waterleaf

Estuary™
Residential Greywater Reuse System

Installation Manual

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Contact Information

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Contents

Safety

Read this manual before installing and/or using the Estuary system.

 WARNING- ELECTRICAL HAZARDS

- **Dedicated GFCI Circuit Required:** The Estuary must be connected to a dedicated 20-amp circuit with GFCI protection. Do not share this circuit with other high-power devices. This prevents circuit overloading and reduces the risk of electrical shock.
- **Do Not Open or Service:** Never open the electrical control enclosure or attempt to service internal components. The Estuary contains hazardous voltages and must only be serviced by approved Waterleaf technicians. Opening the unit will void your warranty and may result in serious injury or death, electrical shock, or property damage.

 WARNING - BIOLOGICAL HAZARDS

- **Non Potable Water:** The Estuary system supplies NON-POTABLE water. DO NOT drink, cook with, or otherwise consume recycled water from the Estuary.
- **Greywater Only:** Never use dark greywater from kitchen sinks or dishwashers.

The Estuary system should only be serviced by authorized technicians. Always disconnect the Estuary system from the main power supply before servicing or maintenance to avoid risk of electric shock.

Responsibility and Liability

Manufacturer

Waterleaf warrants the proper working of the system according to its general sales conditions. Waterleaf is not liable in the following cases:

1. Failure to follow instructions for installation and maintenance of the Estuary.
2. Failure to follow instructions for use of the Estuary system.
3. Inadequate or insufficient maintenance of the Estuary system.

Installer

The installer is responsible for the installation and initial commissioning of the Estuary.

1. The Estuary system should always be installed according to local regulations and standards and the installation manual provided by Waterleaf.
2. Perform initial commissioning and necessary check.
3. Explain the installation to the owner/user.
4. Handover all manuals to the owner/user.

Owner/User

To ensure the optimal functioning of the Estuary system, please observe the following:

1. Read and follow the instructions for the operation of the Estuary system.

2. Request assistance of a qualified installer for installation, commissioning, servicing, and maintenance.
3. Ask the installer for an explanation of the installation.
4. Keep the area around the Estuary accessible for servicing and maintenance.

Introduction

The Estuary Residential Greywater Reuse System is designed to reduce household water consumption. It collects gently used greywater from sinks, showers, and washing machines and recycles it for toilet flushing and garden irrigation. The Estuary is the only living, modular ecological water treatment system powered by the biological systems of natural wetlands and the purifying properties of volcanic soils to clean and recycle water for reuse in the home and garden.

Natural beauty & functionality

Powered by biological wetland systems and purifying volcanic soils in a stylish raised-bed planter.

Industry-leading quality

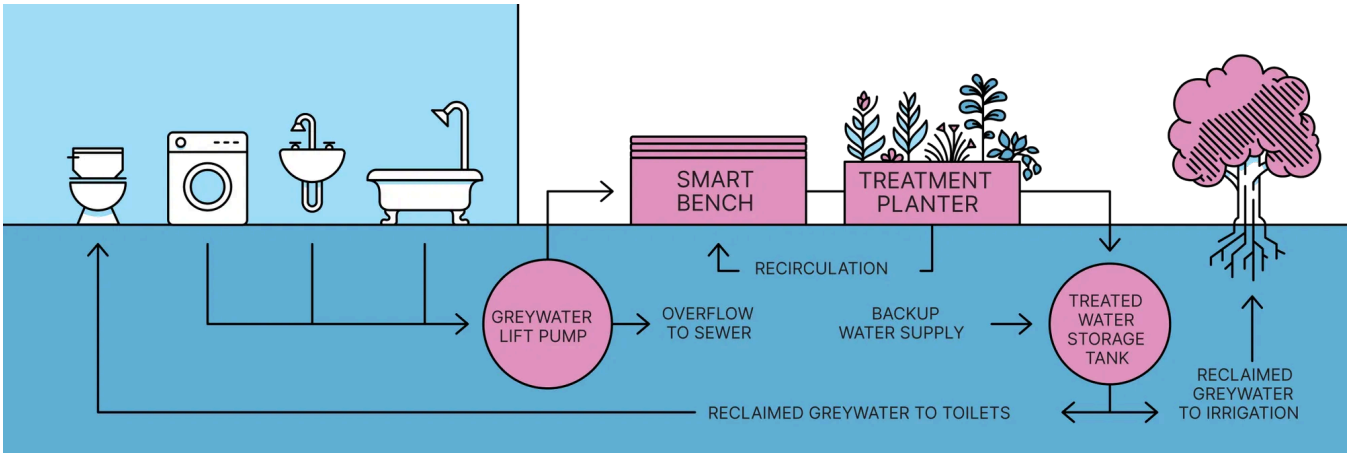
Designed to exceed NSF 350 international water quality standards for safe reuse in your home and garden.

Real-time monitoring

Monitored 24/7 to optimize treatment performance, ensure water quality, and check for maintenance.

System Design

Configuration



Requirements

Always check that the system and installation comply with country, state, and local regulations and standards.

In the case of new construction, we strongly recommend installing the Estuary system *only after* the building process is complete to prevent accidental damage to the system and to prevent building debris and chemicals from entering the system.

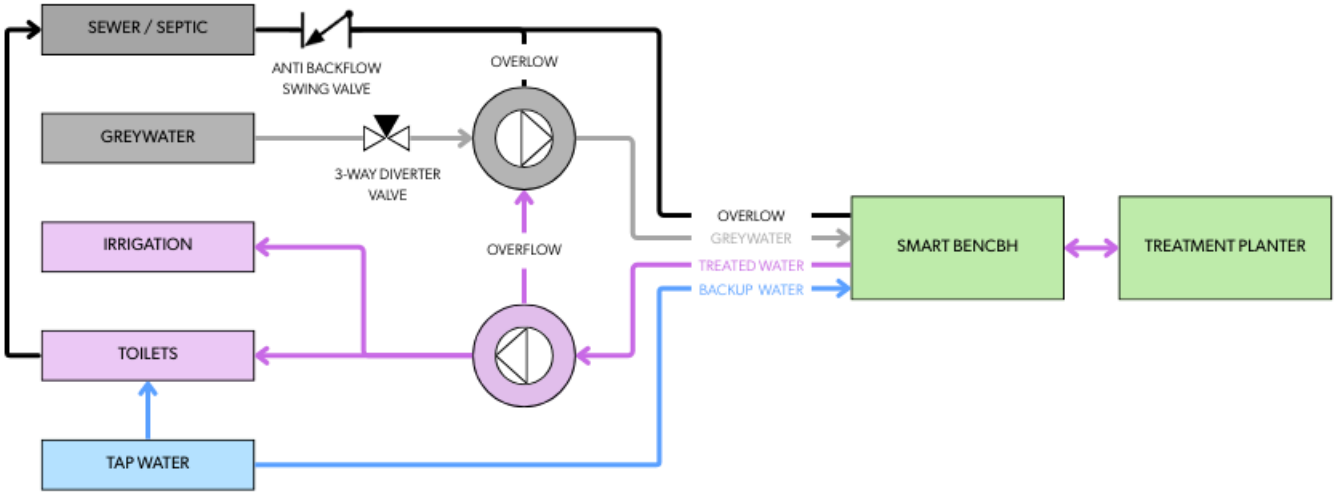
Influent Characteristics

The Estuary system is designed for household greywater, which typically contains soaps, oils, hair, and organic material. The influent characteristics should not exceed the following:

- CBOD5: < 210 mg/L
- TSS: < 160 mg/L
- pH: 6.0 – 9.0

Plumbing

The Estuary requires multiple plumbing connections that should be installed with appropriate stub-outs located near the bench.



Greywater Connections

Use only shower, bath, bathroom sinks, and laundry water as source water. Do not supply wastewater from kitchen sinks, dishwashers, or toilets to the Estuary system.

All separated greywater pipes should terminate at a single 2” stub-out located 12” to 24” below grade.

Greywater Diverter Valve

A manual 3-way valve diverts greywater to the sewer when the Estuary is not in use. Recommended models:

- Jandy 4715 3-port 1.5 to 2-inch Gray Valve
- Pentair 263037 3-way 1.5” to 2” valve

Lift Pump

In most cases, the Estuary system is installed at or above the elevation of the greywater sources, so an appropriate lift pump must be installed to transfer the greywater to the inlet of the Estuary

system. An appropriately sized and certified lift pump tank must be installed in the ground where greywater exits the building. The tank must also have an overflow connection to the sewer.

Backup Freshwater

Supplies fresh water from the main tap when recycled water is unavailable. All connected tanks utilize an internal air gap. There are backup freshwater connections to the bench module and storage tank. In the event of minimal greywater influent to the Estuary, these connections will keep the plants in the planter watered, and supply water to the storage tank to ensure water availability for irrigation and/or toilet flushing.

Reuse Water

Provides recycled water for indoor toilet flushing and/or outdoor irrigation. 3/4" PEX purple pipe is recommended for indoor plumbing. 3/4" PVC or HDPE purple pipe is recommended for outdoor plumbing.

Sewer Connection

Drains excess greywater from the house and treatment system to the sewer.
A 2” or larger ABS or PVC pipe located 18” below grade is recommended.

Flow Rates

The Estuary treats 50 GPD per planter module, up to 150 GPD, or three modules.
The Estuary is capable of handling periodic inflows up to 55 GPM.

Plumbing in cold climates

In colder climates, the Estuary system requires winterization to prevent freezing. External plumbing should be insulated with UV-resistant outdoor-rated pipe insulation.

Power supply

120 VAC 20 Amp circuit with GFCI protection.

Wireless Internet

2.4GHz band (b, g, n, ax, be)

Location

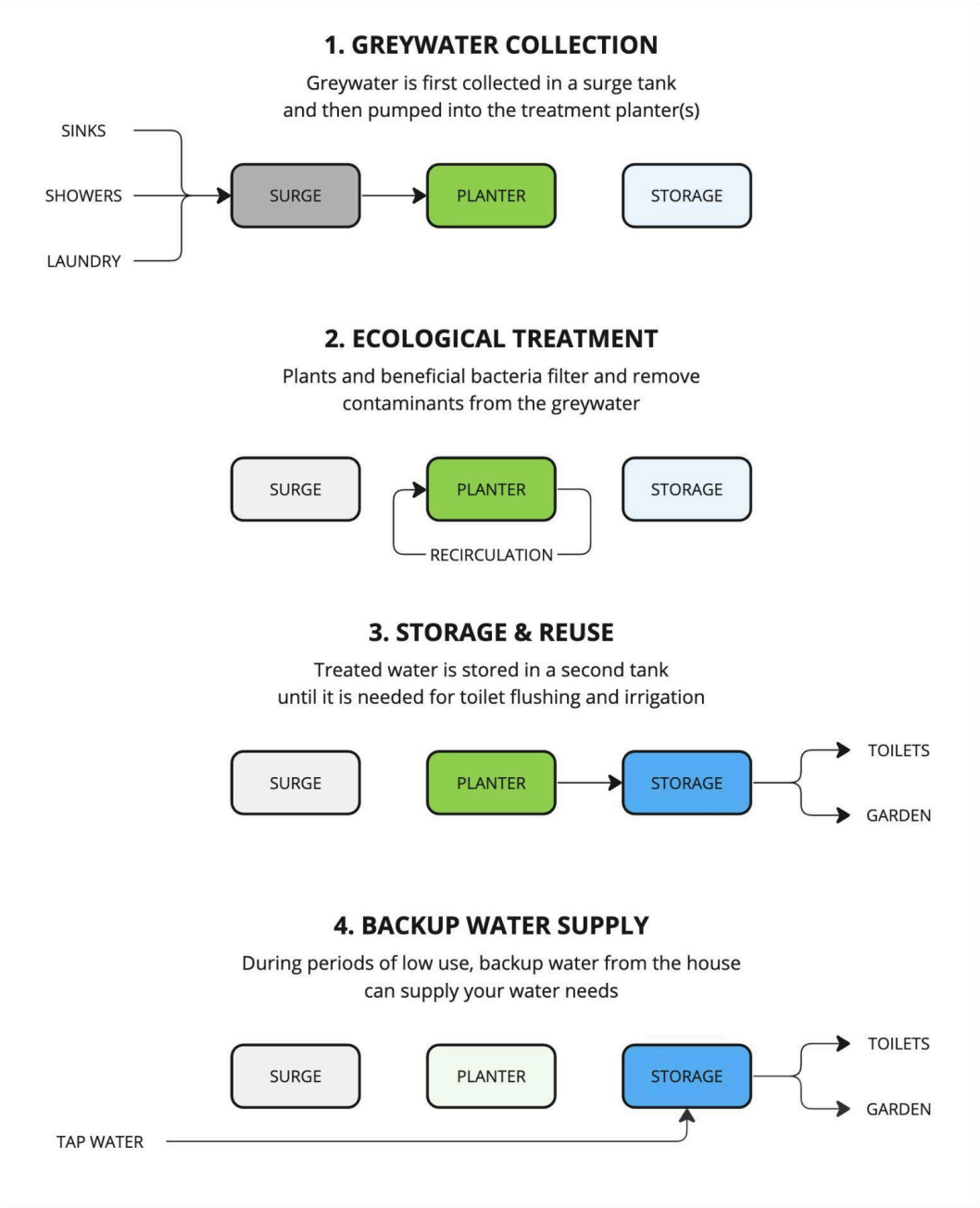
The treatment system must be placed on a flat, level base. 4 inches of compacted crushed rock or a concrete slab are recommended.

Climate

The Estuary operates optimally in outdoor temperatures between 20°F and 110°F. There is no limitation on elevation.

Operation

Treatment Process



Bench Module

The bench module provides all plumbing and electrical connections for the treatment system. The bench receives greywater from the house, distributes it to the planters for treatment, and sends the recycled water to storage. The bench contains a holding and settling tank, pumps, valves, controls and monitoring system, and UV disinfection.

Planter Module(s)

The planter module provides filtration and ecological treatment of the greywater. Multiple planter modules can be connected in series to increase the overall treatment capacity of the system.

Filtration Media

The Estuary uses a proprietary hydroponic soil consisting of a blend of natural volcanic rock and pelletized activated carbon.

Plants

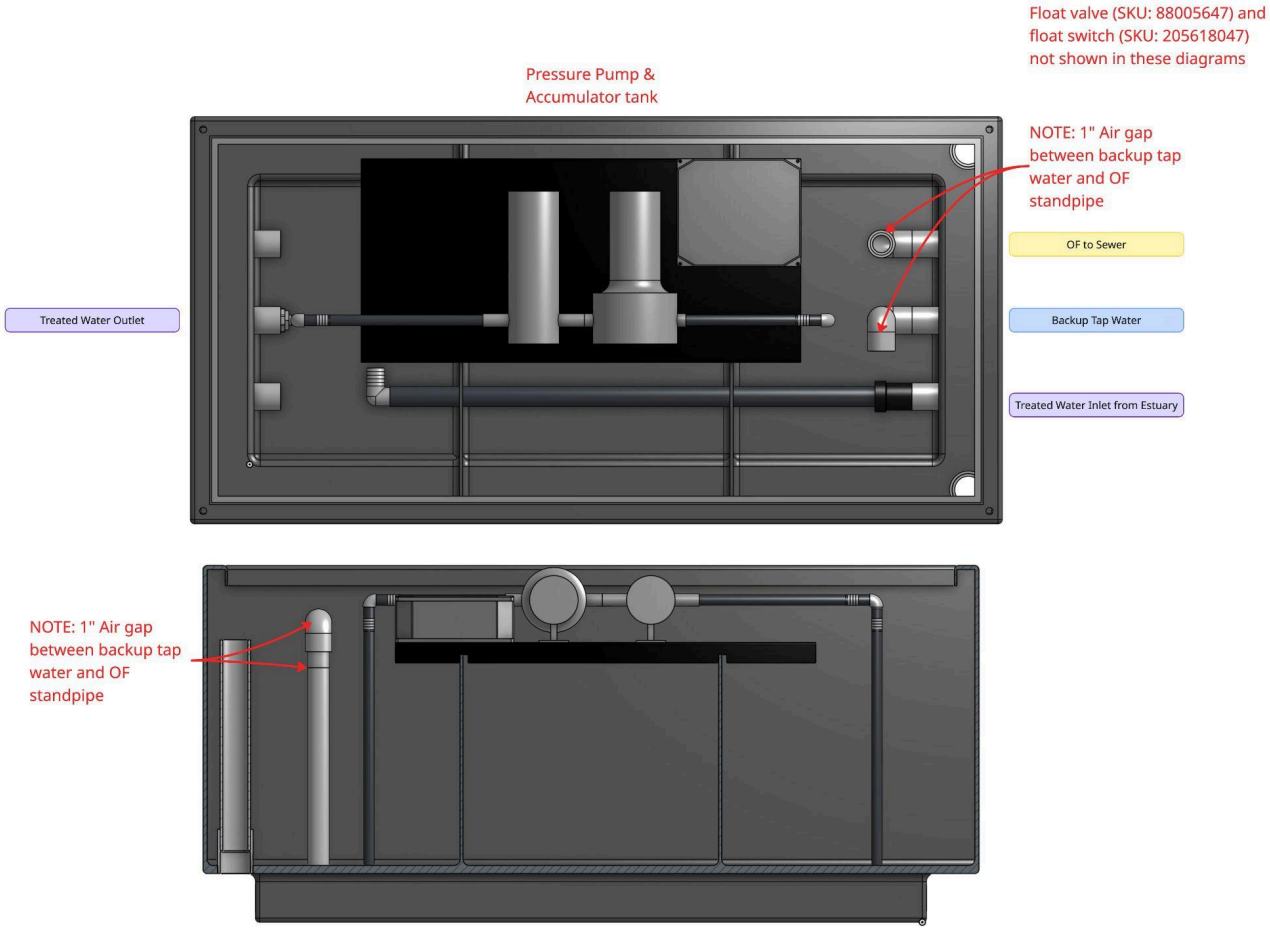
A wide variety of plants are suitable for use in the Estuary. The specific plants selected for each project depend on the local climate conditions and aesthetic preferences of the owner.

Storage and Distribution

Storage Tank

The storage tank can be either above ground or below ground and is individually sized to meet the requirements of each project.

Backup freshwater can be used to maintain the water level in the storage tank when recycled water is unavailable. An included float valve is used for setting the desired water level.



The storage tank should be placed on a level compacted gravel surface or concrete slab the same way the bench module and planter are. The storage pump is a diaphragm pump with a built-in pressure switch and attached pressure tank. To send water to your irrigation lines, simply install a garden irrigation timer downstream of the storage tank and the pump will take care of the rest.

Supply a **GFCI** power connection through the vertical PVC conduit.

Review the above diagram for relevant connections. For ease of installation, Waterleaf recommends using a flexible PVC pipe to make any connections to and from the bench module and storage tank.

Distribution

The Estuary bench module can distribute treated water directly. The maximum flow rate is 250 GPH and the maximum pressure is 2.5 PSI.

If a greater pressure or flow rate is required, the storage tank module contains a high-pressure pump that supplies recycled water for toilet flushing or irrigation. The pump outlet pressure is rated 15 PSI to 45 PSI (max).

A pump controller allows the automatic operation of the pump and prevents it from dry-running. It also has a manual and an automatic reset and a built-in non-return valve.

Materials

Bench and planter modules are made of glass fiber-reinforced plastic (GFRP).

Plumbing components are made of PE, HDPE, PVC, and ABS.

All other component materials per manufacturer specifications.

Installation Instructions

Full installation instructions can be viewed in the Installation Video at
https://www.waterleaftech.com/resources

Off-loading and Unpacking

The Estuary system will be transported on a standard shipping pallet with protective plastic film, cardboard edge protectors and plastic pallet strapping. Multiple bench and planter containers may be stacked together on a single pallet.

The containers are less than 60 pounds each and may be safely carried by two people. When moving the containers, handle them with care and keep them in an upright, vertical position. Once they are in their final installation location, remove the protective film.

Bags of filtration media may be packed inside the containers for shipment. These should be removed before attempting to carry the containers. Afterward, they can be emptied into the planters according to the instructions below.

System Assembly

Bench Module

Set the bench on the prepared base closest to the plumbing connections.

Connect the inlets and outlets to the corresponding pipes using the included sections of flexible PVC pipe and push-connect fittings.

Note: push-connect fittings can only be removed with the included release tool.

Connect the power cord to the GFCI outlet in the plumbing box or to another GFCI-protected outdoor-rated power outlet. Do not turn the system on.

Planter Module(s)

The planter module provides filtration and ecological treatment of the greywater.

Set the planters on the prepared base beside the bench. It is possible to do this with one person but working with a partner is beneficial.

Align the containers and double check their level with respect to each other and the grade.

Note that once the planter module(s) are connected you will not be able to adjust the pipe length without replacing the connecting pipes.

If you wish for the containers to be flush with each other, cut the HDPE pipe into 4.75” segments. If not, cut to desired length. Insert the provided 1” HDPE pipe into the Blu-lock couplers on the outside of the planter. Push the planter towards the bench until the 1” HDPE pipe is about to be inserted into the opposing couplers on the bench. Using one hand, align the HDPE pipe with the couplers, push with the other hand.

Planter Filtration Media

Warning: *Use only the filtration media supplied by Waterleaf.*

Add water to the planters until the water level also reaches the top of the baffles and the filtration media is fully saturated. Then, gently tap the sides of the containers to help the filtration media settle into place and fill any empty corners. This will cause the filtration media to sink lower. Add more media as needed to bring it back up to the top of the baffles.

Plants

Warning: *Plants must be promptly planted into the Estuary system upon arrival. Failure to do so may result in stunted growth or death of the plants. If immediate planting is not possible, place the*

plants out of direct sunlight and ensure adequate and consistent water. Plants stored in this way must be planted within 3 days. Follow planting instructions in installation video: https://www.waterleaftech.com/resources

General Transplanting Tips

1. Maintain consistent moisture levels before, during, and after transplanting.
2. Transplant during cooler parts of the day (morning or evening) to reduce plant stress.
3. Remove any dead or yellowing leaves to reduce stress on the plant

Once all the plants are in the planter, use the remaining filtration media to fill in around the roots. The final level of the filtration media should be about 1" lower than the top of the planter. Adjust the plants so they are all upright and stable. Trim and remove any damaged leaves or stems.

Power & Controls

Remove the Control Unit from its packaging. Secure the Control Unit to the black mounting plate using the velcro strips. Gently press the Control Unit into the mounting plate until it is secure.

Thread the main power cable through one of the vertical PVC conduits in the corner of the bench. The power supply should be 120V 20A with GFCI protection.

Place the water level sensors into the two circular cut-outs on the mounting plate.

Secure the UV lamp power adaptor to the mounting plate using the velcro strap.

Ensure that all pumps, sensors, and electrical devices are plugged into the Control Unit before turning on the main power switch.

Turn on the treatment system via the main power switch located on the Control Unit.

Test each pump by toggling its power switch briefly to "on" and checking for functionality. Reset it back to "auto."

WiFi Setup

1. Ensure the treatment system is connected to power and turned on.
2. Go to the Wi-Fi settings on your phone or computer and join the network named EST-###.
    a. If the network does not appear after 1 minute, briefly press the wifi reset button on the control box and try again.
3. If the device still does not appear after 1 minute, reset power to the treatment system and refresh the home WiFi network. Once connected to the network, you will be automatically redirected to a Wi-Fi portal.
    a. If you are not directed to this portal after 30 seconds go to the following address on your device: http://192.168.4.1/wi?
4. Within the WiFi portal, input the SSID and password of your existing home WiFi network and select "confirm". The treatment system will now connect to the network. If a "success" message appears you can close the portal. Otherwise, input the username and password again ensuring they are correct.

Commissioning

The Estuary needs a few weeks to develop the ecological treatment process and become fully operational. To accelerate this process, add the packets of fertilizer and beneficial bacteria (supplied separately) into the recirculation chamber within the Bench.

Post-installation tasks

- Ensure all switches on the control box are set to the “auto” position.
- Close the bench lid and fasten the security bolts.
- Contact Waterleaf to confirm the successful installation
- Provide the Owner’s Manual to owners.
- Provide post-installation survey to Waterleaf.

Water Quality

The Estuary system is designed and tested to meet the NSF/ANSI 350 standard for residential greywater reuse:

- CBOD5 < 10 mg/L
- TSS < 10 mg/L
- Turbidity < 5 NTU
- E. coli < 14 MPN/100 mL
- pH 6.0 – 9.0

Power Consumption

<175 kWh/year

Noise Level

<30 dB

Startup

The Estuary needs a few weeks to develop the ecological treatment process and become fully operational. Backup freshwater can be supplied until this process is complete. After this startup period, recycled water will become available.

Periods of Inactivity

The Estuary system works completely automatically and adapts to household activity. The Estuary should always be powered on, even when leaving the house for an extended period of time.

If there is no incoming water flow, the Estuary will automatically go into standby mode. The planters will maintain a minimum amount of water to maintain the ecological health of the system.

If the Estuary does not receive any water flow after 1 month, it may need another commissioning period to restart the ecological treatment process.

Power Outages

If power to the device is cut off, the device will not supply recycled water. When power is restored, the system will restart automatically and resume treatment.

Monitoring and Maintenance

The Estuary continuously monitors itself and reports its status to the remote monitoring server via WiFi. In the unlikely event that a component fails, the device will pause treatment and send a warning message to the remote monitoring server.

We recommend a check performed by a Waterleaf accredited technician once every year. This check may contain the following elements:

- Collecting samples of treated water for testing and reporting to local agencies (if required).
- Pruning and weeding the planter(s) to maintain optimal appearance.
- Adding beneficial bacteria to maintain ecosystem health.
- Inspecting pumps, sensors, and other mechanical components for damage.
- Inspecting containers and plumbing for leakage.

Planters

In certain climates, annual pruning of the plants may help maintain the overall health and beauty of the system.

Fallen debris such as leaves and pine needles may accumulate in the planter. This has no effect on system performance but can be cleaned out for aesthetic considerations.

Winter Weatherization

In colder climates, the Estuary system requires winterization to prevent freezing. The storage tank and external plumbing connections should be drained when temperatures drop below 20°F. Planters can be covered or equipped with additional insulation.

Sampling Protocol

For regular water quality assessments, samples should be collected from the treated water outlet. Use a clean, sterilized container and take samples directly from the outlet while the system is running. Alternatively, collect samples from the treated water storage tank. Store samples in a cool environment (<40°F) and deliver them to a certified lab within 24 hours for testing. Ensure all testing follows the local regulatory guidelines.

Do you need assistance? *Contact technical support at support@waterleaftech.com*

Troubleshooting

Issue: System not turning on.

Solution: Ensure the system is plugged into a GFCI-protected outlet and the breaker is not tripped.

Issue: I can’t view my Estuary on Thingsboard

Solution: Contact support@waterleaftech.com

Issue: No recycled water available after startup.

Solution: Ensure the commissioning process is complete and the backup freshwater valve is open.

Appendix A. Parts and Equipment

Parts Requiring Assembly

- Water level sensors
- Controls box
- 2-way backup water valve
- Mounting plate

Mechanical Components and Parts

- 3-way output valve
- Aquasure AS-UV8S UV lamp
- 2x Aquamag 350 pump
- Lift pump
- Flow meter
- Overflow sensor
- Air pump