Wastewater Advisory Committee
Regular Meeting Agenda

Thursday, June 23, 2016
6:00 p.m.
Malibu City Hall – Multi-Purpose Room
23825 Stuart Ranch Road

Call to Order – Chair

Roll Call - Recording Secretary

Pledge of Allegiance

Approval of Agenda

Report on Posting of Agenda – *June 14, 2016*

1. Ceremonials / Presentations

A. Announce Civic Center Wastewater Treatment Facility Groundbreaking Ceremony

2. Written and Oral Communications from the Public

A. Communications from the public concerning matters which are not on the agenda but for which the Wastewater Advisory Committee has subject jurisdiction. The Wastewater Advisory Committee may not discuss or act on these matters at this meeting. (30 minutes total time allotted)

B. Wastewater Advisory Committee comments and inquiries.(15 minutes total time allotted)

3. Consent Calendar

A. Previously Discussed Items

None.

B. New Items

1. Approval of Minutes

Staff Recommendation: Approve minutes for the January 28, 2016 Wastewater Advisory Committee meeting.

Staff Contact: Recording Secretary Nelson-Brown, ext. 286

4. Old Business

None.

5. New Business

A. Discuss Draft Local Agency Management Program (LAMP) for Oversight of Onsite Wastewater Systems in the City of Malibu

Adjournment

Future Wastewater Advisory Committee Meetings

July 28, 2016	6:00 p.m.	Regular Meeting	Malibu City Hall
August 25, 2016	6:00 p.m.	Regular Meeting	Malibu City Hall
September 22, 2016	6:00 p.m.	Regular Meeting	Malibu City Hall
October 27, 2016	6:00 p.m.	Regular Meeting	Malibu City Hall

Guide to the Wastewater Advisory Committee Proceedings

The Oral Communication portion of the agenda is for members of the public to present items which are not listed on the agenda, but are under the subject matter jurisdiction of the Wastewater Advisory Committee. Although no action may be taken, the Committee and staff will follow up, at an appropriate time, on those items needing response. Each speaker is limited to (3) three minutes. Time may be surrendered by deferring (1) one minute to another speaker, not to exceed a total of (8) eight minutes. The speaker wishing to defer time must be present when the item is heard. In order to be recognized and present an item, each speaker must complete and submit to the Recording Secretary a Request to Speak form prior to the beginning of the item being announced by the Chair (forms are available at the entrance to the meeting room). Speakers are taken in the order slips are submitted.

Items in Consent Calendar Section A have already been considered by the Committee at a previous meeting where the public was invited to comment, after which a decision was made. These items are not subject to public discussion at this meeting because the vote taken at the previous meeting was final. Resolutions concerning decisions made at previous meetings are for the purpose of memorializing the decision to assure the accuracy of the findings, the prior vote, and any conditions imposed.

Items in Consent Calendar Section B have not been discussed previously by the Committee. If discussion is desired, an item may be removed from the Consent Calendar for individual consideration. Committee Members may indicate a negative or abstaining vote on any individual item by so declaring prior to the vote on the motion to adopt the entire Consent Calendar. Items excluded from the Consent Calendar will be taken up by the Committee following the action on the Consent Calendar. The Committee first will take up the items for which public speaker requests have been submitted. Public speakers shall follow the rules as set forth under Oral Communication.

Old Business items have appeared on previous agendas but have either been continued or tabled to this meeting with no final action having been taken. Public comment shall follow the rules as set forth under Oral Communication.

Items in New Business are items which are appearing for the first time for formal action. Public comment shall follow the rules as set forth under Oral Communication.

Copies of the staff reports or other written documentation relating to each item of business described above are on file in the Environmental Sustainability Department, Malibu City Hall, 23825 Stuart Ranch Road, Malibu, California and are available for public inspection during regular office hours which are 7:30 a.m. to 5:30 p.m., Monday through Thursday, and 7:30 a.m. to 4:30 p.m., Friday. Written materials distributed to the Committee within 72 hours of the Wastewater Advisory Committee meeting are available for public inspection immediately upon distribution in the Environmental Sustainability Department at 23825 Stuart Ranch Road, Malibu, California (Government Code Section 54957.5(b)(2). Copies of staff reports and written materials may be

purchased for $0.25 per page. Pursuant to State law, this agenda was posted at least 72 hours prior to the meeting.

The City Hall phone number is (310) 456-2489. To contact City Hall using a telecommunication device for the deaf (TDD), please call (800) 735-2929 and a California Relay Service operator will assist you. In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact Environmental Sustainability Department Director Craig George, (310) 456-2489, ext. 229. Notification 48 hours prior to the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting. [28 CFR 35.102-35.104 ADD Title II]. Requests for use of audio or video equipment during a Committee meeting should be directed to Alex Montano at (310) 456-2489 ext. 227 or amontano@malibucity.org at least 48 hours prior to the meeting.

I hereby certify under penalty of perjury, under the laws of the State of California, that the foregoing agenda was posted in accordance with the applicable legal requirements. Dated this 14th day of June 2016.

Rebecca Nelson-Brown, Administrative Assistant

Wastewater Advisory Committee
06-23-16
Item 3.B.1.

Committee Agenda Report

To: Chair Haynie and Members of the Wastewater Advisory Committee

Prepared by: Rebecca Nelson-Brown, Administrative Assistant

Reviewed by: Craig George, Environmental Sustainability Director

Approved by: Craig George, Environmental Sustainability Director

Date prepared: June 13, 2016 Meeting date: June 23, 2016

Subject: Approval of Minutes

RECOMMENDED ACTION: Approve minutes for the January 28, 2016 Wastewater Advisory Committee meeting.

DISCUSSION: Staff has prepared the draft minutes for January 28, 2016 Wastewater Advisory Committee meeting. These minutes are presented to the Committee for approval.

ATTACHMENT: January 28, 2016 Wastewater Advisory Committee meeting minutes.

ACTION MINUTES
MALIBU WASTEWATER ADVISORY COMMITTEE
REGULAR MEETING
JANUARY 28, 2016
MALIBU CITY HALL
6:00 P.M.

CALL TO ORDER

Chair Haynie called the meeting to order at 6:08 p.m.

ROLL CALL

The following persons were recorded in attendance by the Recording Secretary:

PRESENT: Chair Haynie, Co-Chair Sherman, Committee Member Braband, Committee Member Slutske

ABSENT: Committee Member Bradley, Committee Member Rene-Weissman, Committee Member Yaroslaski

ALSO PRESENT: Craig George, Environmental Sustainability Manager; Melinda Talent, Environmental Health Administrator; Rebecca Nelson-Brown, Recording Secretary

PLEDGE OF ALLEGIANCE

Chair Haynie led the Pledge of Allegiance.

APPROVAL OF AGENDA

MOTION Committee Member Slutske moved and Chair Haynie seconded a motion to approve the agenda. The motion carried 4 to 0, Committee Members Bradley, Rene-Weissman, and Yaroslaski absent.

REPORT ON POSTING OF AGENDA

Recording Secretary Nelson-Brown reported that the agenda for the meeting was properly posted on January 19, 2016.

ITEM 1. CEREMONIALS / PRESENTATIONS

None.

ITEM 2. PUBLIC / COMMITTEE MEMBER COMMENTS

None.

ITEM 3. CONSENT CALENDAR

The consent calendar consisted of the following items:

A. Previously Discussed Items

None.

B. New Items

1. Approval of Minutes

Staff Recommendation: Approve minutes for the August 28, 2014 Wastewater Advisory Committee meeting.

Staff Contact: Recording Secretary Nelson-Brown

MOTION Co-Chair Sherman moved and Committee Member Slutske seconded a motion to approve the consent calendar. The motion carried 4 to 0, Committee Members Bradley, Rene-Weissman, and Yaroslaski absent.

ITEM 4. OLD BUSINESS

None.

ITEM 5. NEW BUSINESS

The Committee discussed an ordinance requiring overflow alarms on commercial wastewater treatment systems.

Chair Haynie requested the draft ordinance be submitted to the Wastewater Advisory Committee for review a minimum of one week prior to the meeting.

ADJOURNMENT

MOTION At 7:16 p.m., Committee Member Braband moved and Co-Chair Sherman seconded a motion to adjourn. The motion carried 4 to 0, Committee Members Bradley, Rene-Weissman, and Yaroslaski absent.

Approved and adopted by the Wastewater Advisory Committee of the City of Malibu on June 23, 2016.

NORM HAYNIE, Chair

ATTEST:

REBECCA NELSON-BROWN, Recording Secretary

Wastewater Advisory Committee
06-23-16
Item 5.A.

Committee Agenda Report

To: Chair Haynie and Members of the Wastewater Advisory Committee

Prepared by: Melinda Talent, Environmental Health Administrator

Approved by: Craig George, Environmental Sustainability Director

Date prepared: June 13, 2016 Meeting date: June 23, 2016

Subject: Discuss the Draft Local Agency Management Program for Onsite Wastewater Treatment Systems within the City of Malibu

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RECOMMENDED ACTION: Discuss and provide comments to staff regarding the draft Local Agency Management Program (LAMP) for onsite wastewater treatment systems (OWTS) within the City of Malibu.

DISCUSSION: In May 2013, the Statewide Onsite Wastewater Treatment Systems (OWTS) Policy became effective and set minimum standards for OWTS and OWTS program administration. The Local Agency Management Program (LAMP) is intended to comply with the State OWTS Policy and the City's requirements for program administration. In May 2016, the City submitted a draft LAMP to the Los Angeles Regional Water Quality Control Board for their concurrence. The LAMP will allow the City to continue processing OWTS permits and related program activities.

ATTACHMENT: Draft Local Agency Management Program for the City of Malibu

Local Agency Management Program

Onsite Wastewater Treatment Systems

City of Malibu, California

(DRAFT)

City of Malibu
Environmental Sustainability Department
May 2016

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Appendix A: Supporting Rationale for Malibu OWTS Siting and Design Criteria
Appendix B: OWTS Usage, Wastewater Loading Estimates, and Water Quality Issues/Monitoring Recommendations
Appendix C: City of Malibu Onsite Wastewater Ordinance – In progress
Appendix D: City of Malibu Onsite Wastewater Treatment Systems Manual – In progress

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Introduction

In 2000, the California Legislature passed Assembly Bill 885 (Water Code § 13290) that required the State Water Resources Control Board (SWRCB) to adopt regulations or standards for the permitting and operation of Onsite Wastewater Treatment Systems (OWTS). These new standards were adopted by the SWRCB in June, 2012, as the *Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems*, also referred to as the "OWTS Policy" (Policy). The Policy became effective in May 2013 and sets minimum standards for OWTS and for OWTS program administration by local agencies. The Policy contains five categories, Tiers 0 through 4, for OWTS administration with the following different requirements at each level:

- **Tier 0 – Existing OWTS** that are not failing or contributing to impairment of surface water
- **Tier 1 – Low risk new or replacement OWTS** where there is not an approved LAMP
- **Tier 2 – Local Agency Management Program (LAMP) for New or Replacement OWTS** allows the local agencies to develop equivalent requirements to achieve the same Policy purpose
- **Tier 3 – Impaired Areas** to cover existing, new, and replacement OWTS within 600 feet of water bodies impaired for pathogens or nitrogen per the State
- **Tier 4 – OWTS Requiring Corrective Action** because they are either failing or at the point when an OWTS fails

This document presents the proposed Local Agency Management Program (LAMP) pertaining to the oversight of OWTS within the City of Malibu, California. This LAMP has been prepared in accordance with the requirements of the SWRCB's OWTS Policy.

The SWRCB OWTS Policy provides a multi-tiered strategy for management of OWTS in California. This LAMP has been prepared by the City of Malibu to obtain approval for OWTS management under Tier 2 of the OWTS Policy. As such, it is intended to allow the City to continue providing local oversight of OWTS by implementing practices that: (a) are suited to the conditions in the Malibu area; (b) meet or exceed the environmental protections of the "default" siting and design requirements for OWTS identified in Tier 1 of the SWRCB Policy; and (c) ensure the best opportunity for coordinated and comprehensive management of OWTS, public health and water quality within the City of Malibu.

This LAMP is intended to apply to all OWTS within Malibu having wastewater design flows of up to 10,000 gpd, with the exception of those located on State and Federally-owned lands. Any OWTS with a design flow exceeding 10,000 gpd would be regulated by the LARWQCB.

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Organization of this LAMP

This LAMP is organized to present a comprehensive explanation of the various requirements, policies, procedures and measures used to regulate and oversee the use of OWTS in the City of Malibu. It is also structured as much as possible to address the items listed in the SWRCB OWTS Policy pertaining to Local Agency Requirements and Responsibilities (Section 3.0 of the OWTS Policy) and Local Agency Management Program for Minimum OWTS Standards (Section 9.0 of the OWTS Policy). Reference is made throughout this LAMP to the City's OWTS Ordinance(s) and Manual, which are attached to this LAMP. The following briefly summarize the contents of this document.

- ***Section 1 – Background.*** This section describes the overall purpose, scope, geographical coverage and overview of the key elements of the LAMP.

- ***Section 2 – Environmental Conditions, OWTS Usage and Water Quality Management in the City of Malibu.*** This section provides background information on environmental conditions pertinent to the use and suitability for OWTS, extent of OWTS usage in the City, and summary of OWTS management approaches and requirements adopted for protection of water quality in the City addressing items in OWTS Policy Section 9.1.

- ***Section 3 – OWTS Siting, Design, and Construction Requirements.*** This section summarizes key items of the City Ordinance(s) and the OWTS Manual pertaining to requirements for siting, design and construction of OWTS, per the requirement of section 9.2 and covering applicable items listed under Tier 1 (Sections 7.0 and 8.0) of the OWTS Policy.

- **Section 4 – Special Management Issues.** This section describes the provisions contained in the City of Malibu LAMP corresponding with special OWTS management issues listed in Sections 9.2.1 through 9.2.12 of the SWRCB OWTS Policy.

- ***Section 5 – Prohibitions*.** This section describes the provisions contained in the City of Malibu LAMP corresponding with the required prohibitions set forth in Section 9.4 of the SWRCB OWTS Policy.

- ***Section 6 – Program Administration.*** This section presents the City's existing program and plans for addressing the administrative aspects of the LAMP, including record keeping, on-going assessment of water quality issues related to OWTS, and reporting to the RWQCB(s), as required under Sections 3.3 and 9.3, of the OWTS Policy.

- ***Appendix A – Supporting Rationale.*** This presents discussion of the supporting rationale (including literature sources) for the various siting and design requirements for conventional and advanced OWTS, comparison with Tier 1 standards of the OWTS Policy, historical practices and performance of OWTS in Malibu, and highlighting the requirements and management practices that are more protective than the provisions of the OWTS Policy.

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- ***Appendix B – OWTS Usage, Wastewater Loading Estimates and Water Quality Issues/Monitoring Recommendations.*** This presents the supporting information and details of OWTS usage in Malibu, distribution in different geographical and watershed areas, corresponding estimates of wastewater loading, identification of known/potential water quality issues, and recommendations for water quality monitoring.

- ***Appendix C – City of Malibu OWTS Ordinance -***Revisions in progress and to be submitted to Malibu City Council after Regional SWRCB approval of the LAMP. This document contains applicable section of the City Municipal Code pertaining to OWTS.

- ***Appendix D – City of Malibu Onsite Wastewater Treatment Systems Manual*** **-** This document is a consolidation of standards and policies for the siting, design and construction of OWTS.

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Section 1:
Background

Geographical Setting

The City of Malibu, which incorporated on March 28, 1991, lies entirely within the State Designated Coastal Zone and extends approximately 25 miles from the Ventura County line on the west to Topanga Canyon Boulevard on the east. Inland, the City's Coastal Zone boundary extends approximately 2 miles and includes portions of the coastal terrace and slopes of the Santa Monica Mountains. A map of the area is shown in **Figure 1-1.**

The topography of the area is dominated by the Santa Monica Mountains, an east-west trending mountain range that rises steeply from the Pacific Ocean. The shoreline along the city contains sandy beaches, bluff backed crescent coves and rocky headlands. Drainage is characterized by steep, narrow canyons which run out of the Santa Monica Mountains across a very narrow coastal plain. The shallowest surface geologic units consist of colluvium/soil, alluvium, estuarine deposits, landslide deposits, and terrace deposits, and may be locally covered by artificial fill. Bedrock formations exposed in the Santa Monica Mountains north of the Malibu Coast fault consist of two main sequences. The lower sequence consists of basement rocks including slates, schists, and granitic rocks which are overlain by sandstone and siltstone formations. The upper sequence is a varied group of sedimentary and volcanic formations of Sespe, Vaqueros, Topanga, Conejo Volcanics, Monterey and Trancas.

Annual rainfall within the Malibu coastal plain averages 12-13 inches, though annual rainfall can vary significantly from year-to-year as well as geographically throughout the area, primarily due to the Santa Monica Mountains. Although rainfall in the area is generally low and infrequent, passing storms (coinciding with the southern California rainy season from November to April) are generally intense, capable of releasing large rain amounts in relatively short periods of time.

Land use consists of mostly low density and rural residential development. The majority of developed land is located along or adjacent to the narrow stretch of coastal plain. Commercial development is sparse, generally concentrated along the Pacific Coast Highway by Malibu Canyon and Point Dume. Currently, there are no industrial uses.

The City is located within two main watersheds as defined by the Regional SWRCB most recent Basin Plan. The Malibu Creek Watershed and a portion of the Santa Monica Bay Watershed. There are several subwatersheds in the region including creeks, streams and coastal waters. A map of the watersheds is shown in **Figure 1-2**.

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Figure 1-1 City of Malibu Geographical Setting

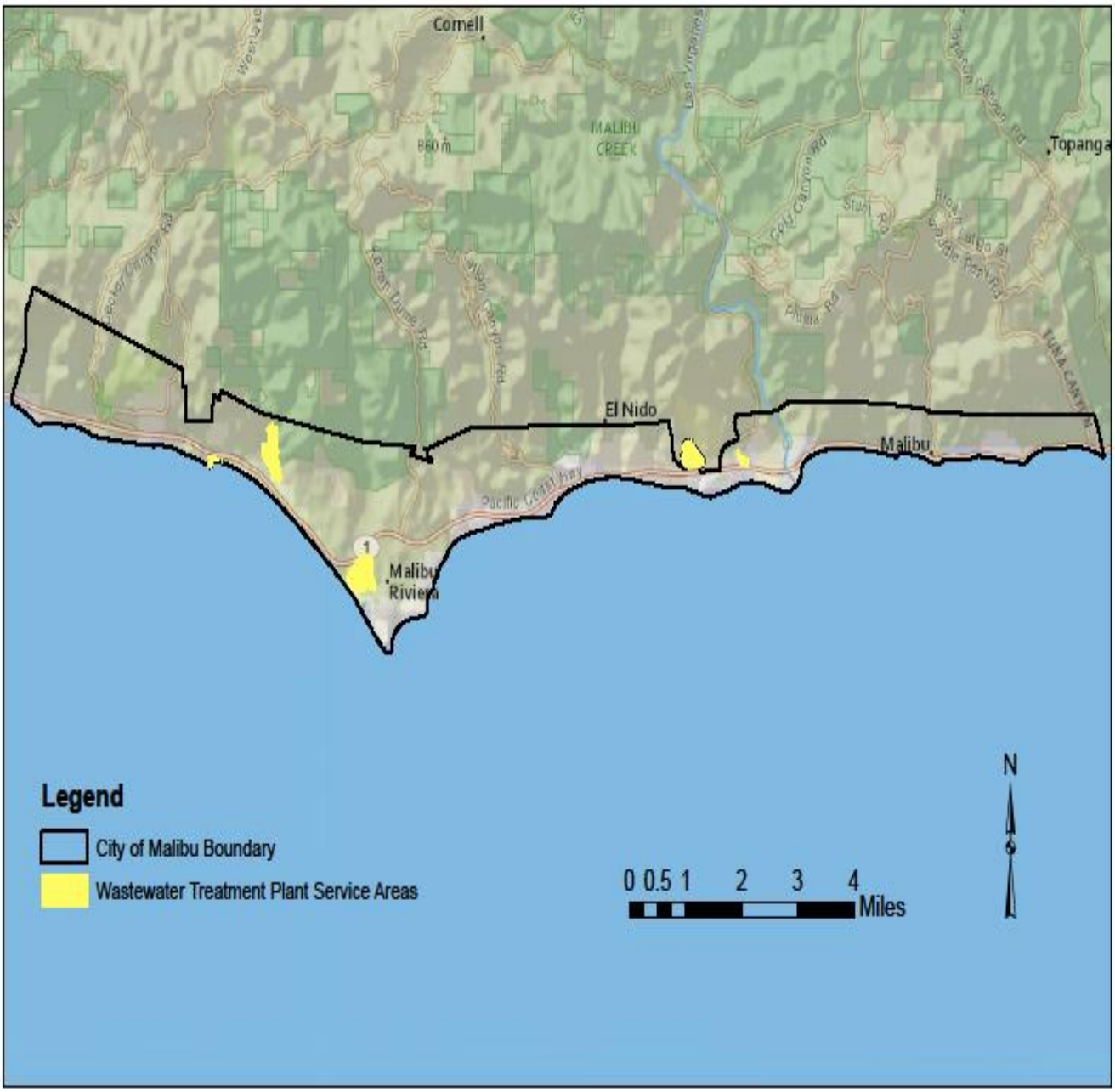
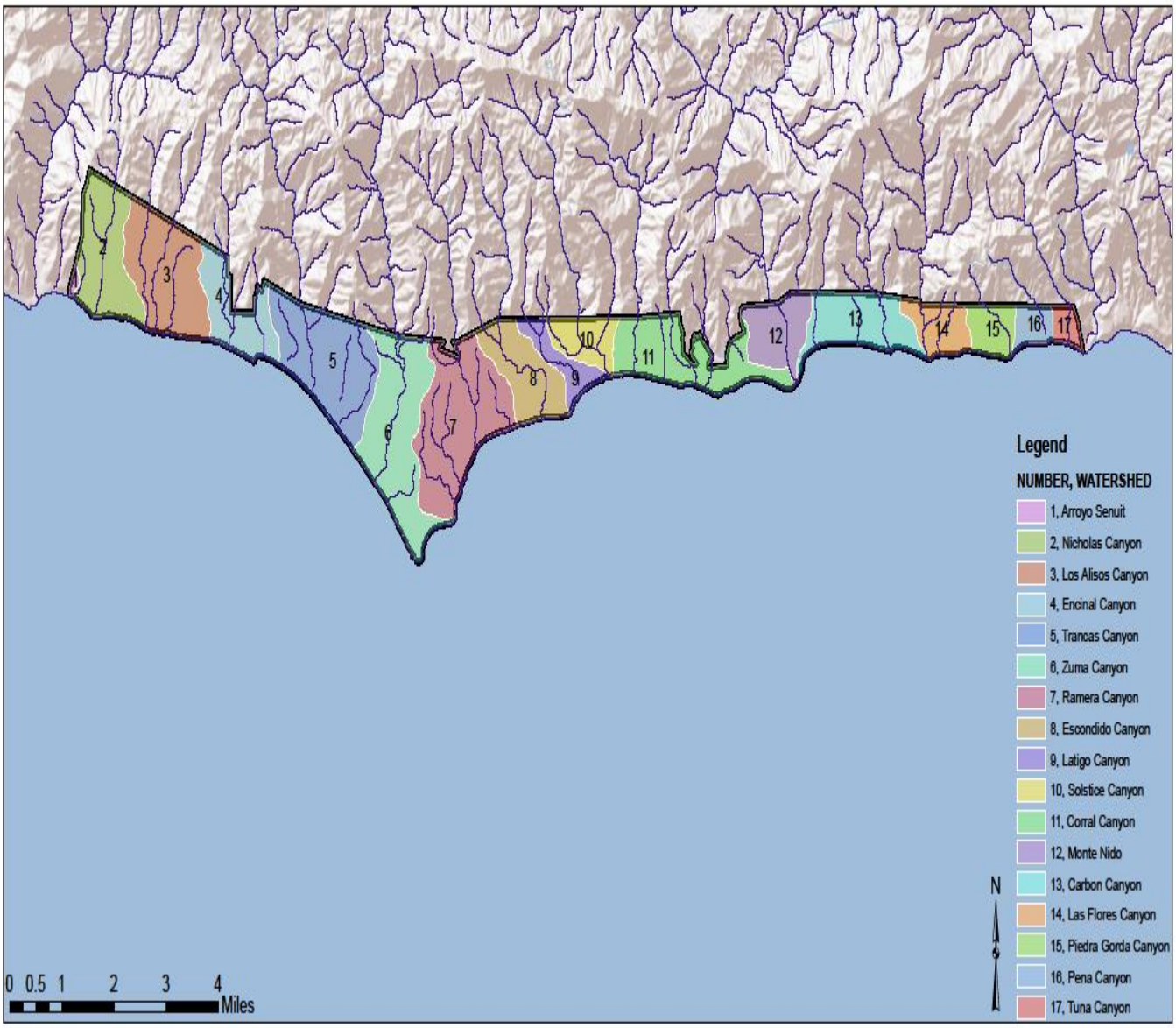


Figure 1-2 City Of Malibu Watersheds



Regulation of Onsite Wastewater Treatment Systems

Background

The City of Malibu has administered a local wastewater management program for OWTS since its incorporation in 1991. The scope of the program includes plan review, permitting, construction and management of OWTS. Most recently in 2004, the City as a Qualified Local Agency, entered into an agreement with the Regional SWRCB for implementation of the wastewater program for most OWTS within the City.

The City's existing wastewater program consists of a combination of municipal codes, plans and policies. The siting and design of systems is regulated under provisions of the California Plumbing Code as amended by Los Angeles County and City of Malibu, and the Local Coastal Program/Local Implementation Plan. Management of OWTS is fulfilled with the Operating Permit Program and OWTS Practitioner Program. Due to the complex nature of the city, various policies and procedures have been put in place for the city to carry out the provisions of the municipal code and intent of the wastewater program.

Update and Transitioning to Tier 2 LAMP requirements

In response to the SWRCB OWTS Policy, beginning in late 2014 the City began taking measures to modify and update the City's onsite system management program to meet provisions of the Policy. This effort has included (a) comprehensive review, update, revisions and merging applicable sections of the City Code pertaining to OWTS; and (b) development of an accompanying "OWTS Manual of Technical Standards and Policies" containing and consolidating various standards for siting, design and construction of OWTS along with other policies and procedures for implementation of the Ordinance and State Policy requirements.

City of Malibu OWTS Requirements

Requirements for the installation, use and maintenance of OWTS in the City of Malibu are contained in two primary documents (summarized below), which accompany and form the basis for this LAMP.

Onsite Wastewater Treatment Systems Ordinance (Wastewater Ordinance)

The Statewide OWTS Policy requires that, in order for the City to continue its oversight of OWTS, the City must prepare a LAMP document and obtain approval from the Regional SWRCB. The City's current OWTS Ordinances will need to be revised in order to align with the requirements of the State OWTS Policy. The new wastewater ordinance will combine the plumbing code, coastal program plan and operating permits program into one ordinance. The ordinance is referenced in this LAMP as Appendix C.

OWTS Manual of Technical Standards and Policies (OWTS Manual)

The OWTS Manual provides the technical details and policies and procedural requirements for implementation of the Ordinance. It includes permitting forms and procedures, siting criteria, site evaluation requirements and methods, requirements/guidelines for cumulative impact studies and geotechnical reports, design standards and guidelines related to both conventional and alternative OWTS, performance evaluation procedures, operation and monitoring requirements, and related technical and procedural information. The OWTS Manual will be reviewed and updated from time-to-time, typically every few years, to keep pace with new issues, policies, procedures, and technologies affecting the use and management of onsite systems in the City of Malibu. The OWTS Manual will be maintained by Environmental Sustainability Department. The initial document is submitted with this LAMP as Appendix D.

Brief summary of OWTS Manual by sections:

Section I Environmental Health Submittal Guidelines - This section describes the type of project reviews conducted by Environmental Health and the information required to be submitted with the applications.

Section II Technical Standards for OWTS Plans and Reports – This section includes the specific details that must be contained in reports and plans and how this information is evaluated by the Environmental Health reviewers.

Section III OWTS Management Program - This section provides information on the operating permit program and registered practitioners program for OWTS.

Section IV Policies and Procedures – This section contains the various policies and procedures used by Environmental Health and the City of Malibu to provide interpretation and clarification of municipal codes.

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Section 2:
Environmental Conditions, OWTS Usage and Water Quality Management in Malibu

This section provides background information on environmental conditions, OWTS usage and management approaches adopted for protection of water quality in the City of Malibu.

Climate

Average annual rainfall in the Malibu area varies across the City, generally in the range of about 16 to 22 inches. Nearly all of the rainfall occurs between November and April. The City experiences warm and dry summers and has a warm summer Mediterranean climate. Average monthly temperatures do not exceed 72 degrees F. The City is also subject to seasonal hot and dry "Santa Ana Winds", onshore winds that often contribute to wildfires in the area. The topography in the City is generally characterized by steep hillslopes with incised canyons and creeks that drain to the Pacific Ocean. Steep rocky bluffs are common along the coastline with sandy beaches located below and between promontories. Due to the steep topography and soil and bedrock types, landslides and mudslides occur periodically during seasonal heavy rainfall in upland areas and along the coastline.

Surface Water Hydrology

California is divided into 10 hydrologic regions by the California Department of Conservation. A hydrologic region is the area drained by a river system or a segment of a river system, a closed basin, or a group of streams forming a coastal drainage area. The City of Malibu is located in the South Coast Hydrologic Region, which extends from Ventura County to the border with Mexico.

The South Coast Hydrologic Region is managed under the Los Angeles Regional Water Quality Control Board- Region 4. The Los Angeles Water Board has subdivided the region into 5 Hydrologic Units. The City of Malibu is located in the Malibu Hydrologic Unit.

The County of Los Angeles also subdivides the County into six major watersheds. A watershed is the area of land where all of the water that is under it or drains off of it transmits to a common place. The City of Malibu is located in the Malibu Creek watershed. The Malibu Creek watershed includes a number of creeks and streams which flow directly into Santa Monica Bay and the Pacific Ocean along the Malibu coastal area. These creeks and streams originate in the Santa Monica Mountains or in the hills adjacent to the coast line.

Utilizing watershed boundaries established by the California Department of Water Resources (DWR), seventeen (17) hydrologic areas were delineated and labeled as shown in **Figure 2-1**. The watersheds as shown on the map include from west to east, Arroyo Senuit, Nicholas Canyon, Los Alisos Canyon, Encinal Canyon, Trancas Canyon, Zuma Canyon, Ramierez Canyon, Escondido Canyon, Latigo Canyon, Solstice Canyon, Corral Canyon, Malibu Creek, Carbon Canyon, Las Flores Canyon, Piedra Gorda Canyon, Pena Canyon, and Tuna Canyon.

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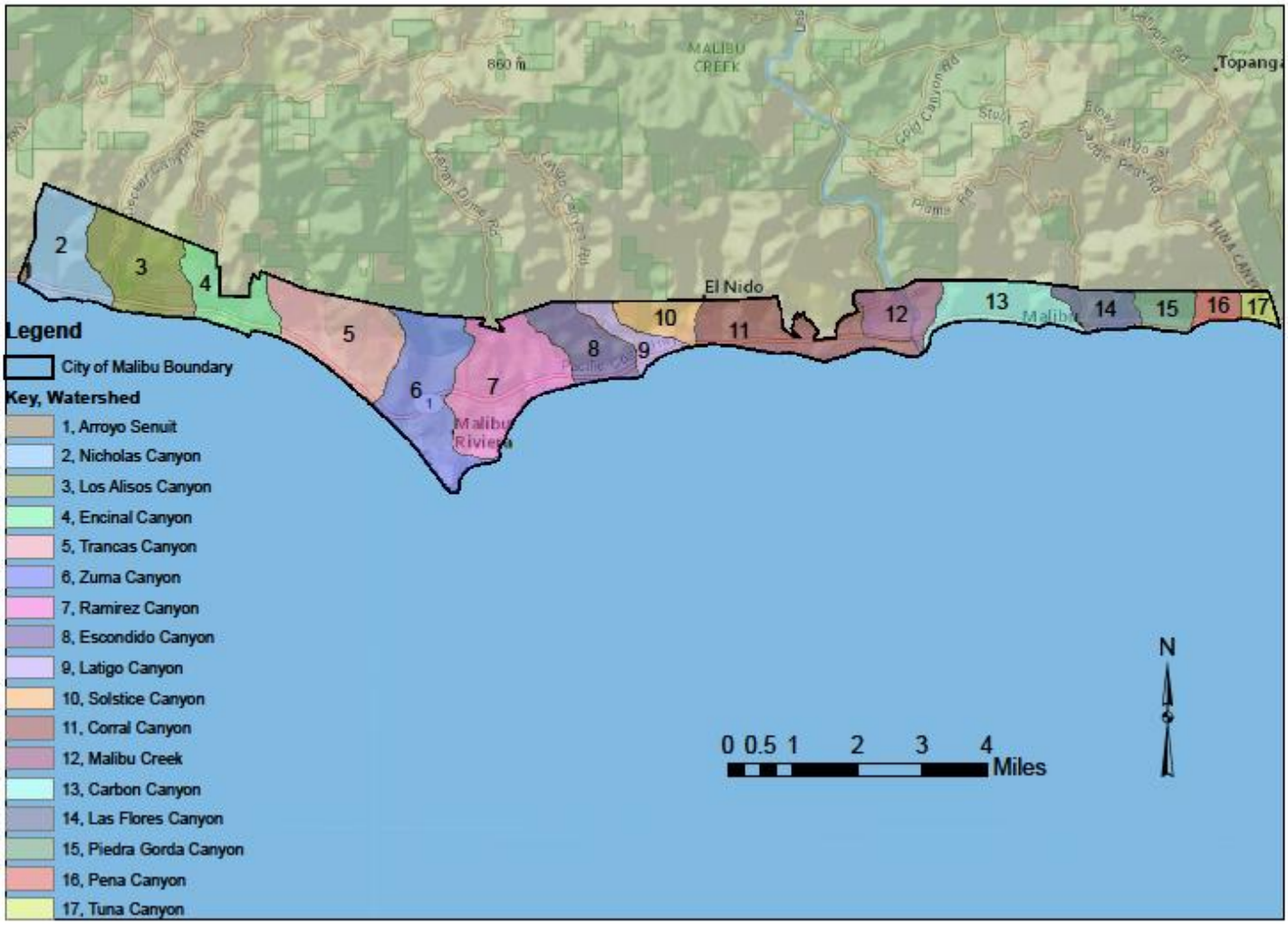
Figure 2-1 City of Malibu Watersheds



Groundwater

Groundwater resources in Malibu are scarce. The only defined groundwater basin is the Malibu Valley Groundwater Basin (Department of Water Resources Basin No. 4-22) which coincides with the Civic Center area of the City. The Malibu Valley Groundwater Basin is approximately 613 acres in size, located along the Santa Monica Bay Coastline. The groundwater basin is bounded on the south by the Pacific Ocean and on the north, east, and west by non water-bearing Tertiary age rocks of the Santa Monica Mountains. (DWR Bulletin #118, Basin No. 4-22).

Groundwater in the basin occurs primarily in Holocene alluvial deposits including clays, silts, sands and gravels. Alluvial thickness is estimated at approximately 90 feet at the upper end of the basin to 140 feet at the lower end. The Malibu Valley Groundwater Basin contains, in general, four hydrostratigraphic units including shallow alluvium, a low permeability zone consisting of fine grained clay and silt deposits, the Civic Center Gravels, and underlying bedrock of Tertiary sedimentary rock.

Recharge of the basin occurs from several sources including: (1) the infiltration of precipitation that falls onto pervious surfaces; (2) runoff in Malibu Creek flows through the basin and water from the creek infiltrates into the alluvium in the upper portions of the creek; (3) percolation from OWTS located within the shallow alluvium and in shallow soils in upland areas; and (4) excess irrigation which infiltrates into and through the shallow surface soil deposits.

Groundwater quality in the basin has primarily been studied in the shallow alluvium and mostly for nitrogen, nitrates and bacteria influences from development. Shallow groundwater in the basin along the coastline in the Malibu Lagoon area shows elevated sodium and chloride concentrations related to tidal influences.

The Malibu Valley Groundwater Basin historically served as a source of water supply for the area, but is no longer used. All water service in Malibu is now provided by Waterworks District 29 (WWD 29), supplied by the Metropolitan Water District of Southern California *(wholesaler*) from various sources, including the Colorado River, State Water Project, and the Owens Valley Aqueduct. However, the potential for future groundwater extraction and beneficial uses in the basin remains a possibility.

On the west side of the Civic Center area there is a small adjacent groundwater basin in the area known as Winter Canyon. Beyond that there are other very smaller alluvial groundwater basins aligned with the lower reaches of some of the stream canyons near their confluence with the ocean. Little is known about the extent and conditions of these groundwater areas. In the upland areas groundwater occurrence is sporadic.

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Geology

The Geology of the City of Malibu is characterized by the intersection of Coastal Processes and surficial geologic processes associated with Santa Monica Bay, Beaches and Sea Cliffs and the Santa Monica Mountains located north of the coast. The Santa Monica Mountains are part of the east-west trending Transverse Ranges. The Geology of Malibu is divided by the east-west striking Malibu Coast fault, with dominantly bedrock units to the north and a combination of bedrock and quaternary sedimentary deposits to the south.

The bedrock of the Santa Monica Mountains consists of a sequence of folded and faulted units. The bedrock formations exposed in the Santa Monica Mountains north of the Malibu Coast fault consist of two main sequences. The lower sequence consists of basement rocks of middle Mesozoic age, including slates, schists, and granitic rocks which are overlain by marine sediments consisting of late Cretaceous and early Tertiary age sandstone and siltstone formations. The upper sequence is a varied group of sedimentary and volcanic formations of middle Tertiary (Oligocene and Miocene) age that make up part of the south-central and western Santa Monica Mountains. The sequence includes the Sespe Formation, Vaqueros Formation, and Topanga Formation, the Conejo Volcanics (volcanic rocks that were deposited in the Middle Miocene, the same time period as the Vaqueros and Topanga Formations and are locally in contact with those units), the Monterey Formation, and the Trancas Formation.

South of the Malibu Coast fault, the geology consists of a variety of units including bedrock and surficial units. The bedrock formations consist of Trancas Formation siltstone, sandstone and claystone (found at Trancas) and Monterey Formation shales (found at Point Dume). The Trancas and Point Dume areas also have associated Pleistocene terrace deposits or Quaternary alluvium, beach, or estuarine deposits. Surficial geologic units include colluvial deposits, alluvial deposits, estuarine deposits, landslide deposits, and terrace deposits. These range in age from very recent (historic) to early Quaternary (Pleistocene), and may be locally covered by artificial fill. All of the natural units were deposited by either water (streams, debris flows, long shore currents, and high tidal surges), gravity (slow creep or rapid slippage), or by in-place weathering (soil).

The Malibu Coast fault is the only fault within the City of Malibu that is zoned as an active earthquake fault by the State of California. A number of other inactive faults have been mapped in the hills on the north side of the City.

Soils, Landforms and OWTS

The Malibu area can be divided into a number of distinctly different landforms, or geologic units, each of which has differing physical characteristics, capabilities, and limitations with respect to onsite wastewater disposal. These landforms or geologic units reflect the complex geologic history of the area, and each landform or unit has a different assemblage of soils or soil types associated with it (see **Figure 2-2**). The landforms or geologic units which would be encountered along an idealized cross-section, from the beach to the uplands, include the following:

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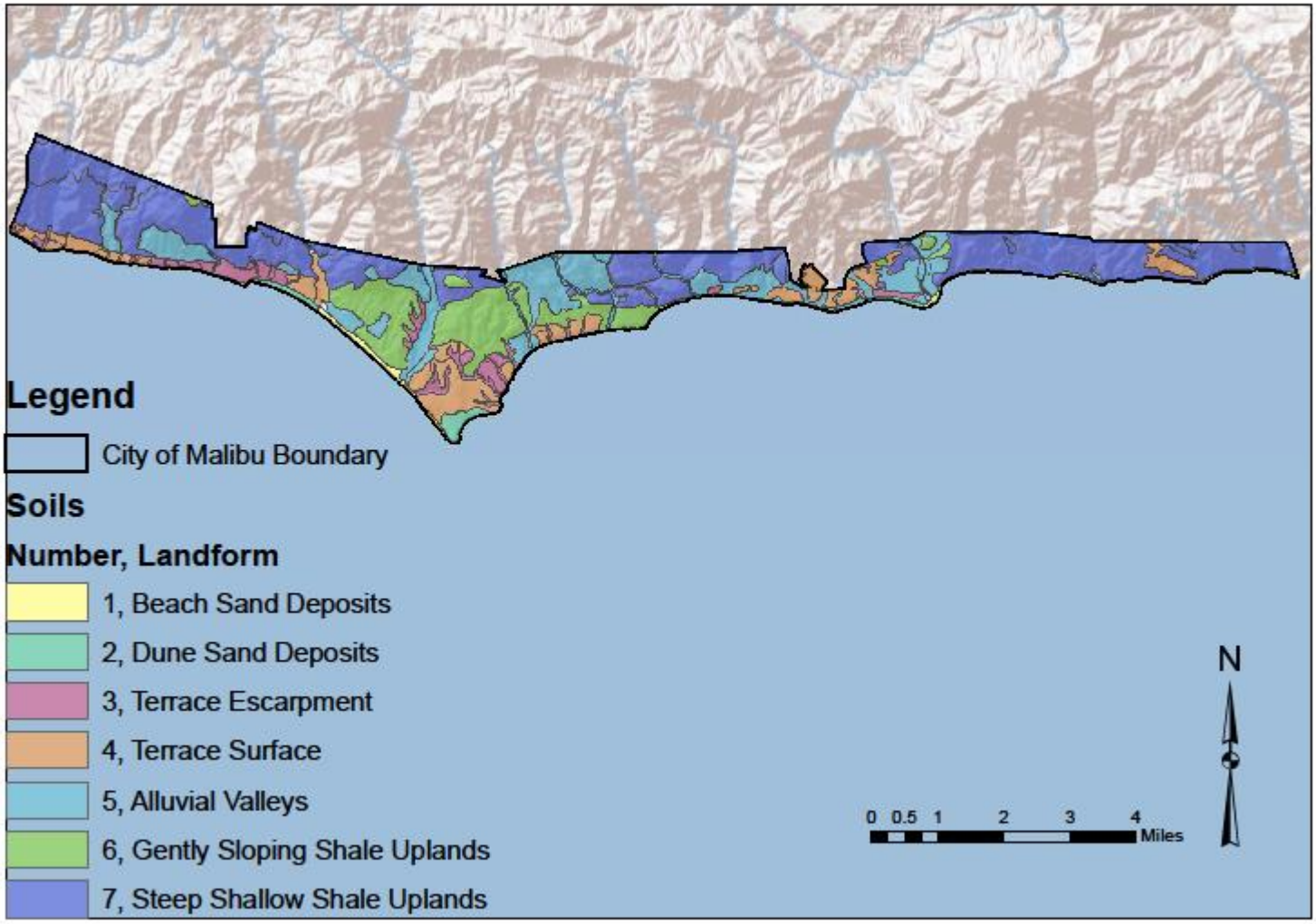
- beach sand deposits;
- dune sand deposits;
- terrace escarpment;
- terrace surface;
- alluvial bottom lands;
- gently sloping shale uplands;
- steep shallow shale uplands.

It should be understood that the characteristics of these landform units will vary somewhat from place to place, but it still is helpful from a planning viewpoint to be able to broadly characterize these units in terms of their capabilities, constraints, and limitations, and to further provide an overview of a geographic area by describing and summarizing the landform units which comprise it.

Figure 2-2 Detailed Soils by Landform



Beach Sand Deposits

Beach sand deposits consist of the generally well sorted, medium grained sands that are deposited at the water's edge by wave action. Most houses along the Malibu shoreline are actually at the landward edge of the beach deposits, with at least a part of the house's foundation being on dune sands or fill materials. The common practice for these houses is to locate the OWTS in sand deposits within a reinforced concrete structure/seawall, protected against damage by wave action or winter storms. OWTS in beachfront areas require advanced (supplemental treatment), including disinfection.

Dune Sand Deposits

Dune sand deposits consist of the loose, hummocky wind deposited sands landward from the modern beaches. The width and height of the dunes vary greatly in the Malibu area, from as little as 200 feet along the eastern side of the City to several hundred feet in the Broad Beach area in the west. Dune sand deposits have very rapid infiltration/percolation rates, but with long lateral run-out areas and flat gradients a high degree of wastewater renovation can occur. High water table conditions, shifting or eroding dune sands, and sea level rise present growing long-term concerns for OWTS in beachfront dune sands.

Terrace Escarpment

The Terrace Escarpment landform consists of the steep slopes along the ocean front edge of the Malibu-Dume terrace or platform. The soils are generally thin, loose, locally re-worked or slope transported materials (colluviums) over more consolidated (dense) sandy clays and clayey sands of the older terrace deposits. In some areas small landslide deposits and soil slips occur along the terrace escarpment. Although only a few structures are located on the less steep areas of the terrace escarpments, they're placement and design should has to take into consideration potential for lateral migration of wastewater and potential breakout of seepage on the slopes below. This analysis is conducted during OWTS project reviews.

Terrace Surface

Much of the elevated, flat lying surface along the Pacific Coast Highway consists of an ancient wave cut marine platform. Marine terrace deposits overlie this platform, and in some areas older wind deposited sands and alluvium washed from the local hills blanket the marine deposits. A number of different soil types are associated with these deposits, including the Lockwood, Rincon, Huerhuero, and Ysidora soils. The soils differ primarily in the texture of the upper 3 to 4 feet; some have clay loams subsoils, some have clayey subsoils and some have hardpan. However, the soils are generally not dissimilar at depths greater than 4 feet and generally have permeable loamy substrata. Although there is no evidence of a high groundwater table within the terrace deposits, areas of hardpan soils may perch infiltrating rainwater during winter months. Areas of terrace deposits, pose slight to moderate constraints for OWTS, but individual soil differences must be considered in system design.

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Alluvial Valleys

Stream land alluvial deposits occur in small canyon and valley bottoms throughout the Malibu area, many of which are largely undeveloped because of potential flood problems. The largest developed areas on alluvial soils are in the Malibu Civic Center area (to be addressed with the CCWTF Project), and the Busch Drive – Bonsall Drive area. Alluvial areas near the mouths of oceanfront stream canyons tend to have high groundwater tables; however, this does not appear to be the case in the Busch Drive – Bonsall Drive area. Adherence to horizontal setback requirements from watercourses must be considered in alluvial valley areas. Generally, the deep, well drained loamy alluvial soils of the Elder and Yolo series that occur in the valley bottoms pose few constraints for OWTS.

Gently Sloping Shale Uplands

Soils of the Cositas, Diablo, and Cibo series occur on the soft, moderately weathered and fractured sandstones and clay-shales of the Tertiary formations of the Malibu hills. These units commonly weather to form gently rolling hills, small ridges, and upland benches. The soils generally have clay loam or clayey textures overlying weathered bedrock at depths commonly between two and four feet. Depending on soil texture, percolation rates may be moderately slow to very slow. Historically, the common practice has been to install deep seepage pits in the weathered and fractured rock in these areas. A concern can arise in lightly weathered-highly fractured zones due to limited biological activity at depth, and the potential for interconnected rock fractures to provide a conduit of for migration and break-out of poorly treated wastewater effluent. Incorporation of supplemental treatment, greater vertical and horizontal setbacks to stream channels and steep slopes can mitigate this concern.

Steep, Shallow Shale Uplands

Generally shallow (less than 2- to 3-foot deep) soils occur on steep upland slopes in the Malibu area. These include soils of the Gaviota, Gilroy, Millsholm, and Los Osos series. These areas provide generally poor and sometimes severely constrained sites for OWTS because the limited soil depth. The availability and use of subsurface drip dispersal methods (preceded by supplemental treatment) has provided a viable option in these shallow areas on steeper slopes. The potential for lateral migration and down slope break-out or surfacing effluent must be examined and addressed in the siting and design of these OWTS. Additionally, as slopes steepen, the potential for slope de-stabilization by OWTS construction and discharges is an important aspect of project feasibility review.

OWTS Usage and Wastewater Loading Estimates

In the early 2000s the City of Malibu implemented a data management system for all OWTS in the City developed by Stone Environmental, Inc. and termed "Integrated Wastewater Management Information System" (IWIMS). In support of the development of this LAMP, IWIMS data were extracted and merged with GIS to create a series of maps and an inventory of OWTS usage in Malibu for each of the coastal watershed that comprise the City. The maps are provided

in **Appendix B** along with some of the key information developed from this inventory and analysis. This information provides an overview and comparison of the amount and distribution of OWTS usage in the different parts of Malibu, the estimated wastewater and nitrogen loading associated with the residential OWTS, and approximate development densities. This is a starting point for the overall water quality assessment that will be carried out in the course of implementing the Malibu LAMP. In the future the data will be expanded to include contributions from commercial occupancies and other additions and refinements as the information becomes available. These data will also be used in conjunction with water quality monitoring information from other existing data collection programs (see Section 6), and for consideration and design of any additional monitoring activities planned by the City to fulfill obligations under this LAMP.

Water Quality Management Measures

The following summarizes how key site suitability, land use and development factors have been addressed in the OWTS requirements of Malibu's LAMP for protection of water quality. This summary is organized to correspond with the elements listed under Section 9.1 of the State OWTS Policy.

Groundwater Quality Protection

1. **Soil Conditions.** 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. Protection of underlying groundwater relies on provision of an adequate depth of permeable soil below the dispersal field (zone of aeration) for absorption and treatment to occur. City of Malibu Onsite Wastewater Ordinance and Manual requires detailed site evaluation to document suitable soil characteristics and depth for each OWTS installation consistent with industry practices and appropriate for the conditions and requirements in Malibu (see **Section 3**). The observed depth and percolation characteristics of the soil are used to select the appropriate location, sizing and design of the OWTS to achieve proper effluent dispersal and groundwater protection.

2. **Geologic Factors.** Geology 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. Although the greatest development densities in Malibu are in areas closest to the ocean, there are also large numbers of OWTS in the upland regions, where the rock formations may influence the suitability for and effects of OWTS. Geologic factors are addressed for new OWTS based on: (a) information from basic site evaluations for all installations; and (b) for systems located on slopes steep slopes or near areas of unstable land masses, the completion of a geotechnical study, including assessment of hydrogeologic conditions, water movement and slope stability.

3. **Groundwater Conditions.** Groundwater is not relied on as a source of water supply in Malibu. However, groundwater conditions are of importance for OWTS usage due to the close hydrological connection with coastal streams and ocean waters, and the extensive recreational water uses. Site evaluation practices include requirements for documenting groundwater conditions, which may include wet weather observations. Documentation of groundwater levels, in combination with soil permeability (percolation rate), provide the basis for selection of the appropriate OWTS design and maintenance of an appropriate vertical separation distance between the point of effluent dispersal and the water table for protection against pathogen impacts. Siting and design criteria addressing groundwater separation requirements have been developed to provide the following:

    - Vertical separation distance of 5 feet for conventional OWTS and 10 feet for seepage pits;

    - Reduced vertical separation distance of 2 to 3 feet, based on inclusion of supplemental treatment and/or alternative dispersal designs (e.g., pressure distribution, drip dispersal) found to provide more effective use of the shallow unsaturated soil zones for improved absorption and biodegradation of wastewater constituents, including pathogens.

    - Required use of supplemental treatment (including disinfection) for all beachfront properties.

    Appendix A provides further discussion of the supporting rationale, including literature sources, for the OWTS groundwater separation requirements adopted by Malibu.

4. **Areas with High Usage of Domestic Wells.** All development in Malibu is served by public water systems. There are no domestic wells and none reasonably expected. Nevertheless, Malibu Ordinance and Manual include appropriate horizontal setbacks between OWTS and domestic wells to ensure their protection, should any wells be proposed in the future.

Surface Water Quality Protection

1. **Minimum watercourse/water body setback requirements.** The primary measure for protection of surface water quality is the establishment of safe horizontal setback buffers between OWTS components (treatment tanks and dispersal fields) and various water and landscape features. The requirements contained in the Malibu Onsite Wastewater Ordinance and Onsite Systems Manual are consistent with current and historical policies and guidelines of the Los Angeles Regional Water Board as well as requirements in the State OWTS Policy. They address setbacks to springs, drainage ditches/swales, watercourses, and reservoirs.

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2. **Alternative treatment and dispersal technologies.** The Malibu Ordinance and Manual includes alternative treatment and dispersal technologies that provide great amount of flexibility and options for system repairs. This has two positive effects for surface water quality protection: (1) the use of alternative treatment technologies, producing higher quality effluent, can compensate for reduced amount of soil absorption area where the repair system on an older non-conforming development site encroaches within the normal setback buffer; and (2) alternative dispersal methods and sizing criteria can reduce the amount of encroachment into the setback area by making more portions of the property (e.g., shallow soil areas) potentially feasible for wastewater dispersal.

3. **Erosion control measures.** Depending on site conditions and system design, construction of an OWTS may pose a threat of soil erosion and impacts on downstream receiving waters from excavations for tanks, trenching for pipelines and dispersal trenches, and associated clearing and grading activities. Malibu's OWTS review process is closely coordinated with other City departments including review and approval of grading, drainage and erosion control plans.

4. **Coastal Engineering.** Flooding or wave damage along the shoreline represents one of the most significant threats to buildings and OWTS in Malibu. All beachfront property require a Wave Uprush Report by a Coastal Engineer to address the necessity of a bulkhead/seawall, and the location and design of any existing, or proposed bulkhead/seawall, meant to protect any existing, or new OWTS from damage by ocean waters, and to protect against discharges or impacts to the ocean waters from the OWTS.

Impaired surface waters (nitrogen or pathogens)

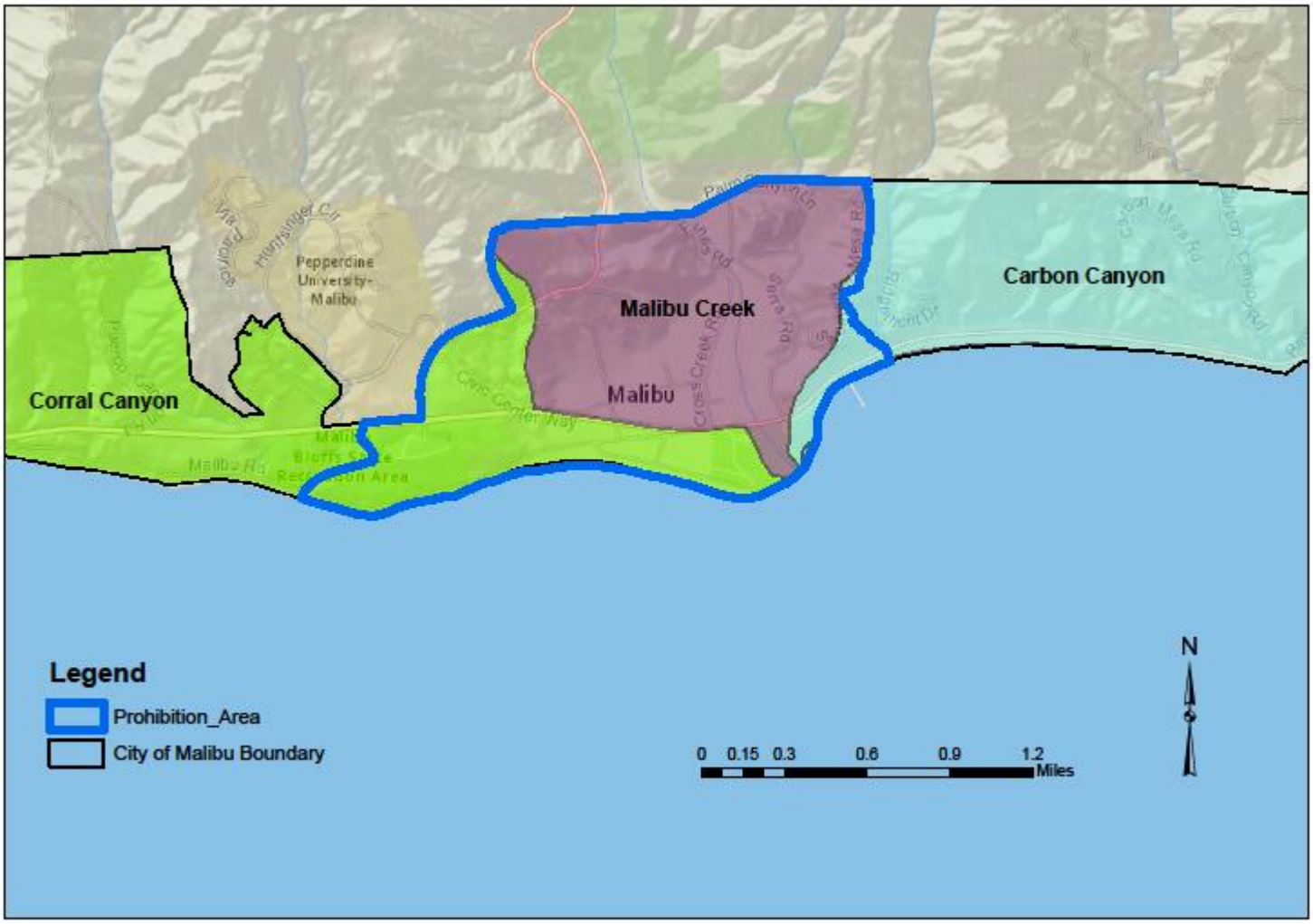
Impaired surface water in the Malibu area include the following three that have been designated impaired for nitrogen and/or pathogens:

- Malibu Creek Watershed (nutrients, bacteria)
- Malibu Creek and Lagoon (nutrients, invertebrates)
- Santa Monica Bay Beaches (bacteria)

In all cases, Total Maximum Daily Load (TMDL) studies have been completed and adopted. In the case of Malibu Creek and Lagoon and Santa Monica Bay, the adopted TMDLs found OWTS not to be a contributory factor to the impairment, and therefore no loadings were assigned to OWTS. With respect to Malibu Creek Watershed, OWTS <u>were</u> determined to be a contributory factor, and loadings were assigned. The affected OWTS in Malibu are all situated within the Malibu Creek watershed in an area subsequently encompassed by the OWTS Prohibition adopted by the Los Angeles Bay Regional Water Board in 2009 (see **Figure 2-3)**. The OWTS Prohibition area is now slated for implementation of the Malibu CCWTF Project, which has been approved and will replace OWTS with a community wastewater collection, treatment and water recycling/groundwater injection system in a series of implementation phases. Agreement on the part of all OWTS owners to connect to the CCWTF Project by the year 2022 (nine years from the effective date of the State OWTS Policy), will relieve the OWTS from the need to implement other

changes to their OWTS to comply with Tier 3 pathogen treatment standards in the State OWTS Policy.

Fig. 2-3 Civic Center OWTS Prohibition Area



High Density of OWTS, Parcel Size and Cumulative Impacts

Consideration of OWTS density, parcel size and potential cumulative OWTS impact issues (e.g., groundwater mounding, nitrate loading) is addressed in Malibu primarily through Ordinance requirements that call for the completion of cumulative impact assessments for certain types of projects or locations, including consideration of 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.

Additionally, the Malibu Ordinance and Manual contain provisions allowing the use of alternative treatment and dispersal technologies to mitigate nitrate loading (e.g., with supplemental treatment systems) and hydraulic mounding (e.g., with pressure distribution or drip dispersal designs).

Geographic areas with many older non-conforming OWTS installations and setbacks

Older, non-conforming OWTS exist in Malibu, but the problem is not as significant as in many areas of California. There is a high property turnover rate in Malibu and substantial building activity which facilitates discovery and upgrading of older non-conforming building conditions. Additionally, the City's unique OWTS management ordinance requiring inspection and evaluation of OWTS at the time of property transfer (point of sale) has been very helpful in bringing about OWTS upgrades where needed.

Measures contained in the City's Ordinance that also aid significantly in addressing problems of older, non-conforming OWTS are the availability of alternative treatment and dispersal system designs to provide more effective upgrades and repairs for lots having limited area, soil limitations or other constraints for conventional OWTS.

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Section 3:
OWTS Siting, Design, Construction and Permitting Requirements

Siting Criteria

The following summarize minimum siting criteria for OWTS as adopted in Malibu Onsite Wastewater Ordinance.

- **Soil Depth, Groundwater Separation and Percolation Rates.** Minimum soil depth, groundwater separation and percolation rates are summarized in **Table 3-1**. Included for comparison are applicable requirements for (a) conventional OWTS (trenches and beds), (b) alternative systems (AOWTS) employing supplemental treatment or pressure distribution/drip dispersal methods, and (c) seepage pits

Table 3-1.
Minimum Soil Depth, Groundwater Separation and Percolation Requirements

Type of OWTS	Minimum Soil Depth[1] (feet)	Minimum Groundwater Separation[1] (feet)	Allowable Percolation Rate (mpi)[2]
Conventional Septic Tank & Dispersal Trench/Bed	5	5	5-60
Conventional Trench/Bed w/Supplemental Treatment	3	3	1-60
Pressure Distribution w/Supplemental Treatment	2	2	1-60
Drip Dispersal w/Supplemental Treatment	2	2	1-120
Seepage pit	10	10	-[3]

[1] Vertical distance measured from the bottom of the dispersal system to the water table
[2] mpi = minutes per inch
[3] Per requirements detailed in City of Malibu "Seepage Pit Percolation Testing Policy", which requires 3-day static head test of a 2-ft diameter borehole extending the full depth of the proposed pit.

- **Ground Slope.** Maximum ground slope requirements:
  - 30% for conventional gravity trenches;
  - 45% for pressure distribution, drip dispersal or seepage pits;
  - Any dispersal field on 30 to 45% slope must address critical factors of soil depth, restrictive horizons, soil permeability, application rates and dispersal methods;

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- Any dispersal system on slope greater than 10% must be evaluated to assess possible impacts of lateral migration of effluent.

- **Horizontal Setbacks.** Minimum required horizontal setback distances between OWTS components and wells, public water supply intakes, watercourses, and various other landscape and site features are listed in Table 1 of the Ordinance. Setbacks are in compliance with criteria contained in the CPC as well as additional requirements specified in the State OWTS Policy.

- **Areas of Flooding.** OWTS systems must be located outside of flood hazard areas. Exception: For existing lots of record where a suitable site outside of flood hazard areas is not available, the OWTS may be permitted to be located in flood hazard areas where appropriate measures are incorporated to minimize infiltration of floodwaters into the system and discharges from the system into the floodwater.

- **OWTS Located on Property Served.** OWTS must be located on the same property as the building(s) being served. Exception: An exception may be granted by the ESD for existing lots of record, where the OWTS may be located on an adjoining property within a non-revocable easement.

Site Evaluation Requirements for OWTS

- For all locations where an OWTS is proposed to be installed, site evaluations must be conducted prior to permit approval to verify conformance with applicable soils, groundwater, horizontal setbacks, ground slope and other requirements as prescribed in the onsite wastewater ordinance. This generally requires more than one professional to complete primary elements: (1) soils and percolation testing; (2) supporting geology/soils report.

- Site evaluation methods include soil profiles, percolation tests and other exploratory tests, as necessary, to verify adequate depth and permeability of soil, and vertical separation between dispersal field and groundwater for both primary and reserve dispersal areas.

- Testing must be conducted in accordance with standards and guidelines provided in the Malibu Onsite Systems Manual.

    - Soils analysis must be conducted by a California Registered Geotechnical Engineer or a California Registered Civil Engineer in the environmental/geotechnical field and the results expressed in United States Department of Agriculture classification terminology.

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- Percolation tests must be conducted by a California Registered Geologist, a California Registered Geotechnical Engineer, a California Registered Civil Engineer, or a California Registered Environmental Health Specialist.

- Supporting geology/soils report must be prepared by a Professional Geologist or Geotechnical Engineer, and must cover field studies and analysis of soils, geologic conditions, groundwater occurrence and movement, slope stability, cumulative impacts and other conditions pertinent to the siting, design, construction and operation of the proposed OWTS.

- Where the ESD has been provided adequate evidence to demonstrate suitable soil conditions and groundwater separation, testing requirements may be waived.

- For new divisions of land, soil profiles, percolation tests and groundwater determinations are required on every parcel unless the ESD 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.

- The permit application for a new or replacement OWTS installation requires an OWTS Design Report prepared by a qualified professional along with supporting results and analysis from soils, percolation testing and geology studies.

Wastewater Flows for OWTS Design

Wastewater flow requirements for OWTS design are covered in Section II of the OWTS Manual and include the following provisions:

- **Peak daily flow.** All OWTS must be sized for peak daily flow

- **Residential OWTS.** Based on number of bedrooms and consistent with CPC criteria

- **Multiple Dwelling Units or Apartments.** Based on the number of dwelling units and consistent with CPC

- **Non-residential OWTS.** Based on consideration of projected activities, occupancy, and facilities and estimating factors (unit flows) and consistent with CPC. Alternative flows may be based on other appropriate literature references (e.g., USEPA Manuals) or documented wastewater flow for a comparable facility, as deemed acceptable by ESD

- **Flow Equalization.** Flow equalization may be used for non-residential and mixed use facilities that experience significant, regular and predictable fluctuations in wastewater flows, such as churches, schools, and special event venues. Flow equalization is the process of controlling the rate of wastewater flow through an OWTS by providing surge

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capacity storage and timed-dosing of the incoming flow. It allows peak surges (e.g., weekend usage) to be spread out over several subsequent days to aid in overall OWTS performance. Where used, the following are required:

- septic tank capacity must be sized based on the peak daily flow for the facility;
- design flow used for supplemental treatment unit(s) and/or the dispersal field may be based on the equalized ("average") flow rate for the facility;
- supporting engineering calculations and operational specifications must be provided; and
- operating permit for the OWTS shall include provisions for monitoring and documenting compliance with the flow equalization design parameters.

Design and Construction Requirements

The following summarizes key design and construction requirements detailed in Section II of the Onsite Systems Manual.

Treatment Components

Septic Tank Requirements. Requirements for septic tanks conform to specifications in the CPC as well as additional requirements contained in the State OWTS Policy, covering the following:

- Capacity
- Plans
- Structural design
- Prefabricated tanks
- Construction materials
- Compartments, partitions and baffles
- Access manholes and sidewalls
- Pipe opening sizes, extension and venting
- Effluent Filter
- Water-tightness Testing

Supplemental Treatment Systems (AOWTS). Requirements for supplemental treatment systems conform with requirements contained in the State OWTS Policy, are consistent with methods and standards described in USEPA publications and other professional literature, and employed in many jurisdictions in California over the past 15 to 20 years, including Malibu. Design requirements and guidelines cover the following:

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- General - provisions, objectives, and definition of terms;
- Applications – approved and/or required conditions of use;
- Siting criteria – for treatment unit and associated dispersal component;
- Performance requirements – general, tanks and component parts, and effluent quality;
- Design and sizing – wastewater flow, third-party testing standards (e.g., NSF), tanks, controls, emergency storage provisions, manufacturer requirements;
- Engineering plans and installation – engineering plans, installer requirements, maintenance contract, installation inspection;
- Operation and management requirements.

Dispersal Components

Conventional Disposal Trenches and Beds. Requirements for conventional disposal trenches and beds conform to specifications in the CPC as well as additional requirements contained in the State OWTS Policy, covering the following:

- General – requires design to be based on soils analysis and/or percolation testing;
- Sizing – effective absorption area and absorption capacity for trenches, leaching beds and chamber designs.
- Construction and materials – addresses depth, length, width, spacing, cover, grade, pipe and filter material, distribution boxes and laterals, connections and joints, surface covering and dosing siphons;
- Inspection - minimum requirements for inspection and testing of installation.

Seepage Pits. New and replacement seepage pits require the addition of supplemental treatment. Requirements for seepage pits are consistent with requirements contained in the CPC and cover the following:

- Sizing and design – effective absorption area, capacity and wastewater treatment
- Multiple Installations – level and sloping sites
- Construction
- Spacing
- Lining
- Sidewall
- Cover
- Inlet Fitting

Pressure Distribution Trench Systems (AOWTS). Requirements for pressure distribution trench systems are consistent with methods and standards described in USEPA publications and other professional literature, and employed commonly over the past 30+ years in many jurisdictions in California and throughout much of the US. Design requirements and guidelines cover the following:

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- General – description of technology, principles and objectives;
- Applications – approved and/or required conditions of use;
- Siting criteria – highlighted differences from conventional disposal trench requirements;
- Sizing and design – wastewater treatment, trench sizing, pressure-dosing, pump(s) and piping, and hydraulics;
- Construction and Materials – dispersal trench, pressure distribution components, control systems;
- Engineering plans and installation – reference guidelines, engineering plans, construction inspection and hydraulic testing;
- Operation and management requirements.

Subsurface Drip Dispersal Systems (AOWTS). Requirements for subsurface drip dispersal systems are consistent with methods and standards described in USEPA publications and other professional literature, and employed over the past 10 to 15+ years in many jurisdictions in California and throughout much of the US. Design requirements and guidelines cover the following:

- General – description of technology, principles and objectives;
- Applications – approved and/or required conditions of use;
- Siting criteria - highlighted differences from conventional disposal trench requirements;
- Sizing and design - wastewater treatment, dripfield sizing, wastewater application rates, dripfield zones and configuration, hydraulic design, pump(s) and piping;
- Construction and materials – dripline materials, layout, depth, and control systems;
- Engineering plans and installation – reference guidelines, engineering plans, construction inspection and hydraulic testing:
- Operation and management requirements.

Project Submittal Procedures and Guidelines

General

Nearly all building projects in the City of Malibu are potentially subject to Environmental Health review at some level. Most of the existing developed properties in Malibu are served by OWTS. Environmental Health reviews are performed to ensure that proposed uses of new or existing OWTS are compliant with applicable regulatory requirements.

Simple projects that do not impinge on a property's existing OWTS often can be reviewed "over the counter". Projects where there is a known or significant potential for the building or development activity to affect the existing OWTS (either through encroachment on regulated setback distances or increased loading from sanitary drainage), or where there is no existing OWTS, are subject to more extensive review to determine conformance with the City of Malibu Onsite Wastewater Ordinance and Statewide OWTS Policy.

ESD submittal guidelines for major categories of building and development projects and special study areas (beachfront) are described below.

New Buildings/Additions/Remodels/Auxiliary Structures

Essential submittals for ESD review of these projects are: (a) an OWTS plot plan; (b) a fixture unit worksheet; and (c) project drawings including architectural plans, grading plans, and (in certain cases) structural plans. In most cases ESD performs its review in two stages: conformance review and plan check. Conformance review is performed to evaluate project feasibility for the Planning Department, and provide a list of conditions for ESD approval. Plan check is the final review stage for the issuance of building permits, where the project construction drawings are inspected to ascertain satisfaction of the requisite conditions of approval.

Reductions in Regulated Setback Distances

Reduction in the horizontal setbacks specified in Malibu Onsite Wastewater Ordinance between OWTS and structures may be is permissible where supported by a letter from the project Structural Engineer and a letter from the project Soils Engineer certifying that the proposed reduction in setbacks will not adversely affect the structural integrity of the OWTS nor the structural integrity of the structures for which the setback is reduced. In the case of a building, a supporting letter must also be provided by the Project Architect, who must certify that the proposed reduction in setbacks will not produce a moisture intrusion problem for the proposed building(s).

New OWTS

ESD performs a two-stage review of all projects involving a new OWTS (e.g., a new single family residence and/or OWTS expansion). Conformance Review is the first-stage review and is completed when the applicant demonstrates the feasibility of the project in support of Planning Division requirements. The second ESD review occurs during Building Plan Check stage. When the Building Plan Check review is completed successfully, ESD issues Final Approval, which is required for all OWTS plans, building plans, and grading plans.

Subdivisions and Lot-line Adjustments

Subdivisions and lot-line adjustments require demonstration of the feasibility of using OWTS as the method of sewage disposal on each proposed lot. A designated area for the OWTS must be established using the same site evaluation procedures as are required for new OWTS (percolation/infiltration tests, soil classification, OWTS design/layout, and supporting geology). For lot line adjustments, the new property boundaries must preserve the integrity of the OWTS for each lot, including designated expansion/replacement areas for effluent dispersal. Submittal requirements for subdivisions and lot line adjustments include an OWTS plot plan showing each lot, the existing and proposed lot lines, the existing and proposed OWTS with expansion/replacement areas designated for effluent dispersal.

Beachfront Property

For all beachfront property, a Wave Uprush Report by a Coastal Engineer must be prepared addressing the necessity of a bulkhead/seawall, and the location and design of any existing, or proposed bulkhead/seawall, meant to protect any existing, or new OWTS. The report must describe the design beach profile and beach scour line subject to significant storm events. It must include a cross-section drawn to scale with a precise datum reference showing the design beach profile and the proposed location for a structural protection device. The beach scour line must be clearly labeled to facilitate development of an integrated cross-section drawing showing geologic units and the anticipated path of effluent (fill, bedrock, beach sand). A copy of the report must be submitted to both ESD and to the City of Malibu Coastal Engineering reviewer. The City Coastal Engineering reviewer must sign and stamp all beachfront OWTS plans prior to ESD final approval.

Management and Monitoring

Malibu Municipal Code Chapter 15.14, enacted in 2001, establishes requirements to assure appropriate operation and maintenance of OWTS to protect public health and safety, the environment and water quality, and to allow OWTS to continue to be a part of the long-term sanitation solution for the City. Chapter 15.14 requires owners of property served by OWTS to be responsible for:

- Obtaining all required inspections and permits;
- Ensuring continued maintenance and proper functioning of the OWTS; and
- Ensuring any necessary repairs, modifications or upgrades to the OWTS are timely completed and made fully operational.

Under Chapter 15.14, the key mechanism to ensure ongoing inspection and monitoring is the issuance of a renewable operating permit for all OWTS in the City. Operating permits are issued for all new development utilizing OWTS, and required for all existing commercial facilities and multi-residential OWTS, respectively, within one year and two years of the effective date of Chapter 15.14. For all other existing OWTS, the issuance of an operating permit is triggered under a variety circumstances as follows:

- At the time of repair, modification or replacement of an existing OWTS (e.g., for abatement or system upgrade);
- At the time of modifications or expansion to an existing structure or uses of a property served by an OWTS that involves additional plumbing fixtures or potential increases in the load to the existing OWTS; and
- At the time of property transfer (point-of-sale OWTS inspections).

Operating permits specify performance standards and expected operation and maintenance practices, according to guidelines provided by the City. The permit duration ranges from two to five years, depending on the nature of the facility (commercial or residential) and type of OWTS (conventional or alternative). Issuance or renewal of an operating permit requires completion

of any outstanding repair work, which must be done under appropriate permitting from the City, as applicable.

Inspections required prior to the issuance of an operating permit (e.g., point-of-sale inspections) must be conducted by a "Registered Onsite Wastewater Treatment System Inspector", as provided in Malibu Municipal Code Chapter 5.34.040(E).

Ongoing operation, monitoring, maintenance and reporting under the terms of the operating permits are required to be conducted by "Registered Operation, Monitoring and Maintenance (OM&M) Specialists" as provided in Chapter 5.38.040(D).

The provisions for inspection, monitoring, maintenance and repair of OWTS are summarized in **Table 3-2** below.

Table 3-2. Summary of City of Malibu Provisions for OWTS Inspection, Monitoring, Maintenance and Repairs

Activity	Inspections	Monitoring	Maintenance & Repairs
Building Additions & Remodels	OWTS performance inspection required at time of application for building addition or remodel; Conducted by Registered Inspector per evaluation procedures specified in Malibu Onsite Systems Manual.	May involve water sampling, dye testing or other monitoring.	Maintenance and/or repair/system upgrade work may be required as a result of inspection findings. Completion of work required before operating permit issued.
Operating Permits	Regular inspections of OWTS according to terms of operating permit by a Registered OM&M Specialist.	Monitoring of OWTS under terms of operating permit varies according to type/size of OWTS; may include flows, water levels, pump-out volumes, and water quality sampling, as applicable.	Maintenance and/or repair/system upgrade work may be required from time-to-time based on observations during routine inspections or as part of normal system servicing. Completion of required work prior to operating permit renewal or sooner depending on nature and urgency of repair.
Point of Sale Inspections	Inspection of OWTS conducted by Registered Inspector in conjunction with sale of a property. Inspection work in accordance with evaluation procedures specified in Malibu Onsite Systems Manual.	May involve water sampling, dye testing or other monitoring.	Maintenance and/or repair/system upgrade work may be recommended or required as a result of inspection findings.
Complaint Investigations (Abatement)	Inspections of OWTS by ESD staff in response to complaints or observed violation(s). Additional follow-up inspection by Registered Inspector may be required.	May involve water sampling, dye testing or other monitoring.	Maintenance and/or repair work/system upgrade may be required as a result of inspection findings. Completion of work required before reissuance of clearance by ESD and re-issuance of operating permit.

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Section 4:
Special OWTS Management Issues

The following describe the provisions contained in the City of Malibu LAMP corresponding with special OWTS management issues listed in sections 9.2.1 through 9.2.12 of the SWRCB OWTS Policy.

OWTS Inspection, Monitoring, Maintenance and Repair

Malibu Municipal Code Chapter 15.14, enacted in 2001, establishes requirements to assure appropriate operation and maintenance of OWTS to protect public health and safety, the environment and water quality, and to allow OWTS to continue to be a part of the long-term sanitation solution for the City. Chapter 15.14 requires owners of property served by OWTS to be responsible for:

- Obtaining all required inspections and permits;
- Ensuring continued maintenance and proper functioning of the OWTS; and
- Ensuring any necessary repairs, modifications or upgrades to the OWTS are timely completed and made fully operational.

Under Chapter 15.14, the key mechanism to ensure ongoing inspection and monitoring is the issuance of a renewable operating permit for all OWTS in the City. Operating permits are issued for all new development utilizing OWTS, and required for all existing commercial facilities and multi-residential OWTS, respectively, within one year and two years of the effective date of Chapter 15.14. For all other existing OWTS, the issuance of an operating permit is triggered under a variety circumstances as follows:

- At the time of repair, modification or replacement of an existing OWTS (e.g., for abatement or system upgrade);
- At the time of modifications or expansion to an existing structure or uses of a property served by an OWTS that involves additional plumbing fixtures or potential increases in the load to the existing OWTS; and
- At the time of property transfer (point-of-sale OWTS inspections).

At the present time operating permits have been issued for approximately 1600 OWTS in Malibu, roughly 33% of the total OWTS in the City. On average, an additional 200 to 250 new operating permits are issued every year.

Operating permits specify performance standards and expected operation and maintenance practices, according to guidelines provided by the City. The permit duration ranges from two to five years, depending on the nature of the facility (commercial or residential) and type of OWTS (conventional or alternative). Issuance or renewal of an operating permit requires completion

of any outstanding repair work, which must be done under appropriate permitting from the City, as applicable.

Inspections required prior to the issuance of an operating permit (e.g., point-of-sale inspections) must be conducted by a "Registered Onsite Wastewater Treatment System Inspector", as provided in Malibu Municipal Code Chapter 5.34.040(E).

Ongoing operation, monitoring, maintenance and reporting under the terms of the operating permits are required to be conducted by "Registered Operation, Monitoring and Maintenance (OM&M) Specialists" as provided in Chapter 5.38.040(D).

The provisions for inspection, monitoring, maintenance and repair of OWTS are summarized in **Table 4-1** below.

Table 4-1. Summary of City of Malibu Provisions for OWTS Inspection, Monitoring, Maintenance and Repairs

Activity	Inspections	Monitoring	Maintenance & Repairs
Building Additions & Remodels	OWTS performance inspection required at time of application for building addition or remodel; Conducted by Registered Inspector per evaluation procedures specified in Malibu Onsite Systems Manual.	May involve water sampling, dye testing or other monitoring.	Maintenance and/or repair/system upgrade work may be required as a result of inspection findings. Completion of work required before operating permit issued.
Operating Permits	Regular inspections of OWTS according to terms of operating permit by a Registered OM&M Specialist.	Monitoring of OWTS under terms of operating permit varies according to type/size of OWTS; may include flows, water levels, pump-out volumes, and water quality sampling, as applicable.	Maintenance and/or repair/system upgrade work may be required from time-to-time based on observations during routine inspections or as part of normal system servicing. Completion of required work prior to operating permit renewal or sooner depending on nature and urgency of repair.
Point of Sale Inspections	Inspection of OWTS conducted by Registered Inspector in conjunction with sale of a property. Inspection work in accordance with evaluation procedures specified in Malibu Onsite Systems Manual.	May involve water sampling, dye testing or other monitoring.	Maintenance and/or repair/system upgrade work may be recommended or required as a result of inspection findings.
Complaint Investigations (Abatement)	Inspections of OWTS by ESD staff in response to complaints or observed violation(s). Additional follow-up inspection by Registered Inspector may be required.	May involve water sampling, dye testing or other monitoring.	Maintenance and/or repair work/system upgrade may be required as a result of inspection findings. Completion of work required before reissuance of clearance by ESD and re-issuance of operating permit.

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OWTS Near Impaired Water Bodies

Currently there are no OWTS in the City of Malibu that are near a Section 303(d) listed water body pursuant to the OWTS Policy Tier 3 requirements. The local Wastewater Ordinance contains provisions, such as supplemental treatment and setbacks to water bodies, to ensure that the standards for OWTS are substantially protective of the watersheds.

Within the City, there are 4 impaired water bodies with TMDL requirements. The water bodies are identified as Santa Monica Bay, Malibu Watershed, Malibu Creek and Malibu Lagoon. The adopted TMDLs are for bacteria, nutrients, DDT and PCBs, trash and nearshore debris and other organics. The TMDLs most relevant to the use of OWTS are the Santa Monica Bay Bacteria TMDLs and the Malibu Creek and Lagoon Bacteria and Nutrient TMDLs.

The City of Malibu continues to place water quality issues as a top priority and takes an active role in educating the community about environmental protection. The City has entered into an agreement with the Regional SWRCB for the installation of the Civic Center Treatment Plant. The Plant will receive wastewater from commercial and some residential structures adjacent to the Malibu Creek area. The City implements a robust Clean Water Program, which includes a proactive pollution prevention program to respond to potential spills from OWTS.

The 2010 Clean Water Act (CWA) Integrated Report and updated 303(d) list were approved by the State Water Resources Control Board on August 4, 2010 and by the United States Environmental Protection Agency (USEPA) on October 11, 2011. The 2010 303(d)-listed water bodies and associated pollutants within the City of Malibu are summarized in **Table 4-2** below:

Table 4-2. 2010 303(d)-Listed Water Bodies and Relevant TMDLs

Water Body	Pollutant Class	Pollutant	Notes
Santa Monica Bay Beaches	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
Santa Monica Bay Offshore/Nearshore	Trash	Debris	Addressed by Debris TMDL
Malibu Creek	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
	Nutrients	Nutrients (Algae)	Addressed by USEPA Nutrient TMDL and USEPA Benthic TMDL
	Trash	Trash	Addressed by Trash TMDL
	Other Inorganics	Sulfates	TMDL Does Not Currently Exist
Malibu Lagoon	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
		Swimming Restrictions	Addressed by Bacteria TMDL
		Viruses (enteric)	Addressed by Bacteria TMDL
	Nutrients	Eutrophic Conditions	Addressed by Nutrient TMDL and USEPA Benthic TMDL

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Variances and Exceptions

Ordinance Code

Provisions for variances to OWTS requirements are specified in the Onsite Wastewater Ordinance, which reads as follows:

> *"Variances from the terms of this chapter may be granted by the City Council where the following findings can be made:*
>
> - *The variance will not harm the environment, public health, safety and welfare of the people of Malibu;*
> - *Due to special conditions or exceptional characteristics of the property, its location or surroundings, a literal enforcement of this chapter would result in an exceptional hardship (as defined in Section 15.20.040 of this chapter); and*
> - *The variance will not have any adverse environmental effect on the use of the adjoining property.*
> *Upon consideration of the factors and purposes of this chapter, the City Council may attach such conditions to the granting of variances as it deems necessary to further the purposes of this chapter."*

OWTS Repairs and Corrective Actions

OWTS that require corrective action to address a current or threatened failure condition must be repaired in a manner approved by the ESD that brings the OWTS into substantial conformance with Onsite Wastewater Ordinance and Manual to the greatest extent practicable. The repair work must be implemented as soon as is reasonably possible and in accordance with any time limits issued by the ESD.

The overall goal with all OWTS repairs is to obtain a practical, timely and effective long-term correction to the failure condition. In determining the level of corrective work required, the ESD will take into consideration a variety of factors, generally according to the following priorities:

- public health and safety
- soil characteristics and groundwater separation
- setbacks from wells and streams
- ground slope and setback from unstable landforms
- OWTS sizing standards
- other setback criteria, e.g., foundations, pipelines, trees

Interim measures such as installation of a holding tank and pumping/hauling of septage may be required for failed systems that require replacement and submittal of system design plans. Submittal requirements for OWTS repairs may vary case-by-case, and will depend on the nature

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of the failure condition, the property location and type of occupancy, and the type of corrective work needed.

Prohibitions

Corresponding to Statewide OWTS Policy Section 9.4, no variances or exceptions are permitted to prohibitions 1 through 9 listed in **Section 5** of this LAMP.

Prohibition 10 in **Section 5,** relating to OWTS in proximity to public water wells and/or water supply intakes, contains specific exception clauses applicable to OWTS repairs and new or replacement OWTS on existing legal lots of record.

Appeals

The Wastewater Ordinance sets forth a process for appeals of an OWTS decision of the ESD/Building Official to the City Council, which may include issues related to variances or exceptions to Ordinance requirements. The City Council may reject, affirm or modify the ESD/Building Official's decision.

Professional, Contractor and Maintenance Provider Qualifications

Malibu Municipal Code Chapter 5.38.040 establishes requirements for registration of professionals and other practitioners that cover work related to design, installation, inspection and maintenance of OWTS within the City. The registration categories include the following:

a. Wastewater Residuals Management (Pumpers).
b. Onsite Wastewater Treatment System Installer (Installer)
c. Onsite Wastewater Treatment System Designer (Designer)
d. Operation, Monitoring and Maintenance Specialist (OM&M)
e. Onsite Wastewater Treatment System Inspector (Inspector)

The standard duration of registration is for two years and requires successful completion of a City-approved written and/or field examination particular to the given registration category as well as the additional requirements for each practitioner discipline as summarized in **Table 4-3.**

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Table 4-3. Registration Requirements for OWTS Practitioners*

Registration Category	Authorized Activities	License or Registration	Experience	Annual OWTS Education Hours
Pumpers	Pump and haul septage	- Vehicle registered w/ Los Angeles and/or Ventura County Public Health; - DMV Registration	Not Specified	3
Installers	Install OWTS in accordance with approved plans and permit conditions per City	Licensed Contractor: - Class A, Gen. Engr. or - Specialty C-42	2 years experience installing OWTS	4
Designers	Site evaluations**, preliminary and final design report, drawings and supporting design analysis required for permitting and installation of OWTS	RCE, PG, REHS, CEG, or GE	- 2 yrs OWTS design experience or - Completion of an OWTS training course	8
OM&M Specialists	Perform inspections, maintenance, monitoring and reporting of OWTS in accordance with conditions of City-issued operating permit	Not Specified	2 years experience: - Performing OM&M in Malibu, or - Working w/OM&M Specialist or - Working as an OWTS Designer	8
Inspectors	Conduct performance evaluation of OWTS for building addition/remodel project, failure investigation, point of sale inspection, or as otherwise required by City	RCE, CEG, GE, REHS, or Contractor Class A, or C-42	Attend City course on guidelines for OWTS inspections	4

*Acronyms: RCE: Registered Civil Engineer; REHS: Registered Environmental Health Specialist; PG: Professional Geologist; CEG: Certified Engineering Geologist GE: Geotechnical Engineer

** Site Evaluations include:

- Percolation/Infiltration Test Report, including field studies, testing and evaluation of percolation/infiltration rates for the purposes of siting and design of an OWTS; by RCE, CEG or REHS.
- Supporting Geology/Soils Report, including: Conduct field studies and analysis of soils, geologic conditions, groundwater occurrence and movement, slope stability, cumulative impacts and other conditions pertinent to the siting, design, construction and operation of an OWTS; by PG or GE.

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Education and Outreach

From its inception in the early 1990s, the City of Malibu has been committed to ensuring appropriate and sustainable use of OWTS to address long-term sanitation and environmental protection needs in the City. Ongoing education and outreach to property owners, OWTS practitioners and the general public is a critical component and consists of a broad range of activities and materials as described below.

- **Direct Public Interaction.** The ESD maintains public counter hours, as well as availability by phone and email, for direct interaction with the property owners, consultants and others on individual projects and issues related to OWTS.

- **Website - Informational Material.** The City website, *www.malibucity.org,* includes up-to-date information on OWTS-related matters, such as: (a) regulatory issues; (b) permitting requirements, procedures, fees, forms, etc; (c) meetings and other announcements; and (d) OWTS user information, guidelines and references. In addition to OWTS policies and procedures, examples of educational and outreach on OWTS and related topics include:

    - **Septic Smart Week.** The City participates in the U.S. EPA's *Septic Smart Week* each September, involving outreach activities to encourage homeowners and communities to care for and maintain their septic systems.

    - **Graywater Reuse.** This includes regulations, City guidelines and homeowner information about the benefits and methods for implementing graywater reuse.

    - **Water Conservation and Landscaping.** This includes City regulations, guidelines and FAQs promoting water conservation and sustainable landscaping practices.

    - **Environmental Programs.** Various information and resources on water resources, recycling, energy and other environmental sustainability topics.

- **Onsite Wastewater Treatment Systems Manual.** The numerous OWTS policies, procedures and guidelines for Malibu have been consolidated into a single Onsite Systems Manual to facilitate the distribution of information and understanding of applicable requirements among OWTS practitioners, the professional community involved with development projects, homeowners and others.

- **Wastewater Advisory Committee.** Established by the City Council, the Wastewater Advisory Committee is a group of OWTS practitioners that meet several times a year to review and may make recommendations to the City Council on matters within the City's jurisdiction concerning wastewater management, treatment and disposal, and other matters as directed by the City Council.

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- **Clean Water Team.** The Clean Water Team is a partnership of the City of Malibu, local businesses and concerned residents that meet and work together to provide guidance, informational pamphlets, and input on a wide range of issues and activities within the community affecting the health of the ocean waters.

- **24-hour Hotline.** The City offers a 24-hour hotline dedicated to receiving information on spills and other pollution incidents observed within the City. The service is provided to protect public health and wildlife, and prevent pollution to storm drains, streams and ocean waters.

Septage Management

Septic Tank Pumping Contractors. Septic tank pumping in the City of Malibu is currently provided by approximately six registered septic tank pumpers. All pumpers operating within the City of Malibu must be registered with the City and County of Los Angeles, and comply with requirements detailed in Section 5.38.040(A) of the Malibu Municipal Code and California Health and Safety Code, which includes, among other things:

- Obtain "registered residuals management certificate" ("Pumper") from the City (requires renewal every two years) and maintain current legal address on file with the City;
- Provide documentation of adequate vehicle for pumping and transporting septage, including registration of vehicle with Los Angeles Public Health and/or Ventura County Public Health;
- Provide monthly reports to the County of every septic tank serviced and the specific disposal location for each load;
- Provide a list to the County of all proposed authorized disposal sites to be used;
- Successfully complete a written and/or field exam administered by the City demonstrating knowledge of regulations, health and safety and practices related to septage pumping and transport; and
- Provide evidence of three hours per year attendance at educational course(s) related to septage pumping, handling and disposal.

Estimated Septage Pumping Volumes. Based on an average pumping frequency of once every three (3) to five (5) years and a pump-out volume of 1,500 gallons per tank, the estimated annual volume of septage generated by the approximately 6,000 OWTS in the City of Malibu is in the range of 1.8 to 3.0 million gallons per year. This equates to an average pumping of about 4 to 6 tanks (6,000 to 9,000 gallons) per day, city-wide.

Septage Disposal Location. There are no septage disposal facilities in the City of Malibu. The primary disposal location for septage generated in Malibu is the Joint Water Pollution Control Plant in the City of Carson, with a treatment capacity of 400 million gallons per day.

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Onsite Maintenance Districts

Presently there are no onsite wastewater maintenance districts (e.g., per Health and Safety Code Sections 6950-6982) in the City of Malibu, and none are currently under consideration. However, many of the key functions of an onsite wastewater management district are already covered on a city-wide basis by requirements and activities under the City's Onsite Wastewater Ordinances and within the provisions of this LAMP, including: (a) operating permits, including inspection and reporting, for all OWTS; (b) requirements for point-of-sale OWTS inspections (c) establishment and maintenance of a comprehensive data management system for all OWTS in the City; (d) ongoing water quality assessment and reporting to the Regional Water Board (see **Section 6** of this LAMP).

In the future, should the need arise for additional focused OWTS management activities or community-type wastewater solutions in given geographical areas of the City, it is anticipated that feasibility studies would include (as a project alternative) consideration of the formation of an onsite wastewater maintenance district ("zone"), in accordance with the provisions of Health and Safety Code. This may be beneficial, for instance, to facilitate and manage cluster/community wastewater solutions for problematic areas, especially where a common/shared system for multiple properties may make water recycling a feasible alternative to augment or replace OWTS capacity. An example of this is the Malibu Civic Center Wastewater Treatment Facility will replace OWTS with a community system to collect, treat and recycle/dispose of wastewater within the most heavily developed and environmentally sensitive area of the City.

Regional Salt and Nutrient Management Plans

Groundwater resources within the City of Malibu are extremely limited, with the only defined basin being the Malibu Valley Groundwater Basin, a small alluvial basin (approximately 600 acres) generally coinciding with Civic Center area of Malibu. Although the basin does not support any active water supply uses per State Water Board's Recycled Water Policy (Resolution No. 2009-0011), a preliminary salt and nutrient management plan (SNMP) and supporting studies have been completed by the Los Angeles Regional Water Quality Control Board for the Malibu Valley Groundwater Basin; environmental review of the findings and recommended implementation measures was initiated in June 2015. Following environmental review the recommended management measures are proposed to be adopted as an amendment to the Water Quality Control Plan for the Los Angeles Region (Basin Plan). Among other things, the studies by the Regional Water Board found that the proposed Civic Center Wastewater Treatment Facility (CCWTF) Project, providing for elimination of OWTS discharges in the Civic Center area and replacement with a central wastewater treatment facility and water recycling for irrigation and injection, would have a net long-term positive impact on groundwater quality as compared with continued use of OWTS. The SNMP supports the CCWTF and the City's program to phase out the use of all OWTS in this part of Malibu.

No other salt or nutrient management planning efforts are anticipated in the foreseeable future elsewhere in the City. Nevertheless, as part of this LAMP, preliminary estimates have been made

of wastewater discharge volumes and nitrogen loading, and provide an initial baseline for assessment of salt and nitrogen loading contributions from the existing residential OWTS in the City (**Appendix B)**. In the future, estimates will be expanded to include contributions from commercial properties and can be updated/refined based on other information as it becomes available. The information is organized according to the watershed sub-basins in the City, and this information will be available for use in salt and nutrient management studies should any be undertaken in the future.

Watershed Management Coordination

The Environmental Sustainability Department and other City departments actively participate in watershed management programs in cooperation with various state, county and federal agencies, landowners, environmental organizations, and volunteer groups. This is essential and unavoidable, given the geographical position of the City at the base of nearly 20 coastal watersheds, most of which extend beyond City borders well into the Santa Monica Mountains and, in the case of Malibu Creek Watershed, into inland urban areas at the edge of the San Fernando Valley.

Two primary areas of coordination are (a) development of guidance and educational materials to address various non-point source runoff issues and water management and (b) data collection (e.g., water quality sampling). The activities and publications of the Clean Water Team (noted under Public Outreach above) are a good example of the coordinated efforts to educate landowners and property owners on practical land and water management practices. The City is a joint participant in stormwater runoff sampling efforts and over the years has either sponsored or supported numerous groundwater and water quality investigations in Malibu, especially in relation to wastewater discharges and potential impacts. The City is also a key partner in the Enhanced Watershed Management Plan (EWMP) for North Santa Monica Bay Coastal Watersheds, recently prepared in collaboration with the County of Los Angeles and Los Angeles County Flood Control District to address watershed-specific conditions, control measures in compliance with stormwater management requirements under the National Pollution Discharge Elimination Permit.

Going forward under this LAMP, the up-to-date and continuing inventory and assessment of OWTS usage, wastewater loading, and water quality monitoring results, organized by watershed, will be a useful and readily available data source to share and with EWMP and other watershed management efforts.

Evaluating Proximity to Public Sewers

There are four public wastewater facilities in Malibu, including the Malibu Civic Center Wastewater Treatment Facility (under development), plus three other systems operated by the Los Angeles County Department of Public Works. There is also a large private wastewater facility at Point Dume, serving multiple connections, which is including in this discussion. A brief description of each facility is provided below.

- **Malibu Civic Center Wastewater Treatment Facility.** This recently approved project includes development of a centralized wastewater treatment facility in the Malibu Civic Center area that would treat, reuse, and/or dispose of wastewater flows from properties in the Civic Center, to be implemented in three phases beginning with the core Civic Center commercial properties.

- **Malibu Mesa Wastewater Reclamation Plant.** This plant, located at 3863 Malibu Country Drive, treats domestic wastewater from 102 single family homes in the Malibu Country Estates (within the City of Malibu), 66 condominiums on Pepperdine campus, and Pepperdine University, which is located in the unincorporated county area.

- **Malibu Water Pollution Control Plant.** This plant, located at 3620 Vista Pacifica Street, treats domestic wastewater on behalf of four condominium complexes in the City of Malibu: 48-unit complex at Maison DeVille; 104-unit complex at Malibu Canyon Village; 17-unit complex at Vista Pacifica; and 22-unit complex in the City of Malibu.

- **Trancas Water Pollution Control Plant.** This plant, located at 6338 Paseo Canyon Drive, treats domestic wastewater on behalf of the Malibu West and Lechuza communities on western end of the City.

- **Point Dume Club Wastewater Treatment Plant.** This plant, located at 29500 Heathercliff Road, is a privately owned and operated wastewater facility that provides service to 297 mobile homes, four 1-bedroom apartments and 90 2-bedroom condominiums (Zuma Bay Villas) in the Point Dume Area.

All properties within the defined sewer service area of these facilities are currently connected or, in the case of the Civic Center project, will be connected to the public sewer during the phased implementation. Public sewer service is not currently available to any other properties in the City, including lands bordering the existing sewer service districts above. In the future, if public sewer service boundaries are expanded and connections become available to other properties, evaluation of public sewer connection options for new and replacement OWTS in affected areas would likely involve procedures similar to the following:

(1) Modify OWTS permit instructions to include advice on the code requirement for connection to public sanitary sewer where the property is within 200 feet of an available sewer.

(2) Modify permit application form to include an entry related to sewer line proximity.

(3) Modify ESD permit review to include sewer proximity as a checklist item for any geographical areas of the City near available public sewers.

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OWTS Notification to Public Water System Owner(s)

There are currently no public water wells or public surface water supply intakes in the City of Malibu. All public water service is provided by Waterworks District 29 (WWD 29), supplied by the Metropolitan Water District of Southern California (wholesaler) from various sources, including the Colorado River, State Water Project, and the Owens Valley Aqueduct. Prior to the advent of WWD 29, water was developed and supplied by the former Malibu Water Company from local water resources, which potentially may be developed and used again in the future. Should this occur, careful siting of new water wells and surface water intakes to maintain safe distances between public water facilities and OWTS. In compliance with the State OWTS Policy, the City of Malibu Onsite Wastewater Ordinance includes special horizontal setback requirements for OWTS located in the proximity of public water supply wells and public water system surface water intakes, which would apply in the event of any future development of public water supplies within the City. Should this transpire, it is anticipated that providing adequate notification to the owner(s) of such public water systems about OWTS installations near their facilities would be accomplished by procedures substantially in conformance with those listed below:

(1) ESD would document the location and respective owner(s) of any new public water supply well or public water supply surface intake at the time of its establishment and incorporate that information on appropriate GIS maps and OWTS database.

(2) Subsequently, at the time of permit application for any new or replacement OWTS, ESD staff will review the location of the proposed OWTS in relation to the known public water wells and surface water intakes using information available per (1) above.

(3) Where ESD staff determines the proposed OWTS dispersal system is closer than 150 feet to a public water well, or closer than 1,200 feet to a public water system surface water intake in a location tributary to the intake, notification of the proposed OWTS application will be sent to the water system owner(s). The notification will be accompanied by a copy of the permit application and supporting OWTS design information, including documented soils, topography, groundwater and percolation data.

(4) The owner(s) receiving notification of proposed OWTS installations per (3) above will be afforded a 15-day period in which to submit comments on the proposed OWTS application.

(5) Prior to issuing an OWTS installation permit for any system per (3) above, ESD will review and consider any comments and recommendations submitted by affected water system owner(s) per (4) above.

(6) Upon issuance and/or denial of an OWTS installation permit per (3) above, ESD will provide notification to the affected water system owner(s) of the action taken.

Procedures for Dispersal Field Located Within Public Well/Intake Setback

As noted above, there are currently no known public water wells or surface water intakes within the City of Malibu that would trigger the special horizontal setback provisions per the State OWTS Policy and Malibu Onsite Wastewater Ordinance. However, in the event that any water supply well or public water supply surface water intake is developed in the future, the following procedures would be followed by the ESD with respect to any OWTS dispersal field within the prescribed setback distances for such public water systems.

New OWTS

In cases where a new OWTS is proposed on a lot created prior to the effective date of the SWRCB OWTS Policy (May 13, 2013), and the dispersal field does not meet the specified OWTS horizontal setbacks per Malibu Onsite Wastewater Ordinance from public water wells or public water supply intakes, the OWTS may be permitted subject to complying with the following requirements to address possible water source impacts:

(1) The dispersal field shall be sited to comply with the setback requirements to the maximum extent practicable;
(2) The OWTS shall incorporate supplemental treatment, including pathogen removal;
(3) Pathogen removal is defined as achieving an effluent fecal coliform bacteria concentration less than or equal to 200 Most Probable Number (MPN) per 100 milliliters;
(4) Minimum vertical separation to groundwater shall be three (3) feet below the bottom of the dispersal field;
(5) The minimum dispersal field soil cover shall be 12 inches; and
(6) Other measures as specified by the ESD.

On a case by case basis, the ESD may establish alternative OWTS siting and operational requirements to those listed above where it is determined by the ESD that the alternate requirements will provide a similar level of protection against adverse impact to the public water source.

Repair/Replacement OWTS

For repair or replacement of an existing OWTS where the dispersal field does not meet the specified OWTS horizontal setbacks per Malibu Onsite Wastewater Ordinance from public water wells or public water supply intakes, the OWTS may be permitted subject to complying with the following requirements to address possible water source impacts:

(1) The dispersal field shall be sited to comply with the setback requirements to the maximum extent practicable;

(2) The OWTS shall incorporate supplemental treatment or other mitigation measures specified by the ESD, unless the ESD finds no evidence of an existing or potential threat

of impact to the public water source by the OWTS based on topography, soil depth and groundwater conditions.

Phase-Out of Cesspool Usage

The City of Malibu Onsite Wastewater Ordinance states the following regarding cesspools:

> *"Cesspools are declared to be a public nuisance and are not authorized for use in the City of Malibu. Upon discovery, cesspools shall be abated in accordance with the provisions of this chapter in a manner approved by the Building Official."*

Cesspools are not in common usage in Malibu. However, some cesspools may still exist and, when discovered, they will be abandoned as called for by City ordinance. There are several ways that discovery and abandonment of existing cesspools will come about: (a) voluntarily by the property owner; (b) in response to complaints; (c) observations and advice to homeowners by septic tank pumping contractors; (d) through OWTS inspections associated building remodels and additions; and (e) through mandatory OWTS inspections at the time of property transfers as required by the point of sale inspection and permitting procedures contained in the City Ordinance (Code Section 15.14.070).

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Section 5: Prohibitions

The following describe the provisions contained in the City of Malibu Ordinance and Onsite Systems Manual corresponding with the required prohibitions set forth in section 9.4 of the SWRCB OWTS Policy.

1. ***Cesspools.*** The use of cesspools for sewage disposal is not authorized under the City of Malibu Onsite Wastewater Ordinance.

2. ***OWTS over 10,000 gpd capacity.*** The City of Malibu Onsite Wastewater Ordinance applies to any OWTS where the maximum daily flow volume of waste produced is 10,000 gpd or less. If the amount of waste produced is more than 10,000 gpd or where a community system serving multiple discharges under separate ownership is proposed, the method of treatment and dispersal must be approved by the Los Angeles RWQCB either through the issuance of Waste Discharge Requirements (WDR) or waiver. However, in such instances the City will be responsible for review of construction plans and for issuance of installation, building and grading permits, as applicable. The City will also issue an operating permit for these OWTS, consistent with requirements contained in any WDR or waiver issued by the RWQCB.

3. ***OWTS with surface discharge.*** Surface discharge of wastewater from an OWTS is not authorized under the City of Malibu Onsite Wastewater Ordinance. The Ordinance defines an OWTS as "a system…used to collect, treat, and disperse/discharge wastewater into the receiving environment below ground surface." Any wastewater system utilizing other than subsurface methods for treatment and dispersal must be approved by the Los Angeles RWQCB either through the issuance of Waste Discharge Requirements (WDR) or waiver. However, in such instances the City will be responsible for review of construction plans and for issuance of installation, building and grading permits, as applicable. The City will also issue an operating permit for these OWTS, consistent with requirements contained in any WDR or waiver issued by the RWQCB.

4. ***OWTS on steep slopes without slope stability report.*** The City of Malibu Onsite Wastewater Ordinance requires that any OWTS dispersal field located on slopes greater 30% shall require a geotechnical assessment and report addressing slope stability, drainage and other pertinent geotechnical factors affecting the operation and and/or impacts from the construction and use of the proposed OWTS. Also any OWTS dispersal field located on slopes greater than 10% requires assessment of potential impacts from lateral migration of effluent.

5. ***Sizing reductions for IAPMO certified dispersal systems.*** Malibu Onsite Systems Manual allows for the use of chambers or alternative filter material in place of standard drain rock in dispersal trenches. However, no reduction in drainfield sizing of more than 30% is allowed for such methods/materials.

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6. ***Supplemental treatment systems without monitoring.*** The City of Malibu Onsite Wastewater Ordinance requires the issuance of an operating permit and associated monitoring provisions for all OWTS, including conventional OWTS and alternative OWTS that commonly include supplemental treatment units. Operating permits are issued for new, replacement and repair OWTS, as well as for any existing OWTS reviewed in the course of mandatory point of sale OWTS inspections required by City Ordinance Chapter 15.14.

7. ***OWTS for RV Dump Stations.*** The City of Malibu Onsite Wastewater Ordinance pertains to the treatment and dispersal of domestic wastewater which, by definition in Ordinance, does not include wastewater from industrial processes or recreational vehicle (RV) dump stations. Domestic wastewater may include incidental RV holding tank discharges, e.g., at the owner's residence/storage location. Any proposals for RV Dump Stations will be referred to the Los Angeles RWQCB for permitting. This limitation does not apply to full hook-up sewer connections similar to those used at a recreational vehicle park.

8. ***Groundwater separation less than two (2) feet, or less than 10 feet for seepage pits.*** City of Malibu Onsite Wastewater Ordinance sets forth minimum siting requirements for OWTS dispersal systems, which specifies a minimum vertical separation distance to groundwater of: (a) two (2) feet for dispersal fields, provided supplemental treatment is included in the OWTS design; and (b) 10 feet for seepage pits.

9. ***Where public sewer connection is available.*** City of Malibu Onsite Wastewater Ordinance requires connection to an available public sewer, subject to approval by the sewer authority, for: (a) newly proposed structures requiring sewage disposal that are within 200 feet of an available public sewer; and (b) developed property where structures served by an existing OWTS are within 200 feet of an available public sewer, at the time of OWTS failure or when replacement or addition to the OWTS is required.

10. ***Proximity to public water system wells and surface water intakes.*** As noted previously, there are currently no known public water wells or surface water intakes within the City of Malibu. However, in compliance with the State OWTS Policy, the City of Malibu Onsite Wastewater Ordinance sets forth minimum horizontal setback requirements for OWTS that include the following restrictions between the location of OWTS dispersal systems and public water supply wells and public water system surface water intakes that may be developed in the future.

    (a) Public water well:
    - 150 feet setback for any dispersal system no greater than 10-feet deep
    - 200 feet for any dispersal system greater that 10-feet deep
    - Completion of 2-yr microbial transport study for any OWTS >20-ft deep and within 600 feet

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(b) Public water system surface water intake:

- 400 feet setback from edge of watercourse/water body where OWTS dispersal field is <1,200 feet from water supply intake
- 200 feet setback from edge of watercourse/water body where OWTS dispersal field is between 1,200 feet and 2,500 feet from the water supply intake

(c) Exceptions for replacement OWTS. For replacement OWTS unable to meet the horizontal setback requirements of (a) or (b) above, the replacement dispersal field shall meet the setback requirements to the greatest extent practicable. Additionally, the City will require the replacement OWTS to incorporate supplemental treatment and other measures, as appropriate, unless the City finds no evidence of an existing or potential threat of impact to the public water source by the OWTS based on topography, soil depth and groundwater conditions.

(d) Exceptions for new OWTS. For new OWTS on parcels created prior to May 13, 2013, that are unable to meet the horizontal setback requirements of (a) or (b) above, the new dispersal field shall meet the setback requirements to the greatest extent practicable. Additionally, the City will require the new OWTS to incorporate supplemental treatment, including pathogen removal, plus other requirements noted below. In accordance with SWRCB OWTS Policy, pathogen removal in this case is defined as achieving an effluent fecal coliform bacteria concentration less than or equal to 200 Most Probable Number (MPN) per 100 milliliters. Other requirements include:

(1) providing a minimum vertical separation to groundwater of three (3) feet below the bottom of the dispersal field;
(2) providing a minimum dispersal field soil cover of 12 inches; and
(3) other measures as specified by the City.

On a case-by-case basis, the City may establish alternative OWTS siting and operational requirements to those listed above where it is determined by City that the alternate requirements will provide a similar level of protection against adverse impact to the public water source.

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Section 6:
Program Administration

Staff Qualifications

City staff involved with review of OWTS projects includes California Registered Environmental Health Specialists (REHS), non-REHS professional staff and clerical support staff. In addition, contract professionals consisting of California Registered Geologists and/or California Civil Engineers are utilized for complex projects, excavation/grading concerns and geology issues.

Site suitability reviews, OWTS design approvals, and construction/repair approvals are conducted by California Registered Geologist, Civil Engineer, REHS or equivalent. Non-REHS personnel may conduct field site investigations and conduct construction/repair inspections under indirect supervision of an REHS or the Building Official.

The City of Malibu Environmental Sustainability Department (ESD) is currently comprised of the following staff:

- ESD Director
- Building Official
- ESD Manager
- Environmental Health Administrator
- Environmental Health Analyst
- Environmental Health Office Assistant
- Contract Professionals – Geologists, Engineers

OWTS Permitting Records

Integrated Wastewater Information Management System (IWIMS)

Beginning in about 2001 the City of Malibu began converting from paper files to an online electronic data management system, IWIMS, to track and manage onsite wastewater treatment systems in the City. All OWTS (existing and new) are now captured in IWIMS. IWIMS was utilized in the compilation of baseline information presented in this LAMP and will facilitate the ongoing record keeping and reporting required by the State OWTS Policy. The system was developed under contact with Stone Environmental, Inc[1]., and provides a range of tools for comprehensive management of OWTS information and activities, including the following:

[1] http://www.stone-env.com/docs/brochureflyer/Stone-IWIMS.pdf

- Operating permits issued for existing, replacement and new OWTS
- Permit record storage
- Report generation
- Conjunction with other City database systems (e.g., building, planning, zoning)
- Data import tool (e.g., monitoring data)
- Program data query and export tool
- GIS functionality

Databases

The ESD also maintains individual projects and other program activities in hard copy files and electronic files. In addition, scanned documents are uploaded into the OnBase system.

In compliance with the State OWTS Policy Tier 2 requirements, the ESD will retain permanent records of OWTS permitting actions and will make those records available within 10 working days upon written request for review by the LARWQCB. At a minimum this includes:

- Installation permits issued for new, repair and replacement OWTS
- OWTS variances and/or exemptions issued, including number, location and description
- Engineering, geological, infiltration and percolation reports
- OWTS design and plot plans

Water Quality Assessment Program

Objectives

The ESD will maintain an OWTS water quality assessment program having three primary objectives: (1) to determine the general operational status of OWTS in the City; (2) assess possible impacts of OWTS on groundwater and surface water quality, and their associated beneficial uses; and (3) identify areas for changes to existing OWTS management practices.

Watershed Approach

The OWTS-water quality assessment will be organized according to the various watershed areas delineated and presented in this LAMP. This will allow the existing GIS-based mapping, OWTS inventories, and wastewater loading analyses to be utilized and updated. Other localized focus areas within each watershed sub-basin may be delineated in the future if warranted.

Operational Status of OWTS

The operational status of OWTS will be assessed through compilation and review of the following types of information:

(1) Point of sale inspection reports;
(2) Complaints and abatement activities for failing OWTS;
(3) Exemptions issued for new and/or repair OWTS;
(4) Performance inspections of existing OWTS in connection with building additions/remodel projects, or property transactions;
(5) Monitoring information submitted in connection with terms of an OWTS operating permit.

The data review and assessment will focus on both positive and negative findings, apparent trends, and areas for changes in practices. The assessment will maintain and update the existing IWIMS data base of OWTS in the City.

Water Quality Assessment

The water quality assessment will include the following:

(1) **Water Quality Parameters of Concern.** The initial focus of the water quality assessment program will be on two key water quality parameters – pathogens and nitrate-nitrogen. Other parameters of concern may be added if warranted.

(2) **Wastewater Discharge Volumes.** Estimates of annual wastewater discharge estimates from OWTS will be updated based upon the running inventory of OWTS per above.

(3) **Nitrogen Loading.** Nitrogen loading estimates (by watershed and/or groundwater area) will be maintained and updated based on the running inventory of OWTS in the City.

(4) **Water Quality Monitoring Data Sources**. Relevant water quality monitoring data for (pathogens and nitrate-nitrogen) will be compiled from a variety of available sources. Primary sources of data are expected to be:

- **OWTS Operating Permits**. This includes effluent monitoring data and, in some cases, receiving water sampling (groundwater and/or surface water) that may be required under the terms of operating permits issued by the City for individual OWTS. Water quality monitoring is not required for all OWTS; however, the ESD has the prerogative to include monitoring requirements appropriate to the size, type and location of the OWTS.

- **WDR Monitoring Reports.** Based on review of the Geotracker Database, there are 42 wastewater systems in Malibu currently covered under Waste Discharge Requirements (WDRs) issued by the LARWQCB. Of this total 27 are currently required to monitoring groundwater quality, typically including one upgradient monitoring well and two or more downgradient wells. The WDR sites of interest are listed in **Table 6-1** and their locations shown in **Figure 6-1**.

Table 6-1: Waste Discharge Requirements that Include Groundwater Monitoring

WDR No.	WDRs with GW Monitoring Requirement	Watershed Name	Watershed No.
100000360	Vista Pacifica at Broad Beach	Trancas Canyon	5
100000354	Trancas Country Market	Trancas Canyon	5
100001768	Zuma Beach Restroom Station #9	Trancas Canyon	5
100018599	Trancas WPCP	Trancas Canyon	5
100001767	Zuma Beach Restroom Station #8	Trancas Canyon	5
100001766	Zuma Beach Restroom Station #7	Trancas Canyon	5
100001763	Zuma Beach Restroom Station #6, Fd Std 2, St yrd	Trancas Canyon	5
100001761	Zuma Beach Lifeguard HQ	Trancas Canyon	5
100000846	Malibu HS, Malibu MS and Juan Cabrillio ES	Trancas Canyon	5
100001206	ZB Restroom Station #1	Zuma Canyon	6
100001762	Zuma Beach Restroom Station #3 & 4, Food stand 1	Zuma Canyon	6
100025258	Villa Malibu Advanced OWTS	Ramirez Canyon	7
100001570	Fire Station #71	Ramirez Canyon	7
100000951	Portico at Malibu	Ramirez Canyon	7
100000710	Paradise Cove Beach Cafe	Ramirez Canyon	7
100000711	Paradise Cove Mobile Home Park	Ramirez Canyon	7
100001615	Geoffreys of Malibu	Escondido Canyon	8
100000858	Malibu Beach RV Park	Corral Canyon	11
100000482	McDonald's	Carbon Canyon	13
100000356	Malibu Cantina LLC	Carbon Canyon	13
100000034	Wavebreak LLC	Carbon Canyon	13
100000333	PC Green	Carbon Canyon	13
100000458	Malibu Outrigger Condos	Carbon Canyon	13
100001557	Malibu Sands	Carbon Canyon	13
100001295	Duke’s Malibu	Las Flores Canyon	14
100000512	Moonshadows Restaurant	Piedra Gorda Canyon	15

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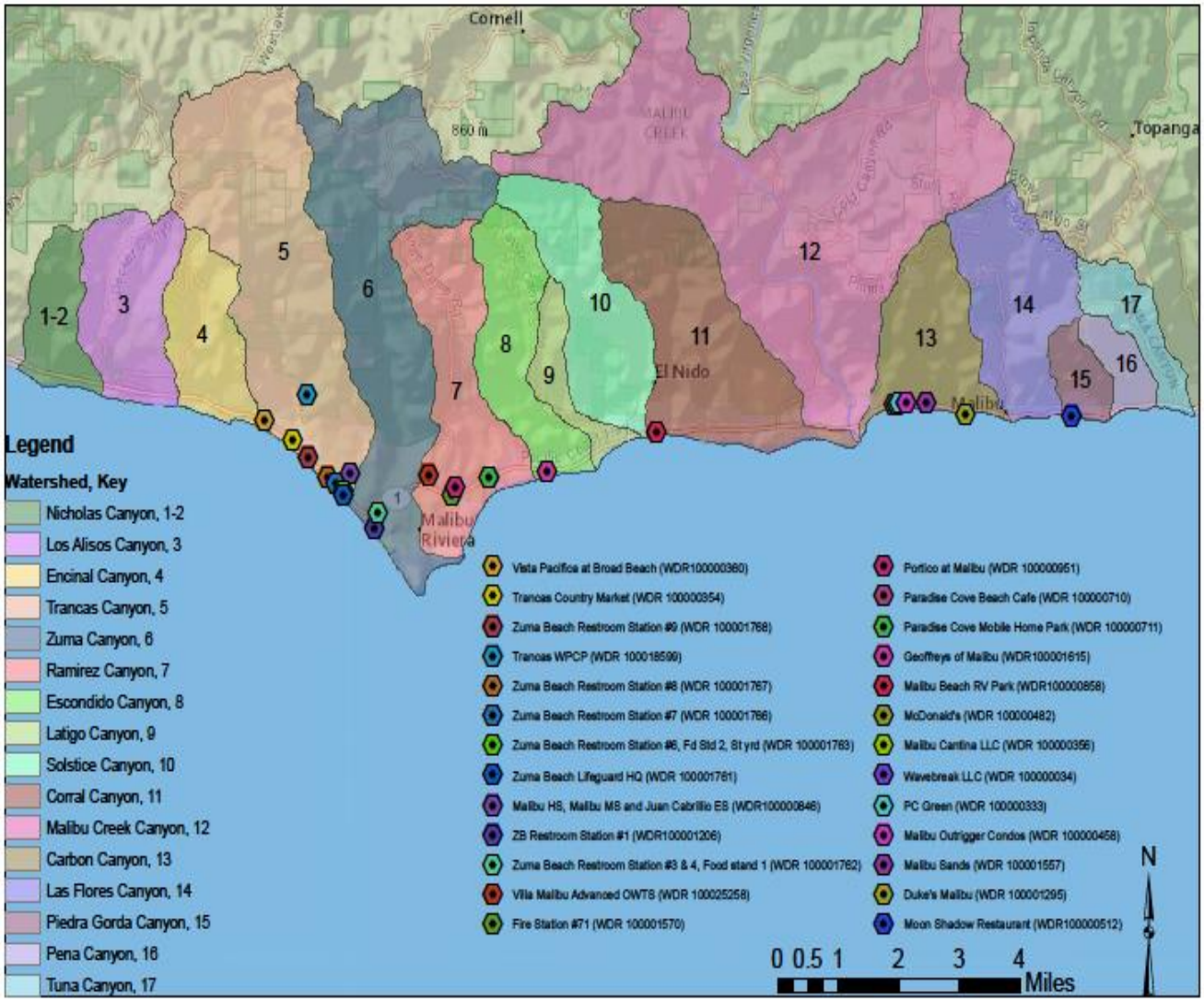
Figure 6-1 WDR Locations with GW Monitoring



- **Beach Water Quality Monitoring**. Los Angeles County Environmental Health Recreational Waters Program routinely collects ocean water samples every Monday at 40 sampling sites extending from the Ventura/Los Angeles County border to south of the Redondo Beach pier. Samples are collected in the surf zone and analyzed by the Department of Public Health laboratory for total coliform, E. coli and enterococcus bacteria. Sampling locations within the City of Malibu are listed in **Table 6-2** and shown in **Figure 6-2**.

Table 6-2: Beach Water Quality Monitoring Locations

Agency Site No.	Beach Monitoring Location	Watershed Name	No.
DPH 009A	Nicholas Canyon County Beach at Nicholas Creek, Malibu	Nicholas Canyon	2
DPH 009B	Nicholas Canyon County Beach 100 ft. west of Nicholas Creek, Malibu	Nicholas Canyon	2
SMB 1-02	El Pescador State Beach open beach, Malibu	Los Alisos Canyon	3
SMB 1-03	El Matador State Beach open beach, Malibu	Encinal Canyon	4
DPH 008A	Zuma Beach at Trancas Creek at Trancas Creek, Malibu	Trancas Creek	5
DPH 008B	Zuma Beach at Trancas Creek 50 yds. east of Trancas Creek, Malibu	Trancas Creek	5
DPH 007A	Zuma Beach at Westward Beach Road at Zuma Creek, Malibu	Zuma Creek	6
DPH 007B	Zuma Beach at Westward Beach Road 50 yds. east of Zuma creek, Malibu	Zuma Creek	6
SMB 1-06	Paradise Cove In front of Walnut Creek, Malibu	Ramierez Canyon	7
DPH 006	Paradise Cove at Ramirez Creek, Malibu	Ramierez Canyon	7
SMB 1-08	Escondido State Beach In front of Escondido Creek, Malibu	Escondido Canyon	8
DPH 005A	Latigo Beach (26610 Latigo Shore Drive) at dewatering well, Malibu	Latigo Canyon	9
DPH 005B	Latigo Beach (26610 Latigo Shore Drive) at treatment plant, Malibu	Latigo Canyon	9
SMB 1-10	Dan Blocker County Beach in front of Solstice Creek, Malibu	Solstice Canyon	10
DPH 004A	Corral Beach (formerly Puerco Beach) at creek, Malibu	Corral Canyon	11
DPH 004B	Corral Beach (formerly Puerco Beach) at lifeguard tower, Malibu	Corral Canyon	11
SMB 1-12	Puerco Beach In front of Marie Canyon storm drain, Malibu	Corral Canyon	11
DPH 003	Malibu Point at west end of Surfrider beach at lifeguard tower #3, Malibu	Malibu Creek	12
HYP S1	Surfrider Beach last known breech, Malibu	Malibu Creek	12
DPH 002	Malibu Pier at Surfrider Beach 50 yards east of Malibu Pier, Malibu	Carbon Canyon	13
SMB 1-13	Carbon Canyon Beach in front of Sweetwater Canyon storm drain, Pacific Palisades	Carbon Canyon	13
SMB 1-14	Las Flores State Beach In front of Las Flores creek, Malibu	Las Flores Canyon	14
DPH 001	Big Rock Beach at Piedra Gorda Canyon In front of stormdrain, 17200 PCH, Malibu	Piedra Gorda Canyon	15
SMB 1-16	Las Tunas County Beach In front of Pena Creek, Malibu	Pena Canyon	16
SMB 1-17	Las Tunas County Beach Santa Monica Canyon storm drain., Malibu	Las Tunas Canyon	17

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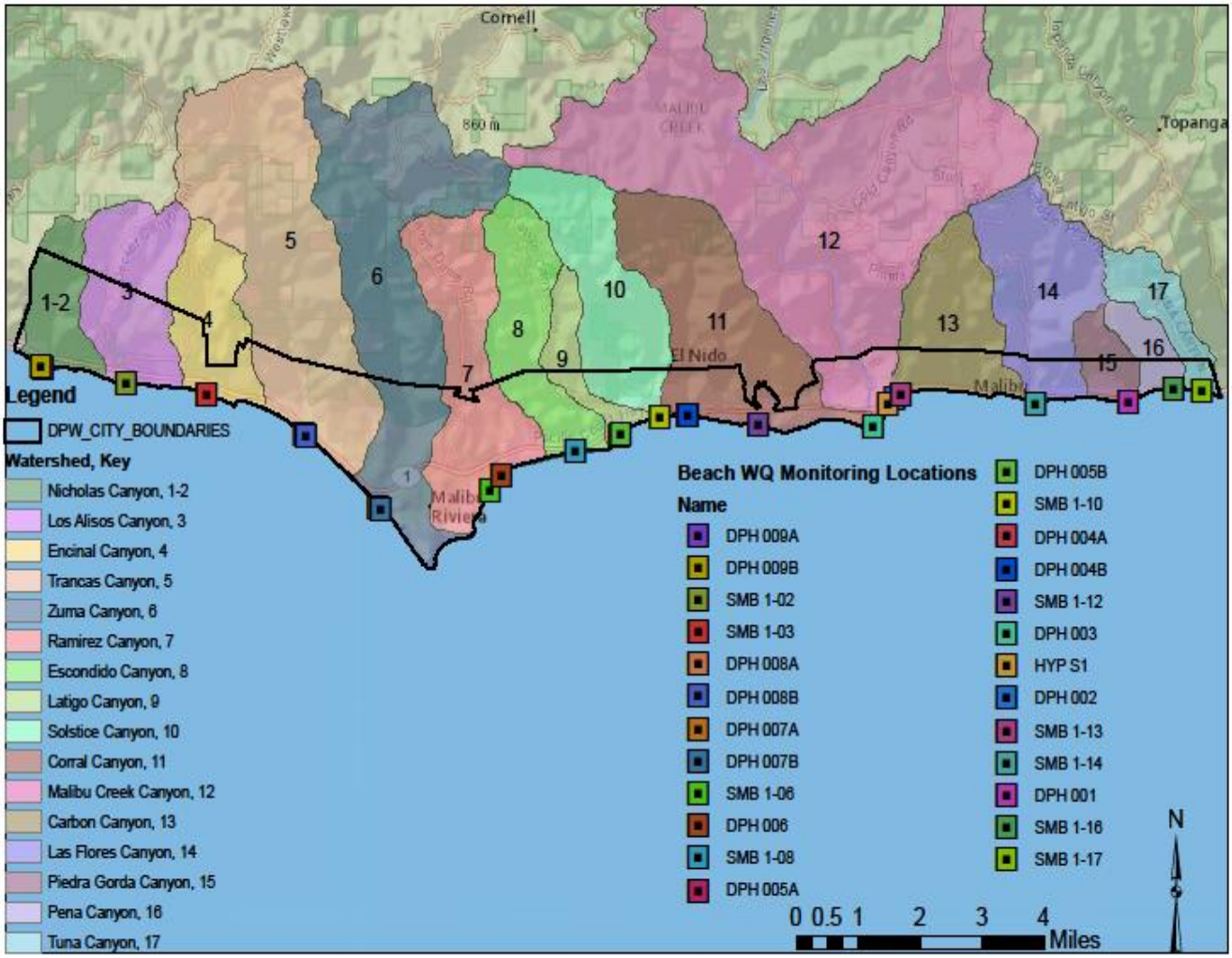
Figure 6-2 Beach WQ Monitoring Locations



Appendix A

Supporting Rationale
for
City of Malibu OWTS Siting and Design Criteria

Following is a discussion of the supporting rationale (including literature references) for the various siting and design requirements for OWTS contained in City of Malibu's LAMP for those items that differ from the Tier 1 requirements of the SWRCB OWTS Policy. The topic areas addressed include: (1) groundwater separation requirements; (2) OWTS design and sizing; (3) use of seepage pits; (4) horizontal setback distances; and (5) allowable OWTS densities (lot size) for new subdivisions. Additionally, highlighted at the end are the various requirements and management practices contained in City of Malibu's LAMP that constitute a higher level of water quality and environmental protection relative to OWTS than provided in the Tier 1 requirements.

1. Pathogen Removal and Groundwater Separation Requirements

Bacteria, viruses, and other pathogens are present in great numbers in sewage and represent an ongoing threat to public health. Preventing the transmission of disease is the foremost concern associated with the treatment and dispersal of sewage and is the basis for many of the established standards that dictate how, where and when wastewater treatment and dispersal can occur. Ground waters and surface waters are afforded protection from OWTS contamination through the establishment of specific criteria pertaining to the soil properties, vertical separation (i.e., the distance from the bottom of the dispersal trench to the seasonal high groundwater below), and horizontal (surface water) setback requirements. The level of wastewater treatment (prior to dispersal) and the design of the dispersal system can also play a role in pathogen removal. The soil is critical, but the factors are complex, and there is no simple rule for proper design and operation. Attenuation and removal of pathogens in the soil is accomplished through such mechanisms as microbial predation, filtration, adsorption, and die-off.[1] Related factors include the depth, texture, and structure of the soil, hydraulic loading rate, and other physicochemical properties such as moisture, temperature, oxygen and pH.

[1] "microbial predation" refers to consumption by other soil microbes; "filtration" refers to physical trapping between soil particles; "adsorption" refers to attachment to the surfaces of soil particles; "die-off" refers to degradation or inactivation due to the inability of the pathogen to sustain itself in the soil environment.

It is well known that soils have a tremendous capacity to remove bacteria from percolating wastewater. The retention and die-off of most, if not all, pathogenic bacteria occur within 2 to 3 feet of the soil infiltrative surface in a properly functioning OWTS (Anderson et al, 1994; Washington Dept. of Health, 1990). Viruses can also be retained and eliminated within a few feet, depending on the soil conditions; but it is generally accepted that they can persist longer and travel farther in the soil than bacteria (Anderson, et al, 1991; Ayres and Associates, 1993). Unlike bacteria, viruses are not always present in individual residential OWTS discharges, since it depends on the health status of the residents. Viruses are more likely to be consistently present at some level in commercial and community wastewater systems, which accept wastes from a broader segment of the population. Once reaching the water table, bacteria and viruses have been found to survive and travel significant distances with the groundwater (potentially hundreds of feet), depending on the rate of groundwater movement. Survival time in soil and groundwater is typically on the order of days to weeks for bacteria, and weeks to months for viruses.

Consistent with current knowledge and practices for preventing pathogen impacts from OWTS, the City of Malibu's LAMP includes a combination of siting and design requirements including: soil depth and percolation characteristics, minimum vertical separation to groundwater, minimum horizontal setbacks to various water/landscape features, dispersal field design/sizing criteria based on percolation rates, and, for some situations, options or requirements for use of supplemental treatment and alternative dispersal designs. Horizontal setbacks are the same for all OWTS (conventional and alternative) and are consistent with long-standing criteria contained in the guidelines of the Los Angeles Regional Water Board and other jurisdictions in California. The setback requirements also include more restrictive requirements for public water wells and public water system surface water intakes per the State OWTS Policy.

The key issue related to potential pathogen impacts from OWTS is the vertical separation below the dispersal trench to the seasonally high groundwater level (i.e., water table). **Table A-1** lists the depth to groundwater requirements for conventional OWTS in Malibu, along with the corresponding groundwater separation requirements contained the Tier 1 requirements in the State OWTS Policy. As indicated, the adopted approach in Malibu utilizes a standard depth to groundwater distance of 5 feet for soils with percolation rates in the range of 5 to 60 mpi; below and above 60 mpi conventional OWTS are not permitted. As such, Malibu requirements for conventional OWTS are more restrictive than Tier 1 for rapid percolation rates (<5 mpi) and slow percolation rates (>60 mpi), since conventional OWTS are not permitted in these soil conditions, but instead require use of an alternative/enhanced OWTS design. In the middle percolation range Malibu standards are less conservative than the Tier 1 criteria (5 ft. vs 8 ft.) for 5 to 30 mpi, and match the Tier 1 standard of 5-ft separation for 30 to 60 mpi. On balance,

Malibu groundwater separation requirements are substantially equal to Tier 1, and could potentially be viewed as somewhat more conservative.

Table A-1.
Comparison of Depth to Groundwater Requirements for Conventional OWTS
(feet, below trench bottom)

Percolation Rate (min per inch)	City of Malibu	SWRCB OWTS Policy Tier 1 Requirements
1-4	Not permitted	20
5-30	5	8
31-60	5	5
61-120	Not permitted	5

Under current practices and this LAMP, City requirements allow reduced groundwater separation distances for different types of alternative treatment and dispersal systems as shown in **Table A-2**, which also includes the requirements for conventional OWTS for comparison.

Table A-2.
Depth to Groundwater Requirements for Conventional and Alternative OWTS
(feet, below trench bottom)

Type of OWTS	Percolation Rate (MPI)	Min. Depth to Groundwater (feet)[1]			
		2	3	5	10
Conventional Septic Tank & Dispersal Trench	5-60			X	
Conventional Trench w/Supplemental Treatment Pressure Distribution (PD) Trench	1-120		X		
Pressure Distribution w/Supplemental Treatment Mound Drip Dispersal w/Advanced Treatment	1-120	X			
Seepage Pit	-[2]				X

[1] Measured from the bottom of the dispersal system
[2] Per Malibu seepage pit percolation testing policy

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 *On-site Wastewater Treatment Systems Manual* (US EPA, 2002). These studies have documented how various advanced treatment and dispersal methods can improve the operation and treatment effectiveness of OWTS as

compared with conventional septic tank-gravity dispersal trench designs. A major focus of the research efforts has been on finding methods to augment or improve the natural pollutant removal processes in the soil (especially related to pathogens) to help overcome limited soil depth and high groundwater conditions, which are a common constraint virtually everywhere OWTS are used. The following is a review of some of the key findings and principles that have emerged from the research and have supported changes in OWTS siting and design criteria.

a. **Pressure Distribution.** There is strong evidence and agreement in the professional literature that pressure distribution improves the performance of any soil absorption system as compared with standard gravity distribution, and should be the distribution method of choice (US EPA, 2002). This is due to two main factors: (1) pressure distribution disperses the wastewater flow uniformly over the entire available soil infiltrative surface, which allows the maximum absorption potential to be realized for any given soil condition; and (2) creation of wetting and draining cycles (via effluent dosing) promotes the maintenance of aerobic soil conditions at the infiltrative surface, which improves biodegradation and reduces the potential for soil clogging caused by the buildup of organic matter. The professional literature also notes that uniform spreading of the effluent discharge to the soil with the use of pressure distribution (or drip dispersal), ideally with timed-dosing, is critical to assure effective pathogen reduction in situations where the vertical separation is reduced.

b. **Supplemental Treatment.** Pathogen removal efficiencies can vary greatly amongst the different types of supplemental treatment systems that would be permitted and used under this LAMP. The greatest removal efficiencies are generally attributed to intermittent sand filters. Crites and Tchobanoglous (1998) present data showing fecal coliform removal efficiencies of 97.9 percent to 99.9 percent for intermittent sand filters. Leverenz, et al (2002) estimate intermittent sand filters as having the ability to produce effluent with fecal coliform concentrations <800 MPN/100 ml. For comparison, the fecal coliform concentration in effluent from a standard septic tank is similar to that in raw sewage, and typically ranges from about 10,000 to 100,000 MPN/100 ml. (Crites and Tchbanoglous, 1998). Additionally, however, an important purpose of the supplemental treatment unit in combination with the dispersal system design is to establish and maintain aerobic/unsaturated conditions in the soil absorption field. Maintenance of aerobic soil conditions is conducive to pathogen removal and an improvement over the operational conditions of conventional gravity dispersal fields, which are designed to allow a saturated (anaerobic) soil-infiltrative surface. Research has demonstrated that aerobic effluent: (a) promotes the growth of aerobic soil microflora that can have antagonistic effects on viruses; and (b) reduces the amount of

organic compounds that compete for adsorption sites with viruses and bacteria (Potts, 2003).

c. **Pathogen Removal in Soils.** The retention and die-off of most, if not all, pathogenic bacteria occur within 2 to 3 feet of the soil infiltrative surface in a properly functioning OWTS (Anderson et al, 1994; Washington State DOH, 1990). Viruses can also be retained and eliminated within a few feet, depending on the soil conditions; but it is generally accepted that they can persist longer and travel farther in the soil than bacteria (Anderson et al, 1991; Ayres Associates, 1993). Studies have shown that vertical separation distances to groundwater of 12 to 18 inches are sufficient to achieve good fecal coliform removal where the wastewater receives supplemental treatment prior to soil application along with pressure distribution or drip dispersal methods (Converse and Tyler, 1998; Duncan et al, 1994). Additionally, most of the research studies of OWTS pathogen removal have focused on sandy soil types; and the results of these studies have formed the basis for the soil depth criteria, such as those contained in the EPA Design Manual (2 to 4 feet unsaturated soil depth). Consequently, the soil depth criteria are already oriented toward the "worst case" conditions (sandy, permeable soils), and there is a built-in safety factor, with respect to pathogen removal, for finer textured soils with higher silt and clay fractions.

As previously noted, while there is no simple rule or absolute formula for OWTS-groundwater separation, the City of Malibu depth to groundwater criteria related to type of OWTS and percolation rates are similar to standards adopted and followed in many other counties in California over the past 10 to 20+ years (for example, Butte, Nevada, Placer, Solano, Marin, Sonoma, Napa, Contra Costa, Mendocino, among others).

Additionally, an important aspect of siting and design of OWTS under these criteria is the process for determining seasonally high groundwater levels in the dispersal field area. The requirements in Malibu specify field observation methods for groundwater determination consistent with best industry practices. These requirements have been in effect for a number of years and will continue under the City's LAMP.

Finally, the LAMP includes an operating permit program for all OWTS that will ensure ongoing inspection and monitoring of OWTS for verification of proper performance.

Based on the above considerations, the criteria relative to the depth to groundwater requirements and use of alternative treatment and dispersal methods are consistent with the current state of knowledge and best management practices and would provide suitable protection against pathogen impacts from onsite wastewater treatment systems.

2. *Dispersal Trench Sizing*

Dispersal trench sizing (i.e., length) is commonly based on three factors: (a) design wastewater flow; (b) trench infiltrative surface dimensions (width and depth); and (c) wastewater application rates (gpd/ft^2) related to percolation rate or soil type. City of Malibu requirements differ in some respects from the SWRCB Tier 1 criteria, but overall provide a more conservative (safe) design approach, as follows:

a. Malibu specifies the use of peak daily wastewater flow for dispersal system sizing; Tier 1 specifies the use of average daily wastewater flow (8.1.3). As a rule of thumb, average daily flow is typically about 50% of peak wastewater flow, resulting in 100% greater sizing/safety factor in the Malibu design approach.

b. The standard allowance for infiltrative surface in Malibu requirements is trench bottom areas, up to 3 ft^2 per lineal foot of trench, which is more conservative than the 4 ft^2 per lineal foot specified in the Tier 1 requirements (8.1.6). Malibu also has allowance for up to 7 ft^2 per lineal foot of trench, which is higher than the Tier 1 requirement; however Malibu also limits the use of conventional trenches to sites having percolation of 60 mpi or less, compared with allowance for percolation rates up to 120 mpi in Tier 1.

c. **Table A-3** below shows a comparison of the wastewater application rate criteria based on percolation rate for a range of values, including Malibu requirements, Tier 1 criteria, and the US EPA Design Manual (2002). As can be seen, there are similarities and differences among all of the criteria. Malibu requirements are patterned after the CPC, which have been followed in Malibu and several other California counties for many years. Malibu requirements are more conservative in the fast range (<5 mpi), where conventional OWTS are not permitted in Malibu; they are somewhat higher in the 5-10 mpi range, similar in the middle range (10-30 mpi), somewhat higher for 30-60 mpi, and more conservative in the slower range (>60 mpi), where conventional OWTS dispersal fields are not permitted in Malibu.

Table A-3
Wastewater Application Rates for
Conventional OWTS Dispersal Field Sizing (gpd/ft^2)

Percolation Rate (mpi)	Malibu LAMP		SWRCB OWTS Policy Tier 1	USEPA Design Manual
	Soil Type	Application Rate*		
1-5	Coarse/Fine Sand	Not Permitted	1.20	1.20
10	Sandy Loam	1.25	0.80	0.80
30	Sandy Clay	0.55	0.533	0.56

60	Clay w/Gravels	0.40	0.2	0.35
60-90	Clay	Not permitted	0.1	0.20
91-120	Clay	Not permitted	0.1	0.20

*Based on 3 ft^2/lf, 3-bedroom system

3. Seepage Pits

Tier 1 of the State OWTS Policy permits seepage pits only for repairs. Tier 2 of the Policy provides only that where seepage pits are used, they shall maintain a minimum separation to groundwater of at least 10 feet, and various other setback requirements from public water wells related to the depth of the seepage pit. Malibu and, before incorporation, Los Angeles County, historically allowed for the use of seepage pits in accordance with the CPC, including the additional requirements that they only be used where disposal fields are not feasible. The Malibu LAMP retains these same existing provisions and requirements for the use of seepage pits and, additionally, requires the inclusion of supplemental treatment for OWTS discharges to seepage pits for new and expanded development.

Malibu has not conducted a local investigation of seepage pit performance and water quality impacts. However, the following two studies with some relevance have been reviewed.

(1) "Potential for Ground-Water Contamination from Movement of Wastewater through the Unsaturated Zone, Upper Mojave River Basin, California." This was a study of the long-term effect of wastewater discharge impacts from seepage pits on groundwater quality in the Mojave River Basin, conducted jointly by the U.S. Geological Survey and the Lahontan Regional Water Board and reported in Water-Resources Investigations Report 93-4137 (U.S.G.S.,1995). The study confirmed a high rate of bacteria removal within a few feet of travel in the unsaturated zone below 30-ft deep seepage pits. The study was aimed at evaluating effects on groundwater quality, but was unable to document any significant change in groundwater quality at an average depth of 150 feet below land surface from the seepage pits after many years of operation. The seepage pits in the area of study are estimated to account for 18% of the annual basin recharge. Rates of wastewater travel in the unsaturated zone ranged from 0.07 to 1.0 feet per day, affording several months to several years of travel time for wastewater constituents to undergo treatment in the unsaturated zone.

(2) "Comparative Treatment Effectiveness of Conventional Trench and Seepage Pit Systems." This was a field study of four conventional trench systems and four seepage pits in Arizona, conducted and reported in 2007 by the University of Arizona. It involved collection and analysis of soil samples from locations to the side and below operating systems. Analyses were completed for various chemical and biological constituents,

including E. coli, total coliform, nitrogen parameters, total organic carbon and others. The results showed most parameters approached background levels within shorter distances (laterally and vertically) for the trench systems as compared with the seepage pits. Bacteriological analyses showed inactivation or attenuation of E. coli within approximately 30 cm of the infiltrative surface for all of the trenches and seepage pits studied.

4. Horizontal Setbacks

Malibu's OWTS Ordinance includes horizontal setback distances that equal or exceed the SWRCB Tier 1 requirements in all respects except for Tier 1 paragraph 7.5.5 which specifies a 200-ft setback from "… vernal pools, wetlands, lakes, ponds, or other surface waters…". Paragraph 7.5.5 includes reference to "tidal waters", which would imply the Pacific Ocean fits in the category of "other surface waters". Malibu treats all of these water bodies the same as "watercourses", with a 100-ft horizontal setback requirement, which is consistent with historical RWQCB guidelines and requirements found in all other jurisdictions reviewed.

The City's 100-ft setback distance is meant to protect beneficial uses of both watercourses and water bodies, which primarily include contact and non-contact recreation and aquatic resources. Consistent with the State OWTS Policy, Malibu includes a 200-ft to 400-ft setback for surface waters in proximity to public water supply intakes – a beneficial use of water warranting a higher level of protection from waste sources. Also, with respect to the Pacific Ocean, Malibu requires the supplementary treatment (including disinfection) for all OWTS in beachfront locations.

The scientific rationale for the Tier 1 200-ft setback in paragraph 7.5.5 is not known. It appears to be without substantial merit and is at odds with other setback requirements – e.g., 100-ft setback from a domestic water supply well. The justification for a 200-ft setback from such water features as stock watering ponds, golf course lakes, and wetlands (that may or may not have any surface water features) is not known; and therefore, it is not included in Malibu OWTS requirements.

5. Allowable Densities for New Subdivisions

Tier 1 (section 7.8) specifies that average development density (i.e., acres per dwelling unit/OWTS) be based on a sliding scale (0.5 to 2.5 acres) related to average rainfall. City of Malibu does not specify minimum lot size requirements, but instead relies on project and site specific analysis of cumulative impacts (e.g., nitrate loading, groundwater mounding) to determine appropriate density of development and OWTS discharges. The results of these analyses may also provide a basis for imposing other mitigation measures (e.g., supplemental

treatment providing nitrogen removal), where warranted on a case-by-case basis. This meets the same objective of Section 7.8, but is done on the basis of site specific conditions and analysis.

6. More Protective Aspects of City of Malibu LAMP

The following highlight the more protective aspects of the City of Malibu LAMP as compared with the Tier 1 requirements of the State OWTS Policy.

- **Alternative OWTS.** Contains requirements for alternative OWTS, providing better options, design guidance and a managed system for dealing with repairs/replacement (where needed) for the approximately 6,000 existing OWTS in the City.

- **Operating Permits.** Contains operating permit requirements for all OWTS to provide a higher level of performance monitoring and regular reporting to the City.

- **Cumulative Impact Assessments.** Includes requirements and guidelines for conducting cumulative impact assessments related to nitrate loading, groundwater mounding and other issues of local concern (e.g., lateral migration) for most OWTS proposals based on system location, ground slope, system size (design flow) etc. Tier 1 allows OWTS designs up to 3,500 gpd with no comparable requirements.

- **Pump Systems.** Onsite Systems Manual includes design guidance and requirements for pump systems; none are provided in Tier 1.

- **Pressure Distribution Systems.** Treats pressure distribution systems as an alternative OWTS, including requirements for operating permit and performance monitoring/reporting. Tier 1 (8.1.4) recognizes pressure distribution as a conventional trench design option without providing or referencing any design criteria.

- **Cut Banks and Steep Slopes.** Includes horizontal setback requirement for cut banks and steep slopes, which represent potential avenues for effluent seepage.

- **Peak vs Average Flow.** Dispersal system design is based on peak, rather than average wastewater flow as provided in Tier 1.

- **Performance Evaluation Guidelines.** Provides procedures and criteria to guide performance evaluations of OWTS in connection with building remodel projects, property transfers, abatement investigations, etc., along with registration and training of practitioners approved for conducting this work to ensure consistency and standard of care.

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Appendix B

OWTS Usage, Wastewater Loading Estimates, and Water Quality Issues/Monitoring Recommendations (Under Development)

DRAFT

Nicholas Canyon

Watershed 1-2

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	61	55	194	90	56	627.3
	Multi-Family (Low - Med Density)	2	6	2.323	2	6	2.323
	Multi-Family (High Density)	0	0	0	0	0	0
	Mixed Use	0	0	0	0	0	0
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	63	61	196.32	92	62	629.62
Non-Residential	Agriculture	0	0	0	0	0	0
	Commercial	0	0	0	0	0	0
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	0	0	0	0	0	0
	Office / Industry	0	0	0	36	0	167.1
	Recreation	0	0	0	1	0	98.88
	Restaurants	0	0	0	0	0	0
	Schools	0	0	0	0	0	0
	Subtotal	0	0	0	37	0	265.98
	Residential & Non-Residential Total	**63**	**61**	**196.32**	**129**	**62**	**895.6**

Los Alisos Canyon

Watershed 3

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	131	127	317.1	205	127	1008
	Multi-Family (Low - Med Density)	0	0	0	0	0	0
	Multi-Family (High Density)	0	0	0	0	0	0
	Mixed Use	0	0	0	0	0	0
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	131	127	317.1	205	127	1008
Non-Residential	Agriculture	0	0	0	0	0	0
	Commercial	0	0	0	0	0	0
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	0	0	0	0	0	0
	Office / Industry	0	0	0	13	0	347.5
	Recreation	0	0	0	0	0	0
	Restaurants	0	0	0	0	0	0
	Schools	0	0	0	0	0	0
	Subtotal	0	0	0	13	0	347.5
	Residential & Non-Residential Total	**131**	**127**	**317.1**	**218**	**127**	**1355.5**

Encinal Canyon
Watershed 4

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	242	239	238	388	241	518.4
	Multi-Family (Low - Med Density)	1	2	0.156	1	2	0.156
	Multi-Family (High Density)	1	5	11.98	1	5	11.98
	Mixed Use	1	2	6.761	1	2	6.761
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	245	248	256.9	391	250	537.3
Non-Residential	Agriculture	1	1	2.668	2	2	4.905
	Commercial	0	0	0	0	0	0
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	0	0	0	0	0	0
	Office / Industry	0	0	0	0	0	0
	Recreation	0	0	0	10	0	14.16
	Restaurants	1	0	1.121	0	0	0
	Schools	0	0	0	0	0	0
	Subtotal	2	1	3.789	12	2	19.065
	Residential & Non-Residential Total	**247**	**249**	**260.69**	**403**	**252**	**556.36**

Trancas Canyon
Watershed 5

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	441	423	543.3	529	423	785.9
	Multi-Family (Low - Med Density)	17	80	18.926	18	80	19.006
	Multi-Family (High Density)	6	54	4.136	6	54	4.136
	Mixed Use	0	0	0	0	0	0
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	464	557	566.36	553	557	809.04
Non-Residential	Agriculture	0	0	0	0	0	0
	Commercial	1	1	13.74	1	1	13.74
	Gas & Service Stations	1	1	3.874	1	1	3.874
	Lodging (Commercial)	0	0	0	0	0	0
	Office / Industry	2	0	94.53	8	0	437.5
	Recreation	1	0	2.14	2	2	14.72
	Restaurants	0	0	0	0	0	0
	Schools	0	0	0	0	0	0
	Subtotal	5	2	114.28	12	4	469.83
	Residential & Non-Residential Total	**469**	**559**	**680.65**	**565**	**561**	**1278.9**

Zuma Canyon
Watershed 6

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	504	498	657.4	576	499	789.6
	Multi-Family (Low - Med Density)	23	114	22.164	23	114	22.164
	Multi-Family (High Density)	1	12	0.471	1	12	0.471
	Mixed Use	0	0	0	0	0	0
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	528	624	680.04	600	625	812.24
Non-Residential	Agriculture	1	0	3.954	2	3	4.427
	Commercial	2	2	3.463	3	0	4.762
	Gas & Service Stations	1	1	0.291	1	1	0.291
	Lodging (Commercial)	1	12	2.034	1	12	2.034
	Office / Industry	4	1	6.227	29	1	498.5
	Recreation	0	0	0	1	0	6.546
	Restaurants	1	0	0.85	1	0	0.85
	Schools	0	0	0	0	0	0
	Subtotal	10	16	16.819	38	17	517.41
	Residential & Non-Residential Total	**538**	**640**	**696.85**	**638**	**642**	**1329.6**

Ramirez Canyon
Watershed 7

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	682	673	1030	821	674	1352
	Multi-Family (Low - Med Density)	12	375	45.89	12	375	45.89
	Multi-Family (High Density)	0	0	0	0	0	0
	Mixed Use	2	236	69.93	2	236	69.93
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	696	1284	1145.8	835	1285	1467.8
Non-Residential	Agriculture	0	0	0	0	0	0
	Commercial	3	0	2.464	5	0	21.4
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	1	12	4.344	1	12	4.344
	Office / Industry	3	1	2.336	9	1	22.35
	Recreation	2	2	7.65	2	2	7.65
	Restaurants	0	0	0	0	0	0
	Schools	1	0	0.431	1	0	0.431
	Subtotal	10	15	17.225	18	15	56.175
	Residential & Non-Residential Total	**706**	**1299**	**1163**	**853**	**1300**	**1524**

Escondido Canyon
Watershed 8

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	243	235	411.3	328	236	720.7
	Multi-Family (Low - Med Density)	4	18	6.762	4	18	6.762
	Multi-Family (High Density)	2	20	4.659	2	20	4.659
	Mixed Use	0	0	0	0	0	0
	Mobile - Homes	1	1	4.063	1	1	4.063
	Subtotal	250	274	426.78	335	275	736.18
Non-Residential	Agriculture	0	0	0	1	0	5.17
	Commercial	0	0	0	0	0	0
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	0	0	0	0	0	0
	Office / Industry	0	0	0	0	0	0
	Recreation	0	0	0	0	0	0
	Restaurants	1	0	0.734	1	0	0.734
	Schools	0	0	0	0	0	0
	Subtotal	1	0	0.734	2	0	5.904
	Residential & Non-Residential Total	**251**	**274**	**427.52**	**337**	**275**	**742.09**

Latigo Canyon
Watershed 9

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	62	59	172.9	108	59	330.2
	Multi-Family (Low - Med Density)	5	118	5.436	5	118	5.436
	Multi-Family (High Density)	0	0	0	0	0	0
	Mixed Use	0	0	0	0	0	0
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	67	177	178.34	113	177	335.64
Non-Residential	Agriculture	0	0	0	0	0	0
	Commercial	0	0	0	0	0	0
	Gas & Service Stations	1	0	0.359	1	0	0.359
	Lodging (Commercial)	0	0	0	0	0	0
	Office / Industry	0	0	0	6	0	12.46
	Recreation	0	0	0	0	0	0
	Restaurants	0	0	0	0	0	0
	Schools	0	0	0	0	0	0
	Subtotal	1	0	0.359	7	0	12.819
	Residential & Non-Residential Total	**68**	**177**	**178.7**	**120**	**177**	**348.46**

Solstice Canyon
Watershed 10

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	0	0	0	6	0	71.63
	Multi-Family (Low - Med Density)	3	7	0.438	3	7	0.438
	Multi-Family (High Density)	0	0	0	0	0	0
	Mixed Use	1	2	4.929	1	2	4.929
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	4	9	5.367	10	9	76.997
Non-Residential	Agriculture	0	0	0	3	0	155.6
	Commercial	0	0	0	0	0	0
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	0	0	0	0	0	0
	Office / Industry	1	0	64.61	1	0	64.61
	Recreation	0	0	0	0	0	0
	Restaurants	0	0	0	0	0	0
	Schools	0	0	0	0	0	0
	Subtotal	1	0	64.61	4	0	220.21
	Residential & Non-Residential Total	**5**	**9**	**69.977**	**14**	**9**	**297.21**

Corral Canyon
Watershed 11

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	109	106	245.2	157	106	517.4
	Multi-Family (Low - Med Density)	38	127	7.559	39	127	7.563
	Multi-Family (High Density)	2	11	0.404	2	11	0.404
	Mixed Use	2	5	2.822	2	5	2.822
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	151	249	255.99	200	249	528.19
Non-Residential	Agriculture	0	0	0	2	0	81.68
	Commercial	1	2	23.65	1	2	23.65
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	1	0	14.41	2	0	18.67
	Office / Industry	3	0	98.78	12	0	113.3
	Recreation	0	0	0	1	0	4.639
	Restaurants	0	0	0	0	0	0
	Schools	0	0	0	0	0	0
	Subtotal	5	2	136.84	18	2	241.94
	Residential & Non-Residential Total	**156**	**251**	**392.83**	**218**	**251**	**770.13**

Malibu Creek Canyon
Watershed 12

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	0	0	0	0	0	0
	Multi-Family (Low - Med Density)	0	0	0	0	0	0
	Multi-Family (High Density)	0	0	0	0	0	0
	Mixed Use	0	0	0	0	0	0
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	0	0	0	0	0	0
Non-Residential	Agriculture	0	0	0	0	0	0
	Commercial	0	0	0	0	0	0
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	0	0	0	0	0	0
	Office / Industry	0	0	0	0	0	0
	Recreation	0	0	0	0	0	0
	Restaurants	0	0	0	0	0	0
	Schools	0	0	0	0	0	0
	Subtotal	0	0	0	0	0	0
	Residential & Non-Residential Total	**0**	**0**	**0**	**0**	**0**	**0**

Carbon Canyon
Watershed 13

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	399	378	208.9	532	379	632.4
	Multi-Family (Low - Med Density)	32	178	13.421	33	178	48.238
	Multi-Family (High Density)	14	117	5.283	14	117	5.283
	Mixed Use	12	22	3.843	12	22	3.843
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	457	695	231.45	591	696	689.76
Non-Residential	Agriculture	0	0	0	0	0	0
	Commercial	12	36	6.526	20	36	9.15
	Gas & Service Stations	2	0	0.803	2	0	0.803
	Lodging (Commercial)	3	37	2.391	3	37	2.391
	Office / Industry	13	3	7.579	17	3	7.733
	Recreation	1	1	1.126	1	1	1.126
	Restaurants	5	0	3.816	5	0	3.816
	Schools	0	0	0	0	0	0
	Subtotal	36	77	22.241	48	77	25.019
	Residential & Non-Residential Total	**493**	**772**	**253.69**	**639**	**773**	**714.78**

Las Flores Canyon
Watershed 14

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	178	165	134.7	277	167	382
	Multi-Family (Low - Med Density)	35	97	5.347	38	100	5.52
	Multi-Family (High Density)	5	60	1.612	5	60	1.612
	Mixed Use	0	0	0	0	0	0
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	218	322	141.66	320	327	389.13
Non-Residential	Agriculture	0	0	0	1	6	0.3222
	Commercial	1	1	0.183	7	1	1.842
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	0	0	0	0	0	0
	Office / Industry	1	1	0.163	5	1	2.876
	Recreation	0	0	0	1	0	2.959
	Restaurants	1	1	1.761	1	1	1.761
	Schools	1	0	0.724	1	0	0.724
	Subtotal	4	3	2.831	16	9	10.484
	Residential & Non-Residential Total	**222**	**325**	**144.49**	**336**	**336**	**399.62**

Piedra Gorda Canyon
Watershed 15

	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	204	204	125.3	236	236	175.3
	Multi-Family (Low - Med Density)	28	63	2.125	28	63	2.125
	Multi-Family (High Density)	1	6	0.201	1	6	0.201
	Mixed Use	0	0	0	0	0	0
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	233	273	127.63	265	305	177.63
Non-Residential	Agriculture	0	0	0	0	0	0
	Commercial	0	0	0	1	0	2.748
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	3	21	1.217	3	21	1.217
	Office / Industry	0	0	0	0	0	0
	Recreation	0	0	0	0	0	0
	Restaurants	1	1	0.301	1	1	0.301
	Schools	0	0	0	0	0	0
	Subtotal	4	22	1.518	5	22	4.266
	Residential & Non-Residential Total	**237**	**295**	**129.14**	**270**	**327**	**181.89**

PenaCanyon Watershed 16							
	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	34	34	3.717	53	34	152.6
	Multi-Family (Low - Med Density)	11	26	7.81	11	26	7.81
	Multi-Family (High Density)	0	0	0	0	0	0
	Mixed Use	0	0	0	0	0	0
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	45	60	11.527	64	60	160.41
Non-Residential	Agriculture	0	0	0	2	0	40.8
	Commercial	0	0	0	0	0	0
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	0	0	0	0	0	0
	Office / Industry	0	0	0	9	0	1.989
	Recreation	0	0	0	0	0	0
	Restaurants	0	0	0	0	0	0
	Schools	0	0	0	0	0	0
	Subtotal	0	0	0	11	0	42.789
	Residential & Non-Residential Total	**45**	**60**	**11.527**	**75**	**60**	**203.2**

Tuna Canyon Watershed 17							
	Land Use Type	Developed			Total		
		Lots	Units	Acres	Lots	Units	Acres
Residential	Single Family Residences	60	59	5.661	72	59	108.9
	Multi-Family (Low - Med Density)	8	18	1.166	8	18	1.166
	Multi-Family (High Density)	2	22	0.374	2	22	0.374
	Mixed Use	0	0	0	0	0	0
	Mobile - Homes	0	0	0	0	0	0
	Subtotal	70	99	7.201	82	99	110.44
Non-Residential	Agriculture	0	0	0	0	0	0
	Commercial	1	1	0.402	1	1	0.402
	Gas & Service Stations	0	0	0	0	0	0
	Lodging (Commercial)	0	0	0	0	0	0
	Office / Industry	0	0	0	1	0	0.006
	Recreation	0	0	0	0	0	0
	Restaurants	0	0	0	0	0	0
	Schools	0	0	0	0	0	0
	Subtotal	1	1	0.402	2	1	0.408
	Residential & Non-Residential Total	**71**	**100**	**7.603**	**84**	**100**	**110.85**

Prohibited Areas

Corral Canyon
Watershed 11

Land Use Type	Developed			Total		
	Lots	Units	Acres	Lots	Units	Acres
Single Family Residences	224	218	66.37838	273	221	164.0204
Multi-Family Residences	4	87	0	7	87	7.787465
Total	**228**	**305**	**66.37838**	**280**	**308**	**171.8079**

Malibu Creek Canyon*
Watershed 12

Land Use Type	Developed			Total		
	Lots	Units	Acres	Lots	Units	Acres
Single Family Residences	135	129	222.7154	163	129	278.241
Multi-Family Residences	4	114	17.50288	5	114	17.8531
Total	**139**	**243**	**240.2182**	**168**	**243**	**296.0941**

Carbon Canyon
Watershed 13

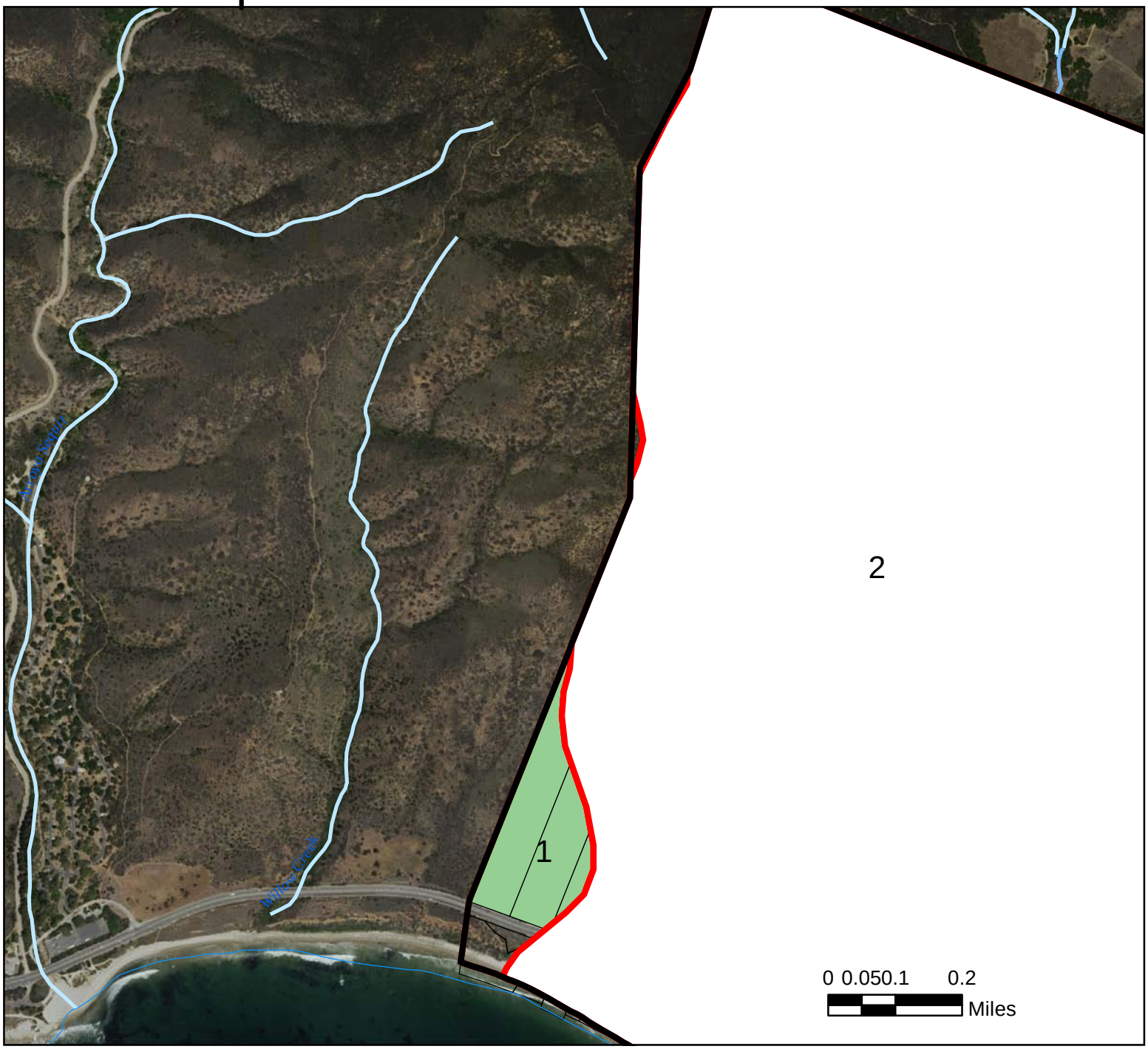
Land Use Type	Developed			Total		
	Lots	Units	Acres	Lots	Units	Acres
Single Family Residences	9	9	7.284579	14	9	9.496222
Multi-Family Residences	1	2	0.426096	1	2	0.426096
Total	**10**	**11**	**7.710675**	**15**	**11**	**9.922318**

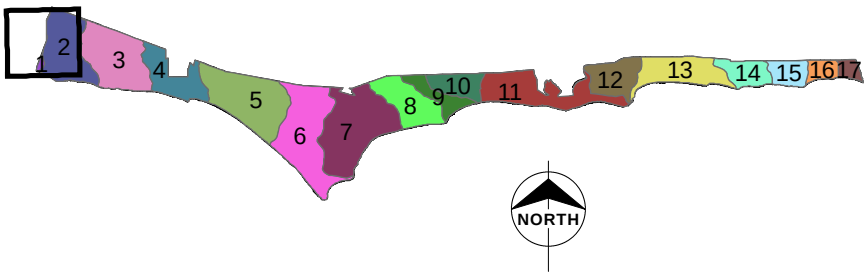
*Additional properties in Malibu Creek Canyon not included are:

1 Vacant Planned Unit Development, 0.193813 acres & 0 units.

1 Developed Live-In Care facility, 26.521271 acres & 3 units.

Development Within Malibu Subwatersheds





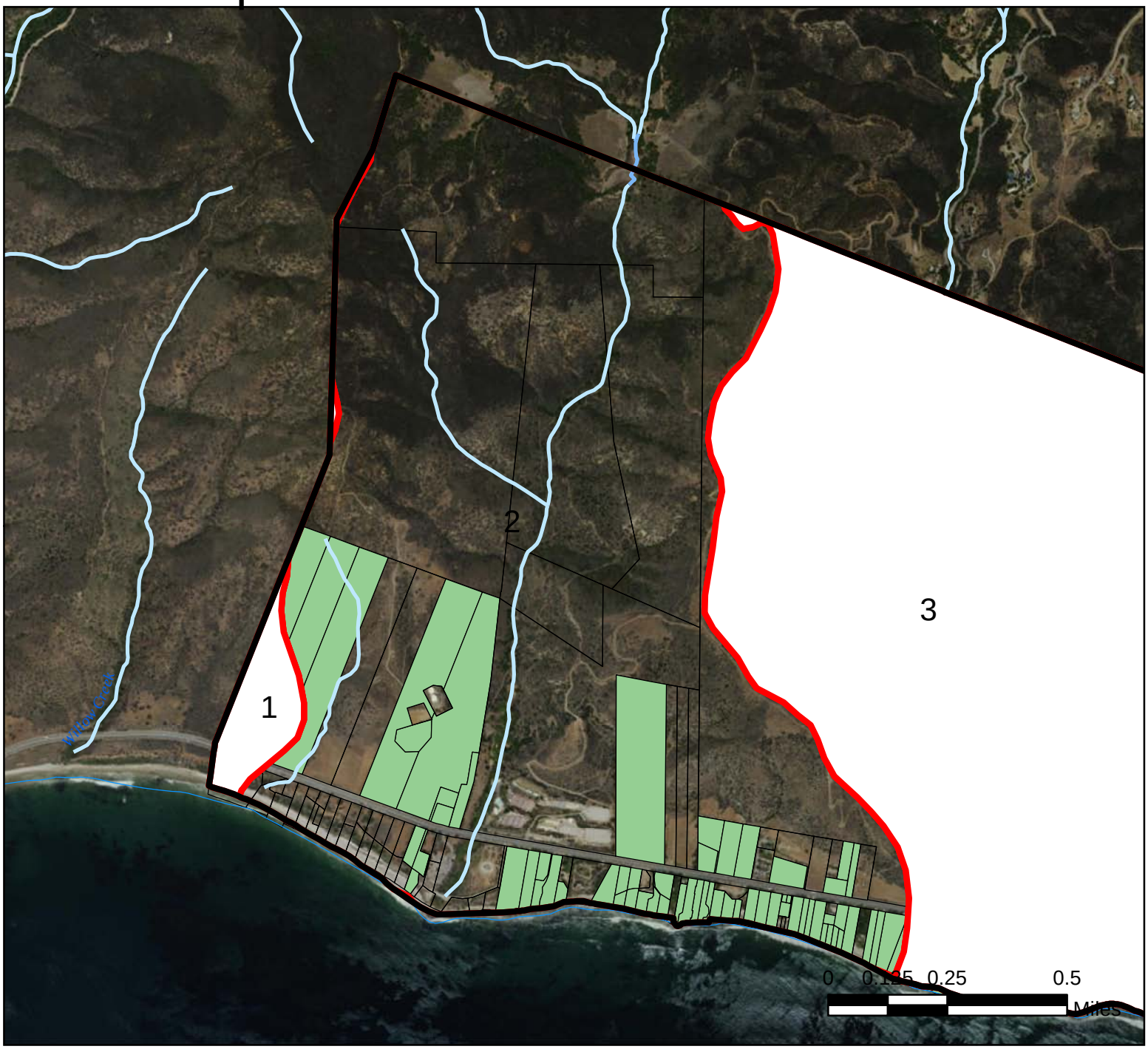
Legend

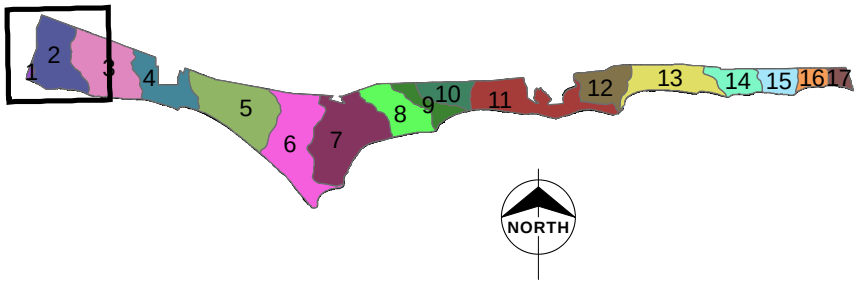
- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Arroyo Senuit

1

Development Within Malibu Subwatersheds



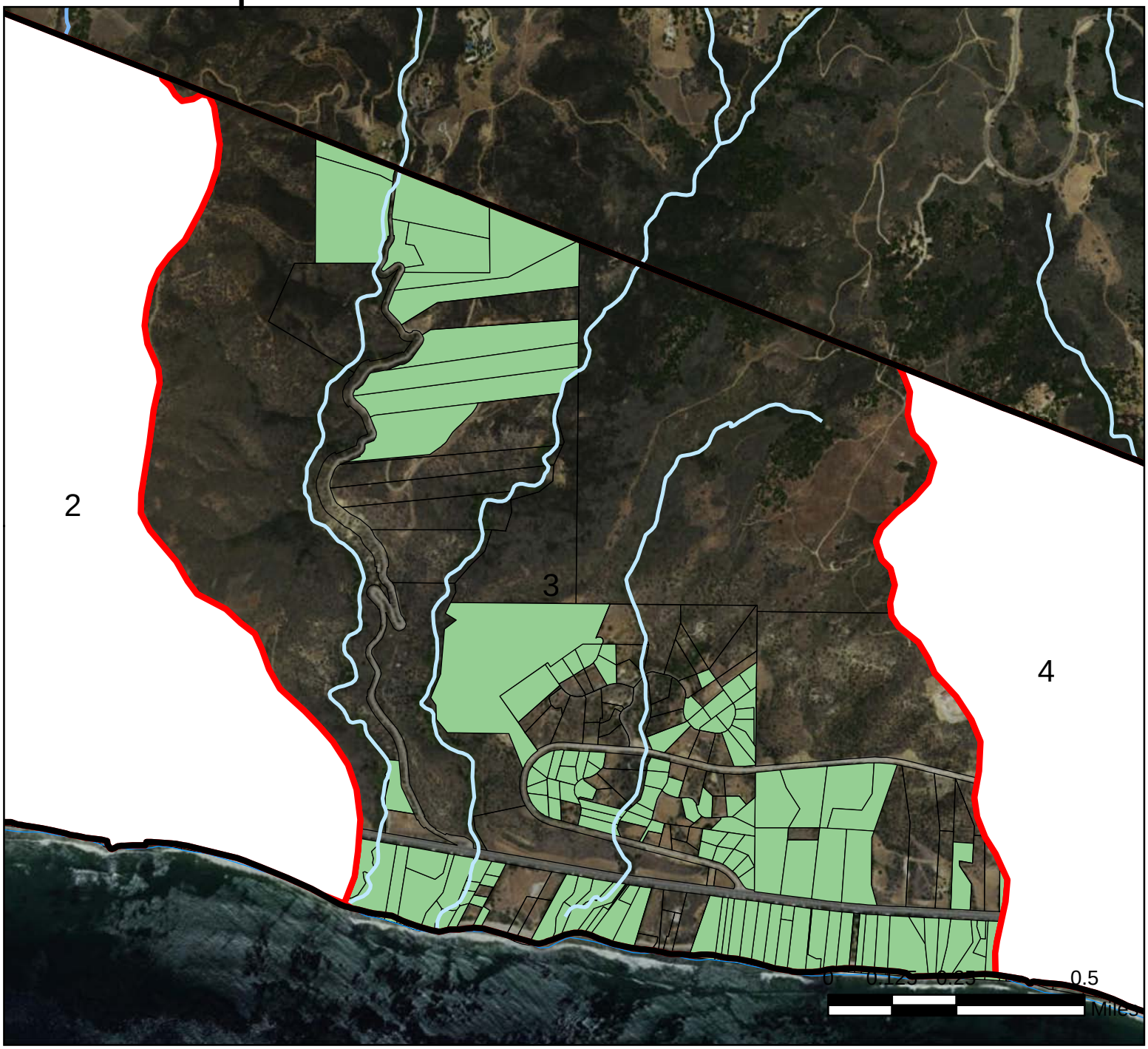


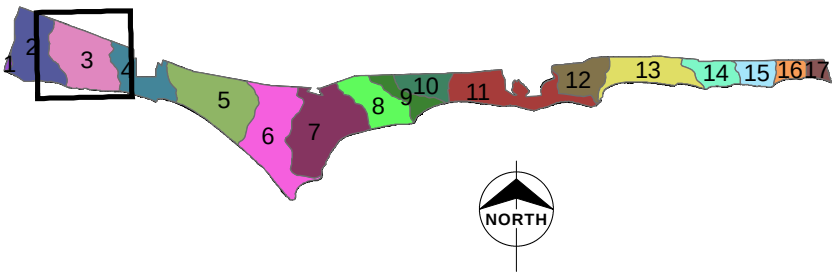
Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Nicholas Canyon 2

Development Within Malibu Subwatersheds



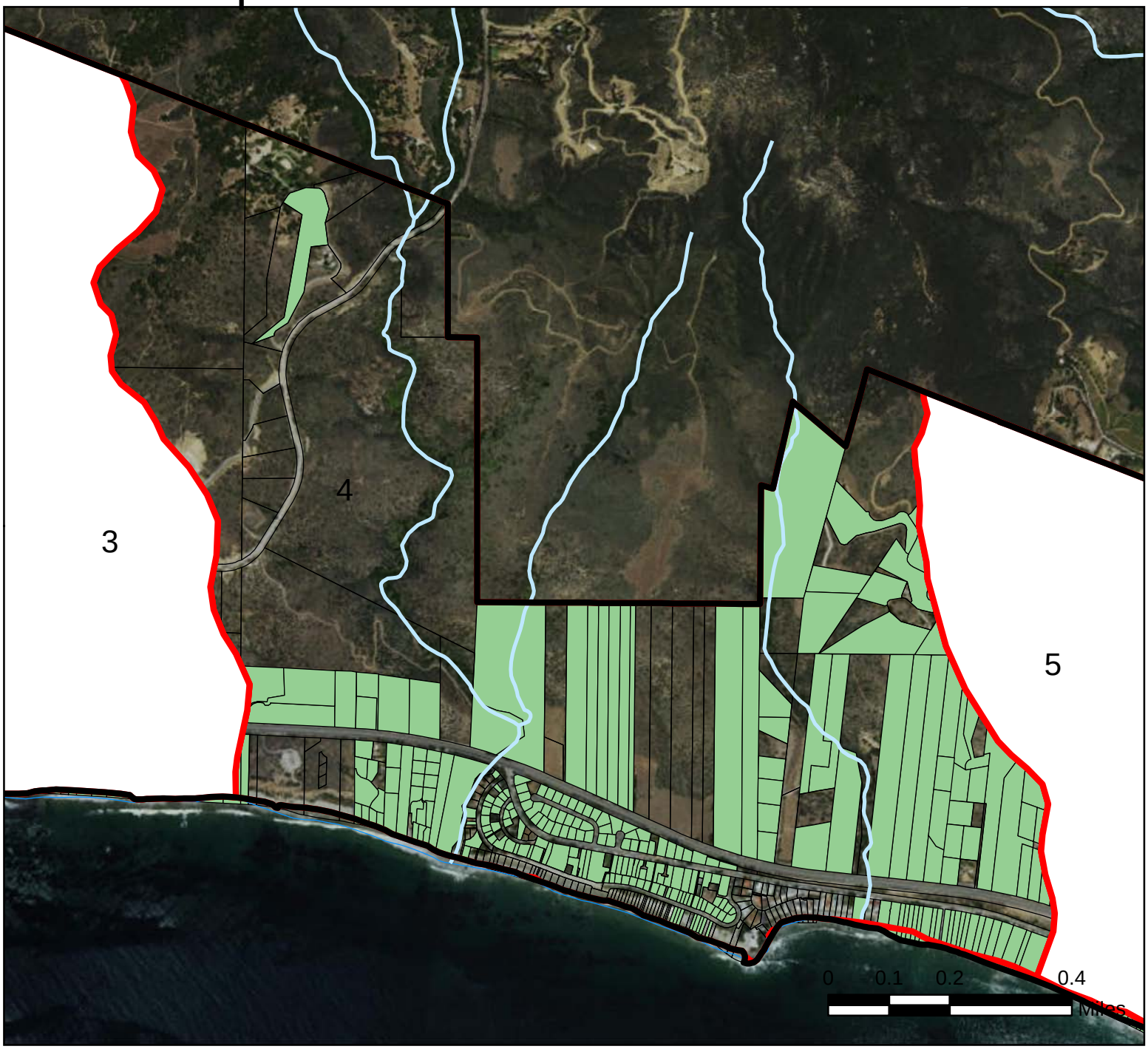


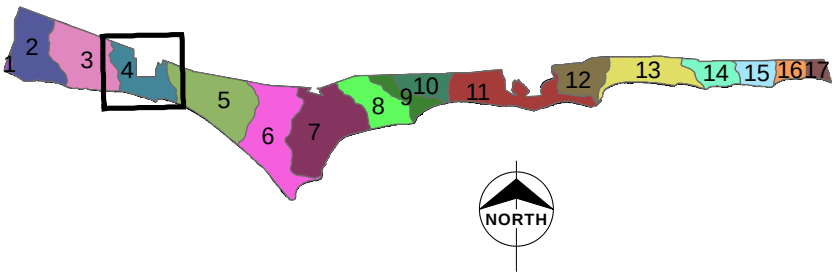
Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Los Alisos Canyon 3

Development Within Malibu Subwatersheds





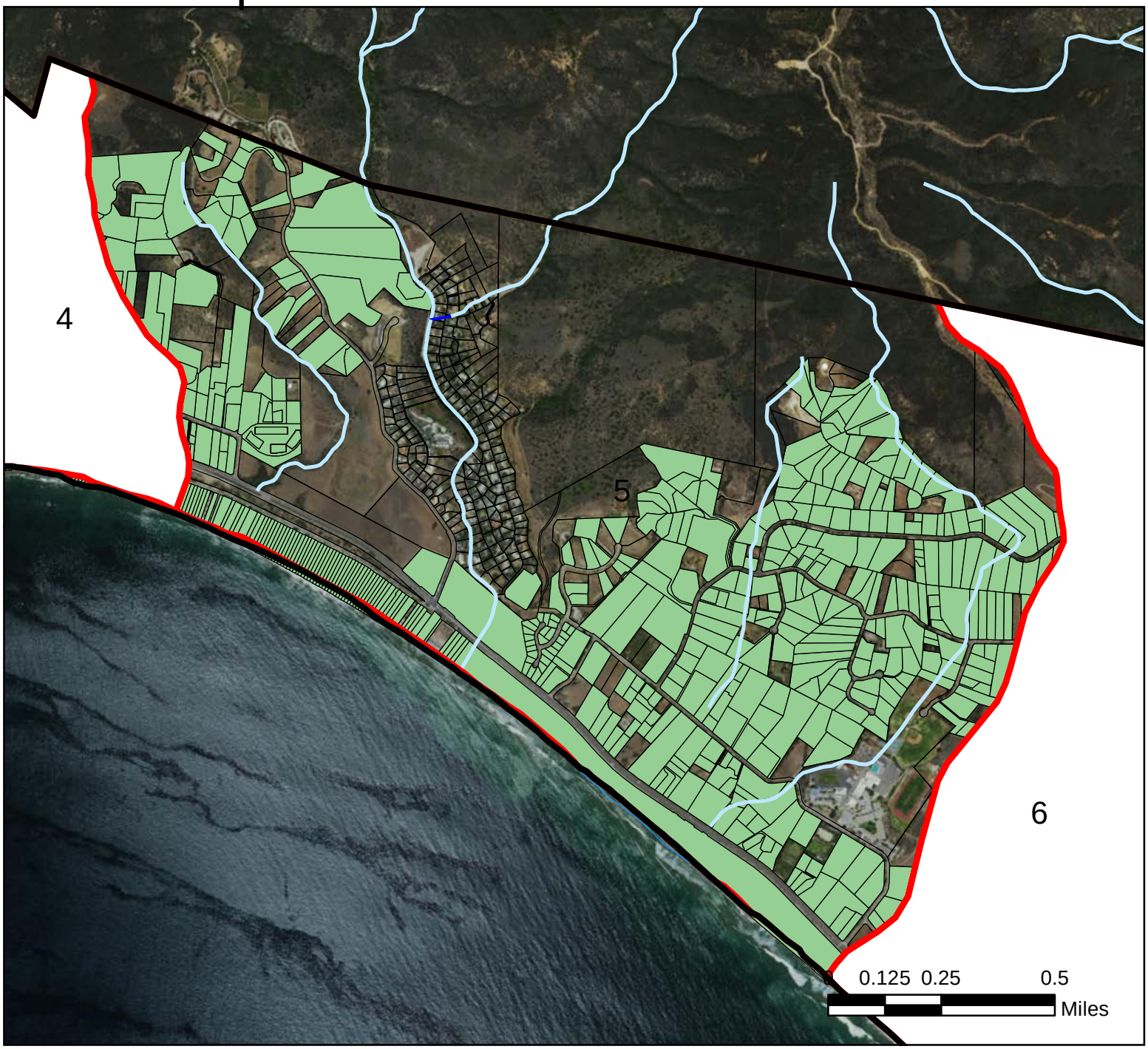
Legend

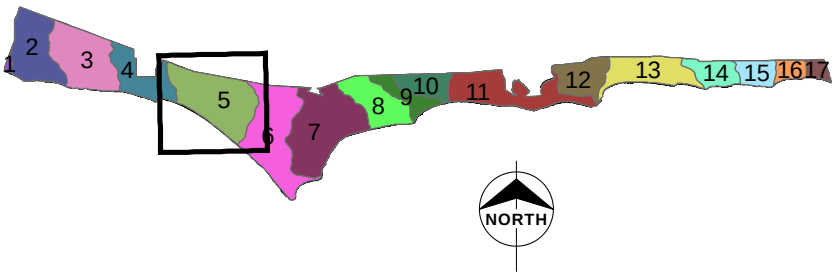
- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Encinal Canyon

4

Development Within Malibu Subwatersheds



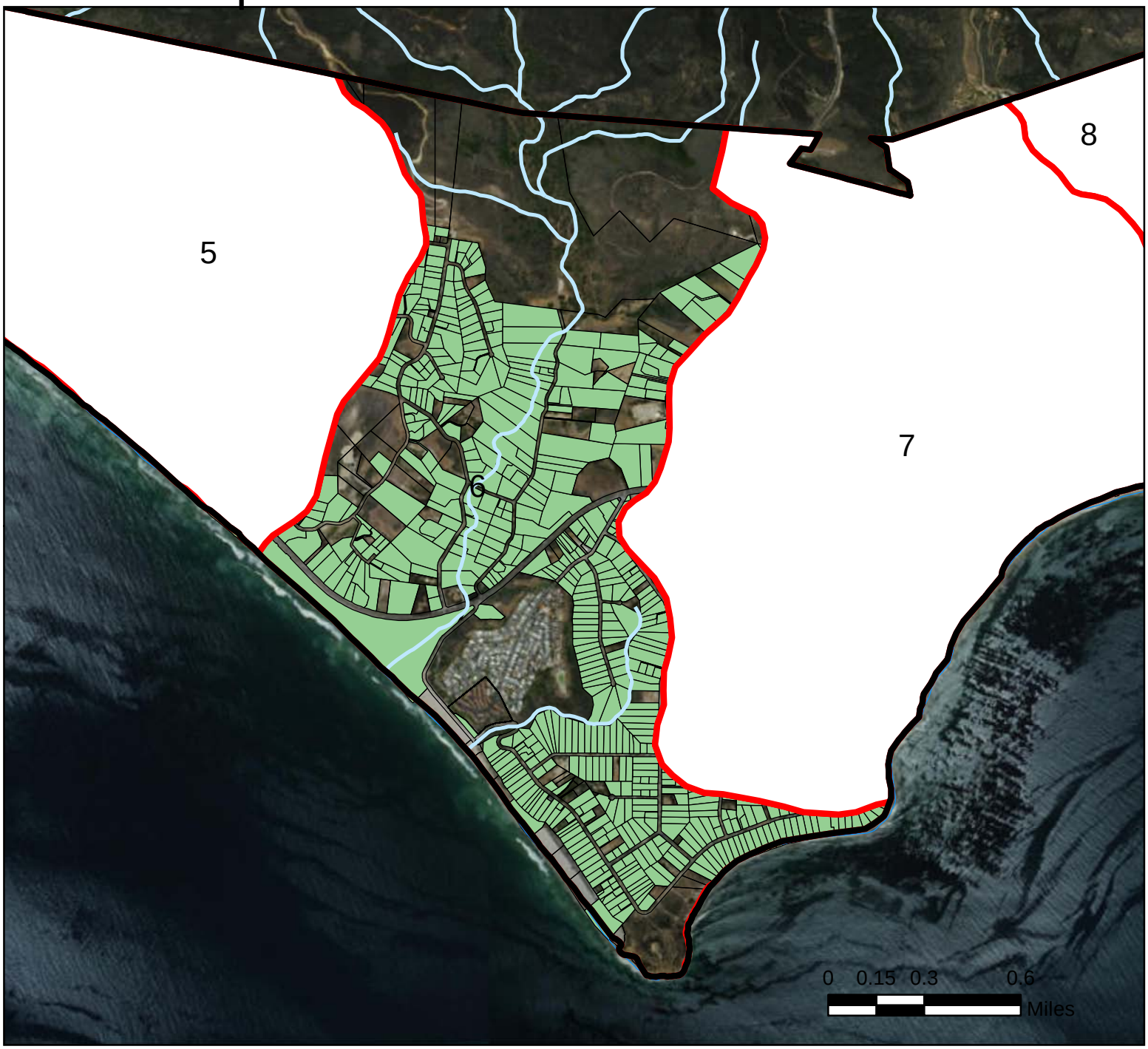


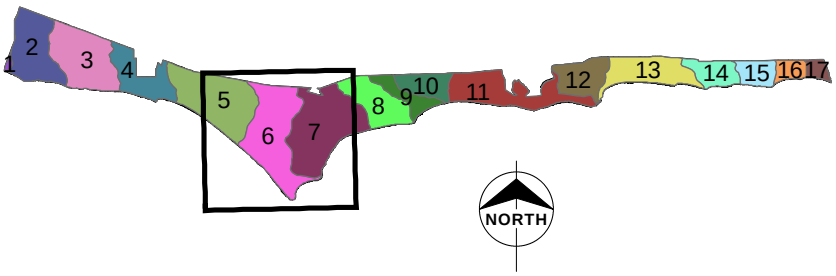
Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Trancas Canyon 5

Development Within Malibu Subwatersheds



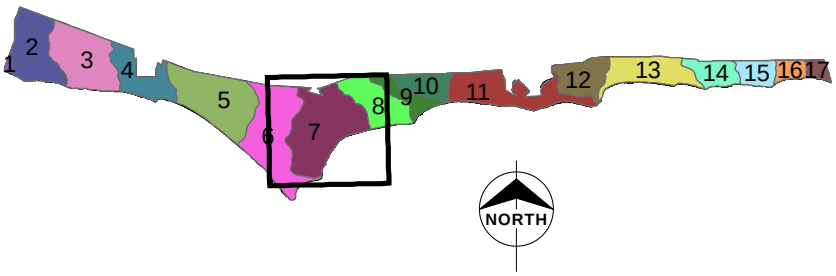


Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Zuma Canyon

Development Within Malibu Subwatersheds

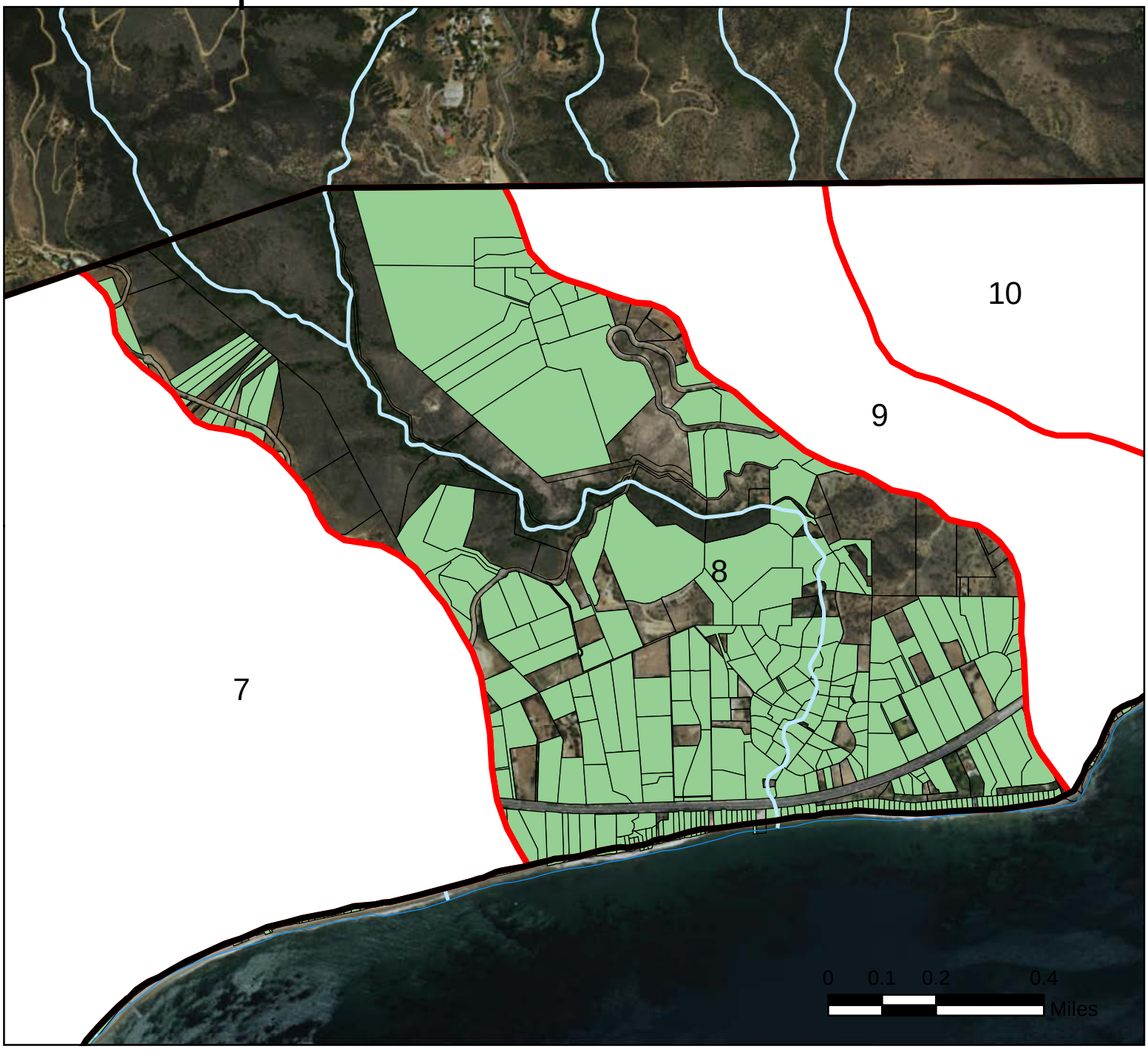


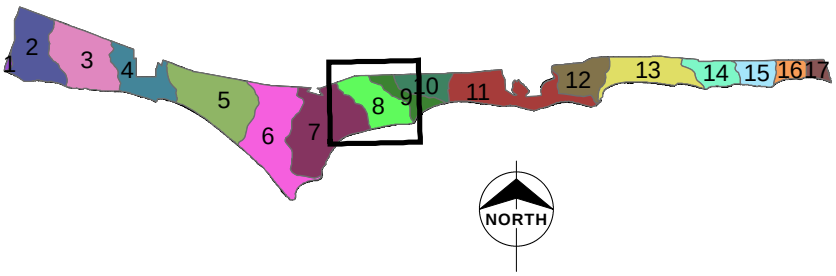
Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Ramera Canyon

Development Within Malibu Subwatersheds



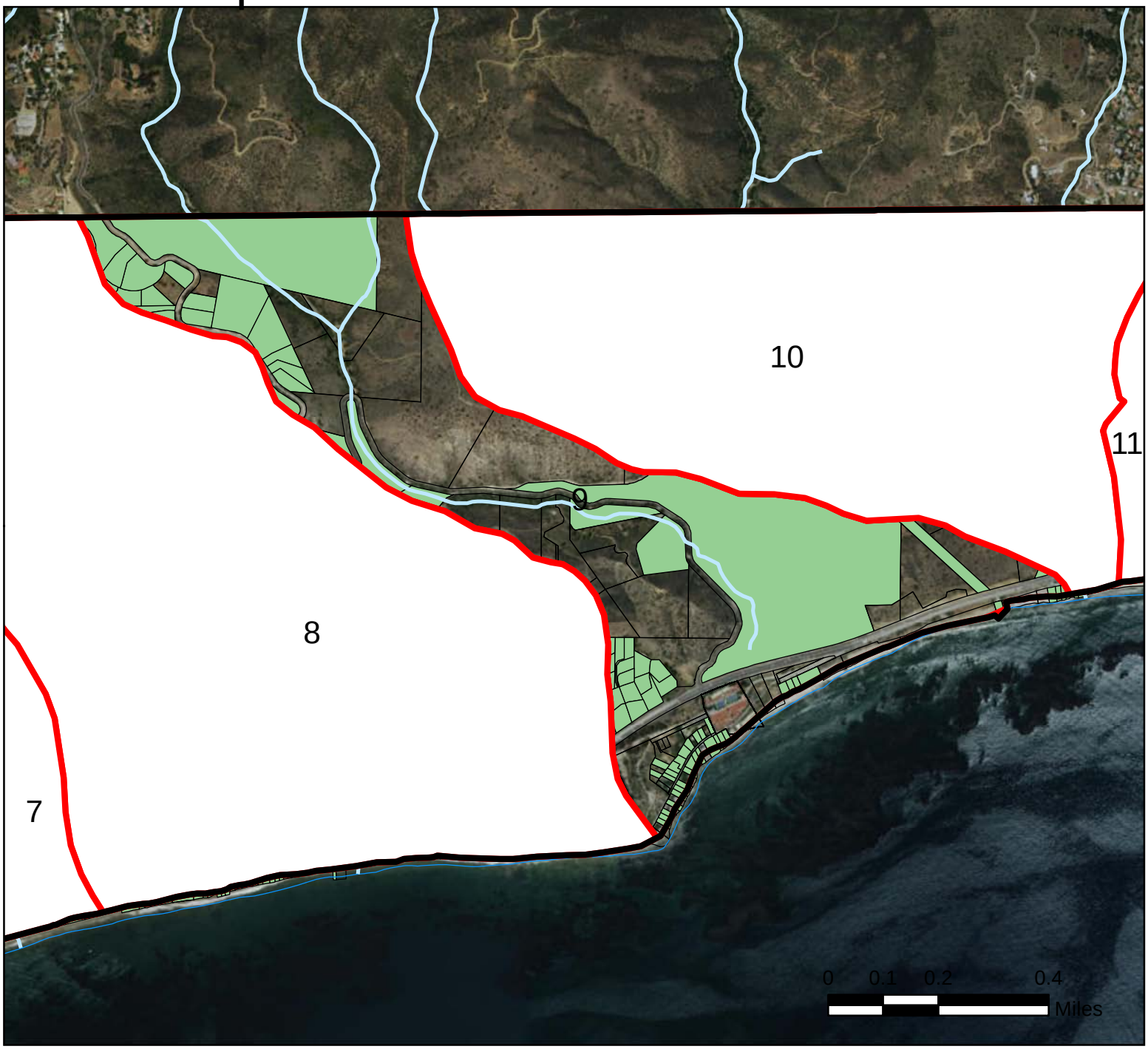


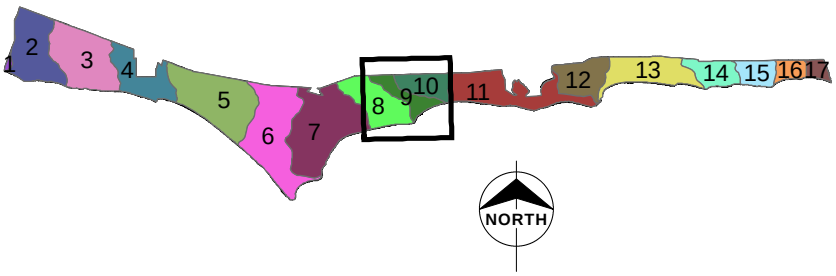
Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Escondido Canyon 8

Development Within Malibu Subwatersheds



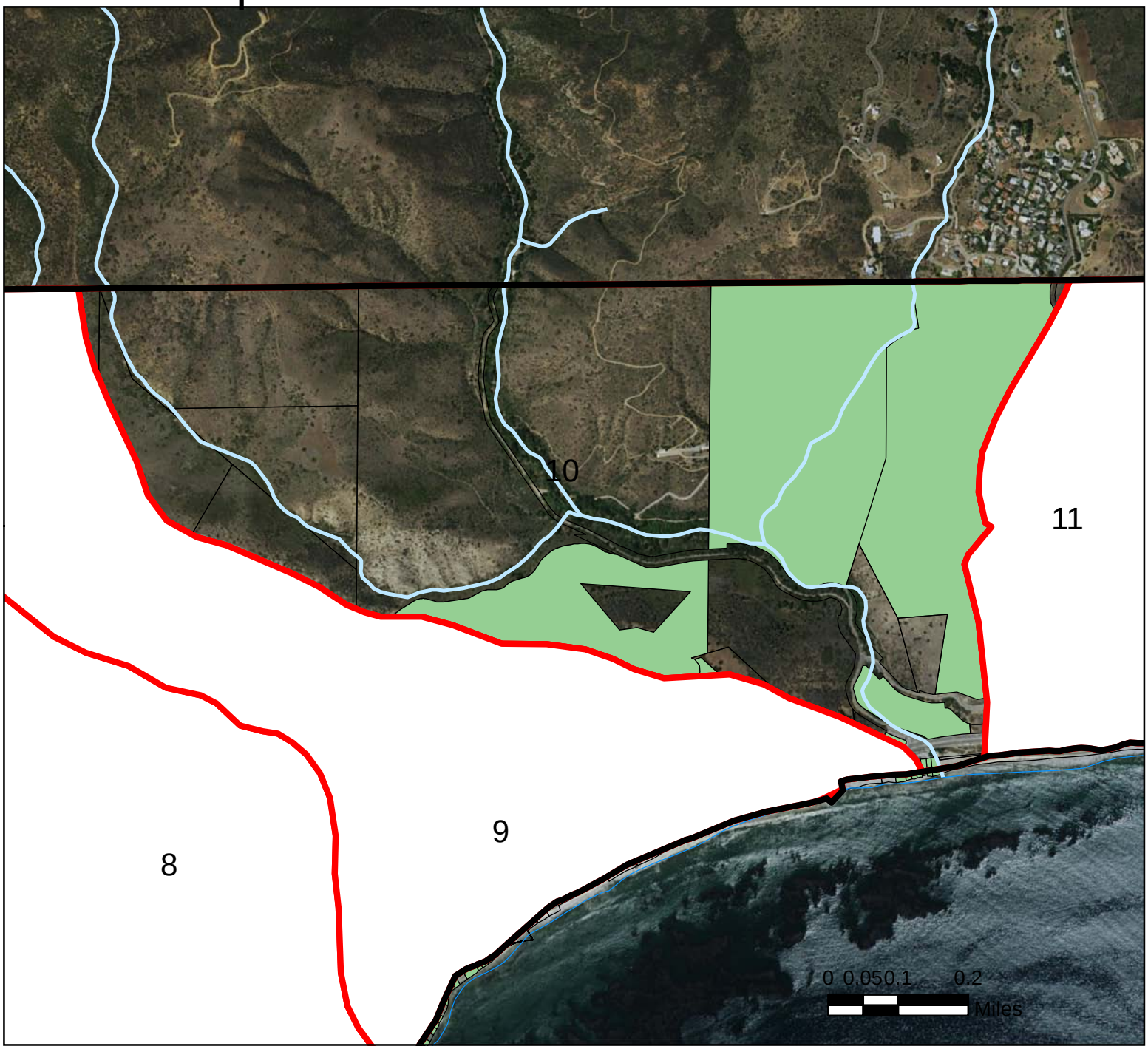


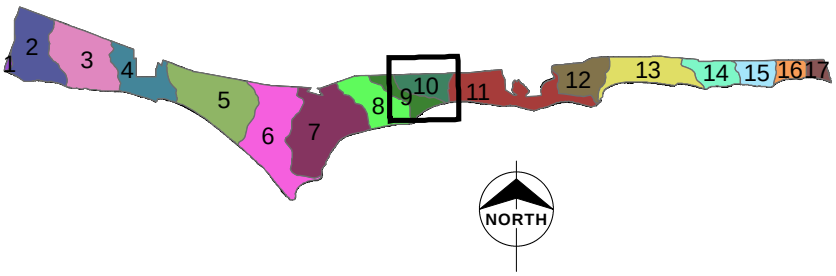
Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Latigo Canyon

Development Within Malibu Subwatersheds



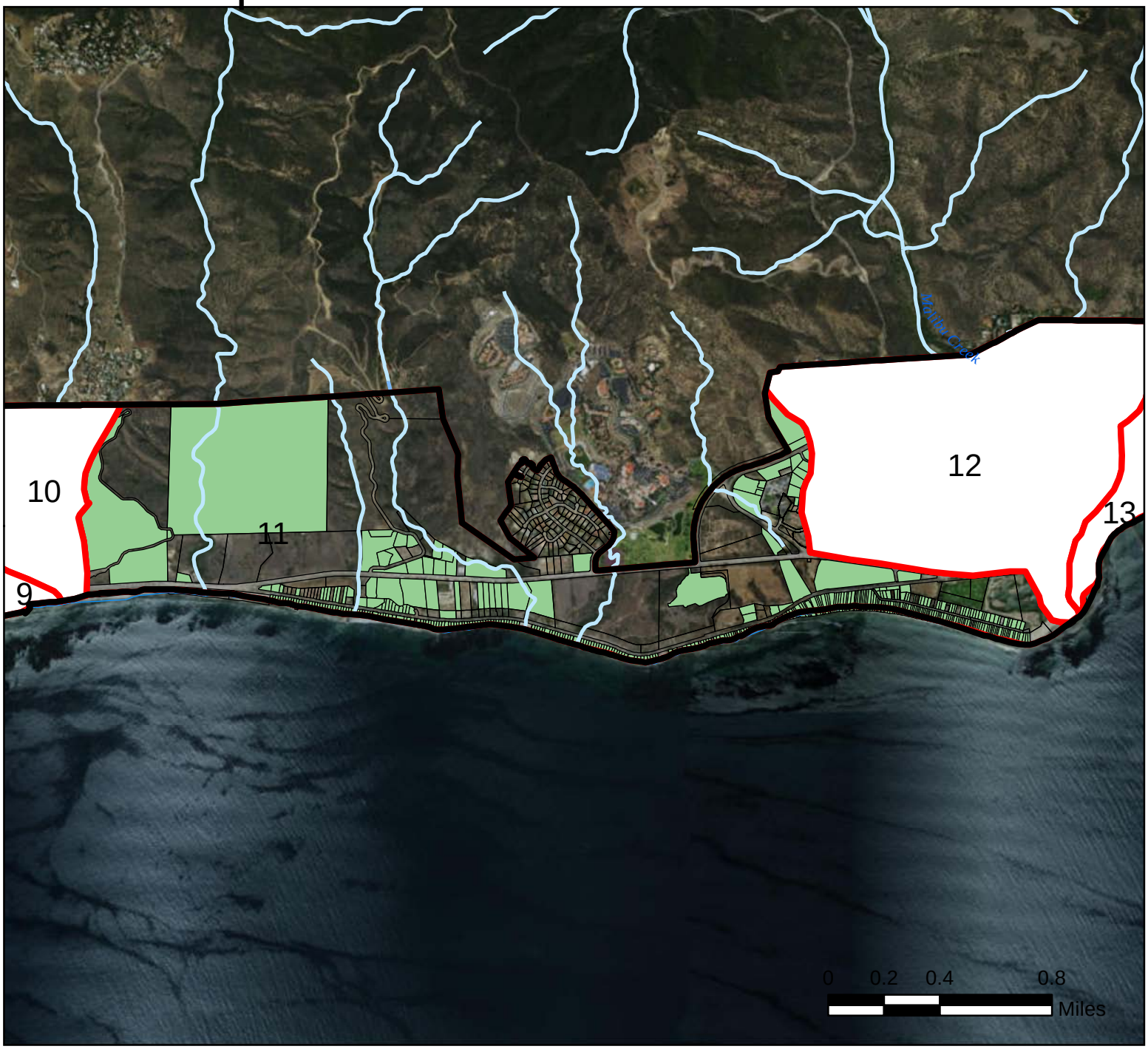


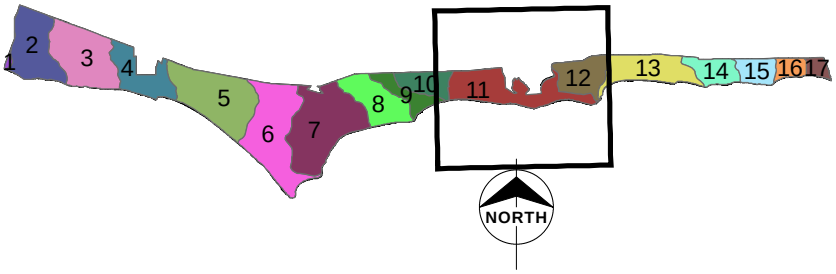
Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Solstice Canyon 10

Development Within Malibu Subwatersheds





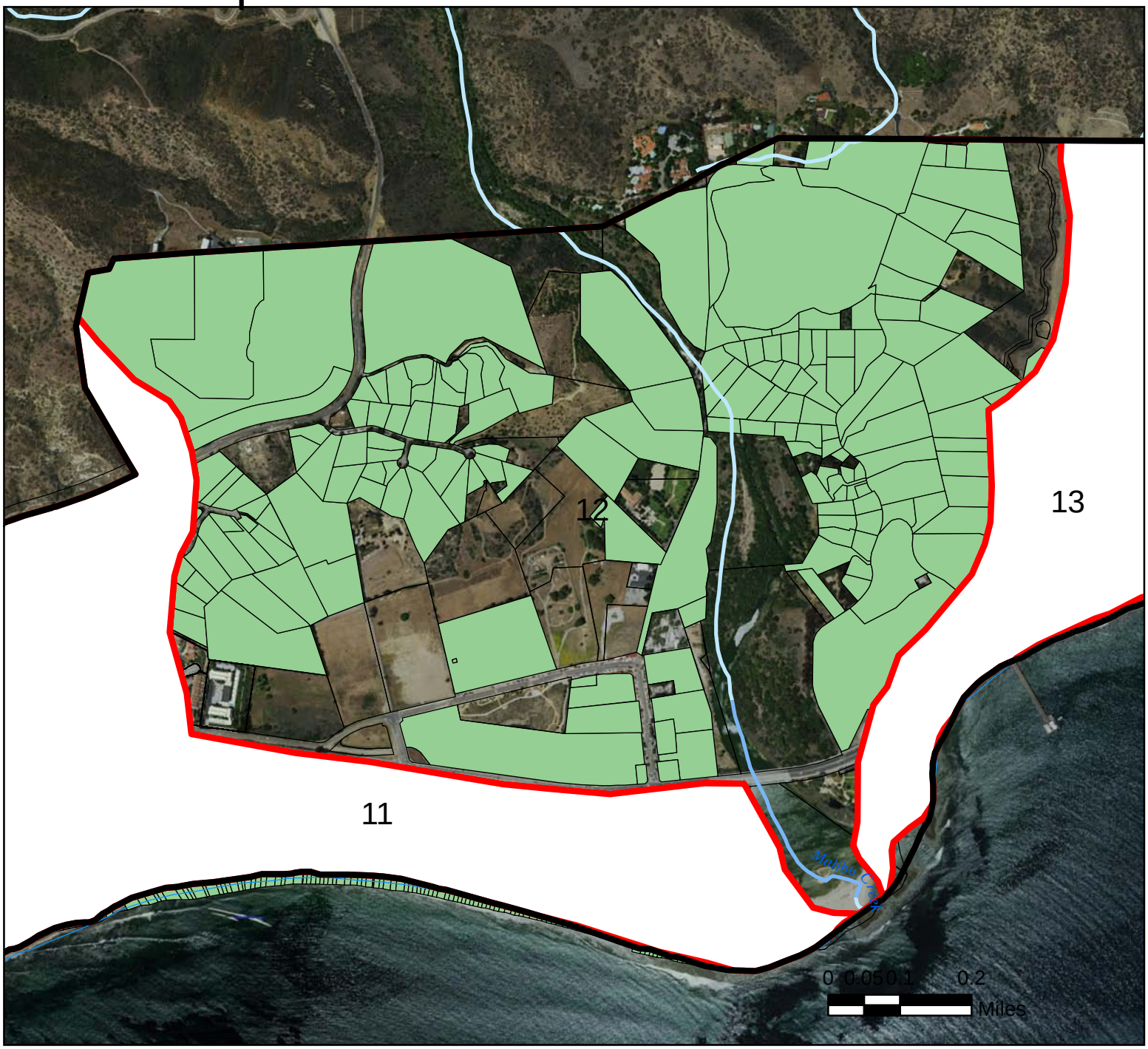
Legend

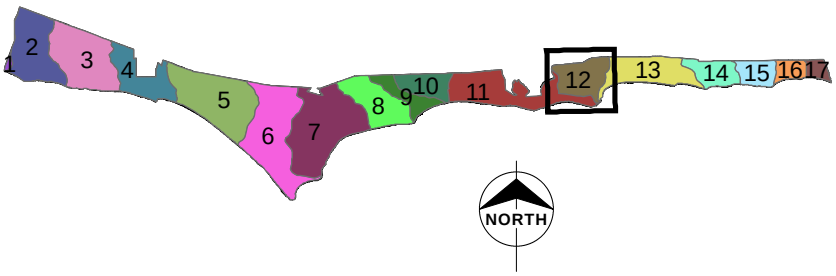
- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Corral Canyon

11

Development Within Malibu Subwatersheds



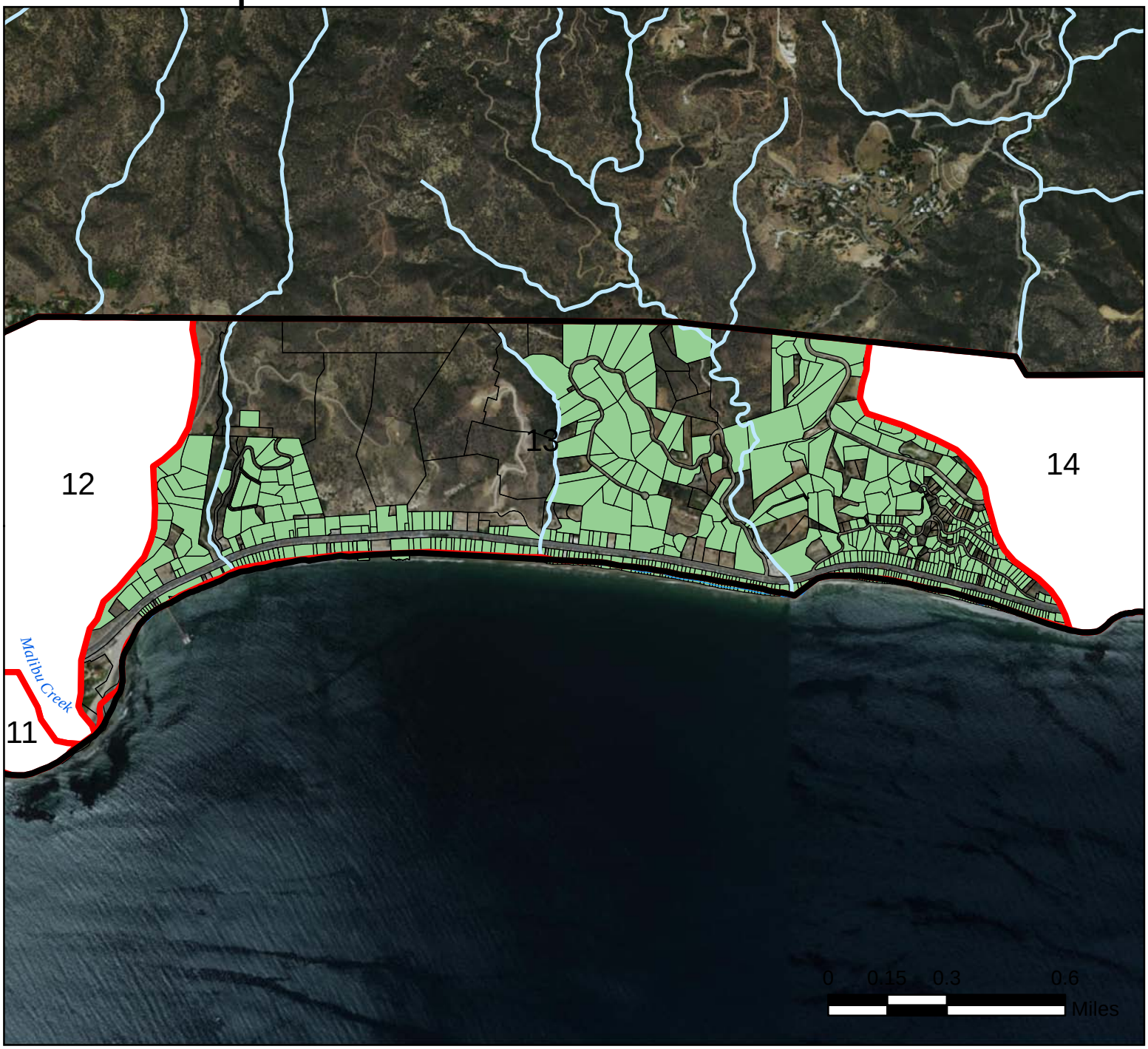


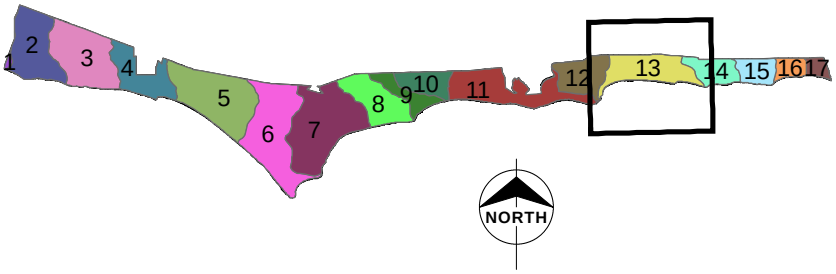
Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Monte Nido

Development Within Malibu Subwatersheds



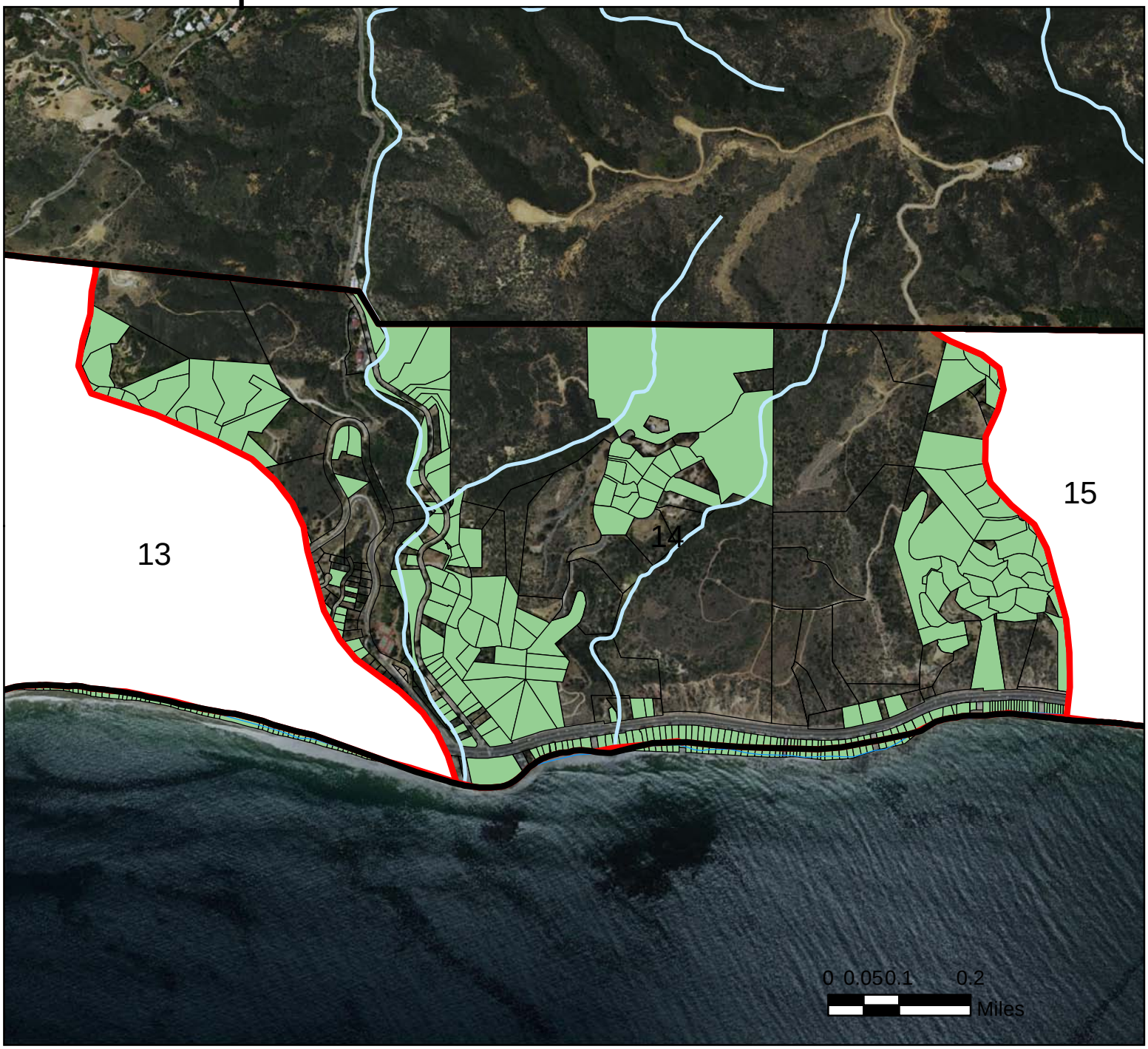


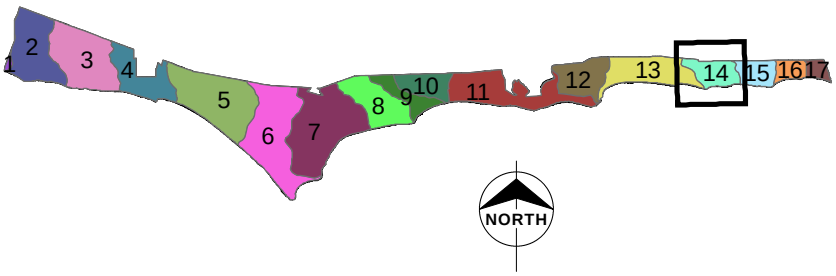
Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Carbon Canyon 13

Development Within Malibu Subwatersheds



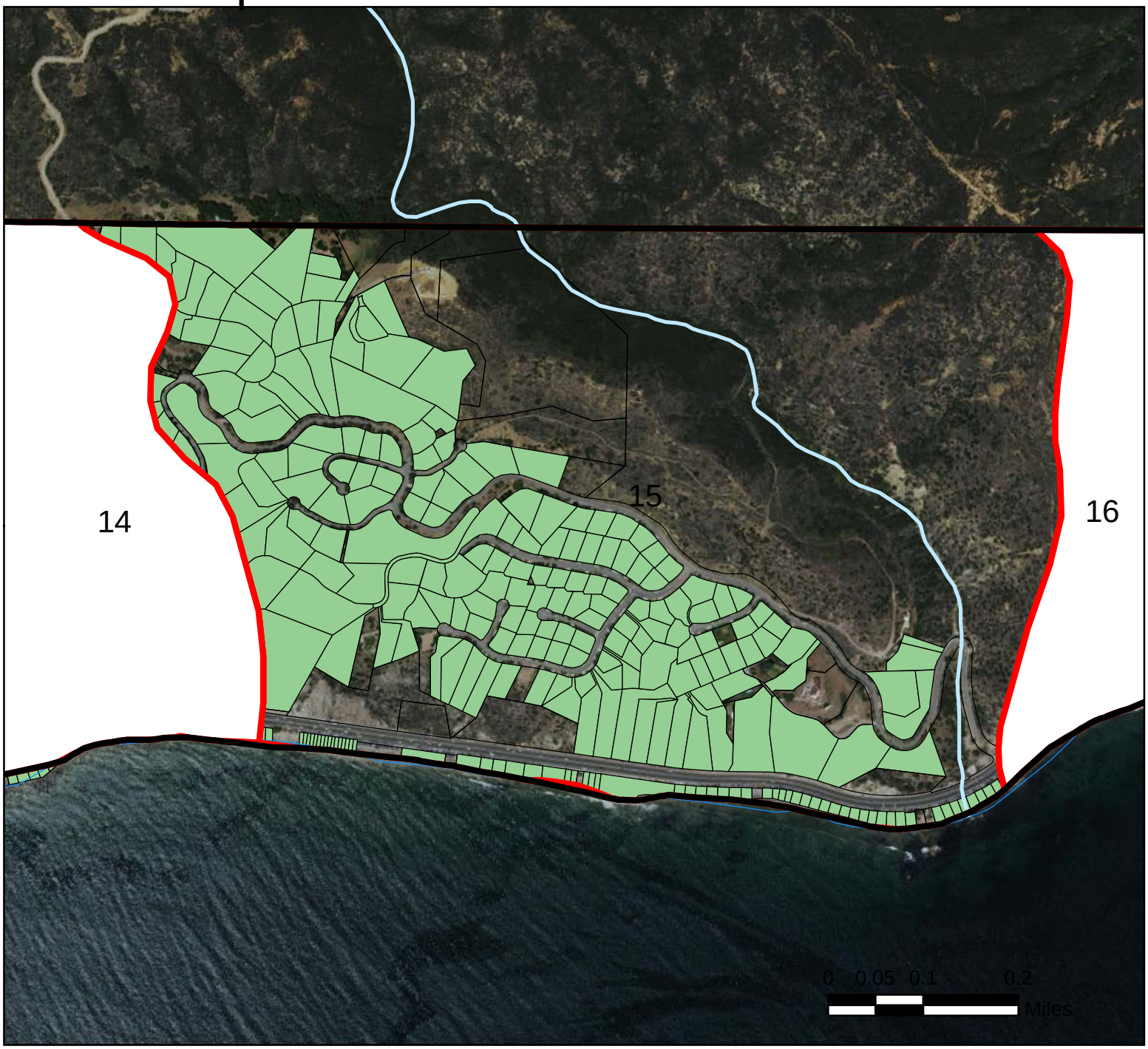


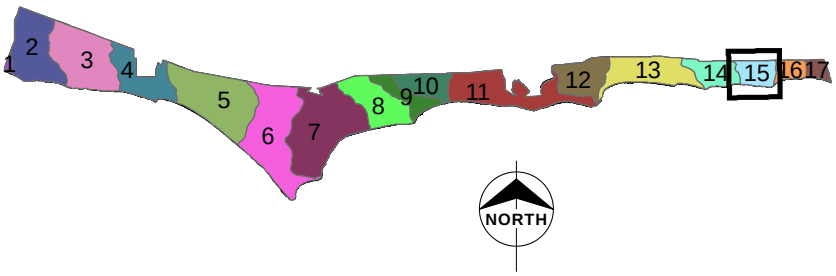
Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Las Flores Canyon 14

Development Within Malibu Subwatersheds



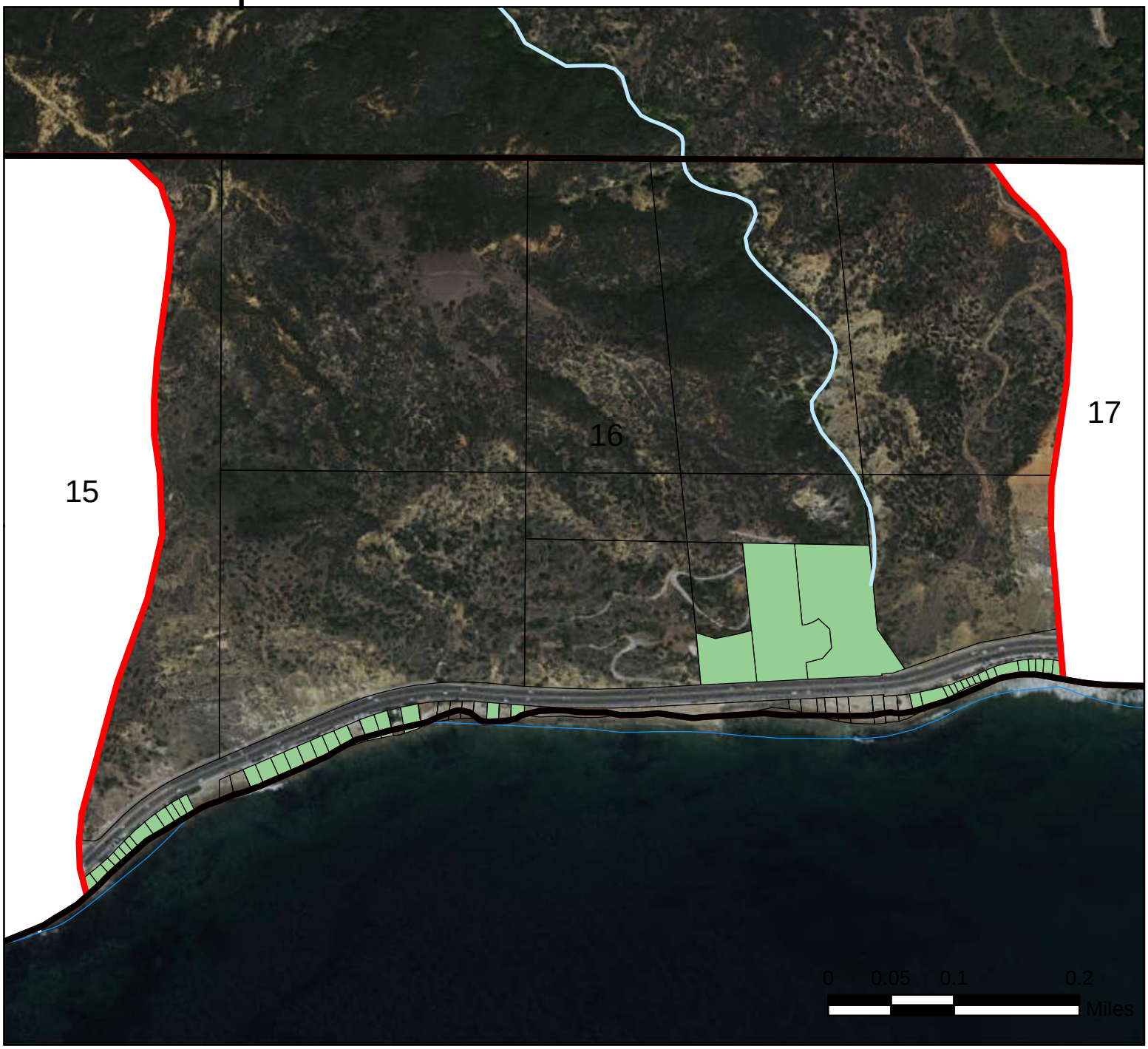


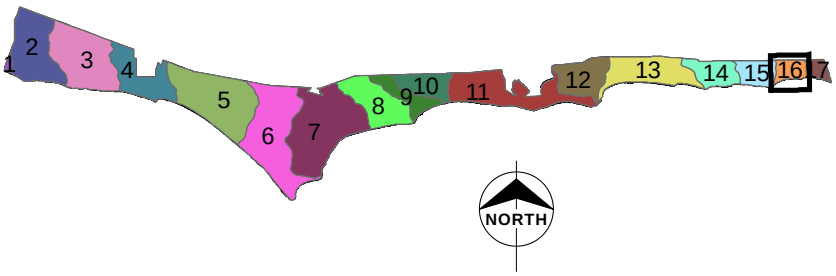
Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Piedra Gorda Canyon

Development Within Malibu Subwatersheds





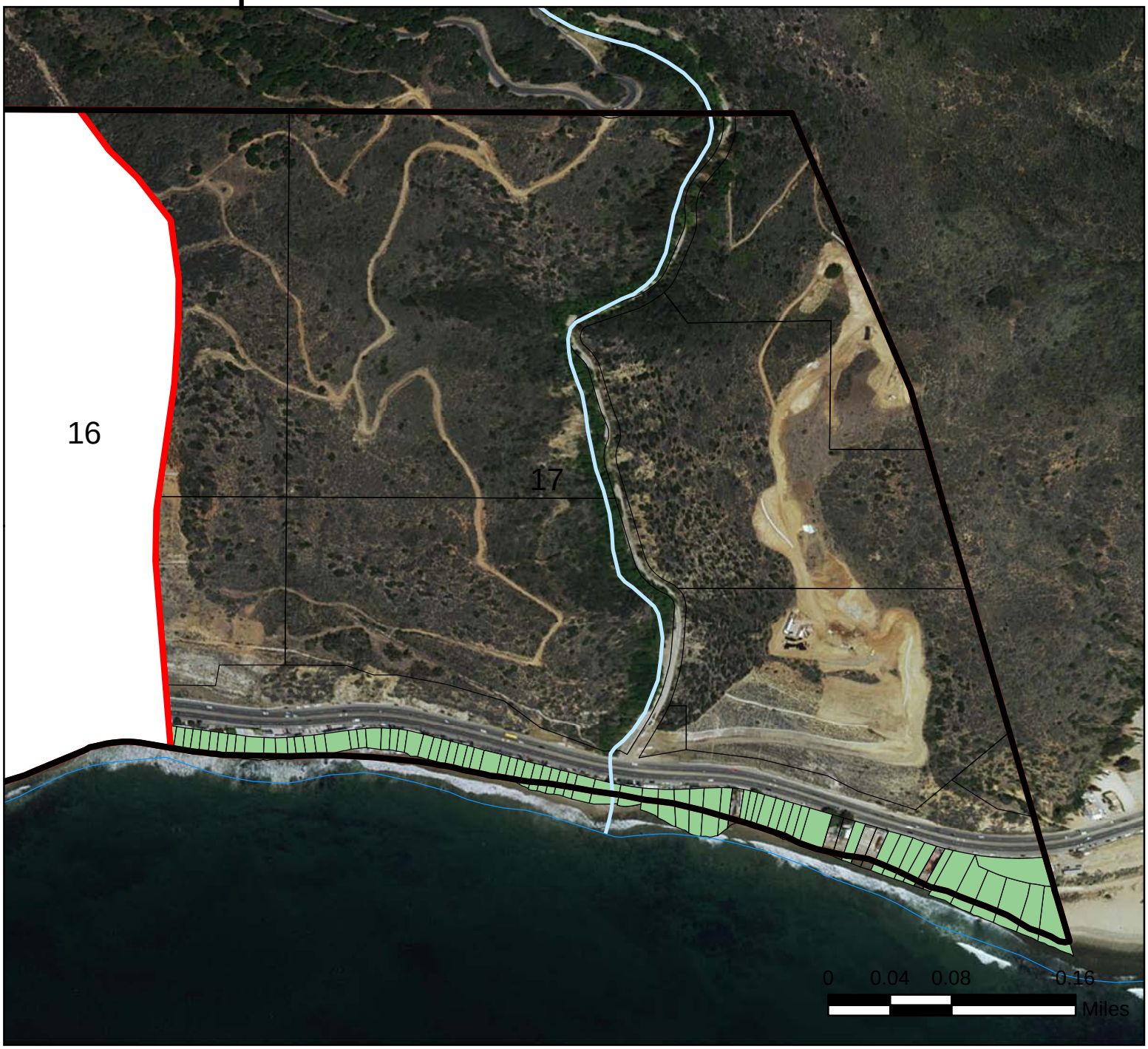
Legend

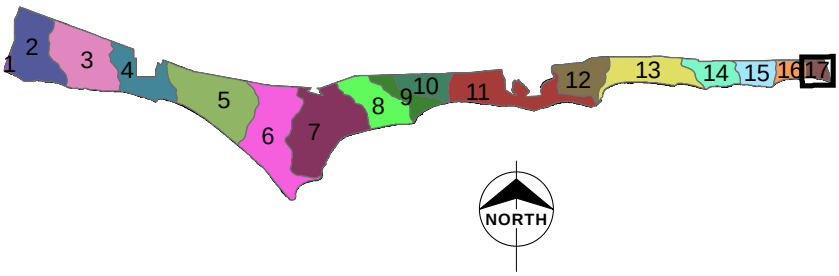
- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Pena Canyon

16

Development Within Malibu Subwatersheds





Legend

- Malibu City Boundary
- Watershed Boundary
- Developed Parcel
- To Package Treatment Plant
- Vacant Parcel

Tuna Canyon

17