

Make Your House “Alternative Water Ready”

WHAT IS AN “ALTERNATIVE WATER READY” HOUSE?

Canadians have access to some of the highest quality water in the world. Despite our abundant supply of fresh water, it remains a limited resource as much of it is not readily accessible. Our future water supplies are less certain than what we enjoy today, and some countries and certain regions in Canada have already begun to experience residential water shortages. Globally and locally, we are beginning to realize the importance of conserving water. At the municipal level, there is increasing pressure to provide treated water to a growing population, and this is increasing the demands on our existing water supply and treatment infrastructure. In our own houses, water conservation can help to reduce utility costs in those areas that charge for water and sewer services and also help protect and preserve this precious resource for future generations.

We can reduce our daily water usage by ensuring that all of our water using fixtures and appliances are water-efficient and by using water wisely. Depending on where we live and what building codes apply, we may also be able to reduce the amount of municipal water or well water we consume by using alternative (or auxiliary) water sources, such as rainwater or **greywater** (see glossary for definitions). To do this, our houses would need to have the necessary equipment and systems to capture, store, treat and redistribute alternative water sources. In many cases, water is readily available and affordable, and it may not appear to make sense today—from a cost savings perspective—to install an alternative water system when building or renovating a house. However, should water costs rise and traditional sources become less reliable, it would be beneficial to rough-in the piping components for future use and later add an alternative water system. This is referred to as an “alternative water ready” house.

Water is abundant today, but planning and building alternative water ready components into your new house construction or renovation project is an inexpensive way to help ready your house in the event it becomes more possible, desirable and cost-effective to use alternative water systems. By installing all of the required supply and wastewater pipes within the wall and floor assemblies during construction, there will be less work, cost and disruption when you finally want to install your system.

Potable or drinkable water, from municipal or well sources, must always be used where it can come into direct human contact, such as for drinking, cooking and bathing. Non-potable alternative sources, such as rainwater, may be permitted for reuse in laundry, toilets and irrigation. Always check with your local building department before you start any work on your system, to find out what is allowable and what is not.

How does an “alternative water ready” house differ from a conventional house?

A typical house has one source of potable (drinking) water entering the house and one waste stream (known as “blackwater”) emptying into the sewer or septic field. An alternative water ready house has in place the necessary systems for two sources of water for supply (potable and non-potable) and two discharge streams (greywater and blackwater) that can be activated in the future. It is more cost-effective to build in a water ready system at the design stage of your new house construction or major renovation project—when the walls are open and plumbing lines are accessible. When it is economically feasible, the technology is robust and regulations permit, you will be ready to connect the necessary treatment equipment to make use of alternative water sources. Designing an alternative

water ready house may be most appropriate in jurisdictions facing—or anticipating—water shortages or infrastructure issues, but an alternative water ready system can be implemented by all homeowners planning to reduce their water consumption and wastewater flows in the future, as a part of an overall effort to minimize the environmental footprint of their house.

Two options as examples available to homeowners include a rainwater collection system and—though less common—a greywater system for reclaiming and collecting water from selected existing fixtures and appliances. The technologies to treat alternative water sources are fairly new and not permitted in all jurisdictions. However, it is relatively easy and inexpensive to ready your new house to receive an alternative water treatment system once it is permitted by your local jurisdiction.

How does it work?

The principal components of an alternative water ready house generally include

- a system or network for collecting water from an alternative source—outdoor sources such as rainwater or melted snow collected from the roof or indoor sources such as laundry and bathroom fixtures (see Table 1);
- mechanisms for filtration and treatment (where needed);
- a well-marked system for distributing the alternative water, for use in or around your house; and
- a well-designed utility room that can accommodate an alternative water storage and treatment system and other required mechanical and electrical services.

Table 1 Alternative water supply options

Water Supply	General Water Quality	Source of Water Supply	Description
Rainwater	High (but variable)	On-site	Rainwater collected by the eavestroughs from the roof and routed through downspouts to a storage tank. Treatment may be required depending on the intended use of the water. Rainwater is not generally collected from ground surfaces, as it could be contaminated.
Greywater	Medium to Low	On-site	Greywater collected from existing water fixtures through a dedicated collection system and routed to a storage tank. Treatment is required for most applications.
Well Water	High (but variable)	On-site	Groundwater that is pumped locally and routed to a storage tank. Treatment may be required depending on the intended use of the water.

Depending on which type of alternative water supply is permitted where you live, and which you select, the amount and quality of water you can collect and use can vary significantly.

DESIGNING AN “ALTERNATIVE WATER READY” HOUSE

Consult with your local building department

Obtain written information from your local building department concerning what alternative water sources are currently permitted in your community and for what uses. The information should also detail the approval process you will have to follow with respect to design documents, product information, inspections and testing. It will be important to distinguish whether

you are intending to immediately connect to an alternative water source or you are only planning to make your house alternative water ready for future connection.

If no guidance exists, you may have to design the system or have it designed by an engineer and then submit it for approval by your local building department. Working with a designer who has experience with alternative water systems in your area would be advisable.

Water balance assessment— understanding the amount and quality of water your household needs

Work with your designer to determine how much water each fixture in your house uses and what level of water quality (high, medium or low) is needed given the intended

use (for example, cooking, doing the laundry or taking a shower). Knowing where and how you use water makes it possible to understand where and how alternative water sources might be best used. This can also save you money by ensuring that you are not putting in an oversized or inappropriate treatment system.

Table 2 provides general guidance on the average volume of water that is needed for, as well as the quality of water that can be collected from, each use or fixture in a typical Canadian house.

Kitchen, bathroom and other faucets as well as dishwashers always use only the highest-quality potable water from your well or municipal service. Some jurisdictions may allow high-quality alternative water to be used for laundry.

Table 2 Typical water demand and water drainage characteristics¹

		Clothes Washer		Dishwasher		Faucet ²			Bath / Shower		Toilet	Outdoor Use	
		Wash	Rinse	Wash	Rinse	Kitchen Sink	Hand Basin	Laundry Basin	Bath	Shower		Above-Ground	Below-Ground
Water Volume (L/cap/d)³	Conventional Fixtures / Appliances	56.8		3.8		41.3			4.5	43.9	70.0	120.0	
	Low-Flow Fixtures / Appliances	37.9		2.7		40.9			4.5	33.3	31.0	Variable	
Quality of Water Collected from Fixture or Appliance		Black or Grey	Grey	Black		Black	Grey	Grey	Grey		Black	N/A	

¹ Water volume data from Vickers, A. (2001). Water use and conservation. Amherst, MA: WaterFlow Press.

² Data are not available for each individual faucet and may be reported in aggregate form for some fixtures, as required.

³ Litres of water per person(capita) per day.

About Your House

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The water you collect cannot necessarily be used for the same purposes. For example, water from showers can be collected and treated for toilet flushing, but only potable water can be supplied for shower use. Your local building authority will be able to provide information on currently permitted uses.

Greywater and blackwater refer to grades of water discharged from various appliances in your home. Not all greywater is of the same quality and can be greatly influenced by homeowner behaviour and activities. Potable water refers exclusively to water sourced from your well or municipal water supply—it is of the highest quality.

Other fixtures as well as subsurface irrigation systems that operate beneath the soil may be able to use a lower-quality or less-treated form of alternative water, as there is less opportunity for human contact—again, check with your local building authority (see Figure 1). Figure 1 shows how different sources of water might be used for different residential purposes.

Design stage

Your designer now must ensure that the necessary components are included at the design stage of your new house construction or renovation project to make your house alternative water ready. This could mean, for example, including in the plumbing system design multiple plumbing lines

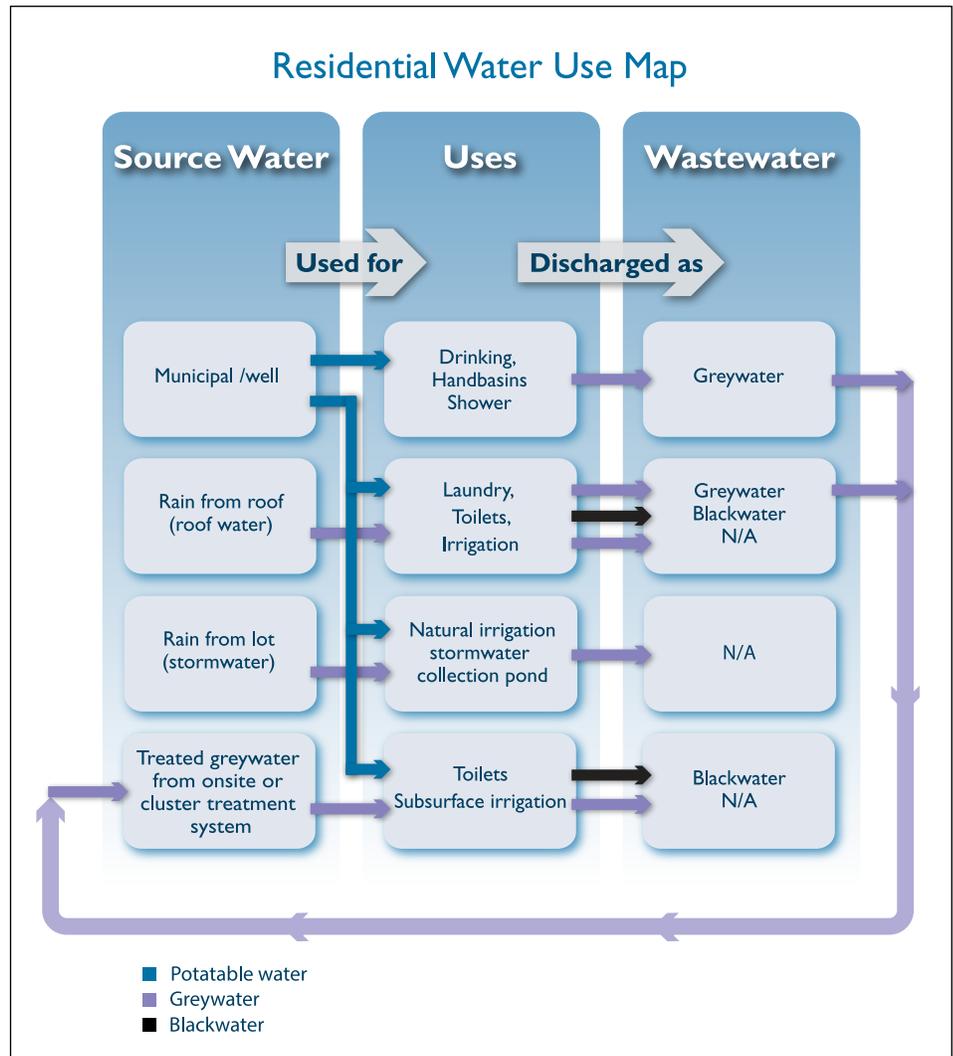


Figure 1 Uses and reuses of potable and alternative (non-potable) water sources

that completely separate and deliver the potable or non-potable water to the intended fixtures and carry away the greywater or blackwater.

In addition, your alternative water distribution lines must be visually identified with purple pipes and clearly marked as “alternative water ready” on the plumbing manifold. This will alert future plumbers and homeowners that your house

is alternative water ready, so they can take advantage of the existing equipment to more cost-effectively install an alternative water system or take the necessary steps to prevent any accidental cross-contamination when they are working on the plumbing system. Your designer should be well versed in national, provincial/territorial and local code requirements for non-potable plumbing systems.

Utility room

Your utility room is a key part of the design and operation of an alternative water ready house and should include

- **easy access** for future operations, maintenance, equipment repair and replacement;
- a **110-V power supply** to accommodate electricity-using equipment, such as the treatment system, circulating pump, controls and a solenoid valve (that is, a top-up device), etc.;
- a **sanitary sewer connection** for modifications to the future storage tank and overflow connection;
- a **dedicated space** in the floor plan that’s large enough to accommodate the installation of the treatment system, storage tank, distribution pump and a control panel, as well as less common add-on components, such as a tankless water heater or pressure tank (a general rule of thumb would be to set aside 1.5 to 4 m² of floor space with unobstructed ceiling to floor **vertical clearance** of at least 1 m above the tallest equipment);

- adequate **elevation difference** between the sanitary sewer service connection (that is, main waste line) and the floor above the utility room, in order to facilitate future plug-in connections and ensure gravity drainage to the sanitary sewer connection; and
- a **lockable, well-sealed storage closet** (possibly vented outdoors) for supplies such as chlorine.

Keep in mind that treatment equipment is relatively new in the marketplace and comes in a range of sizes depending on the specific treatment technology used. Like all technologies, this equipment will continue to change and so likely will the related space requirements. Consult with the product supplier for the space allowances needed for the treatment equipment you are considering installing.

Water collection —drainage system

For water collection, an alternative water ready house needs to have at least two drainage systems operating in parallel: one for non-potable water such as rainwater or readily treatable greywater (for example, water from the bath or shower) for delivery to the greywater treatment system, which will be eventually

installed, and one for blackwater and low-quality greywater (for example, water from the kitchen sink, dishwasher or toilet) for delivery to the municipal sewer or on-site septic system.

NOTE: There should be absolutely no direct connection between your **potable** and alternative water sources, at any point in either the wastewater collection or potable water supply distribution systems. This will ensure that, for example, the rainwater you use for your toilets or clothes washer can never accidentally flow to your kitchen faucet.

In most cases, alternative water collection systems follow standard plumbing design and installation practices, with three key exceptions:

1. The design must have a **dual-pipe system** to keep blackwater (and low-quality greywater) and readily treatable greywater separate.
2. The greywater and blackwater collection pipes in the utility room should have flexible couplings to more easily permit the future connection of the pipes to a treatment system or storage tank.
3. The utility room must have a plumbing vent connection.

Figure 2 illustrates an alternative water collection design for an alternative water ready house that is set up to recycle shower, bath, washroom sink and laundry water. Wastewater from toilets, laundry and kitchen sinks is collected and drained from the house.

**Supply side
—distribution system**

Similarly, your house's alternative water distribution system must also be kept separate from the main (or "potable") water supply at all times. Figure 3 provides one example of a typical water distribution network

that could be set up in a standard alternative water ready house to ensure that your potable and auxiliary water never cross-contaminate or flow to the wrong faucet, appliance or fixture. In this case, municipal water is supplied to the sinks, bath/shower, laundry tub

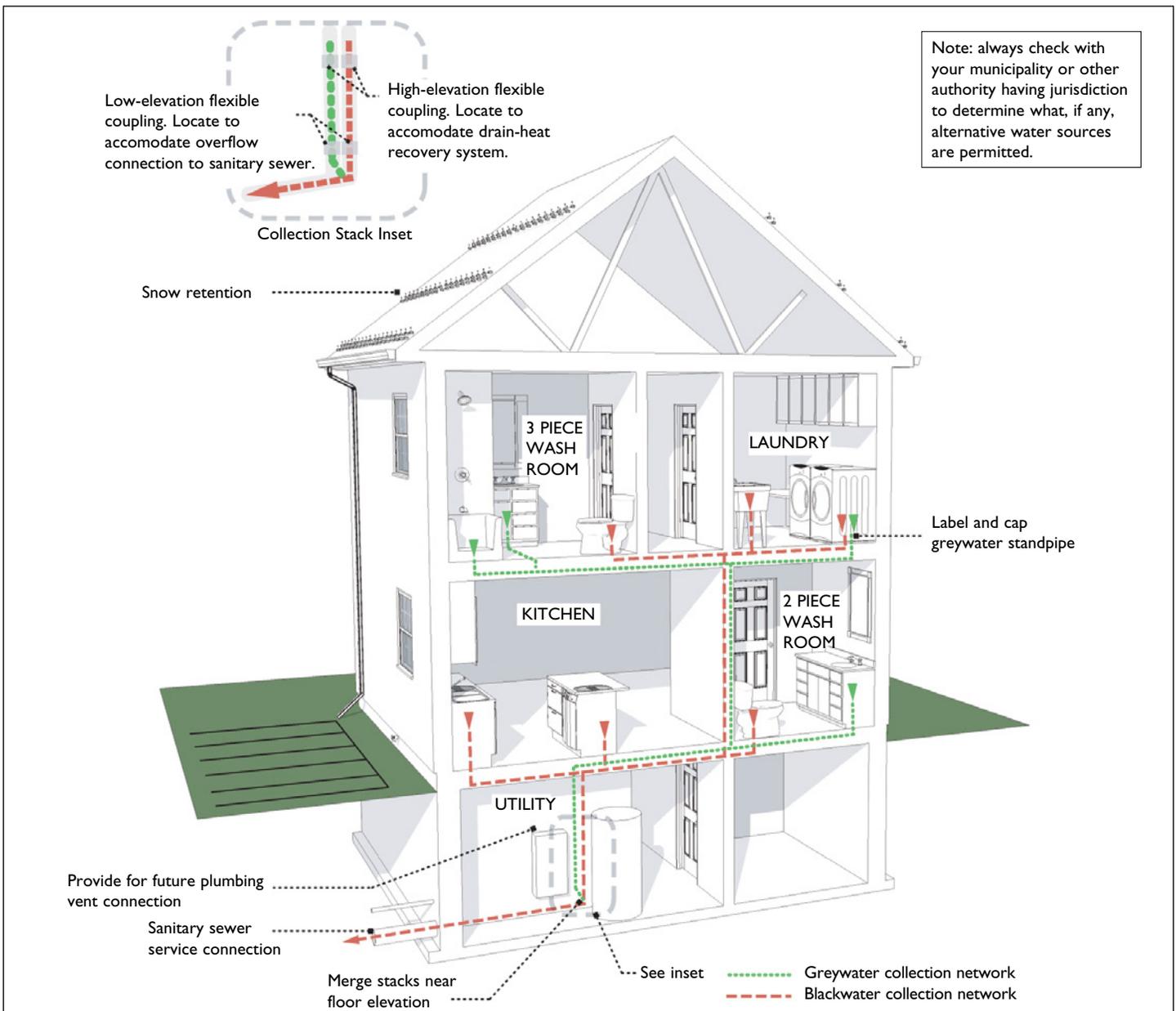


Figure 2 Collection network

and hot water tank. Purple piping is installed so that it could one day take water from an alternative water treatment system to the toilets, laundry and outside hose bib and subgrade irrigation system.

How much will it cost?

Adding a second distribution and collection system to your house to make it alternative water ready will cost around \$1,000 (2014) or more depending on the number of

fixtures serviced and the size of the house. Additional costs include the components such as the treatment and storage systems that will be required when you are ready to begin using your system. That cost

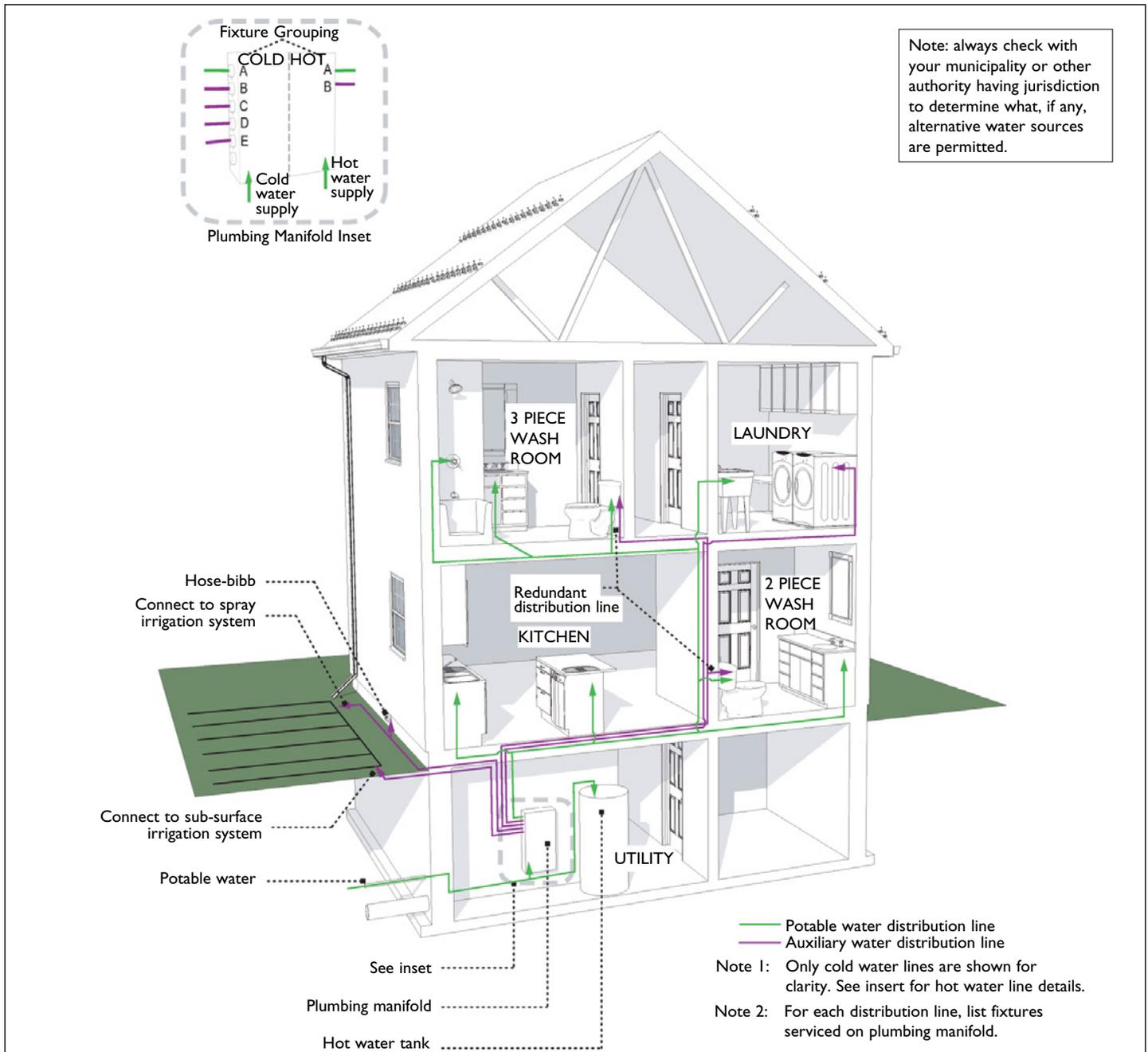


Figure 3 Distribution network

