NET-ZERO WATER MANCHESTER

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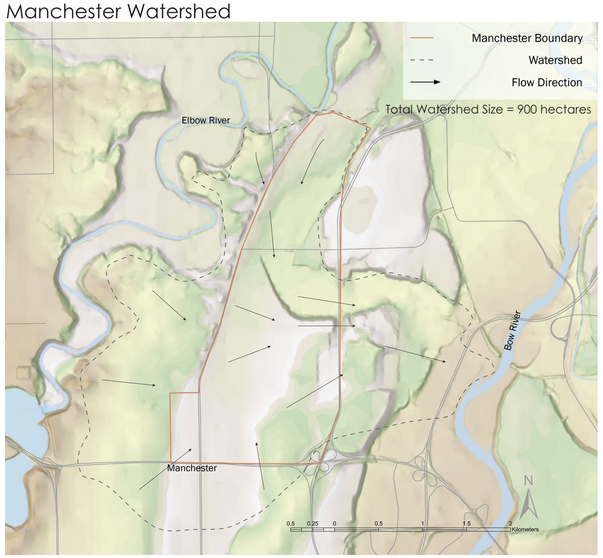
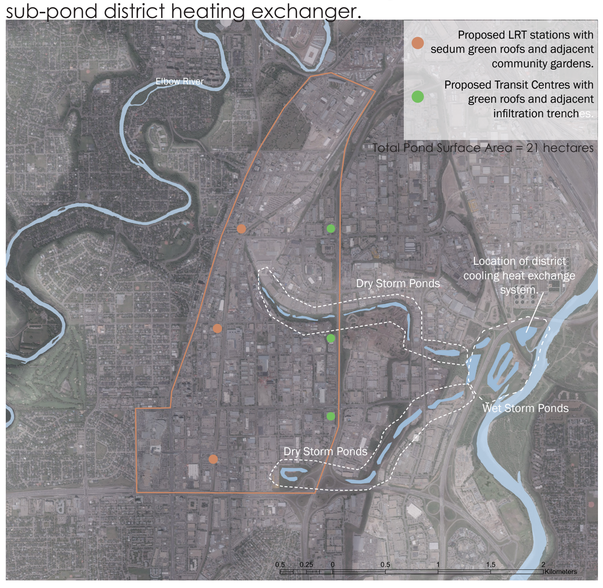
As Calgary expands and density increases, existing water infrastructure will need massive upgrades and enormous amounts of maintenance to service all Calgarians if today's urban water consumption practices remain the same. The Chinook-Manchester of the future will require a net-zero water system to be economically and environmentally viable, with de-centralized water systems reducing strain on Calgary's existing water treatment plants and water infrastructure, reducing the energy and carbon emissions associated with treatment, and offsetting source water consumption.

To minimize impact of flooding and storm water contamination, all water from a 1 in 100 year rainfall event will be able to be captured, slowed, and filtered, by a series of dry and wet storm ponds leading from the district, into the Bow River. For regular precipitation, 15 acres of rain gardens and infiltration trenches will be built in the community in road medians, next to transit structures, and on city land.

Manchester Watershed

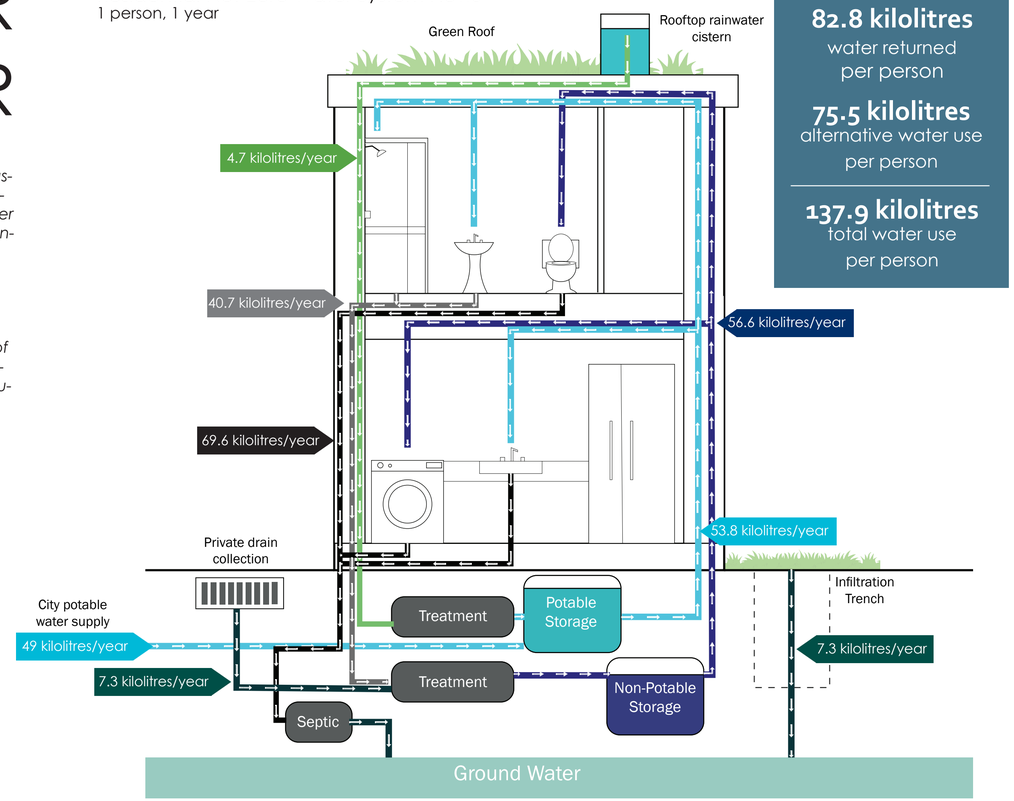


Locations of storm ponds, transit/water green infrastructure, sub-pond district heating exchanger.



Residential Net-Zero Water System Flows

1 person, 1 year



82.8 kilolitres water returned per person

75.5 kilolitres alternative water use per person

137.9 kilolitres total water use per person

GREEN INFRASTRUCTURE NEEDED TO CAPTURE REGULAR PRECIPITATION **15 ha**

21 ha WET/DRY STORMWATER PONDS

~80% REDUCTION IN CITY WATER REQUIREMENTS

Precedents

Rain Garden

University of Minnesota Campus Rain Garden

Small, urban rain garden.

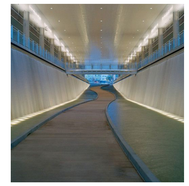
The garden was installed in 2004 and measures 716 square feet in size, with a ponding depth of 0.5 feet. It is designed to capture stormwater runoff with a series of ponds in which rainwater is channelled through. 1 inch/hour infiltration rate and the garden is drained within 2 hours when filled to capacity. This measurement was used to roughly estimate the area of rain gardens needed to fufill the stormwater requirements of Manchester.

Dry Stormwater Pond

Braeside Stormwater Pond, Calgary, AB

Dry stormwater pond with recreational uses.

This pond was build to mitigate the amount of flooding occuring during extreme rain events. As Manchester will be built with a large amount of green infrastructure to absorb and divert rainwater, much of the 315000 m3 of rainwater storage needed can be a dry pond, only filling in the event of an extreme rain event. This allows for recreational space as well as flood mitigation.



Grey Water Reuse

David L. Lawrence Convetion Centre, Pittsburgh, USA

66% reduction in purchased water consumption

At the centre, faucets, water fountains and sinks are supplied with municipal drinking water. This water is then treated at the on-site wastewater treatment plant and diverted to toilet flushing and landscaping irrigation. This principle can be scaled down to individual residential and commerical buildings in Manchester using similar systems to re-use water or scaled up at a community level.

Urban Septic Systems

Waterloo Biofilter

85% less power than aerobic treatment.

Using a foam within the septic tank, wastewater slowly trickles through the system and uses bacteria within the foam to slowly remove contaminants. The water is then chemically and UV treated and diverted back into the water system. The system is small and can be adapted for various construction types, building uses, and soil types.

Transit Green Roofs

Utrecht, Netherlands

Pollinator and bird habitat as well as stormwater infrastructure

Bus shelters in Utrecht, NL were covered with sedum roofs to contribute to pollinator habitat and as an educational tool. These roofs store water, capture particulates, cool buildings, and promote biodiversity. There are also inexpensive after construction and can extend building roof lifetimes. Manchester will benefit from all transit structures and city owned buildings having green roofs installed.

Total yearly flows for Manchester