County of Santa Cruz

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ENHANCED TREATMENT SYSTEM REGULATIONS

I. INTRODUCTION

Many sites in Santa Cruz County cannot meet the criteria for the installation of a conventional Onsite Wastewater Treatment System (OWTS). These sites may have limitations such as reduced setback from a stream, shallow depth to groundwater, soil permeability rates that are too rapid to provide adequate treatment or too slow to provide adequate absorption or have limited space and the OWTS would be undersized. Santa Cruz County code prohibits the installation of conventional OWTS where such conditions occur, due to potential for water quality impacts or drainfield failure. Sections 7.38.182 through 186 of the County Code allow for the use of alternative technology and/or enhanced treatment (ET) systems to overcome such site constraints. In addition, section 7.38.183, requires the use of enhanced treatment systems to reduce the discharge of nitrogen from large onsite disposal systems and OWTS located in fast percolating soils or where there is concern for nitrate impacts on groundwater or surface water. The State OWTS policy and the County's Local Area Management Plan (LAMP) also provide for use of enhanced treatment where onsite sewage disposal may impact impaired surface water bodies, or groundwater quality.

The objective of the regulations outlined in this document is to permit the use of approved technologies that will treat sewage to a level sufficient to prevent surface and groundwater contamination and reduce biomat buildup that causes drainfield failure. The ultimate goal would be to treat sewage in a manner that reliably reduces the Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) to less than 10 mg/L and remove at least 75% of the total Nitrogen to less than 10 mg-N/L. The minimum requirement is to reduce total nitrogen by 50% or less than or equal to 30 mg-N/L (whichever is less) and BOD and TSS to less than 30 mg-/L. These regulations also provide for the use of alternative dispersal methods such as mounded beds, at- grade systems, or drip dispersal systems that allow dispersal at very shallow depths to provide needed groundwater separation.

The following categories of enhanced treatment may be utilized:

- Secondary Treatment provides for the reduction of BOD and TSS to be less than or equal to 30 mg/L prior to effluent disposal. This allows for an increased dispersal application rate therefore allowing a reduced dispersal surface area. BOD and TSS reduction is also required for the use of drip dispersal systems and disinfection. Secondary treatment typically provides95% pathogen reduction (1-2 log) (EPA, 2002)

- Nitrogen Reduction requires total nitrogen concentration reduction by at least 50%. This is required in addition to BOD and TSS reduction in sandy soils when percolation rates are faster than 5 MPI or when minimum vertical separation to groundwater cannot be obtained.
- Disinfection provides additional pathogen reduction and requires 99% reduction of E. coli indicator bacteria and associated virus and other pathogens. This is required where groundwater separation is less than 5 feet or when stream separation is less than 100 feet. E. coli levels should be less than 200 MPN/100 ml.

Types of Enhanced Treatment Systems and Approved Applications

Level of Treatment and Treatment Technology[a]	Reduced Dispersal Application Area	Minimum Groundwater Separation (ft)	Minimum Waterbody setback (ft)	Fast Perc <5 MPI[b]	Slow Perc >60 MPI	Seepage Pits
BOD and TSS Reduction Reduce BOD and TSS to <30 mg/L Intermittent Sand Filter Currently approved proprietary systems that Meet NSF/ANSI 40[c] Certification include: OSI Advantex Biomicrobics FAST AquaKlear Bord Na Mona Multi-Flo Aerobic Trmt MicroSepTec HOOT Acqualogic	Yes, per Table 7.38.150.B.3	See Table 3-4 Groundwater Separation based on Soil Percolation and Water Feature Setback	See Table 3-4 Groundwater Separation based on Soil Percolation and Water Feature Setback OR >50 -feet for Repairs and Upgrades only	Not Permitted See next row for BOD and TSS Reduction with Nitrogen Reduction	Repairs and Upgrades Only	Not Permitted See next row for BOD and TSS Reduction with Nitrogen Reduction
BOD and TSS Reduction with Nitrogen Reduction Reduce Total Nitrogen by 50% Recirculating Sand Filter	Yes, per Table 7.38.150.B.3	See Table 3-4 Groundwater Separation based on Soil	See Table 3-4 Groundwater Separation based on Soil Percolation and Water	Required[b]	NA	Required with min. 10-ft Separation to Groundwater

Trickling Filter Currently approved proprietary systems That Meet NSF/ANSI 245a Certification, include: OSI Advantex Multi-Flo Aerobic Trmt MicroSepTec		Percolation and Water Feature Setback	Feature Setback			
Pathogen Reduction Reduce Pathogens by 99%: Recirculating Sand filter Ultraviolet Light Chlorine disinfection	NA	Required with groundwater separation of 2-5 feet. See Table 3-4 of the Santa Cruz LAMP	25-50 feet for Repairs Only 50-100 ft for upgrades	Depends on stream, GW separation See Table 3-4	NA	Required with minimum Separation to Groundwater of 10 ft.

[a] Specific types of systems that are currently approved for use in Santa Cruz County are listed. Additional systems that meet the requirements may be added in the future.

[b] Nitrogen reduction may be waived outside of nitrogen concern areas.

[c] NSF/ANSI 40 is a standard for residential wastewater treatment systems with rated capacities between 400 and 1,500 gallons (1,514 and 5,678 liters) per day. Class I systems must achieve a 30-day average effluent quality of 25 mg/L CBOD5 and 30 mg/L TSS or less, and pH 6.0-9.0 spanning six months of testing.

II. REQUIREMENTS FOR ENHANCED TREATMENT OR ALTERNATIVE TECHNOLGY

The following are conditions where enhanced treatment systems are required.

A. Limited Site Conditions

For parcels where site conditions do not meet standards for conventional septic systems due to an inability to meet the required vertical setback to groundwater or impermeable layer, slow percolation soils, or inadequate disposal area, the Health Officer may accept sewage disposal permit applications utilizing ET system designs for the upgrade of existing systems to allow building additions or remodels, and for the construction of new systems. Homeowners with single family dwellings on small lots may want to install ET systems in order allow deeper dispersal trenches and to reduce leachfield area requirements and allow future additions to their homes.

1. Insufficient Leaching Area - Whenever a parcel cannot accommodate the size of leachfield required by the soils found on the parcel, ET may be used to reduce the BOD and total nitrogen in order to allow an increase in soil application rates for wastewater loading, pursuant to Section 7.38.150.A.3.
2. Soil Percolation Rates Slower than 60 MPI - For soils percolating 60-120 MPI, the use of ET is required.
3. Setback to Groundwater Unsuitable for Leachfields - Use of enhanced treatment may also allow building additions with reduced groundwater separation. For repairs and upgrades using enhanced treatment, the groundwater separation and distance to surface water bodies may be reduced (Section 7.38.150.B.9). Parcels that have gentle slopes and high groundwater problems that prevent the use of conventional leachfields may be suitable for mound or at-grade systems described below. A proposal for a mound system that meets requirements for the design loading rate may enable bedroom and other building additions provided that an area is available for replacement of the mound.
4. Sandy Soils with Rapid Percolation - Enhanced treatment with nitrogen reduction will be required for all new OWTS and replacement OWTS in sandy soils with percolation rates faster than 5 MPI, except as described below. For fast percolating sandy soils in areas where nitrogen reduction is required, the County Health Officer maintains a list of approved treatment units that can be used to reduce total nitrogen levels in effluent by 50-75% (30 mg-N/L, but with an ultimate target is 10 mg-N/L). For the purposes of this document, “sandy soils” are coarse-grained sands that have demonstrated average percolation rates faster than five minutes per inch. This requirement can be waived for parcels that are greater than 10 acres or outside the nitrate concern areas of San Lorenzo Watershed, North Coast Water Supply Watersheds, Valencia Watershed and La Selva Beach area; and maintain a private well setback of more than 150 ft.

B. LARGE SYSTEMS

For large or commercial onsite sewage disposal systems in all areas of Santa Cruz County, enhanced treatment systems are required at the time of new system installation, upgrades or repairs. Large systems are those onsite disposal systems which serve more than five (5) dwelling units or serve other uses that generate 2,500 gallons or more per day of sewage effluent (typically commercial or institutional development). The County of Santa Cruz Environmental Health Division (EH) will generally assume full jurisdiction over all onsite wastewater discharges between 2,500 and 10,000 gpd (gallons per day) of flow. Where County authority and requirements may not be adequate to prevent significant degradation of water quality, or where total sewage flow exceeds 10,000 gpd, the discharge shall be referred to the Regional Water Quality Control Board staff for review and appropriate action.

III. TYPES OF ALTERNATIVE AND ENHANCED TREATMENT AND DISPERSAL SYSTEMS PERMITTED

The following types of systems may be approved where requirements can be satisfied:

A. Intermittent and Recirculating Sand Filters - Although sand filters may not fully meet the objective for nitrogen removal, they are a proven technology that provides substantial

nitrogen reduction and meets the objectives for BOD reduction. A sand filter treatment system consists of a septic tank, dosing tank and pump, a sand filter bed, and a drainfield. The septic tank allows for anaerobic biological treatment of effluent. Following the septic tank, the filter bed of engineered medium-grained sand physically filters and promotes biological treatment of effluent prior to disposal in the drainfield. The filtering and biological effect of the sand bed results in the discharge of substantially higher quality effluent than effluent discharged directly from a septic tank to a drainfield. Recirculating sand filters reintroduce the aerated nitrified effluent to the anaerobic septic system and provide significant nitrogen removal over Intermittent sand filters. Recirculating sand filters also provide additional pathogen removal.

B. Mounded Bed –The Wisconsin mound wastewater treatment system was developed in the 1970s to overcome site limitations such as high groundwater. The mounded bed system discharges effluent to a sand bed in a constructed elevated mound (typically 3 feet above ground), that provides the vertical distance not provided at the site for minimum treatment prior to effluent reaching underlying groundwater. Mound systems for repairs and upgrades shall be designed to the greatest extent possible according to all provisions of the ”Wisconsin Mound Soil Absorption System: Siting, Design and Construction Manual.” Converse, J.C., and E.J. Tyler, 2000. Pursuant to those guidelines, mounds for repairs or upgrades may be approved on sites with: groundwater at least 1 foot below the native ground surface, on soils with low permeability, over fill with adequate permeability, on slopes up to 21%, and over existing leachfields. The total groundwater separation requirements for use of mound systems system shall be the values for standard leaching devices as described in Section 7.38.150(B)(9) of the Santa Cruz County Code, as measured from the bottom of the dispersal piping. Enhanced treatment and disinfection is required for mound systems with two feet of separation to groundwater, pursuant to Table 3-4.

C. At-Grade Systems - At-Grade systems shall be designed according to the provisions of the 1990 “Wisconsin At-Grade Soil Absorption System - Siting, Design, and Construction Manual" and 1999 “At-Grade Systems for On-Site Wastewater Treatment and Dispersal, by James Converse.” The groundwater setback requirements for use of the At-Grade system shall be the values for standard conventional leaching devices as described in Section 7.38.150(B)(9) of the Santa Cruz County Code, unless supplemental treatment is also provided.

D. Proprietary Technologies - Proprietary packaged treatment systems are devices held under patent, trademark, or copyright. Before the Health Officer issues a permit for a proprietary product, the manufacturer or representative must demonstrate and certify to EH that the device, product, or method meets the requirements of the specific EH criteria, and is an appropriate application of the technology, per the section below on emerging enhanced treatment systems. The proprietary system must be reviewed by EH Staff. All proprietary systems must be installed by a licensed contractor certified by the product dealer. Most proprietary systems can include a disinfection component that treats exposes the treated effluent to ultra-violet light prior to discharge. The following types of proprietary systems have been approved for use in Santa Cruz County:

- OSI Advantex system for enhanced treatment with nitrogen reduction.

- Multiflo Aerobic Treatment Unit (ATU) for enhanced treatment with nitrogen reduction.
- Advantex for enhanced treatment with nitrogen reduction
- Aquaklear for enhanced treatment without nitrogen reduction
- MicroSepTec for enhanced treatment with nitrogen reduction
- Hoot Aerobic for enhanced treatment without nitrogen reduction
- Multi-flo enhanced treatment with nitrogen reduction
- OSI half round pressure distribution for very shallow dispersal of treated effluent.
- GeoFlow drip system for very shallow dispersal of treated effluent**.**

E. **Pressure Distribution** – Although not a treatment technology, pressurized distribution (generally using a 1" to 2" diameter pressure lateral pipe with 1/8" orifices) is an efficient method of providing uniform and dosed distribution of effluent in a drainfield, with alternating saturated and unsaturated aerobic conditions. This technology provides superior conditions for the soil to treat the effluent, especially when used in shallow trenches in conjunction with timed dosing. When used in conjunction with ET, pressurized Shallow Gravelless Drainfields installed in the upper 12" of the soil column have proven to be an extremely effective means of dispersal and can extend the minimum length of a leaching trench above the 100-foot maximum when site limitations do not allow for a conventional drainfield design.

F. **Subsurface Drip Tubing** – Drip emitter tubing uses small diameter, flexible, low-pressure piping which should only be used for dispersal of treated effluent from an ET system. Subsurface drip systems allow for a uniform dispersal of effluent into the upper 6" – 10" of the soil profile where improved treatment and evaporation and transpiration through plant roots can also occur. Discharge of wastewater to such shallow soils has the significant benefit of additional treatment that occurs with the microbial populations that exist in the upper 18 inches of the soil column. As with shallow pressurized gravelless drainfield systems (SPDS), subsurface drip systems can help mitigate high groundwater, shallow depths to impermeable soil and limitations in area available for conventional drainfield trenches. Emitter lines are typically spaced two (2) feet apart on center in sandy and loamy soils and may be spaced twelve (12) inches apart in soils with a higher clay content where greater dispersal area is required. A "cover crop" (preferably grass) must be planted over the lines to stabilize the soil and maximize the evapotranspiration potential. Drip systems must be installed per the manufacturer specifications by qualified installers.

G. **Emerging Enhanced Treatment Technologies** - ET technologies that meet or surpass treatment effectiveness of approved technologies may be approved in Santa Cruz County provided that the following criteria are met:

1. Emerging technologies will only be allowed for the upgrade or repair of an existing onsite sewage disposal system until satisfactory performance of the technology is demonstrated.
2. The manufacturer must apply to the County for approval of an experimental ET system. It is

expected that the manufacturer 1) provide the manufacturer's NSF approval information, the owner's manual, the installer's manual and supporting documents for EH review, 2) conduct a presentation to EH and stakeholders, 3) apply for the experimental review and submit fee.

3. No more than three units from one manufacturer may be installed County-wide during an initial two year evaluation period (or a period determined by Health Officer). The designer is responsible for taking samples quarterly and submitting the lab results to EH. Once satisfactory quarterly monitoring, sampling and maintenance results have been established by EH, the experimental system may obtain approved status and additional systems can be installed for new development.

4. Prior to approval of an individual permit, the consultant proposing a system shall provide satisfactory evidence to Santa Cruz County EH that the new proposed system is NSF approved and will reliably and consistently meet overall ET objectives for BOD and nitrogen removal. The manufacturer will submit review fees, The designer shall the pay the required fee to cover the costs of review and provide adequate documentation to show that the proposal will meet Santa Cruz County EH requirements including the following:

    - Detailed design specifications and calculations.
    - Monitoring results from cited references.
    - Costs of installation, operation, and maintenance, including electricity costs.
    - Information on parts availability
    - Availability of a qualified local service provider
    - Certified installer(s) (contractors) available
    - Jurisdictions where the proposed ET system has been installed including types of uses served, dates in operation, and the names and phone numbers of officials approving and overseeing such systems.

IV. PROCEDURES FOR PERMIT APPLICATION AND APPROVAL

Procedures for obtaining an approved permit for an alternative technology or ET system are subject to the requirements specified in County Code Sections 7.38.182 through 186. The owner or owner's agent will submit an application and fees for a sewage disposal permit specifying the type of ET system. The design must be prepared by a Qualified Professional (QP) such as a California Registered Environmental Health Specialist (R.E.H.S), Professional or Civil Engineer (P.E. or C.E.), or Professional Geologist (P.G.). The QP must demonstrate experience and be certified by EH. The design submission must include supporting documentation such as percolation rates, trenching indicating depth to groundwater, setbacks, pump selection calculations/curves, friction/head loss calculations, design basis flow analysis and waste strength analysis.

Prior to approval of the permit, a signed contract between a qualified service provider and the property owner must be submitted. The owner or installer must submit a separate electrical permit from the Planning Department which is required for systems with electrical components prior to approval/permitting of an alternative or ET system for septic system repair or building

upgrades. The system must have an operating telemetry system installed that the service provider can access and a contract with the provider for ongoing maintenance. In addition, the owner is required to sign an Acknowledgment of Requirements for Use of An Onsite Sewage Disposal Nonstandard System with Special Operating Characteristics which includes the following information: description of system characteristics and limitations; operating, monitoring and maintenance requirements to ensure proper performance; restrictions on system use and property use; and notification that the property owner will be assessed a fee on the annual property tax bill to cover County costs of system oversight.

The following construction inspections are required: 1) Preconstruction meeting with designer, provider, manufacturer, contractor and EH present, 2) Water Tight Test of Tank (1st measurement and 2nd measurement, 3) Leachfield installation, 4) Control panel, pressure test, alarm system, telemetry confirmation and erosion control are generally the final inspection. Ongoing construction inspections are required to be performed by the County and the design consultant. Upon completion, the provider is required to submit an OSSP start up report and the design consultant is required to submit a final "letter of completion" stating that the system was installed according to the design specifications and an As-Built plan if required. Once the system is completed and the electrical permit is signed off by the Building Official, and the Consultant's final letter has been submitted, then, the permit will be finalled (signed-off) and a Notice of Onsite Sewage Disposal System with Enhanced Treatment Technology and Special Operating Conditions, which reiterates the above information, will be recorded on the deed by EH.

V. SYSTEM OPERATION, MAINTENANCE AND MONITORING REQUIREMENTS

Due to their more technical nature, alternative and ET systems generally require more intensive monitoring and maintenance to ensure that they function properly. In addition, particularly with experimental systems, monitoring is needed to ensure that the ET system is working properly and is not contaminating surface or ground water. Monitoring information is required for the overall ET system program to evaluate the effectiveness of various designs and allow broader approval of satisfactory systems.

The recorded Notice of Onsite Sewage Disposal System with Enhanced Treatment Technology and Special Operating Conditions will set forth the specific requirements for operation, maintenance and monitoring. An annual fee will be charged on the tax bill which reimburses the County costs of administering the monitoring and maintenance program. Property owners not complying with the requirements of submitting to EH both annual operation/maintenance service provider reports and annual septic system sample results of treated effluent will receive notice to correct. If non-compliance continues, a "Notice of Violation" will be recorded at the Office of the Santa Cruz County Recorder. Owners of proprietary systems are required to maintain a maintenance/service agreement with a qualified service provider. The following elements for maintenance and monitoring must be included in the system design, installation and ongoing maintenance program:

1. An Operations and Maintenance Manual must be provided to the owner, operator, and EH, specifying inspection and maintenance requirements for all system components essential for operating and trouble-shooting the alternative/ET system. The owner must comply with the provisions in the Manual.

2. Proprietary systems shall upon purchase include a two-year initial service policy with four site visits (every 6 months) for inspection, maintenance, and reporting. A signed contract between a qualified service provider and the property owner must be in effect prior to start-up and maintained through the initial service policy that includes sampling and disposal system maintenance. After the two-year period, the property owner is responsible to maintain a service policy with an approved service provider that covers the system operational requirements and associated fees. A maintenance agreement must be maintained for the life of the treatment unit.
3. Samples of treated effluent from ET systems are to be collected by the Service Provider quarterly in the first year of operation and then annually, with results submitted to EH along with the service report. The design and installation of the system shall include provisions for collecting samples of effluent. Acceptable sampling locations include a sampling port, the pump chamber and the return line. Analysis of effluent samples shall be performed by a certified laboratory and shall include: 5-day biological oxygen demand (CBOD5), Total Suspended Solids (TSS); nitrate as N, ammonia as N and total nitrogen for systems that require nitrogen reduction; and, E. Coli for systems that require pathogen reduction. If sample results do not meet requirements, the homeowner will engage the service provider and any necessary qualified professional (s) as needed to determine the cause, make necessary repairs or adjustments and submit a passing resample within 90 days.
4. Sampling shall be taken 3 months after installation by the provider and submitted to EH.
5. If the testing is not satisfactory, monthly testing will be required every year until a passing report is provided to EH.
6. If the residential or commercial property changes use or ownership, the provider will sample the effluent after 6 months of occupancy of the new owner or change of use and submit the report to EH.
7. Pressure distribution laterals and drip emitter tubing in pressurized drainfields, if any, shall be checked for clogging of orifices and be flushed annually. Filters for subsurface drip systems may need to be cleaned every six months. As part of the annual servicing, the area of the disposal field must be visually inspected for signs of surface failure.
8. Operational telemetry is required and shall be able to diagnose and alert the following: high and low liquid levels, excessive pump cycles/run times and other parameters specified by the manufacturer. This requires either a telephone land line, WIFI to internet router, wireless cellular data connection, direct connected ethernet to internet router, or 5G connection to be installed and maintained by the property owner with ongoing direct connection and monitoring by the service provider.
9. EH may require additional monitoring and maintenance requirements as a condition of initial permit approval, or as part of the Notice of Nonstandard System.
10. Monitoring will be carried out under the terms of the Notice of Nonstandard System, which is recorded on the deed.
11. As specified in Chapter 7.38.184 (E) (4) and 7.38.295 of the Santa Cruz County Code, the property owner may be subject to a violation reinspection fee and/or a recordation of a Notice of Violation

for deficiencies which include: failure to do annual servicing, failure to sample, sample results do not meet standards, failure to operate system properly. Environmental Health will serve adequate notice and allow a reasonable amount of time for the property owner to rectify system deficiencies.

VI. SERVICE PROVIDER REQUIREMENTS

EH maintains a list of approved qualified service providers. For proprietary systems, the service provider must be certified by the product dealer. Service providers must demonstrate specific proficiency in servicing and operating enhanced treatment units through the completion of an onsite wastewater certification training course by a third party entity, such as the California Onsite Wastewater Association (COWA), National Association of Waste Transporters (NAWT), National Sanitation Foundation (NSF), or other acceptable training program as determined by EHD. Approved service providers will maintain and provide proof of general liability insurance. The service provider submits service reports on an annual basis for residential system or quarterly for large systems. If a service provider fails to maintain acceptable servicing proficiency or does not provide samples and/or service reports within 30 days of the service, the service provider shall be removed from the approved Onsite Septic Service Provider (OSSP) list and program. The service provider may be subject to an annual fee charged by EH (and may be reduced for a service provider who service only one system, i.e.: a qualified individual and certified homeowner). The homeowner or qualified individual must be approved by EH. The individual conducting the field inspection work shall be qualified in the operation and maintenance of OWTS and trained specifically in the testing and inspection procedures outlined in this document.