Local Agency Management Program for Onsite Wastewater Treatment Systems (OWTS) in Unincorporated Orange County

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ORANGE COUNTY PublicWorks

Orange County, California

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1. Introduction

Onsite wastewater treatment systems (OWTS) are defined by the United States Environmental Protection Agency (USEPA) as systems "relying on natural processes and/or mechanical components that are used to collect, treat, and disperse/discharge wastewater from single family dwellings or buildings" (USEPA 2002). OWTS are commonly called "septic systems" and are used to treat sewage from homes and businesses that are not connected to a centralized wastewater treatment plant. These types of systems are managed under a wide range of laws, regulations, policies, plans, and programs in California which includes local, state, and federal agencies.

The Porter-Cologne Water Quality Control Act (California Water Code Division 7) authorizes the State Water Resources Control Board (State Board) to regulate all discharges that could affect the quality of the waters of the state, including groundwater. The policies of the State Board are implemented locally through nine Regional Water Quality Control Boards (Regional Board). Each Regional Board developed a "basin plan" that outlines the beneficial uses, water quality objectives, and a program of implementation for achieving those objectives in its respective jurisdiction.

Discharges are regulated through the use of Waste Discharge Requirements (WDR) that act as discharge permits. The State Board's regulatory authority extends to individual OWTS; therefore, general guidelines for the siting, design, and construction of new OWTS are part of each Regional Board's basin plan. The State and Regional Board recognized the advantages and efficiencies of regulation of such systems by local agencies. In June 2012, the State Board adopted the "Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems" (OWTS Policy) (State Water Resources Control Board, 2012). The OWTS Policy was subsequently approved by the Office of Administrative Law on November 13, 2012 and became effective on May 13, 2013. The OWTS Policy allows local agencies to approve OWTS, based on a local ordinance, after approval of a Local Agency Management Program (LAMP) by the Regional Board. Once effective, the Policy established a statewide, risk-based, tiered approach for the regulation and management of OWTS. The full policy is included as Appendix I.

Under the tiered approach of the OWTS Policy, Tier 0 establishes minimum standards for existing OWTS that are properly functioning, and do not meet the conditions of failing systems or otherwise corrective action. Tier 1 establishes minimum standards for low-risk new or replacement OWTS. Tier 2 allows local agencies to develop customized management programs that address the conditions specific to that jurisdiction. These LAMPs must be approved by the appropriate Regional Board, once approved, the standards contained in the LAMP supersede Tier 1 standards (State Water Resources Control Board, 2012). Tier 3 applies special, enhanced standards to both new and existing OWTS located near a waterbody that has been listed as impaired due to nitrogen or pathogens (i.e., primary focus is on fecal indicators) pursuant to Section 303(d) of the Clean Water Act. Tier 4 refers to OWTS that require corrective action or are either presently failing or fail at any time while the OWTS Policy is in effect and must follow the specified requirements (State Water Resources Control Board, 2012).

The LAMP allows local agencies to establish minimum standards that vary from those specified in Tier 1 of the OWTS Policy (State Water Resources Control Board, 2012). This includes areas that do not meet the minimum standards but still achieve the purpose of the OWTS Policy. The State Board recognizes that a single set of criteria for OWTS is inappropriate due to the extreme range of geological and climatic conditions throughout the State of California. In order to accommodate these extreme variances, local agencies may submit an individual LAMP for approval by the Regional Board in an effort to more comprehensively address the site-specific conditions governing the permitting, siting, and maintenance of OWTS in their respective jurisdictions.

The LAMPs may include any one or a combination of the following to achieve this purpose:

- Differing system design requirements;
- Differing siting controls such as system density and setback requirements;
- Requirements for owners to enter monitoring and maintenance agreements; and/or
- Creation of an onsite management district or zone.

This document is the LAMP for unincorporated Orange County (County) that meets all requirements set forth in the OWTS Policy. Implementation of this LAMP is intended to help protect and enhance ground and surface waters within the unincorporated areas under the County's jurisdiction. This LAMP also addresses each component required in the basin plan; however, the means and degree to which each component is addressed is flexible. Accordingly, this LAMP may require updates as information is gathered during implementation and the program matures.

The Santa Ana Regional Board will be the responsible agency in reviewing this LAMP (Figure 1), and in doing so shall consider, among other things, the past performance of the local program to adequately protect water quality and where this has been achieved with criteria differing from Tier 1, shall not unnecessarily require modifications to the program for purposes of uniformity, as long as the LAMP meets the requirements of Tier 2 (State Water Resources Control Board, 2012).

This LAMP document provides guidance to owners, designers, and installers of OWTS within the unincorporated areas of the County to facilitate successful applications for the design, installation, and modification and/or repairs to OWTS, as well as describe the procedures and standards necessary to adequately protect public health, safety, and water quality during OWTS installation and repair activities. **Section 2** discusses the relevant background for the County and includes the pertinent information on waterways, geology, soils, and population trends. **Section 3** includes a summary of the 2003 Septic System Performance and Evaluation conducted by RBF Consulting (RBF). In addition, this section discusses more recent survey data, identifies significant data gaps and explains future data needs for the septic systems within the County's jurisdiction. **Section 4** provides a detailed explanation of the minimum standards outlined in the OWTS Policy which includes considerations for LAMPs, the scope of coverage for this LAMP, local agency responsibilities, variances, and minimum setback requirements. **Section 5** reviews the annual reporting requirements that the County must complete and submit to the Regional Board to be considered in compliance with the Policy.

Figure 1. Regional Map Displaying the Santa Ana (Region 8) and San Diego (Region 9) Regional Board Areas in Orange County, California

2. Orange County Waterways, Geology, Soils, and Population Trends

The County is part of the South Coast Hydrologic Region which includes all of Orange County, most of San Diego and Los Angeles counties, part of Riverside, San Bernardino, and Ventura counties, and a small portion of Kern and Santa Barbara counties. The South Coast HR covers approximately 6.78 million acres (10,600 square miles) of the southern California watershed that drains to the Pacific Ocean. The HR is bounded on the west by the Pacific Ocean and the watershed divide near the Ventura-Santa Barbara County line. The northern boundary corresponds to the crest of the Transverse Ranges through the San Gabriel and San Bernardino mountains. The eastern boundary lies along the crest of the San Jacinto Mountains and low-lying hills of the Peninsular Range that form a drainage boundary with the Colorado River HR. The southern boundary is the international boundary with Mexico. Significant geographic features include the coastal plain, the central Transverse Ranges, the Peninsular Ranges, and the San Fernando, San Gabriel, Santa Ana River, and Santa Clara River valleys (State Water Resources Control Board, 2003). The South Coast HR is divided into Los Angeles, Santa Ana, and San Diego subregions, Regional Boards 4, 8, and 9, respectively.

Approximately half of California's population (about 17 million people) resides within the boundaries of the South Coast HR. The combination of multiple major population centers and a relatively small surface area in this region, results in the highest population density of any in California. According to the 2012 census, approximately three million people live in within the boundaries of the County which makes it the third-most populous county in California.

2.1 Waterways

Several major waterways flow from the higher elevation mountainous areas on the northeastern border of the County and contribute critical surface runoff which flows through both unincorporated and incorporated areas of the County, eventually flowing to the Pacific Ocean. While the County covers an area encompassing both the Santa Ana and a small portion of the San Diego Regional Board's jurisdiction, the majority of the jurisdiction sits within the boundaries of the Santa Ana Regional Board (Region 8), and therefore is considered to be entirely under their purview for the purposes of the OWTS regulations. More information on these Boards and their jurisdictions can be found in Appendix I.

There are 11 watersheds within the County and are divided into North, Central, and South Watershed Management Areas. These watersheds include San Gabriel River – Coyote Creek, Anaheim Bay Huntington Harbor, Santa Ana River, Newport Bay, Newport Coastal Streams, Laguna Coastal Streams, Aliso Creek, Dana Point Coastal Streams, San Juan Creek, San Clemente Coastal Streams, and San Mateo Creek (Figure 2). The first five watersheds listed are regulated by the Santa Ana Regional Board, and the remaining six are regulated by the San Diego Regional Board.

Major waterways flowing through the County include Santa Ana River, Santiago Creek, San Diego Creek, Aliso Creek, and San Juan Creek. All of these waterways flow in a southwesterly direction across Orange County and outlet into the coastal bays and into the Pacific Ocean. There have been substantial alterations to watershed hydrology within this region over the past 150 years, first by agriculture and subsequently by increasing urbanization (Trimble 1998).

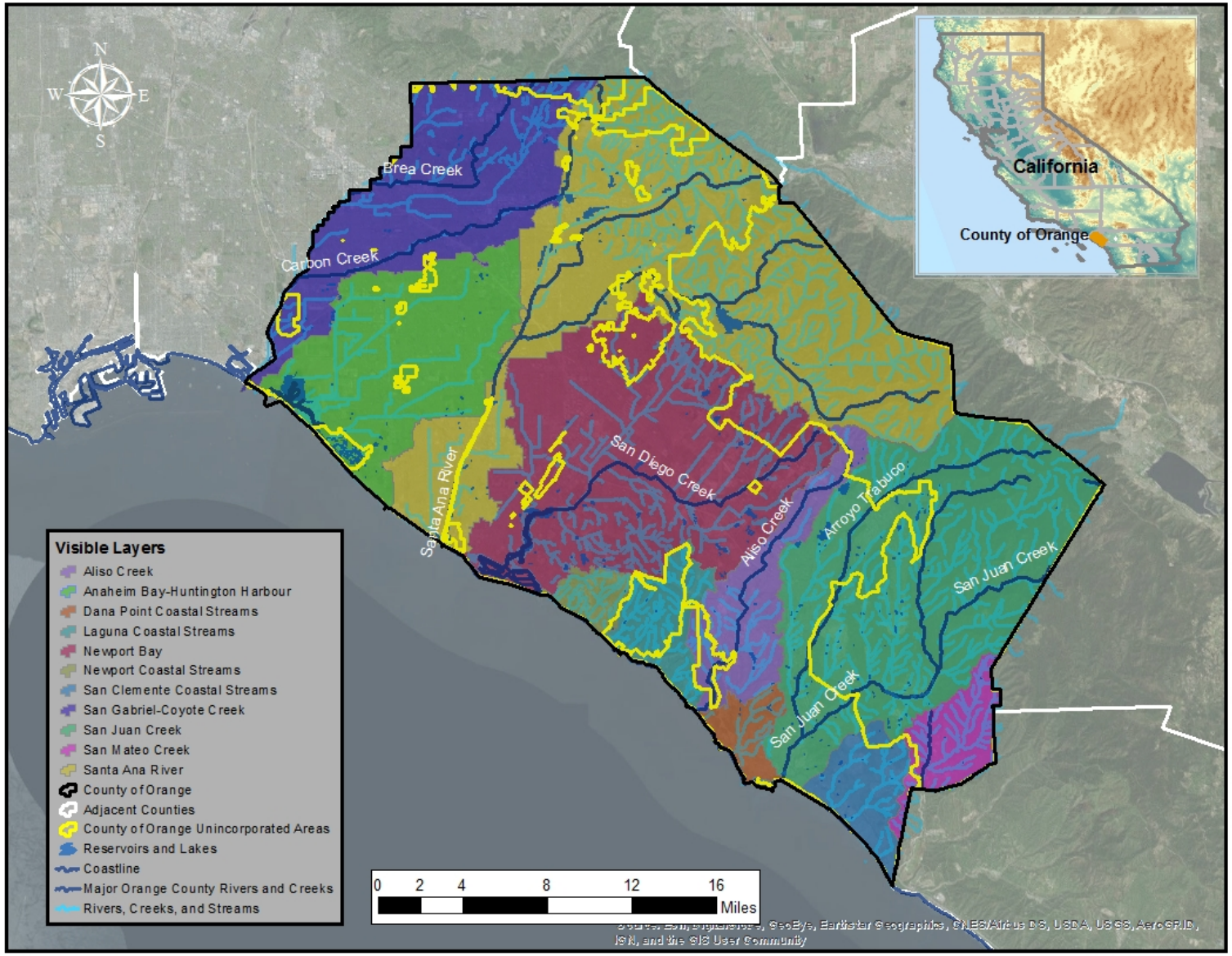

Figure 2. Watersheds and Major Waterways within Orange County, California

2.1.1 San Gabriel River-Coyote Creek

The San Gabriel River-Coyote Creek watershed covers 85.49 square miles in the northwest corner of the County. This watershed includes the cities of Fullerton, Buena Park and parts of the cities of Anaheim, Brea, Cypress, Fullerton, La Habra, La Palma, Los Alamitos, Placentia and Seal Beach. Coyote Creek, its main tributary, flows from the border of Los Angeles and Orange counties, rises in two forks in the northwestern corner of Orange County and continues southwest, combining with multiple tributaries along the way it eventually empties into the San Gabriel River.

2.1.2 Santa Ana River

With its headwaters in the San Bernardino Mountains, the Santa Ana River travels 75 miles to the Pacific Ocean. In San Bernardino County, river flows consist mainly of snowmelt and storm runoff from the lightly developed San Bernardino National Forest (Orange County Public Works, 2013). From San Bernardino to Riverside counties, the River flows perennially, and includes treated discharges from wastewater treatment plants, urban and irrigation runoff, and groundwater. Near the City of Corona, the River is impounded by Prado Dam before flowing into the County's coastal plain. The County's portion of the watershed includes segments of the cities of Anaheim, Brea, Fountain Valley, Huntington Beach, Orange, Placentia, Santa Ana, Villa Park, and Yorba Linda. Much of the Santa Ana River channel above the City of Santa Ana is used for groundwater recharge and there is generally no dry weather flow below Ball Road. The lower River from the City of Santa Ana to the ocean is largely a concrete-lined channels. The only major tributary of the Santa Ana River in Orange County is Santiago Creek, which joins the River in the City of Santa Ana.

2.1.3 Santiago Creek

The Santa Ana River is fed by several significant tributaries which originate within the Santiago Creek watershed. The Santiago Creek watershed covers about 100.6 square miles in the northern portion of the County. Much of the upper course of the Creek remains in its natural state, while the lower section is now urbanized and includes parts of the cities of Orange, Santa Ana and Villa Park as well as significant areas of unincorporated Orange County.

The main stem of Santiago Creek originates in the Cleveland National Forest. From the steep and narrow canyon between Santiago and Modjeska peaks, the Creek runs south-southwest then turns northwest near Portola Hills. Once out of the National Forest it passes through several small urban areas and eventually joins with Baker and Silverado creeks. The primary flow from Santiago Creek sinks into sedimentary deposits and is typically dry by the time it reaches the first crossing of Santiago Canyon Road, near the incorporated area of Modjeska Canyon.

2.1.4 San Diego Creek

San Diego Creek is the principal watercourse of the Newport Bay watershed and is approximately a 16-mile waterway, with a drainage area that covers approximately 122 square miles of the Newport Bay watershed. The San Diego Creek watershed contributes approximately 80 percent of the discharges into the Upper Newport Bay (County of Orange, 2007). The main tributary to San Diego Creek is Peters Canyon Wash; smaller tributaries include Serrano Creek, Borrego Canyon Wash, Agua Chinon Wash, Bee Canyon Wash, Sand Canyon Wash, and Bonita Canyon Creek (Orange County Public Works, 2003). San

Diego Creek is highly urbanized and has undergone extensive channelization for flood control measures (Trimble, 1998).

2.1.5 Aliso Creek

Aliso Creek is the main waterbody in the Aliso Creek watershed; it is a long, narrow coastal canyon with headwaters in the Cleveland National Forest. The Creek ultimately discharges into the Pacific Ocean at Aliso Beach. The watershed is approximately 35 square miles with portions of the cities of Aliso Viejo, Dana point, Laguna Beach, Laguna Hills, Laguna Niguel, Laguna Woods, Lake Forest, and Mission Viejo. The watershed is largely developed, with the exception of the Cleveland National Forest in the upper watershed and the Aliso Wood Canyon Regional Park in the lower watershed. The watershed is within the jurisdiction of the San Diego Regional Board.

2.1.6 San Juan Creek

San Juan Creek is a 29-mile-long stream which originates in the Santa Ana Mountains section of the Cleveland National Forest in the easternmost part of the County. From its headwaters, San Juan Creek winds west and south through San Juan Canyon, where it is joined by many small tributaries, and is joined by its main branch, Arroyo Trabuco Creek, in San Juan Capistrano.

Arroyo Trabuco Creek is a 22-mile-long stream beginning in a rugged canyon in the Santa Ana Mountains of the County, the Creek flows west and southwest before emptying into San Juan Creek in the City of San Juan Capistrano. Arroyo Trabuco Creek's watershed drains 54 square miles of hilly, semi-arid land and lies mostly within the County.

San Juan Creek flows into the Pacific Ocean at Doheny State Beach. The entire watershed covers approximately 160 square miles and includes portions of the cities of Dana Point, Laguna Hills, Laguna Niguel, Mission Viejo, Rancho Santa Margarita, and San Juan Capistrano as well as significant areas of unincorporated Orange County.

2.1.7 Impaired Waters

States are required to “identify those waters within its boundaries for which [discharge] effluent limitations...are not stringent enough to implement any water quality standard applicable to such waters” (Clean Water Act (CWA) Section 303(d)). The CWA also requires states to establish a priority ranking for waters on the CWA 303(d) List of Impaired Waters and establish total maximum daily loads (TMDLs) for such waters. For those waters that are on the CWA 303(d) List of Impaired Waters, especially those being addressed by a TMDL, more stringent requirements apply.

Based on the OWTS Policy, existing, new, and replacement OWTS that are near CWA 303(d)-listed waterbodies may be addressed by a TMDL and its implementation program, or by special provisions under a LAMP (State Water Resources Control Board, 2012). If there is no TMDL or special provisions, new or replacement OWTS within 600 feet of an impaired waterbody must meet the specific requirements detailed under Tier 3. These specific requirements include the formulation of an Advanced Protection Management Program (APMP) (State Water Resources Control Board, 2012). Details on the APMP are found in Section 4.6.

2.1.8 Groundwater

The County's groundwater basin is a critical resource. While the San Juan Hydrologic Basin in the southern portion of the County has a limited groundwater aquifer, the northern and central portions of the County have a groundwater basin with a deep aquifer (up to 2000 feet) that provides approximately 60 to 70 percent of the water supply demand within the Orange County Water District (OCWD) jurisdiction (State Water Resources Control Board, 2012). Nineteen major producers, including cities, water districts, and private waters, pump water from the basin. There are approximately 200 small wells that pump water primarily for irrigation. In order to meet ever-increasing water supply demands, the OCWD maintains groundwater recharge facilities throughout the groundwater basin. The southern portion of the County, outside OCWD jurisdiction, relies heavily upon imported water from other regions.

Figure 3 illustrates depth to groundwater data throughout the County. This figure focuses on shallow groundwater depths of five feet or less. Soils that have a water table at a shallow depth may become waterlogged during periods of heavy precipitation and are slow to drain. The contamination of groundwater is a concern in areas with these soils and can result in OWTS failure. Areas with shallow groundwater depths should be evaluated closely prior to the installation of a new OWTS. Groundwater infiltration into the OWTS dispersal field could result in wastewater surfacing due to poor percolation, resulting in the need for major repairs to the OWTS.

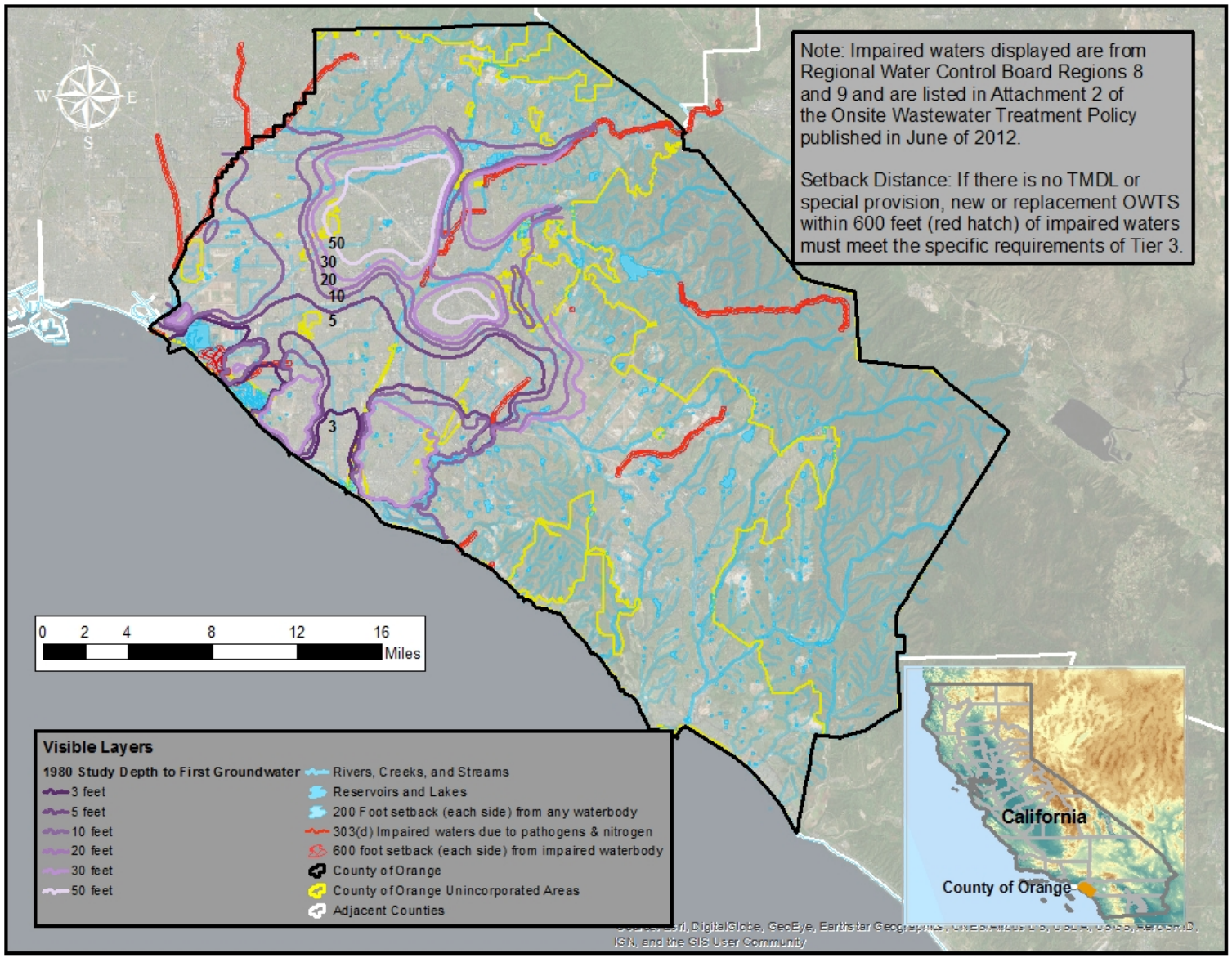

Figure 3. Map of Depths to Groundwater in Orange County, California

2.2 Geology

The County covers an area from the Santa Ana Mountains, which run north to south along the eastern edge of the County, to the broad Coastal Plain, which spans the western portion of the County. A large portion of the County sits within the Tustin Plain which is part of the coastal section of the Peninsular Range Province, a geomorphic province that extends 900 miles south from the Los Angeles basin to the tip of Baja California (Morton & Miller, 2006). The Peninsular Range Province is characterized by elongated northwest-trending mountain ridges separated by sediment-floored valleys. The Tustin Plain separates the Santa Ana Mountains, to the north and east, from the San Joaquin Hills to the south. The northwest trending Santa Ana Mountains have uplifted on their eastern side along the Whittier-Elsinore Fault Zone, producing a tilted, irregular, and complex highland that slopes westward toward the sea. Regional tectonic activity has uplifted the San Joaquin Hills and Newport Mesa between the Santa Ana River and San Juan Capistrano. This folding has occurred as this entire section of the coast has been uplifted by the San Joaquin Hills blind thrust fault.

Sediments eroded from the Santa Ana Mountain and the San Joaquin Hills have been deposited by streams emanating from these highlands (Santiago Creek, Peters Canyon Wash, Rattlesnake Canyon Wash, San Diego Creek, etc.) and the lower reach of the Santa Ana River to produce the broad, complex, alluvial fan of the Tustin Plain, which consists of relatively flat-lying unconsolidated to semi-consolidated sediments that are approximately 30 to over 1,200 feet thick (Herndon & Bonsangue, 2006). These deposits include strata of the upper member of the Pliocene Fernando Formation (approximately 2 to 3 million years old) and Pleistocene (10,000 to 2 million years old) older alluvium. The near-surface, unconsolidated Holocene sediments predominately consist of young alluvial fan deposits (Herndon & Bonsangue, 2006).

The groundwater basin is essentially an alluvial basin where differential subsidence and uplifting have occurred since the late Cretaceous period (Herndon & Bonsangue, 2006). The geologic substructure is subject to considerable tectonic stress and numerous faults traverse the region (Herndon & Bonsangue, 2006). The Newport-Inglewood Fault zone along the coast creates a barrier for the western edge of the coastal groundwater basin. The Santa Ana Mountains form the eastern edge of the groundwater basin. The Loma Ridge and San Joaquin Hills form the impermeable barrier to the south of the groundwater basin.

The groundwater basin is over 2,000 feet deep and consists of a complex series of interconnected sand and gravel deposits with discontinuous clay and silt layers (Herndon & Bonsangue, 2006). In the coastal and central portions of the groundwater basin, the lenses of lower-permeability clay and silt deposits become more common, creating lower permeability and greater separation between the shallow aquifer and the principal and deep aquifers (Herndon & Bonsangue, 2006).

Development on unstable geologic units or soils could result in impacts related to landslide, lateral spreading, subsidence, liquefaction and collapse. In addition to seismically induced landslides, other factors contribute to landslides, including slope undercutting by stream, erosion, and cyclical wetting and drying. Within the County there are areas with unstable, low-density soil characteristics that are

subject to landslide, liquefaction, lateral spreading and collapse. Additionally, areas within the County may also be subject to subsidence. Areas with unstable geologic units or soils can be considered unsuitable to support the installation of OWTS.

2.3 Soils Relating to OWTS Siting

Soil is complex and variable, and its effectiveness at attenuating contaminants from OWTS effluent is determined by many factors, including soil type, soil structure and depth, soil chemistry, moisture, depth to groundwater, and activity in the aerobic vegetative root zone where chemical and organic substances are taken up or broken down. Specific soil conditions, such as oxygen content, pH, salinity, temperature, and moisture affect the community of soil microorganisms that are essential for breaking down and decomposing OWTS effluent (State Water Resources Control Board, 2012).

The management considerations (limitations) for septic tank absorption fields are as follows and must be considered to limit the possibility of OWTS system failure:

- Depth to bedrock: Depth to bedrock affects the construction, installation, and functioning of septic tank absorption fields and affects other site applications. Shallow soils have a limited absorption capacity and have biologically active zones through which waste materials can percolate. If these soils are used as filter fields, environmental and health risks should be considered.
- Depth to pan: Depth to a cemented pan affects the construction, installation, and functioning of septic tanks absorption fields and other site applications. Shallow soils have a limited absorption capacity and have biologically active zones through which waste materials can percolate. If these soils are used as filter fields, environmental and health risks should be considered.
- Flooding, rare flooding, or very rare flooding: Flooding can transport waste offsite and pollute surface waters. Flooding limits the use and management of the soil for sanitary facilities.
- Fragments (greater than 3"): Rock fragments larger than 3 inches in diameter impede the workability of the soil and restrict the use of heavy machinery during construction of absorption fields.
- The saturated hydraulic conductivity of the soil medium (K_{sat}) greater than 6"/hr: The soil horizon with the maximum K_{sat} governs the leaching and seepage potential of the soil. If this rate is high, the transmission of fluids through the soil is unimpeded and leaching and seepage may have environmental, health, and performance implications.
- Saturated hydraulic conductivity less than 0.6"/hr; from 0.6 to 2"/hr: The soil horizon with the minimum K_{sat} governs the rate of water movement through the whole soil. If this rate is low, the transmission of fluids into and through the soil is impeded and runoff, infiltration, and percolation of pollutants may have environmental, health, and performance implications.
- Ponding: Ponding is the condition where standing water is on the soil surface for any period of time. Ponding limits the installation and functioning of most land use applications.
- Saturation: Soils that have a water table at a shallow depth may become waterlogged during periods of heavy precipitation and are slow to drain. The contamination of groundwater is a concern in areas with these soils.

- Seepage in bottom layer: The K_{sat} in the bottom layer of the soil governs the leaching and seepage potential of the soil. If this rate is high, the transmission of fluids through the soil and underlying materials is unimpeded. As a result, leaching and seepage may have environmental, health, and performance implications.
- Slope: Steep slopes affect the transmission of fluids through the soil. As a result, piping or seepage may have environmental, health, and performance implications.

Hydrologic soils are classified by the National Resource Conservation Service (NRCS) as Group A, B, C, or D (NRCS 2007). These classifications are based primarily on the runoff potential of the soil type. Group A soils have low runoff potential when thoroughly wet and water is transmitted freely through the soil. Group B soils have moderately low runoff potential and water transmission through the soil is unimpeded. Group C soils have moderately high runoff potential and water transmission through the soil is somewhat restrictive. Group D soils have high runoff potential and water transmission through the soil is restricted or very restricted. These soils are primarily clays with high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, or soils that are shallow over nearly impervious material. Because of the very slow water transmission rate of Group D soils, they are particularly problematic for proper performance of an OWTS. This is because an important component of OWTS performance is a soil absorption field, and soil absorption is limited in Group D soils. Figure 4 shows the soils of the County based on the hydrologic soil group.

Areas with existing OWTS in areas with soils classified as Group D include San Juan Capistrano, Rancho Santa Margarita and Huntington Beach in the southeastern portion of the County, and La Habra, Brea, Fullerton, Yorba Linda, and Tustin in the northwestern portion. Special considerations are necessary when installing or repairing OWTS in areas with Group D soils, and these special considerations are incorporated into this LAMP.

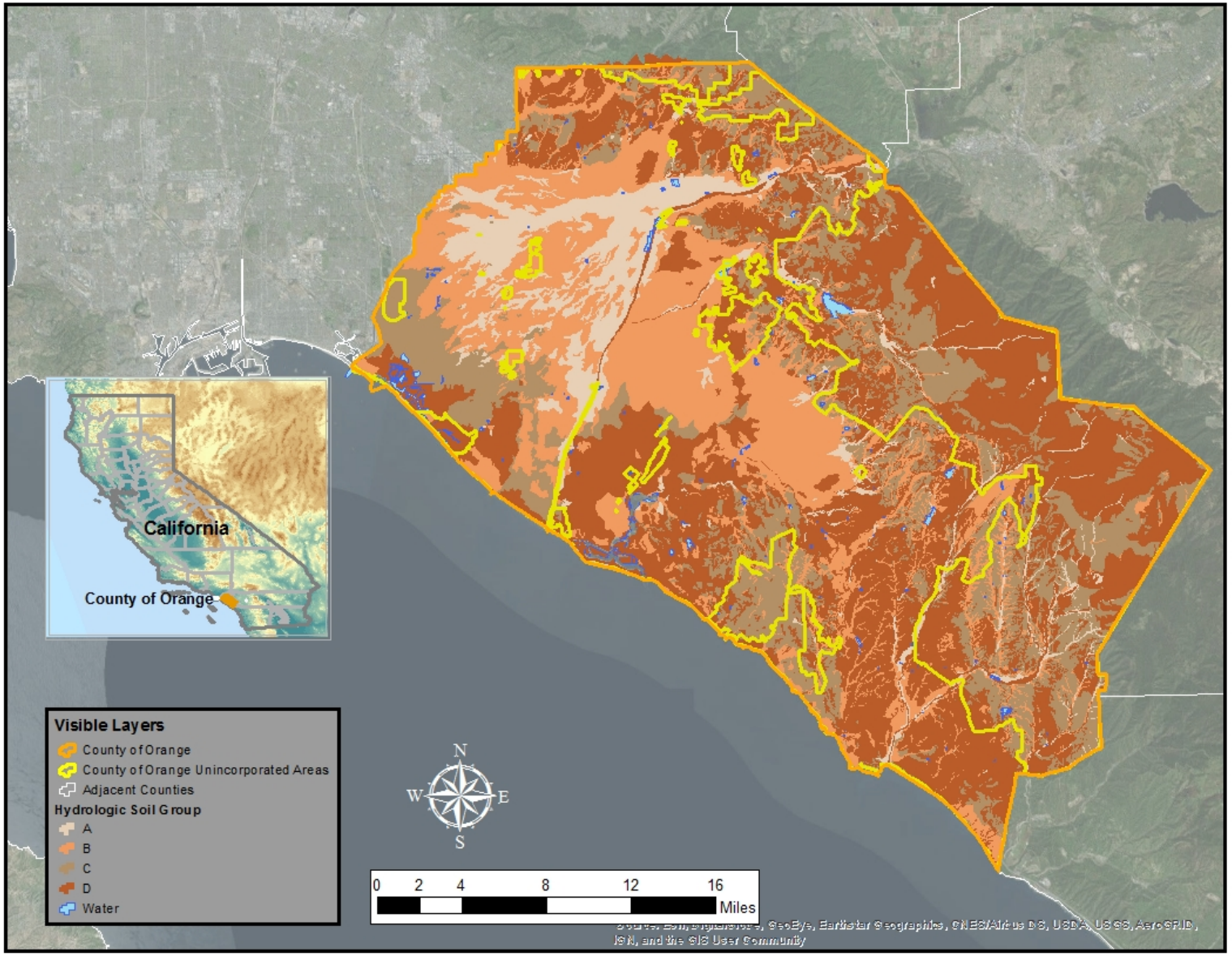

Figure 4. Hydrologic Soil Groups throughout Orange County, California

2.4 Population

Based on the 2010 census, there are approximately 3.0 million people living in the County, making it the third most populous county in California. From 2010 to 2016, the population of the County grew at a rate of 5.4 percent. This is below the California state average population growth rate of 6.1 percent. In 1999, the annual growth rate in new OWTS installations was approximately 1 percent (California Wastewater Training and Research Center, 2003). Figure 5 shows the most recent trends in population growth for the County since 2010. Continued population growth throughout the County has resulted in an increasing demand on public sewer systems as more areas within the County become incorporated.

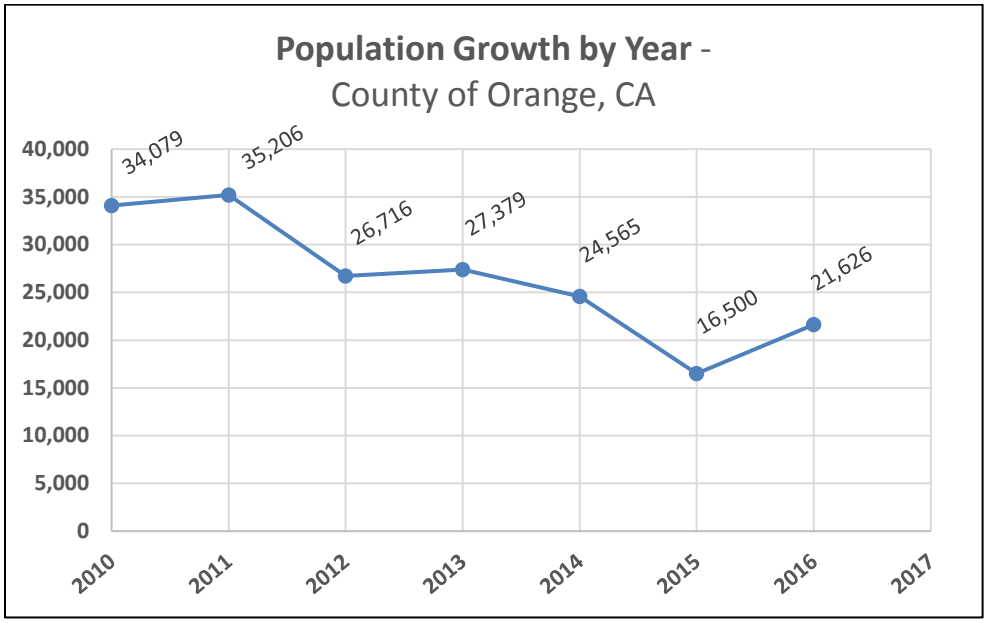

Figure 5. Population Growth by Year in Orange County, California from 2010-2016 (State of California, 2017).

The Southern California Association of Governments (SCAG) report on unincorporated regions of the County provided current information and data for planning and outreach efforts (SCAG 2015). Information on population, housing, transportation, employment, retail sales, and education can be utilized by stakeholders to make informed planning decisions regarding the management of existing systems and OWTS permits for the future. The draft report provides a portrait of the unincorporated area and its changes since 2000, using average figures for the County as a comparative baseline. This draft report demonstrates the current trends occurring for the County (see Appendix III for full report).

In summary, the draft report reveals that between 2000 and 2014, the total population of unincorporated regions of the County decreased by 38,818 to 129,314 in 2014. During this 14-year period, the unincorporated area's population growth rate of -23.1 percent was lower than the County rate of 10.3 percent, and that for the entire County only 4.1 percent of the total population resides in unincorporated areas (SCAG 2015).

Overall, the general trend for population within unincorporated regions of the County is decreasing, suggesting that the maintenance of existing OWTS should be a primary focus of this LAMP, followed by

the proper permitting and installation for any future systems that might be requested, where sanitary sewer is still unavailable.

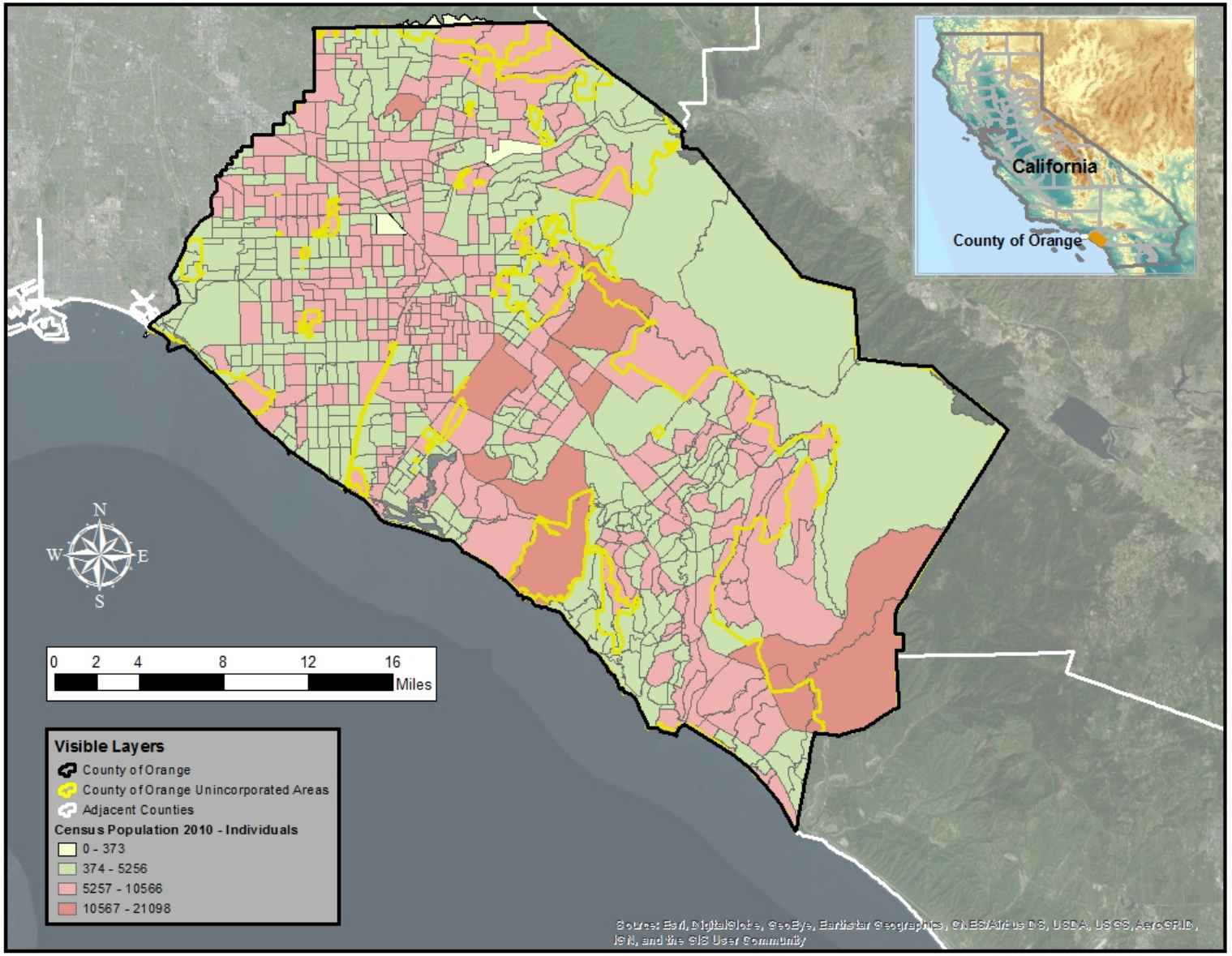

Figure 6. 2010 Census Population Data for Orange County, California

3. Existing Septic System Survey and Evaluation

During 2002-2003 RBF Consulting performed a baseline inventory of existing septic systems throughout Orange County (Appendix IV), although it is important to note that the study was driven by municipal separate storm sewer system (MS4) permit requirements, and therefore focused on areas of the County where MS4s were established. The study helped to develop a baseline inventory for the septic systems within the County and to estimate the potential impact of septic systems on the quality of selected receiving waters. Areas within the County targeted for this study were based on the perceived pathogen loading. Septic systems throughout the County were inventoried, and placed in a GIS layer for ease of viewing and inventory maintenance. The results of that final inventory are depicted in Figure 7.

The final inventory/database compilation resulted in a list of over 2,776 active OWTS. The OWTS are widely dispersed throughout the County but are found in the highest concentrations in the Santa Ana River watershed. The City of Yorba Linda recorded the highest number of systems with over 26 percent of the total, followed by the unincorporated County area with 23 percent of the total.

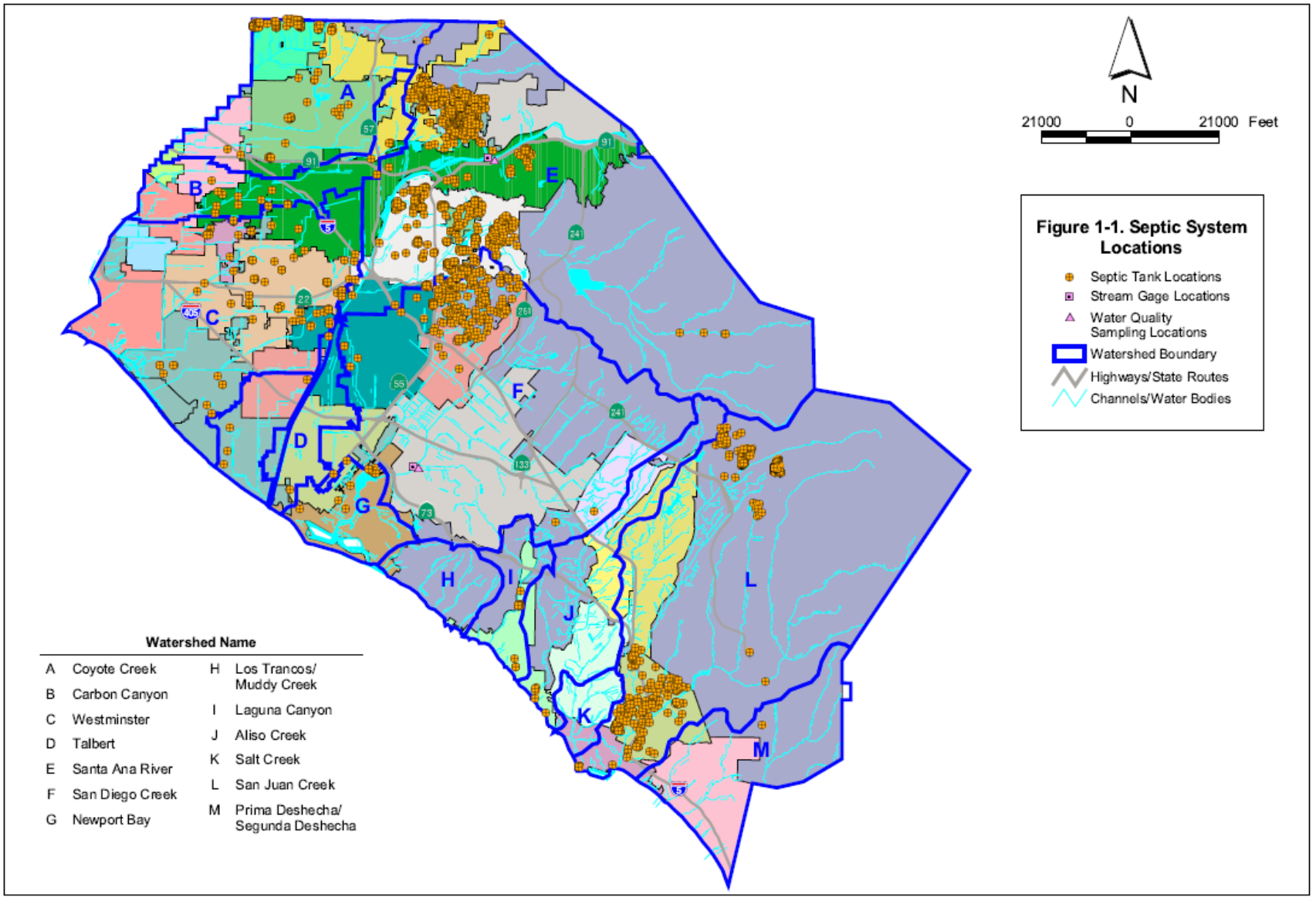

Figure 7. Septic Tank Inventory of Orange County, California (RBF Consulting, 2003)

3.1 2003 Septic System Performance Evaluation

A random field survey of OWTS owners within four selected major areas of the County was undertaken during December of 2002 to evaluate existing system performance. The areas covered under this survey encompassed the cities of Anaheim, Orange, Tustin, and Yorba Linda as well as adjacent unincorporated areas.

The study areas were selected based on the estimated number of systems present, the occurrence of low permeability soils, and proximity to sensitive receiving waters. For the four areas as aggregate, the overall failure rate was determined by the survey of the homeowners and visual inspection of the OWTS, if possible (RBF 2003). The failure rate determined through the field survey was then verified by findings from similar surveys reported in the literature (RBF 2003).

RBF staff contacted eighty system owners over a period of approximately three weeks from December 23, 2002, to January 10, 2003 during the field survey. Failure of an OWTS was defined by RBF as the observance of surface seepage or flow during the inspection. Other information was also gathered from the homeowner during the field survey, and an educational pamphlet regarding operation and maintenance of septic systems was left with each homeowner who was contacted (RBF 2003).

Of the eighty field surveys that were conducted, one failed system was noted by RBF, representing a failure rate of 1.25 percent. This finding was validated by a literature review conducted by RBF, which revealed that a similar study in Oregon recorded a failure rate of 1.3 percent of the 389 systems studied–identical to that of the survey results found in Orange County during 2002-2003. The literature review also indicated that most failures were primarily due to poor operation and maintenance. Excessive water use or insufficient system capacity were also contributors, but the primary failure mechanism was lack of, or deferred maintenance.

RBF also performed an analysis on the extent OWTS may impact water quality in Orange County based on the results from the field survey findings. A spreadsheet model was developed to estimate the loading of pathogen indicators and total Kjeldahl nitrogen (TKN) from the failed systems. A simple mass based loading model was also used to calculate total ambient constituent/indicator load for each study watershed at the points of interest, as a comparison to the estimated load from the failed systems. This comparison was for the purpose of determining if best management practices are required to mitigate discharges from the failed OWTS.

The ambient indicator load model was compiled by RBF for the two selected watersheds to estimate the relative contribution (load) of pathogen indicators in the receiving waters from the failed OWTS. Two cases were evaluated in each watershed: dry and wet weather. Selection of two study cases allowed for varying assumptions as to the indicator load estimated to arrive at the receiving water based on expected physical site conditions such as the presence of saturated soils. The system failure rate was assumed to be 2 percent (the average of the computed confidence interval for system failures determined in the survey portion of this study).

Study results showed that the load from the failed OWTS was a very marginal contributor to pathogen indicators in the receiving waters and was an insignificant contributor for TKN. The loadings of pathogen

indicators and TKN from failed septic systems at the mouth of the Santa Ana River and San Diego Creek at Upper Newport Bay were estimated to be less than a fraction of one percent of total contributory loading under both dry and wet weather conditions. Upper Newport Bay is listed as impaired for pathogens and is currently under a TMDL.

Based on the analysis of these two study areas, RBF concluded that OWTS do not represent a significant source of constituents of concern for the County's receiving waters. In general, RBF found that failure rates were relatively low; for 79 of 80 systems surveyed there were no observed or reported incidences of surface seepage or flow failures. Furthermore, the flow path of septic tank effluent to the receiving water, in most cases, provides for significant storage and infiltration, as well as degradation and natural attenuation, prior to the possibility of conveyance and discharge to receiving waters. RBF concluded from the 2003 study that there would be a steady conversion of OWTS to sewer service as service becomes available in rural areas, and as existing homes are sold and connections are made to available service by the new owner.

Using the map created by RBF Consultants (Figure 7) and comparing the 2003 OWTS locations to known sewer mains in the northwestern half of the County (Figure 8), an estimate of approximately 925 of the total number of OWTS are now located near existing sewer infrastructure. Knowing this information is one criterion that can be utilized in the process of prioritizing OWTS for potential phase out.

Following completion of the 2003 study RBF recommended that periodic homeowner education be conducted via reminder notices to service OWTS, and that homeowners with OWTS be notified when sewer system service becomes available in their area. Regulation of the construction of new OWTS and regular maintenance of existing OWTS is imperative to preventing adverse impacts on receiving waters.

RBF produced a database, containing the identified OWTS by legal parcel in Orange County; a GIS layer, linked to the database with each system was geo-coded and plotted; a load model comparing the estimated loading of selected constituents and indicators from failed systems in any given year to the total estimated loading of constituents and bacteria indicators in the receiving waters was included. The summary report is attached as Appendix IV.

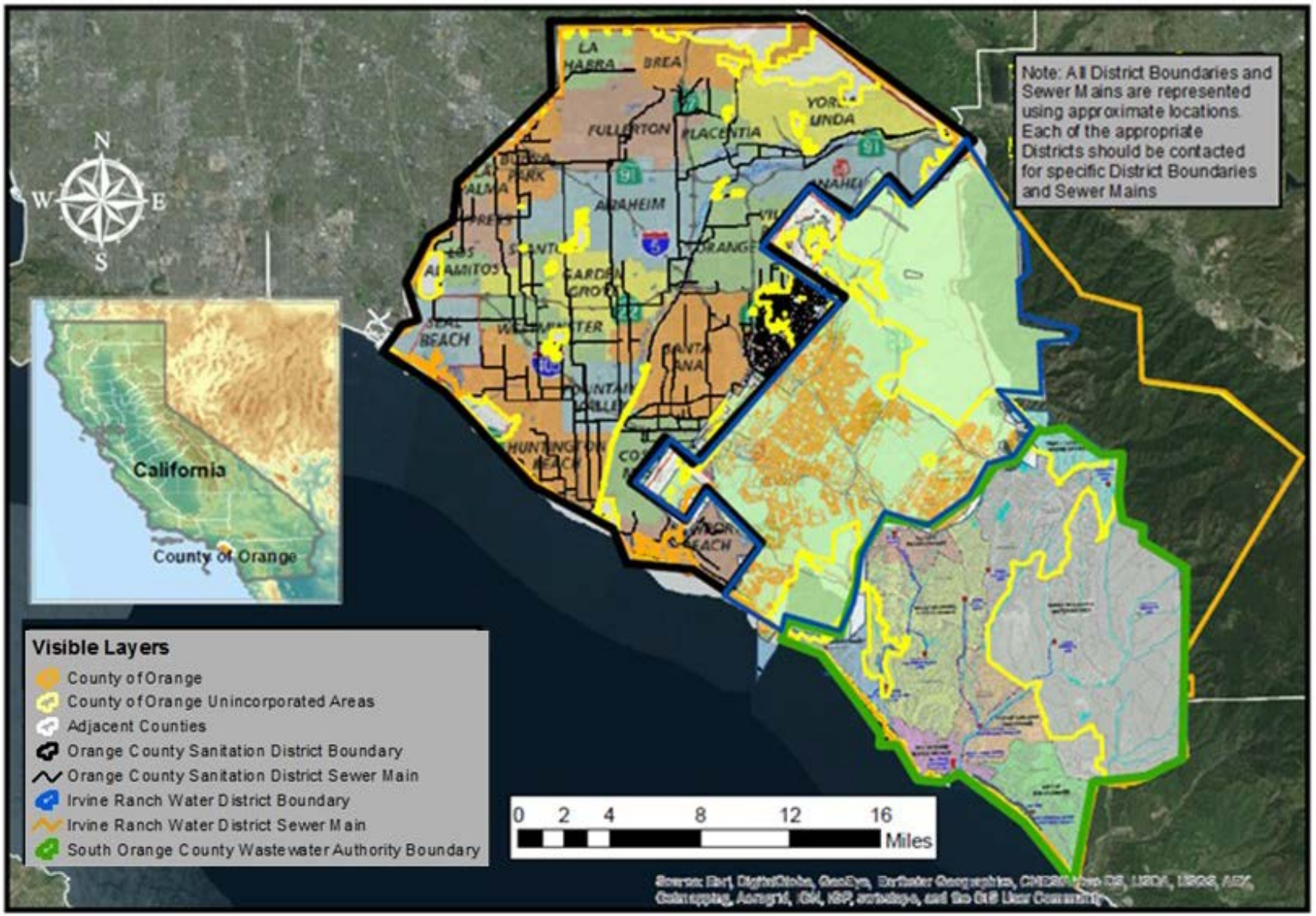

Figure 8. Private Water and Sanitation Districts with Highlighted Sewer Mains in Orange County, California

3.2 Survey and Evaluation Update: Gaps and Future Needs

While the RBF study from 2003 does show the known OWTS locations, these data are more than a decade old and need to be updated into an electronic format for unincorporated areas with a particular focus on rural canyon areas. To aid in future management of OWTS in unincorporated areas, information relating to the unique characteristics identified for each parcel and the minimum setback requirements for OWTS placement need to be investigated. A unique MSLink identifier is used for each parcel number, and this will help to identify parcels and minimum horizontal setback from surface and impaired waterbodies (Figure 9). Once a comprehensive database is created it should be readily searchable, including georeferenced data points so that it could be easily transformed into a GIS map layer for use in analysis.

A set of maps for all of Silverado Creek is included in Appendix V. An updated, interactive, GIS-based tool such as this can be used during the OWTS permitting process to aid the County in determining allowable areas for development, to search and track OWTS permit status, as well as efficiently identify OWTS requiring corrective action in accordance with Tier 4, and phase out systems that are no longer in use. This tracking would also allow for greater collaboration with sanitation districts during the permitting stage and more effectively allow for the County to isolate those properties capable of accessing sanitary sewer, eliminating the need for installation of new OWTS.

The County intends to initiate electronic tracking of new or replacement OWTS upon adoption of this LAMP guidance. While the County holds all records of OWTS that have been installed previous to LAMP adoption, the process to migrate those files to an electronic format will require more time and be completed as practical. As this information is updated, it will be completed in a manner that allows the County to search and use these data to track monitoring status, OWTS requiring corrective action in accordance with Tier 4, and phase out systems that are no longer in use.

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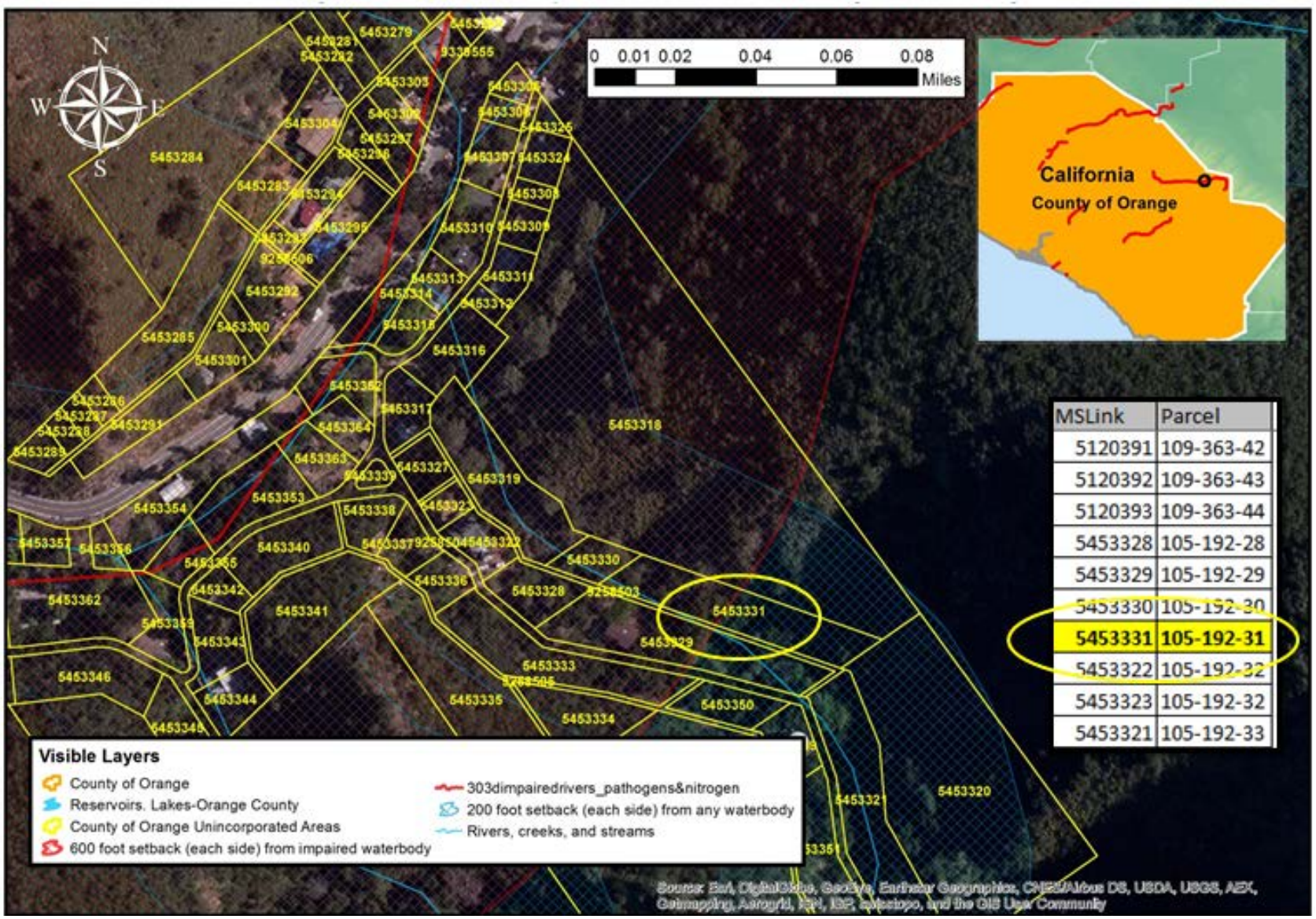

Figure 9. Silverado Creek with Minimum Setbacks and Parcel Relation using MSLink

4. Minimum OWTS Standards

Existing OWTS that are properly functioning that do not require corrective action are currently managed under Tier 0 of the OWTS Policy in Appendix I. These systems will remain under Tier 0 until there is a need for expansion or the system experiences a failure. The Santa Ana Regional Board can deny coverage to any OWTS that are unable to protect the water quality of the state or systems that are currently under waste discharge requirements or individual waiver.

Given the unique and diverse geology, soils, population distribution, and water quality needs of Orange County, it is imperative to manage OWTS to a specific set of requirements that directly addresses the need to protect local water quality and public health. Figures 10 through 13 show typical OWTS with leach lines and seepage pit designs. Note that seepage pits will only be allowed where siting limitations require a variance and in conjunction with supplemental treatment to reduce the risk of groundwater contamination resulting from placement of untreated septic effluent in deep geologic strata.

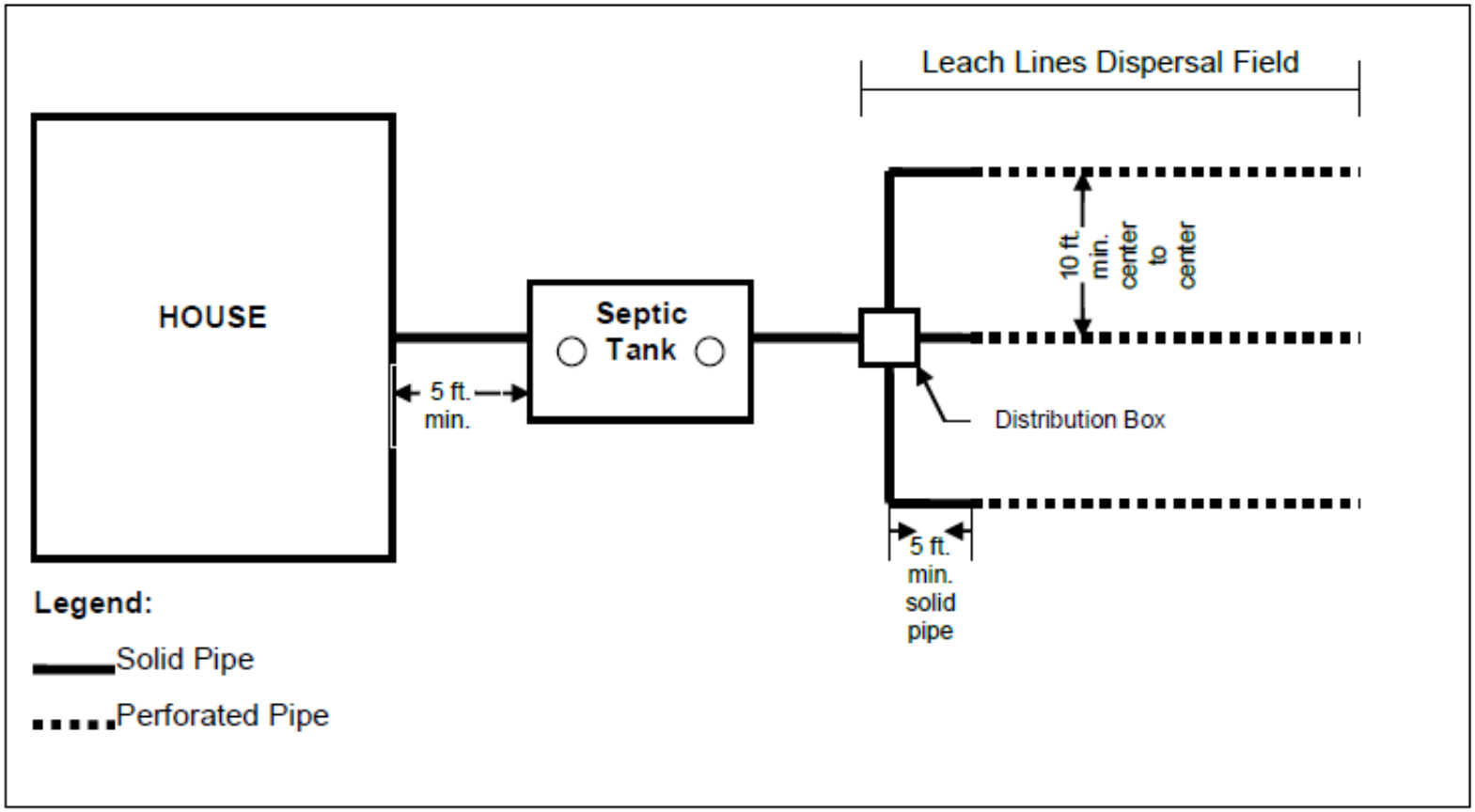

Figure 10. Typical Septic Tank Systems with Conventional Leach Line Dispersal Field (Ventura County Environemtnal Health Division, 2012)

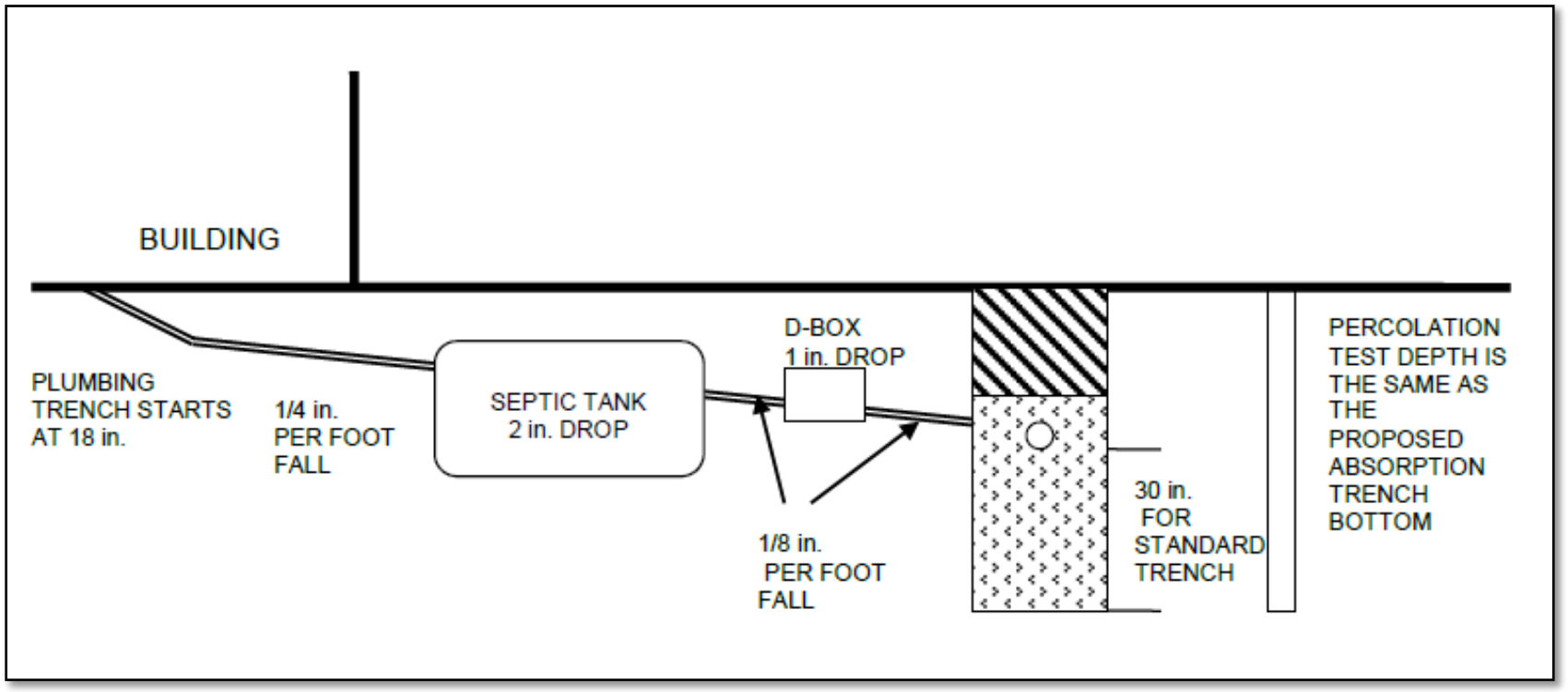

Figure 11. Cross-section of a Septic System with a Rock-filled Leach Line (Ventura County Environemtnal Health Division, 2012)

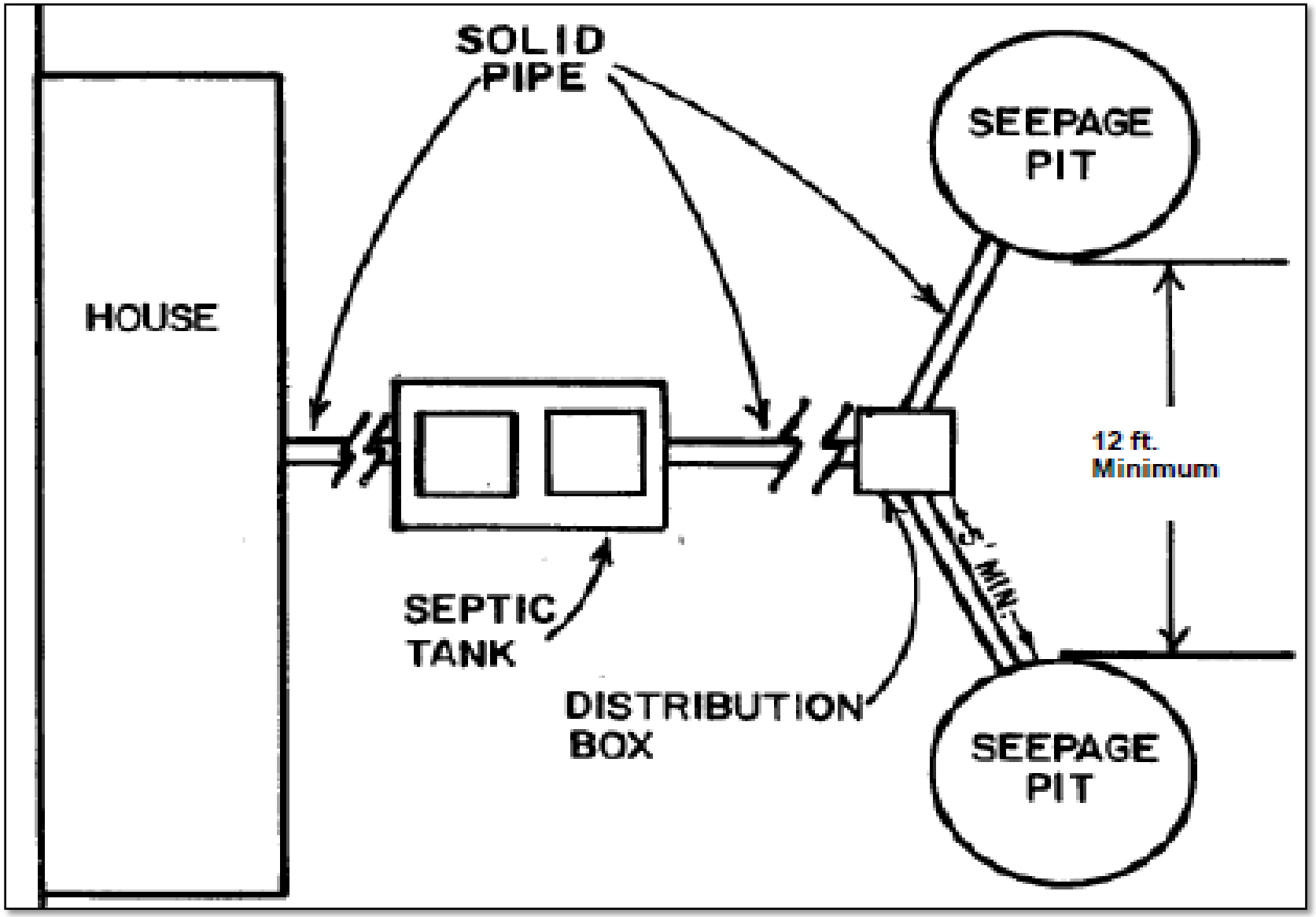

Figure 12. Typical Seepage Pit Layout (Ventura County Environemtnal Health Division, 2012)

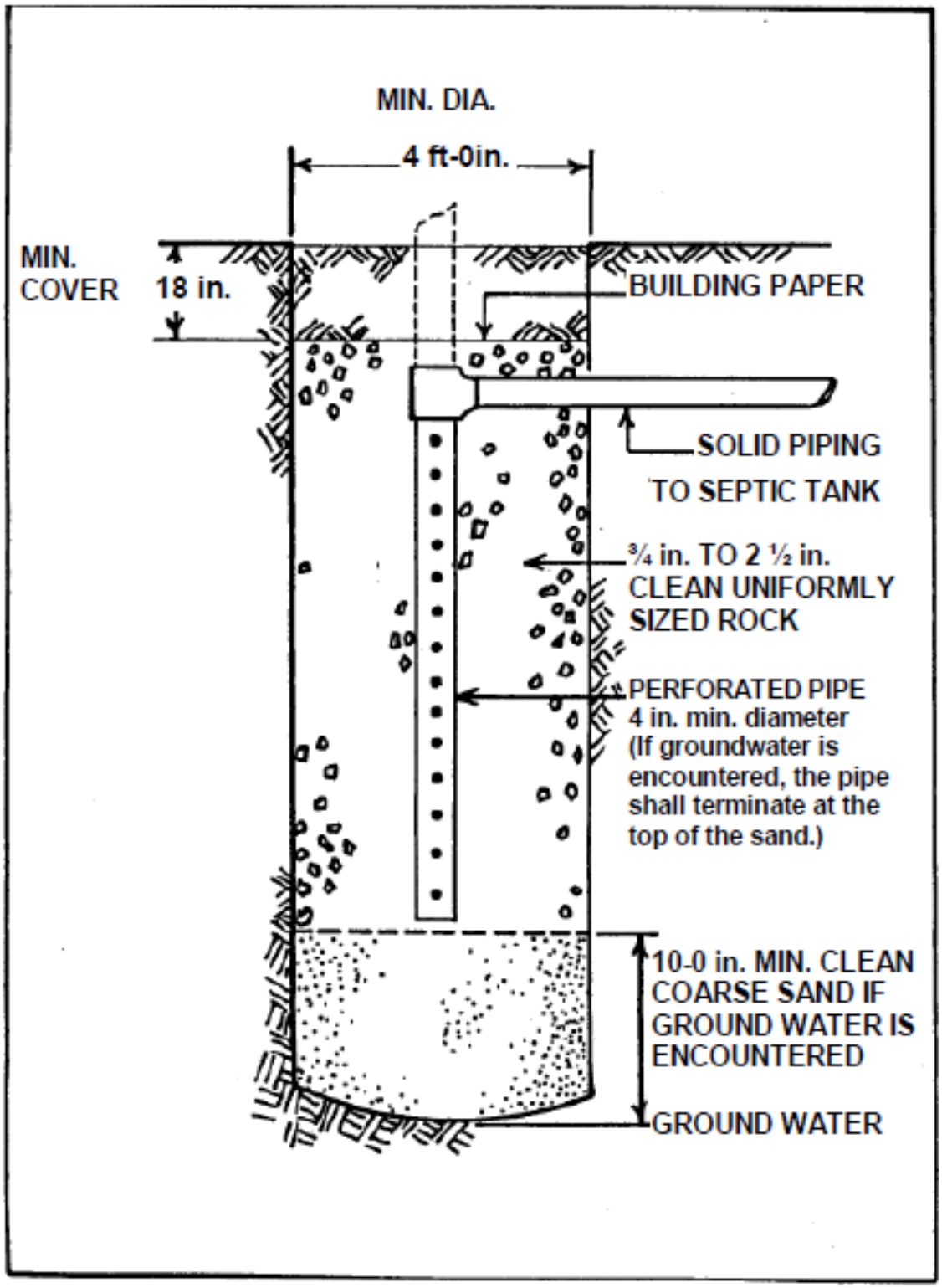

Figure 13. Typical Cross-section of Seepage Pit Construction (Ventura County Environemtnal Health Division, 2012)

4.1 Considerations for LAMPs

To ensure proper function and performance, the siting, design and construction of OWTS is critical and therefore, can only be completed by a Qualified Professional. According to the State Board, a Qualified Professional is an individual licensed or certified by a State of California agency to design OWTS and practice as professionals for other associated reports, as allowed under their license or registration. Depending on the work to be performed and various licensing and registration requirements, this may include an individual who possesses a registered environmental health specialist certificate or is currently licensed as a professional engineer or professional geologist. For the purposes of performing site evaluations, Soil Scientists certified by the Soil Science Society of America are considered Qualified Professionals. A local agency may modify this definition as part of its LAMP.

Minimum OWTS standards are described in the following sections and meet or exceed those standards provided by Tier 1 in the OWTS Policy (State Water Resources Control Board, 2012). These standards relate to site evaluation, sizing, design, construction, and maintenance of OWTS. These standards apply to new or replacement OWTS within the County in order to protect water quality and public health. Each OWTS owner should strive to meet these requirements to the greatest extent possible. In the instance that these standards cannot be met, the County has the ability to issue a variance excepting the OWTS owner from meeting the minimum requirements. Should the system be located adjacent to a 303(d) listed waterway and no TMDL Implementation Plan has been adopted, the additional measures detailed as part of the APMP in Section 4.6 would also apply.

4.1.1 Design and Planning

New or replacement OWTS shall not be allowed where public sewer is available. The public sewer may be considered as not available when such public sewer or any building or exterior drainage facility connected thereto is located more than 200 feet from any proposed building or exterior drainage facility on any lot or premises that abuts and is served by such public sewer. This provision does not apply to replacement OWTS where the connection fees and construction costs are greater than twice the total cost of the replacement OWTS and the Building Official (or designee) determines that the discharge from the OWTS will not affect groundwater or surface water to a degree that makes it unfit for drinking water supply or other uses.

Aspects to consider during OWTS siting, design, and construction include evaluating the compaction and permeability of soils onsite. These inspections must be performed by a Qualified Professional with an appropriate background in geotechnical principles. Soil evaluations will aid in determining where new OWTS or expansion of existing OWTS can occur within the property parcel. If the Qualified Professional with appropriate registration determines that the soil conditions at a site do not warrant the use of an OWTS, this should be documented and sent to Orange County Public Works (OCPW), Development Services for documentation within the OWTS database.

A general site evaluation is to be completed that includes a geologic report describing the soil conditions, depth to groundwater or bedrock. A slope stability study is required by a Qualified Professional with appropriate registration if the project proposes to place the dispersal field on a slope greater than 30 percent. A soil evaluation is required in both the area designated as the primary

dispersal area and the expansion area. Testing shall include one deep boring and three percolation tests within the proposed dispersal area. Results from the soil evaluation are used to determine the appropriate application rate and the subsequent size of the dispersal field. Where leaching chambers are used, the maximum allowable decreased leaching area for International Association of Plumbing and Mechanical Officials (IAPMO) certified dispersal systems shall be computed by using a multiplier of 0.70. This should be taken into account early on in the planning process.

If it is determined that soil conditions are conducive to OWTS construction, a professional engineer, geologist, or registered environmental health specialist is required to design an appropriate type and size of system that will effectively treat all wastewater. Design considerations include evaluating site conditions, calculating daily wastewater volume and distance from all required setbacks. The system shall be located and designed in a manner to ensure that effluent does not reach the surface at any time and that percolation of effluent will not adversely affect the beneficial uses of waters of the state.

A contractor with a valid Engineering (A), Plumbing (C-36), or Sanitation Systems (C-42) license from the state of California is allowed to install an OWTS. These licensed contractors must have the capability to implement all project stages including construction, modification, repairs to systems requiring corrective action (Tier 4) and abandonment of systems that are no longer in use. The County of Orange Development Services will provide a list of licensed contractors to the parcel owner upon OWTS permit approval.

Once construction of the new OWTS is complete, a Qualified Professional must inspect the system and confirm that it was constructed in accordance with the approved and permitted plans submitted to the County of Orange Development Services. A written notification must be submitted by the Qualified Professional to the County of Orange Development Services within 30 days of construction completion, noting that the OWTS was constructed to specifications, or noting any discrepancies and the corresponding corrective actions that will be taken to bring the OWTS into compliance.

Regardless of system type or design, long-term maintenance and care is a necessity for all OWTS. Once placed into operation, regular inspections and maintenance are necessary to keep the system functioning as designed and to prolong its useful life. Inspections, maintenance, and servicing must be performed by a Qualified Professional or licensed contractor. Inspections should include:

- An interview with the parcel owner or primary user of the system and the noting of any leaching or excessive accumulation of water on the ground near the system from the time of construction or last inspection.
- Inspection of the OWTS viewing port for clarity and noting of the condition of the OWTS interior.
- Collection of water samples from the nearest waterbody downslope from the system on three separate occasions over first year of OWTS operation. These samples should be analyzed for pathogen and nitrogen concentrations should be compared to known concentrations in the waterbody if appropriate, or referenced to the relevant TMDL where applicable.
- Sampling will be completed by the County (or designee).

4.1.1.1 Consideration for the Salt and Nutrient Management Plan (SNMP)

The Policy recognizes the potential for increased salt and nutrient loading to groundwater basins as a result of increased recycled water use, and therefore, requires the development of regional or sub-regional salt and nutrient management plans. While the unincorporated regions of the County where OWTSs currently exist should not be in conflict with any of the groundwater basins designated as priority basins by the State Water Board's Groundwater Ambient Monitoring and Assessment (GAMA) program, a SNMP is required as a part of the State Board's Recycled Water Policy (State Water Resources Control Board, 2013), last amended in 2013 and currently under review for additional amendments by the Science Advisory Panel.

The SNMP was originally developed to:

- Ensure the region's long-term water quality is understood,
- Streamline the permitting process for various water quality related projects, and
- Ensure compliance with water quality objectives.

The County will work to support implementation of the SNMPs through the collection of additional information during the permit process for new or replacement OWTS. Of particular concern is the use of self-generating water softeners that use rock salt or potassium chloride pellets to treat hard water. These types of water softeners discharge a brine consisting of concentrated chloride levels. Supplemental information will be collected as to whether the OWTS permit applicant utilizes such methods to treat drinking water. This information may then be used by the Regional Boards when developing and revising SNMPs.

The County will utilize the SNMPs from the Regional Boards as a tool to:

- Assess whether OWTS within the unincorporated areas are contributing to nitrate loading, and
- Address any necessary changes during the LAMP evaluation, which is every five years.

4.1.2 Primary Treatment and Effluent Dispersal

Because the OWTS effluent is discharged at a shallow soil depth, the use of leach lines is the preferred method of dispersal using not more than four square feet of infiltrative area per linear foot of trench as the infiltrative surface, and with trench width no wider than three feet. Seepage pits may only be used where siting limitations require a variance and in conjunction with supplemental treatment to reduce the risk of groundwater contamination resulting from placement of untreated septic effluent in deep geologic strata.

In no instance shall percolation tests be conducted in a graded "fill area". In the case of either a trench leach field or seepage pit, at least one exploratory boring is required per system in order to determine depth to groundwater and any impervious layer. The boring must extend at least five feet below the proposed trench bottom and ten feet below the pit bottom. Further, the soil profiles in each of the exploratory borings are to be recorded. Alternative treatment should be investigated if site conditions indicate shallow groundwater to dispersal system elevation. Zones of seasonal or periodic soil saturation shall be estimated at the highest level of redoximorphic features, such as soil mottles or low-chroma

colors (except soils with rapid permeability). Test holes and exploratory borings shall be back-filled and properly compacted after tests are done.

Unless otherwise waived by the County's Building Official (or designee), both trench leach fields and seepage pit effective sidewall shall be increased by an amount equal to 100 percent of the original design capacity. This is to assure a "backup" system is available at the time of initial construction. The back-up system and primary system are to be separated by a diverter valve.

When seepage pits are used, the percolation rate of each pit must be determined through a percolation test. Absorptive capacities ranging between 1,000 – 8,000 gpd are acceptable. When using seepage pits with this absorptive capacity, the Qualified Professional designing the system shall use an effluent application rate of 0.8 gallons per square foot per day (gal/sf/day) to calculate the number of seepage pits necessary to serve the proposed structure. Seepage pits found to have absorption capacities of 500 – 1,000 gpd or greater than 8,000 gpd may be used but supplemental treatment must be utilized. Dual dispersal fields interconnected by a diverter valve for new OWTS serving commercial buildings are required for supplemental treatment. In addition, a 100 percent expansion area must be designated for future use. There are several benefits to requiring the installation of dual fields:

- If dual fields are constructed this ensures suitable dispersal area is not lost to future development of the property.
- Should one field fail, the second field is readily available.
- There would be little or no public exposure to sewage and no downtime for the commercial operation.
- Switching from one dispersal field to the other on a regular basis prolongs the useful life of both fields.

When using seepage pits with these capacities, the system designer shall use effluent application rates of 0.4 gallons per square feet per day (gal/sf/day) and 1.2 gal/sf/day, respectively. When available information indicates that changes in the levels of groundwater may result in an inadequate separation between the bottom of the dispersal field and groundwater, the County's Building Official (or designee) may require wet weather soil borings in addition to the soil borings and percolation tests previously described. To be reasonably sure that these borings will measure "worst case" conditions, they must generally be completed during the wet season from October through April.

The capacity of a septic tank shall be per the International Association of Plumping and Mechanical Officials, California Plumbing Code, currently adopted edition (IAMPO 2010). Residential septic tank size is based on the number of bedrooms served (Table 1). For design purposes, a bedroom is defined as any space in a conditioned (heated) area of a dwelling unit which is ≥70 square feet in size and which is an exterior room, unless it is one of the following:

- Hall;
- Bathroom;
- Kitchen;

- Living Room (maximum of one per dwelling unit);
- Dining Room (opening off of the kitchen or living room, maximum of one per dwelling unit);
- Family Room (opening off of the kitchen or living room, maximum of one per dwelling unit);
- Breakfast Nook (opening off of the kitchen, maximum of one per dwelling unit);
- Pantry (maximum of one per dwelling unit);
- Laundry Room;
- Closet/Dressing Room opening off of the bedroom

Sewing rooms, dens, offices, studios, lofts, game rooms, and any other exterior room ≥70 square feet shall be counted as bedrooms regardless of whether they are entered through a door, unless the room is otherwise exempted. The County's Building Official (or designee) may grant exceptions, if, in his/her discretion, a room cannot, by its design, function as a bedroom.

When the quantity of sewage exceeds the amount that can be disposed in 500 linear feet of leach line, a dosing tank shall be used. Dosing tanks shall be equipped with an automatic siphon or pump which discharges that tank once every three or four hours. The tank shall have a capacity equal to 60 to 75 percent of the interior capacity of the pipe to be dosed at one time. Where the total length of pipe exceeds 1000 linear feet (304.8 meters), the dosing tank shall be provided with two siphons or pumps dosing alternately and each serving one-half of the leach field.

Water softener, iron filter discharge, or swimming pool and spa filter backwash to an OWTS is prohibited. Provide effluent filter and water tight risers to grade, for filter maintenance.

Table 1. California Plumbing Code Septic Tank Capacity (Appendix II) (County of Orange Planning Department)

Single Family Dwellings[1]	Multiple Dwelling Units or Apartments[2]	Minimum Septic Tank Capacity in gallons (liters)[3]
1 to 2 bedrooms	-	750 (2839)
3	-	1000 (3785)
4	2 units	1200 (4542)
5 to 6	3	1500 (5678)
-	4	2000 (7571)
-	5	2250 (8518)
-	6	2500 (9464)
-	7	2750 (10410)
-	8	3000 (11356)
-	9	3250 (12303)
-	10	3500 (13249)

[1]Extra bedroom: 150 gallons (567.8 liters) each

[2]Extra dwelling units over 100: 25 gallons (96.4 liters) each

[3]Septic tank sizes include sludge storage capacity and the connection disposal of domestic food waste units without further volume increase.

If the OWTS design calls for placing a tank beneath areas subject to vehicular traffic such as a driveway, the tank must be rated to withstand such conditions or the installation is to be engineered to support the additional weight. The tank lids and risers used in such installations must be traffic rated as well.

The OWTS must have a minimum of two compartments and a minimum capacity of three times the peak daily flow. Each compartment shall be accessible through a manway or port that is a minimum 20 inches in diameter.

The OWTS should be designed only for current or project wastewater flows within a building. To ensure systems are appropriately sized to support the existing structure and no additional capacity is built in, OWTS will not be permitted to include capacity for significant wastes from RV holding tanks or other off-site holding areas.

In general, all tanks should be buried as shallow as practicable. Septic tanks should be installed no deeper than 24 inches below finish grade. If it is demonstrated that a septic tank must be placed deeper than 24 inches below finish grade, than each compartment is to be fitted with watertight risers that extend to within 24 inches of finish grade. When it is necessary to extend septic tank risers to finish grade, corrosion resistant fasteners that require the use of tools to remove shall be used to secure the lid to the riser.

Trench leach fields are typically the most economical and practical design for wastewater treatment given an appropriately-sized lot and ideal soil conditions. Perforated pipe is installed to distribute the wastewater into the surrounding soil environment. Drain rock is placed around the piping to filter and store the wastewater as it percolates into the soil. Leach lines are typically long and narrow. Leach lines distribute the septic tank effluent into the surrounding trench at a depth generally not more than six feet. This shallow dispersal system provides effluent disposal under aerobic conditions at a maximum distance from underlying bedrock or groundwater. Trench leach fields should be designed according to Section VII of the County of Orange Planning Department's On-site Sewage Absorption System Guidelines (Appendix II).

To facilitate future inspections of the dispersal field, inspection ports are to be installed at each end of each trench (upgradient and downgradient). Depending on the circumstances, the County retains the authority to require the installation of additional inspection ports at different locations of the dispersal field.

Trench leach fields are the preferred method for water dispersal from OWTS. The use of seepage pits, as a dispersal field, will only be allowed in instances where siting limitations require a variance and in conjunction with supplemental treatment to reduce the risk of groundwater contamination resulting from placement of untreated septic effluent in deep geologic strata.

Table 2. Percolation Rate and Absorption Area Requirements for Trench Leach Fields (County of Orange Planning Department)

Percolation rate (time required for water to fall one inch)	Required absorption area, in square feet, per bedroom based on a standard trench[1,2]
4 minutes/inch	115 square feet
5 minutes/inch	125 square feet
10 minutes/inch	165 square feet
15 minutes/inch	190 square feet
30 minutes/inch	250 square feet

Percolation rate (time required for water to fall one inch)	Required absorption area, in square feet, per bedroom based on a standard trench[1,2]
45 minutes/inch	300 square feet
60 minutes/inch	330 square feet

[1] A standard trench is one in which the filter material extends 2 inches above and 12 inches below a 4-inch perforated drain line.

[2] In cases where the depth of filter material below the drain line exceeds the standard 12 inches of depth, credit may be given for the added absorption area provided in deeper trenches with a resultant decrease in length of trench. See Appendix II for credit amount.

Should siting limitations dictate that a seepage pit is the only option for treatment, a variance in conjunction with supplemental treatment will be required. If permitted, the seepage pit should be constructed as follows:

- Each seepage pit shall be circular in shape and shall have an excavated, diameter of not less than five feet. Each such pit shall be lined with whole, new, hard-burned clay brick, concrete brick, concrete circular type cesspool blocks or other materials approved by the County. Approval shall be obtained prior to construction for any pit having an excavated diameter greater than six feet.
- Each seepage pit shall have a minimum sidewall (not including the arch) of ten feet below the inlet with a maximum total depth of 40 feet unless approved by the County's Building Official (or designee).
- The top of the arch or cover must be at least 18 inches but no more than four feet below the surface of the ground.
- The horizontal distance from a seepage pit to the top of a cut bank shall be equal to five times the vertical height of the bank or 25 feet, whichever is less.
- Maintain a ten-foot separation between bottom of the pit and seasonally high groundwater.
- Ten feet of separation is required between the pit bottom and an impervious layer (e.g., bedrock or any layer where the percolation rate is greater than 20 min/in). In those cases where use of leach lines is not feasible the County may allow the use of seepage pits with supplemental treatment.

Each seepage pit is typically gravel filled and has a centrally located, perforated four inch diameter pipe that extends from the inlet to the bottom of the pit. The use of "hollow" seepage pits, or those without gravel or soil fill is prohibited under current code and will continue to be prohibited.

When soil testing indicates that multiple seepage pits are necessary in order to provide adequate dispersal capacity, it is important that the wastewater flow to each pit be as equal as possible. Consequently, an approved distribution method must be provided when multiple seepage pits are used.

Use of seepage pits will only be allowed where siting limitations require a variance and in conjunction with supplemental treatment to reduce the risk of groundwater contamination resulting from placement of untreated septic effluent in deep geologic strata. Alternative Wastewater Treatment Systems (Section 4.1.4) are OWTS utilizing a dispersal field consisting of components other than a conventional or supplemental treatment system such as "mound" or "subsurface sand filtration" systems.

4.1.3 Secondary and Advanced Treatment Processes

If effluent cannot be treated to the necessary quality through trench leach fields or seepage pits, additional treatment is necessary. Any treatment that provides additional reduction of biological oxygen demand (BOD) and total suspended solids (TSS) parameters is considered secondary treatment. Even in instances where water quality can be met through primary treatment and dispersal with seepage pits and leach fields, implementing secondary treatment can further reduce BOD and TSS, extend the treatment life of the OWTS and reduce maintenance expenses. Advanced treatment reduces BOD and TSS, but also reduces nitrogen and pathogen levels.

The following table outlines secondary and advanced treatment systems that could be used within an OWTS, along with the advantages and limitations of each system.

Table 3. Secondary and Advanced Treatment Technologies (Parten, 2010)

System Type and Description	System Advantages	System Limitations
Single-Pass Biofiltration: Intermittent Sand Filters and Peat Filters: These systems rely on naturally aerobic conditions with the effluent draining through an unsaturated media. Mechanical oxygenation is not necessary to maintain aerobic conditions.	• Reduce nitrogen levels by 20-30% • Provides significant pathogen reduction (average fecal coliform levels of 200 col/100 mL or less) • Typically only requires routine annual maintenance	• Greater space requirements (footprint) than other treatment options. • More costly to service or restore if media becomes clogged. • In peat biofilters, life of peat typically ranges from 4-12 years
Recirculating Biofiltration: Similar to a single-pass biofiltration system, except the waste stream passes through the biofiltration system at a recirculation rate specified by the designer. Recirculation rate depends upon filter media, waste strength, and treatment needs	• Can provide 50-60% total nitrogen removal • Provides significant pathogen reduction (2-3 log reduction for fecal coliform) • Typically only requires routine maintenance once or twice a year.	• Greater space requirements (footprint) than other treatment options • Cannot use area over filter for residential activities or foot traffic • Require control panels with timer capabilities to best control recirculation rates
Submerged or Saturated Biofiltration: Biofilter performing under the absence of free oxygen, while oxygen is available within nitrate and nitrite. Two examples of biofilters include subsurface flow wetlands and trickling filter treatment systems.	• Capable of producing low levels of BOD and TSS • Typically only requires routine maintenance annually or seasonally to remove excess vegetation	• Nitrification is typically limited unless size of system is greatly increased to permit greater oxygen transfer • Must be maintained to remove invasive and woody vegetation
Suspended growth with continuous flow: Also known as aerated tanks, mixing of treatment flow and bacteria occur in suspension with constant mixing. If the system is allowed to go dormant, it may take several weeks to become operational.	• Capable of producing low levels of BOD and TSS • Provides 30-50% total nitrogen removal • Very low space requirement • Less susceptible to reduced performance during periods of sporadic use	• Requires inspection/maintenance more frequently than other treatment options • Cost can be higher than other treatment options • Higher energy usage than attached growth systems

System Type and Description	System Advantages	System Limitations
Suspended growth with batch flow: Mixing of treatment flow and bacteria in distinct steps or batches. Treatment typically occurs within different tanks so as to produce an uninterrupted treatment process.	• Provides 40-70% total nitrogen removal • Very low space requirements • Timing of each step can be adjusted to enhance treatment	• Sporadic periods of use and nonuse adversely affect system performance • Requires maintenance and inspection more frequently

These systems must be designed by a Qualified Professional in conformance with the OWTS Policy. However, the County may adopt local design standards after consultation with the Regional Board. Prior to final approval, the property owner shall be required to record a notice stating that an alternative system has been installed on the property. This "Notice to Property Owner" shall be inherent with the land and will act as construction notice to any future property owner that the property is served by an alternative wastewater treatment system and is therefore, subject to an operating permit with regular maintenance, monitoring, and reporting requirements. A copy of the recorded document shall be provided to the County before final system approval.

4.1.4 Alternate Treatment Systems

The County shall determine if the use of conventional OWTS will be potentially hazardous to public health due to the presence of shallow groundwater, rock, or adverse soil, geologic, or hydrologic conditions. In these instances, an alternative treatment system is necessary. Alternative treatment systems can include secondary or advanced treatment technologies, with the most common being "mound" or "subsurface sand filtration" systems.

Designs for alternate treatment systems must be completed by a Qualified Professional, who shall submit written verification upon completion of the system that the installation is in conformance with the approved design. Properties that use these alternate treatment systems shall be maintained and repaired in accordance with the approved maintenance plan submitted by the Qualified Professional.

Mound systems use pumping to deliver effluent from a septic tank into an above-ground distribution bed and then percolates through mounded sand fill into natural soil. Typical system components include a septic tank, lift pump and wet well, pressurized effluent piping, sand fill mound, distribution bed, top soil and surrounding graded slopes. The lift pump and wet well shall be designed to handle peak flow from the septic tank and never have a pumping capacity less than 20 gallons/minute or have a pump motor rated at less than one-half horsepower.

Mounds cannot be installed on a slope greater than 12 percent. The base of the mound shall be located at least two feet above the highest known seasonal groundwater elevation at the site and two feet above fractured bedrock. The mound may not be steeper than 3 horizontal to 1 vertical. Distribution beds shall be level and located a minimum of five feet above the highest known seasonal groundwater elevation at the site. No part of the system shall be allowed within a 100-year flood plain unless the base of the system is 12 inches above the base flood elevation (BFE defined by the FEMA).

Filtration bed material shall be clean gravel between 0.75-2.5 inches. The bed thickness should include twelve inches of filter material below distribution piping, and two inches of sand above distribution piping. Distribution piping shall distribute effluent uniformly over the entire bed at a rate of not more than 1.5 gallons/square foot/day. Topsoil shall be placed over bed to a depth of twelve inches and placed on the mound sloping sides to a thickness of at least six inches.

Sand filtration systems utilize gravity to deliver effluent from a septic tank to a subsurface gravel distribution bed, and then into a bed of sand to reduce organic matter and pathogenic organisms. This treated stream then percolates into native soil. Typical system components include a septic tank, effluent piping, subsurface distribution bed, sand filtration bed, leaching bed, leach lines, and seepage pits.

Distribution beds shall be designed and constructed in a manner similar to that for mound systems, with the exception of gravity-flow piping instead of pressurized piping. Sand filtration beds shall be at least five feet vertically below and five feet horizontally from the edges of any distribution bed (Ventura County Environemtnal Health Division, 2012).

4.1.5 Degree of Vulnerability due to Local Hydrogeology

Particularly in the northwestern half of the County, there are key areas with shallow groundwater (i.e., depths of five feet or less) that could pose a threat if contaminated from failing systems. In areas where OWTS could be placed or where OWTS currently exist, these systems should be monitored to ensure that water in these shallow groundwater areas does not become contaminated through future septic failure. Currently, OWTS that are located within a shallow groundwater contour are primarily west of the Santa Ana River within the incorporated areas of Garden Grove, Huntington Beach, Santa Ana, and Westminster. Additionally, while the groundwater contour elevation for the southeastern half of Orange County is not currently mapped, there are known septic systems near the confluence of San Juan and Trabuco Creeks primarily located within the incorporated area of San Juan Capistrano.

For proposed new systems in areas of the County with known shallow groundwater, leach lines and disposal fields shall be constructed to have a minimum five feet separation from the highest known seasonal or permanent groundwater level, and seepage pits shall be installed to have a minimum ten feet separation from the highest known seasonal or permanent groundwater level.

4.1.6 Vulnerable Surface Water

Surface water that serves as a high quality ecological area or downstream receiver of impaired waters due to pathogens or nitrogen should be considered vulnerable, and OWTS installation in these areas poses a greater potential for quality reduction (Figure 14). Such waters include:

- Santiago Reservoir (Irvine Lake), which receives water from approximately two-thirds of the Santiago Creek watershed. Santiago Creek is the primary contributing waterbody along with Limestone Wash, Silverado and Modjeska creeks. Silverado Creek is included as an impaired waterbody due to pathogen accumulation. From its headwaters, 3.45 miles of Silverado Creek is designated as impaired before it enters Santiago Creek. Santiago Creek flows 1.5-2 miles from the confluence with Silverado Creek before it enters Irvine Lake.

- The Santa Ana River from the community of Garden Grove to its tidal prism. The upper portion of the Santa Ana River through its entire course in Orange County to the City of Garden Grove is currently listed as an impaired waterbody for pathogens.
- Serrano Creek is listed on the 303(d) impaired waterbodies list for both pathogens and nitrogen, and it is a tributary to San Diego Creek. After their confluence, San Diego Creek flows into the ecological reserve located in the Upper Newport Bay Ecological Reserve. Peters Canyon Channel enters San Diego Creek 2.5 miles upstream of Newport Bay and is also impaired for pathogens. The occurrence of OWTS in or near these two impaired waterbodies is minimal, according to the 2003 Survey (RBF, 2003).
- Both San Gabriel and Coyote Creeks flow toward the Pacific Ocean on the border between the counties of Orange and Los Angeles. Both of these waterbodies are impaired for pathogens.
  The lower portions of Morning Canyon and Los Trancos creeks are impaired for pathogens and outlet directly into the ocean.
  The East Garden Grove Wintersburg Channel drains into Huntington Harbour, both of which are also listed as impaired for pathogens. These waterbodies are bordered by unincorporated areas with known OWTS (RBF, 2003). Seal Beach, adjacent to Huntington Harbour, and is also listed as a 303(d) impaired waterbody for pathogens.

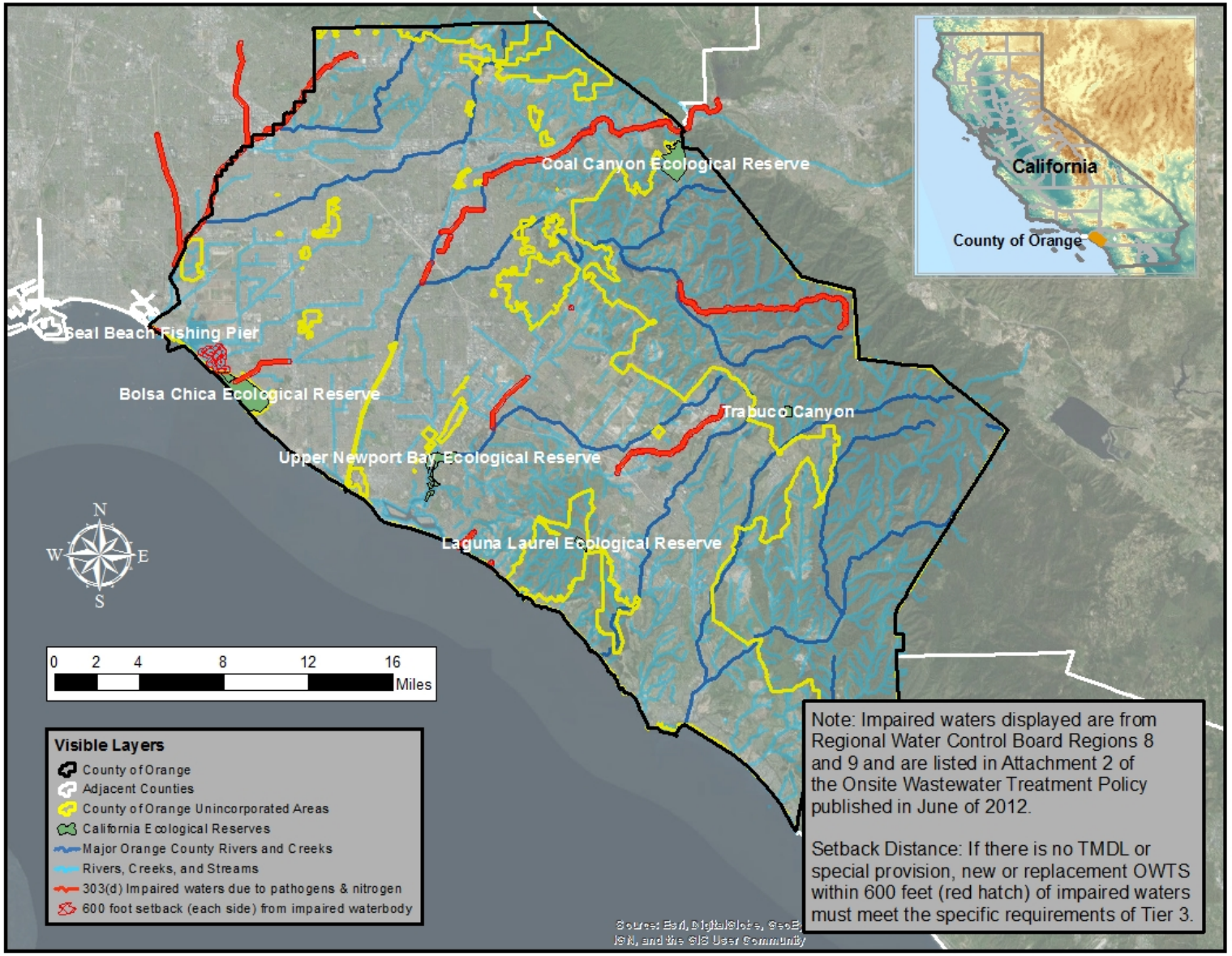

Figure 14. Map Highlighting Ecological Reserves and Impaired Waterbodies for Nitrogen and Pathogens

4.1.7 High Density Areas for OWTS

Based upon the 2003 Septic System Inventory and Assessment (Appendix IV), there are four areas within the unincorporated County that have a high density (17 or more systems per square mile). These four areas are: San Juan Capistrano along San Juan and Trabuco Creeks, unincorporated areas along Upper Arroyo Trabuco Creek surrounding Rancho Santa Margarita, the western third of Yorba Linda, and the unincorporated area immediately north of Tustin. The high density area within Yorba Linda has the greatest system density at 56 OWTS per square mile. Water quality monitoring of surface and ground sources should be included as part of the design criteria for future OWTS to be permitted within these four concentrated areas. Also, OWTS inspections will be completed every five years within these areas to ensure that all functioning systems remain in working order and do not meet the guidelines of a system requiring corrective action under Tier 4.

Californians use about 15 billion gallons of groundwater on a daily basis and over 16 million Californians get at least part of their drinking water from groundwater, from both public supplies and private domestic wells. As of the year 2000, the County was responsible for 6 percent of the domestic well withdrawals in the state at 15.71 million gal/day (California State Water Resources Control Board, April 2011). Given the large use of groundwater for drinking, it is important to take this into consideration when designing OWTS near areas with high domestic well usage. During the building permit application process, the parcel owner should note whether services are provided through a public supply or if they are using a private domestic well. In the event that they are supplying water through a private domestic well, there will be a minimum setback requirement of 150 feet to ensure that wells are not contaminated with nitrogen or pathogens if an OWTS failure occurs.

4.1.8 Limits to Parcel Size

Currently, regional regulations require that the lot size is a minimum of one-half acre for the installation of a new OWTS (State Water Resources Control Board, 1989). This requirement only applies for new systems or systems that are expanded in the future and therefore, have to apply for a new building permit. In the reassessment of OWTS regulation and associated water quality impacts incurred from areas that have a concentration of these small parcels, a minimum parcel size of one acre will apply to new or expanded systems. All systems that were constructed prior to enforcement of this LAMP will be allowed to continue to operate unless expansion or corrective action is necessary. This increase in minimum lot size will decrease system density in critical areas and lead to a reduction in nitrogen and pathogen loading to County waterbodies if system failure does occur. The average density for any subdivision of property shall not exceed one single-family dwelling unit, or its equivalent, per acre for those units that rely on an OWTS.

For OWTS within the County that pre-date the adopted standards outlined in this document, the County will appropriately document these areas in a comprehensive database and provide education and outreach materials to the property owners of these parcels in order to explain why improving their systems will benefit local water quality and public health. The County will also provide these property owners with a succinct guide that includes new requirements and the effective path to permitting and installing an updated OWTS.

4.1.9 Areas with OWTS that Predate Adopted Standards

There are a number of OWTS in use in Orange County that pre-date current standards or in some cases, any standards. These systems are generally located on severely constrained parcels in rural canyon areas. These constraints include one or more of the following conditions:

1. Inadequate area available for the dispersal field,
2. Inadequate setback from drainages or watercourses,
3. Inadequate vertical separation from groundwater or impervious surfaces, and/or
4. Inadequate setback from steep slopes.

When the existing OWTS on these lots fail, it is often not possible to make repairs that meet all current standards. It has been and will remain the policy of the County to be flexible when dealing with systems on lots of record. Accordingly, the repairs are to be made in a manner so that the applicable standards are met to the maximum extent feasible. This approach results in the installation of an OWTS that is often better than the original, keeps the wastewater below the ground surface and protects water quality and public health.

There may be instances when a parcel has no viable area in which to install a competent standard dispersal field. With advances in OWTS technology, depending on the type of site constraint, there may be multiple alternative solutions available. For example, if it were not possible to provide adequate vertical separation between the bottom of the dispersal field and groundwater, the use of supplemental treatment with a shallow drip dispersal field or an advanced wastewater treatment system could be considered.

In almost all situations, it is possible to design an OWTS that will adequately serve the structure and be protective of the environment and public health. However, it is possible that there will be a site that is constrained to the point that no adequate OWTS can be located and installed. In such cases, when all options for subsurface dispersal are exhausted, then a haul away service may be utilized with concurrence of the County's Building Official (or designee).

In addition to repairs on lots with severe constraints there are other circumstances or conditions that would require the use of supplemental treatment as a mitigation factor in order to perform to a standard equivalent to or better than Tier I. It also includes any areas identified by the Santa Ana Regional Board or the San Diego Regional Board as having groundwater basins with significant degradation as a result of the use of OWTS. Supplemental treatment shall be required for all new and replacement systems in areas with these designations.

Existing systems that are located within required setback areas will be responsible for working with the County in order to collect water quality data and perform biannual system inspections. Also, if the system owner observes a failure and corrective action is necessary, they are required to notify the County immediately and coordinate corrective action measures in accordance with Tier 4 of the OWTS Policy.

4.2 Scope of Coverage

This document serves as a comprehensive program for septic systems in unincorporated Orange County with projected flows never greater than 10,000 gpd. Any systems with projected flows surpassing 10,000 gpd are required to obtain waste discharge requirements from the Santa Ana Regional or the San Diego Regional Board. Traditional OWTS should be used and alternative treatment systems can be employed through a variance process when site conditions are not conducive to traditional approaches. Cesspool storage is not included within these guidelines and will not be permitted within the County. When County staff discover a cesspool in use, the County will contact the property owner and require that the cesspool be replaced with an OWTS which meets current standards. System dispersal should remain underground in order to achieve the greatest breakdown efficiency through soil microorganisms.

4.2.1 Installation and Inspection Permits

All OWTS are regulated through Development Services. Development Services is responsible for the documenting, review, and approval of all building permits and systems that are installed throughout the unincorporated County. Additionally, Development Services reviews and approves proposed monitoring programs and annual OWTS inspections.

To ensure that each septic system continues to function properly, it should be inspected at least annually by a Qualified Professional. Inspection reports shall be submitted to Development Services detailing the findings of the inspection within 30 days of its completion, so that routine inspections are tracked and required maintenance can be assured. If upon inspection, corrective action is necessary, these systems will be managed under Tier 4 until corrective actions are complete. After this time, these systems will be reinstated under Tier 2. Any system that uses supplemental treatment must undergo annual monitoring and inspection. Systems with supplemental treatment that do not abide by this active inspection requirement will continue to be managed as a treatment system under Tier 4.

4.2.2 LAMP Variance Procedures

All minimum standards and requirements shall be incorporated into the siting, design, and monitoring of new OWTS. However, there may be instances in which a variance can be issued upon review of the site and building permit application such as unique geological, soil type, and unstable landmass conditions as well as unique circumstances on parcels adjacent to impaired waterbodies. A variance from the stated guidelines and requirements shall be minimized to the extent possible and documented through the permit process in the following manner:

1. Provide a statement of hardship that creates the necessity for the variance;
2. Identify the specific criteria from which the variance is being requested, and
3. Include technical justifications by a Qualified Professional which indicates the specific conditions which may exist and/or measures that will be taken that support a finding that the variance will result in no greater risk than associated with compliance with the requirements.

Examples of conditions which exist, or measures which might be taken, include but are not limited to the following:

- Majority (50% by area) of property enclosed within the required minimum setback

- Unstable landmasses within parcel typically in rural canyon areas
- Class D soils throughout entire property
- Evidence of a natural or manmade physical barrier to the movement of OWTS effluent to or toward waterways or groundwater aquifer the feature from which the variance is requested;
- Placement of a manmade physical barrier to the movement of OWTS effluent to or toward the feature from which the variance is requested; and
- Soil replacement with sand filter media to reduce the infiltration rate of the OWTS effluent such that the travel time of the effluent from the absorption field to the physical feature is no less than the travel time through the native soils at the prescribed setback.

The Regional Board has the authority to impose site-specific requirements and conditions on any variance granted. The following conditions are justification for rejecting a variance request:

- No variance shall be issued where the property can accommodate a conforming OWTS.
- No variance shall be issued to mitigate an error in construction involving any element of property improvements.
- No variance shall be allowed solely for economic gain.
- No variance shall be issued if it will result in a setback reduction to an offsite physical feature that does not conform to the minimum setback requirements of this regulation without the written consent of the owner of property containing said feature. Property lines are considered offsite features.
- No variance shall be issued if it reduces the separation to groundwater or bedrock based on the level of treatment in Table 4.
- No variance from the horizontal setback from a well shall be issued unless it also meets the variance requirements of the Board of Examiners of Water Well Construction and Pump Installation Contractors.
- No variance will be issued when a proposed variance for a system repair or upgrade would result in encroachment on minimum distances to physical features on neighboring properties.

Table 4. Minimum Depths to Groundwater and Soil Depth from the Bottom of the Dispersal System (State Water Resources Control Board, 2012)

Percolation Rate	Minimum Depth
Less than or equal to 1 minute per inch	Only as authorized in a Tier 2 Local Agency Management Program
1 to 5 minutes per inch	20 feet
5 to 30 minutes per inch	8 feet
30 to 120 minutes per inch	5 feet
Greater than 120 minutes per inch	Only as authorized in a Tier 2 Local Agency Management Program

If a variance is requested for a system requiring corrective action, the repairs or upgrade shall be no closer to features requiring setbacks than the existing facilities. Variances requesting setbacks no closer than existing setbacks do not have to provide technical justification from a professional engineer or geologist.

4.2.3 Education and Outreach for OWTS Owners

An OWTS is a significant investment for property owners and can potentially impact the public when systems fail due to poor or inadequate design, installation, or maintenance. This is especially true for systems that depend on supplemental treatment to achieve treatment goals. Yet, there is a lot of myth and misinformation about how to maintain onsite systems. Education and outreach is vital to supporting an informed public who is better able to assure proper maintenance that reduces the chance of failure.

The first step within this process will be to inform property owners that currently have an OWTS on their property that regulations have changed and could impact future construction should they choose to build a new system or expand upon an existing one. Using the database list of addresses compiled from the 2003 Septic System Inventory and Survey, the County will send a notification letter to each address informing them of the changes and new regulations as a result of LAMP implementation. This letter will indicate that an electronic copy of the LAMP document will be available for review on the County's webpage along with other helpful information relating to OWTS.

The County will also inform all qualified contractors and maintenance companies of the updated regulations relating to OWTS and provide similar information so that they are notified of these changes. Providing thorough guidance to these companies will allow for homeowners to access information concerning the regulatory changes through multiple sources.

After this notification, the primary method of education and outreach will be a result of direct interaction between County of Orange staff and the public. The County routinely receives and responds to phone calls and office visits by private property owners, consultants, and contractors with questions about the regulations and/or the permit process. As part of the County's role in the planning process, the intention is to continue to answer questions and provide information to consultants, staff from other departments or agencies, and occasionally directly to decision makers, such as members of the Planning Commission and the Board of Supervisors.

All OWTS permit application forms and instructions will be made available via the Orange County Public Works website. In addition to the forms, the County will post or provide links to the various regulations, such as the applicable sections of the Santa Ana Regional Board's Basin Plan and the County of Orange OWTS ordinance. Additionally, there is general information on the website about proper OWTS maintenance. The pages will list any current prohibitions that could impact OWTS siting and design, as well as other activities that are restricted due to their potential negative impact on water quality. This webpage will also show a clear and definitive path for new individuals that would like to have an OWTS installed on their property, but are unfamiliar with the local codes and regulations. This webpage will include an easy to follow flow chart showing all of the steps necessary throughout all phases of evaluation, siting, design, permitting, construction, inspection, monitoring, and maintenance.

Stakeholder or community meetings are generally conducted as outreach efforts for significant or important projects such as the writing/implementation of new regulations or for projects such as this LAMP. The number of meetings will vary depending on the nature of the project that is being discussed; however, a general protocol is usually followed.

Anticipated meetings will address project goals and objectives, answer questions and to gather comments and concerns from the attendees. For this project, multiple meetings are likely to be held at various locations around the County. In lieu of a meeting, progress or status reports may be distributed electronically.

If for any reason extensive modifications of the draft LAMP document are necessary due to volume and/or nature of the comments received, another round of meetings will be convened following issuance of a revised draft. The County will look for opportunities to collaborate with other interest groups such as the California Onsite Wastewater Association (COWA), home owners' organizations, real estate groups and the building industry to provide reliable and accurate information about OWTS functioning and proper maintenance.

As part of the update of the OWTS requirements within its jurisdiction, the County will also ensure that a relevant and practical approach is taken in releasing this information to those that are involved in siting, designing, inspecting, and maintaining OWTS.

4.2.4 Septage Disposal

Domestic septage is the material removed from the primary treatment component or septic tank in an OWTS. This primary treatment component provides detention time for the raw sewage allowing for: 1) separation of solids from liquid, allowing solids to settle into a sludge layer with the tank providing a place for sludge storage, 2) formation and retention of a floating scum layer consisting of oil, grease, fats and other light materials, 3) additional anaerobic digestion of settled solids, and 4) production of a reasonably clarified effluent that leaves the tank for additional treatment by the next treatment component. Domestic septage contains many different substances depending on the type of waste being treated in the OWTS. It contains mostly water, sewage, inorganic materials like grit, and organic fecal matter. Small quantities of polluting substances that are normal to household activity can also be present. Laboratory analysis of domestic septage typically shows low levels of heavy metals and other pollutants (California Wastewater Training and Research Center, 2002).

Several factors can affect the characteristics of domestic septage such as septic tank size, the time interval between pumping (the tank pump out frequency), and the characteristics of the wastewater being treated. The typical chemical and physical characteristics of septage are listed in Table 5.

Table 5. Chemical and Physical Characteristics of Domestic Septage (California Wastewater Training and Research Center, 2002)

Parameter	Concentration mg/kg dw (dry weight)
Arsenic	4
Cadmium	3
Chromium	14
Copper	140
Lead	35
Mercury	0.15
Nickel	15
Selenium	2
Zinc	290
Nitrogen as N	2 percent
Phosphorous as P	Less than 1 percent
pH	6-7
Grease	6-12 percent
Biochemical Oxygen Demand (BOD)	6,480 mg/L
Total solids	3.4%

The State Water Resources Control Board defines septage for purposes of land application as: waste material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device, or similar wastewater handling device that has not passed through a municipal wastewater treatment facility (California Wastewater Training and Research Center, 2002 and SWRCB General Order Water Quality Order No.2004-0012-DWQ). This definition is consistent with the federal definition under 40 CFR Part 503 and the Orange County Sanitation's (OCSD) Wastewater Discharge Ordinance No. OCSD-48 for domestic septage.

The Orange County Sanitation District (OCSD) is the only septage treatment facility reported in the "Survey of Septage Treatment, Handling and Disposal Practices in California" by the California Wastewater Training and Research Center (2002). As of 2017, there were 41 certified septage haulers operating within the County with the ability to use 121 vehicles for hauling. Based on information supplied by the OCSD, these wastehaulers delivered 8,465 loads totaling 18.1 million gallons per year.

4.2.5 Watershed Management Groups

To protect water resources, point and nonpoint source discharges, ground and surface water interactions, and water quality / water quantity relationships must be considered within a watershed context. These complex relationships present considerable challenges to water resource protection programs. The Santa Ana and San Diego Regional Boards, the other RWQCBs, and the SWRCB are responding to these challenges with the Watershed Management Initiative (WMI). The WMI is designed to integrate various surface and groundwater regulatory programs while promoting cooperative, collaborative efforts within a watershed. It is also designed to focus limited resources on key issues.

As is the case in many landscapes, there are differences between watershed and political boundaries in Orange County. Because of these differences, the County and other jurisdictional agencies are increasingly analyzing pollutant concentrations and loadings on a watershed scale in order to protect public health and water quality. Many of these efforts in both the Santa Ana and San Diego Regional Board areas contribute meaningful monitoring data that can be used to track the progress of pollutant

load reduction, or identify areas with continued degradation. The Orange County watersheds program (OC Watersheds), like Development Services, is continuing to develop management strategies on a regional level that strategically preserve, protect, and enhance both the contributing surface waters and receiving coastal areas throughout the County. Increasingly, human markers are being used to track sources such as failing septic systems and leaking sanitary sewers.

As monitoring data are collected and OWTS replacement or new construction applications are received, Development Services will work with OC Watersheds to ensure that monitoring data are made available to all the relevant parties, and that the result of approving the OWTS application will not adversely impact water quality or human health. Working with local environmental health and watershed groups allows for the implementation of local knowledge and expertise throughout Orange County and LAMP documentation, education, and monitoring plans will be shared with these groups. To coincide with the five-year reporting schedule to the Regional Board, information will be provided to each of the watershed groups and environmental health officials on program status, monitoring data, revisions to current plans, and goals and a vision for the future of the program.

4.2.6 Proximity of Collection Systems to New or Replacement OWTS

As noted above in Section 4.1.1, new or replacement OWTS shall not be allowed where public sewer is available. Development Services will maintain contact with all of the public sanitation districts and sewer providers within its jurisdiction regarding the current sewer main layout and the potential to take OWTS out of operation when sewer connections are readily available.

4.2.7 Public Water System Notification Prior to Permitting OWTS Installation or Repairs

Prior to issuing a permit to install an OWTS Development Services shall determine if the system is within 1,200 feet of an intake point for a surface water treatment plant for drinking water, is in the drainage catchment in which the intake point is located, or is located such that it may impact water quality at the intake point such as being upstream of the intake point for a flowing waterbody. Development Services shall provide a copy of the permit application to the owner of the water system of their proposal to install an OWTS within 1,200 feet of an intake point for a surface water treatment. If the owner of the water system cannot be identified, then Development Services will notify the State Board Drinking Water Program.

The OWTS permit application shall include:

- a topographical plot plan for the parcel showing the OWTS components,
- the property boundaries,
- proposed structures,
- physical address and name of property owner,
- estimated wastewater flows,
- intended use of proposed structure generating the wastewater,
- soil data, and
- estimated depth to seasonally saturated soils.

The public water system owner shall have 15 days from receipt of the permit application to provide recommendations and comments to Development Services.

4.2.8 Policies for Dispersal Areas within Setbacks of Public Wells and Surface Water Intakes

The setback for an OWTS is a minimum of 150 feet down-gradient from a public water well where the depth of the effluent dispersal system does not exceed ten feet. Where the effluent dispersal system is within 1,200 feet from a public water systems' surface water intake point, within the catchment of the drainage, and located such that it may impact water quality at the intake point such as upstream of the intake point for flowing waterbodies, the dispersal system shall be no less than 400 feet from the high water mark of the reservoir, lake or flowing waterbody.

Where the effluent dispersal system is located more than 1,200 feet but less than 2,500 feet from a public water systems' surface water intake point, within the catchment of the drainage, and located such that it may impact water quality at the intake point such as upstream of the intake point for flowing waterbodies, the dispersal system shall be no less than 200 feet from the high water mark of the reservoir, lake or flowing waterbody.

4.3 Minimum Local Agency Management Responsibilities

Development Services will be overseeing, administering, and compiling data regarding new, replacement or abandoned OWTS (Table 6). It is responsible for notifying all current OWTS users of the new regulations upon approval of this LAMP, and assisting applicants for new systems through the OWTS permitting process. Once all information is received for permit review, Development Services can approve the permit or discuss the need for a variance to the permit, if appropriate. Upon permit approval, Development Services will send the approved building permit to the applicant along with an updated list of licensed contractors operating within the County.

Once the new OWTS is installed, Development Services is responsible for ensuring that monitoring data are collected at selected OWTS and communicating with landowners that are collecting their own water quality samples. The monitoring protocol and results will be kept within the OWTS database and used to generate annual reports to the Santa Ana and San Diego Regional Boards. The County will serve as the unifying body that houses all data as it pertains to water quality and OWTS discharge.

In the event that a complaint is received for an OWTS or there is a system in need of correction, Development Services will document this occurrence and investigate the complaint. All systems that are in need of correction are outside the scope of this LAMP and shall follow the Tier 4 Guidelines of the OWTS Policy (Appendix I).

Table 6. Summary of Roles and Responsibilities, Orange County Public Works (OCPW).

Department	Role(s)
OCPW/Development Services/Permitting	- Intake permit application - Permit issuance
OCPW/Development Services/Building & Safety	- Review and approve the design documentation

Department	Role(s)
OCPW/Development Services/Planning	- Review and approve zoning code compliance
OCPW/Development Services/Inspection	- Conduct field inspections
OCPW/Environmental Resources/OC Watersheds	- Monitoring, outreach, coordination, reporting
OCPW/Development Services/Code Enforcement	- Ensure code compliance

4.3.1 Permit Records

The OWTS permit records will be held by Development Services in the newly created database. The historic building permit and known OWTS information will be incorporated into this database by 2023. Newly proposed, replacement, or failed systems will be entered into the database as they are received. Within this database, detailed information and justification will be recorded if there is a variance from the OWTS guidelines. Permit records will be held in an electronic format for as long as possible in order to track long-term maintenance and performance of each system. Once a system is no longer in use, it will be phased out of use and filled in onsite. This action will be recorded in the database and held indefinitely in the event that a property transfers ownership, or a complaint is registered near the abandoned system.

The purpose of a transfer of title inspection is to verify the adequacy of the existing OWTS at the time of property transfer (i.e., sale of property), if it was previously approved and permitted, or to assure that an unapproved OWTS will be permitted and approved within one year of the property transfer. At the time of property transfer, properties with an approved OWTS will need to pass another inspection to ensure that the OWTS continues to operate properly. If the OWTS does not pass this inspection, the property owner will be required to obtain a repair permit to correct deficiencies or obtain an agreement signed by the new owners acknowledging they have accepted responsibility for repairing the identified system.

4.3.2 Water Quality Assessment Program

Throughout the Santa Ana Regional Board's jurisdiction, active water quality monitoring and assessment data are collected in order to ensure water quality and public health. This dataset allows the County of Orange in assisting organizations to pinpoint areas where pollutant loading is a concern and move toward finding the sources.

The purpose of this LAMP is to provide the standards and policies for the installation, operation, maintenance, and removal of OWTS within the County. The standards and policies will help maintain water quality within the surface waters, groundwater, and along the coastal waters of Orange County while providing protection of public health. The water quality monitoring program will provide a tool to track impacts from OWTS effluent and the effectiveness of the policies included in this LAMP.

Based upon the OWTS inventory completed by RBF Consultants, the following streams and lakes flow below or through high density OWTS areas (see also Section 2.1):

- Silverado Creek
- Irvine Lake
- Aliso Creek
- Arroyo Trabuco
- Serrano Creek

Many of these waterbodies flow out of unincorporated areas and into areas that have functioning sewer systems. While the number of OWTS are relatively low in the unincorporated County areas and the percentage believed to be failing is likely extremely small, attention will be paid to nitrogen and pathogen indicator loading in these areas coupled with the use of human markers, where appropriate.

4.3.2.1 Domestic Well Sampling and New Well Development

The State of California does not regulate water quality in private domestic wells, but sampling of private wells is imperative to identify elevated nitrate and pathogen levels that could be caused by OWTS requiring corrective action. Domestic wells should be sampled on an annual basis for a minimum of coliform bacteria and nitrate. These samples must be analyzed by an accredited laboratory in order to ensure quality control of the testing results. A list of accredited laboratories is held by the SWRCB with specific references for each county (California State Water Resources Control Board, April 2011). Annual sampling of wells will become part of the OWTS permit requirements in cases where a well is on the same property as an OWTS. In this instance, the results of the annual testing will be required to be sent to Development Services within 90 days of receiving the test results for entry into the OWTS database. If nitrate and pathogen indicator concentrations are present at elevated levels, further action will be required to investigate the source and, in turn, may cause the OWTS identified to be regulated under Tier 4 and require corrective action.

The Orange County Well Ordinance requires that a permit be obtained prior to the construction or destruction of any well, including monitoring wells. In unincorporated Orange County areas and in twenty-nine of thirty-four cities, the Orange County Health Officer is responsible for enforcement of the Well Ordinance (Orange County Environmental Health, 2015). Once a permit is received for installation of a domestic or monitoring well, the Environmental Health Division will notify Development Services of the permit application. Development Services will share the information it has on OWTS placement and any known OWTS failures within the last ten years with the Environmental Health Department so that they can use this information during the permit application review process.

4.3.2.2 Water Quality of Public Water Systems

For unincorporated areas within Orange County, public water is provided and treated by a range of cities, publicly-held special water districts, and private purveyors. A significant portion of this retail water comes from groundwater managed by OCWD and the balance from imported water. The OCWD services the Santa Ana River Basin, which aligns approximately with the northwestern half of the County and the Santa Ana Regional Board's jurisdiction. Within OCWD's jurisdiction, water quality samples are

collected from approximately 1,500 locations, taking more than 20,000 samples and conducting 400,000 analyses on an annual basis. These samples undergo testing for nearly 500 chemicals, which far exceeds the state minimum requirement of 103 (Orange County Water District, 2013). This proactive approach allows for the OCWD to identify constituents above and beyond the state's requirements to aid in future planning and management of this public resource.

The central portion of the County is serviced by the Irvine Ranch Water District (IRWD) which provides drinking water, wastewater collection, and urban runoff treatment. Water quality staff with the IRWD collects samples from nearly 100 sites on an annual basis and conduct over a quarter of a million laboratory tests every year. The results of these tests are compiled into an annual water quality report that is available on the IRWD website (Irvine Ranch Water District, 2015).

The remaining water districts in the southern portion of the County rely principally on imported water, although some groundwater development and stormwater harvesting is underway in the San Juan Basin.

Development Services will review water quality reports of public waters and discern any relevant relationships between a change in public water quality and potential impacts from OWTS within the County. While unlikely, if there is a noticeable correlation between water quality and OWTS development, the County will contact the appropriate water district to further investigate the issue until more data can be collected and the issue resolved.

4.3.2.3 Beach Water Quality Sampling

Beaches within Orange County and along the southern California coast attract local populations and visitors from outside the region to enjoy the many recreational opportunities they provide. Given the increase in urbanization near these beach areas and proximity of multiple discharge points from several contributing waterbodies upstream, there are relevant concerns about contamination and its effect on public health. These issues gained larger appreciation and awareness in 1999 after several repeated closures of Huntington Beach due to elevated fecal indicator bacteria. While monitoring had been performed for several decades, this issue, as well as State Law AB411, provided a focus for monitoring beach water quality in order to protect public health.

A coordinated beach monitoring program conducted by the Orange County Health Care Agency, Orange County Stormwater Program, and Orange County Sanitation District regularly monitors a large number of beach areas. Heal the Bay converts weekly beach monitoring data into a letter report card in which grades are assigned accordingly to water quality measurements, these grades are made available on their website (Figure 15 and Figure 16). This information can be used by beachgoers to quickly and easily assess potential health risk. Most beaches in the northwestern half of Orange County consistently have an "A" grade during dry weather conditions (inset map in Figure 15 and 16) and the proportion of assessments resulting in an "A" grade reached 90 percent in 2005 and has remained at that level since then (Orange County Stormwater Program, 2014).

In contrast to the progress achieved in maintaining clean beaches during dry weather conditions, significant challenges remain during wet weather. Channel flows during and immediately after wet

weather storms are substantially higher and beaches are constantly inundated with loading from bacteria and other pollutants. As a result of these characteristics of wet weather flow, the Orange County Health Care Agency issues routine health advisories recommending that the public stay out of the ocean during and for 72 hours after storms in order to avoid contact with potentially contaminated discharge (County of Orange Health Care Agency, n.d.).

In managing of the OWTS program, the County will communicate openly with all agencies that are collecting and analyzing water quality data as it pertains to nitrogen and pathogen content. If a reported OWTS failure occurs near a beach sampling site, the County will report this information to the pertinent agency so it can be documented along with other monitoring data. Particular focus will be given to sampling areas that are along the coastline in impaired waterbodies and impaired areas that are immediately upstream of coastal receiving waters.

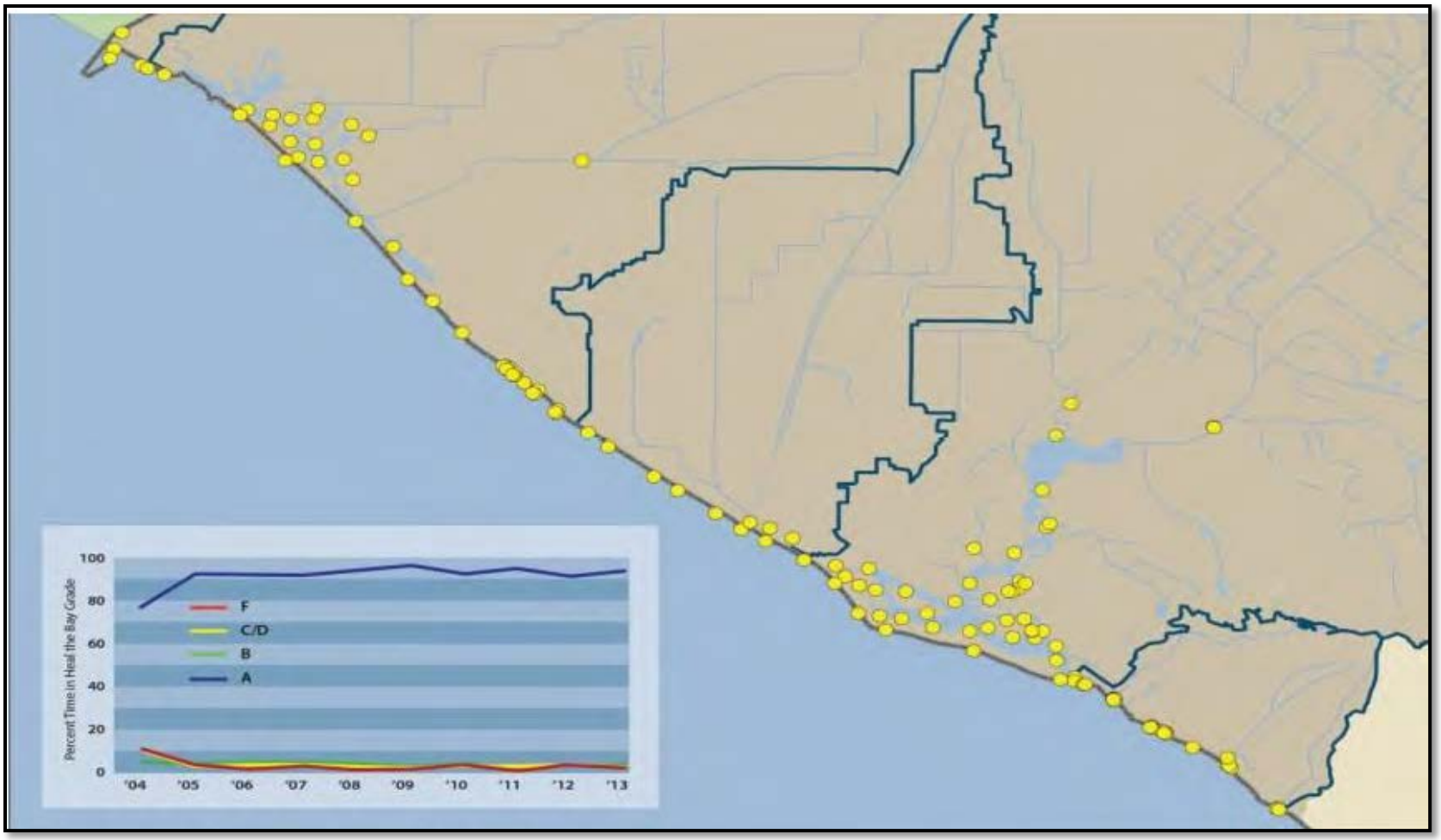

Figure 15. Map of Northwestern Coast of Orange County and Beach Sampling Locations (Report of Waste Discharge, October 2013)

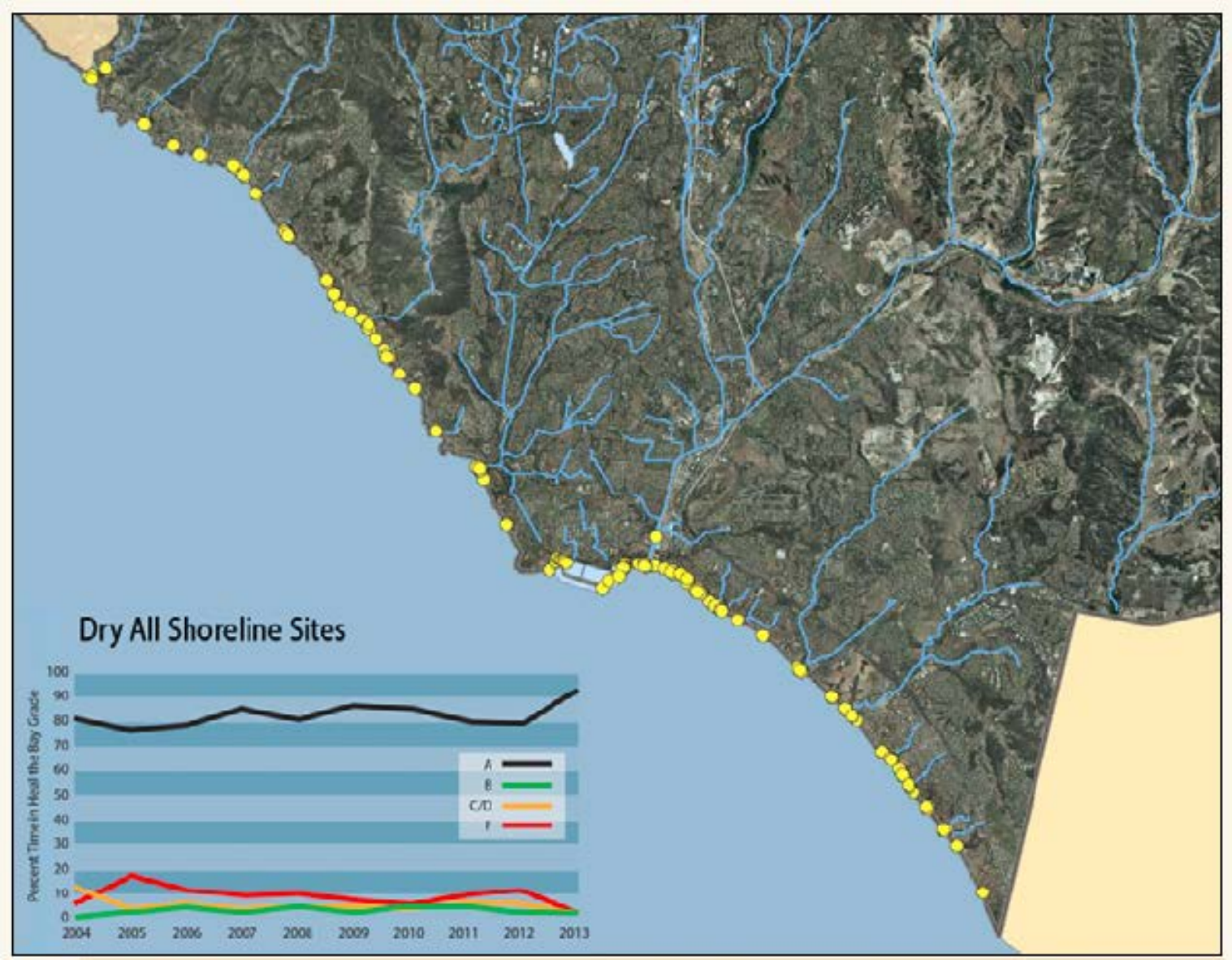

Figure 16. Map of Southwestern Coast of Orange County and Beach Sampling Locations (Orange County Stormwater Program, 2014)

4.3.2.4 Receiving Water Sampling Related to NPDES Permits

There are separate National Pollutant Discharge Elimination System (NPDES) Permits administered by the Santa Ana and San Diego Regional Boards within Orange County. The Orange County Stormwater Program is a cooperative regulatory partnership between the County of Orange, the cities within Orange County, and the Orange County Flood Control District, which operate an interconnected municipal storm drain system which discharges stormwater and urban runoff pursuant to a NPDES Municipal Stormwater Permit. The permit requires the permittees to effectively prohibit non-stormwater discharges to the storm drain system, and implement controls to reduce the discharge of pollutants in stormwater to the maximum extent practicable (Orange County Public Works; Orange County Watersheds, 2013).

4.3.2.5 Data Contained in California Water Quality Assessment Database

The California Water Quality Assessment Database (CalWQA) is an online database that enables the state of California to accurately report and interpret water quality conditions and provide a clear picture of existing water quality in the state (California Water Quality Assessment Database, 2012). This database hosts a vast array of water quality data for the entire state and can be used by Development Services in their assessment of OWTS and potential water quality impacts. As new building or public well permit applications are sent to the County, these sites will be uploaded into CalWQA once the permits are approved and water quality data are submitted. This statewide tool will help to assist the County in tracking water quality data for each OWTS and also broaden the utility of this water quality data to other members of CalWQA.

4.3.2.6 Groundwater Sampling Related to GAMA Program

The Groundwater Ambient Monitoring and Assessment (GAMA) Program is California's comprehensive groundwater quality monitoring program. The GAMA Program collects data by comprehensively testing groundwater sources for naturally occurring and man-made chemicals. The GAMA Program compiles these test results with existing groundwater quality data from several agencies into a publicly accessible information system. There are active monitoring sites within Orange County and a map of these locations can be found using the GAMA GeoTracker tool available on the State Board Website: http://www.waterboards.ca.gov/gama/geotracker_gama.shtml.

When data are collected near OWTS for water quality sampling, the County will provide this information to the Santa Ana and San Diego Regional Boards in the annual report.

4.4 Minimum Setbacks

Minimum horizontal setbacks are necessary to reduce water quality impairment risks and potential negative public health impacts. These minimum setbacks should be met to the greatest extent practicable when replacing or building a new OWTS. In the event that these requirements cannot be met, a variance must be approved by the County of Orange and Regional Board before construction occurs. Minimum horizontal setbacks from any OWTS treatment components and associated dispersal systems are listed in Table 7.

Table 7. Minimum Setback Requirements for OWTS Treatment Components and Associated Dispersal Systems (State Water Resources Control Board, 2012)

Setback Component	Minimum Distance	Minimum Distance Detail
Property Lines and Structures	5 feet	Structures include any building permanently affixed to ground or building foundation.
Water Wells and Monitoring Wells	100 feet	May be less if regulatory or legitimate data requirements necessitate monitoring wells within 100 feet.
Unstable Land Mass (subject to earth slides)	100 feet	Earth slide potential should be identified by a registered engineer or geologist. Setback may be within 100 feet if recommended in a geotechnical report prepared by a Qualified Professional.
Flowing Surface Water and Springs	100 feet	Edge of water is natural or levied bank for creeks and rivers. Setback may be within 100 feet if recommended in a hydrogeological report prepared by a Qualified Professional.
Vernal Pools, Wetlands, Lakes, Ponds, or Other Surface Water	200 feet	Edge of water is the high water mark for lakes and reservoirs. In tidally influenced waterbodies, the high water mark is the mean high tide line. Setback may be within 100 feet if recommended in a hydrogeological report prepared by a Qualified Professional.
Public Water Well	150 feet	Effluent dispersal system depth equals 10 feet or less.
	200 feet	Effluent dispersal system depth equals more than 10 feet.
	2-year travel time for microbiological contaminants	Effluent dispersal system depth exceeds 20 feet and is within 600 feet of a public water well. A Qualified Professional shall conduct this evaluation. Setback may never be less than 200 feet.
Public Water System Intake	400 feet	Measured from the high water mark of the reservoir, lake or flowing waterbody. The effluent dispersal system is within 1,200 feet of the public water system intake point, within the catchment of the drainage, and located in an area where it may impact water quality.
	200 feet	Measured from the high water mark of the reservoir, lake or flowing waterbody. The effluent dispersal system is more than 1,200 feet but less than 2,500 feet from the public water system intake point, within the catchment of the drainage, and located in an area where it may impact water quality.

4.4.1 Special Provisions Regarding Minimum Setback Requirements

Within Orange County, there are many unincorporated areas where existing OWTS are located within the minimum setback requirements, including the Silverado Canyon area. For those systems that are located within the minimum setback requirements, the owner may apply for a variance in order to expand on an existing system or build a new OWTS.

For replacement OWTS that do not meet the horizontal separation requirements in Table 7, the replacement OWTS shall meet the horizontal separation to the greatest extent practicable. In such case, the replacement OWTS shall utilize supplemental treatment and other mitigation measures, unless the

permitting authority finds that there is no indication that the previous system is adversely affecting the public water source, and there is limited potential that the replacement system could impact the water source based on topography, soil depth, soil texture, and groundwater separation. A description of the minimum setbacks proposed shall be included in the OWTS permit application.

For new OWTS installed on parcels of record existing before May 13, 2013 which is the effective date of the OWTS Policy, that cannot meet the horizontal separation requirements, the OWTS shall meet the horizontal separation to the greatest extent practicable and shall utilize supplemental treatment for pathogens as specified in Section 10.8 of the OWTS Policy (Appendix I) and any other mitigation measures required by the County of Orange or the Regional Board.

If a variance is not granted, the user can propose alternate treatment, siting, or changes in operational criteria for the proposed OWTS along with proposed minimum setback distances. The plans and designs for alternative treatment systems must be completed by a Qualified Professional in conformance with the OWTS Policy. These proposed alterations will be reviewed by the County of Orange and the Regional Board before approval to proceed with OWTS installation.

4.4.2 Notification to Additional Parties

Once a permit is received for a proposed OWTS, the County will send notification to the Division of Drinking Water (DDW) when applicable, and to any water system owners within the minimum horizontal setbacks. The notification shall contain the following items:

- Estimated wastewater flows
- Intended use of the proposed structure generating the wastewater
- Soil data
- Estimated depth to seasonally saturated soils
- Topographical plot plan for the parcel showing the OWTS layout, property boundaries, proposed structures, physical address, and the name of the property owner

4.5 Basin Plans

Waterbodies within Orange County are regulated through both the San Diego and Santa Ana Basin Plans. These Basin Plans identify ground and surface waters and establish, for each, its respective beneficial uses and water quality objectives. The following draft water quality objectives are currently being finalized by the SWRCB, once adopted will be integrated to both the San Diego and Santa Ana Basin Plans, as appropriate.

- **Groundwater:** Total coliform numbers shall not exceed 2.2 organism/100 mL median over any seven-day period in sources designated municipal as a result of controllable water quality factors.
- **Bays and Estuaries:** A six-week rolling geometric mean of enterococci not to exceed 30 colony forming units (cfu) per 100 milliliters (cfu/100 mL), calculated weekly, and a statistical threshold value of 110 cfu/100 mL not to be exceeded more than 10 percent of the time, calculated

monthly. U.S. EPA recommends using U.S. EPA Method 1600 (U.S. EPA, 2006) or other equivalent method to measure culturable enterococci.

- **Lakes and Streams:** For *E. coli* the bacteria water quality objective for all waters, except Lake Tahoe, where the salinity is less than 10 parts per thousand (ppth) 95 percent or more of the time during the calendar year is: a six-week rolling geometric mean of *Escherichia coli* (*E. coli*) not to exceed 100 colony forming units per 100 milliliters (cfu/100 mL), calculated weekly, and a statistical threshold value of 320 cfu/100 mL not to be exceeded more than 10 percent of the time, calculated monthly. For enterococci the bacteria water quality objective for all waters where the salinity is equal to or greater than 10 ppth 95 percent or more of the time during the calendar year is: a six-week rolling geometric of enterococci not to exceed 30 cfu/100 mL, calculated weekly, with a statistical threshold value of 110 cfu/100 mL not to be exceeded more than 10 percent of the time, calculated monthly.
- Nitrate-nitrogen concentrations shall not exceed 45 mg/L (as NO_3) or 10 mg/L (as N) in inland surface waters designated as Municipal and Domestic Supply (MUN) as a result of controllable water quality factors.

Table 8 represents all 303(d) impaired waterbodies that are affected by pathogen indicators or nitrogen contamination within the County. These impaired waterbodies are also mapped in Figure 17 below. Specific setback requirements for OWTS include 600 feet on either side of the waterbody to prevent further impairment to these sites through system failure. These areas of impairment and details on setback requirements are discussed above in Section 4.4. There are no OWTS Discharge Prohibition Areas currently listed for the County in the OWTS Policy (State Water Resources Control Board, 2012).

Table 8. List of 303(d) Impaired Waterbodies in Orange County, California

Region Number and Name	Waterbody	Impairment	TMDL Completion Date
8, Santa Ana	Los Trancos Creek (Crystal Cove Creek)	Pathogens	2017
8, Santa Ana	Morning Canyon Creek	Pathogens	2015
8, Santa Ana	Silverado Creek[1]	Pathogens	2017
8, Santa Ana	Peters Canyon Channel	Pathogens	2017
8, Santa Ana	Santa Ana River, Reach 2[1]	Pathogens	2019
8, Santa Ana	Seal Beach	Pathogens	2017
8, Santa Ana	Serrano Creek	Pathogens, Nitrogen	2017
8, Santa Ana	Huntington Harbour	Pathogens	2017
8, Santa Ana	East Garden Grove Wintersburg Channel	Nitrogen	2017

[1]Currently under consideration for delisting by the Santa Ana Regional Board, Final 2014/2016 California Integrated Report (2017).

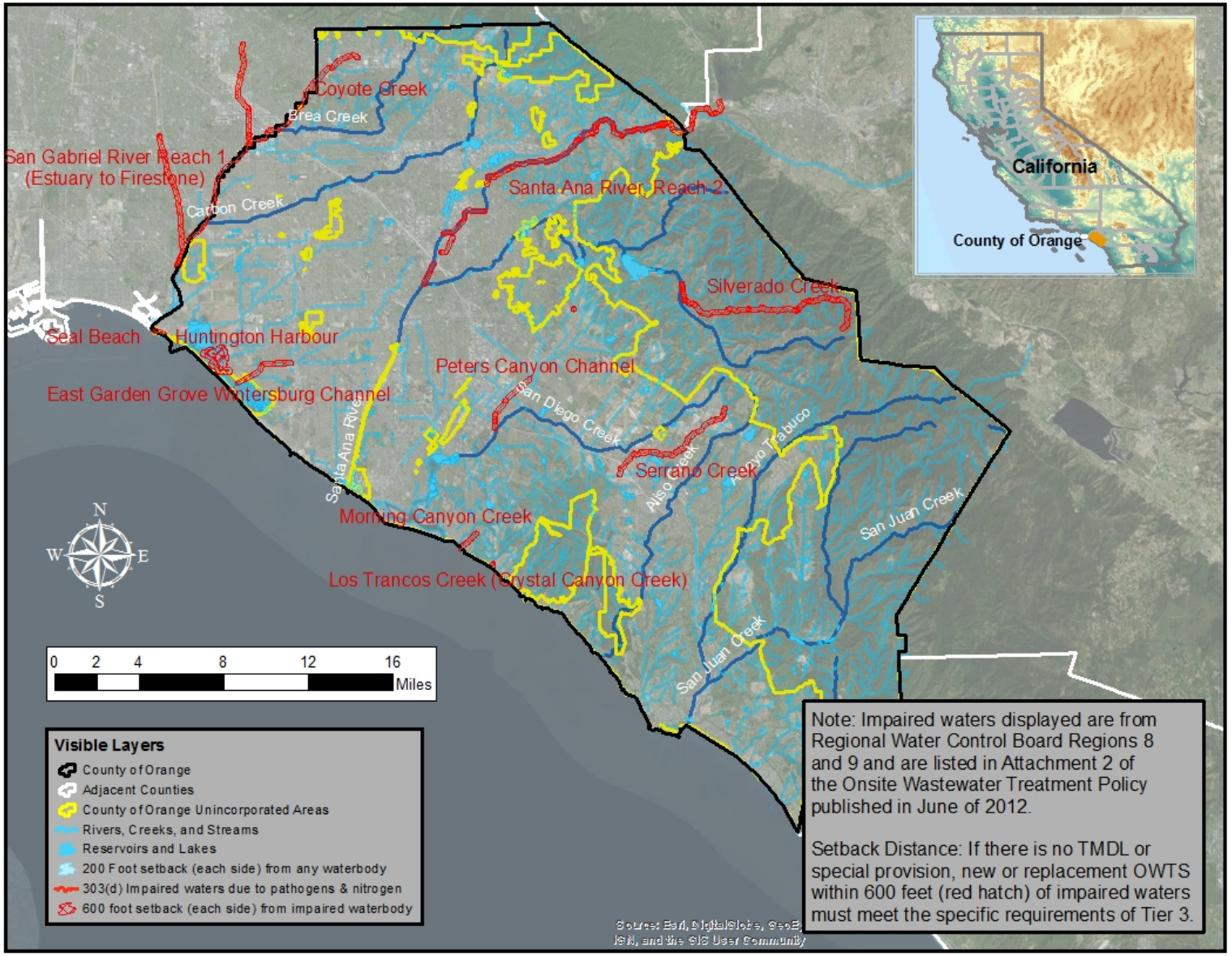

Figure 17. Map of 303(d) Listed Impaired Waterbodies in Orange County, California for Nitrogen and Pathogens

4.5.1 TMDLs for Impaired Waterbodies

A TMDL sets a limit for the total amount of a particular pollutant that can be discharged to a waterbody. This limit ensures that pollutant loads from all sources will not impair the designated beneficial uses of the waterbody. The timeframe for compliance with TMDL targets varies, but may take many years. A TMDL will often include a compliance schedule, identifying interim and final targets.

Section 303(d) of the CWA requires states to establish a listing of all impaired waterbodies and to rank those waterbodies according to priority for TMDL development. This list, called the 303(d) List, is supposed to be updated every two years (although currently behind schedule) and is developed by the Regional and State boards, and then approved by the USEPA. Currently, there are no TMDLs for the impaired waterbodies listed on the 303(d) list included in Table 8. Once a TMDL is adopted, the TMDL implementation plan will supersede the requirements of the APMP detailed in Section 4.6. Unless a TMDL is modified to include actions for OWTS, the OWTS located near an impaired waterbody are not required to take any further actions when there is an approved TMDL addressing the impairment and no load allocation is assigned to the OWTS.

The Regional Board must adopt TMDLs for pathogens for the waterbodies identified on the 303(d) list by the completion dates specified in Table 8. If a TMDL is not adopted by the Regional Board within two years of its specified completion date, the OWTS Policy coverage expires and the Regional Board will be responsible for corrective action and issuing site-specific waste discharge requirements, non-site-specific general waste discharge requirements, and waivers of waste discharge requirements.

For all new or replacement OWTS permitted following the initial listing of impaired waters in Table 8, but not yet included under an adopted TMDL implementation plan, must utilize supplemental treatment, meet performance requirements for nitrogen and pathogen indicator impairments, and comply with applicable requirements outlined in the LAMP APMP (Section 4.6), including setback requirements.

4.5.1.1 Local TMDLs for Orange County

The following TMDLs have been established or are being developed for Orange County waterbodies.

South County Coastal Areas: The Beaches and Creeks TMDLs define the allowable indicator bacteria loads from the storm drain system that will still allow attainment of water quality standards (Figure 18). The modeled reductions required to meet these loads in south Orange County range from 73-99 percent during dry weather to 91-100 percent during wet weather, depending on the location and indicator bacteria species. A 22 percent wet weather allowable exceedance frequency of a TMDL number target is also included in the TMDLs to account for natural sources of bacteria. Compliance with the TMDLs must occur by April 4, 2021 with a possible extension to April 4, 2031 for wet weather load reductions (Orange County Public Works, n.d.).

Dana Point Harbor (Baby Beach): In June 2008, the San Diego Regional Board adopted indicator bacteria TMDLs for Baby Beach in Dana Point Harbor. The TMDLs require 82.7-96.2 percent (dependent upon specific indicator bacteria) wasteload reductions from the storm drain system. Dry weather reductions

must occur by September 2014 and wet weather reductions must occur by September 2019 (Orange County Public Works, n.d.).

Newport Bay/San Diego Creek: Excess nutrients flowing into Newport Bay, primarily from San Diego Creek, have resulted in seasonal algae blooms that have impaired the Bay's environment. In 1998, the Santa Ana Regional Board adopted a TMDL for nutrients in the Newport Bay watershed to decrease the mass of nutrients flowing into the Bay, thus restoring and protecting its beneficial uses. The TMDL establishes maximum nutrient loads (targets) at levels similar to those observed in the 1970s, prior to observations of eutrophic conditions (Table 9). Thus, if these targets are met, signs of eutrophication in the Bay should diminish (Orange County Public Works, n.d.).

Table 9. Nutrient-Related Number Water Quality Objectives for San Diego Creek and Newport Bay (Orange County Public Works, n.d.)

Waterbody	Parameter	Water Quality Objective	Reference
All Inland Surface Waters	Dissolved Oxygen	5 mg/L	Basin Plan 1995
	Ammonia	Variable	U.S. EPA 1999
	pH	6.5-8.5	U.S. EPA 1999
San Diego Creek Reach 1	Total Inorganic Nitrogen	13 mg/L	Basin Plan 1995
San Diego Creek Reach 2	Total Inorganic Nitrogen	5 mg/L	Basin Plan 1995
Upper Newport Bay	Ammonia	Variable	U.S. EPA 1989
	pH	7-8.6	Basin Plan 1995

In 1999 the Santa Ana Regional Board adopted a TMDL for fecal coliform in Newport Bay. Given the complexity of the problem, the paucity of relevant data on bacteria sources and fate, the expected difficulties in identifying and implementing appropriate control measures and uncertainty regarding the nature and attainability of the shellfishing beneficial use in the Bay, a prioritized, phased approach to the control of bacterial quality was developed (Table 10). The TMDL is concentration based, and requires attainment of water contact recreation standards no later than December 30, 2014 and with shellfish standards no later than December 30, 2019 (Orange County Public Works, n.d.).

Table 10. Total Maximum Daily Load (TMDL), Waste Load, Allocations, and Load Allocations for Fecal Coliform in Newport Bay (State Water Resources Control Board, 1989)

TMDL for Fecal Coliform in Newport Bay	Waste Load Allocations for Fecal Coliform in Urban Runoff, including stormwater, Discharges to Newport Bay	Load Allocations for Fecal Coliform in Agricultural Runoff, including Stormwater, Discharges to Newport Bay	Load Allocations for Fecal Coliform from Natural Sources in all Discharges to Newport Bay	Waste Load Allocations for Vessel Waste
As soon as possible but no later than December 30, 2014			In Effect	In Effect
5 Sample/30-day geometric mean less than 200 organisms/100mL, and not more than 10% of the samples exceed 400 organisms/100mL for any 30-day period.				0 MPN/100 mL No discharge.
As soon as possible but no later than December 31, 2022				In Effect
Monthly Median less than 14 MPN/100mL, and not more than 10% of the samples exceed 43 MPN/100mL for those waters that support shellfish harvesting (SHEL beneficial use)				0 MPN/100 mL. No discharge.

Figure 18. South Orange County Indicator Bacteria Impaired Beaches and Creeks (Orange County Public Works, n.d.)

4.6 Advanced Protection Management Program for Impaired Areas

The APMP is the minimum required management program for all OWTS located near a waterbody that is listed as impaired due to nitrogen or pathogen indicators pursuant to Section 303(d) of the CWA. Local agencies are authorized to implement APMPs in conjunction with an approved LAMP or, if there is no approved LAMP, Tier 1 of the OWTS Policy (Appendix I). Per the State Board's OWTS Policy, OWTS which are located near impaired waterbodies may be addressed by a TMDL and its associated implementation program, or special provisions contained in a LAMP. The County of Orange has chosen to include an APMP which has similar requirements to Tier 3 of the OWTS Policy.

The geographic area for each waterbody's APMP is defined by the applicable TMDL, if one has been approved. When there is not an approved TMDL which defines the geographic area, it will be 600 linear feet (in the horizontal map direction) from a waterbody listed on the 303(d) list (Table 8), where the edge of the waterbody is the:

- Natural or levied band for creeks and rivers.
- High water mark for lakes and reservoirs.
- High tide line for tidally influenced water bodies, as appropriate.

For impaired waterbodies that do not have an approved TMDL, the APMP will provide guidance in conjunction with the approved LAMP. Due to the existence of impaired waters within the County without an approved TMDL, this APMP has been developed and implemented in accordance with Section 10.0 of the OWTS Policy (2012). Should the OWTS be located on an impaired waterbody that meets the minimum criteria for delisting and, in turn, be removed from the 303(d) list, new or replacement systems shall meet the minimum LAMP requirements to the greatest extent practical.

The Regional Board must adopt TMDLs for the impaired waterbodies identified on the 303(d) list in accordance with the dates specified in Table 8. Should the Regional Board not adopt a TMDL within two years of the specified date, coverage provided by the OWTS Policy's waiver of waste discharge requirements will expire. This applies to any OWTS which has any part of its dispersal system discharging within the geographic area of an APMP. The Regional Board will then be responsible for the following, with regard to these OWTS:

- Corrective action, and
- Issuing:
    - Waste discharge requirements (site specific),
    - General waste discharge requirements (non-site specific), and
    - Waivers of waste discharge requirements.

The County intends to collaborate with the Regional Boards by sharing any information pertaining to the impairment, providing advice on potential remedies, and regulating OWTS to the extent that its authority allows for the improvement of the impairment.

4.6.1 OWTS installed within an APMP

All new or replacement OWTS permitted after the date that the waterbody is initially listed in Attachment 2 of the OWTS Policy (2012 or as subsequently revised) that have any discharge within the geographic area of an APMP shall meet the following requirements:

- Supplemental treatment requirements when treating nitrogen and pathogens (State Water Resources Control Board, 2012):
    - Effluent from supplemental treatment components designed to reduce nitrogen shall be certified by the National Sanitation Foundation (NSF), or other approved third-party tester to meet a 50 percent reduction in total nitrogen when comparing the 30-day average influent to the 30-day average effluent.
    - Where a drip-line dispersal system is used to enhance vegetative nitrogen uptake, the dispersal system shall have at least six inches of soil cover.
    - Supplemental treatment components designed for pathogen reduction shall provide sufficient pretreatment of the wastewater so that effluent from the supplement treatment components does not exceed a 30-day average TSS of 30 mg/L, and shall further achieve an effluent fecal coliform bacteria concentration less than or equal to 200 MPN per 100 ml.
    - The minimum soil depth to the anticipated high level of groundwater below the bottom of the dispersal systems shall not be less than three feet. All dispersal systems shall have at least twelve inches of soil cover.
- Every effort must be made to comply with the setback requirements as stipulated within this LAMP, and
- Ensure compliance with any applicable LAMP requirements to the greatest extent practical.

All OWTS installed within an APMP require an annual permit, monitoring, and maintenance. The owner of the OWTS shall also connect to a municipal sewer system as soon as it becomes available and follow the appropriate abandonment procedures for the OWTS. Furthermore, the owner or operator should monitor the OWTS in accordance with the operation and maintenance manual for the OWTS and in accordance with the County of Orange and the Regional Board requirements. An OWTS installed within an APMP must be equipped with a visual or audible alarm, as well as a telemetric alarm, which alerts the owner and the person operating, monitoring, and maintaining the OWTS (service provider) in the event of system malfunction. If the installation of a telemetric alarm is not possible, the owner will inspect the system at least monthly while the system is in use.

An OWTS installed near waterbodies impaired for pathogens will be inspected quarterly by a service provider for proper operation, unless a telemetric monitor system is capable of continuously assessing the operation of the disinfection system. Testing of the wastewater flowing from the supplemental treatment components that perform disinfection will be sampled after the treatment components and before the dispersal system. Testing will be conducted quarterly based on analysis of pathogen indicator bacteria (e.g., *E. coli*), using the minimum detection limit established for the method.

All effluent samples must include the geographic coordinates and be analyzed by a SWRCB certified laboratory.

5. Annual Reporting

The County of Orange will compile the following data on an annual basis and submit to the Regional Board:

1. Complaints regarding OWTS and a follow-up report corresponding to the County of Orange response to this complaint and resolution, if applicable.
2. The quantity of new permits issued for OWTS, variances from LAMP guidelines, inspections of existing OWTS, and known failed OWTS.
3. Any updates to the listing of certified contractors for OWTS installation, monitoring, and maintenance.
4. Status report on updates to OWTS inventory database.
5. Status report on database of OWTS that pre-date the adopted standards outlined in this document, and summary of outreach activities to the property owners of those parcels.
6. Status report on outreach to inform all OWTS property owners, and qualified contractors and maintenance companies involved in siting, designing, inspecting, and maintaining OWTS, of the LAMP requirements.
7. Water quality monitoring summaries, as described below in Section 5.1.
8. Status report on cesspool phase out. Cesspools will be phased out as new applications are received for OWTS or if found to be failing through monitoring and/or routine inspections.

The unincorporated County has a relatively small inventory of OWTS that are widely dispersed across the entire geographic area of the County. Reporting will therefore be commensurate with the level of OWTS activity and be focused on areas of greatest OWTS concentration as discussed earlier in this LAMP.

5.1 Water Quality Monitoring Program

The County will maintain a record of existing water quality and conduct assessment on the impact from OWTS on receiving waterways. The assessment program will include monitoring and analysis of water quality data, review of complaints, failures, and OWTS inspections.

Surface water quality monitoring will consist of biannual sampling at locations identified in Figure 19 and be analyzed for the following suite of parameters: temperature, dissolved oxygen, specific conductivity, turbidity, fecal indicator bacteria (FIBs), nutrients, and total dissolved solids. Groundwater sampling will be conducted annually at those locations identified in Figure 19.

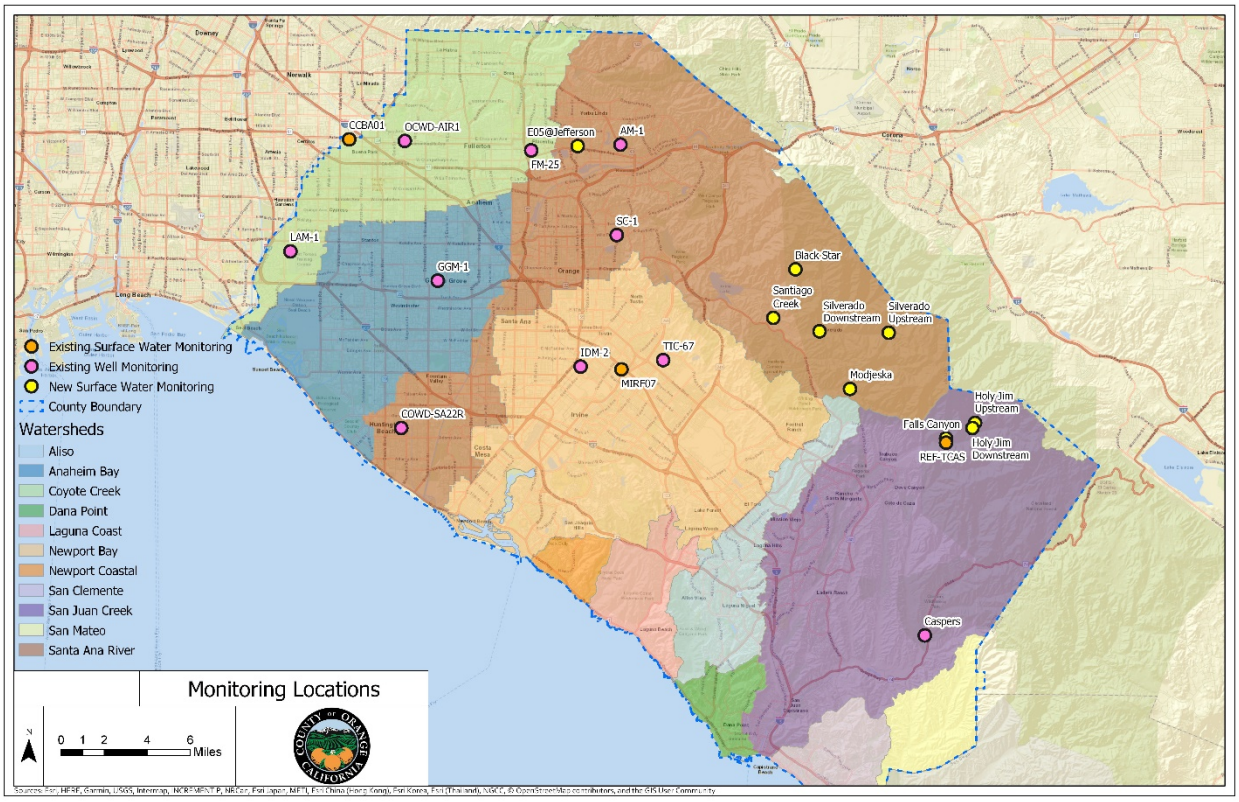

Figure 19. Water Quality Monitoring Locations, Existing and New, for the Unincorporated Areas of Orange County.

The water quality data can be obtained from public well samples, routine water samples from community water systems, potable water wells, coastal and beach water quality sampling, additional relevant sources such as surface or groundwater supplies. A summary of these data shall be submitted to the Regional Board on an annual basis on or before February 1 as a part of the annual reporting detailed in Section 5.0 above. An evaluation of the monitoring program and an assessment of whether water quality is being impacted by OWTS shall be submitted every five years. County permits are one of the main sources of information for OWTS. Permit files will continue to be monitored and maintained by Development Services. Older OWTS may not be included in the files because of incomplete records or permits not being obtained for the systems.

5.2 Property Sales

For properties that are sold or transferred within the unincorporated portions of the County, documentation will be provided that proves that the property is connected to a sewer system or has a permitted OWTS. If the property does not have the documentation that proves either of these, a permit for an OWTS will be required prior to the transfer of ownership of the property. This may require the proper repair or the installation of a fully functional OWTS on the property. Once an OWTS is established at this location, or the OWTS is no longer used and the property is connected to the sewer system, this action will be documented in the County's database and included in the annual report to the Regional Board.

6. Definitions and Acronyms

"303(d)" refers to Section 303(d) of the 1972 Federal Water Pollution Control Act (Clean Water Act) requiring states to identify waterbodies that do not meet water quality objectives and are not supporting their beneficial uses. Each state must submit an updated list, called the 303(d) List of Impaired Waters, to the U.S. EPA every two years. In addition to identifying the waterbodies that are not supporting beneficial uses, the List also identifies the pollutant or stressor causing impairment, and establishes a priority for developing a control plan to address the impairment. The List also identifies waterbodies where 1) a TMDL has been approved by U.S. EPA and an implementation is available, but water quality standards are not yet met, and 2) waterbodies where the water quality problem is being addressed by an action other than a TMDL and water quality standards are not yet met.

"Alternative Private Sewage Disposal Systems" means a system that is specially-designed, engineered, and approved for use in localities where the Building Official (or designee) has determined that the presence of shallow groundwater, rock, or adverse soil, geologic, or hydrologic conditions makes the use of a conventional OWTS potentially hazardous to public health. Alternative private sewage disposal systems shall be limited to "mound" systems and "subsurface sand filtration" systems.

"Basin Plan" means the same as "water quality control plan" as defined in Division 7 (commencing with Section 13000) of the California Water Code. Basin Plans are adopted by each Regional Board, approved by the State Water Board and the Office of Administrative Law and USEPA, and identify ground and surface waters within each Region's boundaries and establish, for each, its respective beneficial uses and water quality objectives. Copies are available from the Regional Board, electronically at each Regional Boards website, or at the State Water Resource Control Board's *Plans and Policies* web page: http://www.waterboards.ca.gov/plans_policies/.

"Bedrock" means the rock, usually solid, that underlies soil or other unconsolidated, surficial material.

"Building Official" means a person trained and/or certified through the International Association of Plumbing and Mechanical Officials.

"CalWQA" is an online database that enables the state of California to accurately report and interpret water quality conditions and provide a clear picture of existing water quality throughout the state.

"CWA" is the acronym used for the Clean Water Act. The Federal Water Pollution Control Act of 1948 was the first major U.S. law to address water pollution. Growing public awareness and concern for controlling water pollution led to sweeping amendments in 1972. As amended in 1972, the law became commonly known as the Clean Water Act.

"Cesspool" means an excavation in the ground receiving domestic wastewater, designed to retain the organic matter and solids, while allowing the liquids to seep into the soil. Cesspools differ from seepage pits because cesspool systems do not have septic tanks and are not authorized under this Policy. The term cesspool does not include pit-privies and out-houses which are not regulated under this Policy.

"Clay" means a soil particle; the term also refers to a type of soil texture. As a soil particle, clay consists of individual rock or mineral particles in soils having diameters <0.002 mm. As a soil texture, clay is the soil material that is comprised of 40 percent or more clay particles, not more than 45 percent sand and not more than 40 percent silt particles using the U.S. Department of Agriculture (USDA) soil classification system.

"Development Services" is a division within Orange County Public Works responsible for the issuance of building and grading permits including permits for OWTS.

"Dispersal system" means a leachfield, seepage pit, mound, at-grade, subsurface drip field, evapotranspiration and infiltration bed, or other type of system for final wastewater treatment and subsurface discharge.

"Domestic wastewater" means wastewater with a measured strength less than high-strength wastewater and is the type of wastewater normally discharged from, or similar to, that discharged from plumbing fixtures, appliances and other household devices including, but not limited to toilets, bathtubs, showers, laundry facilities, dishwashing facilities, and garbage disposals. Domestic wastewater may include wastewater from commercial buildings such as office buildings, retail stores, and some restaurants, or from industrial facilities where the domestic wastewater is segregated from the industrial wastewater. Domestic wastewater may include incidental RV holding tank dumping but does not include wastewater consisting of a significant portion of RV holding tank wastewater such as at RV dump stations. Domestic wastewater does not include wastewater from industrial processes.

"Domestic well" means a groundwater well that provides water for human consumption and is not regulated by the California Department of Public Health.

"Dosing tank" is located after the septic tank or other sewage tank and before the lateral system for effluent distribution. If there is an on-demand system the pump is turned on when enough effluent collects in the tank and shut off after the dose is delivered.

"Effluent" means sewage, water, or other liquid, partially or completely treated or in its natural state, flowing out of a septic tank, aerobic treatment unit, dispersal system, or other OWTS component.

"*Escherichia coli (E. coli)*" means a group of bacteria predominantly inhabiting the intestines of humans or other warm-blooded animals, but also occasionally found elsewhere. Used as an indicator of human fecal contamination.

"Existing OWTS" means an onsite wastewater treatment system that was constructed and operating prior to the effective date of this Policy, and OWTS for which a construction permit has been issued prior to the effective date of this Policy.

"Flowing waterbody" means a body of running water flowing over the earth in a natural water course, where the movement of the water is readily discernible or if water is not present, it is apparent from review of the geology that when present it does flow, such as in an ephemeral drainage, creek, stream, or river.

"GAMA" is the acronym used for the Groundwater Ambient Monitoring and Assessment Program in California. The GAMA Program is California's comprehensive groundwater quality monitoring program that was created by the State Water Resources Control Board (State Water Board) in 2000.

"Geotracker" is the State Board's internet-accessible database system used by the State and Regional Boards, and local agencies to track and archive compliance data from authorized or unauthorized discharges of waste to land, or unauthorized releases of hazardous substances from underground storage tanks.

"gpd" is the acronym used for gallons per day. This is a flow rate used to describe a quantity of fluid volume moving over a duration of time.

"Groundwater" means water below the land surface that is at or above atmospheric pressure.

"High-strength wastewater" means wastewater having a 30-day average concentration of biochemical oxygen demand (BOD) greater than 300 milligrams-per-liter (mg/L) or of total suspended solids (TSS) greater than 330 mg/L of a fat, oil, and grease (FOG) concentration greater than 100 mg/L prior to the septic tank or other OWTS treatment component.

"Hydrologic Region" The Department of Water Resources subdivides the state of California into specific geographical study areas for planning purposes. The largest study areas are the ten hydrologic regions, corresponding to the State's major drainage basins.

"Impaired Waterbodies" means those surface waters or segments thereof that are identified on a list approved first by the State Water Board and then approved by U.S. EPA pursuant to Section 303(d) of the federal Clean Water Act.

"IRWD" is the abbreviation for the Irvine Ranch Water District. The IRWD is an independent special district serving Central Orange County, California. IRWD provides high-quality drinking water, reliable wastewater collection and treatment, ground-breaking recycled water programs, and environmentally sound urban runoff treatment to more than 340,000 residents.

"K_{sat}" is used to denote a soil's saturated hydraulic conductivity in inches per hour. Hydraulic conductivity is a soil property that describes the ease with which the soil pores permit water movement. Values of hydraulic conductivity can vary depending on the type of soil, porosity, and the configuration of the soil pores. In saturated soils, the hydraulic conductivity is represented as K_{sat}.

"Local agency" means any subdivision of state government that has responsibility for permitting the installation of and regulating OWTS within its jurisdictional boundaries; typically a county, city, or special district.

"Major repair" means either: (1) for a dispersal system, repairs required for an OWTS dispersal system due to surfacing wastewater effluent from the dispersal field and/or wastewater backed up into plumbing fixtures because the dispersal system is not able to percolate the design flow of wastewater associated with the structure served, or (2) for a septic tank, repairs required to the tank for a

compartment baffle failure or tank structural integrity failure such that either wastewater is exfiltrating or groundwater is infiltrating.

"Mound system" means an above-ground dispersal system (covered sand bed with effluent leachfield elevated above original ground surface inside) used to enhance soil treatment, dispersal, and absorption of effluent discharged from an OWTS treatment unit such as a septic tank. Mound systems have a subsurface discharge.

"MPN" is the acronym for most probable number. This sampling method is used to estimate the concentration of viable microorganisms in a sample through dilution. The MPN method includes diluting the sample to such a degree that inoculum in the sample tubes will sometimes (but not always) contain viable organisms. From this testing, a fairly accurate estimate of the most probable number of cells in a sample can be determined.

"New OWTS" means an OWTS permitted after the effective date of this Policy.

"NPDES" is the acronym for the national pollutant discharge elimination system. The NPDES Permit Program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

"Onsite wastewater treatment system(s)" (**OWTS**) means individual disposal systems, community collection and disposal systems, and alternative collection and disposal systems that use subsurface disposal. The short form of the term may be singular or plural. OWTS do not include "graywater" systems pursuant to Health and Safety Code Section 17922.12.

"OCSD" is the abbreviation for Orange County Sanitation District. The OCSD is responsible for safely collecting, treating and disposing the wastewater generated by 2.5 million people living in a 479-square-mile area of central and northwest Orange County.

"OCWD" is the abbreviation for Orange County Water District. The OCWD manages, replenishes and protects the Orange County Groundwater Basin—Orange County's largest source of drinking water. The 270-square-mile basin provides approximately 70 percent of the water supply to 2.4 million residents in north and central Orange County.

"Percolation test" means a method of testing water absorption of the soil. The test is conducted with clean water and test results can be used to establish the dispersal system design. Percolation rates must be calculated on the basis of the test data obtained after the soil has had the opportunity to be saturated with clear water. After the test hole has been bored it must be kept filled for at least four hours, and preferably overnight. Tests are to be conducted the following day to allow the soil to swell for at least 24 hours, thereby approaching the conditions during the wettest season of the year.

"OWTS Permit" means a document issued by a local agency that allows the installation and use of an OWTS, or waste discharge requirements or a waiver of waste discharge requirements that authorizes discharges from an OWTS.

"Person" means any individual, firm, association, organization, partnership, business trust, corporation, company, state agency or department, or unit of local government who is, or that is, subject to this Policy.

"Policy" means this Policy for Siting, Design, Operation and Management of OWTS.

"Pollutant" means any substance that alters water quality of the waters of the state to a degree that it may potentially affect the beneficial uses of water, as listed in a Basin Plan.

"Projected flows" means wastewater flows into the OWTS determined in accordance with any of the applicable methods for determining average daily flow in the *USEPA Onsite Wastewater Treatment System Manual, 2002,* or for Tier 2 in accordance with an approved Local Agency Management Program.

"Public Water System" is a water system regulated by the California Department of Public Health or a Local Primacy Agency pursuant to Chapter 12, Part 4, California Safe Drinking Water Act, Section 116275 (h) of the California Health and Safety Code.

"Public Water Well" is a groundwater well serving a public water system. A spring which is not subject to the California Surface Water Treatment Rule (SWTR), CCR, Title 22, sections 64650 through 64666 is a public well.

"Qualified Professional" means an individual licensed or certified by a state of California agency to design OWTS and practice as professionals for other associated reports, as allowed under their license or registration. Depending on the work to be performed and various licensing and registration requirements, this may include an individual who possesses a registered environmental health specialist certificate or is currently licensed as a professional engineer or professional geologist. For the purposes of performing site evaluations, Soil Scientists certified by the Soil Science Society of America are considered Qualified Professionals. A local agency may modify this definition as part of its Local Agency Management Program.

"Regional Water Quality Control Board (Regional Board)" is any of the Regional Water Quality Control Boards designated by Water Code Section 13200. Any reference to an action of the Regional Board in this Policy also refers to an action of its Executive Officer, including the conducting of public hearings, pursuant to any general or specific delegation under Water Code Section 13223.

"Replacement OWTS" is an OWTS that has its treatment capacity expanded, or its dispersal system replaced or added onto, after the effective date of this Policy.

"Sand" means a soil particle; this term also refers to a type of soil texture. As a soil particle, sand consists of individual rock or mineral particles in soils having diameters ranging from 0.05 to 2.0 millimeters. As a soil texture, sand is soil that is comprised of 85 percent or more sand particles, with the percentage of silt plus 1.5 times the percentage of clay particles comprising less than 15 percent.

"SCAG" is the acronym for the Southern California Association of Governments. This is a municipal planning group for six counties in southern California.

"Seepage pit" means a drilled or dug excavation, three to six feet in diameter, either lined or gravel filled, that receives the effluent discharge from a septic tank or other OWTS treatment unit for dispersal.

"Septic tank" means a watertight, covered receptacle designed for primary treatment of wastewater and constructed to: receive wastewater discharged from a building, separate settleable and floating solids from the liquid, digest organic matter by anaerobic bacterial action, store digested solids, and clarify wastewater for further treatment with final subsurface discharge.

"Service provider" means a person capable of operating, monitoring, and maintaining an OWTS in accordance to this Policy.

"Silt" means a soil particle; this term also refers to a type of soil texture. As a soil particle, silt consists of individual rock or mineral particles in soils having diameters ranging from between 0.05 and 0.002 mm. As a soil texture, silt is soil that is comprised as approximately 80 percent or more silt particles and not more than 12 percent clay particles using the USDA soil classification system.

"Single-family dwelling unit" means a structure that is usually occupied by just one household or family and for the purposes of this Policy is expected to generate an average of 250 gallons per day of wastewater.

"Site Evaluation" means an assessment of the characteristics of the site sufficient to determine its suitability for an OWTS to meet the requirements of this Policy.

"Soil" means the naturally occurring body of porous mineral and organic materials on the land surface, which is composed of unconsolidated materials, including sand-sized, silt-sized, and clay-sized particles mixed with varying amounts of larger fragments and organic material. The various combinations of particles differentiate specific soil textures identified in the soil textural triangle developed by the USDA and as found in the *Soil Survey Manual, Handbook 18,* U.S. Government Printing Office, Washington, DC, 1993, p. 138. For the purposes of this Policy, soil shall contain earthen material of particles smaller than 0.08 inches (2 mm) in size.

"Soil Structure" means the arrangement of primary soil particles into compound particles, peds, or clusters that are separated by natural planes of weakness from adjoining aggregates.

"Soil Texture" means the soil class that describes the relative amount of sand, clay, silt and combinations thereof as defined by the classes of the soil textural triangle developed by the USDA (referenced above).

"State Water Board (State Board)" is the State Water Resources Control Board that governs all policies pertaining to water quality and quantity within the state of California.

"Supplemental treatment" means any OWTS or component of an OWTS, except a septic tank or dosing tank, that performs additional wastewater treatment so that the effluent meets a predetermined performance requirement prior to discharge of effluent into the dispersal field.

“Telemetric” indicates the ability to automatically measure and transmit OWTS data by wire, radio, or other means.

“TKN” is the abbreviation for total Kjehldahl nitrogen. This is the combination of organically bound nitrogen and ammonia in wastewater (NO_2, NO_3, NH_3).

“TMDL” is the abbreviation for total maximum daily load. Section 303(d) (1) of the Clean Water Act requires each state to establish a TMDL for each impaired waterbody to address the pollutant(s) causing the impairment. In California, TMDLs are usually adopted as Basin Plan amendments and contain implementation plans detailing how water quality standards will be attained.

“Total coliform” means a group of bacteria consisting of several *genera* belonging to the family *Enterobacteriaceae*, which includes *Escherichia coli* bacteria.

“Trench Leach Fields” Generally, the wastewater disposal system of choice where site conditions meet approved standards. Leach lines distribute the septic tank effluent into the surrounding soil at a depth typically not more than six feet. This shallow dispersal system provides effluent disposal under aerobic conditions at a maximum distance from underlying bedrock or groundwater.

“United States Environmental Protection Agency (USEPA)” is a nationwide agency governing environmental protection standards that relate to air and water quality and public health.

“Waste discharge requirement” or **“WDR”** means an operation and discharge permit issued for the discharge of waste pursuant to Section 13260 of the California Water Code.

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APPENDIX I: OWTS Policy *State Water Resources Control Board*

APPENDIX II: On-Site Sewage Guidelines County of Orange *Development Services*

APPENDIX III: Profile of the Unincorporated Area of Orange County *Southern California Association of Governments*

APPENDIX IV: Septic System Inventory and Assessment *RBF Consultants*

APPENDIX V: Silverado Creek Aerial Map with Property Identification