SAN JACINTO ONSITE WASTEWATER MANAGEMENT PROGRAM

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INTRODUCTION

Inadequate or improper treatment of wastewater by onsite systems in the San Jacinto watershed is contributing to water quality problems, including elevated nutrient and pathogen levels, in Lake Elsinore and Canyon Lake.[1]

Task 6 of the 2004 amendment to the *Water Quality Control Plan for the Santa Ana River Basin to Incorporate Nutrient Total Maximum Daily Loads (TMDLs) for Lake Elsinore and Canyon Lake* requires the County of Riverside and the Regional Water Quality Control Board to implement regulations adopted pursuant to Water Code Sections 13290-13291.7. If no such agreement is required or completed within 12 months of the effective date of the regulations, the County of Riverside and the Cities of Perris, Moreno Valley and Murrieta shall, as a group, submit a Septic System Management Plan to identify and address nutrient discharges from septic systems within the San Jacinto watershed. The Septic System Management Plan is designed to implement regulations adopted by the State Water Resources Control Board pursuant to California Water Code Section 13290 – 13291.7.

The onsite wastewater management program presented in this document, as required under Task 6, is based on a number of legal, technical, management, and policy considerations which are discussed in the 5 sections below:

I. TMDL Requirements for Lake Elsinore and Canyon Lake
II. Wastewater Pollutants and Water Quality Impacts
III. Wastewater Treatment System Options
IV. Management Considerations
V. Proposed Management Program

The intent of this document is to outline a general framework for an onsite wastewater management program, to be further refined by the various stakeholders involved in the development process. The management program described below is generally based on proposed state regulations for onsite wastewater treatment systems contained in California Assembly Bill 885, which has been drafted and is now awaiting final adoption.

I. TMDL REQUIREMENTS FOR LAKE ELSINORE AND CANYON LAKE

Section 303 (d) of the Clean Water Act requires states to identify surface waterbodies that do not meet designated uses. In 1998, the Santa Ana Regional Water Quality Control Board (RWQCB) added Lake Elsinore and Canyon Lake to the Section 303 (d) listing of impaired waterbodies. Both lakes are listed for excessive levels of nutrients. In addition, Lake Elsinore was listed for low dissolved oxygen (DO) and unknown sources of toxicity while Canyon Lake was listed with high bacteria levels. The RWQCB has developed nutrient TMDL's for Canyon Lake and Lake Elsinore, and is in the process of developing bacteria TMDL for Canyon Lake.

Lake Elsinore and Canyon Lake Nutrient Source Assessment

The Santa Ana Watershed Project Authority (SAWPA) coordinated the *Lake Elsinore and Canyon Lake Nutrient Source Assessment* (SAWPA, 2003) in cooperation with the RWQCB and the Lake Elsinore and San Jacinto Watershed Authority (LESJWA). Results of the *Nutrient Source Assessment*, TMDL study, and other efforts provided the framework for developing the *San Jacinto Nutrient Management Plan* for the San Jacinto River watershed (LESJWA, 2004).

Total Maximum Daily Loads (TMDLs)

On December 20, 2004, the RWQCB adopted the *Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Nutrient Total Maximum Daily Loads (TMDLs) for Lake Elsinore and Canyon Lake* (RWQCB, 2004a). This Basin Plan amendment specifies final numeric targets for total phosphorus and total nitrogen for both Lake Elsinore and Canyon Lake. Control of nitrogen and phosphorus is necessary to ensure compliance with relevant numeric and narrative water quality objectives specified in the basin plan, including those pertaining to excessive algae growth and dissolved oxygen.

The amendment also specifies final TMDLs, nitrogen and phosphorus wasteload allocations for point source discharges, and load allocations for nonpoint source discharges – including septic systems, for both lakes. The amendment includes an implementation plan for reducing nutrients, with compliance schedules for the numeric targets, TMDLs, wasteload allocations and load allocations, and a monitoring program to track progress toward compliance. The final onsite wastewater management program must meet the TMDL requirements.

II. WASTEWATER POLLUTANTS AND WATER QUALITY IMPACTS

SAWPA's 2003 *Nutrient Source Assessment* for Canyon Lake and Lake Elsinore provides an analysis of the impacts of conventional onsite systems on water quality. **Figure 1** shows the septic systems in the San Jacinto River watershed identified in the *Nutrient Source Assessment* that pose potential water quality risks. Those systems located within 500 feet of waterway are posing the greatest contamination risk. Rainfall events and hydraulic malfunctions have contributed to the poor performance of systems.

A dynamic hydrologic/hydraulic model of the watershed provides an assessment of nutrient loads contributed by onsite systems to Lake Elsinore and Canyon Lake. The model helped to formulate load allocations for septic systems to achieve TMDLs prescribed by state and local regulations. The model assessed hydrologic conditions during three water years (WY) to evaluate the transport of nutrient loads through the watershed. These conditions were represented as follows:

1. WY 1998 - Mystic Lake and Canyon Lake overflowed
2. WY 1994 - Canyon Lake overflowed
3. WY 2000 – No overflow conditions on either lake

The assessment reveals that improperly operated septic systems are a potential significant source of nutrient loads in areas draining toward Canyon Lake and Lake Elsinore, specifically an area just north of Canyon Lake where the density of septic systems is most pronounced. (See **Table 1**).

The likelihood of nutrient transport (particularly nitrogen) from conventional onsite systems is high during dry years (as evidenced by the higher proportions shown in the modeling results). Nutrients in Canyon Lake and Lake Elsinore are subject to cycling processes that can impair water quality over extended periods resulting in eutrophic conditions.

Figure 1. Septic Systems at Risk Identified in the Nutrient Source Assessment (SAWPA, 2003)

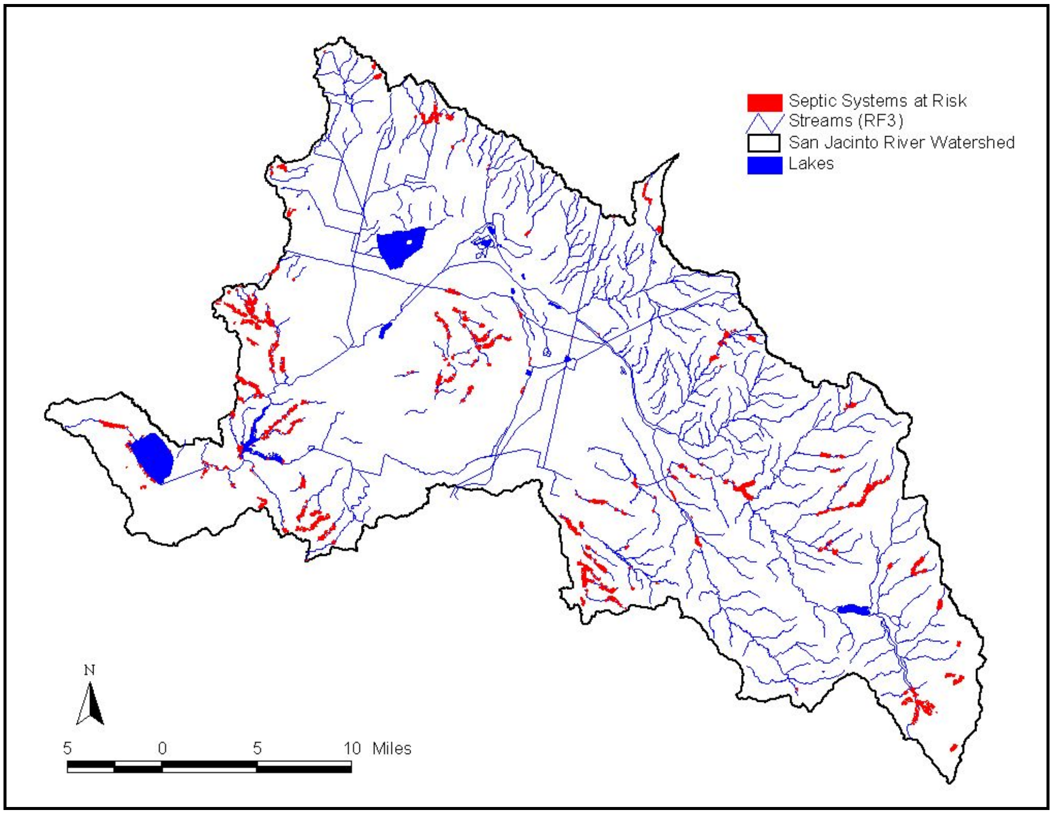


Table 1. Percent of Nutrient Loads to Canyon Lake and Lake Elsinore From Malfunctioning Septic Systems (SAWPA, 2003)

Nutrient	Total Nitrogen			Total Phosphorus		
Scenario	1 (WY 1998)	2 (WY 1994)	3 (WY 2000)	1 (WY 1998)	2 (WY 1994)	3 (WY 2000)
Canyon Lake	25.1%	10.6%	27.4%	6.1%	2.8%	9.5%
Lake Elsinore	8.9%	8.1%	23.5%	2.9%	4.6%	9.1%

Scenario 1: Mystic Lake and Canyon Lake overflowed (wet year).
Scenario 2: Canyon Lake overflowed but Mystic Lake did not (moderately wet year).
Scenario 3: Neither Mystic Lake nor Canyon Lake overflowed (dry year)

III. WASTEWATER TREATMENT SYSTEM OPTIONS

Investments in wastewater infrastructure and management often begin with individual residential applications. Addressing malfunctioning onsite septic systems may entail a number of pollutant reduction strategies, all with various costs and outcomes. While various studies have found that properly sited and constructed conventional onsite systems perform as well as newer technologies in terms of treatment after passing through the unsaturated soil, in some situations standard systems may be a potential problem. Such situations might include environmentally sensitive areas, areas with shallow soils, waterfront lots, or densely populated development sites.

Centralized Systems

Centralized wastewater systems are the used to collect and treat a majority of the sewage generated in the United States. In the San Jacinto Watershed, the Eastern Municipal Water District currently operates five wastewater treatment plants – Hemet, San Jacinto, Moreno Valley, Perris Valley, Sun City, and Temecula Valley – which serve some portions of the watershed area. In rural areas, however, where there are far fewer homes per mile of pipe, centralized collection systems can be costly. In these cases, upgrading existing individual wastewater systems and/or developing appropriately designed and managed clustered treatment facilities to serve multiple homes and businesses can be a more cost effective alternative. In areas where building densities are higher, wastewater collection lines are nearby, and sewage treatment plant capacities can handle the additional load, connection to centralized treatment services is recommended.

Individual Onsite Wastewater Treatment Systems

The conventional gravity-flow, soil-discharging septic system is often the first choice for wastewater treatment because of its low capital and operation/maintenance costs. Individual onsite treatment (septic) systems traditionally consist of a septic tank and a subsurface soil absorption field. Buried in the ground, septic tanks are essentially watertight single or multiple chamber sedimentation tanks. They are designed to receive and pre-treat domestic wastewater, mediate peak flows, and capture settleable solids, oils, and other floatable material, before the liquid is applied to the absorption field. Organic solids trapped in the tank undergo partial digestion when conditions allow.

Wastewater effluent is discharged from the tank and passes by gravity to the soil via a series of underground perforated pipes, perforated pipe wrapped in permeable synthetic materials, or leaching chambers. More advanced, uniform, distribution via pressure or drip irrigation can enhance the soil treatment capacity. The partially treated effluent flows through the soil infiltrative surface, whereupon it moves both vertically and horizontally (but generally downward) until it reaches ground water. Some treatment occurs in the septic tank, but the great majority of treatment is provided by a biomat that forms in certain soils at the soil infiltrative surface and in the unsaturated soil that lies beneath it. It should be noted that approximately 30 inches or more of well-drained (but not excessively drained) unsaturated soil is critical for the treatment of septic tank effluent.

Some additional physical treatment processes can continue as the effluent moves through the groundwater to nearby surface waters. Pressure/drip distribution of effluent to the upper soil horizon (i.e., 8-10 inches below the ground surface) enhances soil treatment by increasing the soil/water contact time, enhancing the use of available carbon to accomplish biological denitrification, and promoting both evapotranspiration and uptake of nutrients by overlying plants.

Time-dosing the septic tank effluent to the soil further improves treatment by allowing the soil to drain for several hours between pump cycles, avoiding the morning, evening, and weekly surges that keep soil saturated during certain periods and pushes the effluent through the treatment zone too quickly to accomplish proper treatment.

Cluster Systems

Cluster systems can serve groups of homes using a single type of system or a combination of collection and treatment methods. The use of cluster systems has a number of benefits and is appropriate in small communities with low population densities and a variety of site conditions. Decentralized systems may also be suitable for ecologically sensitive areas (i.e., where advanced treatment such as nutrient removal or disinfection is necessary) and can also achieve cost savings while also recharging local aquifers.

Cluster (community) systems typically serve fewer than a hundred homes, but they can serve more. Under this approach, septic tank effluent from each home is collected and routed to another site for further treatment via suspended or attached growth processes, and soil discharge. Other designs where primary treatment occurs at the treatment site instead of at individual home septic tanks are also available. Collection and movement of raw or settled wastewater to the final treatment site can be accomplished by gravity, pressure, or vacuum systems.

The advantages of these alternative collection systems include significantly lower capital cost, less opportunity for infiltration and inflow, and increased construction and location flexibility. The off-site treatment facility is still close to the wastewater sources, and may or may not have some features that resemble a traditional small sewage treatment plant. The primary goals of such a facility are to either prepare the wastewater for dispersal back to ground water or provide reuse of the treated wastewater, usually for landscape irrigation.

Treatment facilities range from sedimentation tanks and soil dispersal facilities to advanced treatment systems with distribution to drip irrigation fields or other reuse sites. Although some facilities use technologies similar to centralized treatment plants (such as trickling filters, aerobic tanks or lagoons, constructed wetlands, etc), most designers employ low-maintenance, upset-resistant alternatives that simplify and reduce operation and maintenance requirements. Final dispersal of treated effluent is usually to the soil, due to greater treatment advantages and avoidance of NPDES permitting, monitoring, reporting, and other requirements. However, cluster systems can be designed and permitted to discharge to surface waters, if necessary.

Package treatment plants employing these technologies are available as prefabricated treatment units serving one or more households, or can be custom-built. In general, suspended growth aerobic systems employing variations of the activated-sludge process have not had as successful a record of performance as cluster systems using attached growth treatment, which have proven to be more stable, reliable, and less energy-intensive. Regardless of the particular cluster system treatment technology selected, third-party sustainable management by an entity with the technical, financial, and managerial capacity to assure proper operation is required to ensure long-term service.

Alternative Onsite and Cluster Systems

There are numerous alternative treatment and/or dispersal system alternatives that can be used in areas where conventional septic systems cannot provide adequate treatment of wastewater effluent. These include mound systems, fixed-film contact units, constructed wetlands, low-pressure and drip dispersal, and advanced treatment systems. These systems, which were briefly noted above, are typically used in areas near nutrient-sensitive surface waters or to protect sensitive groundwater resources.

Alternative or innovative systems feature components and processes designed to promote degradation and/or treatment of wastes through biological processes, oxidation/reduction reactions, filtration, evapotranspiration, and enhanced soil application processes. Cluster systems are most often used to implement alternative treatment technologies (e.g., suspended growth and attached growth facilities), because the cost of collecting and treatment wastewater from multiple facilities at a common treatment and dispersal/reuse site offers economies of scale that lower capital and operation/maintenance costs. Cluster systems usually require individual septic tanks for each facility served to provide primary treatment and minimize fat, oil, grease, and solids loadings to the collection system and/or secondary treatment units.

(Note: Cluster systems that serve 20 or more people are regulated as Class V facilities under the federal Underground Injection Control Program. For more information, visit EPA's Underground Injection Control Program Web site at *http://www.epa.gov/safewater/uic.html.)*

IV. TREATMENT PROCESSES AND SYSTEM PERFORMANCE

The two major biochemical environments in which sewage treatment is carried out are anaerobic (by bacteria that do not require oxygen) and aerobic (by bacteria that require oxygen), both of which involve biological decomposition. Aerobic decomposition is generally preferred because aerobic bacteria decompose organic matter (sewage) at a rate much faster than do anaerobic bacteria and odors are less likely. Sewage treatment systems, whether conventional septic systems or more advanced treatment technology, attempt to create specific biochemical environments to promote and control the sewage treatment process.

Treatment Processes

- **Nitrogen**
  Nitrogen in domestic wastewater is present as ammonium, which is rapidly converted to nitrite and then nitrate by biota in the soil. Nitrate is stable and soluble, but can be removed through effective linking of aerobic and anaerobic biochemical transformation processes. In general, however, most conventional septic systems are not considered effective in removing nitrogen without the addition of an anaerobic step that nitrifies the nitrate. Today, several treatment system designs can remove nitrogen to as little as 10 mg/L (the same as the drinking water nitrate MCL) or more, in some cases. Capital and operation/maintenance costs are higher for these system types, which often prompts their application as clustered – rather than individual – treatment facilities.

- **Phosphorus**
  Another primary nutrient, phosphorus, is often the limiting factor for algal growth and eutrophication in freshwater systems. Because other nutrients necessary for the growth of algae and other aquatic plants are usually present in inland waters, even relatively low concentrations of phosphorus can lead to a direct increase in algal growth. Studies have shown that lakes with phosphorus concentrations as low as 30 parts per billion can produce significant algal growth. Septic tanks remove only about 10 percent of the phosphorus in raw wastewater, while the infiltration/dispersal soil-based component of the overall treatment system generally

removes the rest through physical adsorption and chemical reactions with the aluminum, iron, and calcium in the soil.

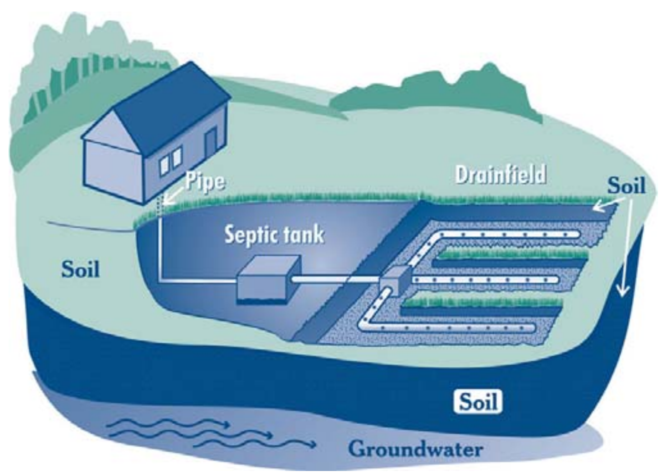
Favorable phosphorus removal conditions exist for soil absorption systems in most soils of the United States, but some phosphorus loading problems might be encountered in areas with older systems located in highly permeable, shallow soils (e.g., sands), mineral-poor soils, that are too close to surface waters, and high system densities (US EPA, 2005b). Some technologies can enhance phosphorus removal (e.g., sand filters with high iron-content sand, sequencing batch reactors operated in certain modes, and some new proprietary adsorptive treatment systems).

- **Pathogens**
  Pathogenic microorganisms found in domestic wastewater, including bacteria, viruses, protozoa, and other parasites, are removed or attenuated through chemical, physical, and biological processes occurring in the septic tank and within the biomat, and the soil. The main methods of bacterial retention in unsaturated soil are filtration, sedimentation, and adsorption. Normal operation of conventional septic tank/subsurface infiltration systems results in retention and eventual die-off of most, if not all, observed pathogenic bacterial indicators within 2 to 3 feet (60 to 90 centimeters) of the infiltrative surface (US EPA, 2002a). With a mature biomat at the infiltrative surface of coarser soils, most bacteria are removed within the first foot vertically or horizontally from the trench-soil interface. Removal rates for other pathogens, such as viruses and protozoa, vary significantly depending on soil, climate, and other factors.

System Performance

- **Conventional Septic Systems**
  The overwhelming majority of onsite systems are conventional onsite systems (**Figure 2**). Primary treatment occurs in the septic tank, where bacteria digest organic matter in the wastewater in an anaerobic (without oxygen) process. The effluent flows out of the tank to the soil absorption system (leachfield) for secondary treatment. The most common cause of conventional onsite system malfunction is inadequate cleaning of the septic tank, which leads to movement of solids into the absorption lines where they accumulate and impair drainfield function. In enhanced systems, the septic tank is outfitted with an outlet filter, to capture solid particles that are too small or too light to settle.

Figure 2. Conventional gravity-flow septic system, with tank and soil infiltration trenches



The septic tank should be watertight, with at least one riser extending to the ground surface, and may be equipped with an effluent filter or screen to minimize the movement of non-liquid or neutrally buoyant material into the drainfield. Removal of total suspended solids is usually 70 to 85 percent for well-designed septic systems. Other pollutant removal rates in the tank are affected by the characteristics of the wastewater. Typically, reduction of biochemical oxygen demand ranges from 40 to 60 percent. Nitrogen and phosphorus removals in the tank are approximately 10 percent, while fecal coliforms are reduced by approximately 90 percent (US EPA, 2002a). Depending on climate, loading rates, and other factors, scum and sludge accumulating in the tank (i.e., septage) will need to be checked during each inspection, or pumped on a regular schedule (e.g., pumped every 3 to 5 years). Periodic visual inspection is the most efficient way to determine pumping intervals. Remote sensing of the depth of those accumulations is also possible with some new sensing devices.

- **Subsurface Wastewater Infiltration (Soil Absorption) Systems**

Infiltration trenches containing perforated pipe and stone are the most widely used method for treating and dispersing septic tank effluent, though other septic tank effluent infiltration approaches (e.g., plastic open-bottomed leaching chambers, perforated pipes encased in net-wrapped foam pellets, and alternate media such as tire chips) have been used successfully. Historically, gravity-fed trenches have typically been about 2 to 3 feet deep and about 2 feet wide. Soils, surface water drainage, and the slope of the land influence the location of the tank and field. For example, conventional septic systems are usually required to be located a code-specified minimum distance from all wells. Trenches typically range in length from 45 to some code-specified maximum of about 100 feet. Infiltration occurs through the bottom and sides of the trench.

Soils that promote rapid movement of wastewater contaminants when fed by gravity, and low-permeability soils (clays, etc.) require very large infiltration areas to accept the entire wastewater volume. Shallow trenches are now generally preferred to deeper trenches because the upper soil horizons are usually more permeable, and they facilitate greater natural aeration and evapotranspiration. A reserve area for future repairs or additions to the drainage field is often required by state codes. Some states also require multiple dispersal systems and alternation of their use (alternating systems).

Septic tank effluent can be distributed to the soil absorption system by gravity, siphon, or pump/drip pressure dosing. Dosing refers to periodically (e.g., 4 to 24 times per day) releasing effluent to the absorption field using a pump or siphon after either a set time period or a predetermined quantity of effluent has accumulated in the pressurization tank. Uniform application methods, such as pressure and drip dispersal, maximize the use of the entire infiltrative surface and maximizes the soil-effluent contact time for treatment.

Distribution boxes located between the septic tank and the soil absorption system are intended to allow even distribution of flows between the gravity-fed distribution laterals of the absorption field, but have functioned poorly due to settling and subsequent uneven distribution. Except where required by outdated codes, these fixtures are not recommended today. Uniform application results in the least amount of infiltrative surface clogging and greatest treatment efficiency. Maintenance of gravity-fed trenches and beds is minimal, but some annual O/M tasks are required for uniform distribution systems. Alternating systems are also effective in extending system service life because they allow the use of one or more leach fields while the others rest for 6 months to a year to restore their effectiveness.

Some clogging of infiltrative surface pores from biomass and slimes produced by natural wastewater decomposition processes occurs under normal conditions. In coarser soils, this “biomat” improves gravity-fed system treatment performance. The vertical distance between the soil infiltration system and groundwater is an important consideration, as is the horizontal distance between the absorption field and nearby surface waters. Seepage from the soil absorption system that reaches ground water where unsaturated soil depth is inadequate could contaminate drinking water wells. Furthermore, during wet seasons, groundwater might rise into the absorption system trenches, causing sewage to move upward toward the ground surface. Other considerations that increase risk of soil system treatment malfunctions are areas with high water tables, poor soil permeability, heavy clays that crack when dry, layered soils, or soils with macropores.

- **Other Soil Dispersal Options**

For the vast majority of decentralized applications, treated effluent is discharged to the soil for further pollutant removal via biological, physical, and sometimes chemical processes. Some of the key soil dispersal alternatives to the conventional gravity-fed perforated pipe/ gravel trench approach discussed below. These soil dispersal options can enhance treatment of the wastewater.

Leaching chambers**:** Molded plastic leaching chambers have been used in lieu of trench-based perforated pipe and aggregate infiltration systems to distribute septic tank effluent to the soil for final treatment. A typical leaching chamber infiltration system consists of interconnected arch-shaped bottomless chamber segments, installed below grade in level beds that comprise the drain field network. Aggregate is not needed, though porous media (e.g., gravel) is often used to fill in around the exterior of the vented chamber sidewalls to accommodate delivery of effluent through the sidewalls when ponding in the chambers occurs. Sizing of the conventional aggregate-filled absorption systems is based on code-prescribed evaluations of wastewater characteristics, flows, and site conditions (soils, depth to groundwater/bedrock, etc.). In several states substitution of chamber systems has been granted a reduced sizing requirement. The use of chambers has increased dramatically in these states due to this size reduction allowance. Chambers and other gravelless systems have some clear advantages that may account for these preferences, including their light weight and ease of installation, that can equate to less natural soil structure disruption and costs, among others. Several states encourage the use of these systems, but do not allow reduced sizing that might drive certain pollutants deeper into the soil matrix.

Pressure Distribution Systems**:** Low-pressure effluent distribution into shallower and narrower trenches has several advantages in terms of treatment capabilities. The two primary types are pressure distribution that has been used for several decades and the more recent drip dispersal alternatives that have been adapted from agriculture. Pumping effluent to the dispersal field typically creates a large flow surge that distributes effluent uniformly throughout the dispersal field. This minimizes localized overloading and maximizes the soil contact time for better treatment potential. Pressure systems can be placed very high in the soil profile and use periodic dosing to distribute effluent to the soil matrix. Pressure distribution trenches are typically shallow and narrow, which provides for ease of installation and maximum carbon availability for treatment processes. Reaeration of the infiltrative surface and drying of the biomat between doses reduce potential clogging threats and help to ensure nitrification and some denitrification of ammonia in the septic tank effluent. Drip irrigation distribution lines are typically installed with a vibratory plow at shallower depths (i.e., 8-12 inches below surface grade) and should be preceded with pretreatment by more than a septic tank (e.g., fixed-film filter) to minimize clogging of emitters.

Spray Irrigation: Spray irrigation is used to discharge septic tank effluent as irrigation water to hayfields or other vegetated areas not used to produce food crops to be eaten raw. However, strict controls on human contact with discharges that might contain pathogens are required. Design of spray irrigation systems must consider soil permeability, slopes, climate, and the water and nutrient needs of vegetation growing on the spray field. Additional treatment and disinfection of spray irrigation water is necessary if human contact with the spray field or wet vegetation is likely. Successful applications have been installed in shallow soils in the Northeast and Southwest. Prior to spraying, it is recommended that effluent be treated to remove most BOD to prevent odors. Spray devices should not be activated during wet weather or freezing temperatures. Large buffer areas around the spray sites are usually required, so that land requirements are quite large, limiting this option to only very large and very rural areas.

Disinfection Devices*:* In some areas (e.g., source water protection areas and sites near recreational lakes, and coastal beaches), pathogen contamination from onsite systems is a major concern. Disinfection devices can be used in conjunction with the post-septic tank treatment technologies summarized above to treat effluent for pathogens before it is discharged. The two most common methods of disinfection in the United States are chlorination and ultraviolet (UV) disinfection. Installation of these devices in an onsite system increases the system's cost and adds significantly to operation and maintenance requirements. Single-home chlorinators in non-dosed conventional systems have a poor track record when applied without third-party management oversight. These units can greatly overdose or not dose at all if frequent, proper operation and maintenance are not required. Chlorine is a powerful biocide and can have significant impacts on aquatic and soil treatment biota at concentrations well below 1 mg/L. Some states (e.g., Maryland) have additional requirements for maximum chlorine concentrations in effluent or prohibit the use of halogen (i.e., chlorine and iodine) processes. UV units generally require controlled feeding of a high quality influent (BOD of 30 mg/L and TSS of 30 mg/L or better) to have consistent performance.

Some communities have elected to make a transition from individual systems to a clustered approach to capitalize on the financial and other benefits associated with the joint use of lagoons, drain fields, and other system components linked by gravity, vacuum, or low-pressure piping. Cluster systems typically serve fewer than a hundred homes, but they can serve more. Under this approach, septic tank effluent from each home is collected and routed to another site for further treatment.

Collection and movement of effluent to the final treatment site can be accomplished by gravity flow or pumps. The off-site treatment facility resembles a downsized centralized treatment plant, using similar technologies such as trickling (media) filters, aerobic lagoons, constructed wetlands, etc. Final dispersal of treated effluent is usually to the soil, due to greater treatment advantages and avoidance of NPDES permitting, monitoring, reporting, and other requirements. Examples of performance from these systems are listed in **Table 2**.

Table 2. Wastewater Constituents of Concern and Representative Concentrations in the Effluent of Various Treatment Units

Constituents of concern	Direct or indirect measure (Units)	Tank-based treatment unit effluent concentrations					Percolation into ground water at 3 to 5 ft depth (% removal)
		Domestic Septic tank effluent[1]	Domestic STE with N-removal cycle[2]	Aerobic unit effluent	Sand filter effluent	Recirculating Media Filters	
Oxygen demand	BOD_5 (mg/L)	140-200	80-120	5-50	2-15	5-15	>90%
Particulate solids	TSS (mg/L)	50-100	50-80	5-100	5-20	5-10	>90%
Nitrogen	Total N (mg N/L)	40-100	10-30	25-60	10-50	30-60	10-20%
Phosphorus	Total P (mg P/L)	5-15	5-15	4-10	<1-10[3]	5-15[3]	0-100%
Bacteria (e.g., *Clostridium perfringens, Salmonella, Shigella*)	Fecal coliform (organisms per 100 mL)	10^6-10^8	10^6-10^8	10^3-10^4	10^1-10^3	10^1-10^3	>99.99%
Virus (e.g., hepatitis, polio, echo, coxsackie, coliphage)	Specific virus (pfu/mL)	0-10^5 (episodically present at high levels)	0-10^5 (episodically present at high levels)	0-10^5 (episodically present at high levels)	0-10^5 (episodically present at high levels)	0-10^5 (episodically present at high levels)	>99.9%
Organic chemicals (e.g., solvents, petro-chemicals, pesticides)	Specific organics or totals (µg/L)	0 to trace levels (?)	0 to trace levels (?)	0 to trace levels (?)	0 to trace levels (?)	0 to trace levels (?)	>99%
Heavy metals (e.g., Pb, Cu, Ag, Hg)	Individual metals (µg/L)	0 to trace levels	0 to trace levels	0 to trace levels	0 to trace levels	0 to trace levels	>99%

[1] Septic tank effluent (STE) concentrations given are for domestic wastewater. However, restaurant STE is markedly higher particularly in BOD_5, COD, and suspended solids while concentrations in graywater STE are noticeably lower in total nitrogen.
[2] N-removal accomplished by recycling STE through a packed bed for nitrification with discharge into the influent end of the septic tank for denitrification.
[3] P-removal by adsorption/precipitation is highly dependent on media capacity, P loading, and system operation.

Source: US EPA, 2002

V. MANAGEMENT CONSIDERATIONS

A majority of the malfunctions associated with onsite and cluster systems are the result of system age, inappropriate design, hydraulic/pollutant overloading, and poor maintenance. Other factors include improper siting of systems in sensitive ecological areas (such as wellhead protection zones, shorelines, or shellfish habitats) or in high-density settings that exceed the hydraulic and hydrologic assimilative capacities of regional soils.

Management Based on Risks

For soil-discharging individual or clustered systems, the intensity and frequency of management attention varies according to the type of system technology and components (i.e., pumps, float switches, timers, etc.), the strength and flow of wastewater processed, the proximity of the water resource receiving the discharges, and other risk factors. All systems require some type of management program, which often includes maintenance contracts, renewable operating permits, or operation/ownership of the system by a designated responsible management entity (RME). Operating and maintenance requirements for several unit processes are listed **Table 3**.

Table 3. Typical Operation/Maintenance Requirements

Treatment System Component	Inspection and/or O&M Frequency
Septic tanks – with effluent screen	1x / yr if effluent screens are used
Septic tanks – no screen used	Every 4 to 7 yrs if no screens are used
Pumps and controls	1x / yr
Electrical systems	1x / yr
Pressure-dosing	1x / yr
Drip dispersal	2x/ yr
ATU – suspended growth	3-4x / yr plus pumping every 8-10 months
- fixed film	2-3x / yr plus pumping every 8-10 months
- fixed film/act sludge	4x / yr plus pumping as required
Intermittent filters	2x / yr
Recirculating filters	2x / yr
UV disinfection	2-4x / yr
Tablet chlorinators	12x / yr

Source: (Kreissl, 2003)

One of the more common reasons why some onsite systems do not perform properly is inappropriate system selection. An onsite wastewater system should be matched not only to site properties, especially the soil and geologic conditions, but also to the volume and concentration of wastewater. The site and soil conditions must be known in detail in order to accommodate system requirements. For example, the absorption and treatment capability of the soil must be able to treat the wastewater flow and characteristics. When a system is selected that is not compatible with the site, the capacity of the system, its service life, and treatment performance can be reduced. This contribution to failure may not become known for years. By then other factors contributing to failure may be equally, or even more important.

In other cases the system was matched to the site but designed poorly. Improper design such as inadequate system capacity or an inadequate absorption field can cause a system to malfunction within months. Conventional septic systems with drain fields may be a potential contamination risk since these systems are not always effective in trapping and preventing nutrients (particularly nitrogen) from entering the lakes via groundwater transport. Unmanaged systems, those that are not inspected or pumped on a regular basis, pose the greatest risk. **Table 4** lists general malfunction problems associated with onsite and cluster systems.

Table 4. Types of Onsite and Cluster System Malfunctions (US EPA, 2005a)

Type of Malfunction	Contributing Causes
Hydraulic Malfunctions	Excessive hydraulic loadings to undersized systems, low soil permeability, and/or poor maintenance. Increases in water usage over a period of years can exceed the original design capacity of the soil-based wastewater treatment system.
	Excessive organic loading from unpumped or sludge-filled tanks resulting in reductions in biomat infiltrative surface permeability.
	Systems more than 25 to 30 years old generally experience more failures if not operated and maintained properly. Failure rates can more than triple for poorly managed older systems. Regular tank pumping and use of alternating absorption fields can prolong system life indefinitely.
Performance Malfunctions	Inappropriate system design for the site; failure to adequately consider or characterize wastewater strength and flow (average daily and/or peak flows); failure to identify and consider restrictive soil/rock layers (e.g., fragipan) or regional geology (e.g., karst features, creviced bedrock); failure to assess landscape position.
	Cumulative effluent load from all systems in watershed or groundwater recharge area exceeds the hydrologic capacity of the area to accept and/or properly treat effluent.
Administrative Malfunctions	Systems built , operated, and repaired without required reviews and permits.

VI. PROPOSED MANAGEMENT PROGRAM

Task 6 of the 2004 amendment to the *Water Quality Control Plan for the Santa Ana River Basin to Incorporate Nutrient Total Maximum Daily Loads (TMDLs) for Lake Elsinore and Canyon Lake* requires the development of a septic system management program. The task specifies that:

> "No later than 6 months of the effective date of an agreement between the County of Riverside and the Regional Board to implement regulations adopted pursuant to Water Code Sections 13290-13291.7, or if no such agreement is required or completed, within 12 months of the effective date of these regulations, the County of Riverside and the Cities of Perris, Moreno Valley and Murrieta shall, as a group, submit a Septic System Management Plan to identify and address nutrient discharges from septic systems within the San Jacinto watershed. The Septic System Management Plan shall implement regulations adopted by the State Water Resources Control Board pursuant to California Water Code Section 13290 – 13291.7.
>
> At a minimum, the Septic System Management Plan shall include plans and schedules for the development and implementation of the following components
>
> - Public education program
> - Tracking system
> - Maintenance standards

- Enforcement provisions
- Monitoring program
- Sanitary survey

In order to facilitate any needed update of the numeric targets and/or the TMDLs and/or septic system LAs, the proposed schedule shall take into consideration the Regional Board's triennial review schedule.

In lieu of a coordinated plan, one or more of the agencies with septic system oversight responsibilities may submit an individual or group Management Plan to develop the above Plan for areas within their jurisdiction. Any such individual or group plan shall also be submitted no later than (*6 months from effective date of this Basin Plan amendment *). This Septic System Management Plan shall be implemented upon Regional Board approval at a duly noticed public meeting. Compliance with the septic systems load allocation may be achieved through a Regional Board approved pollutant trading program."

This section outlines a framework for an onsite wastewater management program. The key elements of the program incorporates the mandates of the Task 6 and the most recent draft of California Assembly Bill 885, and elements of US EPA's onsite wastewater management guidelines. The following subsections address these key program components.

1. Public Education
2. Planning
3. Operation and Maintenance
4. Reporting and Tracking
5. Performance Requirements
6. Site evaluation, system design, installation, construction
7. Monitoring
8. Enforcement and Compliance

It should be noted that the management program described below is based upon the identification of risk tiers, referred to as "critical management zones." These zones represent high, moderate, and lower risk management areas defined by spatial proximity to impaired water bodies, streams emptying into impaired water bodies, or that lie above threatened groundwater supplies.

The proposed management approach recommends more stringent requirements for existing wastewater treatment systems in the higher risk zones, and less stringent requirements for those in the lower risk zones. It also recommends that new treatment systems meet higher nutrient removal performance requirements, based on the relative risk they pose to surface waters or groundwater; i.e., as defined by proximity to valued waters. <u>The approach described herein does not represent a ban on new wastewater treatment systems</u>; rather, it requires that new systems achieve higher pollutant removal rates, either through individual onsite or clustered facilities. It is anticipated that meeting the improved performance requirements will likely result in new clustered wastewater systems and/or extension of centralized sewer lines in many areas, to capitalize on the economies of scale and related cost efficiencies related to community treatment facilities.

Critical Management Zones

As noted above, *critical management zones* have been identified in the San Jacinto watershed to target and reduce pollution threats. These zones have been characterized using data from nutrient management plans, Total Maximum Daily Load analyses, and other water resource studies.

A Geographic Information system was used to map onsite wastewater systems and identify the critical management zones, which are based in part on criteria presented in California Assembly Bill 885. Data sources included the septic system locations from the Elsinore Valley Municipal Water District (EVMWD); land ownership parcel data from Riverside County; and data on sewage systems from the Eastern Municipal Water District (EMWD). The zones are linked to nutrient impairments of Lake Elsinore, Canyon Lake, and groundwater basins in the watershed. The Critical Management Zones are based on the level of risks and are described below:

Zone I: Areas within 600 linear feet[1] (measured horizontally) of Canyon Lake or Lake Elsinore

Zone II: Areas within 300 linear feet (measured horizontally) of perennial streams that discharge to either of those lakes. For this initial effort, all streams and channels located downstream of Mystic Lake are assumed to be perennial, or highly likely to discharge to Lake Elsinore and Canyon Lake during typical storm events. Designation of perennial, intermittent, and ephemeral streams in all zones should be further verified in the field.[2] If streams are determined to be intermittent and/or ephemeral, they will be defined as Zone III streams.

Zone III: Areas within 150 linear feet (measured horizontally) of intermittent and/or ephemeral streams that discharge into either of the lakes. For this initial effort, all streams and channels located upstream of Mystic Lake are considered intermittent since these areas only contribute to pollutant loads to Lake Elsinore and Canyon Lake under extreme conditions when Mystic Lake overflows.

Zone IV: Areas, not already addressed in Zones I through III that overlay currently impaired groundwater basins as identified by the RWQCB.[3] Inspection of systems in this zone are required within five years, with repair/replacement scheduled within five years of inspection if they are found to be deficient.

A series of maps and figures has been developed to depict specifics of the Critical Management Zones and the recommended approach for managing wastewater treatment systems in each of the zones. **Figures 3 and 4** provide a map of the septic systems within the four Critical Management Zones. **Figures 5 and 6** show how these Zones intersect city and groundwater basin boundaries, respectively.

[1] Based on draft State Board Regulations (AB 885)

[2] It should be noted that most streams in the San Jacinto River watershed are considered ephemeral, other than those streams with baseflow sustained by urban runoff. Field verification is therefore required for designation of ephemeral and perennial streams within Zone II.

[3] Resolution R8-2004-0001 outlines revised total dissolved solids [TDS] and nitrate-nitrogen objectives for groundwater, and groundwater basins currently exceeding those objectives (RWQCB, 2004b). The current quality of groundwater basins in the San Jacinto watershed were verified based on monitoring results reported in EMWD's *West San Jacinto Groundwater Basin Management Plan 2006 Annual Report* (EMWD, 2007).

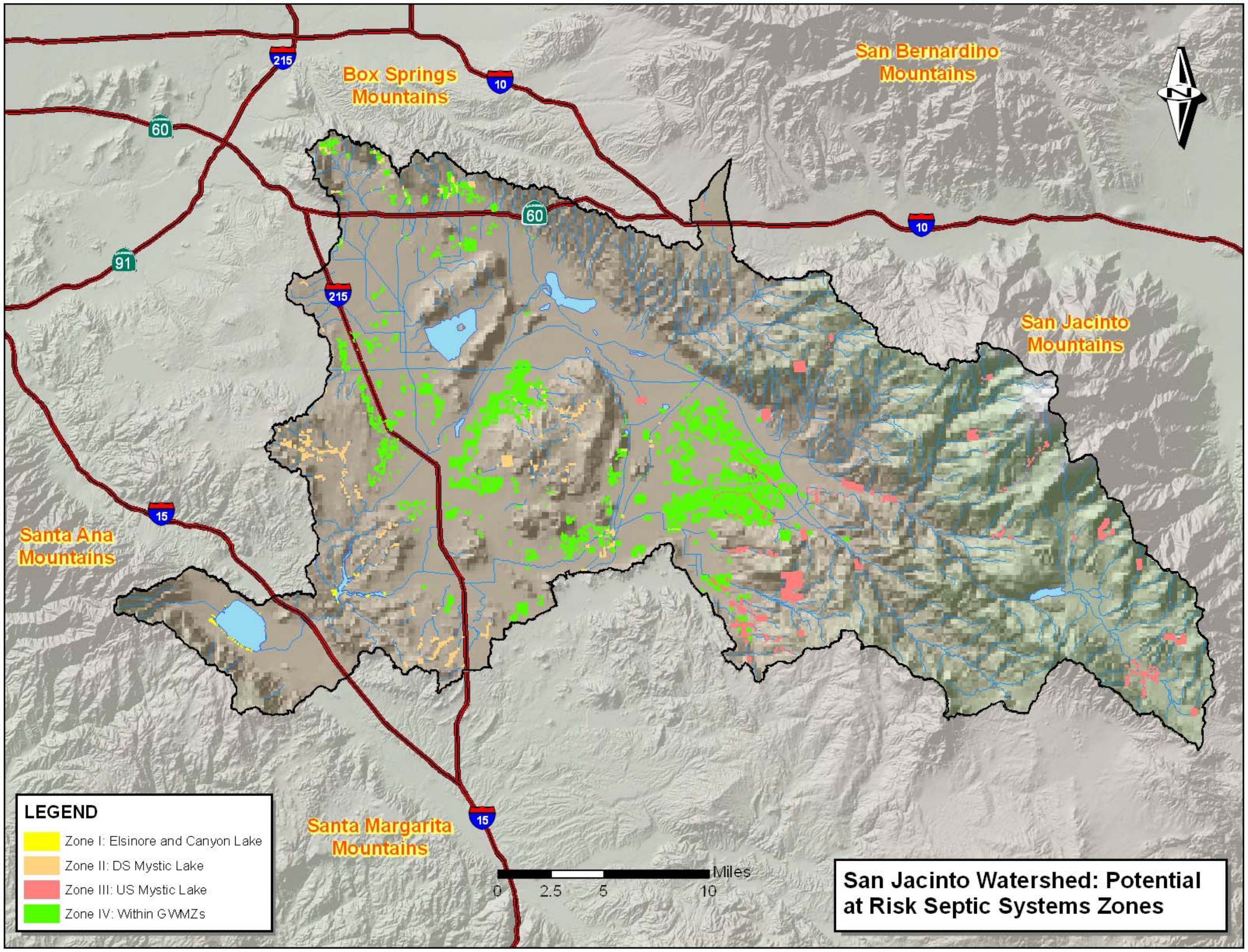


Figure 3. Soil-discharging Wastewater Treatment Systems at Risk Within Critical Management Zones in the San Jacinto Watershed

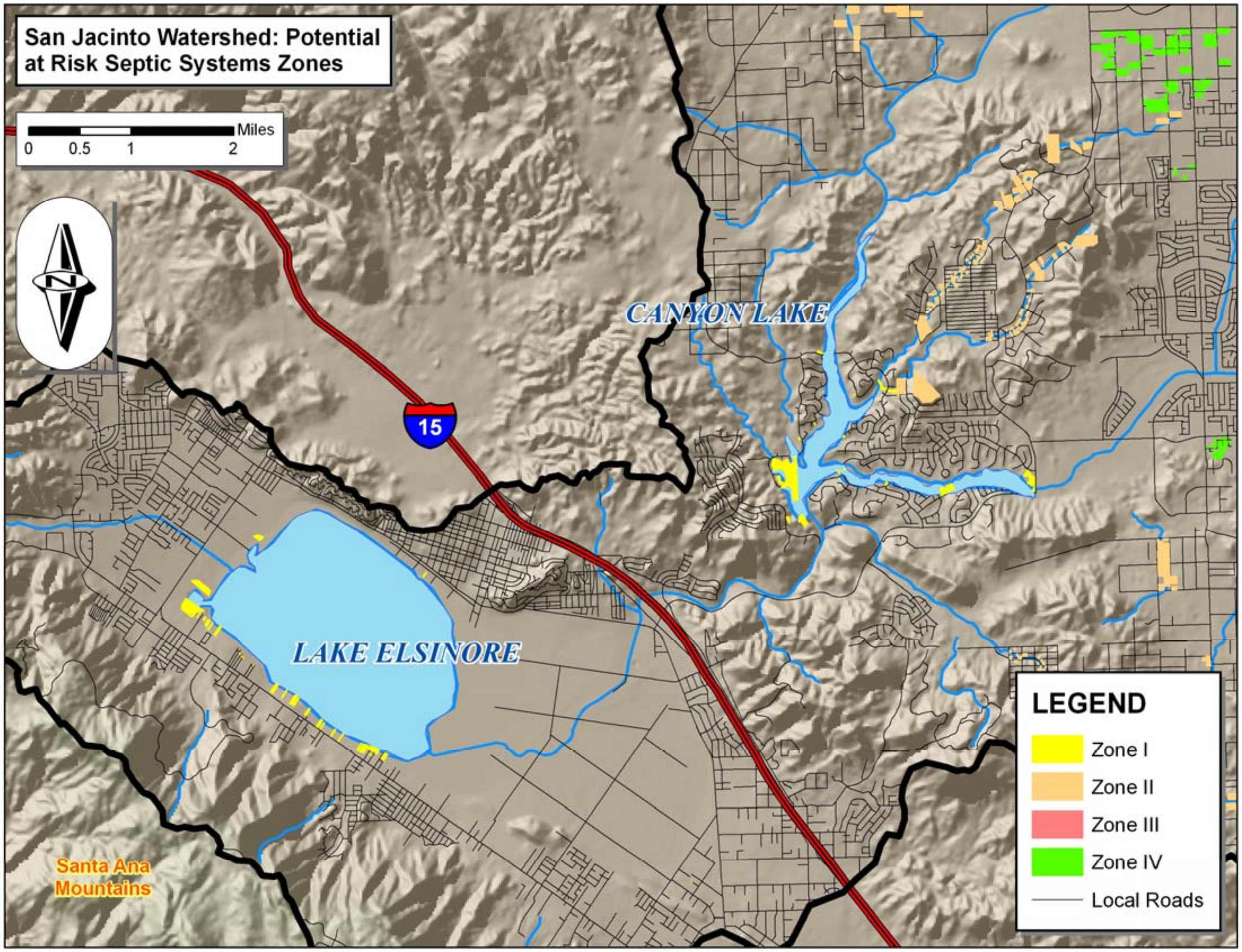


Figure 4. Soil-discharging Wastewater Treatment Systems at Risk Within Critical Management Zones in the Vicinity of Lake Elsinore and Canyon Lake

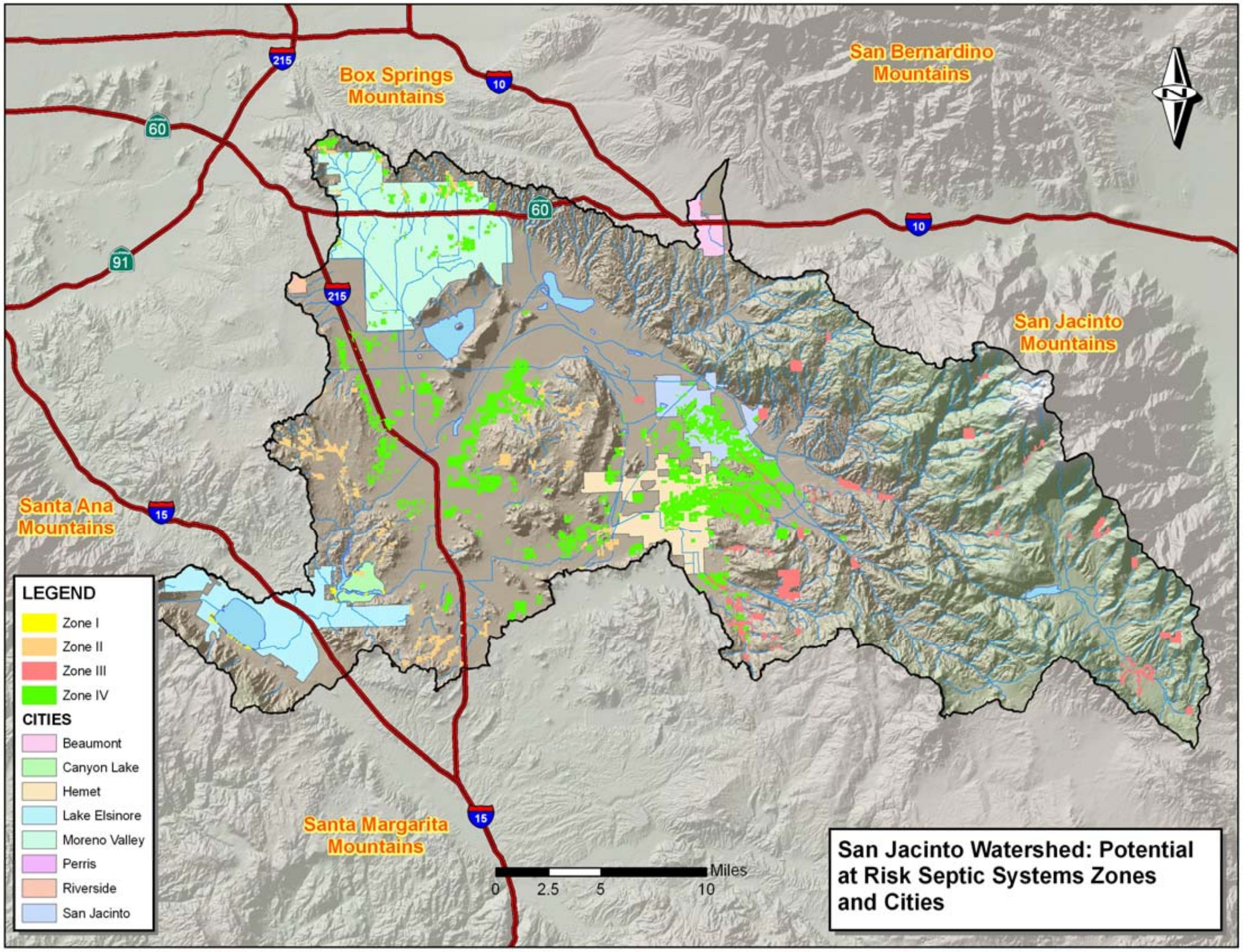


Figure 5. Soil-discharging Wastewater Treatment Systems at Risk Within Critical Management Zones and Cities

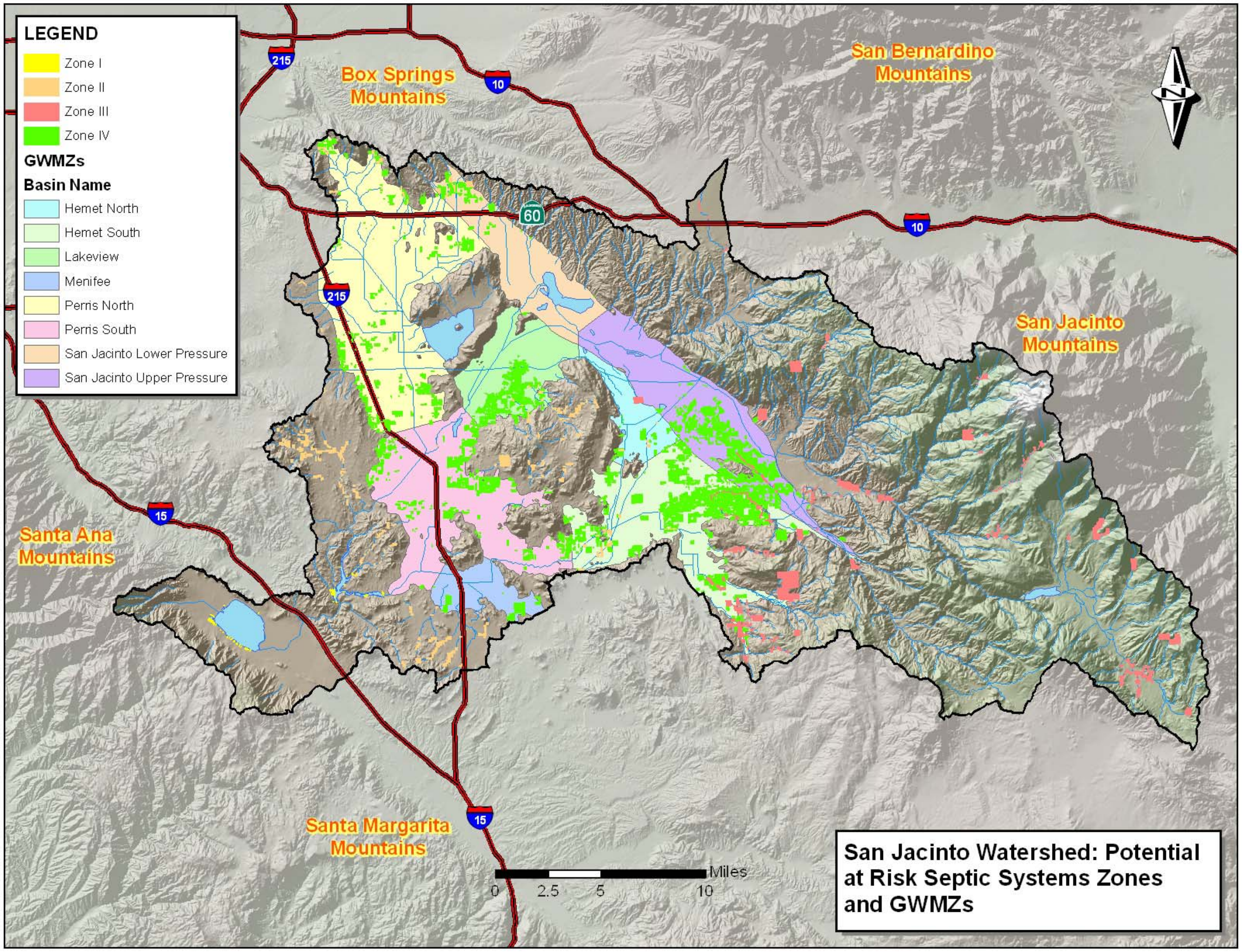
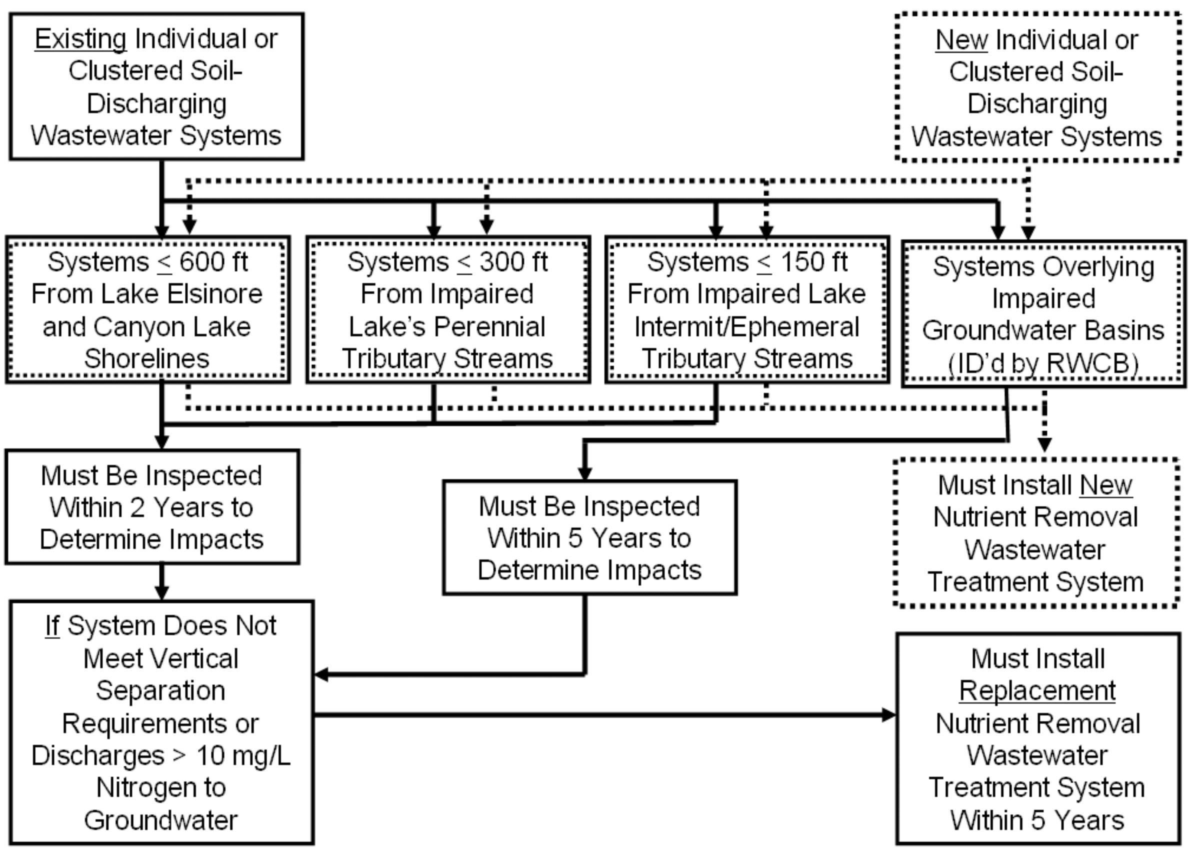


Figure 6. Soil-discharging Wastewater Treatment Systems at Risk Within Critical Management Zones and Groundwater Basins

As noted, the general approach for managing wastewater systems within the Critical Management Zones is based in part on the most recent draft of California Assembly Bill 885. The approach recognizes the importance of spatial proximity in addressing water quality impacts of soil-based wastewater treatment facilities, and outlines an approach for 1) instituting enhanced performance requirements for new systems; 2) examining existing systems near impaired waters to determine potential impacts; and 3) repairing or replacing existing systems that may threaten valued water resources. The current draft of the bill also specifies technical requirements for analyzing soils that will be components of the treatment system, bans new cesspools, and includes other requirements for various system types, which are all incorporated into this proposed management program specifically or by reference. The figure below summarizes the general approach for managing existing and new systems in each of the Critical Management Zones – details on this approach, and the program components specified by amendment to the water quality control plan, are presented in the sections that follow.

Figure 6. Generalized Approach for Managing Existing and New Soil-Discharging Wastewater Treatment Systems in the Critical Management Zone



1. Public Education Program

The actions of the homeowner will ultimately determine the success of any onsite wastewater management program. Numerous surveys of homeowners have revealed a general lack of knowledge regarding their septic system. Most state and local programs include an education program to promote homeowner awareness. Many have developed guides and fact sheets to inform homeowners about how to maintain and troubleshoot their septic systems.

Proposed Program. The San Jacinto onsite wastewater management program should include a strong public education program with the following key objectives:

- **General Awareness**
  Guidelines, instructional materials, and multi-media outlets should be used to inform the public and service providers about program requirements, onsite system impacts, operation and maintenance requirements, and training opportunities.

- **System Owner Education**
  A key element of any effective onsite wastewater management program involves educating the homeowner about their onsite systems. There are a number of mechanisms to inform system owners about their systems including fact sheets, utility bill informational inserts, maintenance reminders, web sites, and direct consultation. A number of resources are readily available to assist with this task with developing an operating manual from EPA and various local and state onsite associations and industry trade groups.

- **Targeted Outreach in Critical Management Zones**
  A proactive outreach program to homeowners living within critical management zones should established to improve onsite wastewater system performance. Workshops, meetings, and one-on-one contacts are among the tools that should be utilized, especially during the first two years of the management program, to educate system owners.

2. Planning

Selecting the appropriate wastewater treatment technology is based on a number of factors including environmental conditions, public acceptance, financial needs, and the community's desired land use and economic development goals. In order to determine the best wastewater treatment options and management approaches, a management plan must be developed that fully considers community's unique social, economic, and environmental conditions.

Proposed Program. The San Jacinto Onsite Wastewater Management Program should include a strong planning component including:

- **System Inventory and Needs Assessment**
  A needs assessment, which includes a system survey, should be conducted to evaluate the community's wastewater treatment needs and existing systems and identify critical areas.
- **Onsite Wastewater Plan**
  Once an inventory is completed and the land use pattern and resources are identified a plan can be developed to assess onsite wastewater treatment system alternatives to compare the short- and long-term costs of different solutions. Particularly with centralized treatment, advanced decentralized treatment, and cluster systems,

operation and maintenance costs that must be covered through user fees differ greatly depending on the type of system.

3. Operation and Maintenance

There are distinct ongoing operation/maintenance requirements associated with various onsite wastewater infrastructure/technology. Most technologies come with suggested operation and maintenance activities from the manufacturer. Maintenance inspections are gaining appeal as a management tool to assess the condition of a septic system and determine pumping needs. In some cases, this is a strictly voluntary program, while other communities mandate pumping based on 3rd party inspections.

Following inspection, the system owner should be notified of any needed corrections and assigned a deadline to verify that corrections have been made. Acceptable proof is usually certification by a contractor listing the types and dates of corrections made and final inspection. Some local agencies have adopted a sewage management program that requires the annual or biannual inspection of systems with newly issued or modified permits and proof of septic tank cleaning for all systems (old and new). Other agencies have designated certain geographical areas (such as aquifer or shoreline protection zones) as being subject to annual system inspections and/or routine tank cleaning.

Alternative and innovative onsite wastewater technologies require additional maintenance and/or ongoing attention. In states and communities where these systems are authorized, performance inspections are mandated in the state onsite code or in the system's operating permit.

Proposed Program. The San Jacinto onsite wastewater management program should include a strong operation and maintenance program including:

- ***Maintenance Rules***
  Maintenance rules should be based on system manufacturers' requirements and reviews by qualified experts. For non-proprietary system types, an operation and maintenance guide specifying operation/maintenance tasks, schedules, inspection requirements, and responsible parties should be supplied or developed.

- ***Maintenance Contracts***
  Repaired or replaced systems located in critical management zones, large capacity systems (those with the capacity to serve 20 or more people) and systems serving commercial establishments should be required to enter into maintenance contracts with qualified private service providers. Maintenance contracts will specify regular inspections and servicing of the system, based on system type and manufacturer's recommendations, if any. In general, tank and soil gravity-flow systems will require inspections and service every 3-5 years. Systems with pumps, float switches, siphons, and other electrical or mechanical components will require at least annual inspections.

- ***Inspection and Pumping***
  Any person owning a septic tank shall have a service provider inspect the septic tank a minimum of once every five years to ensure that the level of settleable solids and/or floatable solids do not impair the performance of the septic tank. It is recommended that septic tanks be pumped if the sum of the scum depth and sludge depth exceeds 50% of the

septic tank depth as measured from the bottom of the outlet pipe to the bottom of the tank. Inspections will be scheduled in accordance with the information presented in the previous subsection.

- ***Low-Risk Systems***
  Existing systems that are not located in the a critical management zones should be maintained by their owners in accordance with the US EPA *Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems* (US EPA, 2003).

4. Reporting and Tracking

Data collection, data access, and data management is the infrastructure that supports an onsite wastewater program. Managing data collected during the inventory, record-keeping, and reporting process requires a database and an information system to manage the information. The use of electronic databases, spreadsheets, and geographic information systems (GIS) increase the ease of collecting, storing, retrieving, using, and integrating data. A database can also be used to track system inspection, monitor compliance, and send maintenance reminders and inspection schedules to system owners.

Proposed Program - The San Jacinto onsite wastewater management program should include a program that considers site conditions with performance of the system including:

- **Records**
  System owners should maintain a Record Plan and for any new or replaced OWTS upon completion of an OWTS installation. Upon the sale of a site, it is the obligation of the owner of the site to provide the buyer, through escrow or otherwise, a complete copy of the O&M manual and record plan for the OWTS at the site.

- **Reporting**
  OWTS owner shall send a report of the inspection to the Regional Water Board within 30 calendar days of the completion of the inspection.

- **Online Tracking System**
  An online tracking and reporting system should be developed to ensure that service provider reports can be verified, stored, and retrieved easily. The data system should allow for the mining of useful information such as system status, services performed, and services needed.

5. Site Evaluation, Design, Installation, Construction

All onsite management programs should evaluate the site and consider construction and installation elements to ensure proper performance of an onsite system using qualified professionals.

Proposed Program - The San Jacinto onsite wastewater management program should include a strong program that carefully considers site conditions with performance of the system including:

- **Site Evaluation**
  Site-specific observations and characterization by a qualified, experienced professional is essential to understanding local site conditions to ensure the proper location and design of an onsite wastewater system. Unless the seasonal high groundwater level at the site is

known to be greater than 10 feet below the ground surface, based on local knowledge of groundwater conditions with the relevant source cited (e.g. previous evaluations and studies, well driller information), a site evaluation conducted by a qualified professional to establish the depth to the seasonal high groundwater shall be performed. Soil mottling observed during the site evaluation by a qualified professional may be used to determine the seasonal high groundwater level.

➢ **System Design**

All new and replacement septic tanks shall meet California standards, have risers to the surface within six inches of finished grade, including secured access ports, and have an effluent filter/screen as an integral part of the outlet. Tanks shall be pumped when the sum of the sludge depth and scum depth exceeds 50% of the tank depth.

Any dispersal system that is part of a new onsite wastewater treatment system (OWTS) will be designed and installed at the shallowest practicable depth to maximize elements critical to effective treatment of effluent in the soil. This requirement is designed to maximize the potential for effective treatment, including oxygen transfer, aerobic biological treatment, evapotranspiration and vegetative uptake of nutrients. Dispersal systems will be designed using only the bottom area of the dispersal system as the design infiltrative surface.

Dispersal systems of all conventional OWTS shall be consistent with groundwater separation requirements specified in Appendix K, of Part 5, Title 24 in the California Code of Regulations. Systems will have at all times during operation at least three feet of continuous unsaturated, undisturbed, earthen material with less than 30 percent of that material by weight containing mineral particles in excess of 0.08 inches (2 mm) in size (i.e. rock) between the bottom of the dispersal system and top of the seasonal high groundwater level. These same separation requirements apply to impermeable strata, or bedrock.

Dispersal systems with Supplemental Treatment Components must meet groundwater separation requirements specified in Appendix K, of Part 5, Title 24 in the California Code of Regulations at all times during operation.

Where undisturbed earthen material has insufficient depth to satisfy minimum code depth requirements, engineered fill may be added to existing site soils so that the site meets or exceeds the specified soil depth requirements. Engineered fill (i.e. sand or crushed glass) shall compensate for the lack of in-place earthen material at a 1.5 to 1 basis so that a one-foot deficiency in the soil column depth would require one and one half feet of engineered fill material. A pressure distribution system is required where engineered fill is used to comply with the minimum earthen material depth requirements. In no case shall engineered fill compensate for more than one foot of the minimum native soil depth requirements.

Conventional OWTS dispersal systems in which pumps are used to move effluent from the septic tank to the dispersal system shall be equipped with one of the following: a visual, audible, or telemetric alarm that alerts the owner or service provider in the event of pump failure. All pump systems shall, at a minimum, provide for storage in the pump chamber during a 24-hour power outage or pump failure and shall not allow an emergency overflow discharge.

Gravel-less chambers shall meet the requirements for dispersal systems as noted above. The infiltrative surface should be sized in a manner consistent with Appendix K, of Part 5, Title 24 in the California Code of Regulations. Dispersal systems using shallow pressurized drip or orifice dispersal should be designed with an effluent application area that shall not exceed one square foot per emitter/orifice. In no case are application areas allowed to be overlapping or less than one square foot per lineal foot. All systems should be designed and maintained to reduce orifice clogging and root intrusion.

6. Performance Requirements

Performance-based management programs are derived by characterizing risks posed by decentralized wastewater systems to public health and water resources. These programs establish pollutant-loading limits for both onsite and cluster wastewater facilities.

Proposed Program - The San Jacinto onsite wastewater management program should target pollutants of concern using performance standards including:

- **Nutrients and Bacteria**
  Supplemental treatment systems to reduce bacteria and nutrient loads will be required for all new, expanded, or upgraded soil-discharging systems in the critical management zones, and for existing systems in the critical management zones that are believed to be discharging bacteria or nitrogen in excess of 10 mg/L into surface waters or contributing significantly to impairment of groundwater.

  Supplemental treatment components designed to perform disinfection shall have sufficient pretreatment of the wastewater so that effluent does not exceed a 30-day average TSS of 10 mg/L and shall further achieve an effluent total coliform bacteria concentration, at the 95 percentile, of not greater-than either of the following:

  a.) 10 MPN of total coliform per 100 milliliters prior to discharge into a dispersal field where the soils exhibit percolation rates between 1 and 10 minutes per inch (MPI) or where the soil texture is sand; or

  b.) 1000 MPN of total coliform per 100 milliliters prior to discharge into a dispersal field where the soils exhibit percolation rates greater than 10 MPI or consist of a soil texture other than sand.

  c.) Effluent from supplemental treatment components shall not exceed a 30-day average TN concentration of 10 mg/L as nitrogen.

- **Biological Oxygen Demand and Total Suspended Solids**
  Supplemental treatment components, other than for disinfection or nitrogen reduction, should be designed to reduce biochemical oxygen demand (BOD) and total suspended solids (TSS) concentrations. Supplemental treatment components, other than for disinfection or nitrogen reduction, shall produce an effluent that meets the following requirements:

  a.) The 30-day average carbonaceous BOD (CBOD) concentration shall not exceed 25 milligrams per liter (mg/L), or alternately, the 30-day average BOD shall not exceed 30 mg/L; and
  b.) The 30-day average TSS concentration shall not exceed 30 mg/L.

7. Monitoring

Routine inspections and monitoring of systems is a critical element of all onsite wastewater management programs. Both individual and clustered systems must be inspected at various stages of construction and operation and monitored to ensure proper performance and the achievement of public health and environmental goals.

Proposed Program - The San Jacinto onsite wastewater management program should initiate an inspection and monitoring program to include:

- **Critical Management Zones**
  Qualified contract service providers should conduct monitoring in critical management zones. The ongoing monitoring of supplemental treatment components designed to meet the performance requirements should be monitored in accordance with the operation and maintenance manual for the OWTS or more frequently as needed.

  Remote Monitoring
  OWTS dispersal systems in which pumps are used to move effluent from the septic tank to the dispersal system shall be equipped with one of the following: a visual, audible, or telemetric alarm that alerts the owner or service provider in the event of pump failure. All pump systems shall, at a minimum, provide for storage in the pump chamber during a 24-hour power outage or pump failure and shall not allow an emergency overflow discharge.

8. Enforcement and Compliance

To be effective local onsite wastewater management programs must have the appropriate enforcement tools to compel compliance. A local onsite wastewater management program should have procedures in place to conduct enforcement and compliance actions. Local regulatory agencies need clear authority to inspect onsite systems and order remedial actions for systems violating laws and rules. Elements of enforcement procedures typically include:

- A process for reporting and responding to problems
- Defining conditions that constitute violations of program requirements
- Establishing inspection procedures to investigate problems
- Use of informal and formal corrective action measures
- Additional or alternate compliance measures
- Appeals process (hearings, etc.)

Proposed Program - The San Jacinto onsite wastewater management program should initiate an enforcement and compliance program as needed including the following:

- **Regulatory Agency**
  The Riverside County Community Health Agency, Department of Environmental Health, Land Use Section, which facilitates the permitting and certification of subsurface sewage systems, should be responsible for implementing and enforcing the onsite wastewater management program.

- **Legal Authority**

Local and state agencies can use existing enforcement powers to address malfunctioning systems and those not meeting the requirements described in this document.

- **Inspection of Systems**

  An owner of any existing onsite wastewater treatment system within the critical management zones will have the OWTS inspected by a qualified professional within two years of the effective date of the adoption of the management program, in the case of systems lying in critical management zones associated with surface water proximity, or within five years in the case of systems lying over impaired groundwater areas.

- **Repair of Systems**

  Systems found to be malfunctioning (e.g., discharging directly to surface waters, discharging to the ground surface) will be repaired within 90 days unless weather or other natural disasters interfere with that schedule. The Regional Board may exempt a property from the 90-days requirement and extend the time frame, but such exemptions shall not be greater than 180 days. Systems found to be discharging nitrogen in excess of 10 mg/L into surface waters or groundwater shall be repaired or replaced with enhanced treatment systems or connected to clustered decentralized or centralized treatment facilities within five years after a determination is made regarding their discharge. Funding to assist system owners with complying with this provision will be sought from local, state, and federal sources, and may include tap-on fees and service charges as appropriate.

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