Appendix B

Project Description Supporting Data
| **Table B-1**  
| Summary of Proposed Ordinance Changes |
|---|---|---|
| **Code Section** | **Synopsis of Existing Code** | **Proposed Change(s)** |
| **Chapter IV. ON-SITE SEWAGE DISPOSAL**  
**ARTICLE 1. GENERAL** | | |
| Section B11-60. Intent and application | Purpose of the code chapter is to provide standards for approval, installation and operation of OWTS for protection of public health and water quality.  
Code applies to individual OWTS that serve buildings not connected to sanitary sewers and have sewage flows no greater than 2,500 gpd; larger flow systems subject to approval of RWQCB.  
Limits new land divisions using OWTS to minimum parcel size of 1 acre, or 2.5 acres in reservoir watershed areas.  
Requires subdivision proposals to document compliance with OWTS standards contained in the chapter. | Change in terminology, replacing the term “onsite sewage disposal system” with the term “onsite wastewater treatment system”, including the acronym “OWTS”.  
Changes the flow limitation triggering RWQCB approval from 2,500 gpd to 10,000 gpd; includes requirement that any OWTS greater than 2,500 gpd is referred to the RWQCB for review and also requires issuance of an operating permit per section B11-92.  
Adds new language clarifying that any “community system” serving multiple discharges under separate ownership shall require approval by the RWQCB.  
Minor language changes in other parts of this section. |
| Section B11-61. County not responsible for damage. | County and employees not liable or responsible for any damages associated with defective construction of OWTS or related to inspection of same. | Minor language changes |
| Section B11-62. Public sanitary sewer; connection to. | For new development connection to public sewer is required where sewer is within 300 feet of property line and LAFCO approval is obtained. For existing development served by OWTS, sewer connection is required upon system failure or building expansion/remodel that increases habitable space. | Minor language changes including: (a) consistent use of the term “available sanitary sewer”; and (b) reference to required approval by the “sewer authority”, as well as by LAFCO. |
| Section B11-63. Violations and penalties.  
New title: Violations. | Prohibits the construction, expansion, repair, alteration or operation of an OWTS in any manner that is offensive, injurious or dangerous to public health and safety or | Delete reference to “penalties” in the title of the section. |
| Section B11-64. Definitions.  
(NEW) | No definitions section in existing ordinance. | New section added with definitions for key terms used in this code chapter. |
|---|---|---|
| **Section B11-65. Private sewage disposal systems; when used.**  
New title: **Onsite wastewater treatment systems; when used.** | Requires that every residence, place of business or other building where people congregate not connected to a sanitary sewer shall be provided with a flush toilet sewage disposal system, including compliance with RWQCB requirements, where applicable.  
Requires that, with exceptions for agricultural employee living units, all detached living units must have their own (separate) OWTS meeting the requirements of the code.  
Requires that every building having one or more waste producing fixtures must be connected to an OWTS. | Condensed to eliminate redundant reference to RWQCB requirements which are covered in Section B11-60.  
Eliminates requirement for detached living units to have their own OWTS; instead require connection to an approved OWTS with sufficient treatment and disposal capacity for the expected wastewater flow.  
Minor language changes to requirements related to OWTS for agricultural employee living units and buildings with one or more waste producing fixtures. |
| **Section B11.66. Sewage disposal systems subject to California Regional Water Quality Control Board waste discharge requirements; county permit required; fee.**  
New title: **Onsite wastewater treatment systems subject to California Regional Water Quality Control Board waste discharge requirements; county permit required; fee.** | Provides that OWTS falling under the jurisdiction of the RWQCB also require approval of sewage disposal plans by the director and the following additional requirements: (a) certification of installation by system designer; (b) minimum of one year of system monitoring per RWQCB requirements; (c) contract with private sanitary engineering firm for first 5 yrs of operation; and (d) obtain County permit and pay applicable fees. | Adds language clarifying which systems require RWQCB approval: (a) those with flows over 10,000 gpd; (b) community systems (multiple discharges under separate ownership); and (b) others as determined necessary by RWQCB for water quality protection.  
Retains requirements that specify:  
- County permit and approval required for system construction.  
- Design, inspection and certification of installation by civil engineer or environmental health specialist. |
| Section B11-67. Private sewage disposal system. | Specifies various procedural, design, siting, testing, and construction requirements for the approval and use of OWTS. Items covered include: (a & d) requirements for septic tank and subsurface leaching system; (b & c) plan submittal and permitting; (e & f) dual leaching system and additional reserve area; (g & h) accessibility and inspection risers; (i, j & k) soil exploration, percolation testing, and geological information; (l) soil depth, groundwater separation, flood areas, maximum slope, and minimum setback distances; (m) soil percolation limits; (n) no crossing of property lines; and (o) provisions for issuance of construction stop work order. | Deletes requirements for:  
• 1 year of monitoring  
• 5-year operations contract.  
Refers to *Onsite Systems Manual* for details regarding site evaluations, plan submittal, design/construction details, construction inspection, and O&M.  
Title of this section changed to: “Onsite wastewater treatment systems, conventional.”  
Reorganized and wording changes include:  
• General requirements applicable to all OWTS (permits, plans, site evaluation, construction, setbacks); and  
• Siting requirements applicable to conventional OWTS (soil depth, fill, groundwater separation, flood areas, ground slope, setbacks, percolation and placement of OWTS on property served). |
| Section B11-68. Plans. | Requires the submission of a contoured plot plan, specifies the minimum scale requirement, and references Bulletin A for details on other information to be supplied. Any subsequent changes without director approval may invalidate the permit. | Revised to delete the specified minimum scale requirement and reference to Bulletin A. Replaced with language referring to the *Onsite Systems Manual* for details and procedures regarding content and submittal of plans. |
| Section B11-69. Fees. | Indicates that applicable permit fees will be as established by resolution of the Board of Supervisors. | Minor language change |
| Section B11-70. State contractor’s license required for installation or repair; registration fee. | Specifies contractor license requirements and payment of fees for installation and repair of OWTS. Explains provisions under which property owner is allowed to construct or repair their own OWTS. | Minor language changes |
| Section B11-71. Refusal to issue building permit. | Prohibits issuance of building permit without written approval of OWTS by director. | No changes |
| Section B11-72. Refusal to issue certificate of occupancy. | Prohibits occupancy and issuance of certification of occupancy without written approval of OWTS by director. | Minor language changes |
| Section B11-73. **Onsite systems manual.**  
(NEW) | No existing requirements in this section. | Adds new section describing the creation of an “Onsite Systems Manual” to include procedures and technical details for implementation of the requirements of this code chapter. Manual to developed and maintained by DEH, include a process for stakeholder input, with approval by the director and RWQCBs. |
| Section B11-74. Cumulative impact. | Provides that the director may require additional study and consideration of potential cumulative impacts related to groundwater mounding and watershed protection for any proposed OWTS. Describes the elements of a technical report and evaluation that would be required for cumulative impact analysis, along with minimum qualifications of individuals preparing the required technical report. | Language revised to refer to the Onsite Systems Manual for details regarding the guidelines and criteria for cumulative impact assessments, covering (a) circumstances requiring cumulative impact assessment; (b) minimum qualifications of individuals performing the work; (c) data needs and assumptions; (d) analytical methods and calculations; (e) evaluation methods/criteria; and (f) provision for additional RWQCB input. Adds requirement that cumulative impact assessment is mandatory for any OWTS over 2,500 gpd. |
| Section B11-75. Sewer wells; cesspool; seepage pits. | Prohibits and declares the use of sewer wells, cesspools and seepage pits to be a public nuisance. | No changes |
| Section B11-76. Holding tanks.  
New title: **Holding tanks; portable toilets.** | Prohibits and declares the use of holding tanks to be a public nuisance with certain exceptions for situations where necessary for public health, safety or welfare. | Language revised to clarify only two exceptions for the use of holding tanks: (a) existing failing systems; and (c) certain public use facilities.  
Provision added to require issuance of an operating permit for any holding tank.  
Adds new requirements addressing portable toilets that: (a) recognize them as facilities for temporary use only; and (b) limits their use to three-days duration unless otherwise authorized by code or exemption from the director. |
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Changes</th>
</tr>
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<tbody>
<tr>
<td>B11-77. Permit and sewage disposal plans; new construction; rebuilding; remodeling.</td>
<td>Describes the requirement for obtaining an OWTS permit approval prior to approval to construct, build, rebuild or remodel any building not connected to a sanitary sewer. Limits the permit to one year with allowance to extend duration for one additional year; specifies minimum size and construction requirements for septic tanks.</td>
<td>Septic tank specifications deleted from this section in their entirety, which are covered instead in Section B11-80 and in the <em>Onsite Systems Manual</em>.</td>
</tr>
<tr>
<td>B11-78. Solid pipe, joints and connections.</td>
<td>Specifies pipe material and size requirements for use in OWTS, including reference to the latest addition of the Uniform Plumbing Code (UPC).</td>
<td>This section eliminated. Piping specifications moved to <em>Onsite Systems Manual</em>.</td>
</tr>
<tr>
<td>B11-79. Distribution pipe.</td>
<td>Specifies pipe material and size requirements for use in OWTS distribution systems, including reference to the latest addition of the UPC.</td>
<td>This section eliminated. Piping specifications moved to <em>Onsite Systems Manual</em>.</td>
</tr>
<tr>
<td>B11-80. Subsurface leaching systems requirements. New title: Subsurface dispersal system requirements, conventional OWTS.</td>
<td>Specifies design and construction requirements for standard leaching trench systems, including trench dimensions, basis for calculating required trench length (related to percolation rate), materials, and construction methods.</td>
<td>Revised to include general statement regarding the need to comply with requirements for septic tanks and subsurface leaching systems and refers to <em>Onsite Systems Manual</em> for all details regarding dimensions, sizing, materials and construction methods.</td>
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</table>
| B11-81. Construction inspections. | Describes requirements and procedures for inspection of system installation, including availability of plans at the jobsite, requests for inspection, stop work orders, and final approval by the director. | Revised to:  
* Include statement of general requirements regarding construction inspections;*  
* Refer to *Onsite Systems Manual* for procedural details.* |
| B11-82. Posting of maintenance guidelines. New title: Operation and maintenance guidelines. | Provides that the director will provide OWTS maintenance guidelines to be posted on the premises following final approval of system construction. | Revised to:  
* require the preparation of operation and maintenance guidelines for all OWTS by designer and/or contractor;*  
* require confirmation of O&M information at jobsite at time of final construction approval;*  
* delete requirement for director to supply maintenance guidelines.* |
| Section B11-83. Slope variances. | Limits installation of OWTS to areas with ground slopes of less than 20%. Allows variance to this slope limit by the director if supported by technical evaluation/report addressing drainage, soil stability, water quality and public health by a civil engineer, engineering geologist or registered environmental health specialist. For OWTS located in Central Coast RWQCB #3 jurisdiction (South County), max slope is 30% unless exemption to the Basin Plan is granted by RWQCB. | Regarding slope variances, revised to:
• incorporate the terminology “geotechnical report”;
• retain >20% slope trigger for geotechnical report, including slope stability analysis;
• limit qualifications for geotechnical report to civil engineer or engineering geologist (delete REHS);
• specify maximum slope limitation of 50% County-wide;
• slopes >30 require use of pressure distribution or drip dispersal;
• delete requirement for Region 3 Basin Plan exemption for >30% slopes.
Adds new sub-section requiring development and implementation of erosion control plans for any OWTS: (a) on slopes of >20%; (b) where above-ground fill is used; (c) where design flow is greater than 1,000 gpd; or (d) which is part of a project requiring a County grading and/or drainage permit. |
| Section B11-84. Life extending construction. | Describes the OWTS requirements that apply to various types of improvements to existing buildings, including:
(a) Major Expansion and Major Intensification of Use – must comply with prevailing code requirements;
(b) Minor Expansion (500 ft² or less) – requires evaluation of existing OWTS by director and case-by-case improvements;
(c) Remodel or Repair (no building expansion or intensification of use) – requires confirmation of satisfactory functioning of existing OWTS. | Revised to:
• include language clarify the meaning of “intensification of use”;
• require that that inspection and performance evaluation of existing OWTS is required for Minor Expansion and Remodel/Repairs;
• refer to guidelines contained in Onsite Systems Manual for inspection and performance evaluations;
• delete language referring to the conduct of OWTS inspections by the director. |
| Section B11-85. Abatement. | Describes the County’s recourse for abatement of failing |  |
**Section B11-86. Abandoned private sewage disposal systems.**

New title: Abandoned onsite wastewater treatment systems.

Describes the requirements and procedures for destroying any OWTS that has been abandoned and discontinued from further use.

Minor language changes

**Section B11-87. Notice of Violation.**

Describes the procedures related to issuance of a formal notice of code violation, including: (a) issuance of notice of intent from the director; (b) 15-day period for property owner to request a meeting; (c) recording a notice of violation with the County recorder, including the restrictions placed on the property until the violation is corrected; and (d) provisions for notice of expungement of violation.

Minor language changes

**Section B11-88. Appeal from denial, revocation or suspension.**

Provides that any appeal of a decision by the director under the code shall be made in writing to the applicable RWQCB.

Revised to delete reference to the RWQCB and instead specify that any appeal of a decision by the director shall be made to the Office of the County Hearing Officer, per Division A38 of Title A of the County Ordinance Code.

**Section B11-89. Septic tank pumping, inspection, and reporting requirements.**

(NEW)

No existing requirements in this section.

Adds new code section requiring that septic tank pumpers complete a basic inspection of the entire OWTS at the time any septic tank is serviced in the county, and that the inspection report be submitted to DEH as part of the normal monthly reporting of septic tank pump-outs. Includes provisions addressing: follow-up corrective work; and notification to system owner of any problems.

(NEW) ARTICLE 3. ALTERNATIVE ONSITE WASTEWATER TREATMENT SYSTEMS
<table>
<thead>
<tr>
<th>Section</th>
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<th>Notes</th>
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<tr>
<td>B11-90. Use of alternative systems.</td>
<td>Sets forth general requirements for the use of alternative OWTS which: (a) allow their use for repairs, upgrades and new construction; (b) limit the types of alternatives to those with design standards approved by the director and RWQCBs; (c) require installation by licensed contractors only; and (d) give the director final authority to approve or disallow their use in cases of special public health or water quality concern;</td>
<td>N/A; see below for synopsis of existing Section B11-90</td>
</tr>
<tr>
<td>B11-91. Construction permit and review requirements.</td>
<td>Sets forth general requirements pertaining to construction approval for alternative OWTS, covering: submission of engineering plans; site evaluations; qualifications of design professionals and scope of responsibilities; technical review by director with allowance for RWQCB and third-party review; and permit duration.</td>
<td>N/A; see below for synopsis of existing Section B11-91</td>
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<tr>
<td>B11-92. Operating permits.</td>
<td>Stipulates that an operating permit, issued by the director, will be required for all alternative OWTS; Sets forth general requirements pertaining to: initial permit issuance and periodic renewal; purpose and scope of permit conditions; payment of fees; submission of inspection reports; reasons for permit revocation or non-renewal, and means of recourse available to the director; and recording of permit. Establishes that operating permits may be issued by the director for situations other than alternative OWTS (e.g., &gt;2,500 gpd flows, holding tanks) where additional oversight and monitoring is warranted.</td>
<td>N/A; see below for synopsis of existing Section B11-92</td>
</tr>
<tr>
<td>B11-93. Performance monitoring</td>
<td>Stipulates that a monitoring program will be</td>
<td>N/A; see below for synopsis of existing Section B11-93</td>
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and reporting.  

(NEW)  

established for each alternative OWTS as a condition of the operating permit to ensure adequate system performance.  

Sets forth general requirements pertaining to monitoring programs, including: scope and purpose; reference to specific guidelines provided in the Onsite Systems Manual; monitoring frequency; qualifications of those conducting the monitoring; provision for additional monitoring by director/third party; reporting of monitoring results; special post-seismic inspections in high-risk areas; compilation and use of monitoring data by director for program adjustments.  

Section B11-94. Types of alternatives permitted.  

(NEW)  

N/A; see below for synopsis of existing Section B11-94. Lists the types of alternative OWTS allowed under this code section, including specific types of alternative treatment systems and alternative dispersal systems. Allows for inclusion of other alternatives, subject to approval of the director and the RWQCBs. Clarifies that any approved alternative OWTS must be in conformance with siting and design criteria specified in the Onsite Systems Manual.  

Section B11-95. Siting criteria, design and construction requirements.  

(NEW)  

N/A; see below for synopsis of existing Section B11-95. Presents siting criteria for different types of alternative OWTS, including: (a) setback requirements, same as those for conventional OWTS; (b) special requirements for areas of flooding; (c) maximum ground slopes, up to 50%; (d) minimum vertical separation distance to groundwater below dispersal system, ranging from 2 to 8 feet; and (e) minimum soil depth below dispersal system of 2 to 3 feet. References the Onsite Systems Manual for specific design and construction requirements.
| Section B11-90. Intent and findings. | Describes the background and intent of establishing special OWTS requirements for Lexington Basin, which is based on the findings and recommendations of the September 1980 study of the Lexington Basin by Montgomery Engineers, Inc. | Requirements deleted. Section number reassigned; see above. |
| Section B11-91. General installation requirements. | Sets forth various procedural and technical requirements for OWTS, similar (but not identical) to many of the requirements specified in Section B11-67. | Requirements deleted. Section number reassigned; see above. |
| Section B11-92. Septic tank requirements. | Specifies requirements for minimum size, construction and installation of septic tanks, including minimum horizontal setback distances. | Requirements deleted. Section number reassigned; see above. |
| Section B11-93. Subsurface leaching system requirements. | Specifies design and construction requirements for standard leaching trench systems, including trench dimensions, basis for calculating required trench length (related to percolation rate), minimum horizontal setback distances, materials, and construction details. | Requirements deleted. Section number reassigned; see above. |
| Section B11-94. Additional requirements for private sewage disposal systems within subareas of Lexington Basin. | Specifies additional requirements applicable to specific subareas of the Lexington Basin related to: (a) acceptable range of percolation rates (5 to 60 mpi); (b) minimum leaching trench length (150 ft); (c) maximum average lot slope (30 to 50%); and (d) minimum lots size, (ranging from 1 to 20 acres). | Requirements deleted. Section number reassigned; see above. |
| Section B11-95. Lake Canyon area. | Prohibits the subdivision or new development on previously undeveloped parcels using individual OWTS in the Lake Canyon area. Exceptions are allowed for development that connects to an approved community leachfield system. | Requirements deleted. Section number reassigned; see above. |
| New section number: B11-96. | Lake Canyon Community Wastewater System was implemented 15 years ago and serves all parcels in the subdivision under permit issued by the RWQCB. | |
| Title changed to: CHAPTER V. INSPECTION REPORTS OF ONSITE WASTEWATER TREATMENT SYSTEMS |
|-----------------------------------------|---------------------------------|----------------------------------|
| Section B11-100. Application; limited inspection; special flood hazard area requirements. | Provides for the County to conduct limited inspections and report of OWTS at the request of the owner; Cites the need to comply with specific requirements of division C12 for new OWTS located in special flood hazard areas. | Minor language changes; Requirements related to special flood hazard areas deleted and moved to section B11-67, under siting criteria for “Areas of Flooding”. |
| New title: Application; limited inspection. | | |
| Section B11-101. Inspection fee. | Fees are required for County inspections, established by the Board of Supervisors. | No changes |
| Section B11-102. County not liable for damage and does not warrant. | Declares the County and employees to be free of all liability related to the completion of OWTS inspections, the accuracy and use of the inspection results, and the condition and/or quality of the OWTS. | Minor language change |
Background and Introduction

Santa Clara County is considering the adoption of a new ordinance covering the regulation of onsite wastewater treatment and dispersal systems (OWTS) in the County. The new Ordinance would update and replace existing regulations to incorporate changes based on the current state of knowledge and advances in practices and technologies for onsite wastewater treatment and dispersal, while also maintaining consistency with applicable requirements of the San Francisco Bay and Central Coast Regional Water Quality Control Board Basin Plans. The proposed Ordinance has been drafted by the Santa Clara County Department of Environmental Health, with consulting assistance from Questa Engineering and in cooperation with a local stakeholder working group.

The County contracted with Questa Engineering Corporation (Questa) and Leonard Charles & Associates (LCA) to conduct environmental studies and to prepare an Environmental Impact Report (EIR) addressing the proposed Ordinance. A significant topic to be addressed in the EIR is the potential growth-inducing impact of the Ordinance. This question arises from the fact that the Ordinance contains provisions and standards for the use of more modern, advanced onsite wastewater technologies (not recognized in the existing County Ordinance) to overcome certain types of soil constraints that currently may be an impediment to the approval of onsite wastewater systems and associated development in some areas of Santa Clara County. A related issue is the increase in the discharge of certain wastewater constituents (mainly nitrate-nitrogen) to the environment from new OWTS in different geographical areas of the County. Preparatory to initiating the environmental studies, Questa was authorized to undertake studies to address these two issues. This report presents the results of these analyses.

Part 1 - Growth Projections

General Approach and Scope

The overall objective of the analysis was to develop estimates of the potential amount of additional growth that may occur as a result of changes in the proposed Onsite Wastewater Ordinance compared with growth likely to occur under the existing regulations. Short of conducting a soil and site evaluation of every property within the County, there is no way to know or predict precisely which properties would or would not benefit (in terms of development potential) from the enactment of the proposed Ordinance changes. However, it was concluded that a reasonable approximation is possible by using a combination of published soils mapping, professional experience and judgment of DEH staff and
consultant, and application of GIS-based data and analysis methods. Following is a summary of the step-by-step approach taken for this analysis:

- **Step 1 – Soil/OWTS Suitability Mapping.** Define soil conditions and OWTS suitability constraints for the County based on published soil maps, augmented with DEH staff experience; geometrically match soil area boundaries with County GIS parcel polygon layer (using centroid of parcel);

- **Step 2 – Watershed Sub-basins.** Delineate watershed sub-basin boundaries and merge with soil/GIS mapping to organize all parcels according to soil suitability area and watershed sub-basin;

- **Step 3 – Ordinance Changes.** Identify specific differences between the existing and proposed Ordinance in terms of issues that would influence OWTS feasibility and, in turn, the potential for new development approval;

- **Step 4 – Estimates of OWTS Approval Rate.** In consultation with DEH staff, estimate how the proposed Ordinance changes (per Step 3) are expected to improve the likelihood of OWTS permitting in given soil suitability areas and according to parcel size; develop estimates of OWTS “approval rate” (percentage) under the existing and proposed Ordinance, for each soil suitability area;

- **Step 5 – Parcel Development Status.** Conduct a systematic GIS-based inventory to determine the development status (i.e., developed or vacant) of all parcels in non-sewered areas of the County;

- **Step 6 – Vacant Parcel Development Projections.** Multiply the estimated OWTS “approval rate” (per Step 4) to all vacant parcels per the applicable soil suitability category and parcel size to estimate the future development potential (# of lots) under existing and proposed Ordinance scenarios; compile and present the results according to watershed sub-basins, including the net increase due to the proposed Ordinance changes.

- **Step 7 – Second Unit Analysis.** Conduct a similar analysis to estimate the potential increase in second unit approvals for existing developed parcels that could be attributable to proposed Ordinance changes.

Two important assumptions used in the analysis were:

(1) **Focus on New Single Family Residences and Second Units.** The analysis focused on development of single-family residences on existing lots of record. This is because: (a) single-family residential parcel development is considered to be the best indicator of growth potential; (b) this is the principal category of development addressed by the County’s onsite wastewater Ordinance (existing and proposed); and (c) the proposed changes in the Ordinance related to use of alternative technologies and design criteria will be limited to existing lots of record. The proposed Ordinance does not provide for alternative OWTS to be used for the creation of new subdivisions, nor does it include other significant changes in OWTS requirements affecting...
subdivision development. It was also determined that some of the proposed Ordinance changes could improve the feasibility for existing developed properties to accommodate a second dwelling unit; therefore, this was also included in the analysis.

(2) Geographic Study Area. The geographic area covered in the analysis included the unincorporated area of Santa Clara County, plus those portions of the City of San Jose and Town of Los Altos Hills which do not have municipal sewer service and instead rely on the use of OWTS. The portions of San Jose served by OWTS are: (a) areas on the east side of the City in the foothills along the base of Mt. Hamilton; and (b) areas in the southern end of the City in the vicinity of Almaden and Calero Reservoirs. In Los Altos Hill about half of the Town is on public sewers and the other half is served by OWTS. Throughout the remaining incorporated areas of Santa Clara County there are a number of individual lots and small pockets development not connected to municipal sewers. These lots were not included in the study, as they tend to be widely scattered and represent a small fraction of the total OWTS in the County. Additionally, from the standpoint of growth implications, the location of these scattered parcels within an existing urban services area (with availability of public sewers) was judged to have more significance than the requirements applicable to OWTS.

Soils/OWTS Suitability Mapping

Compile General Soils Map. Figure 1 presents a General Soils Map of Santa Clara County compiled from information contained in several soil surveys and mapping published by the U.S. Department of Agriculture, which include: (1) Soil Survey of the Gilroy Area, California, 1927; (2) Soil Survey Santa Clara Area, California, 1958; (3) Soil Survey of Eastern Santa Clara Area, California, 1974; and (4) Online soils data base maintained by the Natural Resources Conservation Service (NRCS). The General Soils Map contained in the 1974 Soil Survey of Eastern Santa Clara County provided the baseline groupings of general soil associations, which were extended to cover the other (western) portions of the County, as shown in Figure 1.

In general, soils in the County can be grouped into three general landform classifications as follows:

- **Alluvial Plains, Fans and Stream Benches.** Soils found in the northern portions of the Santa Clara Valley (Santa Clara Plain region) are deep, well drained, fertile soils derived from sedimentary parent material and formed in alluvial plains, fans and stream benches. The deep, well drained clay loam soils in these areas are well suited for conventional onsite wastewater systems. Deep alluvial soils continue throughout the southern portions of the Santa Clara Valley. In the San Martin area, soils are typified by well drained gravelly loams and clay loams that are generally suitable for onsite wastewater systems, although limited in some locations by excessively drained (rapidly permeable) gravelly soils combined with shallow groundwater levels. Some areas of poorly drained clays in agricultural areas generally south of Gilroy are characterized by perching layers, slow percolation and, and poor drainage that pose constraints for onsite wastewater systems.

- **Old Fans and Terraces.** The foothill soils of Santa Clara County are generally shallower, located on old fans and terraces that lie between the more recent alluvial soils on the valley floor.
and the soils of the uplands. Soils range from clays and clay loams to loam derived from the alluvium of sedimentary and various other parent rock landforms. Limited soil depth over bedrock and shallow depth to groundwater pose moderate constraints for onsite wastewater systems in the foothill regions.

- **Uplands.** The mountain soils of the Diablo Range to the east and the Santa Cruz Mountains to the west are typically shallow, well drained to excessively well drained clay, silt or gravelly loams derived from hard sandstone or shale. In these areas, the shallow soil depths over bedrock and steep slopes up to 75% combine with drainage features to pose moderate to severe constraints for onsite wastewater systems. In the experience of County DEH staff, slope and soil constraints tend to be more significant in the Diablo Range than in the Santa Cruz Mountains. Some upland areas near southern San Jose have soils derived from serpentine and basalt bedrock that similarly are severely constrained for onsite wastewater systems by shallow soil depth over bedrock and steep slopes of up to 75%. Rock outcrops and eroded areas are common. Some of the best upland soil conditions for onsite wastewater systems occur in the County’s northwest mountainous regions of Palo Alto, Los Altos Hills, Saratoga, Los Gatos and portions of the Lexington Basin. These areas are typified by deeper sand, clay or gravelly loams derived from residuum, although they may be limited on specific sites by steep slopes, soil depth or slow permeability.

**Soil-OWTS Suitability.** The general mapping of soil conditions takes into account location and landform conditions, depth to bedrock, slope, subsurface texture, and drainage conditions of the soils, which are all key factors that can affect the suitability of the soils for onsite wastewater treatment. Table 1 was developed from the published soil survey information, summarizing the soil characteristics of the general soil associations mapped in Figure 1.

The far right-hand column in Table 1 highlights the key constraints and overall suitability designation for OWTS for each general soil association. The designations were developed and assigned based on the USDA soils information combined with input from DEH staff and Questa’s best professional judgment. This is provided as a general assessment tool and is not a substitute for site-specific investigation of and planning for onsite wastewater treatment systems. It provides a general indication of the management and design issues likely to be encountered in each area. It does not take into account local constraints such as steep slopes, setback or other anomalous conditions that may be found on a particular site.

**Soil-Parcel Boundary Adjustment.** Utilizing the County GIS data, the soil suitability area boundaries were adjusted to conform to parcel boundaries. This was accomplished by geometrically matching the soils map with the County’s GIS parcel polygon layer, using the centroid of the parcel polygons as the basis for assigning the respective soil suitability attribute.
Table 1. Santa Clara County General Soil Associations and OWTS Suitability

<table>
<thead>
<tr>
<th>Map Unit</th>
<th>Soil Name</th>
<th>Parent Material Landform</th>
<th>Slope</th>
<th>Soil Depth</th>
<th>Soil Texture</th>
<th>Drainage</th>
<th>OWTS Suitability and Constraints Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Millsholm-Los Osos-Los Gatos-Lodo</td>
<td>Fine-grained sandstone, shale and metamorphosed shale</td>
<td>15-75%</td>
<td>24-48&quot;</td>
<td>Gravely clay loam</td>
<td>Well drained</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
</tr>
<tr>
<td>1</td>
<td>Yolo Association</td>
<td>Alluvium from sedimentary rock</td>
<td>0-9%</td>
<td>60+&quot;</td>
<td>Loams and silty clay loams</td>
<td>Well drained</td>
<td>Generally to Highly Suitable for conventional OWTS</td>
</tr>
<tr>
<td>2</td>
<td>Arbuckle-Pleasanton</td>
<td>Alluvium from sedimentary rock</td>
<td>0-15%</td>
<td>60+&quot;</td>
<td>Gravelly loams and loams</td>
<td>Well drained</td>
<td>Generally Suitable, limited locally by areas of rapidly permeable soils</td>
</tr>
<tr>
<td>3</td>
<td>Cropley-Rincon</td>
<td>Calcareous alluvium from mixed sources</td>
<td>0-9%</td>
<td>60+&quot;</td>
<td>Clays and clay loams</td>
<td>Well drained</td>
<td>Moderately to Severely Constrained, limited by slowly permeable soils</td>
</tr>
<tr>
<td>4</td>
<td>Clear Lake-Pacheco-Sunnyvale</td>
<td>Alluvium from sedimentary rock</td>
<td>&lt;2%</td>
<td>16-26&quot; to mottled layer</td>
<td>Clays and clay loams</td>
<td>Poorly drained</td>
<td>Moderately to Severely Constrained, limited by shallow restrictive (perching) layer, variable permeability, high groundwater and flooding</td>
</tr>
<tr>
<td>5</td>
<td>Clear Lake</td>
<td>Alluvium from sedimentary rock</td>
<td>&lt;2%</td>
<td>60+&quot;</td>
<td>26&quot; to mottled layer</td>
<td>Poorly drained</td>
<td>Moderately to Severely Constrained, limited by shallow restrictive (perching) layer, high ground water and flooding</td>
</tr>
<tr>
<td>6</td>
<td>Novato-Reyes</td>
<td>Tidal flats alluvium from various rock and hydrophytic plant material</td>
<td>&lt;2%</td>
<td>60+&quot;</td>
<td>Clays</td>
<td>Very poorly drained and somewhat poorly drained</td>
<td>Unsuitable for OWTS due to flooding and slowly permeable soils</td>
</tr>
<tr>
<td>7</td>
<td>Botella-Urban land</td>
<td>Alluvium from various rock</td>
<td>0-5%</td>
<td>60+&quot;</td>
<td>Clay loam</td>
<td>Well drained</td>
<td>Generally to Highly Suitable for conventional OWTS, but mostly occupied by urban land uses</td>
</tr>
<tr>
<td>Map Unit</td>
<td>Soil Name</td>
<td>Parent Material Landform</td>
<td>Slope</td>
<td>Soil Depth</td>
<td>Soil Texture</td>
<td>Drainage</td>
<td>OWTS Suitability and Constraints Summary</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------</td>
<td>-----------------</td>
<td>------------------------------</td>
<td>-----------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Hillgate-San Ysidro</td>
<td>Alluvium from sedimentary rock</td>
<td>0-50%</td>
<td>60+” to 10-26”</td>
<td>Clays and clay loams</td>
<td>Well drained</td>
<td>Moderately Constrained, limited locally by soil permeability and groundwater separation</td>
</tr>
<tr>
<td>9</td>
<td>Francisquito Urban land</td>
<td>Old alluvium from various rock</td>
<td>5-15%</td>
<td>60+” to 16-26”</td>
<td>Loam to clay loam and clay</td>
<td>Well drained</td>
<td>Moderately Constrained, limited locally by soil permeability and groundwater separation</td>
</tr>
<tr>
<td>10</td>
<td>Azule-Altamont</td>
<td>Soft sediments</td>
<td>9-75%</td>
<td>44-60” to 12-34”</td>
<td>Clays and clay loams</td>
<td>Well drained</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
</tr>
<tr>
<td>11</td>
<td>Los Osos-San Benito</td>
<td>Sandstone and shale</td>
<td>15-75%</td>
<td>20-48” to 10-26”</td>
<td>Clay loams</td>
<td>Well drained</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
</tr>
<tr>
<td>12</td>
<td>Los Gatos-Gaviota-Vallecitos</td>
<td>Hard sandstone and shales</td>
<td>5-75%</td>
<td>6-50”</td>
<td>Gravelly loams and loams</td>
<td>Well drained and somewhat excessively drained</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
</tr>
<tr>
<td>13</td>
<td>Gaviota</td>
<td>Hard sandstone and shales</td>
<td>30-75%</td>
<td>6-19”</td>
<td>Eroded gravelly loams</td>
<td>Somewhat excessively drained</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
</tr>
<tr>
<td>14</td>
<td>Felton-Maymen</td>
<td>Sandstone and shale</td>
<td>15-75%</td>
<td>11-59”</td>
<td>Silt loams and fine sandy loams</td>
<td>Well drained and somewhat excessively drained</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
</tr>
<tr>
<td>15</td>
<td>Montara-Inks-Henneke</td>
<td>Serpentine and metamorphosed basalt bedrock</td>
<td>15-75%</td>
<td>10-19</td>
<td>Clay loams and gravelly loams</td>
<td>Somewhat excessively drained</td>
<td>Severely Constrained, limited by soil depth, bedrock and steep slopes</td>
</tr>
<tr>
<td>16</td>
<td>Accelerator-Fagan-Urban land</td>
<td>Residuum derived from sandstone, shale and siltstone</td>
<td>5-15%</td>
<td>40-60”</td>
<td>Loam to clay loam and gravelly loam</td>
<td>Well drained</td>
<td>Generally Suitable, limited locally by areas of slowly permeable soils</td>
</tr>
<tr>
<td>17</td>
<td>Ben Lomond-Felton-Lompico</td>
<td>Residuum derived from sandstone, shale, siltstone and granitic rock</td>
<td>5-75%</td>
<td>37-60+”</td>
<td>Loams and sandy loams</td>
<td>Well drained</td>
<td>Generally Suitable, limited locally by steep slopes and soil depth</td>
</tr>
</tbody>
</table>
Watershed Sub-basins

The majority of Santa Clara County drains in a northerly direction through various streams into San Francisco Bay; the southern portions drain into the Pajaro River, which ultimately discharges to the Pacific Ocean at Monterey Bay. The area draining north falls within the jurisdiction of the San Francisco Bay RWQCB; the area draining south is in the jurisdiction of the Central Coast RWQCB.

The Santa Clara Valley Water District (SCVWD) has defined five principal watershed management areas in the County for the purposes of their activities and operations. From north to south, these include: (a) Lower Peninsula; (b) West Valley; (c) Guadalupe; (d) Coyote; and (e) Uvas-Llagas. All but the Uvas-Llagas watershed area drain into San Francisco Bay. Excluded from the SCVWD watersheds are the northeastern, southeastern and southwestern portions of the County that drain, respectively, into the neighboring counties of Alameda, San Benito and Santa Cruz.

For this study of onsite wastewater treatment systems the SCVWD watershed management areas were amended to encompass all unincorporated lands in the County and were subdivided into smaller sub-basin areas to provide more detailed breakdown in geographic areas having higher concentrations of OWTS. For example, Guadalupe watershed was sub-divided into four sub-basins: Guadalupe River, Lexington Basin, Upper Los Gatos Creek and Alamitos Creek. Also, the Uvas-Llagas watershed management area was divided into Uvas Creek and Llagas Creek watersheds, and Llagas Creek was further subdivided into five geographic sub-basins: Upper Llagas; Llagas Morgan Hill; Llagas San Martin; Llagas Gilroy; and Llagas East Gilroy.

Figure 2 shows the watershed sub-basin map overlain on the soils suitability map. Similar to the approach used for the soil mapping, the centroid of each parcel (per GIS polygon) was used to assign parcels to the applicable watershed sub-basin.

Ordinance Changes

The proposed Ordinance changes were developed in consultation with County staff, along with review and input from RWQCB staff and a Wastewater Advisory Group made up of various OWTS practitioners, agency representatives, and other interested stakeholders in Santa Clara County. Among other things, the proposed Ordinance is expected to remove some current constraints to the development of existing parcels that depend on the use of OWTS for sewage disposal mainly through: (a) reduction in land area requirements for dispersal fields; (b) the ability to utilize more advanced technologies (as compared with conventional onsite systems) to overcome certain types of site constraints, such as high groundwater and shallow soils; and (c) the removal of minimum lot size limitations for new OWTS in the Lexington Basin and for second units in the San Martin area.

Reduction in Dispersal Land Area Requirements

Reduction in land area requirements for OWTS will result from the following proposed Ordinance changes:
• Modify Trench Spacing Requirement. Under the current Ordinance the required spacing between trenches is 10 feet, on centers (o.c.). Under the proposed Ordinance this would be changed to a minimum of 6 feet o.c., with an increase of 1 foot for each 5% increase in slope over 20%. For example, at 30% slope the spacing would be 8 feet, at 40% 10 feet, at 50% 12 feet. Trench spacing affects the overall amount of area required for the dispersal field. Under the proposed Ordinance, the dispersal land area requirement would be reduced for slopes less than 40% percent, and would be equal or greater for slopes over 40%.

• Delete Requirement for 400% Dispersal Field Capacity for Slower Percolation Areas. For soils with percolation rates between 61-120 minutes per inch (mpi), the current Ordinance requires a dual dispersal field (two 100% capacity fields) plus a designated reserve area for complete replacement of the original dual field; i.e., total capacity of 400% dispersal field capacity. Requirements for soil percolation rates between 1 and 60 mpi include dual dispersal fields (i.e., 200% capacity), but not the additional reserve/replacement field area. Under the proposed Ordinance the requirement dictating 400% dispersal field capacity for 61-120 mpi would be deleted, making the current requirements for 1-60 mpi percolation applicable to all OWTS dispersal fields for percolation rates from 1 to 120 mpi. This would be consistent with Basin Plan criteria of both the San Francisco Bay and Central Coast RWQCB. It would reduce by about 50% the dispersal field land area requirements for sites with slower soil percolation rates, in the range of 61-120 mpi; it would not affect sites with soils having percolation rates of 1-60 mpi.

• Delete Requirement for Separate OWTS for Detached Buildings. The current Ordinance requires detached buildings (such as second dwelling units, workshops, pool houses) to have a completely separate OWTS, sized with a minimum capacity for a 3-bedroom residence (i.e., 450 gpd). An exception is provided that allows two agricultural employee living units to share a single OWTS. The proposed Ordinance would drop this requirement and allow detached buildings to be connected to the main OWTS, as long as sufficient treatment and dispersal capacity is provided for the total daily wastewater flow; the requirement to design for a fixed capacity of 450 gpd would also be deleted, as noted above. This would reduce the dispersal field land area requirements for a second unit or other detached building and, in some cases, could be the difference in whether or not such building project is feasible or not.

• Revised Dispersal Field Sizing Criteria. Dispersal fields are typically sized according to: (1) the defined wastewater flow rate from the building (gallons per day, gpd); (2) the dimensions of the effective infiltrative surface of the dispersal trench (i.e., portion of trench bottom and sidewall area in ft²); and (3) a wastewater application rate (gpd/ft²) based on the soil percolation rate. The County’s current sizing standards specify: (a) a minimum design flow of 450 gpd for up to 3 bedroom house, plus 150 gpd for each additional bedroom; (b) standard allowance of 4 ft² of effective infiltration surface per lineal foot of trench; and (c) wastewater application rates that vary from 0.56 down to 0.2 gpd/ft², based on percolation rate. Because of very low application rates (especially for faster percolation soils) the County sizing criteria result in excessively large dispersal fields compared with RWQCB criteria, other Bay Area counties and industry/EPA guidelines.
Under the proposed Ordinance, the wastewater application rates would be revised to be consistent with other industry/EPA guidelines and other jurisdictions in the region. Table 2 shows a comparison of the existing and proposed Ordinance wastewater application rates (for a range of percolation rates) and the resulting land area requirements for a typical OWTS (3-bedroom capacity on a slope of 20% or less). The calculated land area requirements shown for the proposed Ordinance also include reduction in the minimum trench spacing from 10 to 6 feet and elimination of the additional dispersal field replacement area for slower percolation areas, as discussed above. The net result of these changes would be reduction of overall dispersal field area requirements to about 30 to 40 percent of that required under the existing Ordinance.

Table 2. Dispersal Field Sizing Comparison

<table>
<thead>
<tr>
<th>Percolation Rate (MPI)</th>
<th>Existing Ordinance</th>
<th>Proposed Ordinance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wastewater Application Rate (gpd/sq ft)</td>
<td>Dispersal Trench Length (lineal ft)</td>
</tr>
<tr>
<td>5</td>
<td>0.56</td>
<td>200</td>
</tr>
<tr>
<td>10</td>
<td>0.56</td>
<td>200</td>
</tr>
<tr>
<td>20</td>
<td>0.45</td>
<td>250</td>
</tr>
<tr>
<td>30</td>
<td>0.30</td>
<td>375</td>
</tr>
<tr>
<td>45</td>
<td>0.26</td>
<td>433</td>
</tr>
<tr>
<td>60</td>
<td>0.23</td>
<td>489</td>
</tr>
<tr>
<td>90-120</td>
<td>0.20</td>
<td>562</td>
</tr>
</tbody>
</table>

1 For: 3-bedroom residence; 450 gpd design flow; 3-ft deep trench; 20% slope.
2 For 100% primary field
3 Total area for dual (200%) field

Use of Alternative Technologies to Overcome Site Constraints

The proposed Ordinance includes new provisions to allow reduced vertical separation requirements (soil depth and depth to groundwater) below the dispersal system in conjunction with the use of certain alternative treatment and/or dispersal designs. The current requirements for conventional septic tank – gravity dispersal trenches will not change. The proposed depth to groundwater criteria are presented in Table 3. The supporting rationale for the reduced vertical separation requirement for the various alternative OWTS designs is derived from research studies done over the past 30 to 40 years, largely funded by the USEPA and referenced in the Onsite Wastewater Treatment Systems Manual (USEPA, 2002). These studies have documented how various alternative treatment and dispersal methods can improve the operation and treatment effectiveness of OWTS as compared with conventional septic tank-gravity dispersal trench designs. The proposed depth to groundwater criteria related to type of OWTS and percolation rates are similar to standards adopted and followed in many other counties in Northern California over the past 10 to 20+ years (for example, Marin, Sonoma, Napa, Contra Costa, Mendocino, Placer, Nevada, among others).
The land area requirements for alternative OWTS vary from one type of design to another; but, in general, they are reasonably similar to the land area requirements for conventional dispersal trenches under the proposed Ordinance, as presented in Table 2. The primary benefit of the alternative design options would be to improve the overall feasibility and options for individual properties to overcome inherent soil/OWTS suitability constraints, related to groundwater conditions and soil depth.

Table 3
Proposed Depth to Groundwater Requirements

<table>
<thead>
<tr>
<th>Type of OWTS</th>
<th>Percolation Rate (MPI)</th>
<th>Min. Depth to Groundwater (feet$^1$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Conventional Septic Tank &amp; Dispersal Trench$^2$</td>
<td>1-5</td>
<td>6-30</td>
</tr>
<tr>
<td>Conventional Trench w/ Supplemental Treatment</td>
<td>1-5</td>
<td>6-30</td>
</tr>
<tr>
<td>Shallow Pressure Distribution (PD) Trench</td>
<td>1-5</td>
<td>6-120</td>
</tr>
<tr>
<td>At-Grade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shallow PD w/Supplemental Treatment</td>
<td>1-5</td>
<td>6-120</td>
</tr>
<tr>
<td>At-Grade w/Supplemental Treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure-dosed Sand Trench</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raised Sand Filter Bed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drip Dispersal w/Supplemental Treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raised Sand Filter Bed, w/Supplemental Treatment &amp; Drip Dispersal</td>
<td>1-5</td>
<td>6-120</td>
</tr>
</tbody>
</table>

$^1$ Measured from the bottom of the dispersal system
$^2$ Conventional OWTS requirements must be met for all new subdivisions

**Delete Minimum Lot Size Requirements**

The current minimum lot sizes for new subdivisions (2.5 acres for reservoir areas and 1 acre elsewhere) will remain as is. However, the proposed Ordinance provides for elimination of the following OWTS minimum lot size requirements that apply to existing lots of record:

- **Lexington Basin.** The 1-acre minimum lot size limitation (adopted in the early 1980s) that currently applies to any new development using an OWTS on an existing lot of record in the Lexington Basin.
- **San Martin Area.** The existing 5-acre minimum lot size required for approval of second dwelling units in the San Martin planning area. (Note: this is a zoning requirement, not a provision of the onsite wastewater Ordinance).

Whether or not a particular lot can be approved for use of an OWTS is normally determined site-specifically, based on compliance with adopted criteria that establish the necessary area for the treatment
and dispersal system, reserve area, slopes and setbacks, while still allowing for the buildings and other development features. This is the approach followed throughout the rest of Santa Clara County and, under the proposed Ordinance, would also extend to Lexington Basin. The land area requirements for an OWTS can range from as little as a few thousand square feet, to as much as ½-acre or more, depending mainly on soil conditions. Having less than a 1-acre lot size does not preclude the feasibility of developing an acceptable OWTS, just as having more than a 1-acre lot does not guarantee suitable and sufficient area for an OWTS if the soil and/or other site features are not favorable.

Regarding the 5-acre minimum for second-units in the San Martin area, the lot size limitation is understood to have been adopted as a zoning control to limit the amount of nitrogen loading to the Llagas groundwater basin from OWTS. Under the proposed Ordinance the availability of alternative OWTS technologies that provide for substantial nitrogen removal (in many cases 50% or more) compared to conventional OWTS will provide an equally, if not greater, means of controlling nitrogen loading from OWTS, and consistency with the regulatory approach followed elsewhere in the County.

**Estimates of OWTS “Approval Rate”**

Based on the proposed changes in the Ordinance as outlined above, estimates were developed to quantify how the changes would improve the feasibility for OWTS in different soil suitability areas of the County. This was done in consultation with DEH staff, relying on their recent experience with OWTS permit approvals/denials under the current regulations, knowledge of the specific types of OWTS constraints in different geographic regions of the County, and an understanding of the nature of the design changes and alternatives that would be available under the proposed Ordinance to overcome soil and siting constraints. The process involved the following:

- **Detailed Maps.** Detailed maps, such as the one in Figure 3, were developed for use by DEH staff, showing the soil suitability boundaries in relation to roads and other geographic reference points.

- **Current Ordinance Approval Rates.** Using the general and detailed soil maps, soil suitability information from Table 1, OWTS file information, personal knowledge and experience, DEH staff systemically reviewed and assigned an estimated OWTS “approval rate” to each of the 17 soil suitability areas in the County, based on the current Ordinance requirements. The assigned “approval rate” (estimated to the nearest 5%) was intended to represent the best professional judgment of staff as to the probability of finding acceptable conditions for approval of an OWTS for new residential development (e.g., typical 3-bedroom house) on a vacant lot within each respective soil suitability area. The basic OWTS “approval rate” developed for each soil area assumed a lot size of at least 1 acre or more. For lot sizes of less than 1 acre, the basic approval rate for each soil suitability area was adjusted downward as follows, to account for additional limitations due to land area constraints:

  - ¾-1 acre lot size: 20% reduction
  - ½ - ¾ acre lot size: 40% reduction
  - ¼ - ½ acre lot size: 60% reduction
  - ¼-acre or less: 0% approval rate – insufficient area regardless of soil conditions
As noted in the table regarding soil suitability Map Units 12 and 17, an exception to the above adjustments was made for properties in the Lexington Basin, where the OWTS approval rate for all lots <1 acre was set at 0% due to the current 1-acre lot size minimum for new OWTS. At the upper probability end where DEH staff found OWTS approvals to be routinely achieved with no apparent constraints, an approval rate of 99% (rather than 100%) was assigned to account for the possibility of site-specific anomalies.

- **Proposed Ordinance Approval Rates.** Following the same process described above for the current Ordinance requirements, DEH staff then developed estimates of how the probability of OWTS approval would be improved in each soil suitability area, based on the proposed changes in the Ordinance as previously outlined. This included consideration of changes affecting dispersal land area requirements, flexibility to utilize alternative designs to overcome certain soil and groundwater constraints, and elimination of lot size limitations for the Lexington Basin and San Martin areas. A basic OWTS “approval rate” for each soil suitability area was established for lot sizes of 1 acre and larger. The same adjustments from above (reductions of 20%, 40% and 60%) were applied to estimate approval rates for lot sizes smaller than 1 acre; and lots less than ¼ acre were similarly assigned a 0% approval rate due to insufficient area. Under the proposed Ordinance scenario, the approval rates assigned for lots of <1 acre in the Lexington Basin were taken to be the same as those assigned for the rest of the County for the applicable soil conditions (Soil Map Units 12 and 17). This would account for the elimination of the current 1-acre minimum lot size requirement in Lexington Basin.

Table 4 presents the estimated OWTS approval rates developed for all soil suitability areas and lot size variation, for both the current and proposed Ordinance. It should be emphasized that the “approval rates” indicated in the table apply strictly to the permitting of an OWTS, and not to the probability of actually obtaining approval for a particular building project, which is also dependent on satisfying other planning and building requirements.
Table 4. Estimated Approval Rates for New OWTS on Existing Lots

<table>
<thead>
<tr>
<th>Map Unit</th>
<th>Soil Name</th>
<th>OWTS Suitability and Constraints Summary</th>
<th>Estimated OWTS Approval Rate (%)</th>
<th>Ordinance</th>
<th>Lot Size</th>
<th>Current</th>
<th>1/4 – 1/2 ac</th>
<th>1/2 - 3/4 ac</th>
<th>3/4 - 1 ac</th>
<th>&gt;1 ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Millsholm-Los Osos-Los Gatos-Lodo</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
<td>Current</td>
<td>0</td>
<td>25</td>
<td>45</td>
<td>65</td>
<td>85</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Yolo Association</td>
<td>Generally to Highly Suitable for conventional OWTS</td>
<td>Current</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>40</td>
<td>60</td>
<td>80</td>
<td>99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Arbuckle-Pleasanton</td>
<td>Generally Suitable, limited locally by areas of rapidly permeable soils</td>
<td>Current</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>40</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cropley-Rincon</td>
<td>Moderately to Severely Constrained, limited by slowly permeable soils</td>
<td>Current</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Clear Lake-Pacheco-Sunnyvale</td>
<td>Moderately to Severely Constrained, limited by shallow restrictive (perching) layer, variable permeability, high groundwater and flooding</td>
<td>Current</td>
<td>0</td>
<td>5</td>
<td>25</td>
<td>45</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Clear Lake</td>
<td>Moderately to Severely Constrained, limited by shallow restrictive (perching) layer, high groundwater and flooding</td>
<td>Current</td>
<td>0</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Novato-Reyes</td>
<td>Unsuitable for OWTS due to flooding and slowly permeable soils</td>
<td>Current</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Botella-Urban land</td>
<td>Generally to Highly Suitable for conventional OWTS, but mostly occupied by urban land uses</td>
<td>Current</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>40</td>
<td>60</td>
<td>80</td>
<td>99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Hillgate-San Ysidro</td>
<td>Moderately Constrained, limited locally by soil permeability and groundwater separation</td>
<td>Current</td>
<td>0</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Map Unit</td>
<td>Soil Name</td>
<td>OWTS Suitability and Constraints Summary</td>
<td>Estimated OWTS Approval Rate (%)</td>
<td>Ordinance</td>
<td>&lt;1/4 ac</td>
<td>1/4 – 1/2 ac</td>
<td>1/2 - 3/4 ac</td>
<td>3/4 - 1 ac</td>
<td>&gt;1 ac</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
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<td>-------------</td>
<td>------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Francisquito-Urban land</td>
<td>Moderately Constrained, limited locally by soil permeability and groundwater separation</td>
<td></td>
<td>Current</td>
<td>0</td>
<td>10</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>25</td>
<td>45</td>
<td>65</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Azule-Altamont</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
<td></td>
<td>Current</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Los Osos-San Benito</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
<td></td>
<td>Current</td>
<td>0</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
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<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Los Gatos-Gaviota-Vallecitos</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
<td></td>
<td>Current</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>40</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Gaviota</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
<td></td>
<td>Current</td>
<td>0</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Felton-Maymen</td>
<td>Moderately to Severely Constrained, limited by shallow soil depths over bedrock and steep slopes</td>
<td></td>
<td>Current</td>
<td>0</td>
<td>25</td>
<td>45</td>
<td>65</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>35</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Montara-Inks-Henneke</td>
<td>Severely Constrained, limited by soil depth, bedrock and steep slopes</td>
<td></td>
<td>Current</td>
<td>0</td>
<td>20</td>
<td>40</td>
<td>60</td>
<td>80</td>
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<td></td>
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<td>Proposed</td>
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<td>50</td>
<td>70</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Accelerator-Fagan-Urban land</td>
<td>Generally Suitable, limited locally by areas of slowly permeable soils</td>
<td></td>
<td>Current</td>
<td>0</td>
<td>40</td>
<td>60</td>
<td>80</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
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<td>60</td>
<td>80</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Ben Lomond-Felton-Lompico</td>
<td>Generally Suitable, limited locally by steep slopes and soil depth</td>
<td></td>
<td>Current</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>30</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proposed</td>
<td>0</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>
Parcel Development Status

The next step in the analysis was to identify and create an inventory of the non-sewered parcels in the County along with their development status (i.e., developed or vacant). The objective was to identify all vacant lots that could potentially be developed using OWTS, along with their size, location and other attributes. It was found that this information is not readily available from any County department. Therefore, this was done according to the following process using the County GIS data base:

1. Identify Non-sewered Parcels.
   - First, city and sanitary district boundaries were applied to the County-wide data base to exclude parcels located within areas served by public sewers. This included mainly incorporated lands, but it also included unincorporated areas of Lake Canyon and Lions Gate, which are served by their own community wastewater facilities. “Islands” of unincorporated lands falling within city boundaries were also excluded during this step.
   - Next, properties in the City of San Jose and the Town of Los Altos Hills known (from city-supplied data) to be outside of established sewer system boundaries and served by OWTS were added back into the inventory of “non-sewered” parcels.

2. Exclude “Non-development” Areas.
   - Using County-supplied shape-file data, public lands were removed from the non-sewered inventory, including such things as parks, public facilities, rights-of-way, and open space.
   - Other private open space areas and easements (not classified as public lands) identified on maps supplied by the Santa Clara Open Space Authority were removed by best fit analysis.
   - From the above analysis, the total number of non-sewered parcels in the County (excluding non-development areas) was determined to be approximately 17,625.

3. Determine Development Status.
   - County Assessor’s and information and other GIS data were reviewed and found not to have any designation of whether or not a particular property is developed or vacant; “improvement value” for each property was judged to be the most reasonable indicator.
   - An iterative process was followed to determine the “improvement value” most indicative of a developed vs vacant property. Starting with a $20,000+ improvement value, properties were spot-checked against air photos to determine the presence/absence of buildings and other property features indicative of existing development for habitation. This was repeated sequentially for assessed improvement values of $15,000, $10,000, $5,000, $4,000, $3,000, $2,000 and finally $1,000. By air photo inspection, properties with <$1,000 assessed improvement value were shown consistently to be vacant, and therefore this value was selected as the developed vs. vacant indicator.
The $1,000 assessed improvement value indicator as derived above was then assigned to the County-wide GIS inventory of non-sewered parcels, with the following findings:

- Developed Parcels: 12,543
- Vacant Parcels: 5,082
- Total Parcels: 17,625

Vacant Parcel Development Projections

To quantify and compare the future development potential (# of lots) under the current and proposed Ordinance requirements, the estimated OWTS “approval rates” (from Table 4) were applied against the inventory of all 5,082 non-sewered vacant parcels per the respective soil suitability category and parcel size. The information was compiled according to watershed sub-basins and is summarized, respectively, in Tables 5 and 6 for the North County area (RWQCB #2) and South County area (RWQCB #3). The supporting spreadsheet calculations for all watershed sub-basins are contained in a technical appendix to this report which is on file with DEH. Briefly, the results indicate the OWTS Ordinance changes could increase residential “development potential” in the non-sewered areas of the County by an estimated 1,091 parcels, which would be about a 42% increase over development projections under the current Ordinance. The projected increases in development potential would be distributed throughout most of the County, with greatest increases expected to occur in the Lexington Basin, Llagas Creek and Uvas Creek sub-basin areas. As noted previously, the proposed Ordinance changes will increase the potential for development to take place in some areas where soil and other site conditions pose limiting constraints under the current Ordinance. However, the projections do not assure the ability of any particular property to be developed, which is also dependent on satisfying other planning and building requirements.
### Table 5
North County - RWQCB Region 2
Parcel Development Projections by Watershed*

<table>
<thead>
<tr>
<th>Watershed Name</th>
<th>Non-sewered Area (acres)</th>
<th>Existing Parcel Status (&lt;1 Acre)</th>
<th>Existing Parcel Status (&gt; 1 Acre)</th>
<th>Projected Parcel Development Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total Parcels</td>
<td>Developed</td>
<td>Vacant</td>
</tr>
<tr>
<td>San Francisquito Creek</td>
<td>100</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Adobe Creek</td>
<td>3,936</td>
<td>270</td>
<td>180</td>
<td>90</td>
</tr>
<tr>
<td>Permanente Creek</td>
<td>7,715</td>
<td>1,302</td>
<td>1,188</td>
<td>113</td>
</tr>
<tr>
<td>Calabazas Creek</td>
<td>711</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>San Tomas Creek</td>
<td>2,857</td>
<td>18</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Guadalupe River</td>
<td>3,817</td>
<td>368</td>
<td>323</td>
<td>45</td>
</tr>
<tr>
<td>Lexington Basin</td>
<td>9,480</td>
<td>1,289</td>
<td>777</td>
<td>512</td>
</tr>
<tr>
<td>Upper Los Gatos Creek</td>
<td>4,042</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Alamitos Creek</td>
<td>5,636</td>
<td>274</td>
<td>209</td>
<td>65</td>
</tr>
<tr>
<td>Coyote Creek</td>
<td>91,180</td>
<td>467</td>
<td>342</td>
<td>125</td>
</tr>
<tr>
<td>Calaveras Reservoir</td>
<td>50,820</td>
<td>31</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>Northeast County</td>
<td>78,712</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>226,348</strong></td>
<td><strong>4,026</strong></td>
<td><strong>3,042</strong></td>
<td><strong>984</strong></td>
</tr>
</tbody>
</table>

* Does not include 985 parcels that are either publicly-owned or covered by open space easements (i.e., "non-development" areas).
### Table 6
South County - RWQCB Region 3
Parcel Development Projections by Watershed*

<table>
<thead>
<tr>
<th>Watershed Name</th>
<th>Non-sewered Area (acres)</th>
<th>Existing Parcel Status (&lt; 1 Acre)</th>
<th>Existing Parcel Status (&gt; 1 Acre)</th>
<th>Projected Parcel Development Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total Parcels</td>
<td>Developed</td>
<td>Vacant</td>
</tr>
<tr>
<td>Upper Llagas Creek</td>
<td>7,694</td>
<td>13</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Llagas Morgan Hill</td>
<td>8,804</td>
<td>283</td>
<td>164</td>
<td>119</td>
</tr>
<tr>
<td>Llagas San Martin</td>
<td>11,397</td>
<td>530</td>
<td>409</td>
<td>121</td>
</tr>
<tr>
<td>Llagas East Gilroy</td>
<td>9,744</td>
<td>11</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Llagas Gilroy</td>
<td>17,679</td>
<td>219</td>
<td>125</td>
<td>94</td>
</tr>
<tr>
<td>Uvas Creek</td>
<td>41,458</td>
<td>126</td>
<td>48</td>
<td>78</td>
</tr>
<tr>
<td>Pacheco Creek</td>
<td>75,546</td>
<td>14</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Pescadero Creek</td>
<td>6,049</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>178,371</strong></td>
<td><strong>1,197</strong></td>
<td><strong>757</strong></td>
<td><strong>440</strong></td>
</tr>
</tbody>
</table>

* Does not include 264 parcels that are either publicly-owned or covered by open space easements (i.e., "non-development" areas).
Second Unit Analysis

It was determined that some of the proposed Ordinance changes would improve the feasibility for existing developed properties to accommodate a second dwelling unit, specifically: (a) changes in the dispersal area sizing criteria for conventional OWTS; (b) elimination of the requirement to install an entirely separate OWTS for detached buildings, such as second units; (c) ability to utilize alternative OWTS designs to overcome certain soil and groundwater constraints; and (d) elimination of the current 5-acre minimum lot size requirement for second units in the San Martin area. Estimates of the number of additional second units that could potentially be attributable to these Ordinance changes were developed in accordance with the following assumptions and procedures.

1. The analysis focused specifically on the estimated 12,543 non-sewered developed properties determined through the parcel development status analysis above.

2. It was assumed that classification of a non-sewered parcel as “developed” is an indication that basic requirements for a conventional OWTS have been met under either the current or former Ordinance requirements. Undoubtedly, there are some developed properties in the County with OWTS that pre-date regulations and may have unsuitable site conditions per current practices. But the number of such properties was assumed to be relatively small, and no attempt was made estimate how many or where such parcels might be located in the County.

3. Because of the assumption in (2) above, lot size, rather than soil/OWTS suitability area, was judged to be the major factor on which to estimate the impact on second unit development potential for any given developed property under the proposed Ordinance changes.

4. In consultation with DEH staff the following estimates, according to lot size, were made of how the proposed Ordinance changes could improve the probability of being able to accommodate a second unit addition for any existing non-sewered developed property:

   - <1/4 acre: 0%
   - 1/4 - 1/2 acre: 10%
   - 1/2 – 3/4 acre: 20%
   - 3/4 – 1 acre: 30%
   - 1 – 2 acres: 25%
   - > 2 acres: 0% (except in San Martin area)
   - 2-5 acres in San Martin Area: 100% (assumes current 5-ac lot size limit lifted)

5. It is understood that second unit additions are an optional building activity that are only proposed on some percentage of all single family residences. An estimate of this percentage was not readily available from County records or published sources; therefore, it was developed with the assistance of Santa Clara County planning staff as follows:

   - A listing of Santa Clara County residential building permit activities (approximately 2,500 entries) for the past approximately 20 years were obtained compiled;
County planning staff reviewed all entries and identified those where the permit activity appeared to involve a second unit building addition, with the following findings:

- Total # of permit records reviewed: 2,508
- # of permits for second dwelling units: 194
- Calculated second unit percentage: 7.7%

Using the above results Questa adopted the 7.7% as the best available approximation of the apparent “second unit development rate” in the County for the purposes of this study.

6. The estimated increases in second unit development potential under the proposed Ordinance were calculated by multiplying the total number of non-sewered developed parcels by: (a) the lot-sized based “probability” factors (from 4 above); and (b) the “second unit development rate” (from 5 above).

The results of the above analysis were compiled by watershed sub-basin area and are presented in Table 7. The estimated total increase in second unit development potential, Countywide, is 158, with the largest number expected in the San Martin area mainly as a result of the elimination of the current 5-acre lot size limitation for second units in that area.

Summary

The overall results of the OWTS growth analysis study are summarized in Figure 4, which provides: (a) a summary (by watershed sub-basin) of projected single family residence development under the current and proposed Ordinance and the net increase; (b) the projected additional development of second units for existing developed parcels; (c) the combined net increase in vacant parcel development plus additional second units; and (d) an annotated map depicting the geographical distribution of the projected additional development potential throughout the County.
Table 7. Estimates of Additional 2nd Unit Development Potential under the Proposed Ordinance

<table>
<thead>
<tr>
<th>Watershed Sub-basin</th>
<th>Estimated Additional Second Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Francisquito</td>
<td>0</td>
</tr>
<tr>
<td>Adobe</td>
<td>16</td>
</tr>
<tr>
<td>Permanente</td>
<td>20</td>
</tr>
<tr>
<td>Calabazas</td>
<td>0</td>
</tr>
<tr>
<td>San Tomas</td>
<td>1</td>
</tr>
<tr>
<td>Guadalupe River</td>
<td>2</td>
</tr>
<tr>
<td>Lexington Basin</td>
<td>10</td>
</tr>
<tr>
<td>Upper Los Gatos Crk</td>
<td>0</td>
</tr>
<tr>
<td>Alamitos Creek</td>
<td>6</td>
</tr>
<tr>
<td>Coyote Creek</td>
<td>10</td>
</tr>
<tr>
<td>Calaveras Reservoir</td>
<td>0</td>
</tr>
<tr>
<td>Northeast County</td>
<td>0</td>
</tr>
<tr>
<td>Upper Llagas</td>
<td>0</td>
</tr>
<tr>
<td>Llagas Morgan Hill</td>
<td>9</td>
</tr>
<tr>
<td>Llagas San Martin</td>
<td>74</td>
</tr>
<tr>
<td>Llagas East Gilroy</td>
<td>0</td>
</tr>
<tr>
<td>Llagas Gilroy</td>
<td>6</td>
</tr>
<tr>
<td>Uvas Creek</td>
<td>4</td>
</tr>
<tr>
<td>Pacheco Creek</td>
<td>0</td>
</tr>
<tr>
<td>Pescadero</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
</tr>
</tbody>
</table>
PARCEL DEVELOPMENT PROJECTIONS
BY WATERSHED

DATE: 1/24/2013
PROJECT NO.: 1000064
PROJECT: Santa Clara County Onsite Wastewater Growth Analysis
DRAWN: MF
APPROVED: NH

FIGURE 4
Part 2 – Cumulative Wastewater Volume and Nitrate Loading Projections

Based on the estimated number of existing developed properties using OWTS along with the projected future build-out potential from the Part 1 analysis, this section presents estimates of the associated cumulative wastewater loading and distribution throughout different geographical and hydrological regions of the County.

Cumulative wastewater loading projections were made for development projections under the current and proposed Ordinance and were compiled for the 20 watershed sub-basins defined in Part 1.

Wastewater loading projections focused on two parameters: (1) total wastewater volumes discharged via OWTS dispersal fields to the environment; and (2) resultant total nitrate-nitrogen loading to the groundwater within each watershed sub-basin.

Wastewater Volumes

Design Wastewater Flow. Individual OWTS are normally designed on the basis of the estimated maximum daily sewage flow from the residence or building(s) served. Under the current Santa Clara County Onsite Wastewater Ordinance, the standard design factor is 150 gallons per day (gpd) per bedroom, with a minimum size of 450 gpd for any system serving up to a 3-bedroom residence. Under the proposed Ordinance, the 150 gpd/bedroom factor would be retained, but the 450 gpd minimum would be eliminated in favor of requiring the design to be matched to the actual number of bedrooms in the residence.

Actual Wastewater Flow. The design sewage flow is purposely set with a margin of safety above the actual wastewater flows, in order to accommodate maximum usage of an individual system. The factor of 150 gpd/bedroom is based on the assumption of occupancy of two persons per bedroom and a sewage generation rate of 75 gpd per capita. The current 450 gpd minimum design flow in Santa Clara County equates to a household occupancy of 6 persons. According to the 2010 Census, the average occupancy in Santa Clara County is approximately 2.9 persons per household. Also, based on information from the US EPA OWTS Manual (2002) the actual residential sewage generation rates are found to be in the range of 45 to 70 gpd/per capita. Using these figures, the actual average wastewater flow from a group of residential OWTS would be in the range of about 130 to 200 gpd per residence. For comparison, wastewater flow monitoring of the Lake Canyon Community Wastewater System (51 connections) over the past 15 years indicates average wastewater flows in the range of 65 to 120 gpd/residence. Lake Canyon would be considered representative of a group of generally older residences; new homes of typically larger size would likely generate greater wastewater volumes. Considering all of these data, an average wastewater flow on the order of 150 gpd per residential OWTS is considered a reasonable estimate for Santa Clara County as a whole.

Watershed Sub-basin Estimates. Using the unit flow rate of 150 gpd per residential OWTS, Tables 8 and 9 present the estimated volume of wastewater generated for each of the 20 watershed sub-basins for: (a) existing development conditions; (b) projected build-out under the current Ordinance; and (c) projected build-out under the proposed Ordinance. Estimated wastewater volumes are shown in gallons per day (gpd) and million gallons per year (Mgal/yr).
Additionally, the average annual wastewater loadings, in gallons per acre, are calculated and presented based on the total acreage of non-sewered area within each watershed sub-basin.

As indicated in far right-hand column of Table 8, in the North County projected annual wastewater loading rates under the proposed Ordinance range from lows of a few hundred gallons per acre per year in the more remote northeastern areas, to the highest rates on the order of about 7,000 to 16,000 gal/ac-yr in the Adobe Creek and Permanente Creek sub-basins. The higher rates in these sub-basins are influenced by the large number of OWTS located in the Town of Los Altos Hills. The Lexington Basin has the next highest wastewater loading rates (4,600 gal/ac-yr currently, projected to increase to about 5,700 gal/ac-yr under the proposed Ordinance), followed by Guadalupe River and Alamitos Creek sub-basins.

In the South County, per Table 9, the projected annual wastewater loadings range from lows of less than 200 gal/ac-yr in the remote southeast and southwest corners of the County, to the highest in the Morgan Hill and San Martin areas of the Llagas Creek watershed, with loading rates in the range of about 6,000 to 8,000 gal/ac-yr currently, projected to increase to about 7,500 to 9,500 gal/ac-yr, under build-out conditions.
## Table 8. Projected Wastewater Loading Volumes

**North County - RWQCB 2**

<table>
<thead>
<tr>
<th>Watershed Sub-basin</th>
<th>Non-sewered Area (acres)</th>
<th>Existing Conditions</th>
<th>Current Ordinance Projections</th>
<th>Proposed Ordinance Projections</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Developed Parcels</td>
<td>Discharge Volume (gpd)</td>
<td>WW Loading gal/ac-yr</td>
<td>Developed Parcels</td>
</tr>
<tr>
<td>San Francisquito Crk</td>
<td>100</td>
<td>4</td>
<td>600</td>
<td>2.2</td>
</tr>
<tr>
<td>Adobe Creek</td>
<td>3,909</td>
<td>1,013</td>
<td>151,950</td>
<td>55.46</td>
</tr>
<tr>
<td>Permanente Creek</td>
<td>13,948</td>
<td>1,813</td>
<td>271,950</td>
<td>95.62</td>
</tr>
<tr>
<td>Calabazas Creek</td>
<td>855</td>
<td>10</td>
<td>1,500</td>
<td>0.55</td>
</tr>
<tr>
<td>San Tomas Creek</td>
<td>6,985</td>
<td>152</td>
<td>22,800</td>
<td>8.34</td>
</tr>
<tr>
<td>Guadalupe River</td>
<td>10,649</td>
<td>514</td>
<td>77,100</td>
<td>28.14</td>
</tr>
<tr>
<td>Lexington Basin</td>
<td>16,333</td>
<td>1,364</td>
<td>204,600</td>
<td>74.68</td>
</tr>
<tr>
<td>Upper Los Gatos Crk</td>
<td>6,549</td>
<td>38</td>
<td>5,700</td>
<td>2.09</td>
</tr>
<tr>
<td>Alamitos Creek</td>
<td>16,202</td>
<td>638</td>
<td>95,700</td>
<td>34.93</td>
</tr>
<tr>
<td>Coyote Creek</td>
<td>145,642</td>
<td>1,394</td>
<td>209,100</td>
<td>76.32</td>
</tr>
<tr>
<td>Calaveras Reservoir</td>
<td>73,040</td>
<td>124</td>
<td>18,600</td>
<td>6.79</td>
</tr>
<tr>
<td>Northeast County</td>
<td>81,363</td>
<td>110</td>
<td>16,500</td>
<td>6.02</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>316,227</strong></td>
<td><strong>7,174</strong></td>
<td><strong>1,076,100</strong></td>
<td><strong>393</strong></td>
</tr>
</tbody>
</table>
Table 9. Projected Wastewater Loading Volumes  
South County - RWQCB 3

<table>
<thead>
<tr>
<th>Watershed Sub-basin</th>
<th>Non-sewered Area (acres)</th>
<th>Existing Conditions</th>
<th>Current Ordinance Projections</th>
<th>Proposed Ordinance Projections</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Developed Parcels</td>
<td>Discharge Volume (gpd)</td>
<td>Discharge Volume (Mgal/yr)</td>
<td>WW Loading gal/ac-yr</td>
</tr>
<tr>
<td>Upper Llagas</td>
<td>8,840</td>
<td>86</td>
<td>12,900</td>
<td>4.71</td>
</tr>
<tr>
<td>Llagas Morgan Hill</td>
<td>9,685</td>
<td>1,091</td>
<td>163,650</td>
<td>59.73</td>
</tr>
<tr>
<td>Llagas San Martin</td>
<td>12,842</td>
<td>1,896</td>
<td>284,400</td>
<td>103.81</td>
</tr>
<tr>
<td>Llagas East Gilroy</td>
<td>10,108</td>
<td>209</td>
<td>30,600</td>
<td>11.17</td>
</tr>
<tr>
<td>Llagas Gilroy</td>
<td>18,192</td>
<td>1,198</td>
<td>179,700</td>
<td>65.59</td>
</tr>
<tr>
<td>Uvas Creek</td>
<td>47,522</td>
<td>836</td>
<td>125,400</td>
<td>45.77</td>
</tr>
<tr>
<td>Pacheco Creek</td>
<td>97,454</td>
<td>56</td>
<td>8,400</td>
<td>3.07</td>
</tr>
<tr>
<td>Pescadero</td>
<td>6,049</td>
<td>2</td>
<td>300</td>
<td>0.11</td>
</tr>
<tr>
<td>TOTAL</td>
<td>210,692</td>
<td>5,369</td>
<td>805,350</td>
<td>294</td>
</tr>
</tbody>
</table>
Overall, the total volume of wastewater loading in the northern part of the County is presently about 34% higher than in the South County, and this difference is expected to be about 26% under projected build-out conditions. Average wastewater loading rates (i.e., per acre) in the South County are higher, presently about 12% higher and expected to increase to about 19% higher for projected build-out conditions under the proposed Ordinance. Table 10 presents a summary comparing existing and projected wastewater loading rates under the current and proposed Ordinance for the North and South regions of the County.

Table 10
Summary of Existing and Projected Wastewater Loading Concentrations

<table>
<thead>
<tr>
<th>RWQCB Area</th>
<th>Existing Development</th>
<th>Current Ordinance Projections</th>
<th>Proposed Ordinance Projections</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Wastewater Loading (gal/ac-yr)</td>
<td>Annual Wastewater Loading (gal/ac-yr)</td>
<td>Percent Increase²</td>
</tr>
<tr>
<td>Region 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North County</td>
<td>1,242</td>
<td>1,481</td>
<td>19%</td>
</tr>
<tr>
<td>Region 3</td>
<td>1,395</td>
<td>1,715</td>
<td>23%</td>
</tr>
</tbody>
</table>

¹ Average loading rate for non-sewered areas
² Compared to existing development conditions.

Nitrate-Nitrogen Loading

Nitrate-nitrogen loading from OWTS can potentially degrade groundwater quality and contribute to nutrient enrichment of surface waters. Nitrogen occurs in high concentrations in domestic sewage, typically in the range of 50 to 90 mg-N/L. It occurs mostly as ammonia and organic forms, and is removed only partially through conventional septic tank treatment. Upon entering the unsaturated soil environment, these forms of nitrogen undergo transformation to nitrate. Nitrate is highly soluble in water and moves readily through the soil and groundwater with limited removal by the soil under most circumstances. High levels of nitrate in water supplies can cause methemoglobinemia (blue baby syndrome) in infants and pregnant women. The drinking water standard (MCL) for nitrate-nitrogen is 10 mg/L (as nitrogen, N), which is equivalent to 45 mg/L as nitrate, NO₃.

Nitrate loading is normally not an issue for individual residential OWTS, but can become a “cumulative impact” concern for large concentrations of OWTS in a given area or for larger commercial or community-type OWTS. Elevated levels of nitrate, above the drinking water MCL, have been found in water wells located in two principal areas of Santa Clara County - Coyote Valley (21% of wells) and Llagas Sub-basin (8% of wells) according to the SCVWD 2010 Groundwater Quality Report, June 2011. Additionally, Llagas Creek and Pajaro River have been designated as impaired water bodies per Section 303(d) of the Clean Water Act due to high nitrate concentrations. Agricultural fertilizers have been identified by the Central Coast RWQCB as the primary nitrate-nitrogen source and cause of impairment in these two water bodies. Nevertheless, OWTS contribute to the overall nitrate loading to the various watersheds.
and groundwater basins in Santa Clara County; and the contributions will likely increase with future development using OWTS.

Using the estimates of existing and projected OWTS densities and wastewater loading volumes (per above), calculations have been made to estimate the existing contribution and potential incremental increase in groundwater-nitrate concentrations due to future residential build-out under the current and proposed Ordinance requirements. The projected nitrate concentration increases per this analysis would be in addition to other sources of nitrate that might occur in each sub-basin, such as leaching of agricultural fertilizers, confined animal wastes, municipal wastewater discharges, etc.

**Methodology**

The nitrate loading analysis was completed using an annual chemical-water balance analysis. The methodology followed is described in the publication “Predicting Groundwater Nitrate-Nitrogen Impacts” (Hantzsche and Finнемore, *Groundwater*, Vol. 30, No. 4, July-August 1992). According to this methodology, the long-term concentration of nitrate as nitrogen (NO$_3$-N or nitrate-nitrogen) in the upper saturated groundwater zone can be closely approximated by the quality of percolating recharge waters. Considering only the contributions from OWTS and natural sources picked up by rainfall leaching of soil and vegetation, the average concentration of nitrate-nitrogen in recharge water, $n_r$, is estimated using the following equation:

$$n_r = \frac{W n_w (1 - d) + R n_b}{(W + R)}$$

where: $n_r =$ resultant average concentration of NO$_3$-N in recharge water, mg-N/l  
$W =$ average annual volume of wastewater entering the soil, acre-ft/yr (AFY)  
$n_w =$ total nitrogen concentration of wastewater, mg-N/l  
$d =$ fraction of NO$_3$-N loss due to denitrification in the soil  
$R =$ average annual volume of rainfall recharge in sub-basin area, AFY  
$n_b =$ background NO$_3$-N concentration of rainfall recharge at the water table, exclusive of wastewater, agriculture or other development influences, mg-N/l

**Data and Assumptions**

Per the equation presented above, resultant nitrate concentration in the groundwater is estimated to be the weighted average or combined concentration due to wastewater loading and recharge of rainfall (“deep percolation”) contributed from the watershed sub-basin within the area of concern. For this analysis, calculations were made for each of the 20 watershed sub-basins covering the non-sewered areas of Santa Clara County. The analysis includes nitrate-nitrogen
contributions from the existing and projected future OWTS plus a factor representing background nitrate concentrations associated with percolating rainfall in the open space areas. The following summarize the various assumptions.

- **Recharge Area.** The recharge area for each sub-basin includes the total estimated acreage of non-sewered land within each sub-basin, as listed in Tables 8 and 9. The acreage includes the parcels currently and potentially developable with OWTS, as well as the public lands and open space easement areas. Land areas served by public sewers are excluded from the “recharge area”.

- **Wastewater Flows.** The nitrate loading analysis was completed for the existing and projected annual wastewater volumes presented in Tables 8 and 9, which are based on an average wastewater flow assumption of 150 gpd per residential OWTS (3 persons per residence at approximately 50 gpd per person).

- **Wastewater Nitrogen Concentrations.** Total nitrogen concentration in wastewater effluent was assumed to be 70 mg/L, which is typical for domestic wastewater discharges from conventional septic tank – dispersal trench systems, based on a per capita wastewater volume of 50 gpd/capita (Crites and Tchobanoglous, 1998). This value is appropriate for calculations of nitrate loading from existing development and future OWTS under the current Ordinance. Under the proposed Ordinance the use of alternative treatment and dispersal methods will provide greater nitrogen removal, potentially up to 50% or more of that coming from conventional OWTS. Therefore, the value of 70 mg/L is a conservative (safe) assumption for analysis of impacts from the proposed Ordinance.

- **Background Nitrogen Concentration.** Limited water quality sampling data for local wells in non-agricultural areas indicate low to non-detectable levels of nitrate-nitrogen. Therefore, a nominal value of 0.5 mg-N/L was assumed as the background concentration associated with percolating rainfall.

- **Soil Denitrification.** Total nitrogen removal in the upper soil zones (via denitrification) was estimated to be 15 percent of the total nitrogen in the percolating OWTS effluent, which is on the low (conservative, safe) end of the common range of values (10% to 25%) normally attributed to soil denitrification. This value was selected based on the relatively permeable soil conditions in most parts of Santa Clara County.

- **Rainfall Recharge (Deep Percolation).** Deep percolation was estimated through completion of a water balance analysis, which takes into account rainfall, runoff, and evapotranspiration losses. Water balance calculations were made for four different geographic and climatic regions of the County: (1) Santa Cruz Mountains; (2) South Santa Clara Valley; (3) Diablo Range; and (4) Southeastern Diablo Range. Key data sources used in the water balance and the resulting estimates of annual recharge (inches per year) were as shown in Table 11; calculation sheets are attached provided in the technical appendix on file with DEH.
Table 11
Water Balance Data Source and Estimates

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>Rainfall Station</th>
<th>Reference Evapotranspiration Zone (ETo)*</th>
<th>Estimated Annual Recharge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>inches/yr</td>
</tr>
<tr>
<td>Santa Cruz Mountains</td>
<td>Los Gatos</td>
<td>3 – Coastal Valleys/Mountains</td>
<td>10.89</td>
</tr>
<tr>
<td>South Santa Clara Valley</td>
<td>Gilroy</td>
<td>8 – Inland SF Bay</td>
<td>8.16</td>
</tr>
<tr>
<td>Diablo Range</td>
<td>Mt. Hamilton</td>
<td>14 – Mid-Central Valley</td>
<td>7.22</td>
</tr>
<tr>
<td>Southeast Diablo Range</td>
<td>Gilroy</td>
<td>14 – Mid-Central Valley</td>
<td>2.93</td>
</tr>
</tbody>
</table>

*per California Irrigation Management Information System (CIMIS)

Results

The results of the nitrate loading calculations analysis are summarized in Tables 12 and 13, respectively, for the North County and South County watershed sub-basins. The estimated groundwater-nitrate concentration impacts from OWTS are presented for existing development conditions, projected build-out under the current Ordinance, and projected build-out under the proposed Ordinance. The results for the proposed Ordinance include projections for development of vacant parcels as well as results including contribution from additional second units, which were evaluated as being equivalent to an additional single family residence (conservative assumption).

The projected nitrate concentration impacts in the areas of highest OWTS densities range from about 1.5 to 3.6 mg-N/L, well below the drinking water limit of 10 mg-N/L. The difference between the proposed Ordinance and the existing Ordinance is projected to be an incremental rise of about 0.2 mg-N/L or less in all sub-basins, which is within the margin of error in the basic assumptions used in the nitrate loading calculations. Overall, while some addition to groundwater-nitrate concentrations is probable under the proposed Ordinance, the magnitude would be low.

The following should be recognized in regard to these results:

- The results are generalized over each sub-basin area and represent the average, integrated effect of all OWTS and rainfall-recharge contributions;
- The analysis and results do not account for the nitrogen contributions from other possible sources, such as agricultural and landscape fertilizer use, animal wastes, and wastewater discharges other than OWTS.
- Localized results for a specific parcel or group of parcels (e.g., neighborhood) within each sub-basin would most probably differ from the generalize results presented due to site specific conditions such as: parcel size(s) and configuration, local rainfall, site development and landscape features, runoff rates, and wastewater system flows and design.
Table 12
Estimated Groundwater-Nitrate Concentration Impacts from OWTS
North County – SF Bay RWQCB 2

<table>
<thead>
<tr>
<th>Watershed Sub-basin</th>
<th>Non-sewered Area (acres)</th>
<th>Estimated Groundwater-Nitrate Concentration, mg-N/L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Existing Development Conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Francisquito Creek</td>
<td>100</td>
<td>0.93</td>
</tr>
<tr>
<td>Adobe Creek</td>
<td>3,936</td>
<td>3.20</td>
</tr>
<tr>
<td>Permanente Creek</td>
<td>7,715</td>
<td>1.89</td>
</tr>
<tr>
<td>Calabazas Creek</td>
<td>711</td>
<td>0.63</td>
</tr>
<tr>
<td>San Tomas Creek</td>
<td>2,857</td>
<td>0.74</td>
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<tr>
<td>Guadalupe River</td>
<td>3,817</td>
<td>1.02</td>
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<tr>
<td>Lexington Basin</td>
<td>9,480</td>
<td>1.40</td>
</tr>
<tr>
<td>Upper Los Gatos Creek</td>
<td>4,042</td>
<td>0.56</td>
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<tr>
<td>Alamitos Creek</td>
<td>5,636</td>
<td>0.93</td>
</tr>
<tr>
<td>Coyote Creek</td>
<td>91,180</td>
<td>0.66</td>
</tr>
<tr>
<td>Calaveras Reservoir</td>
<td>50,820</td>
<td>0.53</td>
</tr>
<tr>
<td>Northeast County</td>
<td>78,712</td>
<td>0.52</td>
</tr>
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</table>

Table 13
Estimated Groundwater-Nitrate Concentration Impacts from OWTS
South County – Central Coast RWQCB 3

<table>
<thead>
<tr>
<th>Watershed Sub-basin</th>
<th>Non-sewered Area (acres)</th>
<th>Estimated Groundwater-Nitrate Concentration, mg-N/L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Existing Development Conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Llagas Creek</td>
<td>8,840</td>
<td>0.61</td>
</tr>
<tr>
<td>Llagas Morgan Hill</td>
<td>9,685</td>
<td>2.10</td>
</tr>
<tr>
<td>Llagas San Martin</td>
<td>12,842</td>
<td>2.58</td>
</tr>
<tr>
<td>Llagas East Gilroy</td>
<td>10,108</td>
<td>0.79</td>
</tr>
<tr>
<td>Llagas Gilroy</td>
<td>18,192</td>
<td>1.44</td>
</tr>
<tr>
<td>Uvas Creek</td>
<td>47,522</td>
<td>0.69</td>
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<tr>
<td>Pacheco Creek</td>
<td>97,454</td>
<td>0.52</td>
</tr>
<tr>
<td>Pescadero</td>
<td>6,049</td>
<td>0.50</td>
</tr>
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</table>
References


Lexington Basin Parcel Development Analysis (Planning Office, 9/27/12)

Questa analysis was based on 805 parcels in Lexington Basin identified using Assessor’s Office data and some aerial checks. This watershed covers two soil units—Los Gatos-Gaviota-Vallecitos (Map Unit 12) and Ben Lomond-Felton-Lompico (Map Unit 17). The Planning Office assessed development constraints to further reduce vacant lots to those that could reasonably be developed and then reapplied OWTS approval rates as follows:

1. Eliminated all parcels with average slopes of 40% or greater because of the low probability that these can meet County standards for fire access and geologic stability. This reduces the vacant parcel count to 418.

2. “Developable” parcels were further reduced to 334 by zooming in on individual parcels and eliminating those that didn’t meet following criteria:
   a. Lot is actually vacant (a few were identified that had all or part of a structure on them).
   b. Lot is not owned by a utility (e.g., water company for watershed protection)
   c. Feasible access to roads (not landlocked)
   d. Minimum lot size of 3,750 square feet

3. The projected additional lot development in the Lexington Basin based on the expected approval rates under the proposed OWTS ordinance and applied to the original 805 vacant lot estimate is 183 single family homes. Applying these rates to the Planning Office’s estimate of the “developable” parcels, the number would drop to 83. If the 1-acre minimum lot size restriction were retained, the number of lots that could be developed would decrease by 46—from 83 to 37. The following table shows remaining parcels (“developable”) by lot size, and applies estimated approval rates based on the proposed ordinance:

<table>
<thead>
<tr>
<th>Parcel Size</th>
<th>&lt;1/4 acre</th>
<th>1/4-1/2 acre</th>
<th>1/2-3/4 acre</th>
<th>3/4-1 acre</th>
<th>&gt;1 acre</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parcel Count</td>
<td>141</td>
<td>56</td>
<td>18</td>
<td>13</td>
<td>106</td>
<td>334</td>
</tr>
<tr>
<td>Current OWTS Approval Rate(^1)</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>55%</td>
<td>58</td>
</tr>
<tr>
<td>Forecast OWTS Approval Rate(^2)</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>70%</td>
<td>90%</td>
<td>—</td>
</tr>
<tr>
<td>Change in Approval Rate(^3)</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>70%</td>
<td>35%</td>
<td>—</td>
</tr>
<tr>
<td>Additional Parcel Development</td>
<td>0</td>
<td>28</td>
<td>9</td>
<td>9</td>
<td>37</td>
<td>83</td>
</tr>
</tbody>
</table>

\(^1\)Average of approval rates for the two soil units found in the Lexington Basin
\(^2\)Lots under 1 acre excluded from approval under current OWTS ordinance
\(^3\)Lots less than \(\frac{1}{4}\)-acre in size excluded from OWTS approval even under proposed ordinance; therefore, approval rate remains 0%.
Onsite Wastewater System
Practices, Alternatives and Recommendations
Santa Clara County

Prepared for:
Santa Clara County
Department of Environmental Health

Prepared by:
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Tel: (510) 236-6114
Fax: (510) 236-2423

Questa Project #1000064

January 2013
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INTRODUCTION AND BACKGROUND

The County of Santa Clara (County) Department of Environmental Health (DEH) is responsible for regulating onsite wastewater treatment and dispersal systems (onsite systems, or OWTS) throughout the unincorporated areas of the county. Onsite systems are used almost exclusively for properties located outside of municipal sewer service boundaries, which includes large areas in the southern portions of the county, as well as in the eastern and western foothills and mountain regions. Countywide there are currently estimated to be approximately 12,500 onsite systems.

The County operates its onsite wastewater program under the authority granted to it by two California Regional Water Quality Control Boards: (1) the Central Coast Region for those areas that drain south to Monterey Bay; and (2) the San Francisco Bay Region for those areas that drain to San Francisco Bay. The north-south drainage divide is in the vicinity of Cochrane Road.

In recent years, DEH staff and County Planning and Development staff have received feedback from property owners, onsite system practitioners, and land development professionals requesting review and updating of the County’s Onsite Sewage Disposal Ordinance and related General Plan policies regarding limitations on the types of onsite wastewater treatment and dispersal systems allowed in the county. The DEH staff has independently observed these limitations and recognized that many of the difficult soil and site constraints in the county could potentially be addressed more effectively with alternative onsite system technologies that are in common usage elsewhere in neighboring jurisdictions, other parts of California and throughout most of the U.S.

County DEH staff has also become aware of inconsistencies in certain aspects of the existing Ordinance requirements, both internally and with respect to current industry practices and advances in the knowledge, understanding and use of onsite systems. In particular, existing County design standards tend to dictate drainfield (i.e., leachfield) sizes and redundancies significantly larger than are necessary according to published literature and the experience and requirements of staff in other in neighboring S.F. Bay Area counties. Also, the existing Ordinance includes onsite system siting and design requirements that differ for properties located in the Lexington Basin area as compared with the rest of the county. The unique requirements for the Lexington Basin were adopted based on a study done in the early 1980s, prior to significant changes in the County regulations, which occurred in the 1990s, and without the benefit of other advancements in the knowledge and understanding of onsite systems that has transpired over the past 30 years. As a result, the validity and continued need for the Lexington Basin requirements is questionable.

In response to the above feedback and concerns, in late 2010 the County authorized a study to comprehensively review and evaluate the County’s current onsite system regulations and management program. The study, conducted under contract with Questa Engineering Corporation, had the objective of evaluating and making recommendations regarding the following main issues:
• assessment of the adequacy and appropriateness of the existing County Ordinance, including policies and procedures, with respect to the current state of knowledge and industry practices regarding conventional septic tank and drainfield siting criteria and evaluation methods, design standards, and construction requirements;

• incorporation of provisions in a new or revised ordinance allowing certain types of alternative onsite wastewater treatment and dispersal systems, including their applicability to local conditions, along with appropriate criteria and requirements for their use, design, construction, and ongoing management;

• improvements to the County’s regulatory oversight program for septic tank pumping, transport, and disposal of septage;

• applicability of different types of onsite systems and policies for subdivisions, existing lots of record, building additions/remodels, and repair situations;

• requirements and design approaches applicable to onsite systems serving commercial properties, large flow systems, and small community-type systems, including alternative strategies for areas characterized by poor soil suitability and/or high rates of onsite system failures;

• estimates of existing and potential long-term usage and distribution of onsite systems in the county, along with projections of associated cumulative wastewater loading to groundwater basins and watersheds.

The issues, findings, interim work products and draft recommendations developed by Questa during the study were presented and reviewed at monthly progress meetings and other workshops held throughout 2011 and 2012 with County DEH and County Planning and Development staff, Regional Water Board representatives, and members of a Wastewater Advisory Group (stakeholders) assembled for the study. The outcome of this 2-year study effort has been a series of recommended changes and additions to the existing Ordinance along with supporting technical and procedural requirements pertaining to the use and management of onsite systems in Santa Clara County.

This report is a summary document, providing an overview of onsite wastewater system siting requirements, design practices, and technologies available to address the types of physical constraints encountered in Santa Clara County, such as shallow soils, high groundwater, steep slopes, excessively rapid or slow percolation. Practices and requirements followed in Santa Clara County are compared with those in use in other neighboring counties, in published technical literature (e.g., US EPA, 2002), as well as the guidelines and requirements of the S.F. Bay and Central Coast Regional Water Quality Control Boards. Management requirements associated with conventional and alternative technologies are also reviewed. Based on Questa’s review and various input received during the study, recommended changes and additions to existing County regulations and practices are presented at the end of the report.
Related work products prepared by Questa as part of the study include the following:

- Draft of the proposed revised Ordinance.

- “Summary of Proposed Ordinance Changes”. This is a side-by-side comparison of the existing onsite sewage disposal Ordinance and the proposed Ordinance, including a synopsis of each code section and brief description of the proposed changes or additions.

- “Growth Projections and Cumulative Wastewater Loading from Implementation of the Santa Clara County Onsite Wastewater Ordinance Changes”, January 2013. This is a report presenting the results of Questa’s evaluation of soil suitability for OWTS in Santa Clara County, current distribution of OWTS in the County, projected impacts on future development related to Ordinance changes, and estimated wastewater loading volumes and nitrogen loading effects from future build-out using OWTS.

- Draft design and construction guidelines for conventional OTWS and for various alternative OWTS identified in the proposed Ordinance, for inclusion in a newly compiled Onsite Systems Manual.

- Draft guidelines addressing implementation of other Ordinance requirements for inclusion in a newly compiled Onsite Systems Manual, including: (a) soil and site evaluation procedures; (b) geotechnical study requirements for slopes >20%; (c) wastewater flow estimation; (d) guidelines for cumulative impact assessment; and (e) OWTS performance evaluation guidelines.

**SITING REQUIREMENTS FOR ONSITE WASTEWATER TREATMENT SYSTEMS**

The following is a review of the key factors that affect the siting and functioning of onsite wastewater treatment and dispersal systems (OWTS), including the applicable standards contained in the respective Basin Plans of the San Francisco Bay and Central Coast RWQCB and/or Santa Clara County regulations. See **Figure 1** for a depiction of various siting factors.

**Soils**

Soil suitability is the single most critical aspect of onsite wastewater treatment and dispersal. The soil provides the medium for the absorption and treatment of wastewater discharged through sub-surface dispersal systems. This is accomplished mainly through a combination of physical filtering, biological and chemical processes, and dilution. In order to be effective, the soil must have reasonable permeability for water movement, sufficient amount of fine soil particles (i.e., silt, clay, and fine sand) for filtering and support of biological activity, adequate depth of soil above the water table (zone of aeration) for treatment to occur, and suitable drainage to prevent saturation or flooding. OWTS failures can occur as a result of: (a) the inability of soil to absorb the wastewater at a rate that matches or exceeds the flow from the building(s) served; (b) inadequate treatment due to shallow soils and/or rapid percolation down to the water table; or (c)
TYPICAL SITING CONSIDERATION FOR ON-SITE SEWAGE DISPOSAL SYSTEMS

SANTA CLARA COUNTY

*BASED ON PERCOLATION RATE
seepage along a drainage course or cut slope due to inadequate lateral setback, shallow soils, and/or poor percolation.

Soil conditions can vary within short distances. Detailed investigation of the soil is generally needed to determine the OWTS suitability of any given site. At a minimum, proper investigation includes a soil profile analysis to determine soil texture, structure, depth, percolation characteristics, and occurrence of groundwater. Santa Clara County Code requires soil and site evaluation for each OWTS installation according to procedures established by the Director of Environmental Health. The current procedures are generally consistent with industry practices and appropriate for the conditions and requirements in Santa Clara County. They include provisions for wet weather groundwater observations, which is a key consideration in many instances.

Geology

The geology of an area is important to the suitability and performance of OWTS due to its influence on topography and landforms, the type and characteristics of soils that develop at the surface, the occurrence and movement of sub-surface water, and slope stability. For example, more resistant rocks generally are associated with steeper terrain, ridges and knolls, where the soils tend to be relatively shallow and, thus, limited for subsurface wastewater dispersal. Softer rock types, such as sandstone and shale, will weather to form deeper soil layers and deposits of eroded materials. However, soil permeability can vary widely, depending upon the degree of weathering that takes place (i.e., to form clays) and the mineralogy of the rock.

The type and structure of the bedrock has a strong influence on groundwater conditions, which, in turn, affects the suitability and potential impacts of onsite wastewater dispersal. In hard rock areas water movement is generally restricted to fracture zones, often referred to as the secondary permeability, which may offer little in the way of treatment and possess the potential for wastewater to be transported significant distances in an anaerobic state. Some rock types, such as sandstone, conglomerates, and limestone, have significant primary permeability, which provides for transmission of water through the interstices in the rock itself, where additional filtering and treatment can occur. Contacts between different rock types or layers are often avenues for the movement of sub-surface waters; springs and seeps are often found where fractures and geologic contacts come to the surface. Where the underlying rock lacks significant primary or secondary permeability, a water table may form near the ground surface, which can interfere with the suitability and use of OWTS. Areas of steep slopes and weak rock types generally pose the greatest slope stability concerns and most severe limitation for subsurface wastewater dispersal. Santa Clara County has strict requirements regarding ground slope limitations for OWTS, including mandatory geotechnical evaluation of slope stability and other issues for proposed sites on slopes greater than 20 percent (see discussion below under “Slope”).

Percolation

The percolation test is a commonly used method of evaluating hydraulic conductivity (i.e., permeability) in soils and evaluating the suitability and proper sizing for an OWTS. Percolation testing is not the sole determinant of soil suitability, but it provides useful information in combination with the soil profile data.
Percolation testing is standard practice in Santa Clara County. County regulations require that the percolation rate be no faster than 1 minute per inch (mpi) and no slower than 120 mpi\(^1\). Procedures for conducting percolation tests are contained in the County’s “Bulletin A”.

**Groundwater**

High groundwater is another factor that affects the ability of the soils to absorb and provide treatment for the effluent. A high water table can reduce the effectiveness of the soil treatment zone, can be a conduit for groundwater or surface water contamination, and can also contribute to hydraulic failure of a dispersal field, causing the effluent to backup within and adjacent to the dispersal trench, and potentially rise to the surface.

In Santa Clara County, minimum depth to groundwater for conventional OWTS is based on soil percolation rate per Table 1 below, established to conform to the criteria contained in respective Basin Plans of the SF Bay and Central Coast RWQCBs, which are listed in the table. Also shown below are the depth to groundwater requirements that apply specifically to properties in the Lexington Basin area of the County, which were adopted independently in the early 1980s based recommendations from a study known as the “Montgomery Report”. The Lexington Basin requirements are more restrictive than County-wide standards for rapid percolation conditions (1 to 5 mpi), but less restrictive or the same for all other conditions.

<table>
<thead>
<tr>
<th>Percolation Rate (mpi)</th>
<th>Santa Clara County Ordinance</th>
<th>Lexington Basin Requirements</th>
<th>SF Bay RWQCB Basin Plan</th>
<th>Central Coast RWQCB Basin Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 5</td>
<td>20</td>
<td>Prohibited</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>6 – 30</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>31-120</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

**Ground Slope**

Slope stability, erosion hazards and the potential for downslope seepage or breakout of effluent pose limitations on the steepness of the slope where onsite systems can be located. There are also practical limits for construction on steep slopes. Slope requirements for OWTS in Santa Clara County are summarized in Table 2.

---

\(^{1}\) “Minutes per inch” is the time, in minutes, for the water level to drop one inch in a standard percolation test hole.
Table 2.  
Ground Slope Requirements for OWTS Dispersal Fields

<table>
<thead>
<tr>
<th>Ground Slope In Dispersal Area*</th>
<th>OWTS Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 20 percent</td>
<td>OWTS permitted with no special slope limitations.</td>
</tr>
<tr>
<td>20 to 50 percent</td>
<td>Requires variance from Director based on completion of slope stability study performed by registered civil engineer, certified engineering geologist or registered environmental health specialist.</td>
</tr>
<tr>
<td>30 to 50 percent</td>
<td>North County – No additional requirements</td>
</tr>
<tr>
<td></td>
<td>South County – Requires variance from Central Coast RWQCB.</td>
</tr>
<tr>
<td>&gt; 50 percent</td>
<td>OWTS not permitted.</td>
</tr>
</tbody>
</table>

*Note: Under the current Ordinance, certain locations within Lexington Basin have slope limitations ranging from 30 to 50 percent, specified and measured as the “average slope of the lot”.

Table 3  
Minimum Horizontal Distances Setback (feet)

<table>
<thead>
<tr>
<th>Water or Landscape Feature</th>
<th>Dispersal Field</th>
<th>Septic Tank</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Wells and Springs</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Watercourses (top of bank)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Reservoirs (high water mark)</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Cuts or Steep Embankments (top of cut)</td>
<td>4 x h*</td>
<td>10</td>
</tr>
<tr>
<td>Steep slopes (break of slope)</td>
<td>4 x h*</td>
<td>10</td>
</tr>
<tr>
<td>Drainageway/Drainage Swale</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Foundation</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Property Line</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Septic Tanks</td>
<td>6</td>
<td>N/A</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Road easement, pavement, or driveway</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

* h=height of cut
**Horizontal Setbacks**

Minimum horizontal setback distances between onsite wastewater system components and various water and landscape features are established to provide suitable buffer area around the wastewater system. The existing setback standards for OWTS contained in Santa Clara County code are listed in **Table 3**; these standards are applied uniformly throughout the County, including the Lexington Basin. They are all equal to or greater than the requirements contained in the Basin Plans of both the SF Bay and Central Coast RWQCBs.

**Density Considerations and Cumulative Impacts**

High-density development using OWTS can contribute to elevated nitrogen concentrations in the groundwater and/or a general rise or mounding of the water table, both of which are undesirable. Such problems are generally avoided by planning for sufficiently large lots sizes where OWTS are used. Santa Clara County regulations include provisions for the Director to require project-specific technical analysis to address cumulative impact issues where they may be of concern. The regulations also stipulate that for any newly created lot (i.e., new subdivisions), minimum parcel size shall be at least one acre, and any new lot located within a reservoir watershed area the minimum size is increased to 2.5 acres.

**Specific Geographical Area Requirements**

**Lexington Basin**

The current Santa Clara On-site Sewage Disposal Ordinance, under Article 3 (Sections B11-90 - B11-95), includes siting and design criteria for OWTS located in the Lexington Basin area that are unique to that particular geographical area of the County. Some of the requirements are identical to those applicable in the rest of the County (e.g., for septic tanks), some are somewhat different (e.g., dispersal design), and some are entirely unique, in particular the 1-acre minimum lot size for any new OWTS. The requirements were adopted in the early 1980s, to implement recommendations from a wastewater management study by James M. Montgomery Consulting Engineers, Inc., titled “Project Report for the Lexington Basin, September 1980”. As stated in Sec. B11-90 of the Ordinance, the Board of Supervisors made the following findings based on the information in the Montgomery report:

(a) That the continued use of the present septic systems and regulations in the Lexington Basin would result in significant water quality degradation of the local streams and would imperil public health, safety and welfare.

(b) That alternatives to conventional septic systems are necessary in certain areas of the basin in order to protect the public health, safety and welfare.

(c) That development of vacant parcels in the basin proceed only according to certain guidelines, including minimum parcel sizes, maximum parcel slopes, and maximum wastewater application rates in order to protect public health, safety and welfare.

(d) That further development of existing vacant parcels or new subdivision activity in Lake Canyon shown as subarea “Central Facilities – Collection System and Community Leach
Field” on Figure 9-1 (revised October 16, 1980) of the above report would result in significant water quality degradation of local streams and would imperil the public health, safety and welfare.

Questa’s review of the Montgomery report as part of the current study determined that many of the requirements adopted specifically for Lexington Basin in the early 1980s are either no longer necessary or technically supportable based on information (or lack thereof) in the report itself along with the progression of County requirements and the overall state of knowledge regarding OWTS over the past 30 years. Specifically, regarding the above Ordinance findings and the specific requirements adopted for the Lexington Basin:

- The “present ... regulations” that were in place in 1980 at the time of the Montgomery study were very different from current County regulations. County regulations and practices in effect at the time of the Montgomery report have been revised and updated several times over the past 30 years (1990, 1992, 1999, 2003) to conform to RWQCB guidelines and incorporate other advancements in onsite wastewater system practices.

- Evaluation of alternative systems has been a major focus of the current study by Questa, and has resulted in recommendations to incorporate certain types of alternatives into County regulations and practices that would be effective in addressing various OWTS site constraints (soils, slopes, groundwater, etc.), including those affecting properties in the Lexington Basin.

- Many years of DEH staff experience implementing the Lexington Basin requirements has not revealed any particular conditions that could not be adequately addressed by the requirements that apply throughout the rest of the County, including current revisions proposed in connection with the current study by Questa.

- Questa’s review found Montgomery’s 1-acre minimum lot size recommendation for individual OWTS was not supported by any technical analysis. The report merely states: “A minimum developed area size of one acre is recommended to prevent hydraulic overloading of the soil.” While it may be a worthy goal, this recommendation is undermined by other contradictory information elsewhere in the report indicating that Montgomery determined that one acre would be sufficient land area for a community leachfield to serve as many as 20 houses (e.g., Oakmont community), presumably without causing hydraulic overloading of the soil. This information appears in Chapter 7 of the report, in connection with their review of wastewater management alternatives for various neighborhoods in Lexington Basin.

- For individual residential OWTS, compliance with standard soil depth and groundwater separation criteria, dispersal trench sizing, spacing and setbacks are generally recognized as measures that provide an acceptable design to avoid creation of hydraulic overloading of soils (also referred to as “groundwater mounding”). Groundwater mounding is more commonly a cumulative impact consideration for larger flow systems, for example, for OWTS serving commercial and multi-family uses, and is addressed (countywide) under a specific section of both the existing and proposed new Ordinance.
Although the Montgomery report warned of serious water quality impacts from OWTS in the Lexington Basin, the water quality data presented in the report did not reveal any such impact. Moreover, the presentation and discussion of the water quality data in the report relied on a misunderstanding and/or misstatement of the applicable bacteriological criterion for recreational water uses, citing the standard that applies to fecal coliform (median of 200 MPN/100 ml) as being the maximum limit for total coliform, a general class of bacteria for which the standard is 10,000 MPN/100 ml for recreational waters. This brings their water quality assessment and conclusions into question.

The SWRCB and RWQCBs review water quality data for California surface waters every two years to determine the status of impairment under requirements of Section 303(d) of the Clean Water Act. The Lexington Basin has not been found at any time to be impaired in regard to pathogens or nitrogen, the two parameters used as indicators of potential OWTS impacts on surface water quality by these water quality agencies.

In the mid-1990s a community wastewater system for the Lake Canyon area was constructed, replacing all OWTS in the community.

**San Martin**

A related onsite sewage disposal requirement that applies only to the San Martin planning area is contained in the County Zoning Ordinance. It limits the approval of second dwelling unit to parcel sizes of 5 acres or more. The basis for this minimum lot size requirement comes in part from findings in the 1981 “San Martin Area Water Quality Study” by Brown and Caldwell Engineers and Geotechnical Consultants, Inc. This study was conducted for Santa Clara County to document groundwater conditions in the San Martin planning area and evaluate potential effects on surface water and groundwater quality from different land use development scenarios, focusing particularly on the nitrate-nitrogen impacts from residential OWTS.

At the time of the San Martin study it was acknowledged that elevated groundwater nitrate-nitrogen concentrations observed in the San Martin area were largely attributable to historical crop fertilization activities, and that the overall rates of nitrogen loading were in decline as a result of conversion of land uses from irrigated agriculture to rural residential development in the period of 1965-1980. However, there was concern that conversion from agricultural to residential uses dependent on the use of OWTS might eventually cause a rise in nitrogen loading and associated groundwater quality impacts.

The study estimated waste loading and water quality effects from various residential build-out scenarios, assuming minimum lot sizes of 2.5 acres, 5 acres, and 20 acres. The study recommended the adoption of a minimum lot size of 5 acres for new subdivisions to avoid long-term groundwater-nitrate problems. Although the study focused specifically on subdivision of agricultural lands, on the basis of this study the County later adopted a requirement in its Zoning Ordinance specifying that second dwelling units on existing parcels could not be approved for any lot size less than 5 acres in the San Martin area.
Questa reviewed the San Martin Area Water Quality Study as a source of background information and to evaluate the continued applicability and relevance of the assumptions, analysis and findings from this 1980 study in regard to the current proposed changes in the County’s OWTS Ordinance and practices. While most of the technical information in the 1980 study regarding groundwater conditions remains relevant and useful, Questa found some of the assumptions and approach in the water balance and nitrogen-loading analysis to be out-dated and generalized. Of most significance was the general assumption in the 1980 study that annual rainfall-recharge in the area is equal to 10% of the annual rainfall volume, or about 2 inches per year based on annual rainfall of 20 inches in the San Martin area. Using a more detailed monthly water balance approach, which accounts for local rainfall, runoff and evapotranspiration for every month of the year, Questa arrived at a much higher rainfall-recharge estimate of approximately 8 inches per year – i.e., four times greater than the general assumption used in the 1980 study\(^2\). Rainfall-recharge represents the main volume of water available for dilution of any nitrate-nitrogen sources in the soil; thus, the higher the rainfall-recharge, the lower the resulting nitrate concentration in groundwater caused by a given nitrogen source (e.g., an OWTS discharge). Because rainfall-recharge is such a significant factor in estimating long-term groundwater quality changes, Questa determined that the low value assumed in the 1980 study resulted in conclusions that over-stated the potential groundwater-nitrate impacts for different lot-size development scenarios.

In Questa’s current study an analysis was made of increases in potential new rural residential development that might result from the proposed Ordinance changes. This included an assessment of additional second units that might be possible if the existing 5-acre lot size restriction for secondary dwelling units in the San Martin area were to be eliminated. Questa’s study estimated up to 74 second units might occur in the San Martin area (mostly on lots <5 acres) following adoption of the Ordinance. It was estimated that the effect would be an approximate increase of 0.06 mg-N/L in the overall nitrogen concentration contribution from OWTS in the San Martin area, or about a 2-percent rise as compared the effects under the proposed Ordinance without changing the second unit lot size restriction. This represents a very small change, less than the margin of error associated with many of the assumptions used for estimation of groundwater quality changes.

In addition to the above findings, it is also important to recognize (as previously noted) that the existing onsite sewage disposal Ordinance (Section B11-74) provides that the Director may require additional technical analysis for any proposed OWTS where cumulative impacts to water quality are of concern (such as nitrate loading). Later in this report Questa makes recommendations to strengthen this code section with the addition of more specific guidelines for cumulative impact assessments, including the recommendation that second unit proposals on lots smaller than 5 acres in the San Martin area be included among the types of projects requiring cumulative impact assessment. Additionally, many of the alternative OWTS including in Questa’s recommendations have the ability to substantially reduce (e.g., 50% or more) the nitrogen discharge from OWTS, providing an effective means to fully mitigate any increase in groundwater-nitrate loading that might otherwise accompany a second unit OWTS discharges.

\(^2\) See “Growth Projections and Cumulative Wastewater Loading from Implementation of Santa Clara County Onsite Wastewater Ordinance Changes”, Questa Engineering, January 2013.
CONVENTIONAL SYSTEMS

The following is a general description and overview of the components and workings of typical onsite wastewater treatment and dispersal systems and key requirements related to design, construction, operation and maintenance. There can be significant variation between onsite systems on different sites, but the following discussion describes the typical requirements for system components and their general configurations.

Conventional OWTS consist of two major components: (1) a septic tank for collection, settling and digestion of sewage wastes from the building; and (2) a dispersal system for absorption and drainage of septic tank effluent into the soil or geologic strata.

Septic Tank

The septic tank provides primary treatment of wastewater by allowing sufficient detention time for gravity separation of solids. Heavier solids settle, forming a sludge layer at the bottom of the tank while fats, oils, grease, lighter solids, and decomposing organic material float to the surface to form a scum layer. Anaerobic and facultative decomposition of organic material occurs in these layers.

Modern septic tanks are typically constructed of concrete, fiberglass or plastic (e.g., polyethylene) with two compartments, separated by a baffle, as illustrated in Figure 2. Septic tank sizes vary; a 1,500-gallon tank is the minimum required size in Santa Clara County. The septic tank operates in a “full” condition, with the liquid surface level with the invert (bottom) of the outlet pipe and normally about 3 inches below the inlet pipe (from the house plumbing). The septic tank provides several days of detention time for settling and digestion of sewage solids. The inlet and outlet ends of the tank have a “sanitary tee” to maintain a clear pathway for flow into and out of the tank, and to prevent floating material and other solids in the tank from passing into the dispersal field where they can create obstructions or damage the absorption capacity of the soil. Additionally, and especially in cases where a pump system follows the septic tank, it is common to incorporate an effluent filter (usually a type of plastic mesh or screen) at the septic tank outlet to further prevent the passage of suspended solids out of the tank. Some jurisdictions now make this a requirement for all OWTS. The use of effluent filters is encouraged, but they are not currently a standard requirement or common component of OWTS in Santa Clara County.

The clarified effluent passes by gravity from the septic tank into a 4-inch diameter pipe that runs directly to the dispersal field, or to a distribution box that spreads the effluent to different parts of the dispersal field. Although gravity flow is preferred, in cases where it is necessary to locate the dispersal field at a higher elevation than the septic tank, a pump system is installed in a separate basin following the septic tank to collect and pump the effluent to dispersal field, after which it flows by gravity through the trenches. Sewage odors and gases generated in the septic tank are vented back through the house plumbing system to the roof vent pipes. The septic tank is provided with an access manhole and cover on both the inlet and outlet side of the tank.

Septic tanks require periodic inspection to check the tank conditions and clean the effluent filter on the outlet end of the tank, and occasionally to pump out the solids and scum that accumulate
over time. Although highly dependent on use and house occupancy, the commonly recommended pump-out frequency for septic tanks is about every three to five years.

**Dispersal System**

The conventional type of dispersal system approved for use in Santa Clara County is the standard trench system (also referred to as a “leachfield”, “drainfield” “disposal field’, or “soil absorption system”).

A conventional dispersal system consists of a network of perforated pipes installed in gravel-filled trenches. A cross-section of a typical leaching trench is illustrated in Figure 3. The amount of trench length depends upon the soil permeability (percolation) and the size of the house or building being served. Total trench lengths may range from a few hundred feet (minimum) to more than a thousand feet. The effluent from the septic tank flows by gravity through the perforated pipes, exits through the holes in the pipe, and trickles through the rock or gravel where it is stored until absorbed by the soil. The dispersal trenches are excavated into the unsaturated zone of the soil where the wastewater is absorbed and treated through physical, chemical and biological processes as it moves through the soil. The soil also acts as a natural buffer to filter out many of the harmful bacteria, viruses, and some nutrients, effectively treating the wastewater as it percolates through the unsaturated zone before it reaches the groundwater or nearby watercourses.

Dispersal trench sizing is based on: (a) trench dimensions; (b) the “effective wastewater application area” (i.e., the portion of the trench surfaces credited for wastewater infiltration); and (c) adopted wastewater application rates, in gallons per day per square foot (gpd/ft²) of infiltration area, related to soil/percolation characteristics. Design criteria differ between jurisdictions due to varying opinions and uncertainties about the factors that influence soil absorption of wastewater. Santa Clara County regulations currently specify: 2-ft wide dispersal trenches; maximum effective application area of 4 ft² per lineal foot of trench; and application rates as shown in Table 4 below. Also shown for comparison are the corresponding wastewater application rates for Lexington Basin, the two RWQCBs, and the USEPA Design Manual. OWTS sizing criteria for most other counties in the San Francisco Bay Area are patterned after the USEPA Design Manual.

Table 4

<table>
<thead>
<tr>
<th>Percolation Rate (mpi)</th>
<th>Santa Clara County Regulations</th>
<th>Lexington Basin Standards*</th>
<th>SF Bay RWQCB Basin Plan</th>
<th>Central Coast RWQCB Basin Plan</th>
<th>USEPA Design Manual &amp; SF Bay Counties</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>0.56</td>
<td>0.67</td>
<td>1.58 – 0.64</td>
<td>0.80</td>
<td>1.20 – 0.80</td>
</tr>
<tr>
<td>11-20</td>
<td>0.45</td>
<td>0.67</td>
<td>0.62 – 0.45</td>
<td>0.80</td>
<td>0.79 – 0.66</td>
</tr>
<tr>
<td>21-30</td>
<td>0.30</td>
<td>0.40 - 0.67</td>
<td>0.44 – 0.30</td>
<td>0.60</td>
<td>0.64 – 0.56</td>
</tr>
<tr>
<td>31-40</td>
<td>0.26</td>
<td>0.40</td>
<td>0.30 – 0.26</td>
<td>0.25</td>
<td>0.55 – 0.49</td>
</tr>
<tr>
<td>41-60</td>
<td>0.23</td>
<td>0.29 - 0.40</td>
<td>0.26 – 0.22</td>
<td>0.25</td>
<td>0.48 – 0.35</td>
</tr>
<tr>
<td>61-120</td>
<td>0.20</td>
<td>0.25</td>
<td>0.22</td>
<td>0.10</td>
<td>0.35 - 0.20</td>
</tr>
</tbody>
</table>

* implied from trench length requirements.
INSPECTION WELL - 4" NON-PERFORATED PLASTIC DRAIN PIPE; WITH SLOTS OR HOLES DRILLED THROUGHOUT DRAIN ROCK DEPTH

SILT BARRIER

NATIVE TOPSOIL BACKFILL

2" MIN. ABOVE PIPE

4" PERFORATED PLASTIC DRAIN PIPE; LAID LEVEL WITH MAXIMUM 3" IN 100' FALL

3/4" TO 1-1/2" DRAIN ROCK

SIDE VIEW

FINISHED GRADE

NATIVE TOPSOIL BACKFILL

UTILITY BOX (EXTEND INSPECTION PIPE AS NECESSARY TO MATCH FINAL GRADE)

4" PERFORATED PLASTIC DRAIN PIPE;

12" MIN.

6"

VARIES

EFFECTIVE DRAINFIELD DEPTH

24" TO 36"

END VIEW

DATE: 6/5/2012
PROJECT: Santa Clara County Onsite Wastewater Project Description
PROJECT NO.: 1000064
DRAWN: MF
APPROVED: NH

FIGURE 3
Using the wastewater application rates from Table 4 along with the other trench sizing criteria for each jurisdiction (e.g., trench width, effective infiltrative area), several graphs are provided in Figures 4, 5, and 6 to illustrate how much credit (gallons per day per lineal foot of trench) is given under the different design standards, respectively, for three different trench depths—3 feet, 4 feet, and 5 feet. Each plot shows how many gallons per day of loading per lineal foot would be allowed for system sizing. The lower the loading rate, the greater length of trench required for a given wastewater flow, and vice versa. The tables and graphs show Santa Clara County’s current design criteria result in substantially larger dispersal fields as compared with other jurisdictions. The application rate sizing criteria are one of several reasons the dispersal trench sizes are uncommonly large and require so much land area for OWTS in Santa Clara County. Other contributing factors are: (1) minimum trench spacing of 10 feet (6 feet is the common minimum, increasing for steeper slope situations, > 20%); (2) the requirement that every OWTS be designed for 450 gpd (3-bedroom capacity) regardless of building size and projected wastewater flow; (3) the requirement for a separate OWTS (450 gpd capacity) for detached structures with any amount of plumbing fixtures; and (4) the requirement for 200% active capacity and additional 200% reserve area for sites with percolation rates over 60 mpi.

ALTERNATIVE SYSTEMS

Alternative systems include supplemental treatment systems and various types of dispersal methods used in place of or as a variation of a conventional gravity dispersal trench. The most common types of supplemental treatment are intermittent and recirculating sand filters and various types of proprietary systems, including packed bed filters and aerobic treatment units. Alternative dispersal methods include shallow pressure distribution trenches, mound systems, at-grade systems, raised sand beds, and subsurface drip dispersal. Alternative systems are not currently covered under Santa Clara County onsite wastewater regulations; however, they have occasionally been used in the County for repair situations. Alternative systems generally have additional mechanical and electrical equipment as compared with conventional onsite systems, with greater needs for inspection and maintenance attention. Some, but not all, alternative systems can provide a means of reducing the total footprint of an onsite wastewater treatment system where suitable land area is a significant constraint.

Background

Beginning in the 1970s considerable attention has been given in the U.S. to the study and improvement of onsite wastewater treatment and dispersal practices. In addition to fostering a better understanding of how conventional soil absorption systems function, studies and interest in this topic have led to the evolution of numerous alternatives to the conventional OWTS. Technology advancements have also played an important part in the development or refinement of alternative designs. Many alternative systems are currently in use in different parts of California, particularly in the northern parts of the state.

Technology Summary

Alternative system types are presented and discussed here under the categories of: (1) treatment systems; and (2) dispersal systems.
Figure 4. Wastewater Application Rate Comparison
(gpd/lineal foot for 3-foot-deep trench)
Figure 5. Wastewater Application Rate Comparison
(gpd/lineal foot for 4-foot-deep trench)
Figure 6. Wastewater Application Rate Comparison
(gpd/lineal foot for 5-foot-deep trench)
Treatment technologies provide additional wastewater effluent treatment beyond that provided by the septic tank in a conventional onsite system. The most common types of supplemental treatment are intermittent and recirculating sand filters and various types of proprietary systems, including media (“packed bed”) filters and aerobic treatment units.

Alternative dispersal systems provide additional options for system siting and design in constrained soil and geologic environments. Alternative dispersal systems are typically oriented around two principles: (1) shallow dispersal to take advantage of the most aerobic and biologically active soil zone; and (2) uniform distribution of effluent to maximize soil contact and minimize the hydraulic/waste loading in a given area. Some dispersal alternatives also incorporate additional treatment media.

Table 5 presents a general summary matrix of onsite wastewater treatment systems, including both conventional and alternative treatment and dispersal systems. The table provides a general summary of the applicability of different systems for addressing various site constraints and considerations, which are discussed in the individual technology descriptions below. The fact that an entry (X) is given in the table under a particular heading implies that there is support in the literature or in some regulatory programs for the indicated benefit of that type of technology. However, it is not meant to imply that there is universal acceptance. The table also highlights the fact that along with alternative technologies come increased levels of management needs for OWTS inspection, maintenance, and monitoring. The general ratings (Low to High) of system management requirements in Table 5 are based on best professional judgment of the authors of this report.

The following is a general description of available alternative technologies that have applicability in different parts of Santa Clara County and have been recommended for inclusion in the proposed new Ordinance. This review is not intended to be an exhaustive description or discussion of these alternatives, but rather to provide a basis for environmental review. Additional information on these technologies can be obtained from the National Small Flows Clearinghouse website at: http://www.nesc.wvu.edu/wastewater.cfm and the Review of Technologies for the Onsite Treatment of Wastewater in California by the Center for Environmental and Water Resources Engineering at the University of California at Davis (URL). Also, please refer to the applicable sections of the proposed draft Onsite Systems Manual for recommended guidelines for application of these alternative technologies in Santa Clara County.

Treatment Systems

Conventional onsite systems using septic tanks and sub-surface effluent dispersal rely primarily on primary treatment of the wastewater in the septic tank and a combination of filtration, adsorption and chemical/biological transformations during percolation through the soil. Where the soil depth, volume or texture on a given site provide limited capacity for pollutant removal, additional (supplemental) treatment prior to dispersal has been developed and promoted as an alternative means of enhancing system performance and achieving overall sanitation and environmental protection needs. In particular, supplemental treatment systems have been used commonly to overcome soil percolation constraints (rapid and slow), high groundwater conditions, horizontal setbacks, and nitrate loading concerns.
Table 5. Onsite Wastewater Treatment System Matrix

<table>
<thead>
<tr>
<th>ONSITE WASTEWATER TECHNOLOGIES</th>
<th>CONDITIONS / ISSUES ADDRESSED</th>
<th>MANAGEMENT NEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shallow Soils</td>
<td>Slow Percolation</td>
</tr>
<tr>
<td>TREATMENT SYSTEMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Septic Tank</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Intermittent Sand Filter</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Recirculating Sand Filter</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Packed Bed Filters (Propreitary)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Aerobic Treatment Units (ATU)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>DISPERAL SYSTEMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional Gravity Leaching Trench</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Shallow Pressure Distribution Trench</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sand-Filled Trench</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mound</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>At-Grade</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Raised Sand Filter Bed</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Subsurface Drip Dispersal</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

The most common pollutant constituents targeted for treatment in wastewater effluent are total suspended solids, biochemical oxygen demand, total nitrate-nitrogen, and coliform bacteria as an indicator of pathogens. Alternative treatment systems, if properly operated and maintained, are capable of treating effluent to very high levels and providing improved performance of effluent dispersal systems and increased protection of water quality. However, if not appropriately sited, designed, constructed, and managed, alternative treatment systems may potentially cause greater degradation of ground waters and/or surface waters than standard systems. Additionally, while some systems such as sand filters have been used and studied extensively, the reliability and performance of other emerging technologies and some of the proprietary treatment systems is not as well established and may warrant a higher level of oversight or other limitations on their application.
Sand Filters

Intermittent (single pass) and recirculating sand filters are used to provide additional or advanced treatment of septic tank effluent prior to discharge to the dispersal system. They are used to improve or restore the capacity of the dispersal field, reduce pathogenic bacteria and can provide additional nitrogen reduction. Sand filtration is well established in sanitary engineering practice for more than 100 years as a passive, reliable treatment process. Sand filters have been used in the San Francisco Bay region and other parts of Northern California for both individual and community OWTS.

With proper design and operation, intermittent sand filters (ISFs) can reliably produce effluent with total solids (TSS) and biochemical oxygen demand (BOD) under 10 mg/L, and three to four-log (i.e., 99.9 to 99.99 percent) reduction in fecal coliform levels. Intermittent sand filters typically do not provide high levels of nitrogen removal. However, by providing nearly complete nitrification of ammonia, the nitrate in the treated water is immediately available for denitrification and plant uptake upon release to the soil environment, which is an improvement over conventional OWTS.

Recirculating sand filters (RSFs) have the ability to produce effluent quality with TSS and BOD levels similar to ISFs; additionally, they provide in the range of 25- to 50-percent removal of nitrogen as compared with conventional septic tank effluent. Recirculating sand filters are less effective in bacteria removal than ISFs. However, the high quality (clarified) effluent is compatible with any type of shallow dispersal system (e.g., pressure distribution, drip dispersal), making RSFs a versatile treatment option in overcoming a wide range of constraints, including shallow soils, slow percolation, high groundwater conditions, space limitations (i.e., setbacks) and receiving water nitrate-nitrogen limitations.

Proprietary Treatment Systems

Proprietary treatment units cover a category of manufactured or “package” systems specifically developed for residential and other small-scale sewage treatment applications. Most proprietary designs currently on the market fall into two general categories: (1) media filters; and (2) aerobic treatment units (ATUs).

- **Media (“Packed Bed”) Filters.** This includes proprietary designs that function similar to sand filters. In these systems the sand is replaced with an alternate media; peat, gravel or textile are a few examples. Textile and other packed bed filters have been found to produce effluent quality reasonably similar to (or better than) recirculating sand filters, and provide similar capabilities in overcoming various site constraints.

- **Aerobic Treatment Units (ATU).** This includes various proprietary designs that utilize forced air to oxidize the wastewater, promoting aerobic decomposition of the wastewater solids. These systems produce secondary quality wastewater for improvement in dispersal field performance; they also provide varying degrees of nitrogen removal. In general, aerobic treatment units most commonly can be relied on to produce secondary quality effluent, not normally as good as ISFs and RSFs in terms of BOD and TSS levels. ATUs are generally not as effective in reducing pathogen levels as are systems that
incorporate media filtration. However, some ATUs provide reduction in nitrogen levels that are equal to or greater than that provided by a well-designed RSF. Consequently, they offer advantages in addressing most of the typical site constraints encountered in the County.

**Dispersal Systems**

Sites may be constrained for onsite wastewater dispersal due to a number of factors, such as insufficient area, shallow soil depth, percolation (too slow, too fast) high groundwater conditions, or steep slopes. In many cases, alternative dispersal technologies can be used to improve the efficiency of a system’s dispersal capability by matching the layout, design and dispersal method to the site-specific constraints.

**Shallow Pressure Distribution Trenches**

Shallow pressure distribution (PD) systems are a variation of a conventional gravity dispersal trench system that use a pump and small-diameter pressure piping to achieve broad, uniform distribution of wastewater in the shallow soil zones for improved soil absorption and better treatment of percolating effluent. This type of design, especially in conjunction with supplemental treatment, is well suited for steeper terrain and shallow soil conditions.

**Pressure-dosed Sand Trenches**

Pressure-dosed sand trenches are a variation of a shallow pressure distribution system, in which sand media is used in place of drain rock in the lower portions of the leaching trench, improving the treatment of effluent, and controlling the percolation rate before it reaches the trench bottom. Treatment occurring in the sand fill can enhance the acceptance rate of the native soils beneath the trench. This type of design can also be used with supplemental treatment, and is well suited for conditions where the underlying soils are highly permeable and/or groundwater beneath a system is especially vulnerable to wastewater or contaminants.

**Mound System**

This consists of an elevated sand bed with a gravel distribution bed covered by soil fill. It utilizes the shallow surface soils for broad distribution of effluent, and is used to mitigate high water table and shallow soil conditions on flat or gently sloping terrain. Mound systems can be used where there are at least two feet of permeable surface soils (above the water table or restrictive soils) on slopes up to 20 percent, depending upon percolation characteristics.

**At-Grade System**

At-grade systems are similar to mound systems, except that they do not include the sand bed; the gravel distribution bed is placed directly on the scarified (i.e., plowed) soil surface. They are often used in conjunction with a supplemental treatment system. They can be used in the same types of situations as mound systems to overcome shallow soil depths and high groundwater.

**Raised Sand Filter Bed**

A raised sand filter bed is sometimes referred to as a bottomless sand filter. It consists of a raised or terraced sand bed, commonly supported by a low retaining wall or bulkhead, where the
bottom surface is even with or slightly below ground surface and forms the absorption surface. It can also be used in a hillside terrace configuration to provide a stable elevated dispersal area over shallow permeable soils. Raised sand filter beds have been used with or without a supplemental treatment unit ahead of the system. Where supplemental treatment is provided, the raised sand bed provides additional polishing treatment and final dispersal of water into the ground. Without supplemental treatment raised sand beds are similar to mound systems. Their advantage is that they occupy a smaller area than a mound system, and provide equivalent treatment as a sand filter prior to dispersal in the upper soil zones.

**Subsurface Drip Dispersal**

Subsurface drip dispersal is a method for dispersal of treated wastewater that uses special drip tubing designed for use with wastewater. The dripline is placed normally 8 to 12 inches below ground surface and makes use of the most biologically active soil zone for distribution, nutrient uptake and evapotranspiration of the wastewater. A drip dispersal system is comprised of small-diameter (½” to 1”) laterals (“driplines”), usually spaced about 24 inches apart, with small-diameter (1/8”) emitters located at 12 to 24 inches on-center along the dripline. Effluent is conveyed under pressure to the laterals, normally with timed doses. Prior to dispersal the effluent requires supplemental treatment.

Drip dispersal has several advantages, including: (a) it can be effective in very shallow soil conditions since it distributes the wastewater very uniformly to substantially all of the available soil in the field; (b) it can be installed in multiple small discontinuous “zones”, allowing the hydraulic load to be spread widely rather than concentrated in one main area; (c) installation on steeper slopes causes less soil disturbance and erosion or slope stability hazards; and (d) water movement away from the drip emitters is substantially by unsaturated/capillary flow, which maximizes contact with and treatment by the soil.

**Regulatory Requirements**

Conventional onsite wastewater treatment systems installed in appropriate locations, designed and installed properly, and maintained adequately, are generally accepted as providing necessary protection of public health and water resources. Most regulations (including those in Santa Clara County) are formulated around requirements for conventional systems. Application of alternative systems requires additions or variations to conventional system regulations. Many counties and several RWQCB regions in California have developed requirements particular to alternative systems.

At minimum, regulatory requirements for alternative systems generally identify the locations and site conditions under which various technology or design options are permitted, along with specific design, performance, monitoring and reporting requirements. The most commonly accepted regulatory provision for alternative technologies is a reduction in soil depth and/or groundwater separation, which is based on the provision of supplemental treatment in a separate treatment unit or by virtue of the configuration and design of the dispersal system. For example, reduction in standard groundwater separation requirements to as little as two to three feet for effluent receiving supplementary treatment, is recognized and has been adopted into regulations in many counties, special districts and RWQCB Basin Plans in the state.
Verification of appropriate site conditions and an increased level of attention to ongoing operation, maintenance and monitoring are also essential issues to be addressed in regulatory requirements to assure the greatest opportunity for successful application and performance of these systems.

**Dispersal Land Area Requirements**

Some alternative systems can provide a means of reducing the total footprint of an onsite wastewater treatment system where suitable land area is a significant constraint. There are other instances where a larger land area may be required simply to overcome shallow available soil depth. Reductions in dispersal field sizing are based on the theory and empirical evidence (U.S. EPA, 2002, *Onsite Wastewater Treatment Systems Manual*) that the improved quality of the wastewater effluent leads to less clogging in the trench-soil interface and thus a better long-term acceptance rate. Additionally, for sloping sites and those that have discontinuous areas of suitability, pressure distribution and drip dispersal systems can allow effective use of different portions of a site that are most favorable, compared with conventional gravity designs that typically consolidate the dispersal field in a single area where gravity flow is feasible and most practical.

**Operation & Maintenance Requirements**

Alternative treatment and dispersal approaches generally include technologies and components that lack the operational simplicity and passive treatment advantages of conventional gravity systems. A comprehensive and planned operation and maintenance protocol is key to ensuring the long-term viability of these systems. Although they are capable of providing high-quality effluent and dispersal under the appropriate application, care must be taken to ensure their proper functioning for continuous and reliable treatment. The increased system complexity presents greater opportunity for malfunctions that disrupt proper functioning of the system. Since alternative systems are often used to mitigate potential water quality or public health concerns, failure of these systems to provide the expected quality or performance can lead to potentially unsanitary or hazardous conditions. Further discussion of system management considerations is provided at the end of this section.

**Experience in California**

Considerable experience has been gained with alternative onsite wastewater technologies in many local jurisdictions throughout California over the past 30 years. Several counties and special districts, especially in Northern California, have helped to pioneer and develop criteria and workable procedures for application and management of alternative technologies. Notable on this list are the following jurisdictions in the San Francisco Bay Area: Stinson Beach County Water District and the Counties of Alameda, Contra Costa, Marin, Napa, Santa Cruz, Solano and Sonoma. A significant amount of empirical information and data have been collected that facilitate the incorporation of alternative systems into an existing system of regulations more easily than in the past. Nationally, considerable technical information has been developed by the EPA, other states, and by the onsite wastewater industry in general. The technologies discussed in this document are all supported, to varying degrees, by published literature and/or local experience in other areas.
The various programs have slightly different views toward the array of technological options available, with some local agencies having a marked preference toward one technology or another. However, overall, the availability and use of alternative systems has generally been recognized as a positive instrument in providing means for achieving public health and environmental protection needs. The expanded array of design options allows for selection of the best OWTS solution for each site, as opposed to the more traditional prescription of a fixed design, often criticized as a “one size fits all” approach. The keys to the effective use of alternative systems have been found to be the proper siting, design, and construction as well as implementation of an appropriate operation and maintenance protocol to ensure continued proper functioning.

**SYSTEM MANAGEMENT REQUIREMENTS**

**Tasks**

The following summarizes the key management requirements for OWTS organized according to following categories: (1) Inspection, (2) Maintenance, (3) Water Monitoring & Sampling, and (4) Reporting.

**Inspection**

Inspection generally refers to the overall review of the system, its components, and the surroundings, as well as a verification of proper functioning of the system. It does not include sampling or maintenance work. Septic tanks should be inspected to ensure that they are structurally sound and that the plumbing components (e.g. tees, baffles, cleanouts, effluent filters, etc.) are intact. The thickness of the scum and sludge layer should be measured to determine if the tank should be pumped. Disposal fields should be inspected for drainage conditions to verify that there is no surfacing effluent or breakout. Depending on system type, various other inspection activities may be required, such as testing alarm and pump functions or reading dose counters.

The frequency of inspections is largely dependent on the system type and also on the qualifications of the individual performing the inspection. Annual inspection of conventional septic tanks is a good idea; however, in practice, inspection every few years is more typical. Higher inspection frequency should be performed for older systems and those in proximity to sensitive water resources. Often inspections occur also at the time of a transfer of ownership. Triggers for greater or lesser frequency of inspection include the system type and complexity, track record of the system, and loading rates (i.e., usage compared to system design).

**Maintenance**

Maintenance involves both preventative maintenance and repair maintenance. Regardless of the type of maintenance, an effective maintenance program requires a determination of the appropriate level of qualifications for maintenance staff. Both preventive and responsive maintenance should be documented and be available for review.
Preventive maintenance consists of routine work required to continue the proper functioning of an OWTS such as: tank pumping, purging of pressure laterals, cleaning filter screens, and switching diversion valves. The schedule for preventive maintenance can be established by manufacturer specifications (when available), design specifications, O&M guidelines, and regulations.

Responsive maintenance occurs on an as-needed basis, for example when a problem occurs or is likely to occur. A malfunctioning pump, valve, or float, plugged line, damaged tee, malfunctioning control panel are all examples of responsive maintenance needs.

**Water Monitoring & Sampling**

Water monitoring and sampling is identified as a special activity, which includes some basic monitoring information (e.g., system flow); but, also covers additional testing that may be required and undertaken for systems sited and/or designed for more constrained sites or highly sensitive receiving environments.

Flow monitoring provides important data for checking the actual usage of the onsite system against the design flow. If the actual flows exceed the design flows, corrective steps may need to be considered to protect the long-term performance of the system.

Water level monitoring includes monitoring of conditions: (a) in the dispersal trenches or beds; and (b) at the water table beneath or near the dispersal system. Monitoring of the dispersal system is often performed on a regular basis to ensure that the dispersed effluent is draining properly. In this case, monitoring involves measuring the distance from grade to any effluent in the trench inspection wells. If water levels are above the level of the distribution pipe, it may be an indication of excessive water use, surface drainage or infiltration problems, high groundwater, or slow percolation interfering with dispersal field drainage. For large-flow systems, measurements in monitoring wells that extend to the water table may also be required to check for evidence of groundwater mounding effects below and around the dispersal system to assure maintenance of adequate unsaturated conditions for effluent treatment and dispersal.

Water quality sampling is sometimes required to verify that supplemental treatment mechanisms are providing the level of treatment required to protect sensitive receiving environments (groundwater or surface waters). This testing may involve performance testing of effluent prior to dispersal and/or analysis of groundwater samples for evidence of receiving water impacts. Water monitoring and sampling frequency is dependent on several factors: the system type, proximity of the system to sensitive resources, and the track record of the system type.

**Reporting**

Reporting of system conditions and performance is an important component in assessing the adequacy of OWTS and tracking the overall public health and environmental protection program. This is where the results of the inspections, maintenance, and water quality monitoring are relayed to the appropriate regulatory agency responsible for oversight and compliance.
The reporting schedule, like the other components of system management, is dependent on such factors as the system type, proximity to sensitive resources, track record of the general system type, length of time the subject system has been in use, and its history over that period.

Reporting can be accomplished by a variety of methods. Most agencies allow for the reporting individual to submit their information in any manner, with the requirement that the appropriate information be made available. Some agencies are moving toward developing an online entry form to simplify the data entry process. Establishing who should report information to the requesting agency needs to consider the availability of agency staff to oversee the reporting. Typically, reporting is performed by the homeowner, a qualified service provider, a licensed professional, or agency staff. If water quality monitoring is performed, the information can be reported directly by the testing laboratory.

**OWTS Maintenance Providers**

Assuring the availability of adequate qualified personnel to perform the required tasks under an O&M program is a challenge, as is establishing qualification definitions for these personnel. It is generally held that a minimum level of qualification should be established for each task. The EPA Onsite Wastewater Treatment System Manual provides guidance on the certification of OWTS maintenance providers and asserts that such certification can lead to a higher level of program effectiveness. There is no established certification program in California that specifically addresses the needs for OWTS maintenance; therefore, each county has developed an individualized approach.

The inspections of some aspect of simple gravity systems are within the ability of an adequately trained homeowner to perform, with agency or professional oversight. More often, these inspections are performed by qualified OWTS maintenance providers, licensed professionals, or agency staff.

Repairs should be performed by qualified OWTS maintenance providers or contractors with appropriate training in the repair of wastewater systems. Some preventative or recurring tasks such as switching diversion valves, can be performed by adequately educated personnel or homeowners.

Measurement of water levels should be performed by qualified maintenance providers, licensed professionals, or agency staff. Laboratory sampling, including drawing samples and performing tests, should be performed by approved testing laboratory personnel or other properly trained professionals or technicians.

**TECHNICAL AND PROGRAM RECOMMENDATIONS**

Based on Questa’s review and various input received during the study, following are recommended changes and additions to existing County regulations and practices. The aim of the recommendations is to update the County onsite wastewater management program to conform to applicable State and Regional Water Board requirements and guidelines, address local issues pertinent to Santa Clara County, and provide for appropriate use of emerging
technologies and practices based on best current knowledge and understanding of onsite wastewater treatment systems.

**Siting Requirements for OWTS**

**Soils**

Santa Clara County Code requires soil and site evaluation for each OWTS installation according to procedures established by the Director of Environmental Health. The current procedures are generally consistent with industry practices and appropriate for the conditions and requirements in Santa Clara County. They include provisions for wet weather groundwater observations, which is a key consideration in many instances. However, one particular item not addressed in current practices is the allowance for wet season percolation testing of soils that exhibit high shrink-swell characteristics – i.e., showing shrinkage cracks in the dry season, which swell shut in response to wetting in the winter months due to high clay content. Expansive soils such as this can be particular problematic for wastewater dispersal and dry season testing is normally not a valid measure of the soil drainage capability during the wet season. Therefore, it is recommended that soil evaluation procedures be amended to also include provision for wet season percolation testing of expansive soils.

**Percolation**

The County’s specified percolation testing procedure is generally consistent with published guidelines (e.g., SF Bay RWQCB Minimum Guidelines; EPA Design Manual), with one exception - the County procedure specifies a water fill depth of 18 inches, instead of the normal standard of 6 to 8 inches. Greater water fill depth can result in faster percolation rates, which may lead to an incorrect assessment of the soil suitability for a given site, as well as affecting the sizing of the dispersal system. Therefore, we recommended that this aspect of the percolation testing procedure be corrected. As noted previously, it is also recommended that the County soil evaluation procedures include provisions for wet season percolation testing of soils that exhibit high shrink-swell characteristics.

**Groundwater Separation**

It is recommended that the County’s current groundwater separation criteria for conventional OWTS be retained, and that these standards also be applied to properties in the Lexington Basin by deleting the ordinance sections that define different standards for the Lexington Basin area. We also recommended that the County adopt (within the Ordinance) appropriate groundwater separation requirements for various types of “alternative systems”, which have been identified in this report (and recommendation below) for use in Santa Clara County.

**Ground Slope**

For County-wide consistency and conformance with current industry practices the following changes to the existing ordinance requirements are recommended:

- incorporate the terminology “geotechnical report”;


• retain the current maximum slope criterion of 20%, above which additional geotechnical analysis and report is required, including slope stability analysis;

• limit qualifications for geotechnical report to civil engineer or engineering geologist (delete REHS); geotechnical and slope stability analysis does not fall within the practice of an REHS;

• specify maximum slope limitation of 50% County-wide for any OWTS;

• require that for slopes >30% the dispersal system shall be designed using either pressure distribution or drip dispersal, rather than conventional gravity flow distribution; these methods for wastewater distribution are intended to provide uniform, broad distribution of wastewater over the entire dispersal field area, rather than sequentially filling individual sections of trench (by gravity). This reduces the potential for localized saturation of trenches and adjacent soils that occurs with conventional gravity-flow systems on hilly terrain, the use of pressure distribution; these dispersal methods fall under the category of “alternative systems”, discussed later in this report;

• delete the requirement to obtain Region 3 Basin Plan exemption for >30% slopes, in favor of requiring pressure distribution and drip dispersal and associated OWTS monitoring requirements that apply to alternative systems;

• incorporate new requirements mandating the development and implementation of erosion control plans for any OWTS installation in the following circumstances: (a) on slopes of >20%; (b) where above-ground fill is used; (c) where design flow is greater than 1,000 gpd; or (d) which is part of a project requiring a County grading and/or drainage permit. Although it is normal practice followed by many conscientious contractors, the County currently does not have any specific requirements for erosion control in connection with the installation of OWTS.

Horizontal Setbacks

Several clarifications, updates and relatively minor changes to the County’s OWTS setback standards are recommended as follows:

• provide definitions of “watercourse”, “drainageway”, “drainage swale”, “cut bank”, consistent with RWQCB guidelines;

• add new setback requirement (150 feet) from public water supply wells per new SWRCB Policy for OWTS (AB 885);

• include language authorizing the director to establish additional setbacks from public water supply surface water intakes as necessary to implement state and RWQCB requirements (per new SWRCB Policy);

• revise the setback from swimming pool from to be 25 feet rather than 10 feet.
Density and Cumulative Impacts

To provide a consistent basis for implementing the existing ordinance requirements regarding cumulative impact assessments, it is recommended that guidelines be developed covering such items as: (a) defining circumstances requiring cumulative impact assessment; (b) minimum qualifications of individuals performing the work; (c) data needs and assumptions; (d) analytical methods and calculations; (e) evaluation methods/criteria; and (f) provision for additional RWQCB input. Also it is recommended that the ordinance be amended to clarify that cumulative impact assessment is mandatory for any OWTS with a design flow over 2,500 gpd, consistent with the standard approach followed by the RWQCB in their current review and regulation of OWTS of this size. We also recommend that the guidelines developed for cumulative impact assessment consider requiring that second unit development proposals on lots less than 5 acres in size in the San Martin Planning Area be included among the type of projects warranting cumulative impact assessment.

Specific Geographical Area Requirements

- **Lexington Basin.** We recommend that the OWTS requirements in the existing Ordinance that apply specifically to properties in the Lexington Basin, including minimum lot size restrictions, be deleted from the Ordinance altogether and that they be replaced with the requirements applicable to the rest of the County. This recommendation is based on Questa’s findings that the various OWTS requirements adopted in the early 1980s for the Lexington Basin are either: (a) no longer necessary because of the progression of County requirements and the overall state of knowledge regarding OWTS over the past 30 years; or (b) not technically supportable based on information (or lack thereof) in the report itself.

- **San Martin Planning Area.** We that the requirement contained in the County Zoning Ordinance requiring a minimum lot size of 5 acres for approval of a second dwelling unit on properties using OWTS in the San Martin Planning Area be removed. This is based on Questa’s finding that: (a) the technical basis for the original adoption of this restriction (i.e., 1981 study of nitrate loading effects on groundwater quality) were over-stated; (b) current projections of growth and associated nitrate loading effects using more detailed methodology show a small to negligible effect from second unit development in the San Martin area; and (c) the existing County Ordinance and proposed changes include suitable provisions to assess and provide appropriate mitigation for localized nitrate loading impacts from OWTS in the San Martin area.

Conventional OWTS Design Standards

Septic Tanks

It is recommended that the design and construction standards for septic tanks be removed from the County Code and consolidated with other technical, procedural and policy materials in an accompanying *Onsite Systems Manual*, to be maintained by the Department of Environmental
Health, with all provisions subject to approval of the director and the appropriate RWQCB. Specific recommendations for septic tank design and application are:

- Include requirements for inclusion of an effluent filter on the outlet end of the septic tank;
- Delete the existing code provision (Section B11-65) that requires a separate OWTS (including a 1,500-gallon septic tank) for every building with plumbing fixtures, such as detached living units, workshop, etc. It is appropriate and often more practical to allow a main house and detached building to be served by a common OWTS, provided the system has sufficient capacity for all waste flow;
- Adopt guidelines for sizing septic tanks for commercial and other large-flow OWTS (currently not addressed in regulations or guidelines) to assure a minimum two-day hydraulic retention time for the design wastewater flow.

**Dispersal Systems**

To bring Santa Clara County dispersal field sizing more in line with current industry practices the following are recommended, most of which should be addressed in the *Onsite Systems Manual* (rather than by Ordinance):

- Delete mandatory minimum 450 gpd wastewater design flow requirement; this is an overly conservative requirement, not necessary if the dispersal field is designed appropriately for the building size and expected usage;
- Provide guidelines for estimating wastewater flows and system sizing requirements for commercial and other non-residential projects based on type of facility and projected usage;
- Delete requirement (Section B11-65) for separate OWTS for every detached structure (repeated from above recommendations under Septic Tanks);
- Revise wastewater application criteria based on information from the USEPA Design Manual and as applied in other S.F. Bay Area counties;
- Allow increased trench width (up to 3-feet wide), and wastewater loading credit for full trench bottom area; different trench configurations to match soil and other site conditions will lead to a better functioning design;
- Allow increased sidewall design depth (up to 8 ft²/lineal foot; i.e., 4-ft sidewall, two sides) for areas of deep soils, low slope (<20%), and compliance with all other siting criteria and design standards for conventional dispersal fields; this is consistent with RWQCB guidelines with limited application in portions of the County having the most favorable soil conditions;
- Revise trench spacing (on centers) requirement as follows: (a) equal to two (2) times the
effective trench depth, or 6-ft minimum, whichever is more; (b) increase the spacing by one additional foot for each 5% increase in slope over 20%.

- Update construction specifications for dispersal fields including: (a) the use of filter fabric (geotextile) in place of building paper for silt barrier above the trench drain rock; (b) installation of trench inspection wells/risers in each dispersal trench for routine check of dispersal field operation; (c) provisions for gravel-less trenches, such as chambers and other media in place of gravel.

**Alternative Systems**

To provide a broader range of OWTS treatment and dispersal options for new construction and repair/replacement situations, we recommend revisions to the current Santa Clara County Ordinance to permit the use of alternative OWTS in accordance with the following general provisions and specific requirements:

**General Provisions**

- Alternative systems to be permitted by the Director of Environmental Health for the repair or upgrading of any existing OWTS and for new construction on any legally-created parcel where: (a) it is determined that sewage cannot be disposed of in a sanitary manner by a conventional OWTS; or (b) the Director determines that an alternative system would provide equal or greater protection to public health and the environment than a conventional OWTS.

- Alternative systems not to be used as the basis approval of creation of new lots (subdivisions).

- Types of alternative systems permitted should be limited to those identified for which siting and design standards have been adopted and incorporated in the Ordinance and Onsite Systems Manual, as applicable.

- All alternative systems should only be installed by a contractor duly licensed by the Contractors State License Board of the State of California to install OWTS.

**Specific Requirements**

The County code section dealing with alternative systems should include requirements addressing the following:

- **Construction Permitting and Review Requirements** – covering general requirements related to site evaluations, engineering plans, designer qualifications, construction inspection, engineering review, and permit duration.

- **Operating Permits** – providing a new County requirement for the issuance of renewable operating permits that would apply to all alternative systems. Operating permits are intended to serve as the basis for verifying the adequacy of alternative system performance and ensuring on-going maintenance, including requirements for system
inspection, monitoring and reporting of results to the DEH, along with the requirement for permit renewal, typically on an annual basis. Provisions should be include to allow operating permits to be issued for OWTS other than alternative systems where a higher level of oversight is warranted (e.g., for large flow systems, >2,500 gpd).

- **Performance Monitoring and Reporting** – addressing the general parameters for alternative systems monitoring and reporting of results, along with procedural details and requirements for different types of alternative OWTS.

- **Types of Alternative Systems** – identifying and providing design and construction guidelines for the following alternative treatment and dispersal technologies presented in this report:
  
  ➢ **Alternative Treatment Systems:**
    - Intermittent and recirculating sand filters
    - Proprietary treatment units that provide secondary or better effluent quality
  
  ➢ **Alternative Dispersal Systems:**
    - Shallow pressure distribution trench
    - Mound
    - At-grade
    - Pressure-dosed sand trench
    - Raised sand filter bed
    - Subsurface drip dispersal

  Also, provide allowance for future inclusion of other types of alternative OWTS, subject to the systems being reviewed and approved by the Environmental Health Director and the RWQCBs.

- **Siting and Design Criteria** – setting forth specific siting criteria for different types of alternative treatment and dispersal systems, addressing:
  
  ➢ **Horizontal setbacks** – these criteria should be the same as those that apply to conventional OWTS
  
  ➢ **Ground slope** – maximum ground slope limitations according to system type as presented in Table 6.
Table 6
Recommended Maximum Ground Slope for Alternative Wastewater Dispersal Systems

<table>
<thead>
<tr>
<th>Type of Disposal System</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mound, At-Grade</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>• Raised Sand Filter Bed</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>• Shallow Pressure Distribution</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>• Pressure-dosed Sand Trench</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>• Subsurface Drip Dispersal</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

- **Depth to groundwater** – minimum vertical separation distances from the dispersal field to seasonal high groundwater level, ranging from 2 to 8 feet, based on the enhanced degree of effluent treatment provided by the particular type of alternative system as presented in Table 7.

Table 7
Recommended Minimum Vertical Separation Distance to Ground Water for Alternative OWTS

<table>
<thead>
<tr>
<th>Type of OWTS</th>
<th>Percolation Rate (MPI)</th>
<th>Vertical Separation to Groundwater (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2'</td>
</tr>
<tr>
<td>• Conventional Trench w/ Supplemental Treatment</td>
<td>1-5 6-30 31-120</td>
<td>X</td>
</tr>
<tr>
<td>• Shallow Pressure Distribution (PD)</td>
<td>1-5 6-120</td>
<td>X</td>
</tr>
<tr>
<td>• Mound</td>
<td>1-5 6-120</td>
<td></td>
</tr>
<tr>
<td>• Pressure-dosed Sand Trench (PDST)</td>
<td>1-5 6-120</td>
<td></td>
</tr>
<tr>
<td>• Raised Sand Filter Bed</td>
<td>1-5 6-120</td>
<td></td>
</tr>
<tr>
<td>• Subsurface Drip Dispersal w/Supplemental Treatment</td>
<td>1-5 6-120</td>
<td></td>
</tr>
</tbody>
</table>

1 Measured from the bottom of the dispersal system to the seasonal high water table.

- **Soil depth** – minimum depth of soil below the dispersal field to an impermeable layer, ranging from 2 feet to 3 feet, depending on the particular type of alternative system per Table 8.
Table 8
Minimum Soil Depth Beneath Alternative OWTS

<table>
<thead>
<tr>
<th>Type of OWTS</th>
<th>Minimum Soil Depth (feet)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Conventional Trench w/ Supplemental Treatment</td>
<td></td>
</tr>
<tr>
<td>• Shallow Pressure Distribution Trench (PD)</td>
<td></td>
</tr>
<tr>
<td>• At-Grade</td>
<td></td>
</tr>
<tr>
<td>• Shallow PD w/Supplemental Treatment</td>
<td></td>
</tr>
<tr>
<td>• At-Grade w/Supplemental Treatment</td>
<td></td>
</tr>
<tr>
<td>• Mound</td>
<td>X</td>
</tr>
<tr>
<td>• Raised Sand Filter Bed (Open Bottom Sand Filter)</td>
<td></td>
</tr>
<tr>
<td>• Subsurface Drip Disposal w/Supplemental Treatment</td>
<td>X</td>
</tr>
</tbody>
</table>
| • Raised Sand Filter Bed, w/Supplemental Treatment & Drip Dispersal | X | ¹ Measured from the bottom of the dispersal trench, bed or piping (drip dispersal only).

Other Program Recommendations

Onsite Systems Manual
We recommend development of a comprehensive Onsite Systems Manual containing procedural and technical details for implementation of the Ordinance, covering administrative, design, materials, construction, operation, maintenance and monitoring matters, and user information.

This is intended to replace and incorporate information included in the existing “Bulletin A”, along with the inclusion of design details and guidelines related to both conventional and alternative systems, operation and monitoring requirements and related procedural matters. Some of the design and construction standards in the existing Ordinance would be moved to the Manual. It is recommended that the Onsite Systems Manual be reviewed and updated from time-to-time, every year or two if possible, to keep pace with new issues, policies, procedures, and technologies affecting the use and management of on-site systems. The Onsite Systems Manual should be developed and maintained by the DEH. The initial document and any substantive changes would require approval by the Director and the two RWQCBs.

Septic Tank Inspection and Reporting Program
We recommend adoption of a new program requiring that septic tank pumpers complete a basic OWTS inspection at the time any septic tank is serviced in the county, and that the inspection report be submitted to DEH as part of the normal monthly reporting of septic tank pump-outs.

The inspection work would be in accordance with guidelines provided in the Onsite Systems Manual, and reported using a standard County-supplied form. The DEH would be responsible for maintaining and reviewing the data, and for oversight and permitting of any follow-up repair work that might result from the findings of the OWTS inspection. Because of the increased responsibilities for observation and reporting of OWTS operating conditions, the individuals
conducting this work should meet minimum qualifications, including demonstrated training and experience with on-site systems and participation in annual training update conducted by DEH.

The aim of the proposed program is to help identify and proactively address OWTS maintenance issues before they develop into more severe operational/failure problems requiring more extensive and costly corrective work. This recommendation is modeled after a successful program that has been in place for the past 12+ years in Santa Barbara County, as well as in neighboring Santa Cruz County. It could also aid substantially in meeting County obligations for ongoing assessment and reporting of OWTS impacts as will be required for Local Agency Management Programs (LAMP) under provisions of the recently adopted SWRCB Policy for OWTS that takes effect in mid-2013.

Onsite Wastewater Maintenance Providers

The following recommendations have been developed in consultation with County DEH staff and stakeholder representatives as minimum requirements for OWTS maintenance providers:

    Onsite wastewater maintenance providers shall be registered with the Department of Environmental Health and meeting all of the following qualifications:

    a. Minimum one year of experience in OWTS maintenance and servicing;
    b. Experience in the construction and/or operation of alternative OWTS, as evidenced by the possession of a C-36 or C-42 contractor’s license or equivalent experience deemed acceptable by the Director;
    c. Current certification of completion of an onsite wastewater training course by a third party entity, such as the California Onsite Wastewater Association (COWA), National Association of Waste Transporters (NAWT), National Sanitation Foundation (NSF), or other acceptable training program as determined by the Director;
    d. Participation in an annual training/review session conducted by the Director;
    e. Payment of the current annual registration fee.

REFERENCES


OWTS Regulations and Guidelines for the following Counties: Alameda, Contra Costa, Marin, Napa, Solano, Sonoma, and Santa Cruz.
CHAPTER IV. ONSITE WASTEWATER TREATMENT

ARTICLE 1. GENERAL

Sec. B11-60. Intent and application.

The purpose of this chapter is to establish standards for the approval, installation, and operation of onsite wastewater treatment systems (OWTS) within Santa Clara County, consistent with the appropriate California Regional Water Quality Control Board standards and basin plans. The standards are adopted to prevent the creation of health hazards and nuisance conditions and to protect surface and groundwater quality.

OWTS may be considered for the treatment and dispersal of domestic sewage where a sanitary sewer is not available consistent with the provisions of section B11-62 of this chapter. No hazardous wastes shall be discharged into any OWTS.

This chapter applies to premises where there is proposed or exists a residence, place of business or other building or place which people occupy, or where persons congregate, reside or are employed and where the maximum daily flow volume of waste produced is ten thousand gallons per day (10,000 gpd) or less.

If the amount of waste produced is more than ten thousand (10,000 gpd) gallons per day, or where a community system serving multiple discharges under separate ownership is proposed, the method of treatment and dispersal must be approved by the appropriate California Regional Water Quality Control Board consistent with the requirements of section B11-66 of this chapter. Any proposed OWTS with a projected daily wastewater flow of more than two thousand five hundred gallons per day (2,500 gpd) will be referred by the director to the appropriate California Regional Water Quality Control Board for review and will also require the issuance of an operating permit as provided in section B11-92 of this chapter.

New divisions of land using OWTS shall be limited to a minimum parcel size of one acre, or to a minimum parcel size of two and one-half acres if within a reservoir watershed.

For any subdivision of land, the subdivider must demonstrate that the onsite wastewater treatment system(s) design and siting is consistent with section B11-67 of this chapter.

Sec. B11-61. County not responsible for damage.

The County is not liable or responsible for damage resulting from the defective construction of any OWTS as herein provided, nor will the County or any official or employee thereof be liable or responsible by reason of any inspection authorized hereunder.


Every property where there is proposed a residence, place of business, or other building or place which people occupy, or where persons congregate, reside, or are employed, and which abuts a street or alley in which there exists an approved available sanitary sewer, or which property line is within three hundred feet of an approved available sanitary sewer, must be connected to the sanitary sewer in the most direct manner possible, provided a right-of-way and any necessary approval from the appropriate sewer authority and the Santa Clara County Local Agency Formation Commission is first obtained. On property where an OWTS exists, and where such property abuts a street or alley in which there exists an approved available sanitary sewer or which property line is within 300 feet of an approved available sanitary sewer, connection to the available sanitary sewer will be required at the time of system failure or when the building is remodeled, increased in square footage or altered in a manner as to change uninhabitable space into habitable space provided any necessary approval from the appropriate sewer authority and Santa Clara County Local Agency Formation Commission is first obtained.
Sec. B11-63. Violations.

(a) No person may construct, add to, repair, alter or maintain any OWTS, sewer pipes or conduits, or any other conduits for the treatment or discharge of sewage, impure waters, or any matter or substance offensive, injurious, or dangerous to health so as to cause any of the following to occur:

(1) Sewage, impure waters, or any matter or substance offensive, injurious, or dangerous to health to empty, flow, seep, or drain onto the surface of any land, or saturate the soil within twelve inches of the surface.

(2) Sewage, impure waters, or any matter or substance offensive, injurious, or dangerous to health to empty, flow, seep, drain into, or affect any well, spring, stream, river, lake, or other waters.

(3) Result in any condition which, in the opinion of the director, is unsafe or dangerous, or creates a nuisance.

(b) A violation of this section is hereby declared a public nuisance.

Sec. B11-64. Definitions.

As used in this chapter, the following terms and phrases have the following meaning:

(a) Alternative OWTS: is a type of OWTS that utilizes either a method of wastewater treatment other than a conventional septic tank and/or a method of wastewater dispersal other than a conventional drainfield trench for the purpose of producing a higher quality wastewater effluent and improved performance of and siting options for effluent dispersal.

(b) At-grade: means a type of dispersal system consisting of a gravel distribution bed placed on top of a tilled, in situ soil absorption area, which is then covered by a minimum of 12 inches of suitable soil that will support vegetative growth. Wastewater effluent is applied to the gravel distribution bed using pressure distribution.

(c) 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 Water Quality Control Board, approved by the State Water Board and the Office of Administrative Law, and identify surface water and groundwater bodies within each Region’s boundaries and establish, for each, its respective beneficial uses and water quality objectives.

(d) Bedrock: means the rock, usually solid, that underlies soil or other unconsolidated, earthen material.

(e) Beneficial uses: means those qualities in waters of the state that may be protected against quality degradation that include, but are not necessarily limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; esthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife and other aquatic resources or preserves.

(f) 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. The use of cesspools is not authorized in Santa Clara County.

(g) Community system: means an OWTS that provides for the collection, treatment and dispersal of wastewater from multiple discharges under separate ownership. Community systems are subject
to review and approval of the applicable California Regional Water Quality Control Board.

(h) Conventional OWTS: is a type of OWTS consisting of a septic tank for primary treatment of sewage followed by a system of drainfield trenches for subsurface dispersal of effluent into the soil. A conventional OWTS may utilize gravity flow or a pump system to convey effluent from the septic tank to the drainfield.

(i) Cut or embankment: means any altered area of land surface having a distinctly greater slope than the adjacent natural ground surface, over 24 inches in vertical height, and any part of which is lower in elevation than the ground surface at the nearest point of the OWTS. Cuts supported by retaining walls or similar structures shall be included in this definition, as shall steep natural ground surfaces where a sharp break in the ground slope is discernible.

(j) Cumulative impacts: The persistent and/or increasing effect of OWTS resulting from the density of such discharges in relation to the assimilative capacity of the local environment. Examples include, but are not limited to: (a) nitrate or salt additions to ground water or surface water; and (b) rise in groundwater levels (“mounding of the water table”) that interferes with the performance of an OWTS, causes drainage problems or results in other adverse hydrological or soil conditions affecting public health, water quality or public safety.

(k) Dispersal system: means a series of trenches, beds, subsurface drip lines, or other approved method for subsurface infiltration and absorption of wastewater effluent, including all component parts, such as piping, valves, filter material, chambers, dosing pumps, siphons and other appurtenances.

(l) 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 does not include wastewater from industrial processes or recreational vehicle dump stations.

(m) Drainage swale: means any course of concentrated drainage water that has formed over time by either natural or man-made forces, and where the flow of water is either at or near ground surface.

(n) Drainageway: means an unlined channel, with definite bed or banks, which conveys stormwater runoff and provides surface hydraulic continuity with either seasonal or perennial streams or water bodies.

(o) Drainfield: means a system of rock-filled trenches or beds that distribute treated sewage effluent for subsurface dispersal into the soil. A drainfield is also known as a “leachfield” or a “soil absorption system”.

(p) Failure: The ineffective treatment and dispersal of waste resulting in the surfacing of raw or inadequately treated sewage effluent and/or the degradation of surface or groundwater quality.

(q) Geotechnical report: means a written document used to communicate soil and geologic site conditions, interpretations, analysis and recommendations pertinent to the design, installation and
operation of an OWTS in areas of steeply sloping terrain. A primary emphasis of the geotechnical report is the evaluation of potential slope stability issues that may be affected by or result in impacts to the operation of the proposed OWTS.

(r) Groundwater: means water below the land surface that is at or above atmospheric pressure.

(s) 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 or a fats, oil, and grease (FOG) concentration greater than 100 mg/L prior to the septic tank or other OWTS treatment component.

(t) Holding tank: means a watertight receptacle used to collect and store wastewater prior to it being removed from a property by means of vacuum pumping and hauling, or other approved method. The use of holding tanks in Santa Clara County is authorized for limited circumstances, including, but not limited to, for the abatement of health hazards or for certain public use facilities.

(u) Intermittent sand filter: means a packed-bed filter of medium-grained sand used to treat septic tank effluent to an advanced level. The sand filter consists of a lined excavation or structure filled with uniform clean sand, with an under-drain system at the bottom. The wastewater is dosed to the surface of the sand through a pressure-distribution network and allowed to percolate through the sand where biochemical oxygen demand (BOD) is reduced and suspended solids are removed; treatment is accomplished by physical filtration as well as microbial growth on the surface of the sand grains. After a single pass, the treated water is collected in the under-drain for further processing or disposal.

(v) Mound: means an OWTS consisting of above-ground sand bed placed over a tilled, native soil absorption area, on top of which is placed a bed of gravel for distribution of septic tank effluent, which is then covered by suitable soil to stabilize the surface and support vegetative growth. Effluent is applied to the gravel distribution bed using pressure distribution.

(w) Onsite Systems Manual: means the document developed, maintained, and amended by the Santa Clara Department of Environmental Health containing policy, procedural and technical details for implementation of this Chapter, as prescribed by the director and approved by the appropriate California Regional Water Quality Control Boards, as applicable.

(x) Onsite wastewater maintenance provider: means a person capable of operating, monitoring, inspecting and maintaining an OWTS, and filing appropriate reports regarding OWTS performance in accordance with the requirements of this Chapter, and possessing minimum experience and qualifications as established by the director in the Onsite Systems Manual.

(y) Onsite wastewater treatment system (OWTS): means a system of pipes, tanks, trenches and other components used for the collection, treatment and subsurface dispersal of domestic wastewater at or near the building or buildings being served. The short form of the term may be singular or plural. For the purposes of this Ordinance, OWTS do not include “graywater” systems pursuant to Health and Safety Code Section 17922.12.

(z) Operating permit: means the administrative document issued by the director authorizing the initial and/or continued use of an alternative OWTS in conformance with the provisions of this Ordinance, intended to aid in verification of the adequacy of alternative OWTS performance, and that may contain both general and specific conditions of use. An operating permit may also be issued for
circumstances other than alternative OWTS, such as in connection with holding tank exemptions or where, in the opinion of the director, the type, size, location or other aspects of a particular OWTS installation warrant the additional level of oversight provided by an operating permit.

(aa) Percolation test: means a method of evaluating water absorption of the soil. The test is conducted with clean water and test results are used in the design and sizing of the dispersal system.

(bb) Permeable soil: means soil having a percolation rate of 120 minutes per inch or faster or having a clay content of less than 60 percent, and shall not include solid rock formations or those that contain continuous channels, cracks or fractures.

(cc) Installation permit: means a document issued by the director that conveys approval of and sets forth applicable conditions for the installation of an OWTS, or component thereof.

(dd) Portable toilet: means an enclosed unit intended for temporary use at a given location. Portable toilets can also be known as, but not limited to, chemical toilets in this chapter.

(ee) Pressure distribution: means a method of wastewater dispersal employing a pump or automatic dosing siphon and distribution piping consisting of small diameter plastic pipe with small perforations spaced uniformly along its length; it is used to achieve equal distribution of wastewater within a treatment unit (such as a sand filter) or a dispersal field.

(ff) Pressure-dosed sand trench: means an alternative dispersal system consisting of a variation of a shallow pressure distribution system that utilizes specially graded sand in place of gravel to backfill the bottom portion of the dispersal trench, improving the treatment of effluent, and controlling the percolation rate before it reaches the trench bottom.

(gg) Raised sand filter bed: means an alternative dispersal system consisting of a raised or terraced sand bed, commonly supported by a low retaining wall or bulkhead, where the bottom surface is even with or slightly below ground surface and forms the absorption surface. Used following a supplemental treatment unit, the raised sand bed provides additional polishing treatment and final dispersal of water into the ground.

(hh) Recirculating sand filter: means a packed-bed filter of coarse-grained sand used to treat septic tank effluent to an advanced level. It is a modified version of an intermittent (single pass) sand filter which includes a recirculation system that causes the wastewater to pass through the sand media several times prior to final dispersal, usually controlled by a timer.

(ii) Regional Water Quality Control Board: means the California Regional Water Quality Control Boards designated by Water Code Section 13200, which have authority for adopting, implementing and enforcing water quality control plans (basin plans) which set forth the State’s water quality standards and the objectives or criteria necessary to protect those beneficial uses. There are two RWQCBs having jurisdiction over different parts of Santa Clara County: San Francisco Bay Region (2), and Central Coast Region (3). Any reference to the Regional Water Quality Control Board in this Ordinance 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.

(jj) Registered Septic Tank Pumper: means a person with an active liquid waste pumper permit issued by the director, per Santa Clara County Code Division B11, Chapter X, beginning with section B11-
as qualified to pump and haul septic tank sludge ("septage") and to perform service inspections of septic tanks and associated components of OWTS as required in this chapter.

(kk) Sanitary sewer: means a system for collecting residential or municipal wastewater and directing the collected wastewater to a treatment works prior to dispersal.

(ll) Septic tank: means a watertight, covered receptacle designed and constructed for primary treatment to receive the discharge of sewage from a building sewer, separate solids from the liquid, digest organic matter and store digested solids through a period of detention, and allow the clarified liquids to discharge for supplemental treatment and/or final dispersal.

(mm) Shallow pressure-distribution trench: means an alternative dispersal system which consists of a variation of a conventional gravity drainfield that uses a pump and small-diameter pressure piping to achieve broad, uniform distribution of wastewater in the shallow soil zones for improved soil absorption and enhanced treatment of percolating effluent.

(nn) Site: means the land area occupied, or proposed to be occupied, by the OWTS, including any designated reserve area.

(oo) 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 chapter. Site evaluations shall be in accordance with procedures and criteria established by the director and contained in the Onsite Systems Manual.

(pp) 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.

(qq) Subsurface drip dispersal: means a method for releasing treated wastewater to the soil for final treatment and dispersal via small diameter flexible plastic tubing manufactured with emitters spaced uniformly along its length; the drip field is designed and installed such that the drip tubing is installed in the shallow surface soils, typically 8 to 12 inches below finished grade.

(rr) Supplemental treatment: means a device or system used in an OWTS to perform additional wastewater treatment functions, beyond primary treatment, and capable of reliably producing wastewater effluent of secondary quality or better, prior to discharge to the dispersal system. For the purposes of this chapter, secondary quality is defined as effluent meeting 30-day average concentration limits of 30 mg/L for biochemical oxygen demand and 30 mg/L for total suspended solids.

(ss) Waste discharge requirements (WDR): means an operation and discharge permit issued for the discharge of waste pursuant to Section 13260 of the California Water Code.

(tt) Wastewater maintenance provider: means a person capable of inspecting, monitoring, and maintaining an OWTS in accordance the provisions of this chapter, and meeting minimum qualifications as established by the director.

(uu) Watercourse: means a definite channel with bed and banks within which water flows either perennially, ephemerally or intermittently, including overflow channels contiguous to the main channel. A watercourse may be either a natural or man-made channel.
ARTICLE 2. ONSITE WASTEWATER TREATMENT SYSTEMS

Sec. B11-65. Onsite wastewater treatment systems; when used.

(a) Every residence, place of business, or other building, or place where persons congregate, reside, or are employed, and which cannot be connected to a sanitary sewer, must be provided with a water flush toilet connected to an approved OWTS.

(b) Each detached living unit shall be connected to an approved OWTS determined to have sufficient treatment and dispersal capacity for the expected wastewater flow from the detached living unit as well as from any other facilities connected to the OWTS.

(c) Every building, structure, or appurtenance that contains one or more waste producing fixtures such as toilets, sinks, showers or bathtubs, clothes washing machines, dish washing machines, animal wash pads, floor drains or other fixture or fittings intended to drain organic or inorganic waste material must be connected to an approved OWTS that meets the requirements of this chapter.

Sec. B11-66. Onsite wastewater treatment systems subject to California Regional Water Quality Control Board waste discharge requirements; county permit required; fee.

Review and approval by the applicable California Regional Water Quality Control Board is required for OWTS in cases where: 1) the peak wastewater flow handled by the OWTS is more than 10,000 gallons per day; 2) the OWTS is a categorized as a community system, which serves multiple discharges under separate ownership; or 3) the California Regional Water Quality Control Board has otherwise determined that their review and approval is necessary and appropriate for water quality protection. OWTS that are subject to the requirements and approval of the California Regional Water Quality Control Board are also required to obtain approval of the director in accordance with the following:

(a) The proposed system must be designed to accommodate the waste discharge consistent with the requirements of the appropriate California Regional Water Quality Control Board.

(b) The director will require engineered sewerage plans to be submitted by a registered civil engineer or a registered environmental health specialist with experience in OWTS design before issuing a permit.

(c) A registered civil engineer or a registered environmental health specialist will be required to inspect the construction of the OWTS and, upon completion, to submit a letter of certification to the director verifying the proper installation and operation of the OWTS;

(d) Site evaluations, plan submittals, design and construction details, inspection, and operation and maintenance shall be consistent with guidelines and procedures prescribed by the director and contained in the Onsite Systems Manual.

(e) The applicant must obtain a permit(s) from the director and pay a permit fee(s) in an amount established by resolution of the Board of Supervisors.


(a) Where an OWTS is required it shall, at a minimum, consist of a septic tank and subsurface dispersal system for absorption and leaching of the effluent into the soil. The septic tank and subsurface effluent dispersal system must be so constructed as to meet the requirements prescribed by this chapter and the rules, regulations and guidelines contained in the Onsite Systems Manual.

(b) OWTS must be installed in accordance with the plans approved by the director. Any changes in the installation plans must be reviewed and approved by the director prior to installation.

(c) No person may construct, add to, repair or alter any existing OWTS without first submitting plans to the director for approval and obtaining a permit pursuant to the requirements of this chapter.
(d) Two dispersal fields (dual leaching), each one hundred percent of the total size required by the director, must be installed and interconnected with an approved flow diversion device, intended to allow alternate use of the two fields.

(e) OWTS must be located to be easily accessible for maintenance and repairs.

(f) For all locations where an OWTS is proposed to be installed, soil profiles, percolation tests and other exploratory tests, as necessary, shall be performed to verify adequate depth and permeability of soil and separation between trench bottom and groundwater. Testing shall be conducted in accordance with requirements and guidelines prescribed by the director in the Onsite Systems Manual. Such procedures shall include provisions for completion of groundwater observations during the wet season, as well as wet season percolation testing in cases where soils exhibit high shrink-swell characteristics related to clay content, plasticity and/or structure. Where the director has been provided adequate evidence to demonstrate suitable soil conditions and groundwater separation, testing requirements may be waived.

(g) For new divisions of land, soil profiles, percolation tests and groundwater determinations will be required on every parcel unless the director determines, on a case-by-case basis, that such testing is not necessary due to the availability of sufficient information to demonstrate conformance with applicable siting criteria for all proposed OWTS locations.

(h) When a geological report is required by the county geologist, it must be made available to the director.

(i) Approval of any Conventional OWTS shall require compliance with the following minimum siting criteria:

1. Soil Depth. Minimum depth of permeable soil beneath the bottom of the proposed dispersal field shall be 5 feet. Permeable soil is defined as having a percolation rate of 120 minutes per inch or faster or having a clay content of less than 60 percent, and shall not include rock formations that contain continuous channels, cracks or fractures;

2. Soil Fill. Maximum depth of soil fill covering any portion of the area proposed for installation of a dispersal system shall not exceed twelve inches in depth.

3. Vertical Groundwater Separation. Minimum required vertical separation distance between trench bottom and groundwater shall be determined according to the soil percolation rate as follows:

<table>
<thead>
<tr>
<th>Percolation Rate (Minutes/Inch)</th>
<th>Vertical Distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>1-5</td>
<td>20</td>
</tr>
<tr>
<td>6-30</td>
<td>8</td>
</tr>
<tr>
<td>31-120</td>
<td>5</td>
</tr>
<tr>
<td>More than 120</td>
<td>Not Permitted</td>
</tr>
</tbody>
</table>

4. Areas of Flooding. OWTS shall not be located in areas subject to flooding as defined by the limits of the 10-yr floodplain, determined or estimated from published floodplain maps or on the basis of historical evidence acceptable to the director. New OWTS that are to be located in areas of special flood hazard, as identified in division C12 of this Ordinance Code, must comply with all relevant provisions of division C12 of this Ordinance Code.

5. Ground Slope. Maximum ground slope in the dispersal field area shall not exceed thirty percent. Additionally, for any site where the ground slope exceeds twenty percent, approval shall be dependent upon completion of a geotechnical report as provided in section B11-83 of this chapter.
Horizontal Setbacks. Minimum horizontal setback distances from various site features to OWTS components shall be as follows:

<table>
<thead>
<tr>
<th>Site Feature</th>
<th>Minimum Setback Distance* (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To Dispersal Field</td>
<td>To Septic Tank</td>
</tr>
<tr>
<td>Non-public water supply wells and springs</td>
<td>100</td>
</tr>
<tr>
<td>Public water supply wells</td>
<td>150</td>
</tr>
<tr>
<td>Watercourses (from top of bank)</td>
<td>100</td>
</tr>
<tr>
<td>Reservoirs (from highwater mark)</td>
<td>200</td>
</tr>
<tr>
<td>Cuts or steep embankments (from top of cut)</td>
<td>4 X h** 10 feet</td>
</tr>
<tr>
<td>Steep slopes, &gt;50% (from break of slope)</td>
<td>4 X h** 10 feet</td>
</tr>
<tr>
<td>Drainageway/drainage swale (from edge of flow path)</td>
<td>50</td>
</tr>
<tr>
<td>Foundation</td>
<td>10</td>
</tr>
<tr>
<td>Property line</td>
<td>10</td>
</tr>
<tr>
<td>Septic tanks</td>
<td>6</td>
</tr>
<tr>
<td>Swimming pool</td>
<td>25</td>
</tr>
<tr>
<td>Road easement, pavement, or driveway</td>
<td>5</td>
</tr>
</tbody>
</table>

* Note: the director may prescribe more restrictive (greater) horizontal setback distances from watercourses in the vicinity of a public water supply surface water intake, as needed, for implementation of State and Regional Water Quality Control Board policies. Such additional requirements will be prescribed in the Onsite Systems Manual.

** h equals the height of cut or embankment, in feet. The required setback distance shall not be less than twenty five feet nor more than one hundred feet.

Soil Percolation Rate. The average soil percolation rate in the proposed dispersal field area shall not be faster than one minute per inch (1 mpi) nor slower than one hundred twenty minutes per inch (120 mpi), determined in accordance with procedures prescribed by the director in the Onsite Systems Manual.

OWTS Located on Property Served. OWTS shall be located on the same property as the building(s) being served.

Upon notice from the director that work on the OWTS is being conducted in violation of this chapter, or in an unsafe or dangerous manner, the work must stop immediately. The stop-work order must be in writing and must be issued to the owner of the property involved by first class U.S. mail. A copy must also be supplied to the owner's agent, or to the person doing the work. It must state the conditions under which work may be resumed.

Sec. B11-68. Plans.

The OWTS plans must comply with and contain all information as prescribed by the director in the Onsite Systems Manual. Any change in the OWTS plans after the issuance of a permit must first be approved by the director. Failure to obtain approval from the director will invalidate the permit.

Sec. B11-69. Fees.

Permit fees for OWTS subject to this chapter and all related fees will be an amount established by resolution of the Board of Supervisors.
Sec. B11-70. State contractor's license required for installation or repair; registration fee.

(a) No person may install, construct, alter, enlarge, reconstruct, replace, improve, recondition or repair an OWTS pursuant to this chapter unless the person possesses a general engineering contractor's license (class A) as defined in section 7056 of the Business and Professions Code, or a Class C-42 sanitation system contractor's license or Class C-36 plumbing contractor's license from the Contractors State License Board of the State of California.

(b) In the case of a conventional OWTS, the property owner may construct or repair an OWTS on his/her own property, which system serves or will serve the building on the property that is neither being offered for sale nor intended to be so offered, provided: 1) persons hired by the owner to do the subject work must comply with section B11-70(a); or 2) persons hired by the owner must be hired as employees of the owner and the owner must provide workman's compensation insurance, as required by law; and 3) an OWTS permit is obtained.

Sec. B11-71. Refusal to issue building permit.

No building permit may be issued for any building requiring a sewage disposal system that is not to be connected to an approved sanitary sewer unless the applicant has received written approval of the director for an OWTS.

Sec. B11-72. Refusal to issue certification of occupancy.

(a) No certification of occupancy may be issued for any building that is not connected to an approved sanitary sewer without written approval of the director for an OWTS.

(b) No person may occupy or otherwise use any premises or building that has not been connected to an approved sanitary sewer unless the director has approved the method of sewage disposal.


(a) Policy, procedural and technical details for implementation of this Chapter shall be contained in a document titled the Onsite Systems Manual.

(b) The Onsite Systems Manual shall be developed and maintained by the Department of Environmental Health, and shall provide a reasonable process for seeking input from the affected public and OWTS practitioners in connection with its development and when changes are made.

(c) The Onsite Systems Manual and any amendments shall be subject to approval by the director and by the San Francisco Bay and Central Coast Regional Water Quality Control Boards in accordance with applicable State requirements and policies for onsite wastewater treatment.

Sec. B11-74. Cumulative impacts.

Where OWTS may have cumulative impacts on groundwater and/or watershed conditions due to such factors as the constituent levels (e.g., nitrogen content) in the wastewater, the volume of wastewater flow, the density of OWTS discharges in a given area, and/or the sensitivity and beneficial uses of water resources in the discharge area, the director may require additional technical studies (also termed "cumulative impact studies") or other information demonstrating to the satisfaction of the director, that use of the proposed OWTS will not create adverse cumulative effects on water quality, public health or safety. Cumulative impact studies shall be mandatory for any OWTS with wastewater flows of 2,500 gpd or more. In all cases, such cumulative impact studies will be conducted in accordance with the Onsite Systems Manual. The Onsite Systems Manual guidelines will cover items including, but not limited to, the following: (1) circumstances requiring cumulative impact assessment; (2) minimum qualifications of individuals performing the work; (3) data needs and assumptions; (4) analytical methods and calculations; (5) evaluation methods and criteria; and (6) provision for inclusion of specific requirements or recommendations of the California Regional Water Quality Control Board having jurisdiction.
Sec. B11-75. Sewer wells; cesspools; seepage pits.

All sewer wells, cesspools, seepage pits, and similar excavations are hereby declared a public nuisance and are prohibited.

Sec. B11-76. Holding tanks; portable toilets.

(a) All holding tanks are hereby declared a public nuisance and are prohibited.

Exception to this prohibition may be granted by the director:

(1) If it is necessary to use a holding tank to abate a nuisance or health hazard caused by a failing OWTS.

(2) For a publicly-owned nonresidential facility necessary for the public health, safety or welfare, where installation of an OWTS is not feasible and a holding tank is determined by the director to provide the safest and most acceptable method of sewage disposal.

Where exceptions are granted and holding tank(s) approved, an operating permit issued by the director will be required, which will provide for approval of the tank pumper, maintenance schedule, tank/sewage level monitoring, and reporting requirements.

(b) Portable Toilets. Portable toilets are intended to serve non-residential, limited use activities, such as field labor operations, special events, and temporary construction sites where connection to a sanitary sewer system or installation of an OWTS is not practicable. Excluding those activities covered under California labor and sanitation code requirements, the use of portable toilets at a particular location or event shall not exceed three consecutive days duration unless otherwise exempted by the director. Such exemption, where approved, may require the issuance of an operating permit in accordance with section B11-92 of this chapter, which will specify the terms and conditions for extended use of the portable toilet(s).

Sec. B11-77. Permit and onsite wastewater treatment system plans; new construction; rebuilding; remodeling.

No person may construct, build, rebuild or remodel any residence, place of business, or other building or place where persons reside, congregate or are employed which is not to be connected to an approved sanitary sewer without first submitting plans of the OWTS to the director for approval and 1) obtaining approval of the proposed construction, building, rebuilding or remodeling to be served by an existing OWTS, or 2) obtaining an OWTS installation permit pursuant to this chapter. The approval or permit cannot be transferred and expires one year after the date of issuance; except that the director, upon a showing of good cause, may extend the approval or permit for any time not to exceed one additional year. Failure to obtain an approval or permit from the director is a violation of this chapter.

The director may revoke a permit or approval issued pursuant to this chapter in case of any false statement, or misrepresentation of fact in the application or on the plans on which the permit or approval was based.

Sec. B11-78. Reserved.

Sec. B11-79. Reserved.

Sec. B11-80. Subsurface dispersal systems requirements, conventional OWTS.

(a) The conventional dispersal method approved for use in Santa Clara County shall be a gravity dispersal trench system, consisting of an 18- to 36-inch wide trench, no greater than 8-feet deep, filled with gravel filter material and perforated distribution pipe, with the total length determined based on soil percolation rates and the projected wastewater flow rate of the building(s) being served. Trench system designs utilizing chambers or other filter material in place of gravel may be approved by the director and addressed with specific criteria in the Onsite Systems Manual as a conventional dispersal system design option.
(b) Conventional OWTS shall be designed and constructed in accordance with requirements prescribed by the director in the Onsite Systems Manual.

Sec. B11-81. Construction inspections.

A stamped copy of the building plans for the approved OWTS must be kept available at the jobsite during system installation and until the system passes final inspection by the director. Inspections of each new installation must be made to ensure compliance with all the requirements of this Code and the Onsite Systems Manual. Requests for inspection must be made at least one business day in advance of the commencement of work. In the event the director determines there has been an improper installation, a stop-work order may be posted on the jobsite. Before any further work is done on a posted system, clearance from the director must be obtained.

Sec. B11-82. Operation and maintenance guidelines.

(a) Operation and maintenance guidelines for each OWTS installation shall be provided by the designer and/or the installer, with a copy provided to the director as well as to the system owner.

(b) Final approval of system installation shall be contingent upon confirmation by the director that required operation and maintenance guidelines have been provided.

Sec. B11-83. Slope variances and erosion control.

(a) No subsurface dispersal system may be constructed on slopes exceeding twenty percent. Variances to this slope requirement may be granted by the director where the applicant can demonstrate, through a geotechnical report and a complete engineering installation plan prepared by a California-registered civil engineer or a California-certified engineering geologist, that use of a subsurface dispersal system will not permit sewage effluent to surface, degrade water quality, create a nuisance, affect soil stability, or present a threat to the public health or safety. The geotechnical report must include but not be limited to soil percolation rates, contours, soil depth, seasonal groundwater elevation(s), location of all existing or proposed ground cuts, rock formations, soil stability, drainage, and other data as determined by the director and the County geologist.

(b) Pressure Distribution and Drip Dispersal Methods. In addition to the provisions of subsection (a) of this section, any OWTS proposed for construction on slopes exceeding 30 percent shall require the use of pressure distribution or drip dispersal methods, which are classified as an alternative OWTS and shall be designed and permitted in accordance with applicable provisions contained in Article 3 of this Chapter and in the Onsite Systems Manual.

(c) Erosion Control. In addition to the provisions of subsections (a) and (b) of this section, an erosion control plan shall be prepared and implemented for the following circumstances:

(1) Any alternative or conventional OWTS located on slopes exceeding 20 percent;

(2) Any alternative or conventional OWTS that includes the use of above-ground fill, regardless of the slope of the terrain;

(3) Any OWTS with a design capacity of greater than 1,000 gallons per day (gpd); and

(4) Any OWTS which is part of a development project requiring a grading and/or drainage permit per requirements of the County grading ordinance, Division C12, Chapter III of the County Code.

The erosion control plan shall incorporate measures consistent with guidelines and requirements contained in Division C12, Chapter III of the County Code, and shall be included as a part of the installation plan for the OWTS.

Final approval of the OWTS installation by the director is contingent upon confirmation that the specified erosion control measures have been implemented.
In addition to the above requirements, the director may require implementation of erosion control measures where, in his or her judgment, there is found to be a significant threat of sediment discharge to a drainageway or watercourse as a result of the manner in which the OWTS was installed.

Sec. B11-84. Life extending construction.

(a) Major Expansion and/or Major Intensification of Use. Where construction associated with an existing structure will result in a major expansion of the structure resulting in greater than five hundred cumulative square feet of all additions since March 2, 1982 or where the construction will result in a major intensification of the use of the property, (such as any increase in number of bedrooms for a residence or any increase in occupancy or wastewater flow for a commercial building), the OWTS must meet the minimum prevailing wastewater treatment and dispersal requirements of this Code.

(b) Minor Expansion. Where construction associated with an existing structure will result in a minor expansion of the structure resulting in five hundred cumulative square feet or less of all additions, the director shall require the following:

(1) Conduct an on-site inspection to determine adequacy and safe functioning of the existing OWTS in accordance with guidelines prescribed by the director in the Onsite Systems Manual.

(2) Exposure and pumping of the existing septic tank except where the applicant can document that the tank has been pumped within the last three years; a receipt for service from a licensed septic tank pumping firm may be considered sufficient documentation.

(3) Determination of the location of existing dispersal trenches and identification of area where future dispersal system expansion may occur; the septic tank file will then be updated.

(4) Improvement and/or expansion of the existing OWTS when, in the judgment of the director, the system is determined to be inadequate to accept current and/or projected waste flows. The determinations are to be made based on size and functioning of the current system, coupled with slope, soil, hydrological, and related factors. Where inspection results in a determination that the OWTS is failing, can reasonably be expected to fail or to contaminate surface waters or groundwaters, the director will require the replacement or improvement of the sewage disposal system pursuant to section B11-65 of this Code.

Where improvement and/or expansion of the OWTS is required, but required repairs cannot be made, the director will disallow the application.

(c) Remodeling or Repair. Where the existing OWTS does not meet requirements of this chapter, but is functioning safely and cannot be improved, construction will be limited to the remodeling or repair (as defined in the Uniform Building Code) of the existing structure provided:

(1) The construction will not constitute any major expansion or major intensification of the use of the property or structure.

(2) Construction will not result in conversion of uninhabitable area(s), such as a garage, deck, porch, patio, or similar area(s), to habitable area(s).

For purposes of implementing this section, the term "intensification of use" means a change that may place an additional demand on the OWTS of a property. The magnitude of the intensification (major or minor) will be determined by the director.

The restrictions in this section also apply in the event of accidental or natural damage to a structure.
For purposes of implementing this section, the terms "remodeling" and "repair" are as defined in the Uniform Building Code which is adopted by reference into the County's building ordinance.

**Sec. B11-85. Abatement.**

To the extent possible, failing OWTS must be brought into compliance with this Code. In case of any failure, malfunction or breakdown of any OWTS, if not corrected within a time designated by the director, the director may order or cause corrections to be made and bill the property owner for the costs and may place a lien on the property for the abatement costs. The director may also order the premises to be vacated if no safe manner of abatement is possible.

**Sec. B11-86. Abandoned onsite wastewater treatment systems.**

Every OWTS that has been abandoned or has been discontinued from further use or to which no waste or waste discharge pipe from a plumbing fixture is connected must:

(a) Have the sewage removed from, and disposed of, in an approved manner.

(b) Have the tank top and bottom crushed, backfilled and compacted with material approved by the director or be removed and disposed of in an approved manner.

Completion of the above-described work shall require that the property owner obtain a septic tank abandonment permit from the director.

**Sec. B11-87. Notice of Violation.**

The director may provide a notice of intent to record a notice of violation to the owner of property upon which a failing or substandard OWTS exists. Notice will be provided to the property owner by mail at the address shown on the latest assessment roll or at any other address of the owner known to the director. The notice will also be posted on the property. The notice will state that within 15 days of the date of the notice, the property owner may request a meeting with the director to present evidence that a violation does not exist.

If, within 15 days of the date of the notice, the property owner does not request a meeting and the violation has not been corrected, or if, after considering the evidence presented by the property owner at the meeting, the director determines that a code violation in fact exists, the director may record a notice of violation in the office of the County Recorder. Upon recording the notice, the director will notify the owner of the action. The notice is to inform all parties that no improvements, including building additions, can be approved while the failing or substandard OWTS continues in operation.

At the request of any affected property owner and upon full payment of any fees established by resolution of the Board of Supervisors for recovery of associated enforcement costs and payment of any fee for the recordation of the notice of violation, the director will issue a notice of expungement of violation upon proof to the director that the noticed violation has been remedied. The notice of expungement may be recorded by the property owner at his or her expense.

**Sec. B11-88. Appeal from denial, revocation or suspension.**

Any appeal to the decision of the director pursuant to this chapter must be made in writing to the Office of the County Hearing Officer, per Division A28 of Title A of the County of Santa Clara Ordinance Code, within fifteen days after the decision is received by the applicant. A copy of the appeal must also be filed with the director. The appeal must specifically describe the grounds upon which it is taken. The decision issued by the County Hearing Officer will be final.

**Sec. B11-89. Septic tank pumping, inspection, and reporting requirements.**

(a) Septic Tank Pumping. Whenever an OWTS is serviced for the purpose of septic tank pumping, the following shall occur:
(1) All compartments of the septic tank shall be pumped of all scum and sludge by a registered septic tank pumper.

(2) The septic tank shall be inspected for signs of damage, deterioration, corrosion, leakage, blockages, high liquid level or other deficiencies.

(3) Any pumping systems that are part of the OWTS shall be tested for proper operation and inspected for any deficiencies in the pump/sump tank, pump unit, piping, valves or control systems.

(4) The dispersal field shall be inspected for indications of system failure such as flooded trenches, soil saturation or surfacing sewage, backflow of water into the septic tank, down-slope seepage, erosion or drainage problems, or other deficiencies.

(b) Report Required. A written report on form(s) provided by the director shall be completed by the registered septic tank pumper and shall be submitted to the director and the property owner no later than 30 days following septic tank pumping. The report shall include:

(1) The name of the property owner, the street address of the property where the OWTS is located, and the date of servicing.

(2) The name of the septic tank pumper, size of the septic tank(s), gallons pumped, the name and location of the disposal site and a description of servicing activities.

(3) A description of any OWTS maintenance performed.

(4) A description of any failure or uncorrected deficiencies in the OWTS. Reported deficiencies shall include, but not be limited to: deteriorated, corroded or damage septic tank components; deficiencies in the condition or operation of any pumping systems; dispersal field problems such as surface failure, flooded trenches, down-slope seepage, backflow of effluent from the dispersal field into the septic tank, or other deficiencies.

(c) Notification to Property Owner. Upon being notified of a failure condition or other uncorrected deficiency in an OWTS, the director will notify the owner in writing, by hand-delivery or first class U.S. mail, of the needed corrections required to comply with the applicable standards in this Chapter.

(d) Action by the Property Owner. Within 60 days of notice of such written notification, the property owner shall take all corrective actions necessary to comply with the applicable standards in this chapter, unless otherwise approved by the director.

ARTICLE 3. ALTERNATIVE ONSITE WASTEWATER TREATMENT SYSTEMS

Sec.B-11-90. Use of alternative systems.

(a) Alternative OWTS may be permitted by the director for the repair or upgrading of any existing OWTS and for new construction on any legally-created parcel where:

(1) it is determined that sewage cannot be disposed of in a sanitary manner by a conventional septic tank–dispersal field system; or
(2) the director determines that an alternative system would provide equal or greater protection to public health and the environment than a conventional septic tank-dispersal field system.

Such alternative OWTS must comply with the specific requirements set forth in this section and as prescribed by the director in the *Onsite Systems Manual*.

(b) Types of alternative OWTS permitted shall be limited to those identified in the *Onsite Systems Manual* for which siting and design standards have been adopted, and which have been approved by the director and the appropriate California Regional Water Quality Control Board(s).

(c) All alternative systems shall be installed by a contractor duly licensed by the Contractors State Licensing Board of the State of California to install OWTS.

(d) Notwithstanding any other provisions of this section, the director shall have the authority to deny and/or require modifications to any alternative OWTS proposal where, in his/her opinion, such proposal poses an unacceptable threat to public health and/or water quality.

**Sec. B-11-91. Installation permit and review requirements.**

(a) Engineering plans and site data for alternative OWTS shall be submitted in accordance with application procedures prescribed by the director in the *Onsite Systems Manual*.

(b) Site evaluations, including soil profile inspection, percolation testing and groundwater evaluation, shall be conducted in accordance with procedures in the *Onsite Systems Manual*.

(c) Engineering plans and site data for alternative OWTS shall be submitted in accordance with application procedures established in the *Onsite Systems Manual*.

(d) Engineering plans and site data for alternative OWTS shall be submitted in accordance with application procedures in the *Onsite Systems Manual*.

(e) Engineering plans for alternative OWTS shall be prepared and signed by a California Registered Civil Engineer, Professional Geologist, or Registered Environmental Health Specialist who is knowledgeable and experienced in the field of onsite wastewater treatment and dispersal. The designer shall also be responsible for inspection of system installation to assure conformance with approved plans, and shall provide an "As-Built" drawing of the installation to the director and property owner. The construction inspection by the designer shall be in addition to standard County inspection work carried out in accordance with provisions of section B11-81 of this chapter and any additional standards in the *Onsite Systems Manual*.

(f) Engineering plans will be reviewed by the director and, where warranted, the director may refer the plans to the applicable California Regional Water Quality Control Board staff and/or external third-party consultant(s) for additional review, the costs for which would be the responsibility of the applicant.

(g) Installation permits issued for alternative OWTS are subject to the same expiration and extension time frames as specified in section B11-77 of this chapter for conventional systems.
Sec. B-11-92. Operating permits

(a) In addition to an installation permit, an operating permit is required for all alternative OWTS, including those installed in connection with the repair or upgrade of existing OWTS as well as those for new construction. General requirements pertaining to operating permits are as follows:

(1) The operating permit will be issued by the director following: (a) completion of construction of the alternative OWTS; (b) satisfactory compliance with the installation permit requirements; and (c) payment of applicable fees. Operating permits are non-transferable.

(2) After initial issuance, the operating permit is required to be renewed periodically, the standard renewal period being one year. The director may establish conditions allowing the time period between renewals to be extended for certain types of OWTS based on a record of favorable performance or other factors warranting a reduction in system oversight by DEH. Provisions for adjusting the operating permit renewal period shall be prescribed by the director in the Onsite Systems Manual. Operating permits must also be renewed at the time of change in property ownership.

(3) Operating permits are intended to serve as the basis for verifying the adequacy of alternative OWTS performance and ensuring on-going maintenance. Permit conditions shall include monitoring and inspection requirements, permit duration, and other provisions as prescribed by the director in the Onsite Systems Manual or as deemed appropriate by the director on a case-by-case basis.

(4) Renewal of an operating permit requires: (a) payment of the applicable fees, upon receipt of notice from the director; and (b) submission of the results of required system inspection and monitoring.

(5) Failure to pay the required fee or submit the specified monitoring and inspection information, or failure to undertake any required corrective work specified by the director may be cause for issuance of a citation, penalty fees, non-renewal and/or revocation of the operating permit by the director. The director may place a lien on the property for recovery of any associated abatement costs and unpaid fees.

(6) A certified copy of the following shall be recorded against the property in the office of the County Recorder of Santa Clara County: (a) initial operating permit issued for the system; (b) reissuance of operating permit to new owners; and (c) notices of withdrawal of any operating permit.

(b) Other uses of operating permits. An operating permit may also be utilized for circumstances other than alternative OWTS, such as for larger flow OWTS (>2,500 gpd), in connection with holding tank exemptions or where, in the opinion of the director, the type, size, location or other aspects of a particular OWTS installation warrant the additional level of oversight provided by an operating permit. In such cases, the issuance and scope of operating permits will be issued in accordance with the general requirements listed in section B11-92 (a)(1) through (a)(6) above, and any additional requirements prescribed by the director in the Onsite Systems Manual for particular circumstances.

Sec. B11-93. Performance monitoring and reporting

(a) A monitoring program will be established for each alternative OWTS as a condition of the operating permit at the time of permit issuance, and may be amended at the time of permit renewal. Said monitoring shall be performed to ensure that the alternative OWTS is functioning
satisfactorily to protect water quality and public health and safety. The monitoring program will be in accordance with guidelines in the *Onsite Systems Manual* and may also incorporate recommendations of the system designer, manufacturer, or third-party reviewer.

(b) Monitoring requirements will vary depending upon the specific type of alternative OWTS in accordance with guidelines in the *Onsite Systems Manual*.

(c) The required frequency of monitoring will be in accordance with guidelines in the *Onsite Systems Manual*. Monitoring frequency may be increased if, in the opinion of the director, system problems are experienced.

(d) Monitoring of alternative OWTS shall be conducted by or under the supervision of one of the following:

1. Registered Civil Engineer;
2. Professional Geologist;
3. Registered Environmental Health Specialist; or
4. Other onsite wastewater maintenance provider registered with the Department of Environmental Health and meeting qualifications as established in the *Onsite Systems Manual*. Registration shall entail: (a) documentation of required qualifications; (b) participation in annual training/review conducted by the director; and (c) payment of an annual fee established by the Board of Supervisors.

Additionally, the director may require third-party or County inspection and monitoring of any alternative OWTS where deemed necessary because of special circumstances, such as the complexity of the system or the sensitive nature of the site. The costs for such additional monitoring would be the responsibility of the owner.

(e) Monitoring results shall be submitted to the director in accordance with reporting guidelines provided in the *Onsite Systems Manual*. The monitoring report shall be signed by the party responsible for the monitoring. Notwithstanding formal monitoring reports, the director shall be notified immediately of any system problems observed during system inspection and monitoring that threaten public health or water quality.

(f) In addition to regular inspection and monitoring activities, post-seismic inspection and evaluation of alternative OWTS located in high-risk seismic areas will be required in the event of an earthquake causing significant ground shaking in the region, as determined by the director in consultation with the County geologist. The director will be responsible for issuing appropriate notices when such inspections are required; those conducting the inspections will be required to report the inspection results to the director. The purpose of such inspections will be to assess and document any damage to the OWTS and to implement corrective measures, as needed, in a timely manner. Post-seismic inspection shall be in accordance with requirements prescribed by the director, in consultation with the County geologist, and contained in the *Onsite Systems Manual*.

(g) The director will, from time-to-time, compile and review monitoring and inspection results for alternative OWTS and, at least every two years, will provide a summary of results to the San Francisco Bay and Central Coast Regional Water Quality Control Boards. Based on this review, the director may require corrective action for specific properties or certain types of alternative OWTS, or general changes in monitoring and inspection requirements.
Sec. B11-94. Types of alternative systems permitted

(a) Alternative Treatment Systems. Alternative treatment systems may be used to produce higher quality of wastewater effluent beyond that provided by a conventional septic tank and improve the performance of and siting options for the dispersal system. The following alternative treatment systems (also termed “supplemental” treatment) may be approved for use in Santa Clara County subject to compliance with the siting and design criteria specified in this section and the Onsite Systems Manual:

(1) Intermittent and recirculating sand filters;
(2) Proprietary treatment units that provide secondary or better effluent quality; or
(3) Other alternative treatment systems approved by the director and the appropriate California Regional Water Quality Control Board(s).

(b) Alternative Dispersal Systems. The following alternative dispersal systems may be proposed for use in Santa Clara County subject to compliance with the siting and design criteria in the Onsite Systems Manual:

(1) Shallow pressure distribution trench;
(2) Mound;
(3) At-grade;
(4) Pressure-dosed sand trench;
(5) Raised sand filter bed;
(6) Subsurface drip dispersal; or,
(7) Other alternative dispersal systems approved by the director and appropriate California Regional Water Quality Control Board(s).

Sec. B11-95. Siting criteria, design and construction requirements.

All requirements specified in section B11-67 of this chapter for conventional OWTS also apply to alternative OWTS, except as specified below. Design and construction of alternative OWTS shall be in conformance with requirements in the Onsite Systems Manual.

(a) Horizontal Setbacks. Horizontal setback requirements for alternative treatment systems are the same as those specified in this section B11-67 of this chapter for septic tanks. Horizontal setback requirements for alternative dispersal systems are the same as those specified in section B11-67 of this chapter for conventional dispersal systems.

(b) Areas of Flooding. Alternative OWTS shall not be located in areas subject to flooding as defined by the limits of the 10-yr floodplain, determined or estimated from published floodplain maps or on the basis of historical evidence acceptable to the director. Alternative OWTS shall be located and designed to avoid contamination of or damage from inundation by floodwaters during a 100-year flood event. As appropriate, such measures shall include: 1) protecting OWTS supplemental treatment, pressure distribution and/or drip dispersal components from flood damage using structural tie-downs and/or elevating critical components above the 100-year flood level; 2) preventing discharge of wastewater into flooded dispersal areas from pump systems (e.g., using flood-activated float switches to override/disable pump operation during high water conditions); and 3) providing additional emergency storage capacity for flood periods.
Ground Slope. Maximum ground slope for different types of alternative wastewater dispersal systems are as follows:

<table>
<thead>
<tr>
<th>Type of Disposal System</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mound, At-Grade</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raised Sand Filter Bed</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Shallow Pressure Distribution</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Pressure-dosed Sand Trench</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsurface Drip Dispersal</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

1Related Requirements: Any disposal system located on a slope greater than 20 percent shall require the completion and approval of a geotechnical report per section B11-83 of this chapter.

Vertical Separation to Groundwater. Where alternative OWTS are used, minimum vertical separation distance to groundwater, measured from the bottom of the dispersal system to the seasonal high water table, may be reduced from the requirements that apply to conventional OWTS (per section B11-67 of this chapter), as specified in the table below. Design requirements for alternative OWTS in the *Onsite Systems Manual* may impose additional restrictions on permissible groundwater separation distances based on system size (i.e., volume of wastewater flow) or for particular site conditions or geographic locations.

<table>
<thead>
<tr>
<th>Type of OWTS</th>
<th>Percolation Rate (MPI)</th>
<th>Vertical Separation to Groundwater (feet)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Trench w/ Supplemental Treatment</td>
<td>1-5 6-30 31-120</td>
<td>2' 3' X X X X</td>
</tr>
<tr>
<td>Shallow Pressure Distribution (PD)</td>
<td>1-5 6-120</td>
<td>X X X</td>
</tr>
<tr>
<td>Shallow PD w/Supplemental Treatment</td>
<td>1-5 6-120</td>
<td>X X X</td>
</tr>
<tr>
<td>Mound</td>
<td>1-5 6-120</td>
<td>X X X</td>
</tr>
<tr>
<td>Pressure-dosed Sand Trench (PDST)</td>
<td>1-5 6-120</td>
<td>X X X</td>
</tr>
<tr>
<td>Raised Sand Filter Bed</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Subsurface Drip Dispersal w/Supplemental Treatment</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Raised Sand Filter Bed, w/Supplemental Treatment &amp; Drip Dispersal</td>
<td>1-5 6-120</td>
<td>X X X</td>
</tr>
</tbody>
</table>

¹ Measured from the bottom of the dispersal system to the seasonal high water table.
(e) Soil Depth. Minimum depth of permeable soil beneath the bottom of the dispersal field shall be as specified in the table below for different types of alternative OWTS. Permeable soil is defined as having a percolation rate of 120 minutes per inch or faster or having a clay content of less than 60 percent, and shall not include solid rock formations or those that contain continuous channels, cracks or fractures. Design requirements for alternative OWTS prescribed in the Onsite Systems Manual may impose additional soil depth requirements based on system size (i.e., volume of wastewater flow) or for particular site conditions or geographic locations.

<table>
<thead>
<tr>
<th>Type of OWTS</th>
<th>Minimum Soil Depth (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Trench w/ Supplemental Treatment</td>
<td>2’ X</td>
</tr>
<tr>
<td>Shallow Pressure Distribution Trench (PD)</td>
<td></td>
</tr>
<tr>
<td>At-Grade</td>
<td></td>
</tr>
<tr>
<td>Shallow PD w/Supplemental Treatment</td>
<td>X</td>
</tr>
<tr>
<td>At-Grade w/Supplemental Treatment</td>
<td></td>
</tr>
<tr>
<td>Mound</td>
<td></td>
</tr>
<tr>
<td>Raised Sand Filter Bed (Open Bottom Sand Filter)</td>
<td>X</td>
</tr>
<tr>
<td>Subsurface Drip Disposal w/Supplemental Treatment</td>
<td></td>
</tr>
<tr>
<td>Raised Sand Filter Bed, w/Supplemental Treatment &amp; Drip Dispersal</td>
<td>X</td>
</tr>
</tbody>
</table>

1 Measured from the bottom of the dispersal trench, bed or piping (drip dispersal only).

CHAPTER V. INSPECTION REPORTS OF ONSITE WASTEWATER TREATMENT SYSTEMS

Sec. B11-100. Application; limited inspection.
(a) Any person may apply to the department, on forms approved by the director, for an inspection report of the OWTS located on the applicant's property in the county.
(b) The agency will only inspect the OWTS for obvious deficiencies.

The application must be accompanied by a nonrefundable inspection fee in an amount established by resolution of the Board of Supervisors.

Sec. B11-102. County not liable for damage and does not warrant.
The county, its officers, agents and employees assume no liability to the applicant or anyone else relying on the report issued hereunder for damage to persons or property caused by or arising from the inaccuracy of the report and/or undetection of sewage disposal problems; nor does the county make any warranty or guarantee of any kind to anyone, express or implied, regarding the condition and/or quality of the OWTS.