Webinar: Whole-house Greywater Systems: GreyFlow, IrriGRAY, and Nexus eWater

March 16th, 2016

Moderator:
Laura Allen
Greywater Action

Presenters:
Paul James
Water ReNu-IrriGRAY

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AWWS GreyFlow

Bob Hitchner
Nexus eWater
Grey Water Reuse in Domestic & Commercial Applications

By Sam Milani
Managing Director
Presentation Outline

- What we have learned about greywater diversion in the past 12 years
- Greyflow Range of Domestic Grey Water systems
- The Greywater irrigation system
- Domestic & Commercial Applications
- AWWS the world leader in Greywater diversion
What we have learned about Grey water diversion systems in the past 12 years

1. Your soil is your tank
   - Avoid large tank, more Hygienic, reduces footprint, more economical systems, easier to transport and install, will fit in 99% of the homes

2. Good Pre-filtration and no Post-filtration

3. People do not like to maintain or clean dirty filters manually.
   - Install a low maintenance system with Self-cleaning filter mechanism

4. Drip is the best way to spread the water over a large area. But Greywater drip irrigation is very different than normal drip irrigation

5. New homes require 2 stage installs

6. Water restriction, government incentives & cost of water are the biggest driver of grey water reuse.

7. Commercial Greywater systems are sized based on the garden sizes and require disinfection to avoid risk of infection
1. G-Flow Plug & Play (8 Gal tank)
   - Above Ground & Partially Buried
   - 2” inlet/outlet
   - RRP $600 + Tax

2. Grey Flow PS Self clean Plug & Play (5 Gal tank)
   - Above & Partially Buried
   - 4” inlet/outlet
   - RRP from $1700 + Tax

   - Below Ground & Partially Buried
   - 4” inlet/outlet
   - RRP from $2300 + Tax
Greyflow Range of Greywater
2 stage install diversion system for new homes on slab

1. Grey Flow PS 2 stage install
   - Below Ground
   - 4” inlet/outlet
   - RRP from 1800 + Tax

2. Grey Flow Pro 2 stage install
   - Below Ground
   - 4” inlet/outlet
   - RRP from 2500 + Tax
Greywater irrigation system

Greyflow Dripline 2.6 GPH with large passages

Lilac color with emitters every 12” (comes in 330 feet coil)

2 to 6 stations GF Rotor volumetric indexing Valve

Rotates once 13 or 26 gallons have passed thru

**Installing the GF Drip-Tube irrigation lines**

1. 1” or larger feeder pipe
2. Coil of GF Drip-Tube around trees
3. Elbow take-off adaptor
4. 0.6” GF Drip-Tube (no more than 7 yd length
5. 1” flush manifold
6. Manual flush valve

**Multi station distribution using GF Rotor**

Use GF Rotor flow based indexer to split the system into more than one station. Up to 6 stations.

2 or more stations can be joined to form a single station

Make a hole with punch tool & insert drip tube takeoff

1” Low density poly supply pipe. (Not supplied with the system. To be purchased separately)

Minimum of 4 and maximum of 8 trees per station (one emitter per tree)

When using driplines make sure to adhere to the max run length of 7 yards per take-offs

**Grey Water Warning Sign** to be visible at all times

GREY WATER IN USE ON THIS PROPERTY
Domestic & Commercial Applications

✓ Homes with the G-Flow & Town water backup
☑ New Homes with the G-Flow & scheme water backup
✓ New Homes with the Grey Flow PS
St Barbara Mining Camp Leonora WA (2008) with 75 x Greyflow PS self clean (1/donga) for a saving of 3 Millions Gallons/year
St Barbara Mining camp
construction phase May 2008
St Barbara Mining camp
Planting phase Feb 2009
St Barbara Mining camp
After 2 years Feb 2011
Get $ 8000/year rebate on their sewer fees
Coogee surf lifesaving Club (2012)
With 1 x Greyflow Pro 5000 with ozone disinfection for a saving of 300,000 Gal/year
Leederville Office Building (2015)
With 1 x Greyflow Pro 600 with ozone disinfection for a saving of 50,000 Gal/year
Warncliffe Mill Caravan Park WA (2015) with 1 x Greyflow Pro 150 with chlorine disinfection for a saving of 300,000 Gal/year
Bethanie Gwelup WA age care laundry (2016) with 2 x Greyflow Pro 150 with ozone disinfection for a saving of 700,000 Gal/year
AWWS is the World leader in Greywater diversion

- With over **12 years experience** in greywater diversion for gardens
- **Competent & Qualified** design staff
- More than **7,000 systems installed worldwide** (Australia, New Zealand, South Africa, Israel, Morocco, England, Chile & USA)
- A wide range of **Award winning systems** to suit **domestic & commercial applications**
- A unique **Patented** self cleaning system

AWWS is the uncontested world leader in Greywater diversion for gardens
We manufacture Smart Graywater, Rainwater, Condensate & Potable Water Irrigation systems for residential, commercial and industrial clients.

Patents Pending
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Paul James
VP Research & Product Development
Water ReNu LLC Plano Texas
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Water ReNu

- Signature product = IrriGRAY
  - Product Development since 2000 / 2001
  - IrriGRAY platform released 2015
  - Small / large residential, multi-family & commercial

- Automated Filter Systems
  - Well Water
  - Industrial Process
  - Other

- Monitoring
  - Wells
  - Water Storage
  - Filter Performance
  - Commercial Controllers

Texas Advisory Board
- Tim Jackson
  2016 President, Texas Association of Builders (TAB)
- Michael Biggerstaff, TAB Developer of the year 2015
- Chad Decker, 2016 President, San Angelo HBA
- + More across Texas
Key Client Drivers – **95%** of Residents

- **Landscape Insurance** (avoid drought / water restrictions)

- **Save Money Each Year** (lower water bills)
  - $512 per year with IrriGRAY
  - $1,394 with Potable Water Smart Controller & Sprinklers
  - $1,107 with Potable Water Smart Controller & Sprinklers (max usage = 1” per week)

  - **NET** saving (after including incremental installation cost, amortized in mortgage, and running costs) between $350 & $650+ per year
  - Future water pricing increases not included in cost savings

- **Social Conscience / Save Water**

- **Base Price** = $4,150 + Irrigation Dripperline / Irrigation Components

- Incremental installed cost ~ 2,500 – 5,000 more than traditional spray 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**
Key Client Drivers - Installation

- **Builders; need solutions for reducing outdoor water consumption**
  - Standardized installation process for plumbers, electricians and landscapers
  - Site Context Flexibility (multiple sources of water)
  - Monitoring for landscape guarantees

- **Building Contractors; need plug and play solutions**
  - drop in plumbing,
  - pre wired electrical and control cabling

- **Landscape Installer; simplify installation**
  - simplified rules & techniques, reduce labor & time by 50%
  - One controller for all irrigation and water management methods
  - Internet Based programming
  - Remote Control ability for on site testing and commissioning
  - Automated monitoring until resident move in and initial landscape warranty

- **Landscape Maintenance; minimize site visits while providing superior service**
  - Automated monitoring
  - Internet accessible controller programming
  - Water Management and Budgeting Data / Skills (new residential offering)
IrriGRAY has 5 main components

- Compact Pumping Basin
- Self Cleaning Filtration and Water Management Module
- On-Site Water Management and Process Controller (Wifi Capable), remote software version management and updating
- Irrigation Zones (sub surface landscape bed / turf dripperlines)
- Internet Based Reporting / Configuration / Monitoring Service

Other Managed Components / Supplies

- Rainwater storage & level control
- Condensate
- RO waste (diluted)
- Potable dripperline zones (vegetable gardens)
- Potable sprinkler zones
- Pool / fountain top ups
IrriGRAY Graywater Collection

- Compact 18” Diameter x 30” Deep Sump Basin

- Pumps out as quickly as graywater is produced, storage not required

- **Segregated Waste Plumbing:**
  - Sewer / Septic waste (commodes, kitchen, basins);
  - Graywater (everything else)

- Larger Basin for Commercial applications e.g. Hotels
IrriGRAY Basin, Inside View with Basin Extension

- Energy
  - ~ 0.3 kWh / day (family)
  - < $0.05 day, $16 per year @ $0.15 per kWh

- Pump to Waste Electric Valve (fail-safe to waste)
- Brass Swing Gate Non-Return Valve
- Pump to Filter / Irrigation Electric Valve
- Removable High Capacity Coarse Bag Filter (check annually)
- This valve no longer used, check valve moved to here
- Manual Gate Valve for Manual Shutdown (Code Requirement)
- Self Sensing
- Auto Backwash to Septic / Sewer
- Compact size
- Freeze protected
- Does not remove soap (this helps irrigation)
Disc Filters
Irrigation

- **Landscape Beds**
  - Dripperline on top of soil, under mulch, every 3 - 6 feet, subject to soil type
  - **Capillary Irrigation:** Water the Soil, not the plant

- **Turf, 1-3 inches + below sod, every 12 inches**
  - Prevent striping, small lawns can irrigate via capillary transfer from landscape beds
  - **Dripperlines MUST be pressure flushed every month (5 on / off cycles)**

- **NO Restrictions***
  - Graywater or Potable Water;
  - *A limited number of regions apply potable water restrictions to dripperline systems

- **Uses ½ or less water, grows faster**
  - Daily irrigation c/w irrigation
  - Roots in topsoil, 95% efficiency

*Up to 16 Graywater dripperline, potable water sprinkler & dripperline, & master valve zones
IrriGRAY Controller

- Weatherproof & Lockable Cabinet
- 24v AC 750 ma Manifold & Actuator Power Supply

- 7” Tablet attached with industrial Velcro
- 5v DC Tablet and Electronics Power Supply
- 15 x 24v AC solenoid zones, additional sensor inputs
Water Management & Preventative Maintenance Examples:

How to Manage Graywater throughout the year?

- **Summer**
  All graywater for primary landscape, + makeup water if required

- **Fall / Spring**
  Excess graywater to secondary landscape, e.g. native grasses

- **Winter / Freeze**
  All graywater to secondary, subsurface drainage field
  Keeps load off septic, reducing maintenance

Preventative Maintenance

- Dripperlines require pressure flushing every month to ensure optimum performance for many years – avoid issues with soap and other TDS.
- Too many to describe today
IrriGRAY™ Controller: In the ‘Cloud’

Climate & Water

Select Location:

USA  TX  Dallas/Ft. Worth

ET Values:

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Use Excess Graywater?

Choose which months excess (extra) graywater can be used in the landscape. Otherwise extra graywater is sent to waste.

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Freeze Controls:

Activate Freeze Mode When Temperature Falls Below:  40

Disable Freeze Mode When Temperature Reaches Above:  50

Potable Water Drippe Use

This section defines which days over a two week period that potable water
**IrriGRAY Smart Controller**

### 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.

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<th>Monday</th>
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Maximum Allowed Inches of Sprinkler Irrigation Per Month: 0

### Potable Water Dripperline 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.

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Apply Extra Water On Permitted Days?
- Yes

**Authorities have applied special potable water dripperline use restrictions - and this is rare across the US because dripperlines are normally exempted from restriction - you can turn off days as required.**

Apply Extra Water on Permitted Days?
- If potable water restrictions apply to dripperline irrigation systems in your area, AND you have turned off days as per your restrictions for Potable Water Dripperline Use, you can elect to have the "missing" water - from days where potable water is disabled - added to the next allowed potable water irrigation day. The default setting is "Yes".

Makeup Water Supply Starts at....
- Specify what time of the day graywater production normally ceases. For most households this is 10pm, allowing for night time showers and laundry activities.

If Rainfall Detected.....
- Most rain sensors are adjustable - and are often set to trigger with 1/4, 1/2, or more inches. Subject to your rain sensor, you can set the delay period before potable water should be used to make up for a shortfall of graywater.

Use Excess Graywater?
- Yes
IrrigRAY Smart Controller

**Water Usage by Zone Chart**

| Start Date | February 29, 2016 | End Date | March 01, 2016 | Submit | Reset |

Water usage is split into 5 possible water/irrigation types:

- Potable Dripperline Irrigation
- Potable Sprinkler Irrigation
- Makeup Water Irrigation (related to graywater irrigation zones)
- Excess Graywater Irrigation (if excess graywater has been pumped to a zone)
- Graywater Irrigation

You can change the start and end dates to review water use at different times. The Y-axis shows the number of gallons, and the X-axis shows each zone.
**Live View Chart**

This chart shows when irrigation events occur during the day. The IrriGRAY tablet sends data to the IrriGRAY server every minute and activity is occurring.

The Y axis represents the zone number, with the exception of filter clean events, which are drawn at Y = 0.5.

The X axis represents the date & time range, between the Start Date and End Date.

**Graywater Events**

Graywater is being irrigated throughout the day, and to which zones. Graywater is indicated by yellow triangles.

**Makeup Water** is irrigated (generally at the end of the day), and to which zones. Makeup Water is indicated by yellow diamonds.

When the filter has self-cleaned, it is indicated by an orange circle. Filter cleaning is not related to irrigation zones, so these circles are placed below zone 1.

**Potable Water Zone Events**

Potable water dripperline zones do not use potable water for irrigation. This chart by amCharts.
Remote Control

Sensor Readings

- Pressure before Filter: 2 psi
- Pressure after Filter: 1 psi
- Basin Water Level: inches
- Makeup Water Flow Rate: 1 gpm
- Potable Sprinkler / Drip Flow Rate: 2 gpm
- Temperature Sensor: 2 F

Irrigation Zones

- Zone 1: Graywater Turf South East
- Zone 2: Graywater Turf South West
- Zone 3: Potable Vegetable Garden
- Zone 4: Graywater Landscape
- Zone 5: Excess Graywater (freeze ok)
- Zone 6: Graywater Turf North West
- Zone 7: Sprinklers
- Zone 8: Graywater Turf North East
- Zone 9
- Zone 10
- Zone 11
- Zone 12
- Zone 13
- Zone 14
- Zone 15
- Zone 16: Potable Water Master Valve

Pump On?
Filter Backwash
Alternate Water
Water Diversion?
Filter Position

Help Desk
Remote Control
Remote Control allows anyone with account access to place the IrriGRAY Controller into a remote controllable manual state.

This enables any of the individual controls such as pump power / water valves & irrigation solenoids to be turned on or off immediately.

Live sensor data (pressure sensors & temperature sensor) are shown every 0.1 second. Please note these numbers do jump around in value, as the values have not been smoothed / averaged by the software.

Gallons per minute flow indicators take some time to show a value, because at least 2 meter clicks are required to determine the flow speed through the meter. If flow stops, the value is not changed to 0. The software continues to measure time and meter clicks to determine if a very slow flow is still occurring.

Before closing the session, and after all water operations have been completed, open one of the irrigation solenoids to remove any residual pressure in the system. If this is not done, IrriGRAY will detect the residual pressure and assume the graywater pump is attempting to irrigate, and the software will create...
• What Graywater Irrigation Can Achieve:
  – For a DFW property with 2,000 sq ft turf & 1,000 sq ft beds (3 residents)

• 124,000 Gallons Potable Water with Sprinklers and a ‘smart’ controller

• 96,000 Gallons Potable Water with Sprinklers limited to a max of 1" per week

• 5,000 Gallons of Potable Water in conjunction with an Efficient Graywater System
Nexus eWater

Water Recycling for the Home

Bob Hitchner, bob@nexusewater.com
1. Grey water is collected
2. Warmth is extracted and sent to NEXheater
3. Water is treated in NEXtreater
4. Treated water is stored for lawn irrigation & toilet flushing
What we will cover

1. The Nexus Solution is a “certified” greywater treatment solution – So What?
2. The Nexus solution is an automatic greywater solution – So What?
3. How the Nexus System Treats Water
4. Installation: “Recycle Ready” + NEXtreater
5. Installation pix
NEXtreater

why certified treatment?

- Certified to NSF/ANSI 350
- Very high water quality
- Connects to any irrigation system
- Above-ground irrigation OK
- Veggies watering OK
- Flushing toilets OK
How clean? Very clean!

Water Quality Spectrum: BOD

- Sewage
- Blackwater
- Grey Water (untreated)
- Septic Discharge

BOD$_5$

- 500
- 450
- 400
- 350
- 300
- 250
- 200
- 150
- 100
- 50

- Secondary Treated Sewage
- Tertiary Treated Sewage

- Potable

Nexus e-Water

NSF Certified to standard 350
An Automatic System – So?

1. Treats and stores water until use
2. Connects to automated irrigation controllers
3. Works in background – no active operation by you, the Homeowner
4. Operates continuously – no diverters to operate
5. Alerts you when a filter needs to be changed
6. Works when you are on vacation
Socal City – Recycling Impact

2000 sq ft landscape, 4 persons

Greywater available monthly

[Bar chart showing monthly greywater availability for different months]
Data is available on mobile app
Treatment Process

1. Grey Water Collection
2. Batch Treatment Process
   - Coarse Filtration (~30 mesh)
   - Hybrid Flotation (Aeration, Ozone and Electrolysis)
   - Activated Carbon Contact
   - Fine Filtration (<0.5µ)
   - UV Disinfection
3. Storage and Reuse Management
4. Monitoring and Reporting
5. Fault Detection
Installation Requirements
See: The Nexus Guide to the Recycle-Ready Home

1. Dual Plumb
2. Greywater and Black water must exit home in same location
3. Two tanks in ground
4. Pre-configured “greywater access port”
5. NEXtreater treatment appliance (above-ground)
6. 10 Amp electrical circuit
7. Nearby hose bib for top-up water
8. Connect treated water tank to any irrigation system
Side View with Tanks

75 gallons Greywater

200 gallons fresh water
NEXtreater

The heart of a certified, treated, automatic solution
Select Tank & Treater Locations
Dig Appropriately Deep Holes
Level, Square, & Align
Connect Underground
Connect Vent
Install Bench
Connect Plumbing to Bench
Voila! Your Greywater Access Port
Bench Level & 5”+ off House
Recycle-Ready
Tanks Backfilled
NEXtreater Installed
Your Next Steps

• If building a new home: Ask your builder to make it “Recycle Ready”

• Download our Guide to the Recycle Ready Home (see home page or ...):
  http://www.nexusewater.com/recycle-ready-home-design

• Send me questions: bob@nexusewater.com
Thank you!