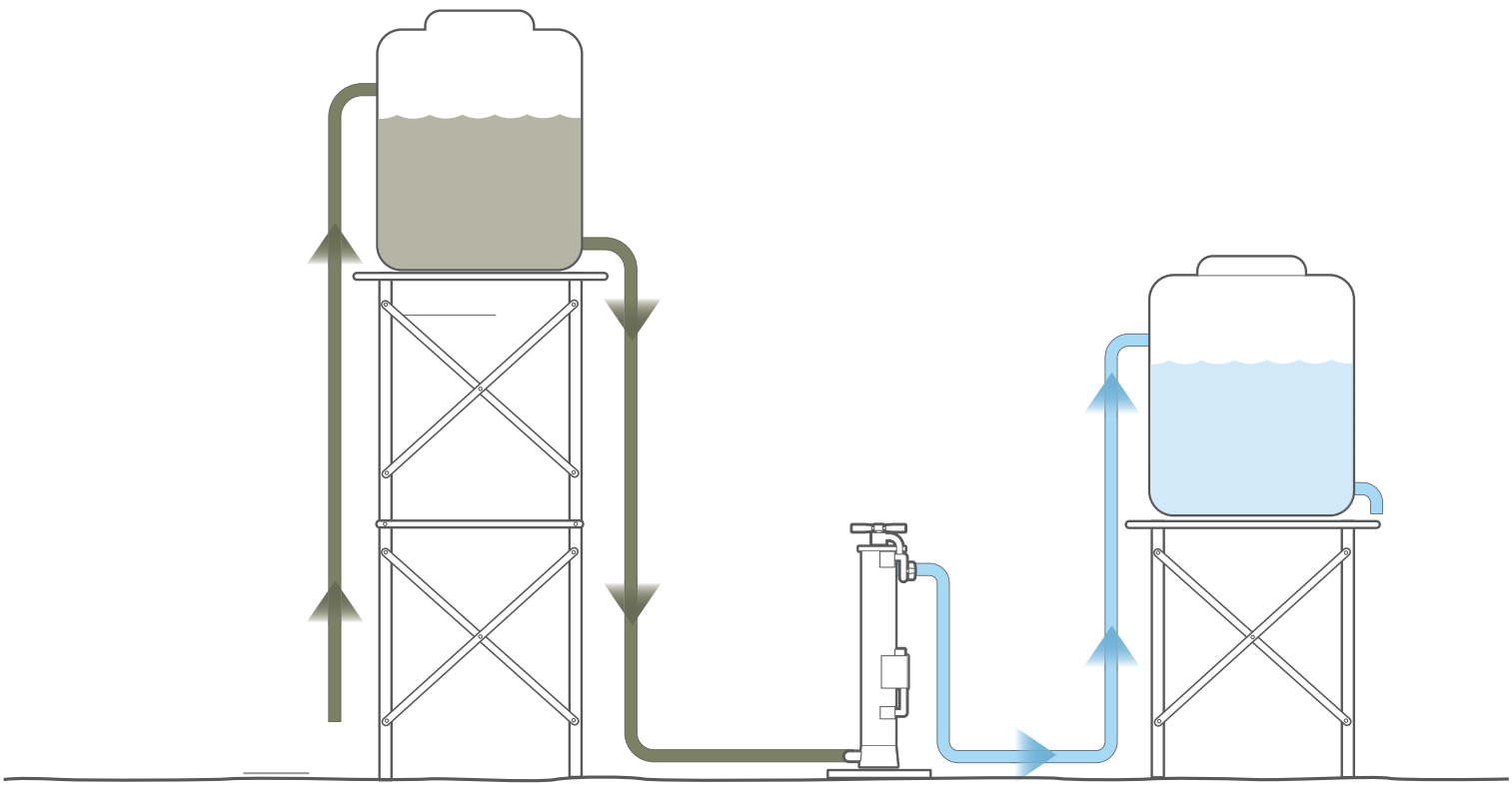
SkyHydrant®
ULTRAFILTRATION UNIT



SETUP OPTIONS

SkyHydrant Ultrafiltration Units can be setup and configured to accommodate numerous site applications. Various setup options have been outlined in the following diagrams and discriptions to assist users.

SkyJuice FOUNDATION

Safe Water for Every Child

www.skyjuice.org.au | info@skyjuice.org.au

SkyHydrant - the ultimate multi-purpose drinking water supply system ...

Designed for easy setup and operation in many configurations to produce sustainable safe drinking water without the need for consumable media.

SkyHydrants are used for a wide range of applications, from remote communities to farmhouses even mining or industry water. The patented cleaning process keeps the system running almost indefinably using a simple procedure easily operated by non-technical persons.

The unique ultrafiltration process enables SkyHydrants to operate almost continuously while still producing high quality high flow drinking water. In fact, the World Health Organisation classifies the ultrafiltration technology used in the SkyHydrant as virtually complete removal of pathogens (disease carrying organisms) as well as dirt and turbidity. The system is however not designed to remove salt or chemicals from water.

During the water filtration process, contaminates are sieved by billions of microscopic pours located in the non-stick Teflon like filter fibres which allows only clean filtered water to pass through. Periodically contaminates need to be shaken free from the filter fibres and flushed out of the SkyHydrant so they don't clog up the system.

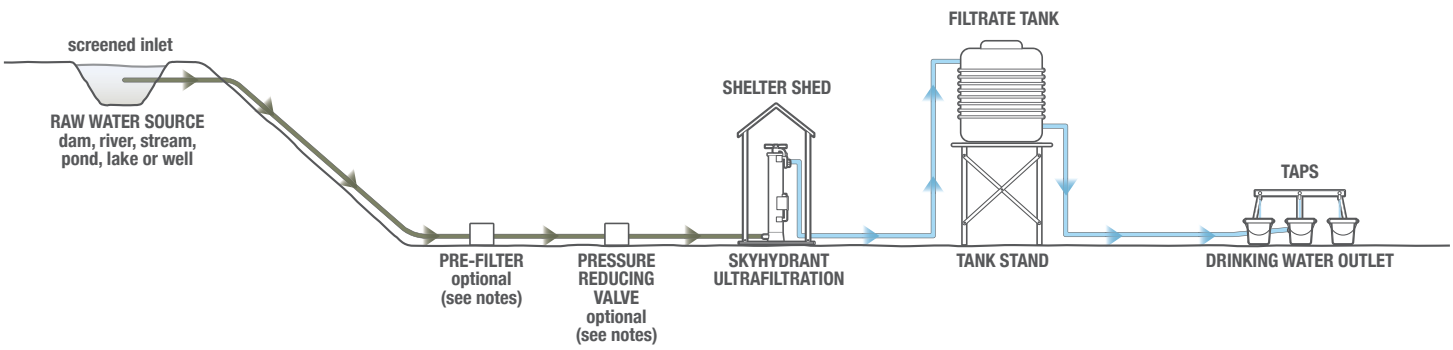
This simple SHAKE & FLUSH process only takes a couple of minutes each day. Handles on the SkyHydrant are moved back and forth to shake loose contaminates from the non-stick filter fibres inside the unit. The released contaminates are flushed out through the base of the SkyHydrant and drained to a disposal area.

SkyHydrants are extremely versatile and rugged as well as lightweight and portable making transportation to remote locations easy. SkyHydrants operate on low water pressure and are ideal for gravity flow systems to produce large volumes of filtered water. This means setup is quick and easy as only minimal additional equipment is needed to get the system operating in fact for rapid emergency water supplies a packaged system can be operational in only a few minutes.

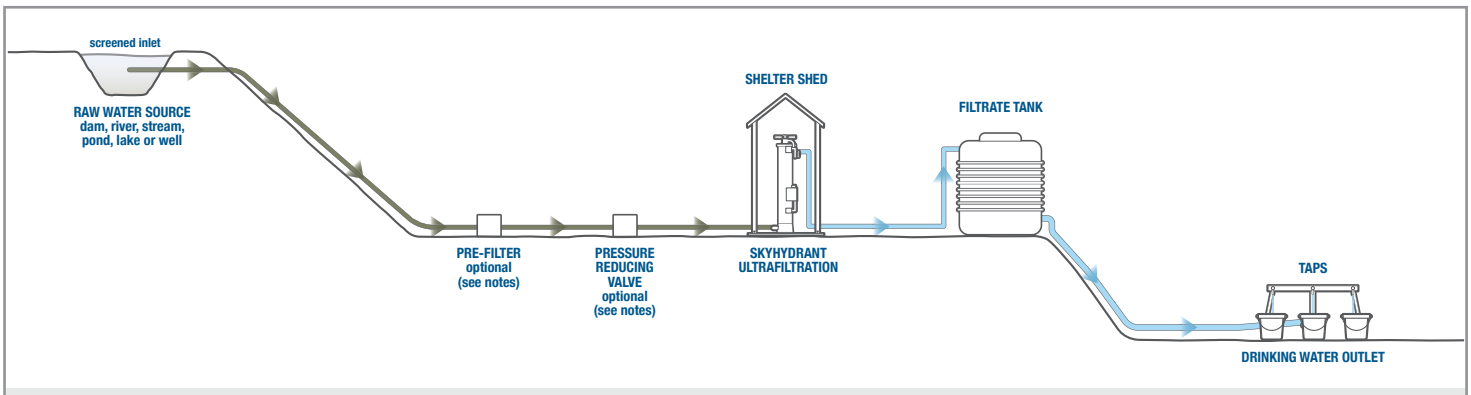
SkyHydrants used for a multitude of applications…
SkyHydrants can be configured for numerous applications and some examples are outlined below:

SKYHYDRANT INSTALLATION OPTIONS

DIRECT GRAVITY FLOW SYSTEMS

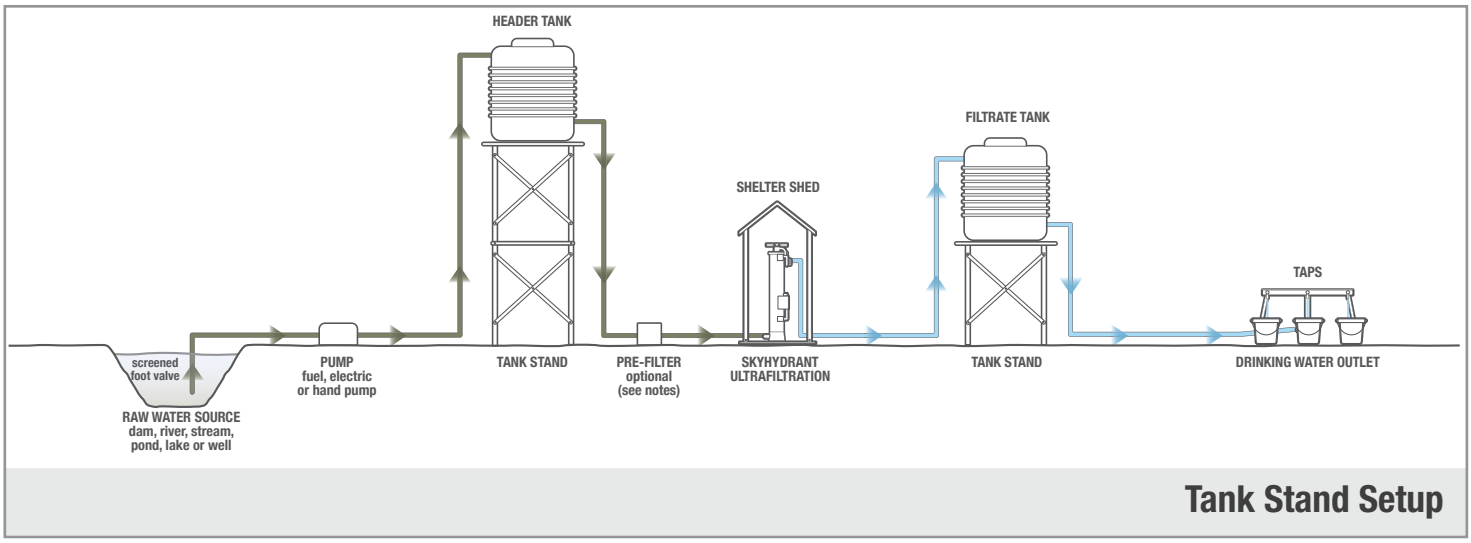


Elevated Water Supply & Tank Stand Setup

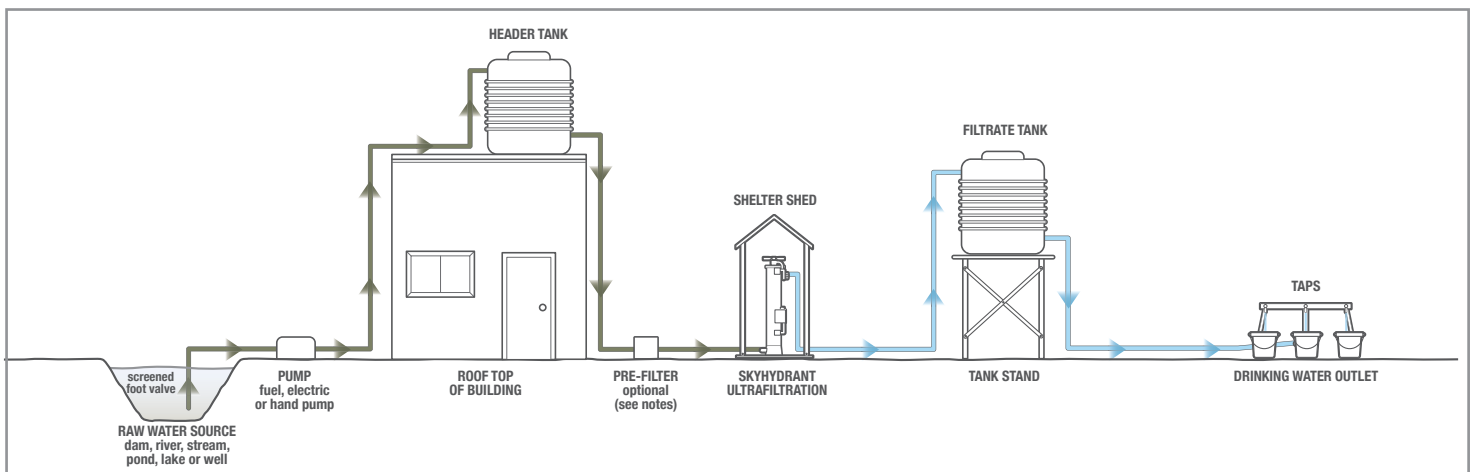


Elevated Water Supply Setup

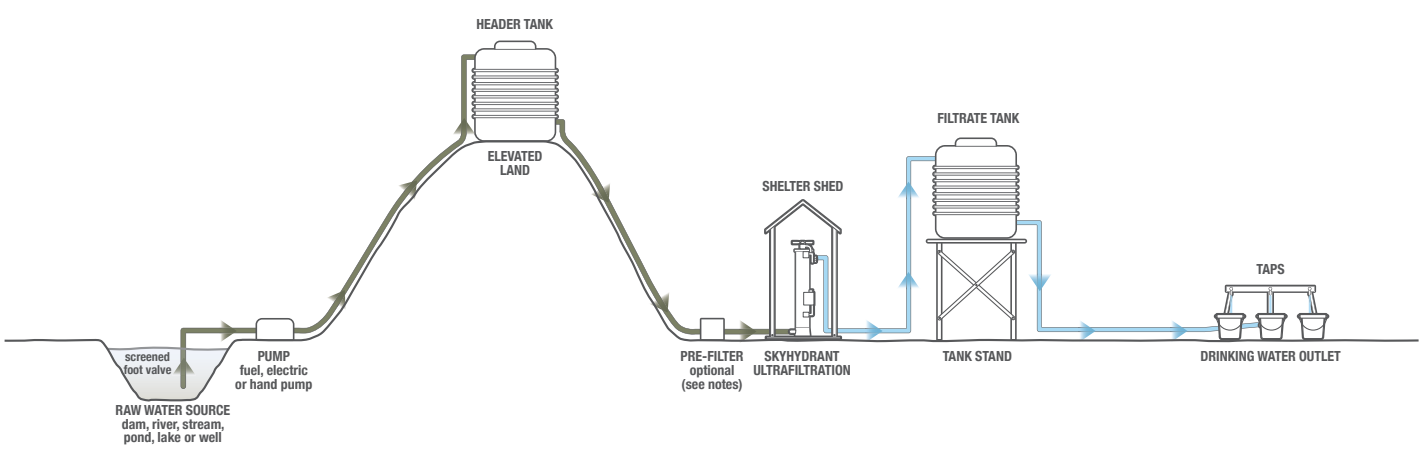
PUMP & GRAVITY FLOW SYSTEMS



Tank Stand Setup

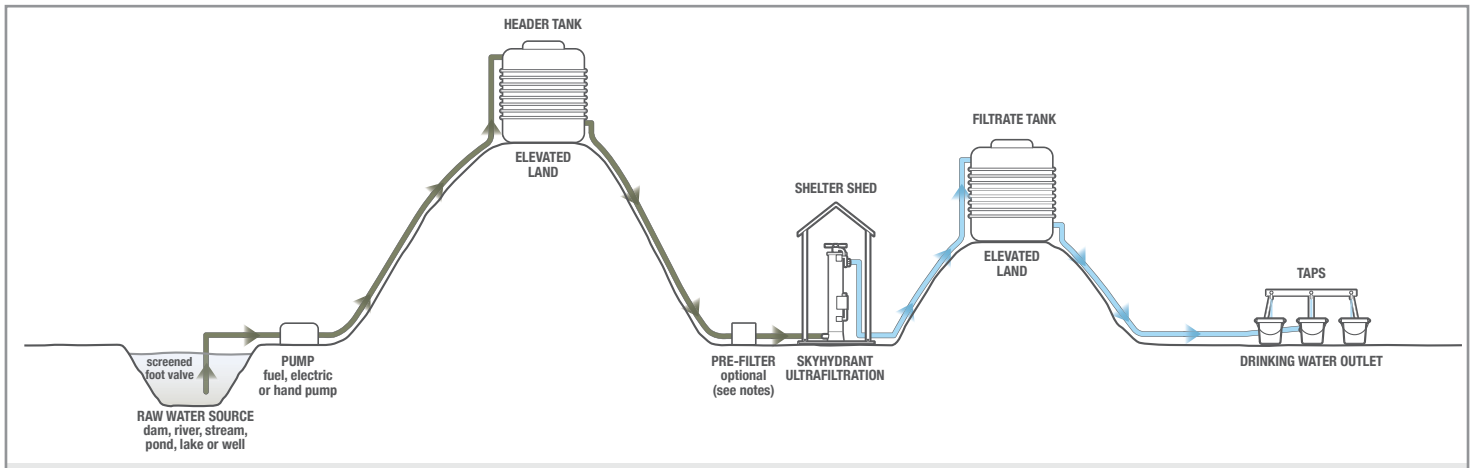


Roof Top & Tank Stand Setup

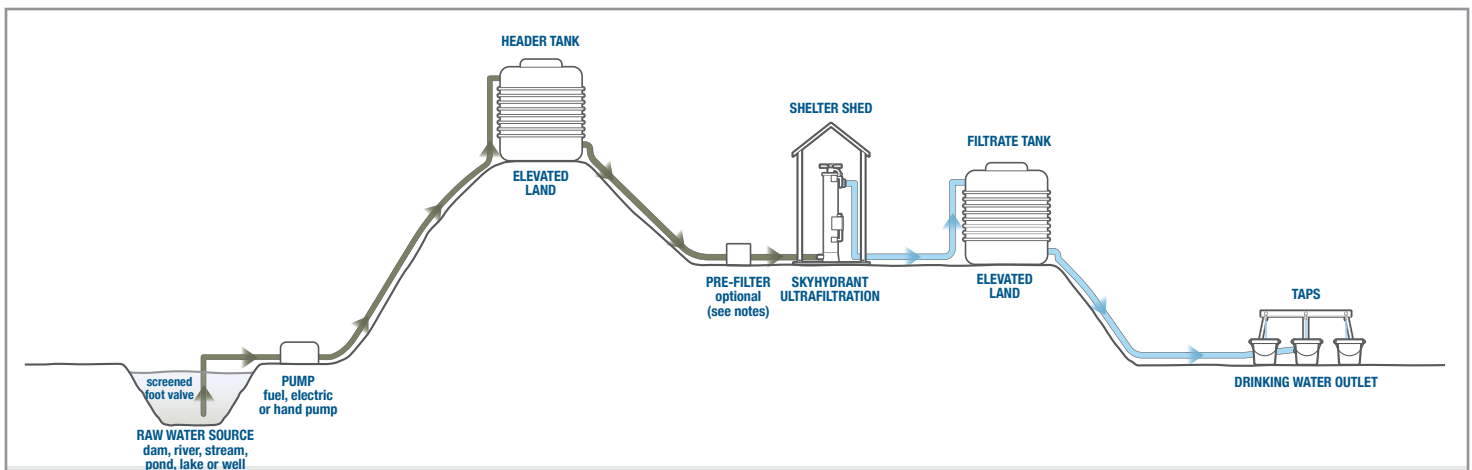


Elevated Land & Tank Stand Setup

PUMP & GRAVITY FLOW SYSTEMS (CONT'D)



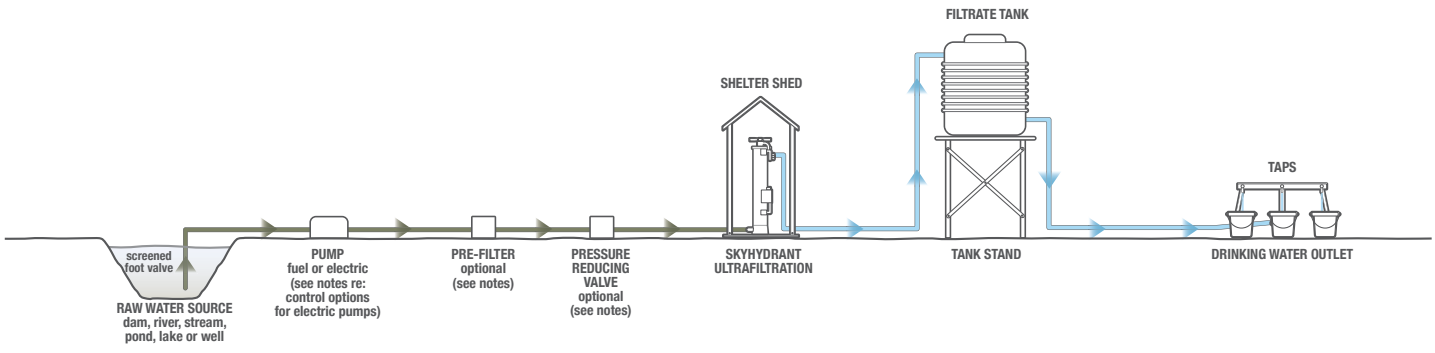
Undulating Land Setup



Elevated Land Setup

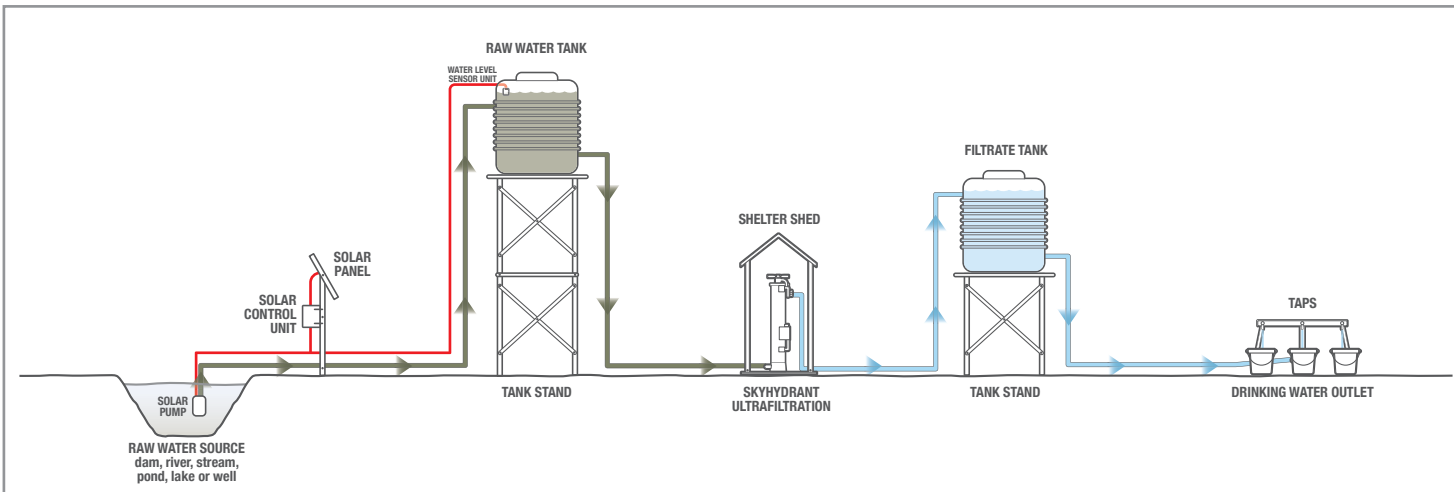
DIRECT PUMPING SYSTEM

NOTE: When using a flow control device with an electric pump an override switch should be installed to allow the electric water pump to be turned on by the operator when undertaking backwashing.

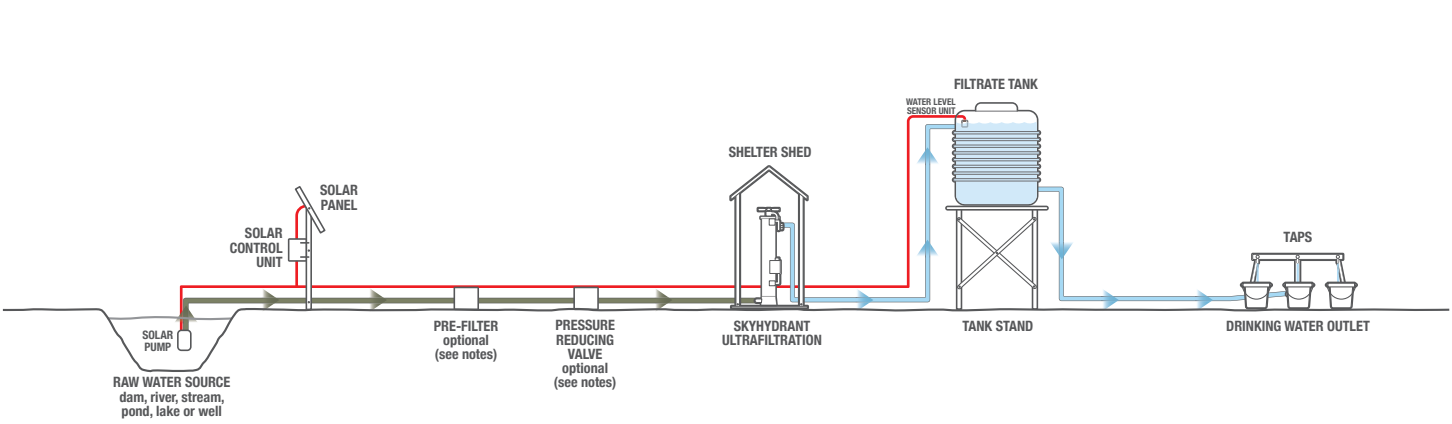


Direct Pumping Setup

SOLAR PUMPING SYSTEMS

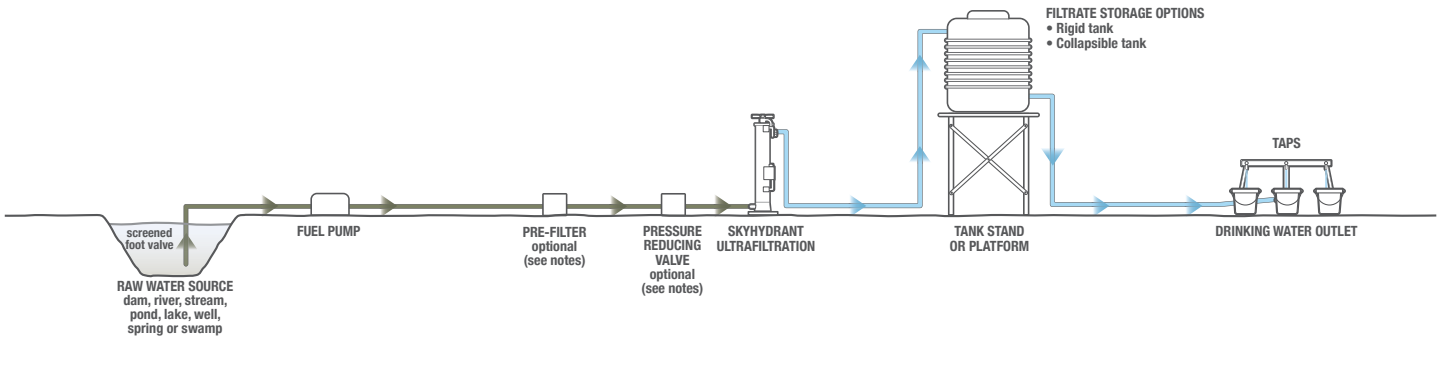


Solar Pump to Gravity Flow Setup

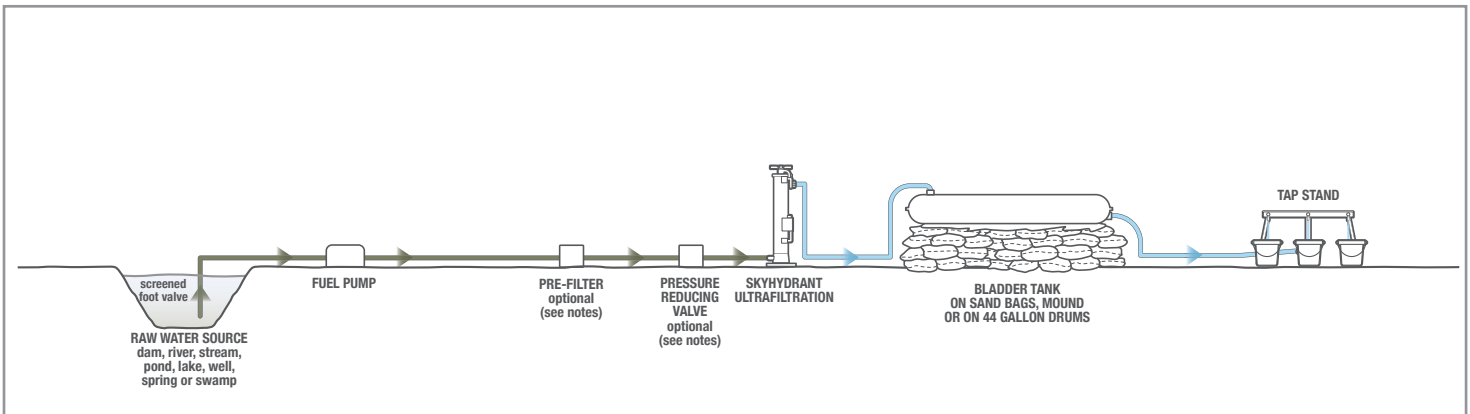


Solar Direct Pumping Setup

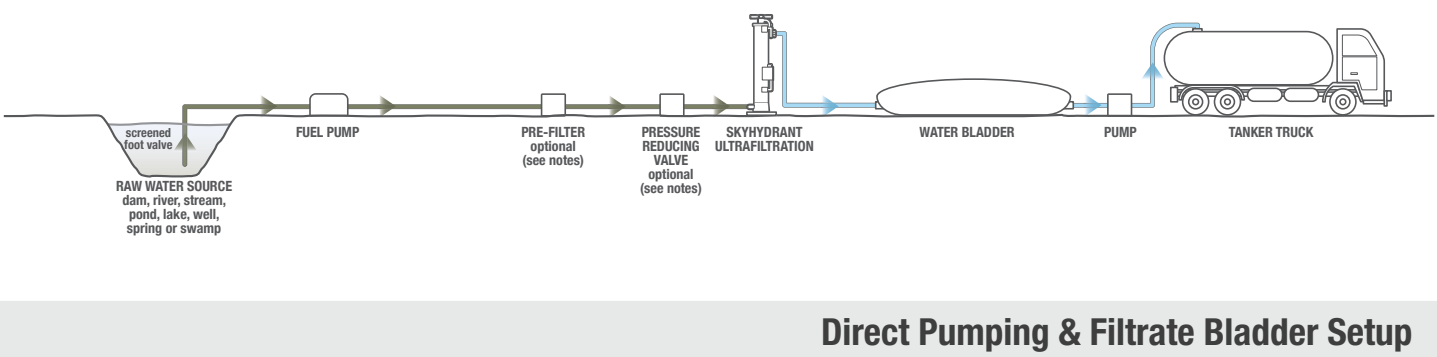
EMERGENCY AND RAPID WATER WATER SUPPLY SYSTEMS



Direct Pumping & Tank Stand Setup

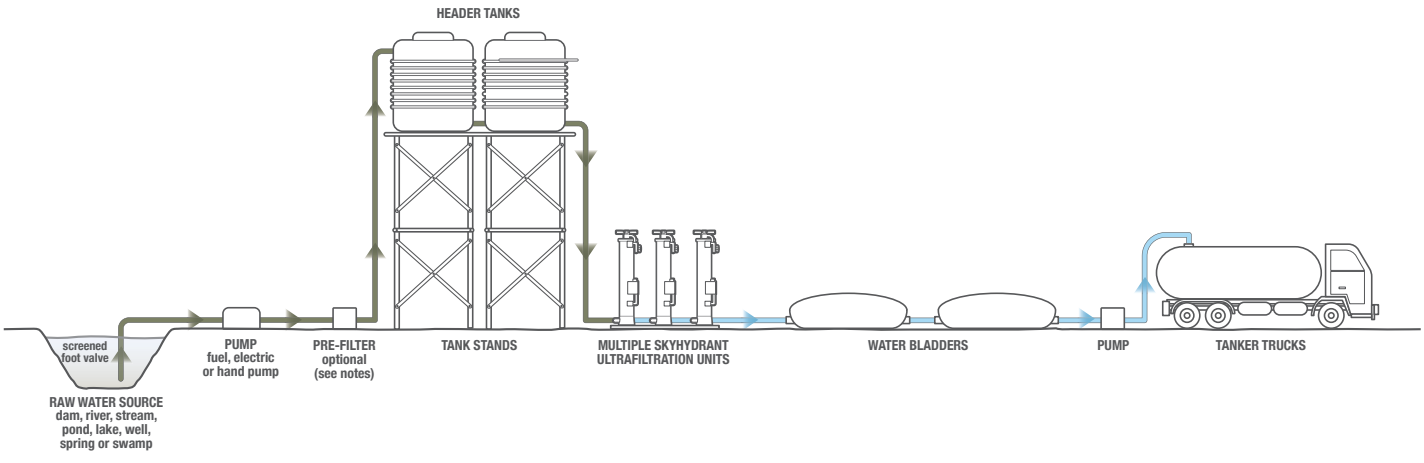


Direct Pumping & Elevated Bladder

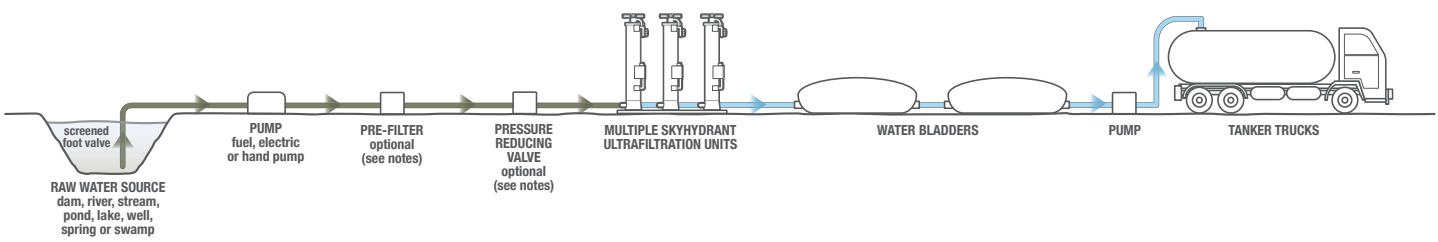


Direct Pumping & Filtrate Bladder Setup

BULK WATER SUPPLY SYSTEMS



Pump & Gravity Flow Multiple SkyHydrants Setup



Direct Pumping Multiple SkyHydrant Setup

SKYHYDRANT EQUIPMENT OPTIONS

SkyHydrants need to be configured correctly with the right control equipment to operate effectively. A site assessment should to be undertaken to determine the optimum set up procedure.

The following parameters need to be considered when setting up a SkyHydrant:

- **Controlling Water Pressure:** To avoid excessive pressure which may damage the SkyHydrant.
- **Water Level Control Devices:** Used to maintain water tanks full without overflowing.
- **Pre-Filter devices:** May need to be used to avoid excessive clogging or malfunction.
- **Post-Filtration and Treatment Devices:** Can be installed to treat other types of contaminates not removed by the SkyHydrant.

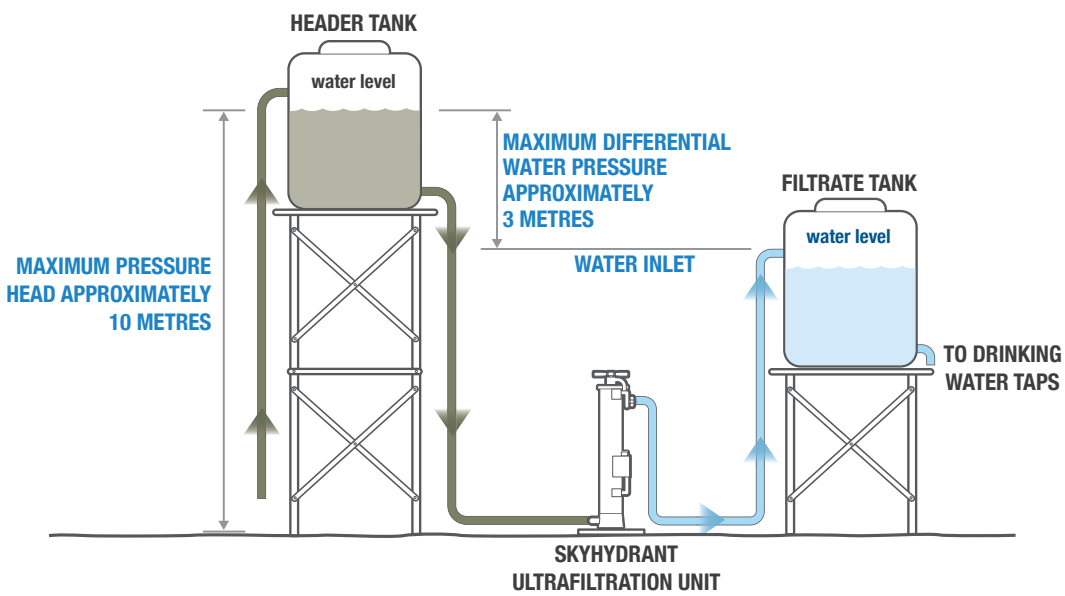
WATER PRESSURE CONTROL

Gravity Flow Pressure Control:

Gravity flow is a simple means of running water through pipes from a higher level to a lower level. A relatively small change in elevation provides sufficient pressure allowing water to flow through the SkyHydrant allowing the filtration process to occur.

The following diagram details the recommended maximum gravity flow water pressures:

The SkyHydrants are designed to operate at low differential water pressure not exceeding 30 kPa. This prevents the SkyHydrant filter fibres being damaged by excessive water pressure. At low water pressures, contaminates build up as a biofilm layer around the filter fibres inside SkyHydrant. This layer of contaminates easily falls away when the filter fibres are shaken during the cleaning agitation process. Higher water pressures forces contaminate to lodge into the porous surface of the filter fibres where they become stuck eventually blocking water flow and damaging the unit.



Options for controlling water pressure are as follows:

Mechanical Pressure Control Devices:

Another option to control water pressure is the use of mechanical pressure control devices. The SkyHydrant is designed to run on a maximum differential water pressure of 30 kPa. Pressure control devices can be set to the required level to maintain the correct pressure.

When setting a pressure gauge add the height of the filtrate tank outlet to the maximum differential pressure of the SkyHydrant (30kPa). Note: every metre height of filtrate tank outlet = 10kPa. **Example:** 2 metre high outlet in filtrate tank (20 kPa + 30 kPa = 50 kPa). Set the pressure guage at maximum 50 kPa.

Two types of pressure control devices are available:

1) Pressure Reducing Valve: An adjustable screw located on the PRV is set to the required pressure as indicated on the pressure gauge. This device will maintain the correct water pressure for the SkyHydrant. To protect the PRV from malfunction, a pre-filter may need to be installed if the water contains contaminates exceeding 300 micron.

2) Pressure Relief Valve: An adjustable knob located on

PRESSURE REDUCING VALVE

PRESSURE RELIEF VALVE

WATER LEVEL CONTROL

Water Level control device allow tanks to be maintained full of water, preventing tank overflow and water wastage. Various control options are available:

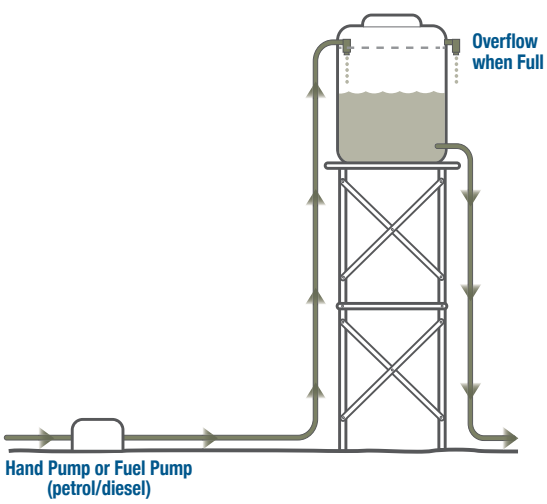
Option A: Overflow Outlet – Visual:
Mostly used with Hand operate or fuel operating pumping, this is the simplest method of water level control and relies on visually observation of water discharging thorough an overflow outlet and turn off the supply pump or water flow.

Option B: Float Valve:

Used in header tanks supplied form an elevated gravity flow water source and also used in filtrate (drinking water) tanks the float valve closes when the tank becomes full and reopens when the tanks needs water. This is a simple and easy flow control solution.

Option C: Water Level Controllers when using Electric Pumps:

Using an electronic flow control device will switch off an electric water pump when a water tank becomes full and switch back on when water levels fall allowing the tank to be refilled.

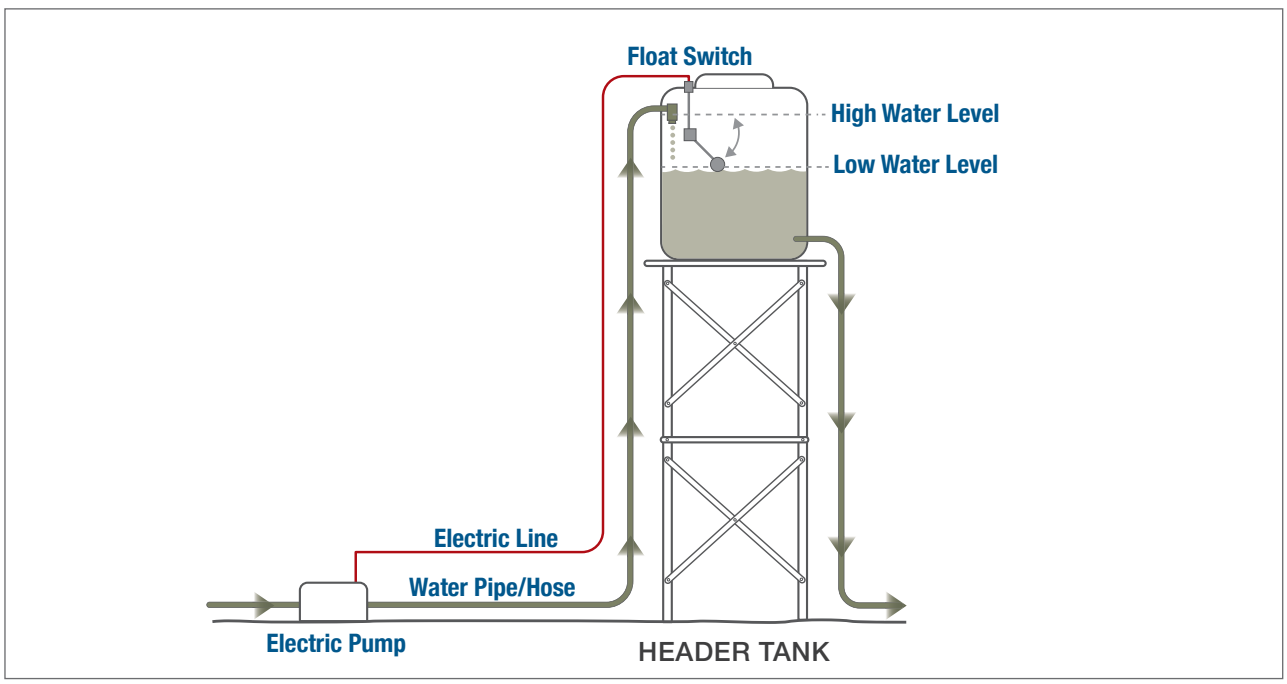


HEADER TANK

Two (2) types of electric flow control devices are available:

Type 1: Float Switch - Water Level Controller:

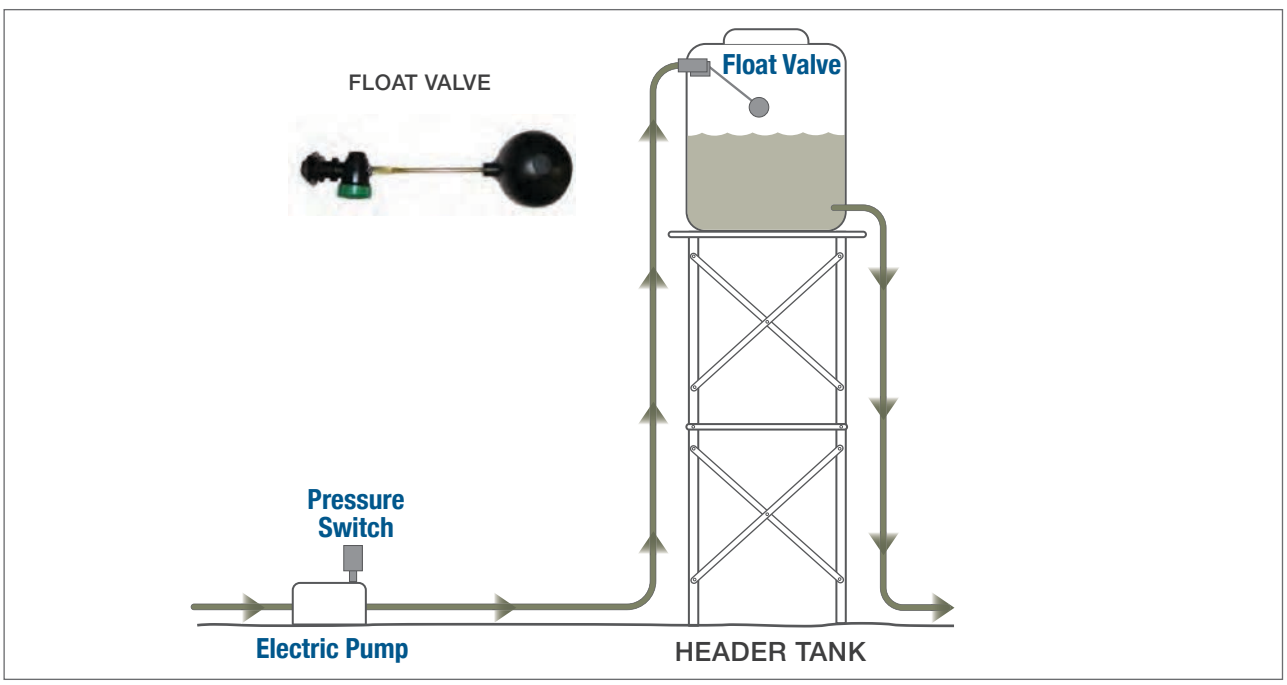
This device is suspended inside the water tank and activates when the water falls to a nominated level. The operate sets the refill level saving the electric pump from continually truing on and off with small top ups.



Type 2: Pressure Switch Water Level Controllers:

This pressure switch is installed on the electric water pump and senses an increase in water pressure to turnoff the water pump. A float switch installed inside the water tank turns off the water flow when the tank is full causing water pressure to build up which in turn activates the pressure switch to turn off the water pump.

When the water level on the tank falls, the float valve opens reactivating the water pump. A small cylinder tank is often installed on the waster water ump which acts a pressure buffer stopping the electric pump continually truing on and off with small top ups.



PRE-FILTER DEVICES

Pre-filters remove excessive contaminates from raw supply water to reduce contaminate loading on the SkyHydrant or to avoid malfunction of other equipment. A pre-filter would be installed prior to a SkyHydrant or prior to other equipment such as a pressure reducing valve or pressure relief valve. Pre-filters need to be chosen carefully taking into consideration the amount of contaminates that need to be removed and the frequency of cleaning or replacement.

When choosing a pre-filter to protect pressure control devices a 300-micron size is suitable.

Various types of pre-filters are available and are used of for different purposes. Pre-filters can be disposable, manually cleaned for reuse or more expensive units are self-cleaning. Another type of pre filtration is settlement and flocculation.

- **Disposable Pre-Filters:** These are often referred to as Pleated Cartridge Filters and they work very effectively. They may be able to be cleaned a few times before being disposed. They are relatively low cost however as they are a consumable will need constant replacement.

- **Manually Cleaned Pre-Filters:** The most common variations are screened filters and disc filters and usually only take a couple of minutes to clean.

  Screen Filters: These are usually a simple cylinder of mesh contained within a housing. They can be plastic mesh or stainless steel mesh and are easily cleaned using a small scrubbing brush. Some types actually have an internal rotating brush that the operator can turn by hand to make cleaning easier.

  Disc Filters: Contained inside a plastic housing are lots of flat washer shaped serrated plastic discs, which clap together crating a large surface area for filtration. The operator simply unscrews the housing removing the discs spine and shakes in water to clean. The use of a scrubbing brush helps. The discs are simply put back and for reuse.

- **Auto & Self Cleaning Pre-Filters:** These usually require a high water flow from a pump to operate and can be difficult to setup with ultrafiltration where low pressure, low flow is required. Various types are available including media filters; self-cleaning disc and screen fitters.

- **Sedimentation & Flocculation Pre-Treatment:** This relies on water in tanks sitting still for long enough for certain contaminate to fall to the bottom leaving the water cleaner. These work well for water containing suspended solids such as dirt and mud. For water containing colloidal material (like some clays) and for other contaminates, chemicals can be added to the settlement tank to chemically bond with contaminates and dragging them to the bottom of the tank leaving cleaner water above. Work is required to set these systems up and maintain them.

- **Foot Valve (screened):** Screened foot valves are used on a suction intake line (before a water pump) and are located in a raw water source such as a creek or dam. They serve two purposes; firstly they screen out leaves, twigs and other debris from entering a water pump. Secondly they contain a one-way valve that stops water running back down the suction hose thus keeping the pump full at all times and preventing run dry.

POST-FILTRATION & TREATMENT DEVICES

SkyHydrants will not remove chemicals or minerals from water and these contaminants will simply pass through the system. Should these types of contaminate need to be removed, post treatment devices available.

Some examples of these types of devices are listed below:

• Carbon Filters - granular activated carbon (GAC):
A filter with granular activated carbon (GAC) is a proven option to remove certain chemicals, particularly organic chemicals, from water. GAC filters also can be used to remove chemicals that give objectionable odours or tastes to water such as hydrogen sulfide (rotten eggs odour) or chlorine.

• Hard Water Treatment:
Hard water is water that has high mineral content such as calcium and magnesium. A number of options are available for treating hard water including chemical water softeners, water filters, mechanical water softeners, magnetic of water conditioners.

A common method is the use of water softeners:
Removing the calcium and magnesium it contains softens hard water. When hard water passes through the softening system's resin bed, it exchanges the hard ions in the water for soft ones, so only softened water passes through to your home.

Once the resin bed fills up with hardness ions, it must be cleaned. Salt is typically used in the regeneration (cleaning) process and restores the resin to a "clean" state so the ion exchange process can begin again.

• Reverse osmosis:
Reverse osmosis information uses a membrane, which removes chemicals and other contaminants from water. Reverse osmosis is not efficient at removing large amounts of in 10 minutes it is best located hey downside of reverse osmosis is that it can waste more water then it produces and often requires high energy consumption.

• UV:
Known as ultraviolet irradiation this system relies on a UV light passing through clean water to inactivate microorganisms. This system can be a good redundancy option when coupled with ultrafiltration such as a SkyHydrant.

• Chlorinators:
To prevent post contamination by microorganisms of water produced from a SkyHydrant, the use of a chlorinator will add a measured dose of chlorine to drinking water.

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FOUNDATION

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