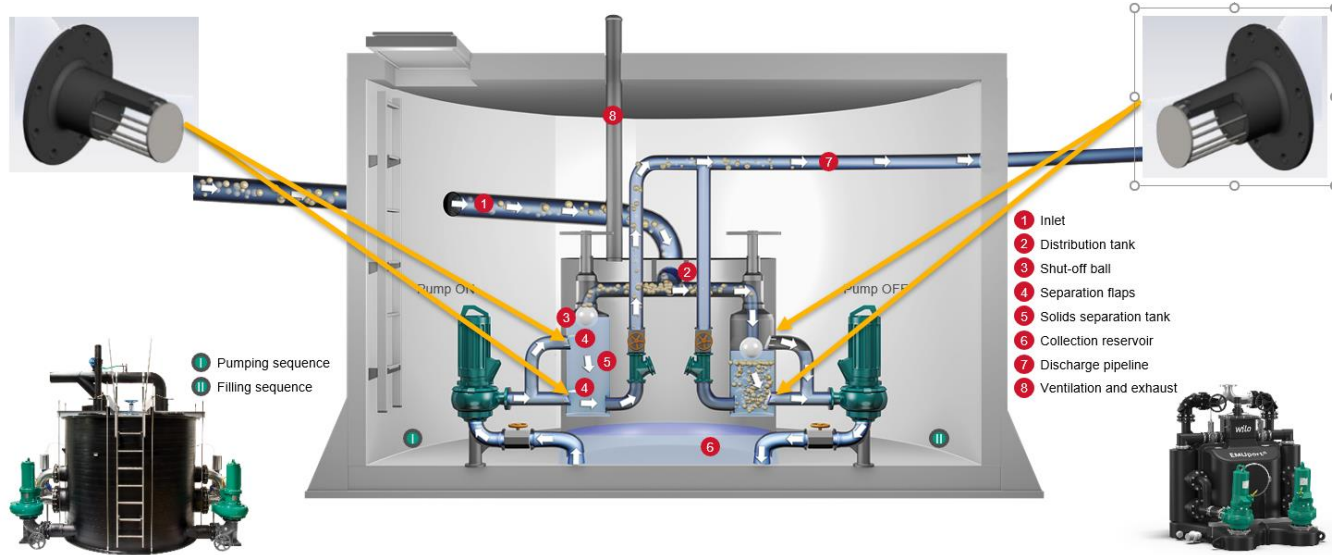
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- All included: pumps, stairs, pipes, valves, electric panel, sensors, cover
- All under German factory quality control – no object mounted on site
- No additional concrete walls/building required
- Station is calculated and guaranteed against coalpse and flotation

Solution deployed



Results obtained



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Pumpe			Betriebspunktendaten		
Laufrad Ø	ausgelegt 324	mm	Volumenstrom	286,7	m³/h
Nennndrehzahl	1460	1/min	Förderhöhe	26,5	m
Frequenz	50	Hz	Wellenleistung	P ₂ 32	kW
Laufradtyp	Einkanal		Leistungsaufnahme	P ₁ 37,4	kW
Motor			NPSH - Wert der Pumpe	3,5	m
Bemessungsleistung	55	kW	Drehzahl	1475	1/min
Gew. Explosionsschutz					

Pumpe			Betriebspunktendaten		
Laufrad Ø	ausgelegt 310	mm	Volumenstrom	287,1	m³/h
Nennndrehzahl	1450	1/min	Förderhöhe	26,6	m
Frequenz	50	Hz	Wellenleistung	P ₂ 29,7	kW
Laufradtyp	Solid T		Leistungsaufnahme	P ₁ 33,7	kW
Motor			NPSH - Wert der Pumpe	4,9	m
Bemessungsleistung	35	kW	Drehzahl	1458	1/min
Gew. Explosionsschutz					



	Conventional dry well installation with 150 mm free ball passage	Pumps stations with solids separation system with 78 mm free ball passage
Wilo-EMU FA sewage pump type	FA 25.36 E	FA 15.95T
Type of impeller	Single channel impeller	Solid T impeller
Ball passage of pump type	150 mm	78 mm
Power consumption at duty point P ₁	37,4 kW	33,7 kW
Annual energy costs	USD 16381	USD 14760
Extra energy costs compared to solids separation system	11 %	
Energy costs savings per year*		USD 1.621

* At an electricity price of 0.15 USD/kWh (actual electricity costs without basic fee which depends on the estimated rated output).

Results obtained

- **Energy savings** – in average, compared with a conventional pumping station, due to use of high efficiency impellers, total energy costs are cut with about **10-20%**
- **Operation costs** – Due to the anti-clogging design, the service and mainance cost are cut with about **90%!!!**Less service trips -> less energy consumption
- **Leakage free pumping station** – due to the special structure of the walls, material used – PEHD, and quality control -
- **Hygiene** – due to use of PEHD and lack of leakage or smells, service and maintenance is posing a minimal risk to the health of service operators

Conclusion

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Thank you for your attention!

Any Question?

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