



844-GRAYH₂O
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waterrenu.com

The Breakthrough Graywater Irrigation System



Minimize **Water** Restrictions
Keep Your Landscape **Green** All Summer
Save **Water** and Money
Protect your **Landscape** Investment
Re-use **Water** you've already paid for
Effective. Efficient. Economical

www.WaterReNu.com

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Your IrrigRAY™ Purchase

You have made a thoughtful economic decision. The use of Graywater as the primary source of irrigation is not a new concept. What's new is hassle free automated operation, very low maintenance, monitoring, and a robust controller providing the highest efficiency irrigation system available ... period. All these benefits are coupled with a price point that quickly pays for itself through water savings and landscape health.

A family of four typically generates enough graywater to fully irrigate 4,000 square feet (or more) of beds and grass landscape areas so you can have that guilt-free healthy oasis you deserve.

IrrigRAY also gives you the capability to irrigate larger areas with additional water sources such as AC condensate, rainwater & potable water utilizing the most efficient methods of dripperline and sprinkler irrigation. If a larger landscape area is desired our 95% efficient system provides the most eco-friendly and economical solution available.

About This Guide

This is your system manual / installation guide, and includes the following sections:

- [An Introduction to IrrigRAY](#)
- [About Graywater: How much, DO's & DON'T's](#)
- [Plumbing Installation](#)
- [Electrical Installation](#)
- [Mandatory Irrigation Components](#)
- [Irrigation Zone Design and Installation](#)
- [IrrigRAY Programming](#)
- [Preparing the IrrigRAY Controller Tablet](#)
- [IrrigRAY System Check \(First Time\)](#)

IrrigRAY is always being improved, with additional functions and improvements in constant development. The latest version of this installation guide can be downloaded from www.WaterReNu.com/documents/.

IrrigRAY is designed to use as little potable water as possible for irrigation. Instead it uses various water sources such as graywater, AC condensate, and rainwater as efficiently as possible.

The basic concepts of IrrigRAY are very simple:

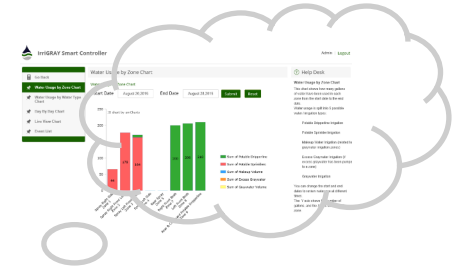
- * Catch the graywater in a small pumping basin, sending graywater through the filter as soon as there is as little as 7 gallons available. IrrigRAY does NOT store graywater for batch irrigation
- * Pass the graywater through an automated self cleaning filter
- * Send the graywater & any other water sources to irrigation zones based on climate and plant needs.

Managing graywater efficiently is a complex task—and that is why we developed our own integrated controller.

In addition to providing remote programming and remote control access to your system, IrrigRAY Online also includes a range of charts showing the types and volumes of different water sources used to irrigate your landscape.

IrrigRAY Controller:

- Simple to use touch interface
- Runs on or off internet
- Remote access
- Remote version control

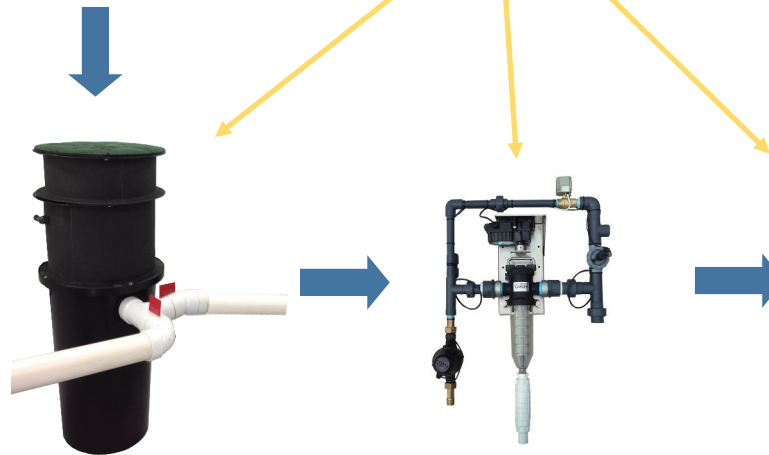


IrrigRAY Online:

- Phone / Tablet / PC access and remote control of on-site controller
- Performance analysis & System monitoring
- Reporting & charts

Graywater:

- Showers
- Tubs
- Laundry
- Condensate



IrrigRAY Pumping Basin:

- Virtually Immediate Irrigation
- Minimal footprint
- Self cleaning

Self Cleaning Filter & Water Management Assembly:

- Fully automated
- Choice of filters (residential, multi-family, commercial)

Landscape Irrigation:

- Up to 16 Zones (standard)
- Graywater beds and turf (sub surface dripperline)
- Potable water sprinklers
- Potable water drip
- Graywater disposal

Monitoring

Managing all possible water sources as efficiently as possible is a complex task—but IrriGRAY makes it easy.

While dripperline is the most efficient method of irrigation, if something goes wrong, you normally can't tell until the landscape is stressed.

Here are *some* of the potential issues that can occur:

- Failed irrigation solenoid valve
- Broken distribution pipe
- Failed potable water supply (city water or well pump)
- Power failure (GFI)
- Power / Wi-Fi router failure / poor signal
- Graywater pump float position
- Graywater pump performance
- Automatic filter clean issue

If Wi-Fi is available at the property, IrriGRAY sends performance information to the IrriGRAY Online server every minute something occurs. This includes type and amount of water irrigated per minute, water level in the pumping basin, pressure sensor values, tablet charging, battery and temperature status, environmental sensors and more.

You can see this detailed information yourself via your own account login, although most clients never need to look!

The IrriGRAY support team at Water ReNu use automated monitoring tools to detect issues, review these issues and contact the client and/or landscape maintenance contractor.

Monitoring is provided free during the system warranty period, and thereafter a small monthly fee is charged to cover our monitoring costs.

If the monitoring subscription stops, we still monitor the graywater pump—but we do not monitor flow rates / power / solenoids, broken pipes etc.

New Home Builds: *Home Wi-Fi service is usually not available until you move in. Water ReNu provides low cost Wi-Fi hotspots on a monthly basis to ensure the new landscape is monitored until the permanent Wi-Fi connection has been installed.*

Warranty

Warranty: Water ReNu will repair or replace any product that fails in normal use within the warranty period stated below. Item must be returned to appropriate dealer, distributor, or manufacturer based on where your purchase occurred. Product failures due to improper installation or improper selection of components identified in the IrriGRAY Installation Guide are not covered by this warranty. Product failures due to acts of God including lightning, flooding, and earthquakes are not covered by this warranty.

Monitoring: Water ReNu provides free monitoring during the warranty period and then at the following monthly rates stated below.

Water ReNu will not, under any circumstances, be responsible or liable for incidental or consequential damages no matter how they occur.

Warranty & Monitor Periods:

- Standard Residential system: 1-year warranty (monitoring \$7.00/month thereafter), 3 year pump warranty
- Heavy Residential system: 2-year warranty (monitoring \$7.00/month thereafter), 3 year pump warranty
- Commercial system: 3-year warranty (monitoring \$18.00/month thereafter), 3 year pump warranty
- Dripperline: 8-year warranty.



Graywater

Graywater (also spelled Greywater) is a fantastic resource, because we produce it EVERY day. Although types of graywater vary according to state and local codes, commonly accepted sources are:

- Showers
- Laundry (but not diaper waste)
- Tubs
- Sinks
- AC Condensate

The average person generates 25 to 40+ gallons graywater per day in summer, often much more in drier, hot climates like California, Arizona and Texas.

Now 40 gallons doesn't sound like much, but with 3 people in a house, that adds up to 3,600 gallons per month.

AND when using sub surface dripperlines, together with the sophisticated control system included with IrriGRAY, **95% of this water is used effectively, compared to less than 50% efficiency with clean water spray irrigation.**

In fact, with 3 residents in a hot climate, the IrriGRAY system provides as much irrigation water as a 20,000 gallon rainwater tank, at a fraction of the cost.

So, even if you are in a very dry, hot and dusty location, you can have the landscape you want, while saving water and money every year.

The amount of Landscape Beds and Lawn that graywater can irrigate is dependent on the ratio between lawn and beds, and your climate. These tables show examples of how much extra water (called Makeup Water) is required per year to suit your landscape conditions.

Note: The tables are calculated using a month by month formula to determine makeup water required each month, summed to annual totals.

Feel free to [contact](#) us if you would like calculations for your location.

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Sod SF	750	Beds SF	1,000	-----Make-Up Water Required-----							
	Graywater generated	Graywater generated	Graywater generated						CIMIS 4	CIMIS 9	CIMIS 14
Residents	Daily	Monthly	Annually	Dallas	Antonio	Angelo	Phoenix	County	Marin	Los Angeles	Sacramento
1	40	1,200	14,400	7,200	8,100	12,300	10,450	3,800		6,950	7,950
2	80	2,400	28,800	-	-	1,300	850	-		-	300
3	120	3,600	43,200	-	-	-	-	-		-	-
4	160	4,800	57,600	-	-	-	-	-		-	-
5	200	6,000	72,000	-	-	-	-	-		-	-
6	240	7,200	86,400	-	-	-	-	-		-	-

Small landscape areas, typically found on small lots, and per unit multi-family developments, do not require much water, even in hot and dry regions. For example, with 2 residents in Phoenix AZ with 750 sq ft lawn & 1,000 sq ft of landscape beds, only an extra 850 gallons of potable water is required per year.

Sod SF	2,000	Beds SF	1,000	-----Make-Up Water Required-----							
	Graywater generated	Graywater generated	Graywater generated						CIMIS 4	CIMIS 9	CIMIS 14
Residents	Daily	Monthly	Annually	Dallas	Antonio	Angelo	Phoenix	County	Marin	Los Angeles	Sacramento
1	40	1,200	14,400	29,950	31,850	42,100	36,750	22,750		29,400	30,900
2	80	2,400	28,800	16,150	18,000	28,300	22,950	9,000		15,650	17,650
3	120	3,600	43,200	4,250	5,000	14,750	10,900	100		3,400	6,750
4	160	4,800	57,600	-	-	3,850	2,800	-		-	1,000
5	200	6,000	72,000	-	-	-	-	-		-	-
6	240	7,200	86,400	-	-	-	-	-		-	-

Medium landscape areas, typically found on average sized lots, with an average of 3 residents, only needs a total of 3,000 extra potable water gallons per year in the Los Angeles region, if irrigating 2,000 sq ft of lawn, and 1,000 sq ft of beds. Landscape beds require less water due to lower planting density, and lower water consumption compared to grass.

Sod SF	3,500	Beds SF	1,500	-----Make-Up Water Required-----							
	Graywater generated	Graywater generated	Graywater generated						CIMIS 4	CIMIS 9	CIMIS 14
Residents	Daily	Monthly	Annually	Dallas	Antonio	Angelo	Phoenix	County	Marin	Los Angeles	Sacramento
1	40	1,200	14,400	60,950	64,150	81,650	72,550	48,600		60,000	62,550
2	80	2,400	28,800	47,150	50,350	67,850	58,750	34,800		46,200	48,750
3	120	3,600	43,200	33,350	36,550	54,050	44,950	21,000		32,400	35,300
4	160	4,800	57,600	20,050	22,750	40,250	31,650	8,200		19,200	23,200
5	200	6,000	72,000	8,500	10,050	26,800	19,950	550		7,050	12,650
6	240	7,200	86,400	2,050	1,500	14,750	10,150	-		1,100	5,550

Large landscape areas, typically found with custom homes, do not require much water because of the increased landscape areas, but with 4 residents, the extra water is only 22,000 gallons per year in San Antonio TX; saving 176,00 gallons of potable water per year, compared to standard sprinkler irrigation systems.

The first step is to check which graywater sources have been plumbed into the graywater collection and pumping basin.

Typical sources of graywater are:

- Showers
- Laundry (but not diaper waste)
- Tubs
- Sinks
- AC Condensate

All water going down those drains will be pumped to your landscape, so a little care should be taken:

- Diaper wash water is not allowed to enter the graywater collection and pumping basin. Use another sink, where graywater is not connected, or close the pumping basin bypass valve.
- Horticulturists suggest liquid laundry detergent - powdered laundry detergent often has high levels of salt, best avoided in the soil
- Use liquid hand soaps, if your hand basin waste water is connected to the pumping basin. Cheap bar soaps have a very high percentage of fat, which can cause filters to need cleaning more often, wasting water
- We recommend dryer sheets vs liquid fabric softener which can cause a layer to build up on top of the soil (landscape beds only), stopping the soil from breathing properly
- Avoid Boron or Borax detergents. These could be toxic to certain plants in your landscape
- Be aware that some detergent manufacturers claim their product is green simply because the container has been manufactured with some recycled plastic.

Does SOAP hurt my landscape?

Soaps help with Irrigation, if spread over a large area:

Surfactants in soap and detergents help irrigation within soil by reducing water surface tension, making it easier for water to move within the soil. However if a large amount of soapy water is concentrated in a few holes in the ground, this could result in toxic buildup over time. This is why reservations have been raised about concentrated irrigation methods such as Laundry to Landscape and Branched Drain gravity systems that have a limited number of mulch basins as outlet locations.

Because IrriGRAY uses a large number of sub surface emitters covering thousands of square feet, any soap is dispersed over a very large area and therefore does not create toxicity issues. It is even possible to use aggressive agents such as chlorine e.g. Chlorox without issue.

If you are concerned about soap in the environment, we recommend first considering the dangers of soap and detergent use inside the home. For example, instead of using very strong shower cleaners that produce potentially harmful vapors, try some citrus oil based cleaners that do almost as good a job but present far less personal safety risk.

Can I grow vegetables / fruit / nuts with graywater?

Regulations and codes vary enormously by county, state and even country. It should be noted that there is NO evidence that soaps or bacteria enter the food product at all. The only risk is bacteria contamination on the surface of the edible product, and with sub surface drip irrigation, this only effects root vegetables. However we do not advocate breaking local regulations.

Even if your local authorities allow root vegetables to be grown with graywater, care should be taken to carefully wash root vegetables that will be eaten raw (cooking kills any bacteria so removes the risk). For this reason we do not recommend growing green onions, and similar layered growth vegetables, as bacteria could remain inside the vegetable.

A good common sense question to ask is how do you supply nutrients to your food producing zones - manure / compost already has substantial bacteria!

For regions which prohibit food production with graywater, IrriGRAY includes potable water only dripperline irrigation zones, specifically designed for vegetable garden irrigation.

These zones receive water up to 3 times per day, providing optimal garden growth.

IrriGRAY System Schematic

Electrical

- 110 V
- Pumping Direction Control
- Filter & Potable Control
- Irrigation Zone Control

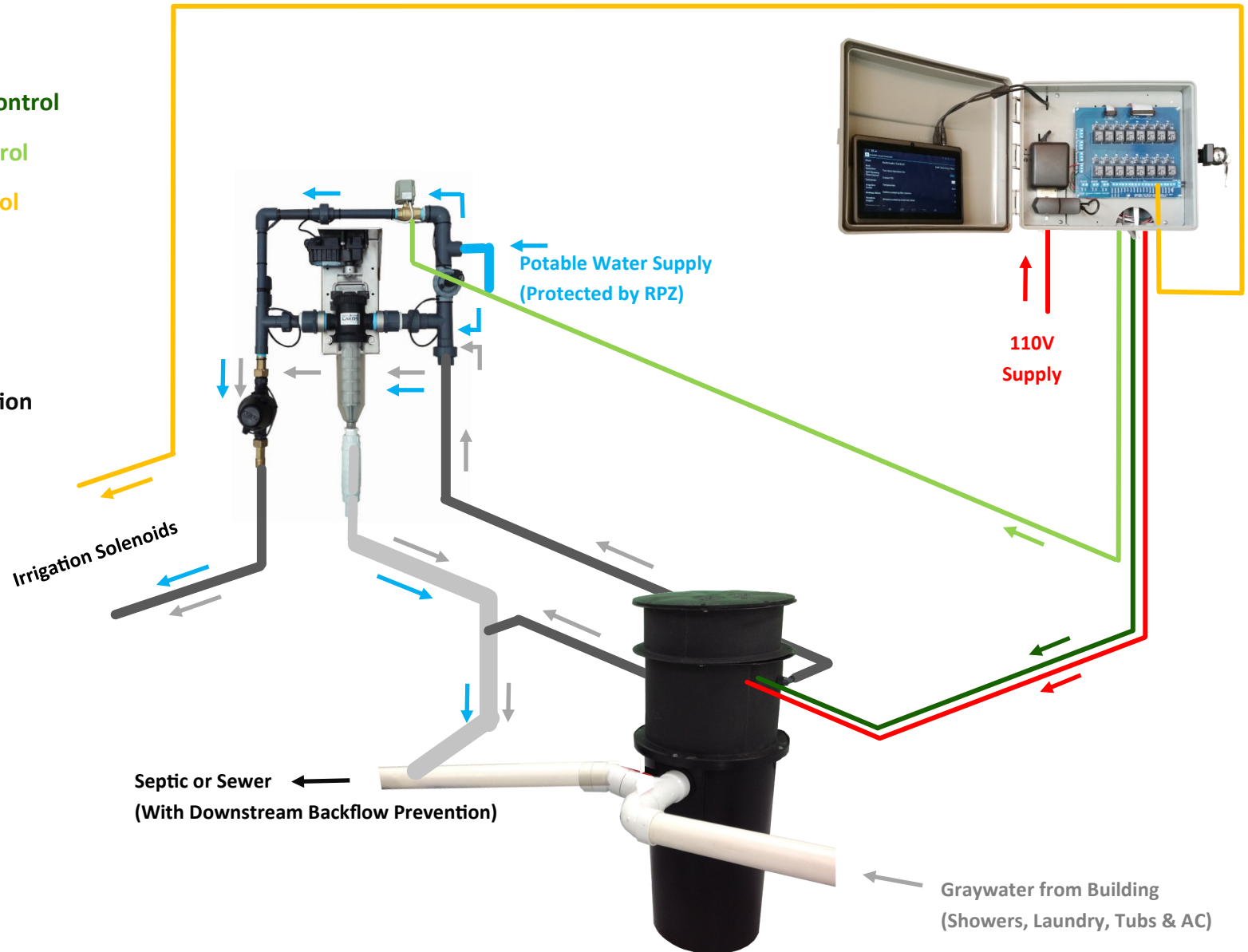
Plumbing

- Graywater
- Potable Water
- Black Water Connection

Note:

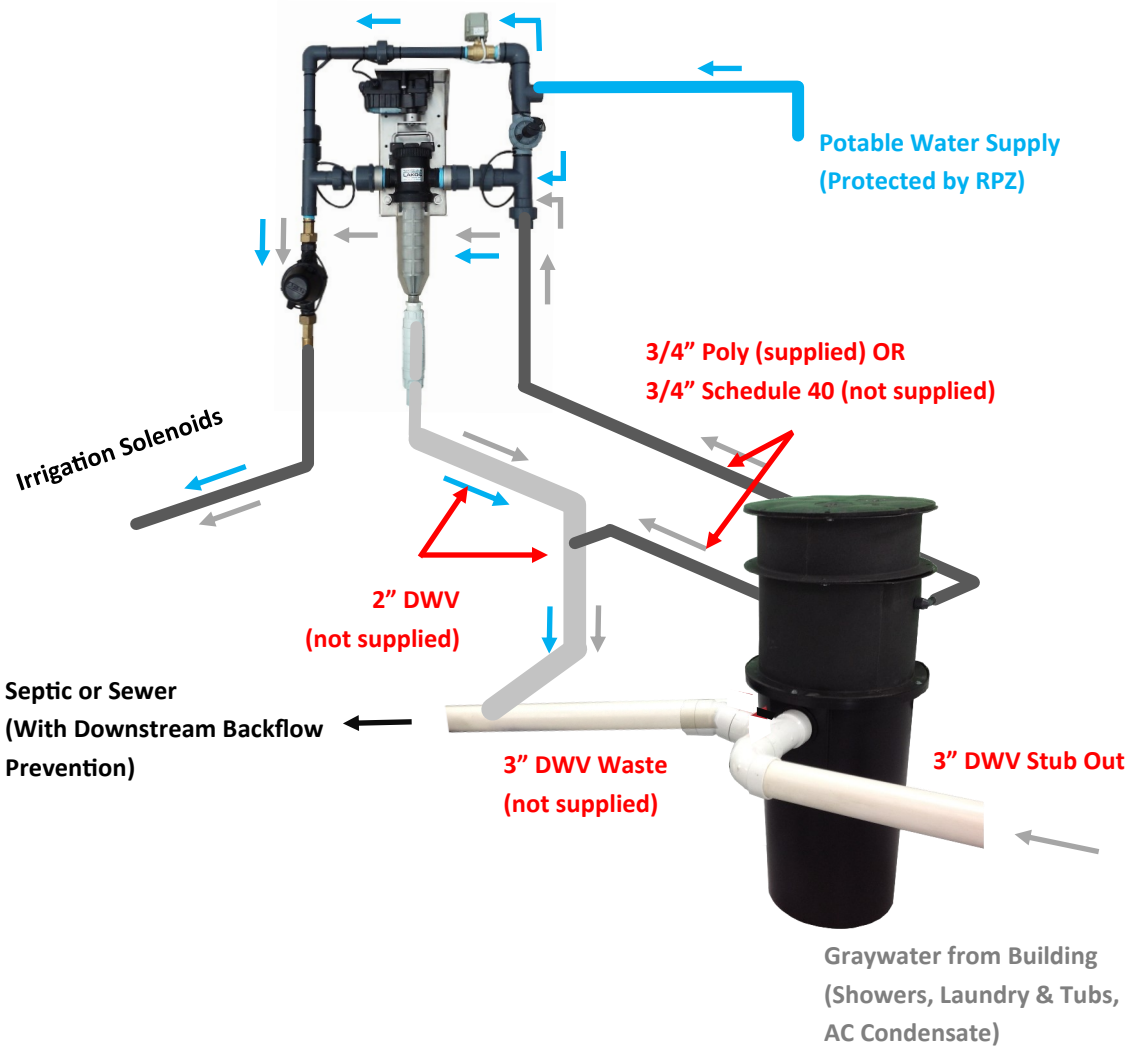
The filter assembly may be located up to 20' from the pumping basin, either on an exterior wall or inside a garage.

The Controller must be located within 4' cable run of the filter assembly.



IrriGRAY System Plumbing

— Graywater — Potable Water — Black Water Connection



Plumbing Overview

Recommended Graywater sources:

Showers / Tub Units, Laundry & AC Condensate if available. To assist with blackwater flow within the building, we recommend plumbing hand basin waste to the black waste system instead of graywater.

Location of the Basin:

The IrriGRAY basin can be positioned in any location that provides sufficient fall to loop the graywater overflow / diversion waste pipe back into sewer / septic.

Basin support and backfill:

If the surrounding soil contains any sharp stones or rocks, alternate base and backfill must be used. We recommend a 2" base of Pea gravel, with backfill up to the level of the graywater inlet. Soil is then used for remaining backfill.

Backflow Prevention:

Check local codes for backflow prevention requirements. Most codes require an accessible backflow prevention valve. Backflow prevention valves are not supplied as standard due to variance in code requirements.

Venting:

Code requirements vary significantly. Check local codes for any requirements, and whether the basin must be vented or possibly the graywater inlet can be vented (easier). An additional 2" uniseal is included to allow the basin to be vented. A 3" hole saw is required to fit the uniseal.

Potable Water Connection:

Potable water is used to clean the filter and as a makeup water source. To prevent any possibility of cross section, an RPZ must be fitted. Check with local authorities for specific requirements.

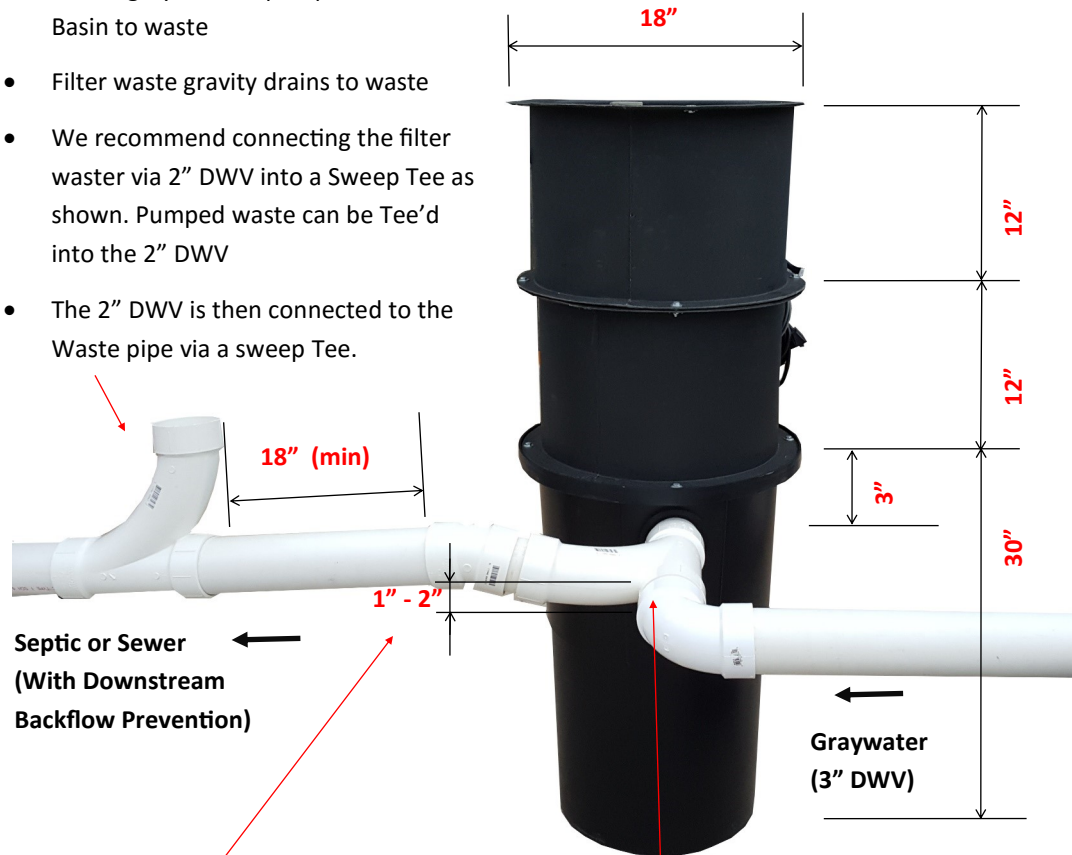
Filter Waste Repair Coupling:

To enable removal of the filter bowl (threaded attachment) a repair coupling has been provided. This coupling must be installed such that there is sufficient room and accessibility to push down the bowl for removal.

**Please Read All Plumbing Pages
Before Commencing Installation**

Filter Waste and Pumped Basin Waste Connections

- Excess graywater is pumped from the Basin to waste
- Filter waste gravity drains to waste
- We recommend connecting the filter waster via 2" DWV into a Sweep Tee as shown. Pumped waste can be Tee'd into the 2" DWV
- The 2" DWV is then connected to the Waste pipe via a sweep Tee.



Septic or Sewer
(With Downstream
Backflow Prevention)

Graywater
(3" DWV)

Combination Inlet, Overflow & Graywater Diversion

- A 3" Sweep / Combi Tee, 3" 90, 3" 22.5 are provided dry assembled for adjustment and gluing on site
- The Tee is installed backwards to the normal graywater flow direction into the basin, **and the branch elevated 1—2" above grade**, forming a hump. Graywater naturally falls into the basin first. If the basin fills, or the internal gate valve is closed, graywater rises over the hump level and drains to waste.

Basin Dimensions and Graywater Inlet Depth below Surface

The IrriGRAY Graywater Collection & Pumping Basin is 18" Diameter and 30" High.

- The top of the combination graywater inlet / overflow / diversion entry point to the basin is 3" below the top of the basin.
- 12" Extension Risers are used to extend the pumping basin to finished surface.
 - The Extension Risers do not add to the capacity of the basin. The joints between the risers are not, and do not need to be watertight. If groundwater seeps into the basin it is managed as graywater
 - The lid of the riser (or pumping basin if no riser is used) must be accessible for annual inspection and servicing if required. We recommend installing the top such that it is 1" above finished surface, including any mulch / gravel or other surface covering. This to help avoid surrounding material falling into the basin while the lid is removed.
 - Allowing 1" above finished surface, recommended DEPTHS of the TOP of the 3" DWV inlet, below finished surface are:
 - 2"
 - 14"
 - 26"
 - 38"

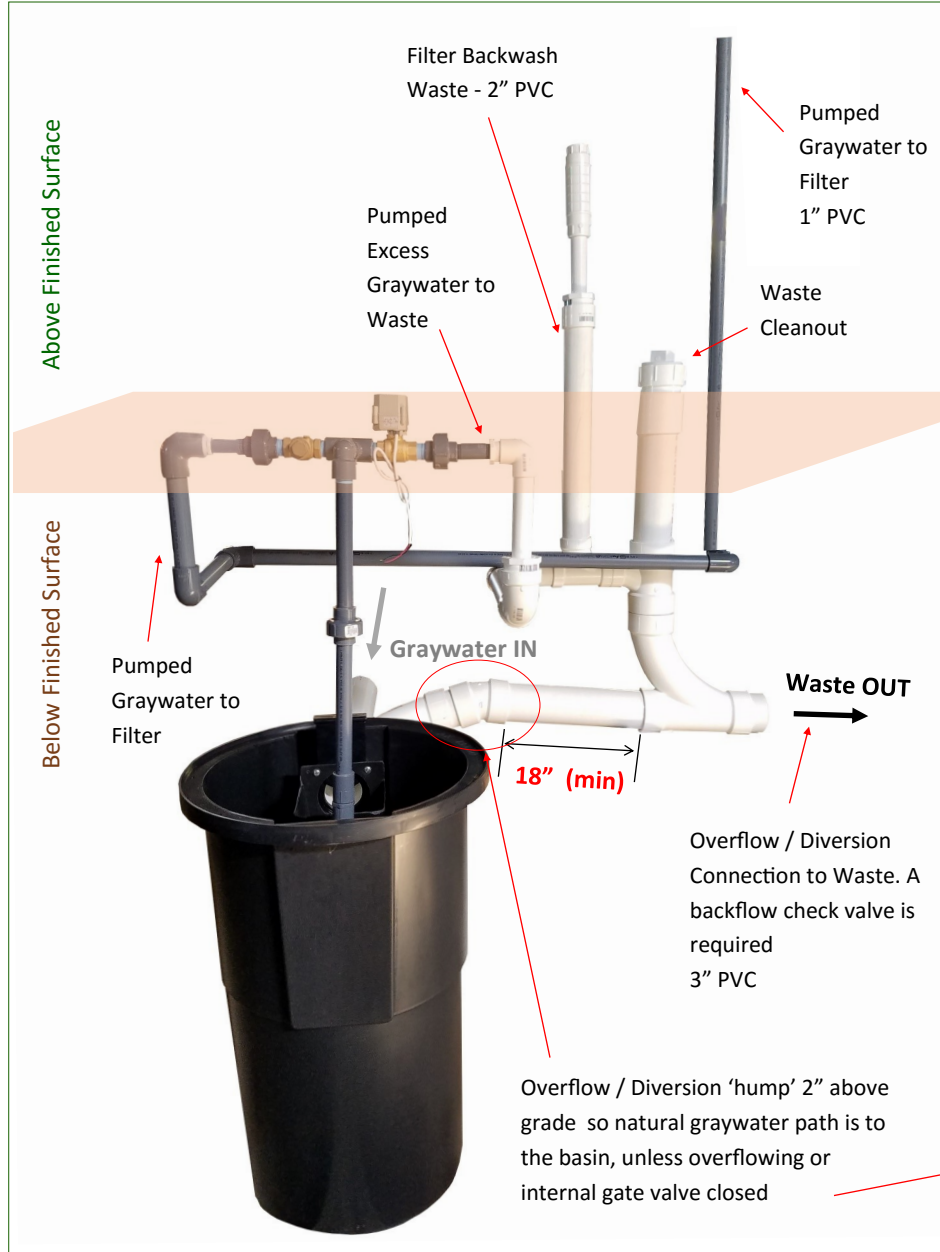
PROTECTIVE COVER DURING BUILDING CONSTRUCTION

The pumping basin is usually installed during plumbing rough in. Water ReNu provides free 4' x 4' construction covers with anchor rebar to avoid damage during building construction.

WASTE BACKFLOW PREVENTION

A check valve MUST be installed inline between this assembly and connection to the waste system

IrriGRAY System Plumbing

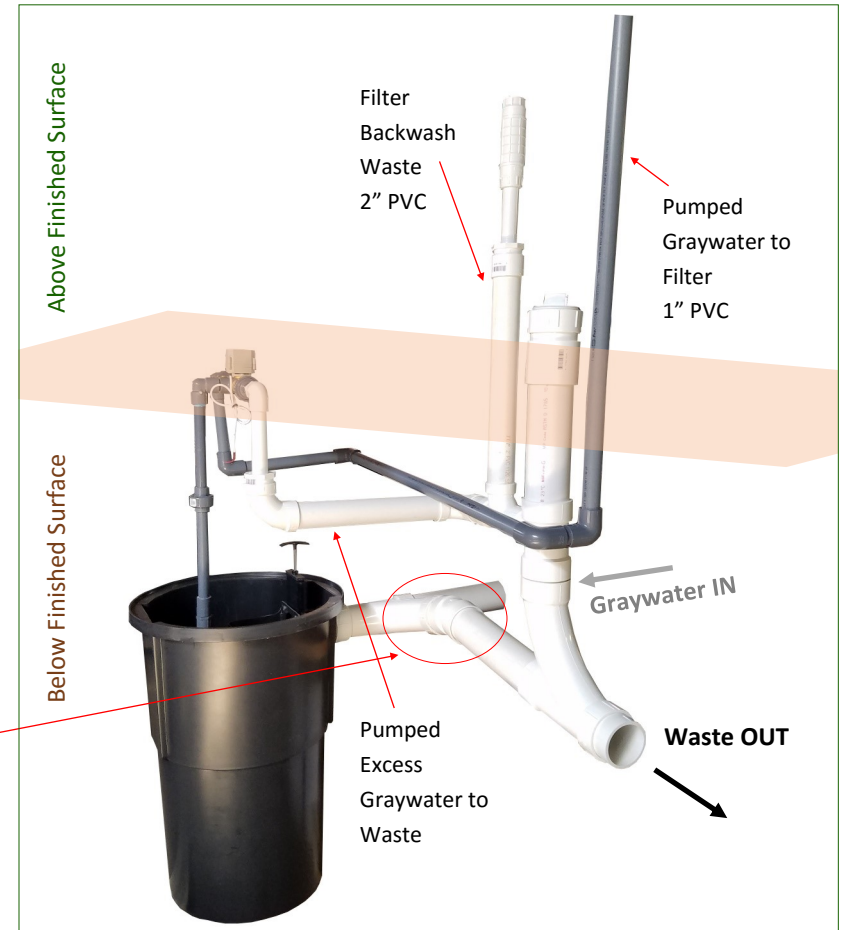


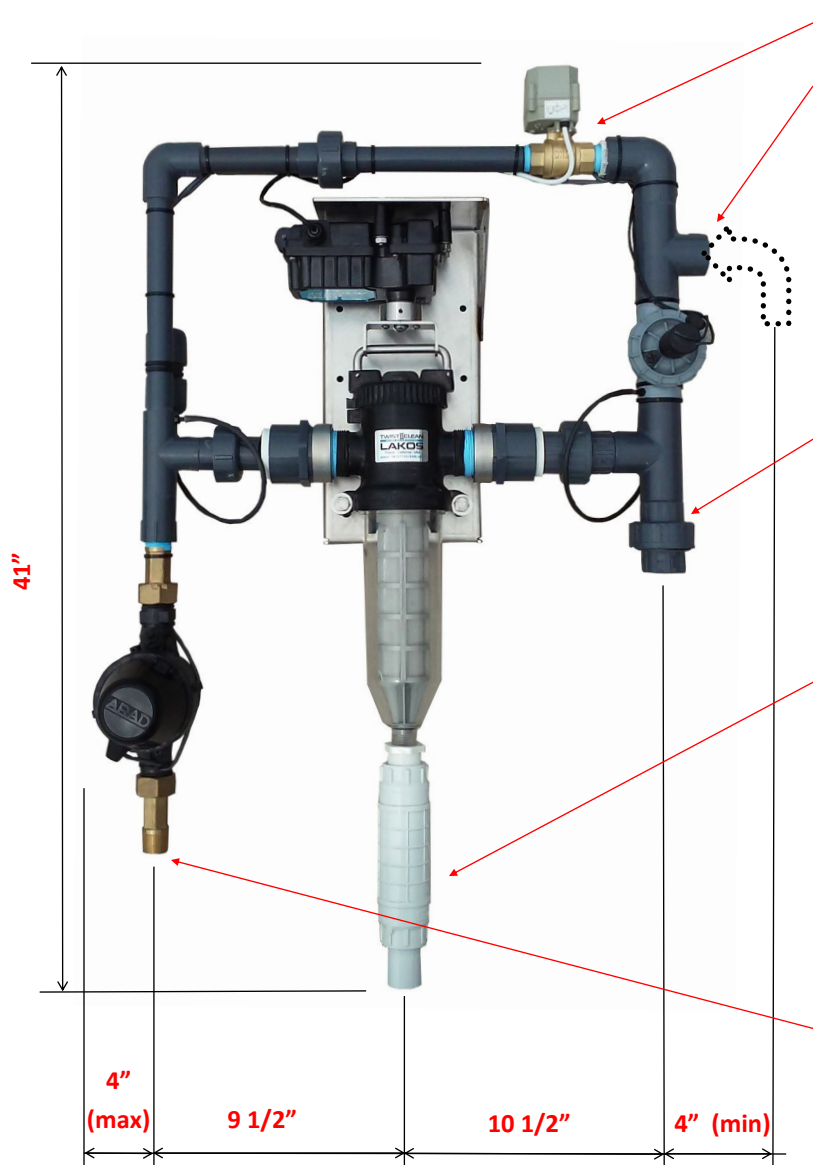
Basin, Twist Filter & Overflow Plumbing Example

These pictures illustrate typical plumbing connections between the pumping basin, filter assembly and waste plumbing. Basin extensions normally used to bring the basin to finished surface have been excluded to aid interpretation.

- Schedule 80 (Gray) pipe is not required for Pumped Graywater from the basin to the filter assembly. It has been used in these pictures to aid drawing clarity

- The only critical dimensions are the 18" length of 3" DWV after the Overflow 'hump' (2" above grade). This distance ensures filter waste and pumped excess graywater does not re-enter the basin
- The waste cleanout may not be required by code, although is recommended.





Control Cable Connector

Alternate Water Supply (Potable or Rainwater)

- 1" F Slip
- **RPZ required inline** to prevent cross connection
- Supply can be horizontal or vertical

Graywater Inlet from Pumping Basin

1" F Slip

Filter Waste

- Telescopic Connector
- Install full extended, to allow Filter Body to unscrew down during maintenance
- Connect to Graywater Waste with 2" PVC

Irrigation Outlet

- 3/4" Brass MPT
- Use 1" PVC distribution to Zone Solenoids / Manifolds

Introduction

The filter and alternate water module performs the following functions:

- Filters graywater to 80 Mesh, pumped from the IrriGRAY Graywater Collection & Pumping basin:
 - Using a built in pressure sensor between the filter and the water meter, determines when the filter needs to be cleaned
 - Rotates the filter handle to place the filter in the cleaning position
 - Applies filter flush water via the 1" Solenoid valve.
- Supplies makeup water via the 3/4" motorized valve. Makeup water is routed around the filter to avoid compressing solids into the filter screen with high pressure water supply
- Provides water meter data to the IrriGRAY controller.

Location

Distance from Controller

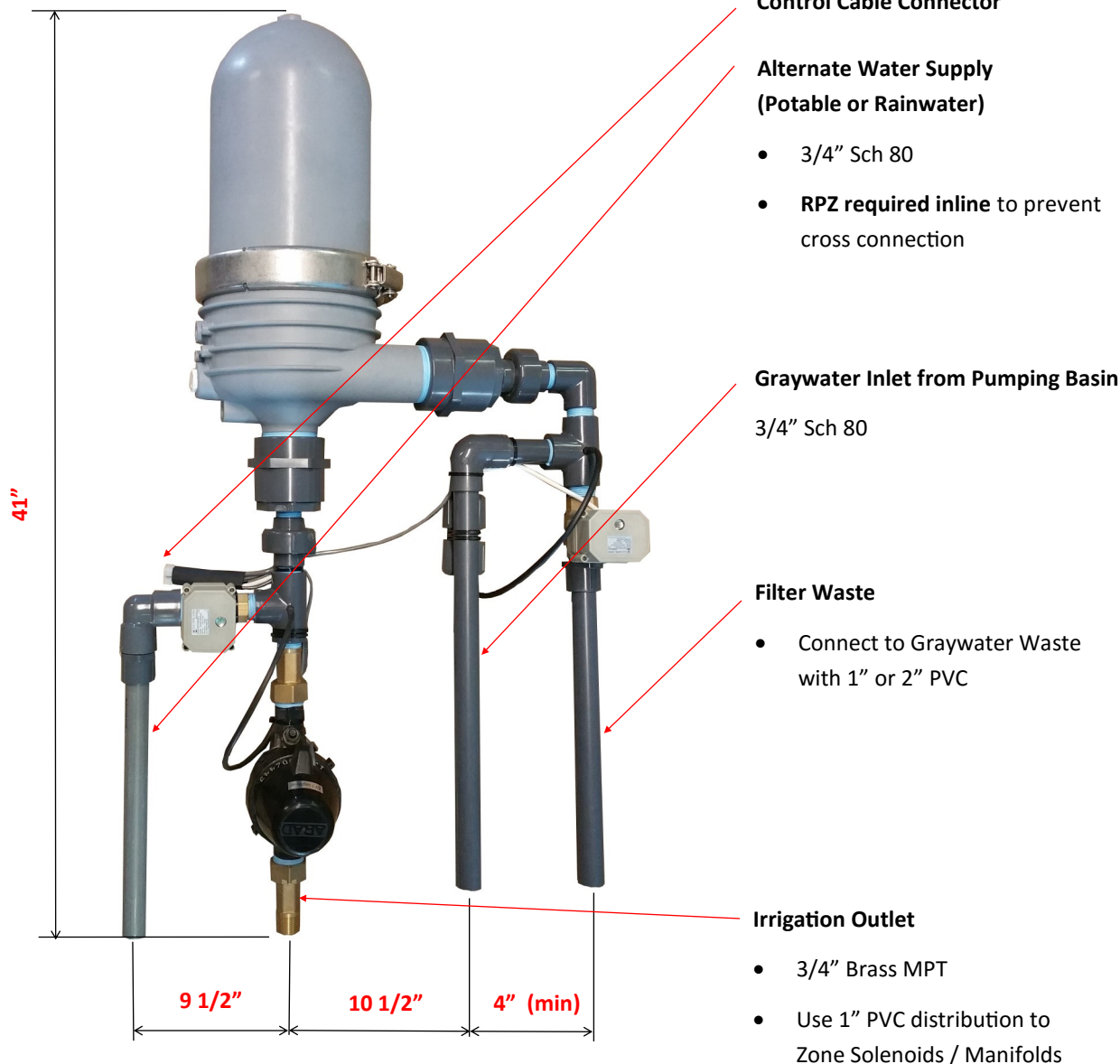
The 'plug and play' control cable is 5' long. We recommend placing the top right hand corner of the module within 4' of the controller box. Extension cables are available as an option.

Garage Installation

Install the module in a protected location, in a self draining region in case the module is damaged and develops a leak.

Outdoor Installation

The module can be installed outdoors. In freezing conditions the filter moves into cleaning position and self drains. Pipe insulation is only required for the alternate water supply, up to both of the supply valves.



Introduction

The filter and alternate water module performs the following functions:

- Filters graywater to 80 Mesh, pumped from the IrriGRAY Graywater Collection & Pumping basin:
 - Using a built in pressure sensor between the filter and the water meter, determines when the filter needs to be cleaned
 - Reverses water flow through the filter for cleaning.
- Supplies makeup water via the 3/4" motorized valve. Makeup water does not pass through the filter Provides water meter data to the IrriGRAY controller.

Location

Distance from Controller

The 'plug and play' control cable is 4' long. We recommend placing the top right hand corner of the module within 3' of the controller box. Extension cables are available as an option.

Garage Installation

Install the module in a protected location, in a self draining region in case the module is damaged and develops a leak.

Outdoor Installation

The module can be installed outdoors. In freezing conditions the filter moves into cleaning position and self drains. Pipe insulation is only required for the alternate water supply, up to the supply valve.

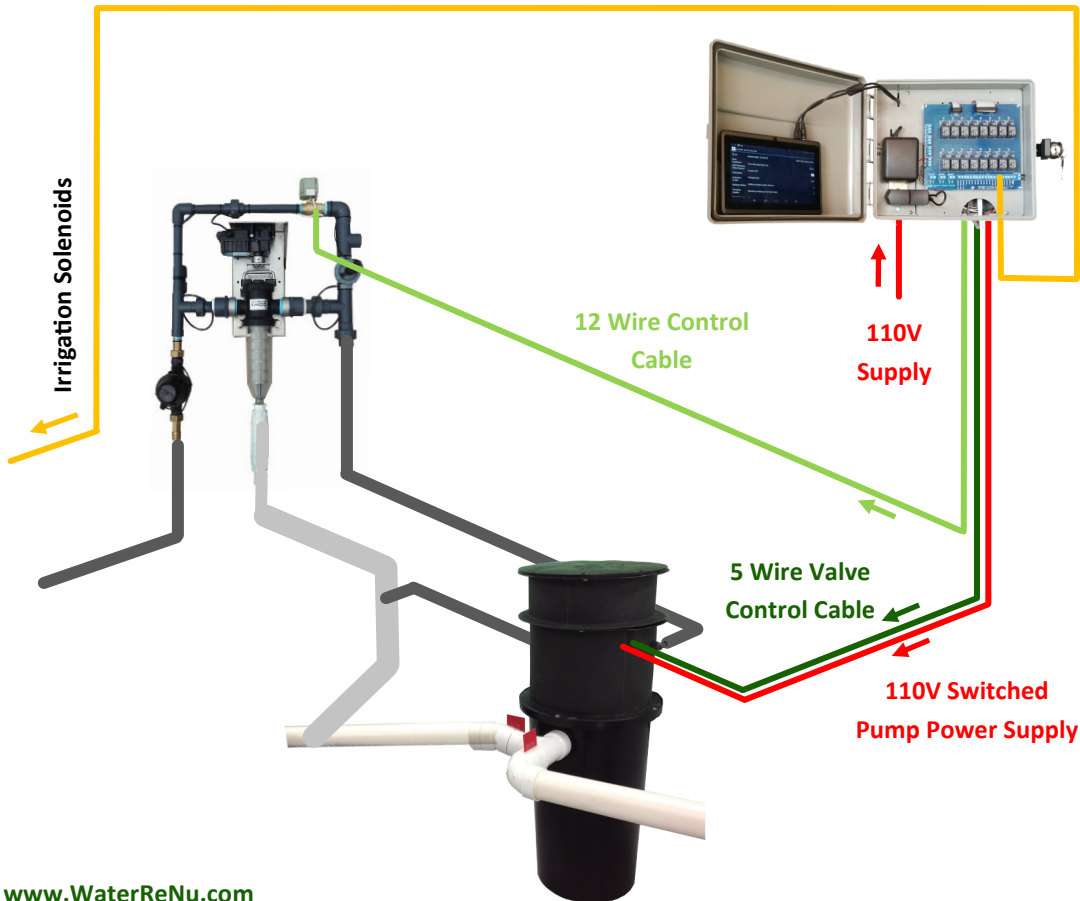
New Home Construction:

The IrriGRAY controller is now also available with all electrical cables passing through the rear of the controller box. This enables all wiring to be hidden, and removes the need for an additional GFCI for a wall circuit.



- 110 V
- Pumping Direction Control
- Filter & Potable Water Control
- Irrigation Zone Control

Irrigation Control Cable (not supplied)



Installation Guide

Power Requirement:

110V AC 10 amp supply. IrriGRAY is supplied with a 3' power lead, male 3 wire plug.

Although the IrriGRAY system includes GFCI protection, this system MUST NOT be placed on a supply circuit also used for any refrigeration equipment.

Placement of Controller near Filter Assembly:

The main control cable between the Controller unit and the Filter Assembly is 4' long. Longer lengths are available by custom order. The Controller needs to be placed within 4' cable run of the top right of the Filter Assembly.

Pump Power Lead must NOT be cut:

Cutting the pump power lead will void the pump warranty. If the basin is more than 10' from the controller we recommend installing an outdoor power socket close to the pumping basin, and hardwired into the controller.

The Controller has a 3' tail switched pump power supply plug. This plug can be cut off without affecting warranties.

Pumping Basin Valve Control Cable (extending):

The control cable has 5 wires, and is easy to extend. Cut and splice with any 5 wire cable. Voltage carried is 24V AC @ 200 milliamps, and 5v DC @ 20 milliamps.

Conduit:

The installer should check local codes for any conduit requirements. 110V AC is supplied to the pumping basin from the controller. It is the responsibility of the installer to ensure safe installation of power supply cable at or below ground level. Conduit should be of sufficient size to pass the pump power plug.

Controller GFCI:

The Controller includes a GFCI protected power supply. This GFCI may be replaced with a standard power socket if the GFCI conflicts with an upline GFCI.

Irrigation Solenoid Cable:

Standard irrigation control wire should be used for connecting up to 16 irrigation zone solenoids.

IrriGRAY uses a variety of sensors to measure performance and control when, where and type of water to irrigate throughout the day.

The majority of core system sensors such as pressure sensors, system valve controls and the primary water meter are pre connected to the rear circuit board.

Additional Sensors are connected to the front panel.

Temperature Sensor (included)

Although most rain sensors also include freeze detection (approximately 37 degrees Fahrenheit) to avoid spraying water in near freezing conditions, the sensor does not differentiate between rainfall and freezing weather.

For this reason, IrriGRAY includes an additional temperature sensor. The temperature reading is used to determine whether to place the system in freeze protection mode—protecting the filter, or whether graywater should be irrigated to only freeze capable irrigation zones, such as sub turf dripperline zones in climates where hard freezes do not extend deep underground. Note it is the responsibility of the installer to ensure all pipes are freeze protected if graywater will be irrigated in these temperatures.

If the controller box is installed outdoors, this temperature sensor can remain as supplied. If the controller box is installed inside e.g. Garage Wall, the temperature sensor should be located outside, and a 3 wire cable used to extend the supplied sensor.

Rain Sensor (not included)

Any adjustable 2 wire rain sensor (normally closed circuit) can be used. In addition to the rain sensor's built in dry delay, IrriGRAY has an extra software setting to add an extra X hours delay to irrigation when the sensor dries.

This rain sensor does not suspend graywater irrigation. It does suspend makeup water, potable spray and potable dripperline irrigation. To avoid false rain signals, IrriGRAY requires a continuous 5 minute rain signal before rain actions are implemented.

Flood / Heavy Rain Sensor (not included)

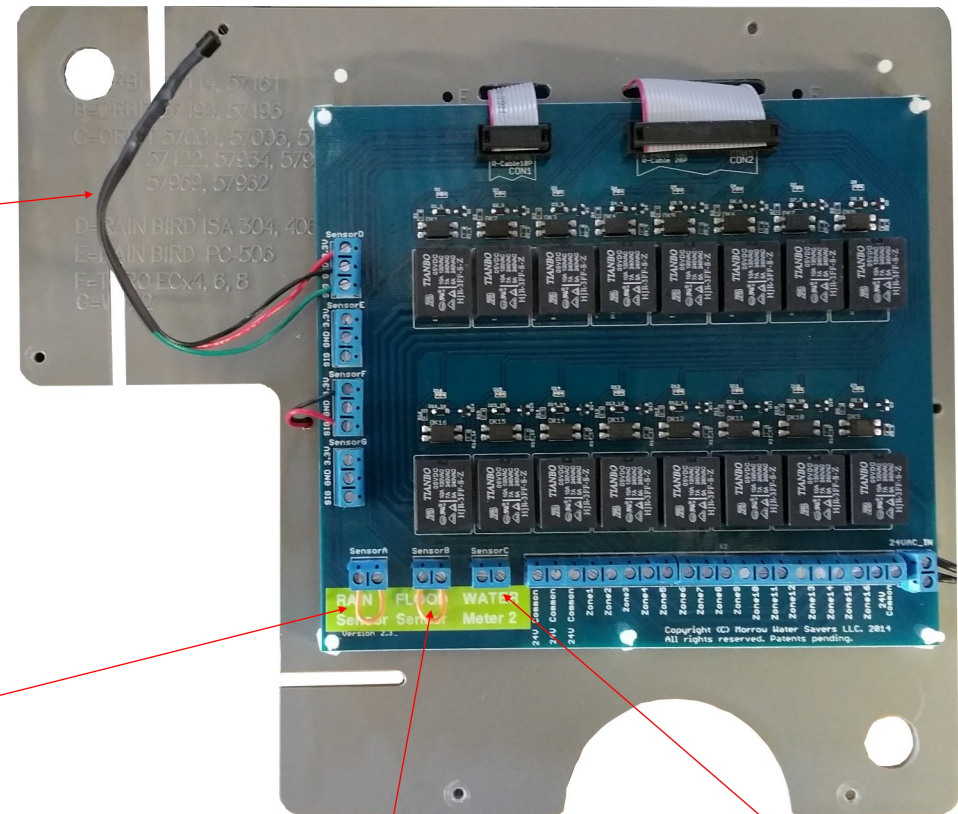
Any adjustable 2 wire rain sensor (normally closed circuit) can be used.

In most cases, this sensor is manually set to approx 2" of rainfall. When this sensor is triggered, all irrigation, including graywater, is suspended until the sensor has dried. In this situation graywater is automatically pumped to waste.

Water Meter 2 (not included)

If the irrigation system has zones which are supplied with only potable water because they are sprayed or irrigate vegetables, cross connection prevention rules require the plumbing for those zones be completely separated from any graywater plumbing / irrigation.

An independent 2 wire water meter is required to measure water for these zones.



Mandatory Irrigation Components

Graywater Irrigation Systems have EXACT irrigation component requirements:

Regular dripperline is not designed for graywater use. Standard emitters will clog in a relatively short amount of time, and in most cases can not be repaired.

Specialized dripperlines have been developed for landscape beds and under turf irrigation. Water ReNu only specifies the following components because they are proven to perform, for many years.

Check Valve (CV) and Pressure Compensating (PC) dripperline must never be used with graywater. Graywater is 'sticky' and will stop the moving parts of these emitters from working, even with regular pressure flushing of lines.

Landscape Beds

IrriGRAY 2.2 GPH dripperline (manufactured for Water ReNu by Netafim USA) is the perfect dripperline for graywater irrigation. Tested for over 15 years in Australia and the USA .

Recommended coverage per zone is 300', with a theoretical flow rate of 10 gallons per minute. As little as 150' can be used in a single zone, halving the flow rate, which could result in graywater loss to overflow.

Under Turf Zones

Netafim Bioline 0.6 and 0.9 GPH dripperline is the ONLY sub surface dripperline recommended by Water ReNu for sub surface graywater irrigation. BIOLINE is specifically designed for waste water irrigation and has been tested by Water ReNu for over 15 years.

If you are purchasing this component separately from a supplier, you must ensure it is Netafim **BIOLINE**. It is very common for suppliers to misquote other purple dripperline. Virtually all irrigation suppliers do not stock this dripperline and can only supply as a special order.

Recommended coverage per zone is 1,000' @ 0.6 gph with 12" emitter spacing, covering 1,000 square feet or turf area. Minimum coverage is 500 linear feet, and Maximum coverage 1,200 linear feet.

Note: IrriGRAY automatically pressure flushes graywater dripperlines zones every month to prevent soap / detergent buildup on emitters.



Irrigation Solenoid Valves

Most commercial style irrigation valves require too much pressure to open (and stay open).

Graywater pumps typically produce between 3 psi and 10 psi at the valve.

The only recommended valve is the Rainbird DV100.

All other valves, including the Rainbird DVF 100 (variable flow rate) **MUST NOT BE USED**. For any graywater supplied irrigation zones.

Take-Off Connectors

These components are not mandatory, but will save you substantial time & money.

Instead of using 1" PVC as header or footer material, use 3/4" poly tube.

The red punch tool is used to punch a 8mm hole in the 3/4" poly, and the takeoff connector pushed into the end of the dripperline, and then clicked into the poly tube.

Cost savings are about \$1 per connection, and take 70% less time! / labor.

Irrigation Zone Types

IrriGRAY does much more than just manage graywater. Each installation has different needs, and the irrigator can choose from a variety of water sources including graywater, rainwater, AC condensate & potable water.

Depending on the size of the property, and the amount of graywater, the best outcome may be a mix of graywater zones around the house to keep trees, shrubs, flowers and immediate lawn areas irrigated without restrictions, while still using

potable water for spray irrigation for other areas on large properties, or for growing vegetables.

IrriGRAY has 4 zones types to meet these needs.

Graywater Dripperline



This type of zone is designed for graywater irrigation, plus makeup water (potable water or rain) at the end of the day if not enough graywater was produced.

Graywater Zones can set as freeze capable, in which case any graywater generated during freezing conditions can still be irrigated.

Excess Graywater Disposal

Instead of excess graywater being sent to waste (sewer / or septic), excess graywater can instead be sent to a special disposal zone.

An excess graywater / disposal zone typically has 500' or more of Netafim Bioline, installed beneath the hard freeze soil level for your location.

This type of zone keeps graywater away from the septic all year, significantly reducing septic maintenance costs.

Multiple excess zones can be installed. Because these zones are still considered to be irrigation, leach field code / regulations do not apply with significant cost savings as a result.



Note: IrriGRAY uses water meter/s to accurately provide the exact number of gallons required based on climate, season and plant needs.

Potable Water Sprinklers / Spray



Although dripperline irrigation is far more efficient than sprinkler / spray irrigation, installing under turf irrigation can be expensive for very large areas, or impractical for existing lawns.

Instead of using two irrigation controllers, IrriGRAY also manages sprinkler irrigation as efficiently as possible, using the cycle / soak method.

To avoid cross connection issues, the plumbing and water supply for sprinkler zones is completely separate from graywater related plumbing.

An additional water meter is required for potable supply, and IrriGRAY delivers the precise number of gallons required for the day,

To achieve the highest irrigation efficiency, water is irrigated for 5 minutes each hour, until the required number of gallons has been delivered.

Potable Water Only Dripperline Beds

Most US jurisdictions do not allow vegetables to be irrigated with graywater.

As for sprinkler zones, a second water meter is required to monitor the potable water supply - both types of zones share the same water meter.

IrriGRAY provides irrigation to these zones up to 3 times per day. The 3 start times can be set for any time of the day, generally morning, midday and late afternoon, with the percentage of daily requirement set for each time.



This type of zone is also used for turf and landscape bed irrigation zones where graywater will not be used.

Irrigation Zone Distribution

IrriGRAY is a virtually instant graywater irrigation system - this means graywater is sent out in burst of 5—20 gallons of graywater at a time.

To make sure irrigation is consistent across a zone, distribution pipes (carrying water from the filter assembly to the zone) are full of water all the time.

Each burst of water is then applied to the zone rather than removing air from the distribution pipe/s.

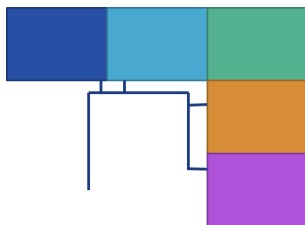
1" PVS is recommended for distribution plumbing, then changing to 3/4" poly tube for dripperline supply and connections.

Note: Most jurisdictions do NOT require the use of purple PVC for onsite graywater re-use outside of the home. Purple PVC is required for plumbing treated graywater back into a building for toilet or laundry supply, and irrigation systems using re-claimed water (treated water supplied by the water company).

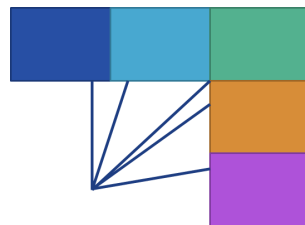
Zone Valve Placement / Density

Placing all of the zone valves together in a single manifold, near the IrriGRAY filter module seems attractive for simplicity, but requires a large amount of PVC pipe to distribute the water to each zone.

Distributing the zone valves close to the irrigation zones uses far less PVC pipe, reducing material and labor cost. The most common method used by contractors is installing a single distribution pipe almost encircling the property, and then valves located near to each zone. To minimize the number of valve boxes installed, up to 4 zone valves can be installed together—a compromise between number of valve boxes and length of distribution pipe.



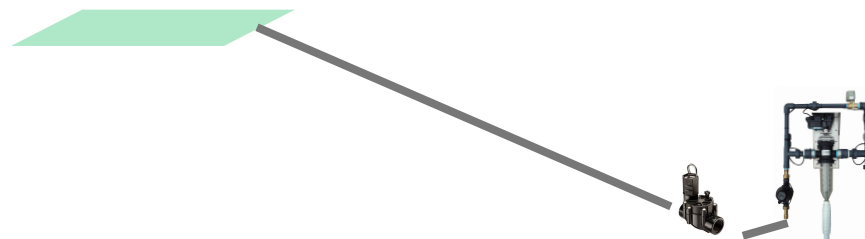
Valves located near each zone



Valves located centrally

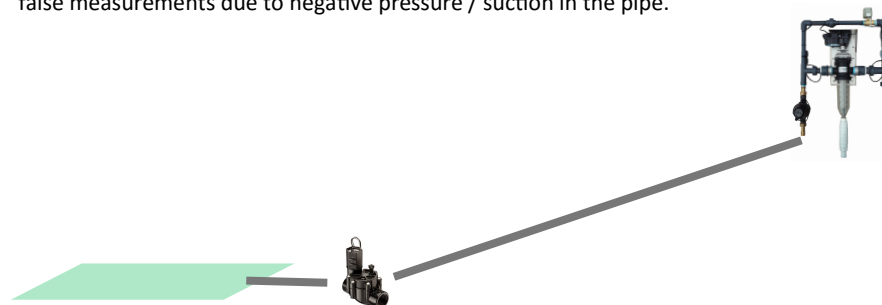
Up Hill Zones

To reduce backwards pressure on the IrriGRAY filter assembly, locate the zone valve at the lowest point of the distribution pipe. This also ensures the distribution pipe will stay full of water all the time.



Down Hill Zones

To avoid distribution water emptying into the irrigation zone by gravity, locate the zone valve at the lowest point of the distribution pipe. This also ensures system pressure sensors do not give false measurements due to negative pressure / suction in the pipe.



Irrigation: Landscape Beds (1)

The primary design factor for landscape beds is to include enough dripperline to irrigate graywater as quickly as it is produced. This is to avoid graywater building up in the pumping basin and overflowing to waste.

The usual maximum flow rate from the building into

the graywater pumping basin is 5 gallons per minute, so ideally sufficient dripperline is needed to practically pump at 5 gpm.

Pumped graywater usually irrigates at half of the published flow rate, due to the low pressure output of the pump.

The recommended dripperline is IrriGRAY 2.2 gph.

300' of IrriGRAY dripperline has a theoretical flow rate of 10 gallons per minute and a practical flow rate of approximately 5 gallons per minute and is the ideal total length for a zone.



Capillary Effect

An outstanding benefit of graywater irrigation is DAILY irrigation of the landscape. Daily irrigation is far more water efficient than delayed deep watering methods, which lose significant amounts of potable water to gravity and aquifers.

With daily irrigation, the top 4—6" of topsoil becomes moist all the time, and forms a balanced moisture zone. Plants can take as much or as little as needed, and the soil maintains equilibrium.

Water the Soil—Not the Plant

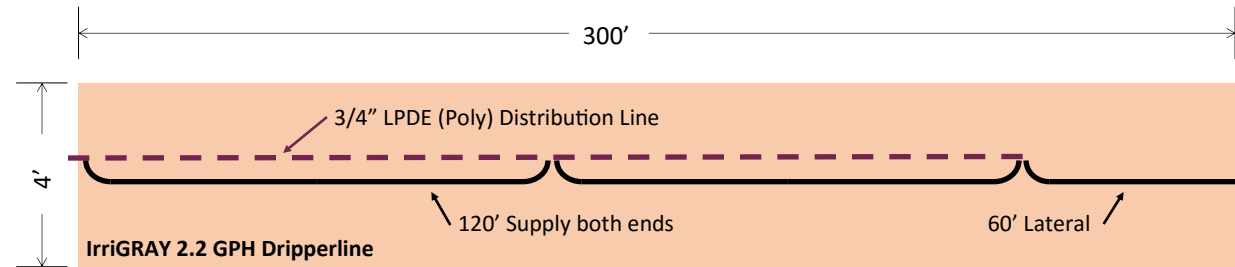
The moist soil easily distributes extra moisture evenly across the bed. The maximum recommended distance between dripperlines is 3', so if a bed is 5' wide, a single dripperline laid along the middle of zone is sufficient.

The maximum recommended distance from a bed edge to dripperline is 2'.

Mulch

Although a 2" covering of mulch or some other material is already required by code for graywater irrigation, mulch is also extremely important for dripperline irrigation and capillary effect.

Mulch needs to cover the soil to avoid direct sun contact, which would evaporate the moisture from the soil, and breakdown the beneficial capillary effect.



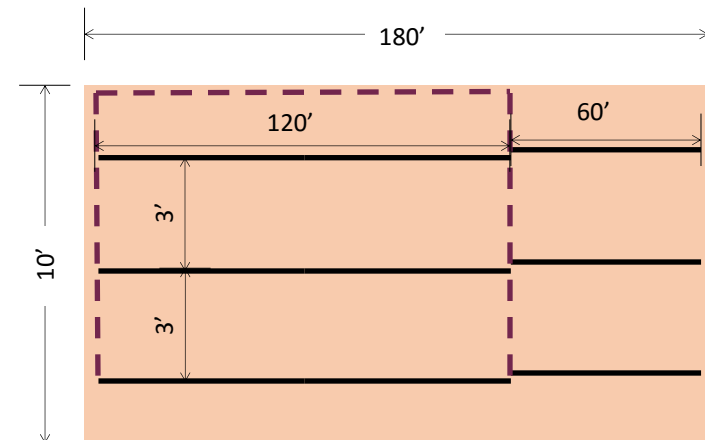
This landscape bed, with 1,200 square feet, has 2 long dripperlines connected at both ends, and 1 dripperline connected at one end only.

Lateral Length

The maximum recommended length of IrriGRAY 2.2 GPH dripperline, supplied from one end only is 60'.

The maximum length, supplied from both ends, is 120'.

If the landscape bed is long, run a distribution pipe along the bed, and use multiple lengths of dripperline.



This landscape bed, with 1,800 square feet, has 2 vertical Distribution Headers, supply both ends of the 120' dripperline lengths, and 1 end of 60' lengths.

3 dripperlines have been used to ensure the edge of the bed is no more than 2' from a dripperline.

Irrigation: Landscape Beds (2)

Landscape Beds (1) illustrated typical zone layouts for the ideal total length of IrriGRAY 2.2 gph dripperline (300').

With 3' spacing between dripperlines, 300' of dripperline can easily irrigate 1,200 to 1,800 square feet (or more) of landscape beds.

Many landscape beds are much smaller, perhaps only 200 square feet, so how can the ideal amount of dripperline be installed into a small area?

Less dripperline:

The minimum recommended amount is 150' of IrriGRAY 2.2 gph dripperline. This provides a practical

flow rate of at least 2.5 gallons per minute with pump pressure.

Add extra dripperline:

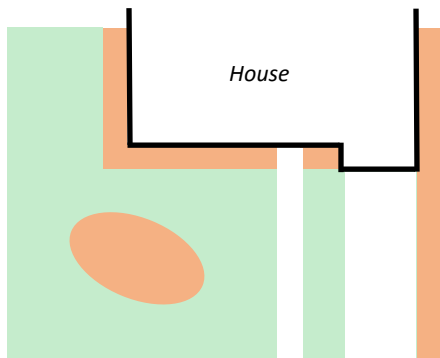
The key point here is the IrriGRAY controller uses a water flow meter to accurately provide X gallons—It doesn't matter if you have twice the dripperline!

Combine areas into a single zone

Most properties do have significant areas of landscape beds, although often distributed around the building.

Each of the landscape areas can be joined into a single zone, however the following needs to be considered:

- Do the landscape beds have similar plants and planting density? The IrriGRAY controller will just deliver X gallons to the zone area/s per day. Even if one area needs, say, twice as much water because it has very thirsty plants, or heavily planted, this can be achieved by including twice as much dripperline per square foot compared to the rest of the zone.



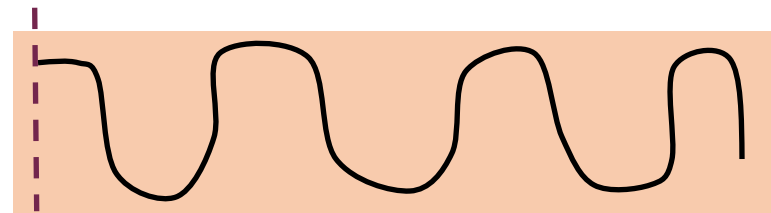
Separate landscape beds can be joined into a single zone

- Are all of the small areas at the same vertical level?

Water will always flow to the lowest point on the ground, so if you have some high areas and some low areas, the low areas will always get some more water, particularly when the zone depressurizes when the pump stops. Careful thought and planning can help avoid this issue.

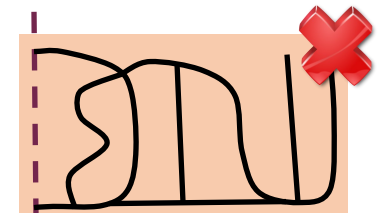
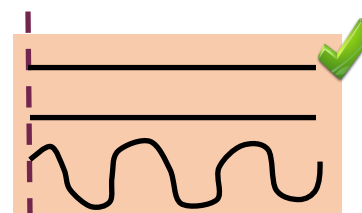
Add extra dripperline

- If your zone would normally require 150' of dripperline, simply double up the dripperline! Because the irrigated water is measured by the flow meter, the zone will not receive twice as much water
- Snaking dripperline is an effective method of quickly laying sufficient dripperline into irregular shaped landscape beds.



Avoid spaghetti connections!

- Although the IrriGRAY controller automatically pressure flushes dripperline regularly to avoid soap and detergent buildup on dripperline emitters, it is still good design to enable future manual flushing of dripperlines—just in case!



Irrigation: Lawn Zones (1)

Just as for landscape beds, the primary design factor for turf zones is to include enough dripperline to irrigate graywater as quickly as it is produced. This is to avoid graywater building up in the pumping basin and overflowing to waste.

The usual maximum flow rate from the building into

the graywater pumping basin is 5 gallons per minute, so ideally sufficient dripperline is needed to practically pump at 5 gpm.

Pumped graywater usually irrigates at half of the published flow rate, due to the low pressure output of the pump.

The recommended dripperline is Netafim Bioline .0.6 gph @ 12" emitter spacing

1,000' of 0.6 gph Bioline has a theoretical flow rate of 10 gallons per minute and a practical flow rate of approximately 5 gallons per minute and is the ideal total length for a zone.



Dripperline Density

To avoid color striping in the lawn, dripperline must be laid every 12" across the zone.

Recommended Maximum Zone Size

The ideal size for flow rate is 1,000 square feet. If necessary it can be increased to 1,200 square feet.

Recommended Minimum Zone Size

Avoid using less than 500 feet of Bioline 0.6 gph, as the practical flow rate for pumped graywater across the entire zone will fall below 2.5 gallons per minute.

Alternate Dripperline Emitter Flow Rates

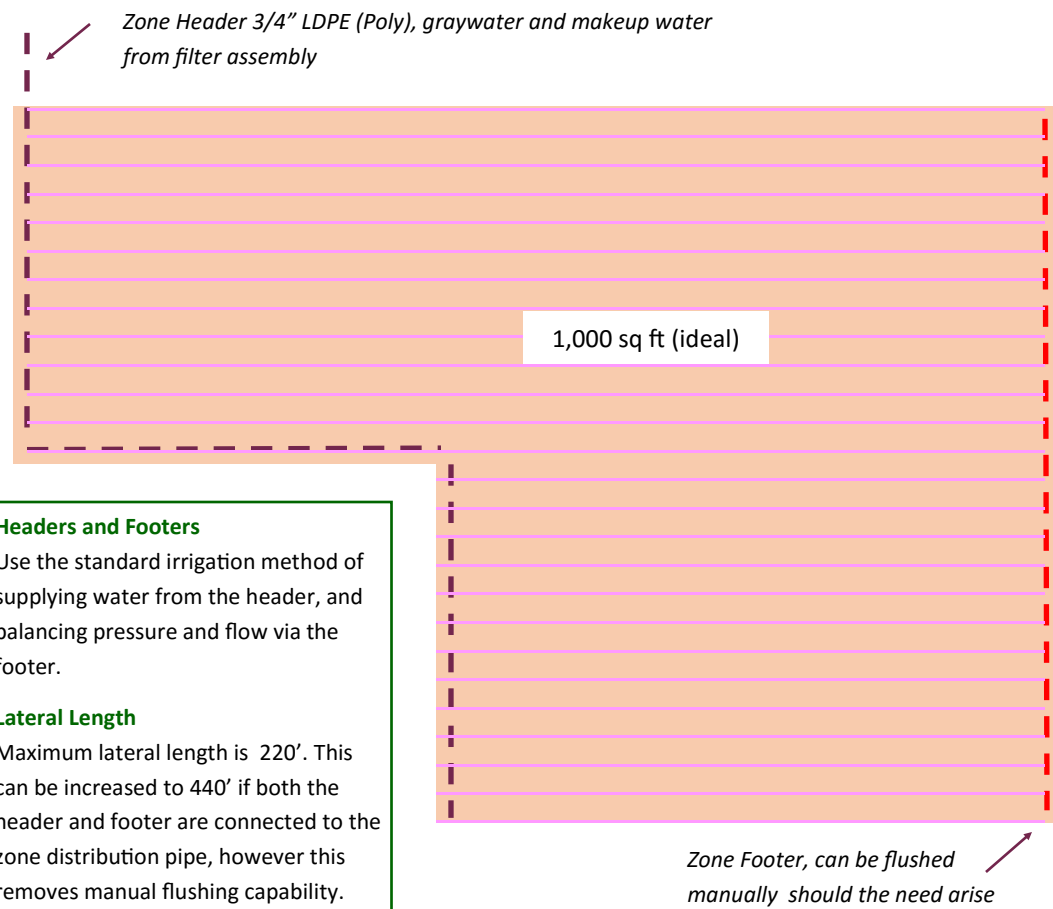
Other flow rates, such as 0.4 gph and 0.9 gph are also available, although should only be used for special circumstances. Contact Water ReNu if you need to use varying flow rates. 0.6 gph is the optimal flow rate for irrigation efficiency.

Depth Of Dripperline

Sod does better with quality subsoil, so the best outcome is achieved by scraping the surface, laying the dripperline, then bringing in 2" of top soil before laying sod. However we do note installers have achieved ok results without adding topsoil.

Take Extra Care with Sloping Zones!

Water will always fall to the lowest level in a zone, particularly when potable pressure or pump pressure stops. Always run dripperline along surface contours, and increase dripperline spacing towards the bottom of a slope to avoid overwatering the low areas.



Headers and Footers

Use the standard irrigation method of supplying water from the header, and balancing pressure and flow via the footer.

Lateral Length

Maximum lateral length is 220'. This can be increased to 440' if both the header and footer are connected to the zone distribution pipe, however this removes manual flushing capability.

Irrigation: Lawn Zones (2)

Once the zone design process has been completed, the next step is to plan the installation of each zone.

As a general principle, dripperlines should be laid level

across any hills, so when graywater or makeup water stops, the water doesn't drain via gravity to one end of the line.

Then decide where the header/s and footer/s should be placed,, such that each dripperline is connected at both ends.

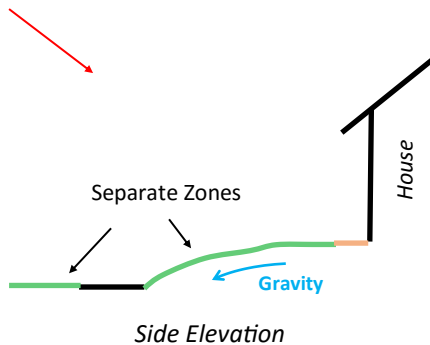
Dripperline across the slope

Lay the dripperline along the contour, perpendicular to the direction of fall. In some compound curve situations, additional infills of dripperline may be required. These do not need to be connected to the header or footer, and can be tee'd into surrounding dripperline.

Downward movement of Moisture by Gravity

Although a small volume of water will naturally flow down the headers and footers by gravity when the graywater pump or makeup water supply has stopped, a bigger impact is natural movement of moisture down hill within the soil.

Turf areas at the bottom of a hill, such as on a sloped lot with a green strip on the other side of the sidewalk, should be separated into a different zone, so the water supply can be reduced independently.

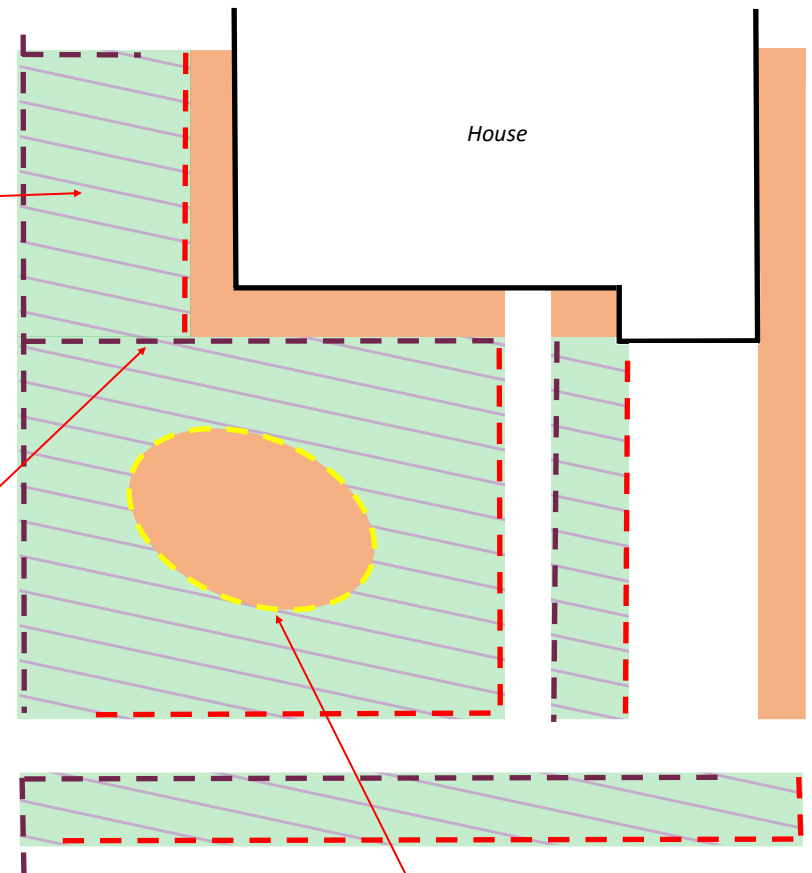


Direction of Fall

Headers and Footers

Depending on the shape of the zone, headers and footers may need more than one section.

If only a few small sections of dripperline are difficult to reach with headers and footers, they can be tee'd into other dripperlines in the area.



Obstructions

Totally enclosed obstructions, such as in-lawn landscape beds should have their own landscape dripperline. Enclose the obstruction with 3/4" LDPE (Poly) tube and join the dripperline where it would normally intersect the obstruction. Water will circulate around the 3/4" tube and act as both footer and header.

Irrigation: New Plantings / Dry Soil

Daily irrigation is very different to once a week or every second week irrigation. Heavy, infrequent irrigation needs a lot of water to overcome hydrophobic soil (so dry it repels water, using gravity to get the water down to deep roots). Daily irrigation relies on a little water every day, keeping the soil moist, but not wet, at all times.

IrriGRAY Controller “New Planting” Feature

With IrriGRAY, every individual zone can be automatically given extra water every day from a start date to an end date. The amount of additional water is specified as an extra % of the normal daily irrigation amount, and this extra water can be gradually reduced to 0% for a specified number of days before the end date.

New Sod

In almost all cases, New Sod is laid over relatively dry soil, otherwise the landscape area is too muddy to work with.

Newly cut Sod is also stressed, and needs extra water during the establishment period—often 4 weeks or more.

For the first few days, additional water should be applied on top, by hose or temporary sprinklers.

Using the “New Planting” feature of the IrriGRAY controller, apply 100% extra water for the next 3–4 weeks, with the last 10 days tapering from 100% down to 0% additional water.

Always check with local turf and irrigation experts regarding watering in periods for different sod species in your area.

Sod Bare Patches

If a section of turf is replaced, or a bare patch seeded, top watering of that section is required until roots establish, or

Daily irrigation is almost twice as efficient (95% efficiency) as infrequent irrigation (50% efficiency), but does not happen straight away if the soil is dry to start.

True capillary effect requires up to 2 weeks of regular daily irrigation to overcome dry soil hydrophobia.

in the case of seed, grass blades cover at least 50% of exposed soil.

Dry Landscape Beds

Landscape beds are often very dry when first being planted. In addition to adding water directly to planting holes when adding stock, ensure Untreated Natural Mulch is applied at least 2” thick, covering all exposed soil. Apply extra water for 3–4 days using the “New Planting” feature, and for small seedlings whose roots may not have extended into old soil, top water the plant directly—no more than would be required to water the plant if it was still in its original tray.

Soil Moisture Sensor

We have all been conditioned to add more water when a plant doesn't appear to be 100% healthy. In most cases TOO MUCH water is a significant contributor to plant sickness.

It is tempting to keep on adding water—especially as moist soil doesn't feel wet—just a few degrees cooler than expected. Before increasing the irrigation amount, purchase an inexpensive soil / ph moisture sensor from a big box store. This one was purchased from Home Depot for under \$10.



In addition, new sod, and seedlings experience stress at planting, needing additional water for the first 2–4 weeks.

Total soil coverage, whether by sod or landscape bed mulch covering is essential to lock in soil moisture, protected from direct sun and surface evaporation.



The IrriGRAY system includes a 7" tablet as the controller. The tablet manages all minute by minute activities such as water management, filter cleaning, dripperline flushing. When connected to the house or building Wi-Fi, the tablet can be programmed via our internet server (www.irrigray.com) or directly on the tablet. Internet programming and connectivity provides many advantages, such as remote control from any device, remote programming, and continuous performance monitoring and issue notifications.



The programming interfaces on the tablet and www.irrigray.com are almost identical. www.irrigray.com is device responsive, meaning the screens adapt to best suit your internet device, whether it be a smart phone, tablet, PC or Apple computer, without needing an application.

We strongly recommend programming your IrriGRAY system via Computer first, and then activating the tablet, because of the larger screen size, easier keyboard, and built in Help screens.

This an introductory guide. Once you have created an account, there are just 2 main screens that must be setup before the system is turned on (Climate & Water – settings related to your climate and any potable water restrictions, & zones – settings for the type of landscape / lawn areas in each zone).

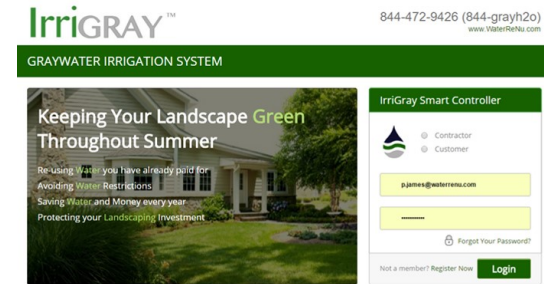
Programming IrriGRAY is much easier than traditional dial based irrigation controllers.

Just 6 Simple Steps:

- 1) Create an Account
- 2) Add your "Installation"
- 3) Edit a "Configuration"
- 4) Set Climate & Water values
- 5) Create Zones
- 6) Save your "Configuration" & Mark it "Active"

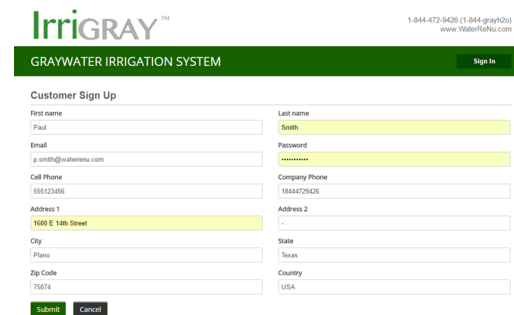
Step 1: Create an Account

- Go to www.irrigray.com



- Click on **'Register Now'**, just left of the Login Button

Please note: Contractor accounts can only be created by the IrriGRAY support team. Please contact Water ReNu to have your contractor account created. Once a contractor has an account, the contractor can add new clients / installations on behalf of clients.

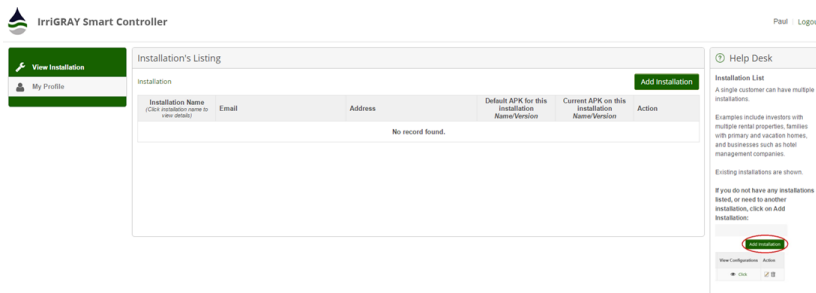


Client information is only used by the IrriGRAY support team, for identification & communication purposes. Contractors are required to also keep client information confidential, signing confidentiality agreements before the contractor account is established. Your information will never be provided to third parties unless we receive your permission first, or we are bound to do so by legal process.

Step 2: Add Your Installation

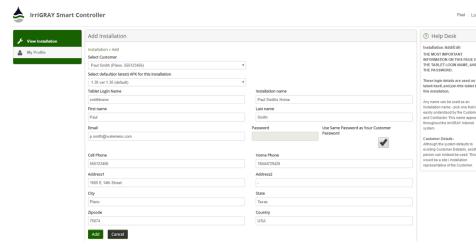
Some clients have multiple irrigray systems – we call them **installations**. Click on “View Installations” to see installations already created.

- Click on ‘Add Installation’



Note! Every screen has a ‘Help Desk’ section on the right of the page, containing detailed instructions for completing the page.

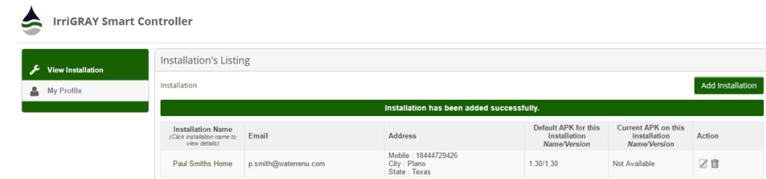
Address details, passwords and contact details default to the main client details, but can be changed as required. Clients having just one IrriGRAY system usually accept the default values and use the same password as their client login.



Clients with multiple systems, whether at the same location or different locations must use different tablet login names and passwords for each system.

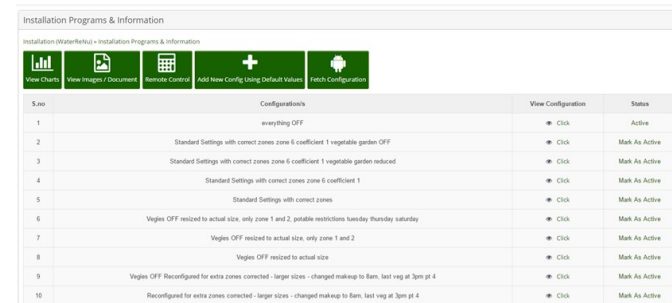
- Complete the required fields, and click on ‘Add’
- Keep the **TABLET LOGIN NAME** and **PASSWORD** for connecting the tablet later.

Step 3: Edit a Configuration



- Click on the Installation Name you have just created to view ‘Configurations’
‘Configurations’ are similar to computer restore points. Whenever you want to change details of a program, the changed program / configuration can only be saved as a new version. This is very helpful if you want to go back to a previous program version quickly.

Although IrriGRAY is climate based, and therefore varies the amount of water applied to the landscape automatically, configurations also allow program settings to be changed temporarily to cope with a special event at the property, and revert to the normal configuration with a single click when the special event is finished.



Here is an example of multiple configurations on our Water ReNu testing system, any configuration can be applied to the tablet by clicking ‘Mark as Active’, and will take effect in less than 4 minutes. We regularly test a large number of configuration settings as part of our system quality control processes, so we have a lot of configurations. Most clients have less than 5 – 10.

Step 4: Set Climate & Water Values

The system location (by CIMIS zone number in California, or by nearest city in other States) enables IrriGRAY to automatically determine irrigation required to suit your landscape. If your location is unavailable, edit monthly values directly.

Potable water restrictions may apply in your area – IrriGRAY has very flexible rationing settings for both spray and dripperline styles of potable water irrigation.

Climate & Water

Select Location: USA, TX, Dallas/Ft. Worth

ET Values:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.0	2.46	3.96	5.14	6.21	7.06	7.4	7.25	5.49	4.19	2.89	2.1

Use Excess Graywater?

Freeze Controls:
 Activate Freeze Mode When Temperature Falls Below: 30
 Disable Freeze Mode When Temperature Reaches Above: 60
 Freeze to Waste:

Potable Water Sprinkler Use—Select days that Potable Water should be used for sprinkler irrigation.
 We recommend having every day ON (better irrigation efficiency), however turn OFF any days which are not permitted for potable water sprinkler use if required by local water restrictions.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Week 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Week 2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Week 3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Week 4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Maximum Allowed Inches of Sprinkler Irrigation Per Month: 0

Use—Select days that Potable Water should be used for makeup water and vegetable gardens.
 We recommend having every day ON (better irrigation efficiency), however turn OFF any days which are not permitted for potable water dripperline use if required by local water restrictions.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Week 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Week 2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Apply Extra Water On Permitted Days?
 Yes
 No

Makeup Water Supply Starts at: 8:00 am
 If Rainfall Detected, Delay use of Potable Water for irrigation for 1 hours after the rainfall sensor has reset.
 Makeup Water Setting: On

- **Make selections as required.** Refer to the right hand Help panel for detailed instructions.

Step 5: Create Zones

- **Click on menu options 'Zones'** to see a summary of all 16 zones. This example is from a system with multiple zones already programmed and turned on. Your zones will initially have default setting and turned off.

Zones

Zone	Zone Name	Zone Type	Settings preview	Edit	Status
1	Zone 1 Graywater Turf South East	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15 Zone Type: 1 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	On
2	Zone 2 Graywater Turf South West	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	On
3	Zone 3 Potable Vegetable Garden	Potable Water Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	On
4	Zone 4 Graywater Landscape	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	On
5	Zone 5 Excess Graywater (Re-use)	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	On
6	Zone 6 Graywater Turf North West	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	On
7	Zone 7 Sprinklers	Potable Water Sprinkler	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	On
8	Zone 8 Graywater Turf North East	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	On
9	Zone 9	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	Off
10	Zone 10	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	Off
11	Zone 11	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	Off
12	Zone 12	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	Off
13	Zone 13	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	Off
14	Zone 14	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	Off
15	Zone 15	Graywater Dripperline	Surface Area: 120 Plant Type: 0.5 Plant Density: 100 Plant Spacing: 12 Line Length: 15	Edit	Off
16	Zone 16	Zone 16 must be used on the Smart Irrigation Controller because one of your other zones uses potable water.			Off

- **Click on 'Edit'** to change a zone

Step 5.1: Zone Types

ontroller

Configuration Name: Standard Settings with correct zones zone 6 coefficient 1

Zone 1

Back Zone 1 Graywater Turf South Save zone (saves zone settings to session only - this does not save a new config version)

GRAYWATER DRIPPERLINE GRAYWATER DISPOSAL POTABLE WATER SPRINKLER POTABLE WATER DRIPPERLINE

Surface Area: 120 Plant Type: 0.5 (Medium Water Use e.g. Roses)

Planting Density: 100% Increase / Decrease

Apply Water Every Day? (a few plants such as grapes, avocados and cacti prefer only 1-2 days per week)

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Line Length: 1000 Flow Rate: 0.6 Emitter Spacing: 12 Line Spacing: 12 Estimated Water: 1.27

Freeze Capable

There are 4 different types of zones:

- **Graywater** zones use graywater throughout the day, and any shortage is filled by makeup water at the end of the day
- **Excess Graywater** zones help keep graywater away from a septic system year round
- **Potable Water Sprinkler** zones only use potable water, with separate non-graywater plumbing, and are programmed automatically for cycle soak (hour by hour irrigation), the most efficient method of spray irrigation
- **Potable Water Dripper** zones use non-graywater plumbing to irrigate up to 3 times a day, with each session receiving an adjustable % of the days' climate and plant based requirement.

Programming of zones is very easy because there is no need to set the number of minutes or do any math. IrriGRAY uses a water flow meter to accurately and automatically provide the exact amount of water required based on climate and zone plant settings.

Step 5.2: Save and Turn On Zones

- When you have finished editing a zone, including the zone name, click on 'Save Zone'

This saves the zone into the session memory only. It does not save the overall configuration.

IrriGRAY Smart Controller

Configuration Name: Standard Settings with correct zones zone 6 coefficient 1

Save As New

Help Desk

Zone	Zone Name	Zone Type	Settings preview	Edit	Status
1	Zone 1 Graywater Turf South East	Graywater Dripper	Surface Area: 120 Plant Type: 0.5 Flow Rate: 0.6 Line Length: 1000 Emitter Spacing: 12 Line Spacing: 12 Estimated Water: 1.27	Edit	On
2	Zone 2 Graywater Turf South West	Graywater Dripper	Surface Area: 120 Plant Type: 0.5 Flow Rate: 0.6 Line Length: 1000 Emitter Spacing: 12 Line Spacing: 12 Estimated Water: 1.27	Edit	On
3	Zone 3 Potable Vegetable Garden	Potable Water Dripper	Surface Area: 120 Plant Type: 0.5 Flow Rate: 0.6 Line Length: 1000 Emitter Spacing: 12 Line Spacing: 12 Estimated Water: 1.27	Edit	On

Help Desk: The purpose of each of these zones is described in the Help Desk panel of the Zone Edit function. Zones do not need to be entered in numerical order. For example zone 5 could be set back while zones 1-4 and zones 6-10 have settings. Zones can also be turned on or off on the spot. Equipment breaks or a substantial leak develops in a zone - the zone can be turned off.

- Ensure your new zones are turned ON!
Click on the on/off dropdown to turn the zone on or off.

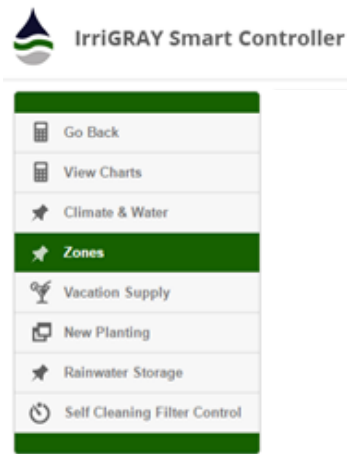


- Does your IrriGRAY system have the **Automated Water ReNu Disc Filter**?
If you do have this filter, click on 'Self Cleaning Filter Control' and change the filter type to Disc Filter.

Step 6: Save Configuration & Mark it 'Active'

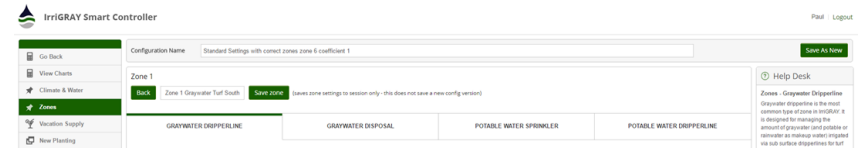
Before saving your new configuration, now is a good time to look at some other program options, such as:

- Vacation Supply:** If everyone is on vacation and no graywater will be generated, extra potable water would normally be added at the end of the day. With vacation settings, you can tell IrriGRAY to start adding potable water throughout the day instead of waiting until the end of the day
- New Planting:** Newly installed landscape (new sod and plant stock) require extra water to cope with transplant stress and for growing roots as quickly as possible. With New Planting settings, every zone can have additional water added between individual start and end dates, and taper the extra water to zero over the last X days.
- Rainwater Storage:** We recommend using stored rainwater as soon as possible (after using graywater) so the rainwater tank has room for more rain! IrriGRAY automatically manages rainwater storage and provides detailed storage reporting
- Self-Cleaning Filter Control:** IrriGRAY is designed for single family, multi-family and commercial installations, with a range of available filters. Settings can vary from site to site and are made in this section.



Note: You can also store photos and PDF documents about the installation in IrriGRAY Online, via the 'Documents' Button on the Installation configurations pages.

- Type in your preferred configuration name, and click on 'Save As New'



- Your new configuration will be at the top of the list. Click 'Mark As Active' to make this configuration Active.

Any configuration can be marked as Active at any time. Once the tablet is connected via Wi-Fi, it will automatically retrieve the 'Active' Configuration.

If the tablet is already active, setting a new Configuration as active here will force the tablet to load the new configuration within 4 minutes.

Installation Programs & Information

Installation (WaterReNu) > Installation Programs & Information

View Charts | View Images / Document | Remote Control | Add New Config Using Default Values | Fetch Configuration

S.no	Configuration's	View Configuration	Status
1	everything OFF	Click	Active
2	Standard Settings with correct zones zone 6 coefficient 1 vegetable garden OFF	Click	Mark As Active
3	Standard Settings with correct zones zone 6 coefficient 1 vegetable garden reduced	Click	Mark As Active
4	Standard Settings with correct zones zone 6 coefficient 1	Click	Mark As Active
5	Standard Settings with correct zones	Click	Mark As Active
6	Vegies OFF resized to actual size, only zone 1 and 2, potable restrictions tuesday thursday saturday	Click	Mark As Active
7	Vegies OFF resized to actual size, only zone 1 and 2	Click	Mark As Active
8	Vegies OFF resized to actual size	Click	Mark As Active
9	Vegies OFF Reconfigured for extra zones connected - larger sizes - changed makeup to 8am, last veg at 3pm pt 4	Click	Mark As Active
10	Reconfigured for extra zones connected - larger sizes - changed makeup to 8am, last veg at 3pm pt 4	Click	Mark As Active

Charts:

Once the tablet is connected to Wi-Fi, and the tablet login name and password entered, the tablet will send performance data to the www.irrigray.com server every minute. SOME examples of this data include:

- **Irrigation:** Type of water (graywater, excess graywater, potable water, zone type), Zone Number, Volume of Water and Water Pressure
- **Maintenance Information:** Automated Filter Cleans, Software Version Updates, Automated Dripperline Flushing
- **Environmental Information:** Air Temperature, Pumping Basin Water Level, Internal Tablet Temperature, Tablet Battery Storage Level, Wi-Fi signal strength, Rainwater Storage Level.

From this data, IrriGRAY prepares a range of water consumption charts to help you or your landscape contractor review the amount and type of water used in each irrigation zone.

The performance data is also used for the continuous monitoring service, notifying you or your contractor of any issues such as low potable water pressure, power failure, Wi-Fi failure, high water levels, damaged distribution lines, zone solenoid valve failures & more.

Please note these chart examples are from our primary test system – so this data may not reflect usual residential water graywater production and irrigation patterns.

Installation Programs & Information

Installation (WaterReNu) » Installation Programs & Information

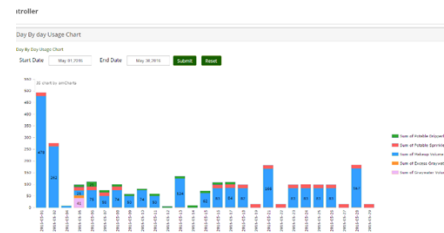
View Charts
 View Images / Document
 Remote Control
 Add New Config Using Default Values
 Fetch Configuration

S.no	Configuration's	View Configuration	Status
1	everything OFF	Click	Active
2	Standard Settings with correct zones zone 6 coefficient 1 vegetable garden OFF	Click	Mark As Active

To view Charts, click on 'View Charts', on the Installation Configurations Page.



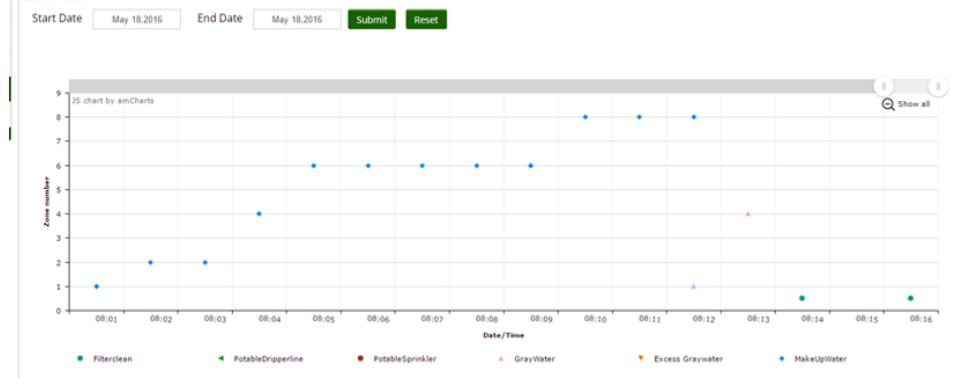
Water Usage by Zone



Day by Day Water Usage



Total Water Usage



Timeline Chart

Timeline is useful if you want to review what has happened on a minute by minute basis. For most clients it is just a cool feature, being able to see what times of the day different types of water irrigation and maintenance events occur. For advanced users, such as Landscape Contractors and the IrriGRAY support team, it is an effective tool for quickly analyzing the effects of configuration settings at the installation site.

Tablet Wi-Fi & Time Zone Settings

IrrigRAY includes a 7" Android based tablet as the on-board computer. You do not need to know how to use Android, other than following these directions to connect the tablet to your Wi-Fi network.

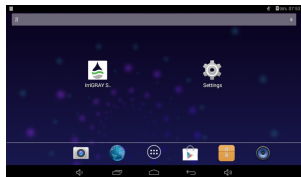


Step 1: Turn on the tablet

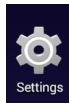
Press and Hold the Power Button, located at the top right corner, until the 'Dragon Touch' logo appears on the screen.

The tablet will take about 1 minute to boot up.

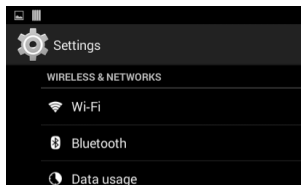
If the tablet display is blank, it is in screen saver mode. Press the Power Button quickly to show the screen, and swipe the padlock to the right to unlock.



Step 2: Go to Settings



Press on the Gear Icon to enter the settings page.



Step 3: Select Wi-Fi Network

Press on Wi-Fi to see the list of available networks, and then Press on your Wi-Fi Network Name.

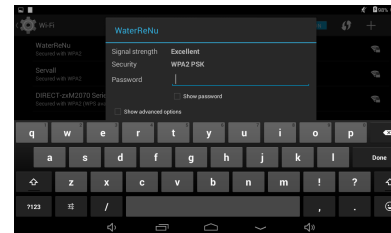


Select from list of running Apps

Go to Home screen

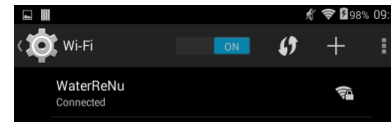
Go back

This is the Bottom Navigation Bar in Android. Use these icons to Select from running applications, Go to the Home Screen, or Go Back.

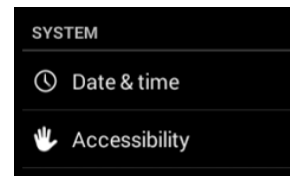


Step 4: Enter Wi-Fi Password

Enter the Wi-Fi password, press Done on the keyboard, then Connect on the Wi-Fi connection screen.



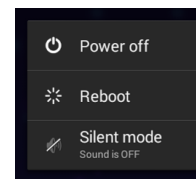
Verify the tablet is connected to Wi-Fi - It should say 'Connected' under the network name.



Step 5: Check your Time Zone

Press on the back button at the bottom of the screen, to go back to the main settings page.

Press on 'Date & Time' to check your time zone settings.



Step 6: Restart / Reboot Tablet

Hold the Power Button until a box appears with the option to Reboot.

The IrrigRAY application starts automatically each time the tablet is turned on, but will take a minute or more to load.

You Do NOT need to start the application again—Wait for the application to self load.

Note: Just like cell phones and other tablets, the IrrigRAY tablet works better if it is rebooted. You don't need to do this, IrrigRAY automatically reboots at ~ 2.10am every morning.



Step 1: Turn on the tablet



Press and Hold the Power Button, located at the top right corner, until the 'Dragon Touch' logo appears on the screen.

The tablet will take about 1 minute to boot up.

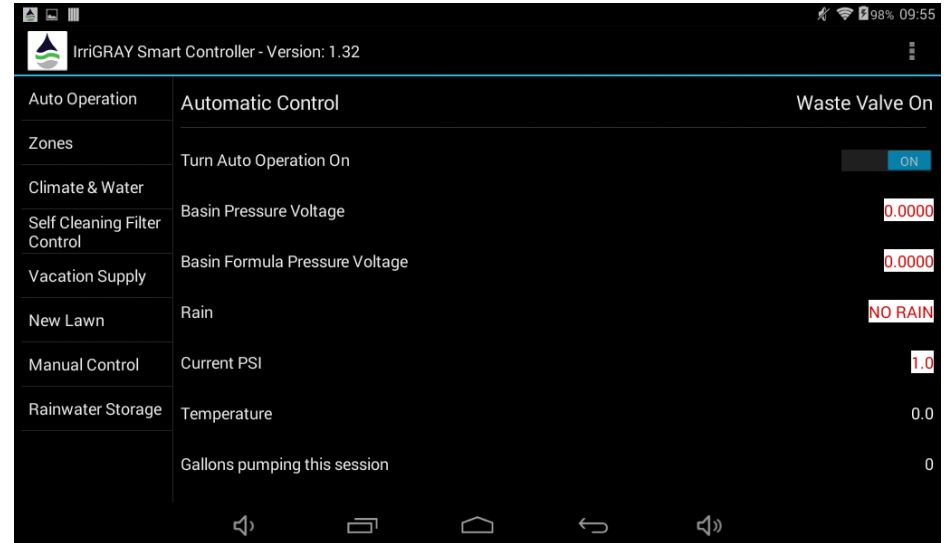
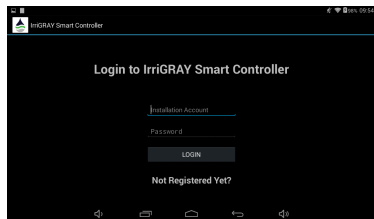
If the tablet display is blank, it is in screen saver mode. Press the Power Button quickly to show the screen, and swipe the padlock to the right to unlock.

Step 2: Login

Enter the TABLET LOGIN NAME you created when you set up the new installation in IrrigRAY Online.

Enter the tablet PASSWORD as well.

Note: This is the IrrigRAY Tablet login details, NOT the Wi-Fi password.



When the IrrigRAY application starts, it takes up to 2 minutes for the application to download all the settings previously created in IrrigRAY Online, as well as power-up of water control valves.

- During this period, if more than 7 gallons of graywater is in the pumping basin, the pump will automatically pump this graywater to waste. This is a safety feature, ensuring any graywater possibly stored longer than 24 hours is not used for irrigation
- Left hand menu options will not activate until the startup phase has finished
- If the tablet is not connected to the controller box (USB cable) IrrigRAY may automatically attempt to clean the filter and place the filter into freeze mode. This is a safety feature, resulting from lack of temperature sensor information, to avoid freeze damage to the filter.

When the application has finished initializing, sensor values such as Current PSI and Temperature will start to vary—this is normal, displayed values are not averaged or smoothed at all, and can 'bounce' around in value.

The Manual Control page lets you individually control:

- System valves
- Pump power
- Filter position
- Irrigation Zone valves.

The following Sensor information is displayed:

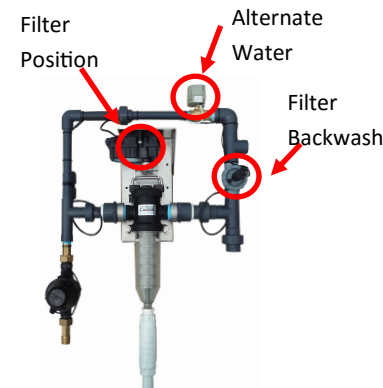
- Pressure before Filter (PSI)
- Pressure after Filter (PSI)
- Pumping basin water level (Inches)
- Makeup Water (Alternate Water) flow rate (gpm)



Manual Control suspends all irrigation activities. It stays active until the tablet goes into screen / power saver mode, when the program reverts to Auto Operation. You can also exit Manual Control at

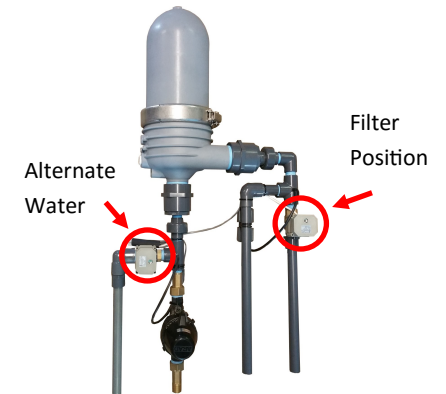
any time by selecting another left menu option. Because the screen is long, scroll the page up and down to access the sensor data, irrigation zone and system switch sections.

Automated Twist II Clean Filter



- This filter has two separate valves for supplying Makeup water (Alternate Water) and Filter Backwash.
- The Filter Position actuator moves the filter handle from normal position to cleaning position.

Automated Water ReNu Disc Filter



- This filter uses the Alternate Water valve for both Makeup Water and Filter Backwash
- The Filter Position valve opens reverse flow to waste, allowing the filter to backwash backwards.

• Check Pumping Basin Waste Valve Operation

When the **Waste Diversion** switch is OFF, the electric valve in the pumping basin should be in the closed position. Turn on the switch to see the valve move to the open position.

• Check Filter Operation

Select **CLEAN** in the **Filter Handle Position** dropdown. For the Twist II Clean Filter, the handle will move to the cleaning position. For the Disc Filter, the Filter Position valve

will open. Move the Filter Handle Position back to **NORMAL** when finished.

• Check Filter Backwash Operation (Twist II Clean filter only)

Turn on the Filter Backwash switch - You should hear the solenoid valve click and maintain a buzzing sound.

• Check Alternate Water Supply

Turn on the **Alternate Water** switch. The valve will open, and the Pressure Sensors before and after the filter will rise. This is the static supply pressure (no water flow) and for a Twist II Clean Filter System

should be 40 PSI or more. The Disc Filter system requires at least 25 PSI static pressure. Keep the **Alternate Water Supply Valve ON** for the next check.

- **Check each Zone for flow & pressure** With Alternate Water On, turn on each irrigation zone at a time, and check the flow pressure is at least 5 gallons per minute—this will take up to 1 minute to display properly because the meter must pass 3 gallons for an accurate measurement. When finished, turn off the

Alternate Water supply switch, keeping 1 irrigation zone open until the pressure has dropped below 2 PSI.

• Check Water Level Sensor and Pump Operation

Using a hose, or by turning on a graywater shower, fill the pumping basin half way.

Check the Basin Water Level Sensor shows a value between 0 and 20 inches. Turn on the Pump switch and check pressure after the filter - It should be between ~ 8—12 PSI.

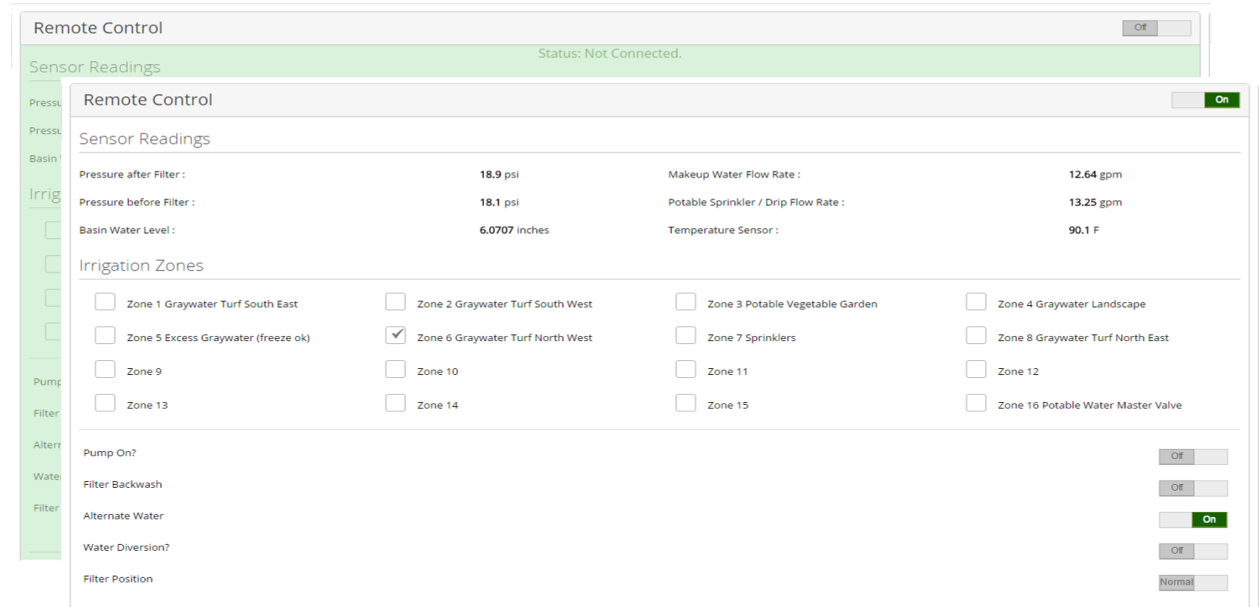
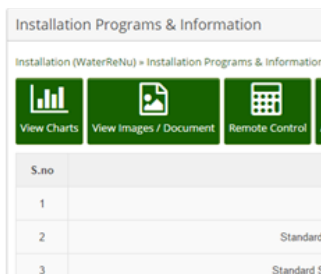
A unique feature of the IrriGRAY system is remote control. Any smart device, with the correct login details, can 'remote control' all valves & functions. Flow rates, pressure values and water levels are updated ~ every ½ second, providing instant feedback. This is particularly useful for:

- Landscape installers who want to check their installation while standing in the landscape
- Clients / Contractors who want to add extra water to a zone as a one-time event
- The IrriGRAY support team, running system checks when diagnosing an issue.

When remote control starts, it automatically suspends any controller programmed activity – it even stops a local manual control screen if it is active. When the remote control is stopped, the controller resumes usual automatic operation.

The tablet also has a virtually identical page called 'Manual Operation' which enables the same functions directly on the tablet, whether Wi-Fi is connected or not.

To access Remote Control, log in via www.irrigray.com, select the installation required, and then click on the Remote Control button.



- Turn on Remote Control by clicking the on/off button at the top right corner of the screen.

The first third of the screen provides near real time feedback of filter pressures, graywater pumping basin water height, and flow rates. Note: flow rates need at least 3 gallons to pass through the flow meter before accurate values are shown.

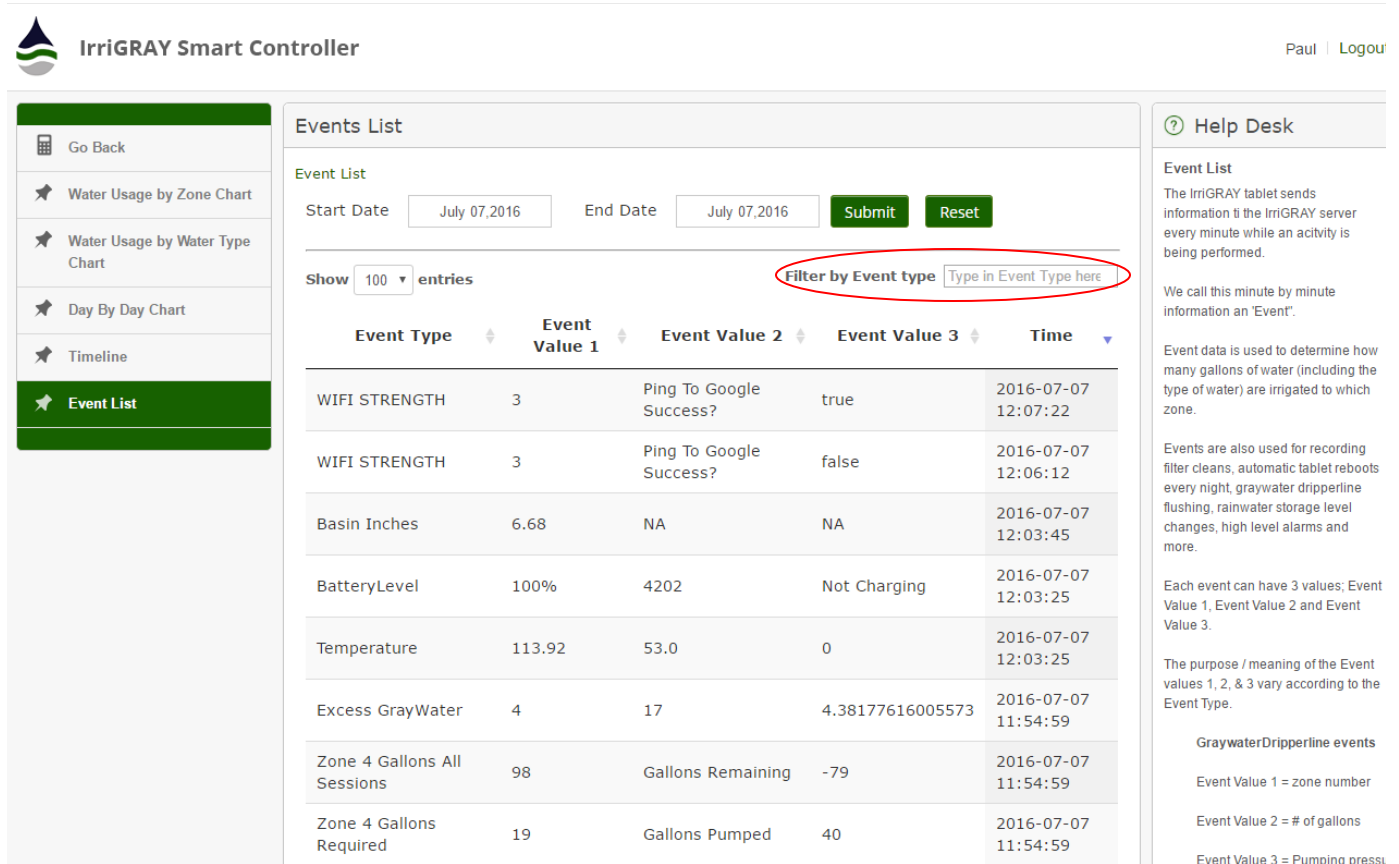
The next section of the display allows you to turn on all irrigation zones, separately or together. The final section has individual control for alternate water supply, filter backwash, graywater pump and also the graywater diversion valve to waste, inside the pumping basin.

ALWAYS TURN OFF Remote Control when you have finished. Automatic irrigation and manual control modes are always suspended while Remote Control is turned on—Even If You Close Your Web Browser!

When connected to the internet via Wi-Fi, the IrrigRAY tablet sends the following performance information to the IrrigRAY Online Server:

- Irrigation events, every minute any type of water is irrigated. The data sent includes zone number, type of water, water budget & water pressure
- Filter cleaning information, every time the filter self cleans
- Tablet / Circuit Board connection details, software version
- Environmental data, generally every 10 minutes:
 - Temperature (sensor), Temperature (internal tablet temperature)
 - Tablet charge level and charging status
 - Graywater pumping basin water level
 - Wi-Fi signal strength.
- Immediate sensor warnings, include:
 - Pumping basin high water level
 - Low potable water pressure
 - Zero flow graywater
 - Zero flow potable water.

This list is not complete, and more features / events are being added as new features are included in IrrigRAY.



IrrigRAY Smart Controller Paul | Logou

Events List

Event List

Start Date End Date

Show entries Filter by Event type

Event Type	Event Value 1	Event Value 2	Event Value 3	Time
WIFI STRENGTH	3	Ping To Google Success?	true	2016-07-07 12:07:22
WIFI STRENGTH	3	Ping To Google Success?	false	2016-07-07 12:06:12
Basin Inches	6.68	NA	NA	2016-07-07 12:03:45
BatteryLevel	100%	4202	Not Charging	2016-07-07 12:03:25
Temperature	113.92	53.0	0	2016-07-07 12:03:25
Excess GrayWater	4	17	4.38177616005573	2016-07-07 11:54:59
Zone 4 Gallons All Sessions	98	Gallons Remaining	-79	2016-07-07 11:54:59
Zone 4 Gallons Required	19	Gallons Pumped	40	2016-07-07 11:54:59

Help Desk

Event List

The IrrigRAY tablet sends information to the IrrigRAY server every minute while an activity is being performed.

We call this minute by minute information an 'Event'.

Event data is used to determine how many gallons of water (including the type of water) are irrigated to which zone.

Events are also used for recording filter cleans, automatic tablet reboots every night, graywater dripperline flushing, rainwater storage level changes, high level alarms and more.

Each event can have 3 values; Event Value 1, Event Value 2 and Event Value 3.

The purpose / meaning of the Event values 1, 2, & 3 vary according to the Event Type.

GraywaterDripperline events

Event Value 1 = zone number

Event Value 2 = # of gallons

Event Value 3 = Pumping pressure

The Event List is the quickest way to determine if the IrrigRAY installation has connected properly via Wi-Fi to the IrrigRAY online server. Even if no water has been processed, there will be event records within 2 minutes of connection.

Most clients will never need to look at information on this page, however it can be useful for installers who want to look at individual flow and pressure rates for each zone, filter tuning and more.

To access this page, select 'Charts' from the Installation Configurations page.

Data is easily filtered by Event Type - just start typing the name of the event and the list will automatically filter.

Advanced Graywater & Rainwater

This diagram illustrates components required to manage both Rainwater & Graywater with IrriGRAY. In this example, Rainwater is used as makeupwater supply for graywater zones, as well as direct, disconnected use for irrigating vegetables and if necessary spray zones.

When designing an alternate water supply system, carefully analyze the ROI of graywater and rainwater separately:

- 3 Residents produce ~ 4,000 gallons graywater per month
- If Irrigated by capillary drip, 95% efficient
- An equivalent rain storage system, using spray once per week @ 50% efficiency requires
- San Angelo: > 3 months or 24,000 gallons
- San Diego: 9 months or 72,000 gallons
- Small Rain Tanks useful in winter, for supplying commodes and laundry
- Rain ROI increased if substantial penalties for site run-off
- Rain does have good PR and Off Grid attractiveness

Concept Diagram for Illustrative Purposes Only. © Water ReNu LLC
Do Not Scale. Verify all details and modifications before Construction.

