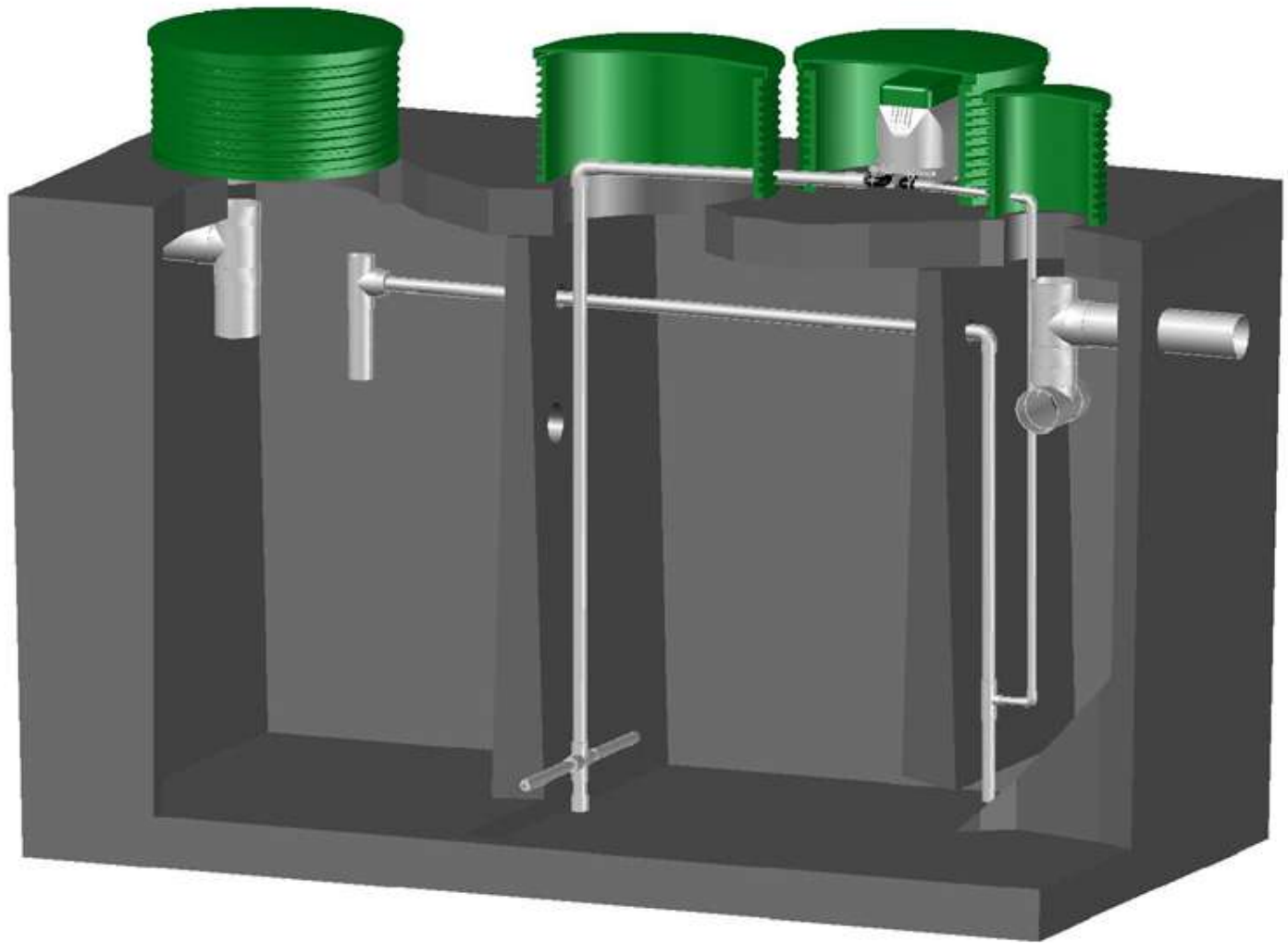




NuWater

Advanced Treatment Systems By Enviro-Flo, Inc



BNR Series Aerobic Treatment Unit Installation and Maintenance Training

2014

Table of Contents

Process Description	3
Definitions	4
Installation	
Installation of the Treatment Tank	5
Installation of Components	5
Installation of Low Air Alarm	6
Replacement of Components	6
Wiring	6
Operation	
Startup	6
Discontinued Service	6
Restart Procedures	6
Discharge	
UV Light	6
Pump Tanks	7
Maintenance	
Trouble Shooting	7
Installer requirements	8
Maintenance duties	8
Maintenance Contract Requirements	8
Amending or Terminating a Maintenance Contract	9
Homeowner's Responsibilities	9
Systems, Parts, and Manuals	9
Contacts	
State Representative & ATU Manufacturer	9
Appendices	
Posted Treatment System Notice	10
Blower / Disconnect Wiring Diagram	11
Parts Assembly Drawing	12
Tank Drawing	13

Process Description

The NuWater BNR Wastewater Treatment System is designed for treating domestic wastewater generated by normal household activities. The system consists of a single tank utilizing the extended aeration activated sludge process. The system is capable of producing an effluent which meets or exceeds applicable state discharge standards. This system has been successfully tested in accordance with National Sanitation Foundation (NSF) Standards 245 and 40.

Treatment begins when wastewater from the home flows into the pretreatment zone of the system. Here, the organisms begin to break down and convert the waste into gases and additional microbes. This is also where nitrate is converted to nitrogen gas. The partially broken down waste then enters the treatment area, or aeration chamber.

In the treatment area, waste is continually exposed to microbes for the remainder of the treatment process. The digestion action of the aerobic microbes results in a lower concentration of pathogenic bacteria.

After average retention time in the aeration zone of 24 hours or more, the mixture enters the clarifier where calm conditions enable separation of microbes, solids, and treated wastewater. The microbes that settle out of the water sweep back into the aeration chamber where they are again beneficial in wastewater treatment. The proprietary airlift provides for a portion of the treated wastewater to be returned to the pretreatment zone for additional treatment and de-nitrification.

The result of aeration and quiescent separation, followed by recirculation is an effluent that is clear, odorless, and low in nutrients which may be discharged according to local health regulations. The NUWATER BNR Wastewater treatment system is available in concrete and polyethylene. Materials are subject to state approval.

Definitions The following words and terms, when used in this text, mean the following:

Aerobic digestion:

Bacterial decomposition and stabilization of sewage in the presence of free oxygen.

Alter:

Use of components from any configuration not authorized by NSF Intern. or Enviro-Flo, Inc.

Anaerobic digestion:

Bacterial decomposition & stabilization of sewage in the absence of free oxygen.

Denitrification:

The process where nitrate is converted to nitrogen gas.

Discharge:

To deposit, conduct, drain, emit, throw, run, allow to seep, or otherwise dispose of.

Holding Tank:

A water tight container used to receive and store sewage pending its delivery to an approved treatment process.

Installer:

An individual who is compensated by another to construct an OSS.

Maintenance:

Required or routine performance checks, and upkeep of components without alterations to an OSS.

Nitrification:

Two-step process where ammonia is converted to nitrite and then to nitrate

On-Site Sewage Disposal System (OSSDS):

A system that is used only for sewage produced on a site where any part of the system is located.

Pretreatment Tank:

A tank placed ahead of a treatment chamber that functions as an interceptor for foreign materials that are potentially harmful to the treatment unit components.

Sewage:

Waste that is primarily organic and biodegradable or decomposable; and originates as human, animal, or plant waste from certain activities, including use of the toilet facilities.

Sludge:

A semi liquid mass of partially decomposed organic and inorganic matter which settles at/or near the bottom of a receptacle containing sewage.

Soil:

The upper layer of the surface of the earth that serves as a natural medium for the growth of plants, and microbes.

Installation of the Treatment Tank (see tank drawing in appendix)

Review permit / design conditions accordingly, and decide on an appropriate location for the tank(s) which is accessible to the home sewer outlet. Excavate a site which is approximately 1' larger than the tanks at a depth that will allow proper coverage of the system. The building sewer outlet will determine the minimum depth of the plant. Make sure you have a smooth level surface for the base of the unit. The tank must be placed on stone-free undisturbed soil or fill sand / pea gravel over stony soil (stones greater than 1/2 "diameter). Place the treatment tank into the excavated site and double check for level. Carefully backfill around the unit, gently compacting the soil as well as possible, and leaving the inlet and outlet holes open for connections. Connect the influent end to the building sewer outlet. Connect the appropriate discharge to the effluent end of the plant. Only 4" schedule 40 pipes or equivalent per code should enter and exit the unit until undisturbed soil is reached. Inlet and outlet pipes should extend at least 3" into the system, with a baffle on inlet as well as (double-tee) baffle assembly on outlet. Carefully install treatment unit components (next section), then install electrical components in accordance with local electrical codes. Fill the unit to the level of the effluent discharge. One by one, turn on each electrical component and verify that there are no leaks, air or water, throughout the system. If a leak is detected, repair and retest. After all required health department or electrical inspections, carefully backfill the excavated site. The first 4" of backfill around and on top of the tank is to be the same as the backfill under the tank. Visually inspect all above ground connections, and double check riser perforations for sign of misplaced boot seals, etc. Connect the clarifier tee to the effluent pipe inside the unit making sure it is in the level vertical position. Install riser vent or vented lid at the digester access riser, or as an alternative, vent at clarifier access if tank is properly constructed with free-moving air between digester & clarifier.

Installation of Components (see assembly drawing in appendix)

Read the equipment parts list provided in the owner's manual and verify that all required parts are on site. Before the system package is installed inside of the unit, each component should be carefully inspected for damage or defects. Never install damaged components inside of the treatment system. The dual port linear blower should be no more than 50' away from the plant and in a well ventilated area. The precaster will typically install a tank adapter ring onto the lid of the tank, which works well if there is 12" or more of riser height available to accommodate the blower. If the tank is shallower, blower can be installed at remote location (either in separate ventilated basin or crawlspace, etc.). Air line to diffusers should be made with 1" PVC schedule 40 pipe. Make sure the pipe is stable and resting on the excavated surface as opposed to hanging. All PVC glue fittings should be connected using approved PVC primer and cement. Use provided adapter fittings to adapt from blower to 1" PVC, as outlined in assembly drawing. A hole saw will be necessary to tap through the riser(s), and rubber grommets (recommend pull thru Polylok grommets) will be necessary to keep riser perforations watertight. As per the assembly diagram, the diffuser manifold assembly, will hold the diffusers off the bottom of the tank approximately 4 inches. The screw-in diffusers are placed parallel to and approximately 4" away from the inter-compartmental wall. Verify that the clarifier tee assembly is vertical and level for correct operation. The second aerator port marked "skimmer" will adapt to 1/2" Schedule 40 PVC as per the assembly diagram. This line feeds the airlift for the sludge recirculation. The 1" PVC recirculation inlet is installed vertically in the inlet of the clarifier, 4" from the angled hopper floor as measured from the lowest measurable point. Tie the 1/2" skimmer airline into the 1" x 1/2" tee exactly 8 inches above the recirculation inlet. The recirculation line then runs vertically up to a point as shown on the tank diagram above the liquid level, and then runs horizontally back across the digester to the pretreatment tank. Upon entering the pretreatment tank, immediately adapt up to 2" Schedule 40 PVC with the provided adaptor (this is necessary to avoid splashing at the return inlet). Then run the 2" PVC back to a point visible from the access riser above and into the 2" San-Tee provided. Extend the 2" PVC down into the pretreatment tank as shown on the tank diagram. The Aerator and alarm control panel should be installed in areas where their function will not be hindered.

Installation of low air alarm (see assembly drawing in appendix)

The low air alarm is built into the NuWater ATU combo timed dosing panel. The small diameter flex air tubing attaches to the barbed brass tank tap on the side of the blower, and adapts up to ½" PVC with the provided fittings (see assembly diagram). The ½" PVC runs underground to the location of the ATU combo panel, then elbows up and transitions to UV rated (gray conduit) ½" PVC, which runs up to the base of the control panel. The provided fittings adapt back to the small diameter flex tubing at the base of the control panel. Apply a ring of silicone sealant at the perforation. The fittings will effectively pinch the bottom wall of the control panel, forming a water-tight seal, as shown on the assembly diagram. The flex tubing should do a ¾ loop inside the panel to allow slack for future removal and repositioning, and tie in at the barbed air switch.

Replacement of Components

Components should be carefully inspected before replacement. Never install damaged components. Replace components only with factory provided replacements. Make sure power is disconnected before service begins. Aerators and diffusers require no tools for replacement. Components shall be replaced in the same manner as the original installation.

Wiring

Separate circuit is required for the controls. Timer controller at panel controls effluent pump on/off. See wiring diagram. Outdoor plug receptacle independent of controls required in blower housing, resulting in constant power to blower (blower has internal controller for skim cycle). All electrical wiring shall conform to the requirements of the NEC (National Electric Code) and all other standards under the jurisdiction of the state. All external wiring must be installed in approved conduit.

Start up

Initially the NUWATER system is to be filled with clean water. Once all the proper connections are complete and tank is filled with water, the aerator is turned on. Cycle the airlift (see Pg. 7, duties, #9), observe proper operation, then switch it back to "auto". The system is now in operation. For the unit to become biologically stable, it will take four to sixteen weeks from first use to establish a population growth of microbes. It is microbes from the waste stream which make the system operate properly.

Discontinued Service

If the unit is to be removed from service, it is suggested to leave the effluent in the system. This will prevent structural stress to the tank. If the system is to be completely abandoned, it is recommended that the unit be pumped out and decommissioned according to the rules of the health department.

System Restart

If the system has been removed from service for over 60 days, it is recommended that an O&M professional inspect and service the system prior to restart. Systems discontinued for greater lengths of time may need to have the system pumped and the air diffusers cleaned before restart.

Salcor UV light for Treatment level "A" systems

For systems meeting treatment level "A", UV disinfection is required. The Salcor 3G UV light is commercially available at most pipe supply houses. Refer to installation instructions provided by Salcor. It is imperative that care be taken not to break the fragile UV bulb. The UV assembly shall be installed in the inlet of the pump chamber. Use a reducing fernco to suspend the UV assembly from the 6" inlet access, and install the ballast and controls just below final grade in a Electrical-style access box (similar to a valve can but larger). Individual circumstances may prevent installation inside the pump chamber, in which case the UV assembly can be direct-buried along the line between the treatment unit and the pump chamber. The base must bear on native soil or on compacted granular fill.

Pump Tanks

For effluent to be pumped to a disposal area, an appropriate pump shall be placed in a separate or attached watertight tank or chamber. The pump tank shall be equipped to prevent siphoning. Sufficient capacity shall be provided in the pump tank to allow for the daily flow (surge volume between low-level timer on and high-water alarm on), plus $\frac{3}{4}$ of the daily design flow, according to the state requirements. Separate float assembly shall be installed by contractor (hanging floats off discharge line not allowed). There are two options for float configurations, see design for designer's preferred method: 1) Two-float setup with low level timer on/off and high water alarm on and, 2) Three float setup which adds a redundant off float to the same configuration. See wiring diagram for float wiring options. Pump tank construction and installation shall be according to WAC 246-272A, and all tanks must be approved by the State.

Trouble Shooting

System has offensive odor: Check that no harmful chemicals have been permitted to enter the system. Check for aerator operation including a restricted filter (*see system not aerating.*) Check against free-flowing air movement between the digester and the anaerobic pretreatment tank (should be somewhat airtight between these chambers). Check to see if the system has been pumped recently or large surges have entered the system, allowing high concentrations of anaerobic waste into digester.

System appears dead: Check that owners are not using excessive amounts of anti-bacterial soaps, heavy medicine concentrations, bleaches, fabric softeners, etc. Discuss the owner's water usage schedule and/or the use of afore mentioned items.

Aerator is not running: Check circuit breakers for failure. Plug into receptacle or extension cord known to be working. Check for proper wiring connections by removing four screws at base of blower and checking connections where the power supply connects to the motor (connectors are within small black sleeve). Check small overload shear pin for failure (see blower manual or HiBlow website for instructions). If the prior remedies are not sufficient, replacement might be necessary.

System is not aerating: Check aerator for operation. Check aerator filter element for restrictions. Visually check airline and diffusers for broken connections or restrictions. Check aerator pressure output using a standard low pressure gauge and compare to manufacturer's specifications. If aerator is underperforming, it likely needs to be rebuilt or replaced.

Audible/visual alarm sounds: Verify that the aerator is working. Check for dislocated airlines. Check water level, making sure tank is full of water to create backpressure. Check for water in blower or water in alarm tubing, and blow out if necessary. If all appears normal, new air switch may be needed.

Water in Aerator Basin: Ensure surface water directed away from tanks. Ensure all electrical lines installed in conduit. Check that rubber grommets are used at all riser perforations. Ensure tank adapter is sealed. If needed, temporarily drill 5/16" hole in tank lid till drier conditions allow repairs.

Aerator is loud: Linear compressors are made to function quietly. If the following remedies do not correct the problem, the aerator may need to be rebuilt or replaced. Check for vibrations against solid structures. Check filter cover for proper torque.

Responsibilities of Installers

The installer shall possess a current Installer license, as well as endorsement from the proprietary manufacturer before beginning construction of a NuWater System. The installer should, as a matter of practice, record his/her license number on all bids, proposals, contracts, invoices, or other correspondence with owners, the executive director, or authorized agents. The installer must provide true and accurate information on any application or any other documentation. Installers shall only install that which has been authorized by the permitting authority for the specific location in question. The installer is responsible for requesting the initial, final, and any other inspections from the permitting department. A licensed installer must be present at the job site during construction of the OSSDS. The installer must clearly indicate on the contract with the owner that, included in the purchase price of the system are the first 2 years of maintenance inspections as required by the manufacturer and NSF. This includes a total of 4 inspections, at six, twelve, eighteen, and twenty-four months. The maintenance for the entire system, including pump chamber, pumps, and drainfields, as required by the local jurisdiction, must be included in the initial purchase price.

Maintenance Duties:

1. Remove filter element from aerator and clean with soapy water. Dry and replace.
2. Test high water alarm and low air alarm for visual or audible warning function.
3. Check components for buildup such as ant beds or grass. Keep all vents clear of foreign materials.
4. Perform sludge measurement in trash tank. Arrange for pumping if within 12 inches of outlet (more than 24" total sludge depth).
5. Observe performance of digester, check for consistent, even rolling pattern of wastewater.
6. Perform settled solids check from digester. Have tank pumped if settled solids reach 40%.
7. Perform visual check of discharging effluent for clarity, and check for rotten egg odor, which would signify improper treatment of wastewater. If desired, sampling of effluent should be done in a free-fall at the inlet of the pump chamber as opposed to dip samples. Typical effluent ranges as follows:
 - PH: 6 to 9
 - Dissolved Oxygen: 1 to 4 mg/L
 - Turbidity: 2 to 18 NTUs
8. If system is equipped with UV light, check and replace bulb if required.
9. Test operation of sludge return by temporarily switching blower to "manual" on the unmarked switch inside the cover. Stand back from the return inlet to the trash tank, as there can be a small splash upon startup of the recirculation. Check for consistent flow intermixed with bursts of air. Be sure to switch it back to "auto" when done, and observe the digester diffusers resume their airflow.
10. Inspect remainder of disposal system per county requirements, including but not limited to: Test pump discharge rate, test alarm, inspect disposal field, flush lines if necessary, etc..

Maintenance Contract Requirements

Ongoing maintenance contracts are required for advanced treatment. The installer of an OSSDS shall provide the owner of the system with information regarding maintenance of the system at the time the system is installed, and either agree to provide the maintenance, or contract it out to a qualified individual who can. The maintenance contract shall specify the following:

- List items that are covered by the contract (example: labor only, or parts and labor);
- Specify a time frame in which the maintenance company will visit the property in response to a complaint by the property owner regarding the operation of the system;
- Specify the name of the individual employed by the maintenance company who is certified by the manufacturer of the system;
- Identify the frequency of routine maintenance and the frequency of the required testing.

Maintenance Contract Requirements Continued:

Keep a maintenance record, and submit maintenance reports to the permitting authority and the owner of an OSSDS for which the installer/ maintenance company has contracted to provide maintenance. It is the installer's responsibility to record owner's name, address, inspection dates, and serial number as required by NSF International.

Amending or terminating maintenance contract. If the owner of the on-site sewage disposal system enters into a new maintenance contract or revises the original maintenance contract, the owner must submit a copy of the new or revised maintenance contract to the permitting authority not later than the 30th day after the date on which the original contract terminates or is modified, unless a county's individual requirement is more stringent. If the maintenance company wishes to terminate to maintenance contract they shall provide at least 30 days written notice to the homeowner and appropriate authorities. If the cancellation occurs within 2 years of the installation, the system manufacturer shall be notified.

Homeowner responsibilities

It is the owner's responsibility to operate the NUWATER system to the best of their ability. To ensure proper operation the following precautions should be noted.

Do not allow nest buildup around aerator or other components. Maintain grass and shrubs around the system. Restrict automotive travel over treatment unit. Never allow unapproved items to enter the system such as:

- (a) Products high in phosphates; (ex. Some detergents and dishwashing liquids.)
- (b) Non- biodegradable items; (ex. Diapers, condoms, tampons, cigarette butts etc.)
- (c) Concentrated cleaning agents; (ex. Carpet shampoo waste)
- (d) Highly toxic chemicals; (ex. Acids, hair treatment chemicals, insecticides, etc.)
- (e) Large quantities of grease or lard.
- (f) Large amounts of hair.
- (g) Concentrated chlorine or disinfectants; ex (toilet bowl tablets etc.)
- (h) Discharge from a water softener

System parts and manuals

Other than simple PVC fittings, system parts and manuals must be ordered from the manufacturer or authorized state representative. Never purchase or install aftermarket or equivalent parts. Only factory authorized parts are covered under NUWATER's certification and warranty.

Contacts

For concerns about system performance or operation contact NuWater at one the following:

State Representative

Nathan Ek
P.O. Box 3097
Battle Ground, WA 98604
(360) 687-7668

Nathan@ekengineering.net

National Headquarters

Enviro-Flo, Inc.
PO Box 321161
Flowood MS 39232
(877) 836-8476

For more information: www.ekengineering.net/nuwater

NUWATER BNR TREATMENT SYSTEMS

(Post in a Service/Utility Area)

NOTICE

An Individual Wastewater Treatment System serves this home. This system will serve you well only if it is properly maintained. Your system is comprised of

Your system is located _____.

- You should not build or fill over this area, or allow heavy traffic. Do not allow water to stand over this area, avoid using strong chemicals, cleaning fluids, etc., which will kill helpful bacteria in the system. You should also avoid flushing grease, food scraps, cigarette butts, sanitary napkins, & other inorganic waste down drain.
- You should have your system serviced (pumped out) every 3 to 5 years. Your service technician can advise you if you need more frequent or additional service.

To have your system serviced, or for additional information, call _____ at _____.

All of the details regarding system operation can be found in your homeowner's manual which you should have received at installation. If you did not receive a copy call 1-877-836-8476 and we will send you one at no charge.

Keep A Record Of Service Below:

DATE	SERVICE PERFORMED	SERVICE TECHNICIAN

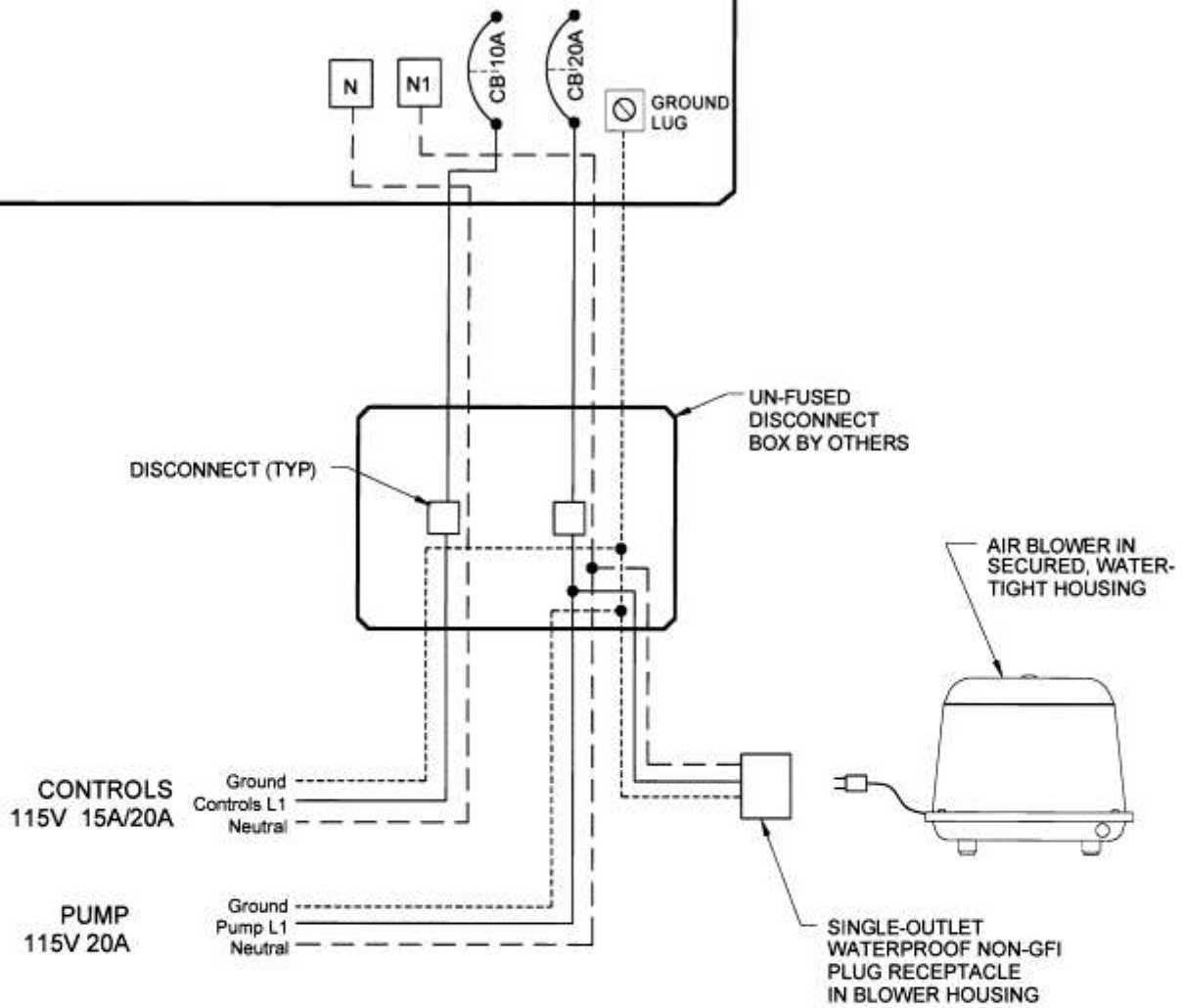
Enviro-Flo Inc. Wastewater Treatment Technologies. P.O. Box 321161 Flowood Ms. 39232

THE FOLLOWING SHOULD NOT BE DISPOSED INTO THE SYSTEM

- Greases, Fats and Oils – Pesticides, Herbicides, or any other toxins.
- Garbage disposal should be used sparingly. Dispose of food waste, grease, etc., in the solid waste bin. Food waste represents additional loading the Aerobic Treatment Plant would have to digest, increasing pump out intervals.
- Paints, household chemicals – automobile fluids – do not discard mop water into the system.
- Non-Biodegradable items such as cigarette butts, disposable diapers, feminine hygiene products, condoms, hair, coffee grounds, rags, paper towels, bandages, etc.
- Wash loads must be spread out over the week. Once a week multiple loads or half loads are not recommended.
- Citrus products, oranges, lemons, grapefruit, etc.
- Additives for septic systems – they do no more harm than good.
- Hydraulic overload due to excessive water from other sources.
- Home Brewery Waste – Strong Medicines, Antibiotics. Anti-Bacteria Soaps should be avoided.
- Strong disinfectants or bleaches. Laundry products such as: Lysol, Pine-Sol, Tidy Bowl, or discharge from water softeners, Drano.
- Recommended detergents are: powdered, low-suds cleaners, low phosphates and biodegradable, washing soda ingredients such as Gain, Arm & Hammer, Fresh Start, and Dash Bright. Fabric softener dryer sheets are recommended.
- Recommended cleaning products are: Non-chlorine, biodegradable and non-toxic such as Ivory & Sunlight dish washing liquids, Cascade & Sunlight powdered dishwasher detergents, Comet & Biz powdered cleaners, baking soda.

Systems requiring pump-outs due to the above violations are not covered by the warranty.

EAS-S1PT-LAA SERIES CONTROL PANEL
SEE SEPARATE WIRING DIAGRAM



NOTES:

THESE FIGURES DEPICT A RECOMMENDED WIRING CONFIGURATION. OTHER POSSIBLE VARIATIONS INCLUDE:

3 CIRCUITS: ADD A SEPARATE CIRCUIT FOR THE AIR BLOWER.

USE OF BREAKERS: USES A SMALL BREAKER BOX. NOTE THAT NEC REQUIRES #10 AWG MIN. FEEDER SIZE IN THIS CASE.

230 VOLT PANEL: REQUIRES ENTIRELY SEPARATE 115V CIRCUIT FOR THE AIR BLOWER.

OTHER NOTES:

BLOWER RUNS CONTINUOUSLY, INDEPENDENT OF CONTROLS IN PANEL.

ALL WIRING TO BE WITHIN APPROVED CONDUIT.

SEE TREATMENT UNIT INSTALLATION MANUAL FOR CONNECTION OF LOW AIR LINE.



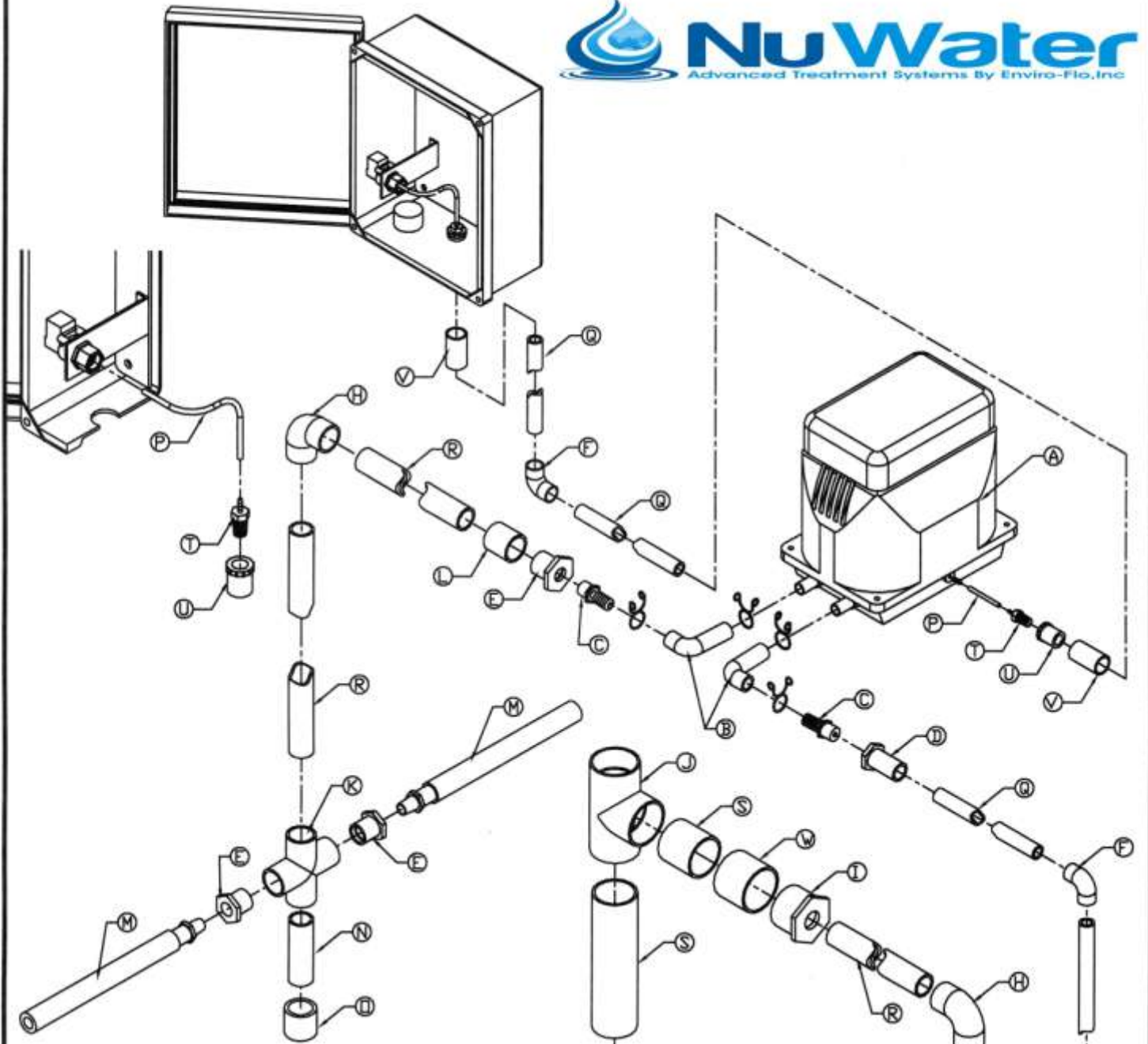
**AIR BLOWER & DISCONNECT WIRING DETAILS
NUWATER ATU USING (2) 115V CIRCUITS**

NuWATER

Advanced Treatment Systems By Enviro-Flo Inc.
Washington Contact: Ek Engineering Inc.
(360) 687-7668 - (360) 687-7669 fax
www.ekengineering.net/nuwater

REVISED:

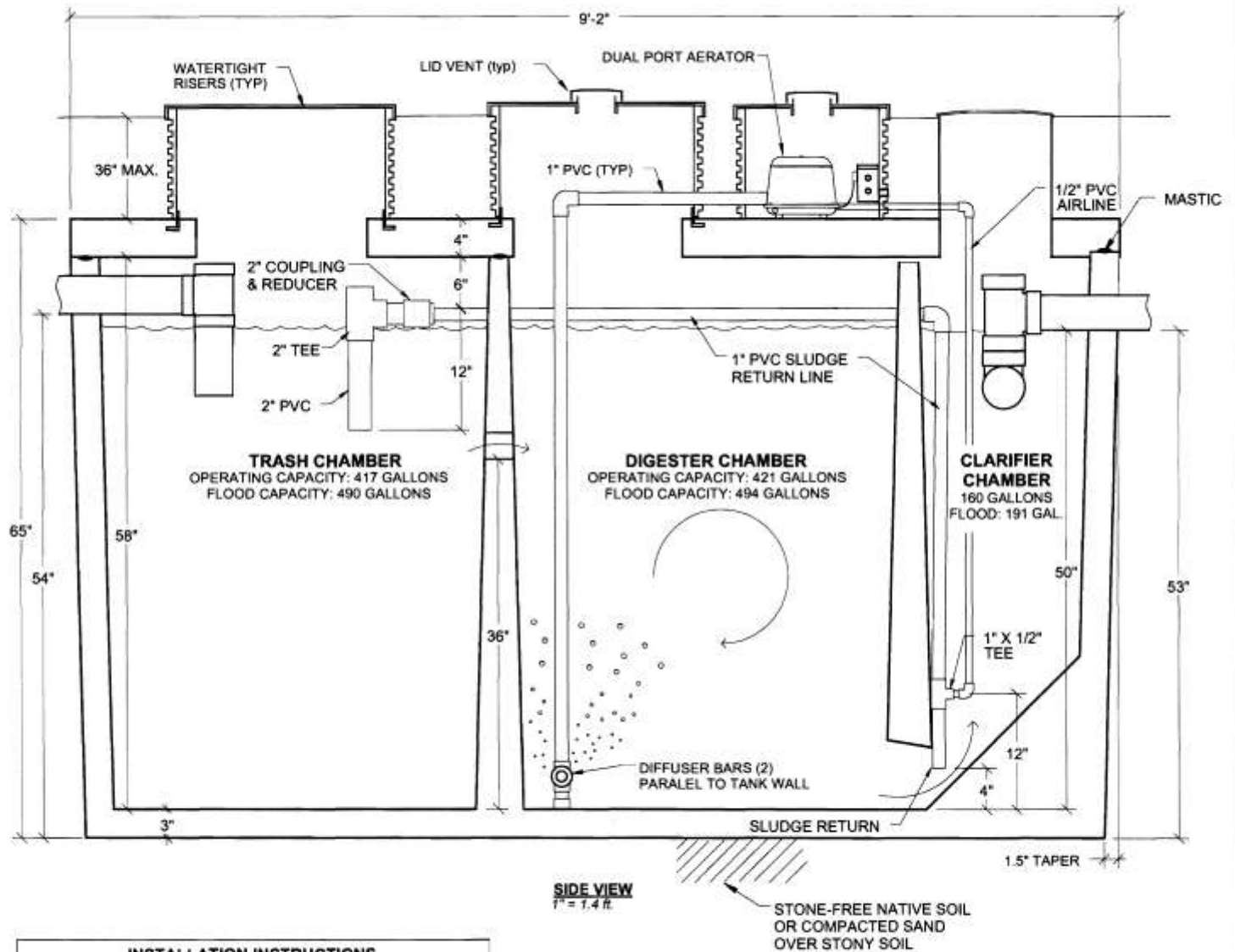
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PARTS LIST

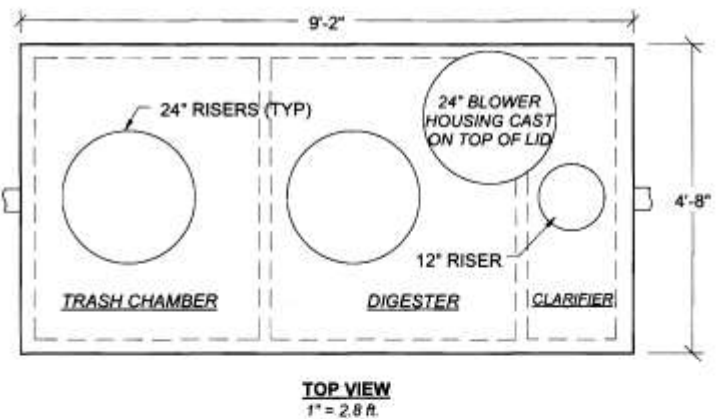
NuWater NR Assembly Diagram

- | | |
|---------------------------------------|--|
| A. DUAL PORT AERATOR | M. POLY DIFFUSER BAR (2) |
| B. 3/8" RUBBER 90° W/ CLAMPS (2) | N. 1" PVC (3 1/2" SECTION) |
| C. 3/8" BARBED ADAPTOR X 1/2" NPT (2) | O. 1" SLIP CAP |
| D. 1/2" SLIP X 1/2" NPT ADAPTOR | P. 1/8" CLEAR PVC HOSE (OPTIONAL 5') |
| E. 1" STREET X 1/2" NPT BUSHING (3) | Q. 1/2" PVC PIPE (BY INSTALLER) |
| F. 1/2" 90° ELBOW (3) | R. 1" PVC PIPE (BY INSTALLER) |
| G. 1" X 1" X 1/2" TEE | S. 2" PVC PIPE (BY INSTALLER) |
| H. 1" 90° ELBOW (3) | T. 1/8" BARBED ADAPTOR TO 1/4" NPT (2) |
| I. 2" X 1" BUSHING | U. 1/2" STREET X 1/4" NPT BUSHING (2) |
| J. 2" SANITARY TEE | V. 1/2" PVC COUPLER (2) |
| K. 1" PVC CROSS | W. 2" COUPLER (BY INSTALLER) |
| L. 1" COUPLER (BY INSTALLER) | |



INSTALLATION INSTRUCTIONS

- 1) Excavate tank hole with vertical walls to 1 foot larger than tank on all sides.
- 2) If bottom of hole is stony, install 3" of compact sand & level out with screed.
- 3) Install tank in center of hole, keeping 1 ft. void space on all sides.
- 4) As tank is filling with water, fill in void space with compact granular (sandy) soil free of large clumps of clay.
- 5) Install rest of system, & affix risers to adapters with waterproof adhesive.
- 6) Perform watertightness test in field as required by local jurisdiction.
- 7) Upon approval to backfill, carefully backfill with native soils over top of tank.
- 8) Final grade the surface to avoid channelling surface water toward tank.



AEROBIC TREATMENT TANK DETAIL FOR NuWATER BNR-500 TREATMENT UNIT

ENVIRO-FLO, INC.
 Wastewater Treatment Technologies
 P.O. BOX 321161, Flowood, MS 39232
 (877) 836-8476 (601) 845-4716 fax
 www.enviro-flo.net

REVISED: 3/01/12
 SCALE: 1" = 1.4 ft.