



Life cycle assessment - Alternative water supply for a building block

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DTU



Life cycle assessment

Alternative water supply for a building block

Sarah Brudler, Berit Godskesen, Martin Rygaard

Assessment scope

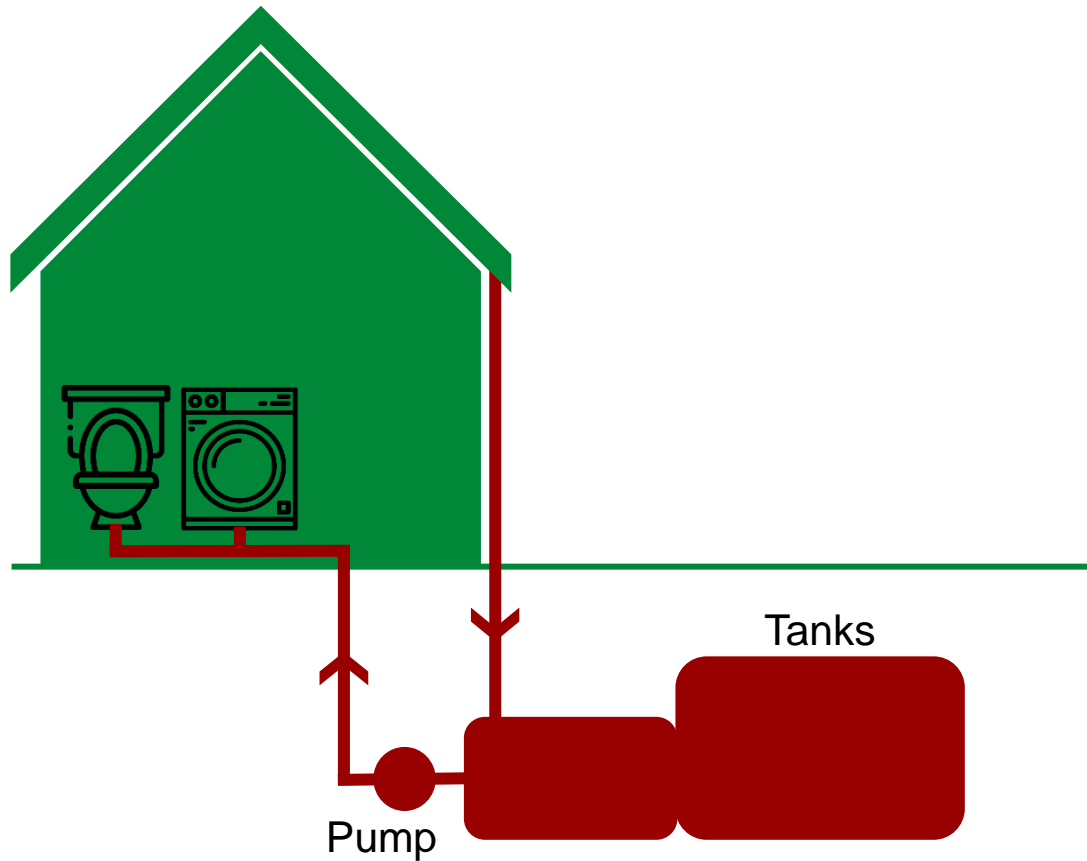


Provision of 250m³ of water per year for toilet flushing and laundry in a building block from an alternative source to groundwater

- All processes over the whole life cycle of the different systems are assessed
- Environmental impacts are quantified using standardised life cycle assessment methods and databases
- Impacts are shown exemplarily for climate change (as emissions of CO₂ equivalents)

System setup

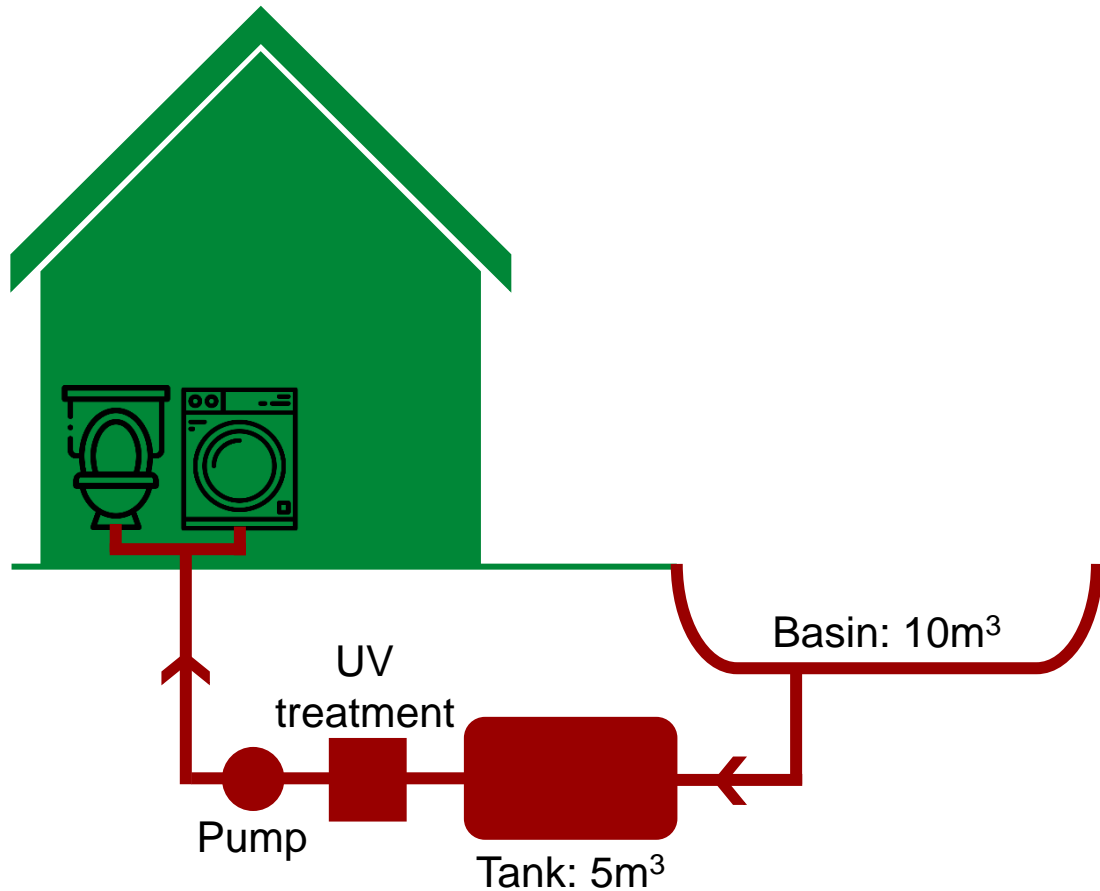
1.1 Rainwater system: tanks



- Roof runoff is collected in underground tanks (15m²)
- No treatment
- Pumping to apartments

System setup

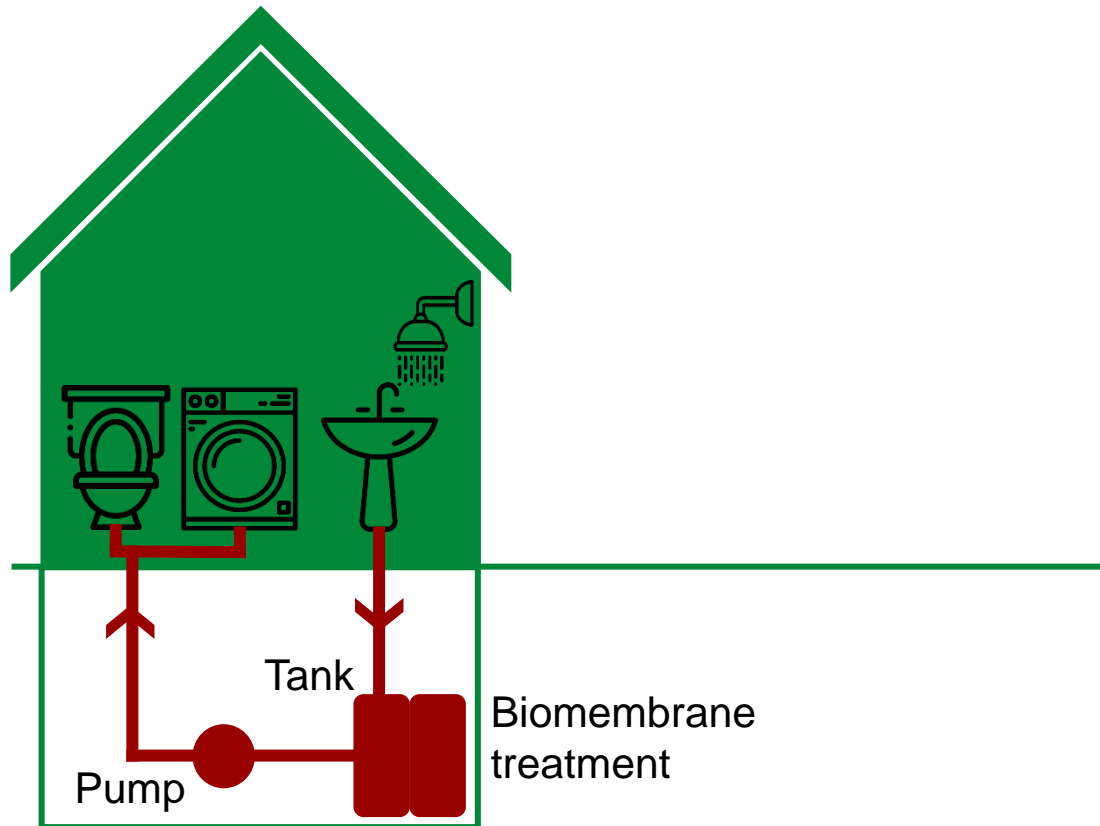
1.2 Rainwater system: basin



- Roof runoff is collected in a basin (10m³) and an underground tank (5m³)
- Simple UV treatment for disinfection
- Pumping to apartments

System setup

1.3 Greywater system

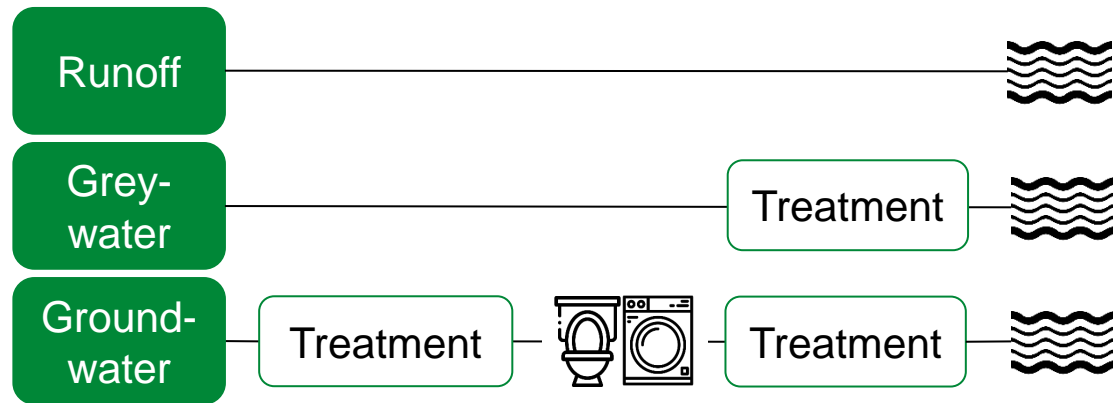


- Greywater from bathroom sinks and showers is collected in a tank (1m²)
- Biomembrane treatment integrated in tanks
- Pumping to apartments

Flow charts

Baseline

Baseline

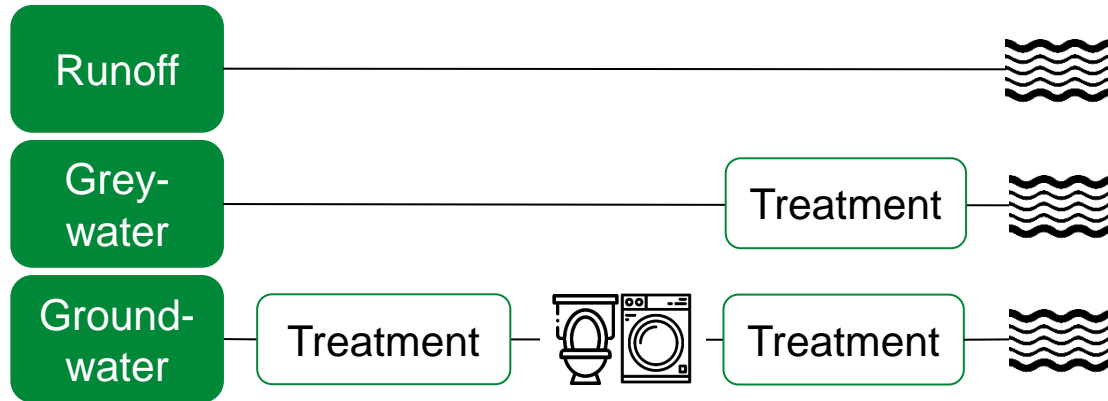


- Runoff is discharged in a separate sewer without treatment
- Greywater goes through the wastewater treatment plant
- Water demands for toilet flushing and laundry are covered by groundwater

Flow charts

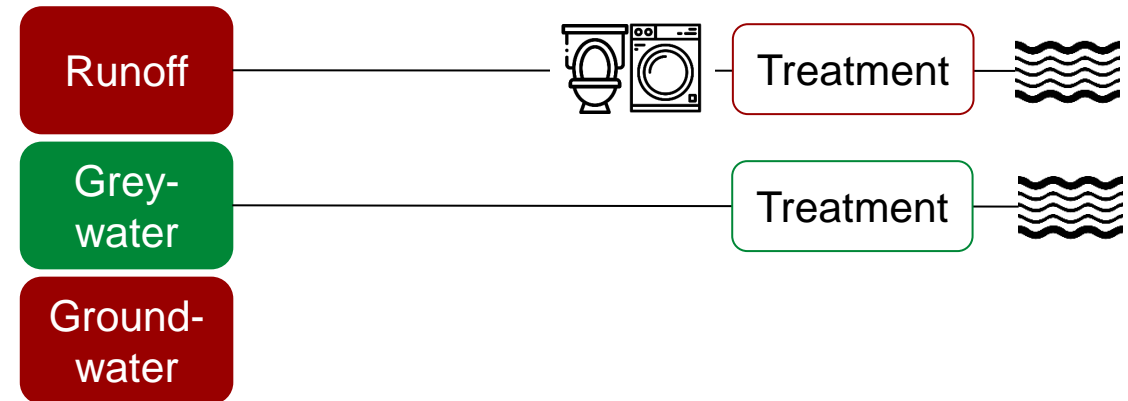
Rainwater systems

Baseline

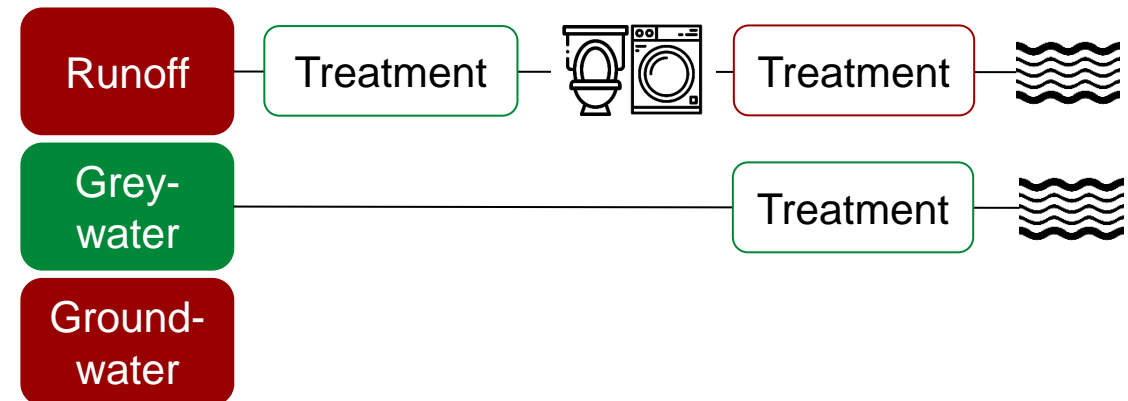


- Water demands for toilet flushing and laundry are covered by (treated) runoff
- Greywater goes through the wastewater treatment plant
- No groundwater needs to be abstracted

1.1 Rainwater system: tanks



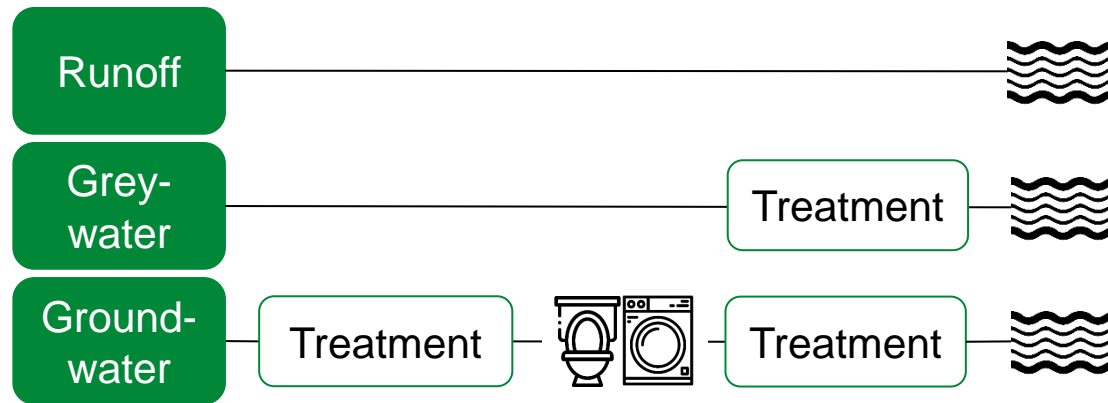
1.2 Rainwater system: basin



Flow charts

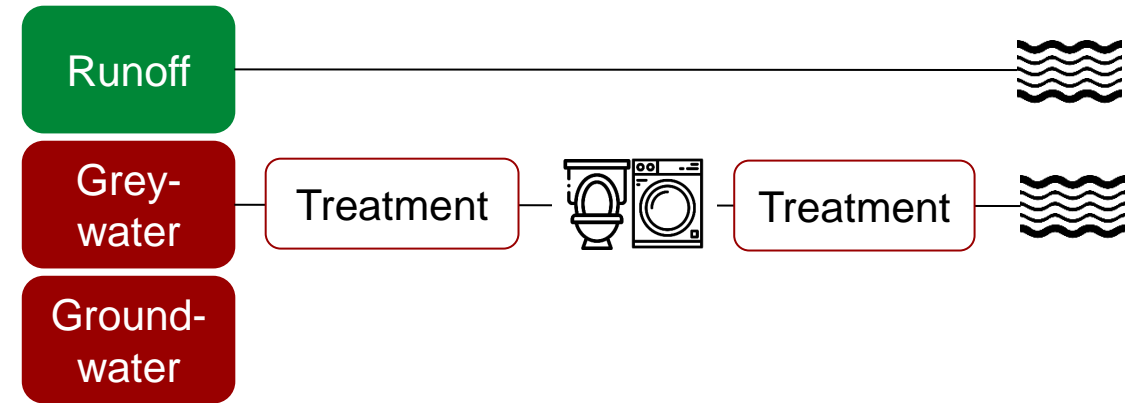
Greywater system

Baseline



- Runoff is discharged in a separate sewer without treatment
- Water demands for toilet flushing and laundry are covered by treated greywater
- No groundwater needs to be abstracted

1.3 Greywater system



Process inventory

	1.1 Rainwater: tanks		1.2 Rainwater: basin				1.3 Greywater			ALL		
	Collection pipes	Tanks	Basin	Drainage pipe	Tank	UV treatment	Collection pipes	Tank	Membrane treatment	Pump	Supply pipes	Avoided treatment
Materials	PE	PP	Rubber Gravel	PVC Gravel	PP	Lamps	PP	PE		PP Steel	PE	
Transport	Truck	Truck	Truck	Truck	Truck		Truck	Truck		Truck	Truck	
Construction		Excavation Soil transport	Excavation Soil transport	Excavation Soil transport	Excavation Soil transport							
Operation			Excavation Sediment transport			Electricity			Electricity	Electricity		Electricity
Decommissioning	Truck Recycling	Excavation Truck Recycling Backfilling	Truck Incineration	Excavation Truck Recycling	Excavation Truck Recycling Backfilling		Truck Recycling	Truck Recycling		Truck Recycling	Truck Recycling	

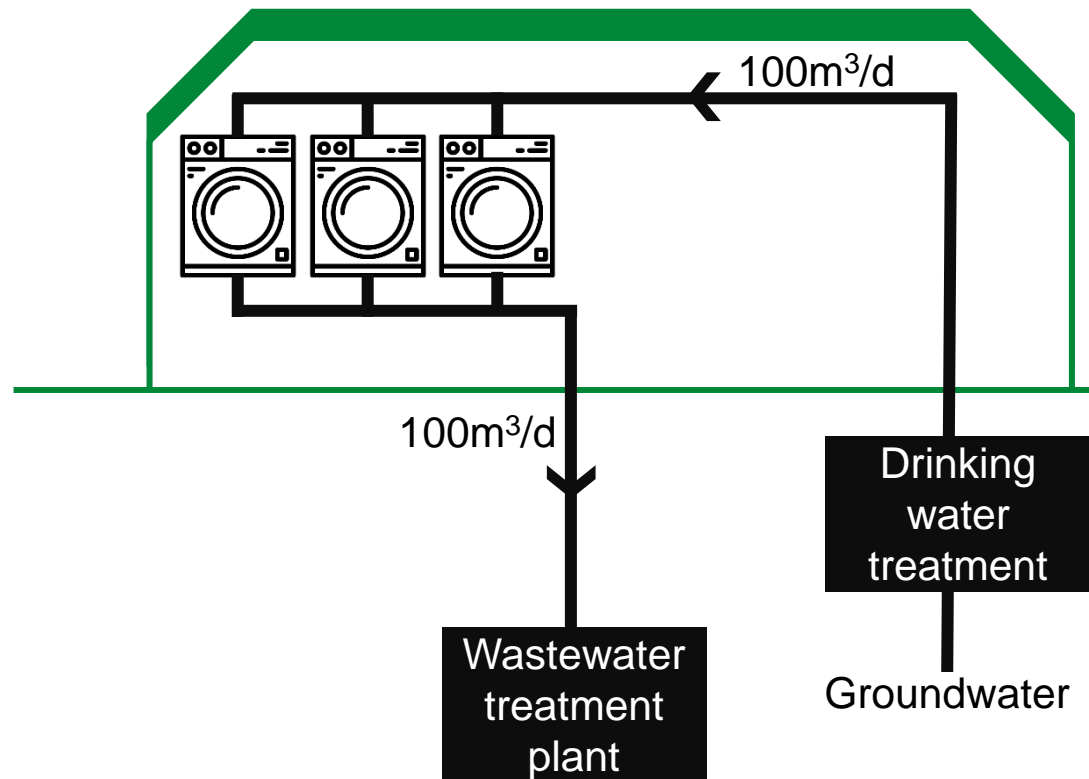
Life cycle assessment

Alternative water supply for Berendsen A/S

Sarah Brudler, Berit Godskesen, Martin Rygaard

Assessment scope

Functional unit

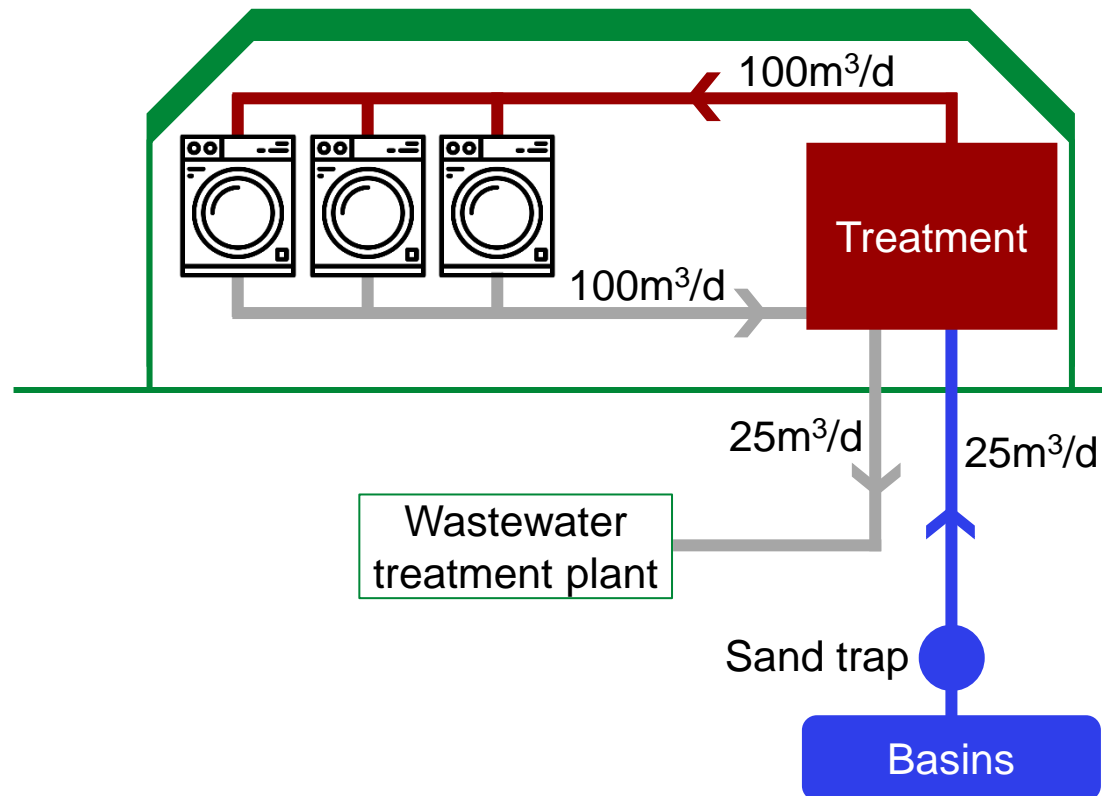


Provision of 100 m³ of water per day for industrial laundry from an alternative source to groundwater

- All processes over the whole life cycle of the different systems are assessed
- Environmental impacts are quantified using standardised life cycle assessment methods and databases
- Impacts are shown exemplarily for climate change (as emissions of CO₂ equivalents)

System setup

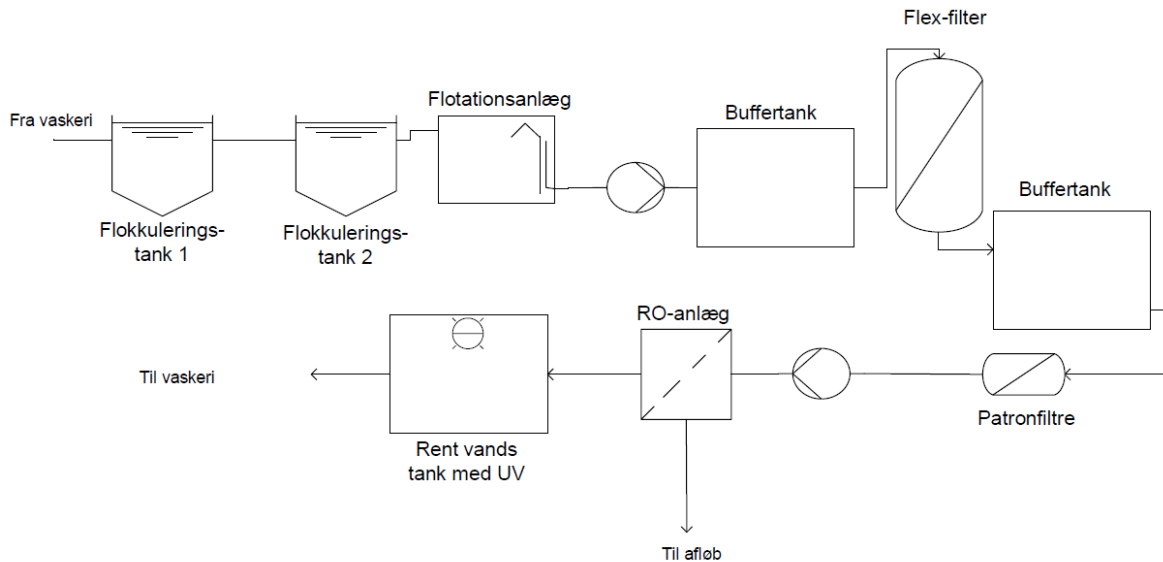
Recirculation and stormwater as alternative water source



- Wastewater from laundry:
 - 75m³/d goes into treatment on site
 - 25m³/d is discharged to the sewer
- Stormwater: 25m³/d is provided from
 - downstream basins, pumped in a new pipe (system 2.1)
 - upstream basins, transported in an existing pipe (system 2.2)
- No primary treatment is included except for a sand trap

System setup

Treatment system



- Design specifications are not yet available (tank sizes, materials, etc.)
 - Only electricity consumption included in the assessment
- Assumed to be the most important process

Process inventory

	2.1 Downstream basins			ALL		
	Basins	Pump	Pipe	Sand trap	Treatment	Avoided treatment
Materials		Iron PE	PE Gravel	Concrete		
Transport		Truck	Truck	Truck		
Construction	Excavation Soil transport		Excavation Soil transport	Excavation Soil transport		
Operation		Electricity	Inspection / cleaning		Electricity	Electricity
Decommissioning	Truck Recycling	Truck Recycling	Excavation Truck Recycling	Excavation Truck Recycling		