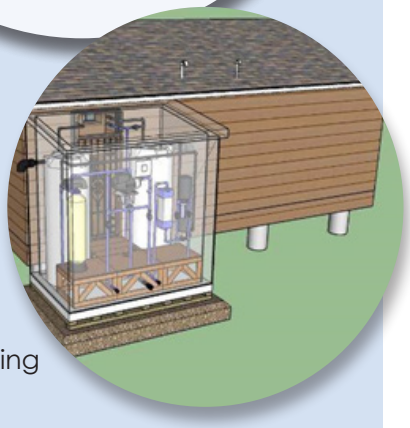
Alaska Water and Sewer Challenge

# Prototype Household Water and Sewer System

## System Highlights

- System components for water treatment are **located in a "vestibule" attached to the side of the house.**
- In order for a household of four people to use 60 gallons of water per day, a total of **90 gallons** of water will need to be **brought into the home** each week.
- Also, **90 gallons** of wastewater will need to be **removed from the home** each week. Wastewater is produced by flushing the toilet or using the kitchen sink. All other water; from the bathroom sink, the shower, and the wash machine is recycled.
- System components for water treatment are **located in a "vestibule" attached to the side of the house.**
- Sources of water that can be treated **for drinking and cooking** purposes include **rain water, water from a lake, or water from a river.**
- Sources of water that can be used **for wash water** include **rain water, water from a lake, or water from a river.** Wash water refers to the water used in the house for uses besides drinking and cooking. The drinking water system is completely separate from the wash water systems.
- **Hot water** can be made available to any of the fixtures based on plumbing arrangements and user preference.

**DOWL is working with partner communities in the Yukon Kuskokwim and Norton Sound Regions to gather system feedback from potential end users.**



## *The proposed DOWL System has the following features:*

**A stand-alone filtration system for drinking and cooking Water.** This filtration system consists of two stacked plastic buckets and a disc-shaped filter made of a porous ceramic material to remove bacteria (the filter is currently being tested with special coatings to see if it can also remove viruses). The filter is installed in the top bucket and the whole unit sits on a kitchen counter top. Untreated water from local sources can be loaded into the filter and treated for drinking. An additional bucket with holes can be placed in the top of the unit to hold melting ice. *Drinking water is safe and the filter units are inexpensive and user friendly.*

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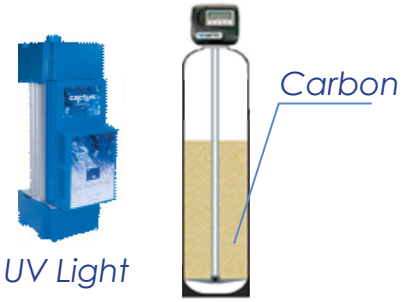
**A separate system that treats and recycles wash water in the home.** This allows for water to be used multiple times before it turns to wastewater as it goes through the toilet and kitchen sink. The wash water recycling system takes water from the bathroom faucet, the washing machine, and the shower and filters it through a multi-stage filtration system that includes a carbon/zeolite filter and woven fabric cartridge filters. Filtered water is then disinfected using Ultra-violet (UV) light and another form of disinfection. Wash water that goes through the recycling system is safe, but not meant for drinking and cooking. *Components within the proposed DOWL system are available commercially. A maintenance cooperative through a local government could stock replacement parts that would apply to all systems in a community.*



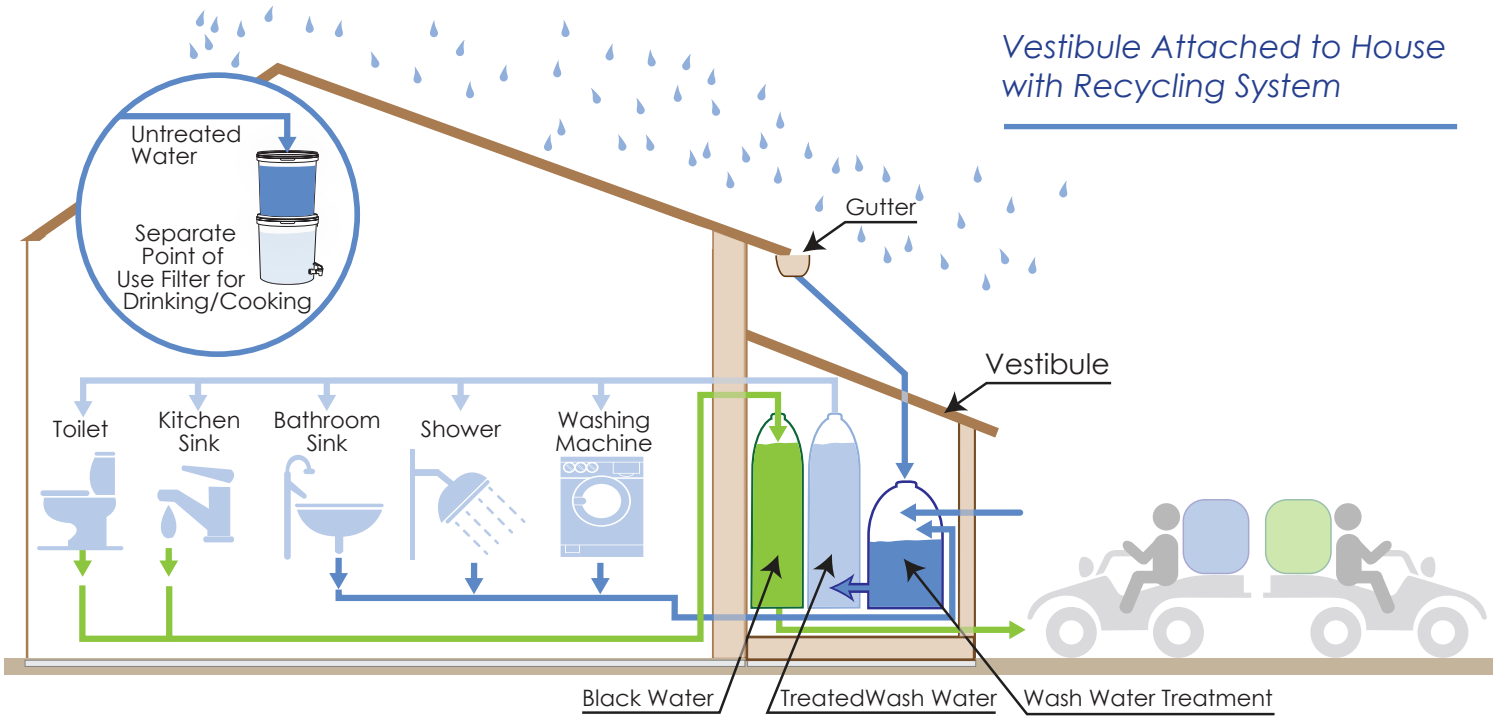

## *Multi-Stage Carbon/Zeolite Filter for Filtration Followed by Ultraviolet Light for Disinfection*

- **Separate tanks for storing wash water and wastewater.** Wastewater generated from the flush toilet, and the kitchen sink is transferred to a holding tank where it is held until it can be pumped away from the household by the local government. No water from the toilet or the kitchen sink enters the wash water recycling system. There is a separate storage tank for treated wash water. Treated wash water is stored in this tank until it distributed to the different fixtures.

- **A "vestibule" attached to the side of the house.** The water recycling system and the tanks for storing water are housed in a "vestibule" that attaches to the side of the house. These components are placed in the vestibule so the tanks and recycling system do not take up space inside the home. The vestibule also allows heat from the house to drift into the vestibule, so a separate heating system is not required. The vestibule is super insulated and has a separate foundation system to allow the vestibule to allow for ground movement underneath the vestibule.

- **Low energy demand.** Since the vestibule is super insulated it will not take much energy to heat it. A small energy demand will come from the pumps and disinfection system. The disinfection system, which is an ultraviolet light, has about the same energy demand as a normal light bulb. Holding tanks for wastewater are kept inside the warm vestibule, so no heat trace is needed.

*Vestibule Attached to House with Recycling System*

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