Oak Park
Municipal Advisory Council

REGULAR MEETING

Minutes

March 27, 2025, 7:00 pm

Municipal Advisory Council Oak Park

Oak Park High School, Room G-9
899 North Kanan Road
Oak Park, CA 91377

WEB ACCESS
At: ventura.org/oakparkmac
MAC Calendar, Agenda, and Minutes

Welcome to the meeting of the Oak Park Municipal Advisory Council (MAC) an advisory council for the unincorporated area of Oak Park to Ventura County Supervisor Jeff Gorell.

LEGAL NOTICES

Persons who require accommodation for any audio, visual, language, or other disability to review an agenda or to participate in a meeting of the Oak Park Municipal Advisory Council per the American Disabilities Act (ADA), may obtain assistance by requesting such accommodation by calling (805) 214-2510 or e-mailing district2@ventura.org. Any such request for accommodation should be made at least 48 hours prior to the scheduled meeting for which assistance is requested.

All agenda reports and supporting data, including those filed in accordance with Government Code Section 54957.5 (b) (1) and (2) are available from Ventura County

Supervisor Jeff Gorell's office at 2100 E Thousand Oaks Blvd, Suite E, Thousand Oaks, CA 91362. The same materials will be available and attached with each associated agenda item, when received, at the following website: ventura.org/oakparkmac.

Documents including staff materials, comment emails and letters, photos, etc., distributed to the Oak Park Municipal Advisory Council regarding any agenda item during an open session or after the meeting concluded, are posted online and made available for public inspection at ventura.org/oakparkmac.

PUBLIC COMMENT: Public comment is the opportunity for members of the public to participate in meetings by addressing the Oak Park Municipal Advisory Council in connection with one or more agenda or non-agenda items. Public comments by a member of the public at a single meeting are limited to a cumulative total of five minutes at such meeting unless the time allotment is increased or decreased by the Chair depending on the number of speakers. The public comment period during the opening part of the meeting to address non-agenda items is limited to 30 minutes total for all speakers; this 30-minute limit does not apply to items on the agenda.

To maintain a public meeting environment conductive and welcoming to receiving public comments from all members of the public, the audience is discouraged from engaging in displays of support or opposition to staff reports or public comments, including clapping, yelling, booing, hissing or cheering, that may create a disruptive environment for members of the public wishing to participate. Any person who disrupts or impedes the orderly conduct of a meeting will be instructed to cease the disruptive conduct. Failure to do so may result in that person being removed from the meeting.

Members of the public who would like to augment their comments with visual or audio presentations must submit their materials to the supervisorgorell@ventura.org for review at least 48 hours before the meeting. The review will be conducted to determine only whether the materials are on matters within the jurisdiction of the Municipal Advisory Council, would be disruptive of the meeting, or would foster illegality, such as identity theft. If it is determined that materials are about matters not within the Municipal Advisory Council's jurisdiction, or would be disruptive of the meeting, or would foster illegality, use of County-provided equipment will not be allowed.

Email or Mail Public Comment in Advance of the Meeting: If you wish to make a comment on a specific agenda item by email or mail, please submit your comment by 12:00 p.m. on the day prior to the meeting. Indicate in the Subject Line the Agenda item number (e.g., Item No. 9) on which you are commenting. Your email or written comment will be distributed to the Municipal Advisory Council and placed into the item's record for the minutes of the meeting. Public Comments submitted in writing are public records and subject to disclosure. An unredacted version is made available when records are requested by a Public Records Act request. Please do not submit personal contact information you do not want to be made public. Please submit your comment to district2@ventura.org or mail to: Oak Park Municipal Advisory Council, Supervisor Jeff

Gorell, 2100 E. Thousand Oaks BLVD Suite E, Thousand Oaks, CA 91362.

In-Person Public Comment: If you would like to provide a verbal comment in person during the meeting, upon arrival at the meeting location, check in with staff and complete a comment card. When your name is called for public comment, please proceed to the podium. If you do not wish to pre-register but would like to provide in-person comments at the meeting, you must check in with the staff prior to the agenda item being called.

Video Recording – Live Stream Information of Meeting
View the meeting on the livestream at the following link:
https://www.youtube.com/@vcd2super/streams.

OPENING

1. Call to Order Brian Trushinski 7:03 pm
2. Roll Call Brian Trushinski, Jane Nye, Brianna Adams, JL Diaz, Michelle Santucci and Madeleine Kim (**OPUSD** student representative)
3. Pledge of Allegiance
4. Approve Minutes of the February 27, 2025, MAC meeting motion to approve minutes as amended with mention of full name of Madeleine Kim within the minutes. Moved by JL Diaz, Briana Adams Second, All in Favor
5. Agenda Review and Approval, Jane Nye Moved to approve, Michelle Santucci second, **All in Favor.**
6. Approve Consent Items Motion to approve Jane Nye, Brianna Adams second, All in Favor

   Consent Item A: Recommendation to Receive and File: Ventura County Sheriff's Office Report

   Consent Item B: Recommendation to Receive and File: California Highway Patrol

   Consent Item C: Recommendation to Receive and File: CSA 4 Landscape Committee Report

   Consent Item D: Recommendation to Receive and File: March 2025 Oak Park MAC Tickler Log

   Consent Item E Recommendation to Receive and File: Ventura County Fire Department Report.
7. Public Comments

A. Tom Hansen – Reported that he reached out to the Acorn and asked for coverage. He offered to provide a written report to the Acorn after each meeting in hopes they will include coverage about the MAC in the printed Acorn newspaper.

B. Deena Perry - Request for a plaque on a bench for Ron Stark at Mae Boyer Park. Request that this item on next MAC meeting agenda

C. Deena Perry - Request for ambulance time report every month or every other month to MAC.

D. Deena Perry - Geoengineering of the skies in Ventura County. She wants legislation to ban it.

E. Brett Austin – Concerns about bike safety. He has provided a power point called Active Transportation. He wants more awareness, enforcement and education about bike safety.

F. Brett Austin - Concerns about Sunrise Creek. He's provided a power point that is labeled Sunrise Creek.

G. Janet Jackson – Wants trees removed on Los Arcos. Very concerned about the fire risk and wants them taken out immediately. There was discussion about having this on the agenda and perhaps having a forum to discuss the item in the future. JL Diaz asked for Ms. Jackson's contact info to follow up with Fire Safe Council information.

8. Written Comments
9. Council Comments
10. Oak Park MAC Committee and Liaison Reports:

A. CSA 4 Landscape Committee (Brian Trushinski) printed report provided.

B. Rancho Simi Recreation and Park District Liaison (Brian Trushinski) indicated that Deer Hill Pickle Ball court work continues until April and possibly

May, three weeks behind schedule for weed abatement, will be clearing debris from 100 ft minimum from structures, from Bromey to Kanan Rd. Dept Fish and Wildlife agreement in place.

C. Legislative Committee (Michelle Santucci & Brian Trushinski) no new County Board of Supervisors agenda information pertaining to Oak Park.

D. Oak Park Unified School District Liaison (Brianna Adams) - Brianna Adams reported that Outsiders will be preformed at OPHS April 24-26, OPHS took 1st Place in the Science Olympiad Competition, it was the first time heading to State in 8 years, Medea Creek Middle School Abilities Awareness Program was just completed. Oakparkfest.com is coming and is an opportunity to help support local schools. Education Foundation needs more support. 80 percent of residents no longer have school aged kids. The Foundation would like more people involved in the Board. Contact Stefanie.amar@oakparkeducation.org.

E. Fire Safe Council Liaison (JL Diaz) - Oak Park Fire Safe Council came to the last meeting and was very helpful. Their website is very helpful for information for residents to understand how to protect their property. https://opfsc.org/

F. Triunfo Water & Sanitation District Liaison (Jane Nye) Jane provided flyers for student art contest with Metropolitan Water District. Winner gets $100 and $25 to each of students who submits artwork. Fire scaping provided in March. 40 attendees were at the training. There will be a Saturday workshop on drip irrigation. 50 people signed up. More information at https://www.triunfowsd.com. New technology was piloted recently that could help during droughts. More information at https://www.kclu.org/local-news/2025-03-25/new-technology-which-could-help-ease-droughts-being-tested-in-the-conejo-valley.

G. OPHS Student Liaison (Madeline Kim) Rally and Spring Fling dance,

fundraisers happening with ASB and PFA to help support school/students. April 11 is a fundraiser where the community can also support the cause. Testing all next week.

11. Announcements and Other Business –
    A. Michelle Santucci – Suggested a forum to discuss what trees are fire safe and what trees are a fire hazard. Jane also agreed with this item and asked for any info about the Fire Safe Council input on item. JL Diaz agreed it should be an agenda item.
    B. Brianna also asked that protected bike lanes be added to the agenda for April. Also announced the launch of Oak Park social media accounts.
    C. JL Diaz asked for Ron Stark bench/plaque be on the next agenda including funding.
12. Introduce Supervisor Gorell or a representative from his office for remarks. Students from the Brain Stormz robotics team were invited to provide their presentation instead of D2 comments.

Regular Agenda

13. 2025 Tech Challenge (FTC) Southern California Regional Championship
    - Presentation from Brain Stormz Team - Students and coach talked about their work building their robot and how successful they were at the competition. The team is headed to the World Championships.
14. Oak Park CSA 4 Budget Funding for Volunteers in Policing Program
    - Presentation from County Sheriff's Office – No representative was available.
15. Oak Park CSA 4 Budget Funding for Ventura County Watershed Protection District's Green Streets Program
    - Report on the Health of the Environment in Oak Park.
    - Actions Taken in 2024 to Protect and Improve the Environment.
    - Power point provided by Public Works.
    - Website about Green Streets also provided by Public Works: https://uninc.vcstormwater.org/oak-park-green-streets-urban-retrofit/.

OAK PARK MAC - REQUEST TICKLER LOG (CLOSED)

Ref #	Date Requested / Reported	Category	Sub Category	Request / Issue Description	Activity / Update	Priority / Time Sensitivity (Low, Med, High, Critical)	Responsible Party	Status	Estimated or Actual Completion Date
2	5/30/2023	Public Safety	Roads & Transportation	Install speed bumps on Conifer Street, between Kanan Road or Satinwood and Smoketree. This is a route for children attending Brookside Elementary and Mae Boyer Park. Car speeds are up to 45mph at all hours of the day and night. Written comment received via email from resident Alison Kollee to Dale Thomas and included MAC June 2023 agenda packet.	**Update 2/18/25:** Per Roads and Transportation, the road is posted at 35mph per a 2018 Engineering &Traffic Study that is used to establish Speed limits on roadways. Another speed survey would likely not bring the speed limit down to 25mph. One of the requirements for speed humps is that it can be installed only on Roadways with speed limit 25 MPH or lower. There are also 25mph school zone signs. This is an enforcement issue & CHP may need to be notified.	Medium	VC Supervisor	Closed	2/18/2025
3	3/28/2024	Public Safety	Crime Report	Requested future VCSO crime reports be expanded to include all crimes reported in OP, such as those reported in The Acorn, not just property crimes.	**Update 5/30/24:** Current report and reports thereafter have included all crimes**.** **Update 4/25/24:** Per VCSO Detective Tim Behrand future reports will include all reported crimes.	Low	VC Superisor / VCSO	Closed	4/25/2024
6	6/27/2024	Public Safety	Crime Prevention	Suggestion from the public for VCSO to create a Neighborhood Watch program	**Update 7/25/24:** As reported by Supervisor Gorell's office, Neighborhood Watch is a matter of private citizens to implement, not law enforcement.	Low	VC Supervisor	Closed	7/25/2024
10	9/26/2024	Public Safety	Vegetation	Juniper bushes at the intersection of Kanan Road and Tamarind Street (southeast side) require additional pruning as they are blocking driver visibility.	**update 11/30/25:** All bushes were removed. **Update 10/21/24:** Public Works has deemed this to be a traffic safety issue and a notification has been sent to the property owner to resolve. **Update 9/26/24**: Ashley will request status from Public Works.	High	Public Works	Closed	11/30/2024

Published 3/27/2025

VENTURA COUNTY FIRE DEPARTMENT

Dustin Gardner
Fire Chief
2400 Conejo Spectrum Street, Thousand Oaks, CA 91320

Website: **VCFD.org**
Twitter: **@VCFD**
Facebook: **@VenturaCountyFire**
Instagram: **@VenturaCountyFire**

Contact: Scott Thomsen
Direcotor of Communications and Public Affairs
Phone: **(805) 914-8502**
Email: **scott.thomsen@ventura.orgOcto**

March 5, 2025

Attn: Supervisor Jeff Gorell and Municipal Advisory Committees

- The Ventura County Fire Department is scheduled to start carrying whole blood in its rescue ambulances in April. This program will allow paramedics to start transfusions for bleeding patients before they reach the hospital, increasing the chances of survival for seriously injured people.

- Firefighters are scheduled to start moving into new Fire Station 34 in Thousand Oaks on March 10. Some concrete work remains to be completed, but operations will be possible while that work continues. A grand opening celebration could take place sometime in May.

- VCFD has received four new Type III Brush Engines, which are now being outfitted with radios and other equipment. Engineers also will receive training on the new apparatus before they are deployed to the field. The new engines are 4-wheel-drive, enhancing the department's wildland firefighting capabilities. These four are the first in an 11-engine order. The rest are currently scheduled to arrive over the next 12-18 months.

- The VCFD Awards is scheduled April 24 at the Thousand Oaks Civic Arts Plaza, Scherr Forum Auditorium. In addition to firefighter of the year awards in each battalion and employee of the year awards for each bureau, the department will honor civilians and public safety personnel for lifesaving acts, meritorious service, and to four individuals, medals of honor – the highest honor the department bestows.

Sincerely,

Scott Thomsen
Director of Communications and Public Affairs
Ventura County Fire Department

Oak Park MAC CSA 4 Landscape Committee Report
Submitted by: Brian Trushinski, CSA 4 Landscape Committee Chair
March 27, 2025

- The County Public Works Agency (PWA) conducted tours of CSA 4 on March 19th to contractors who are bidding on the landscape RFP. The selected contractor will begin July 1, 2025.

- Two juniper trees planted in the Kanan Road median between Conifer St, and Smoke Tree Ave. in 2024, have been staked and straightened.

- To reduce the landscape budget, PWA has agreed to plant perennials instead of annuals in front of the 'Welcome to Oak Park' monument sign on Kanan Road (south of Conifer Street). Also, the solar lights that illuminate the sign need have been replaced.

- There are several bare-patch areas on the hillsides along Kanan Road (north & northeastern side) between Golden Eagle Dr. and Los Arcos Dr.) that need planting and irrigation investigation. Enhanced Landscapes will provide a cost estimate by the April MAC meeting.

- There are notable bare-patch areas on both sides of Hawthorne Dr. between Cremona Way and Kanan Rd. that need planting and irrigation investigation. Enhanced Landscapes will provide a cost estimate by the April MAC meeting.

- There are new bare-patch areas on the north side of Hawthorne Dr. between Bowfield St. and Rockfield St. that need planting. Enhanced Landscapes will provide a cost estimate by the April MAC meeting.

- At the January 30, 2025, MAC meeting, a resident requested that the County remove all the mature pine trees located on the north-west side of Los Arcos Dr. (between Monteleone Ave. and Churchwood Dr.) for wildfire safety purposes. PWA staff informed that these trees were trimmed a couple of months ago and removal is not supported.

- No irrigation breaks in March.

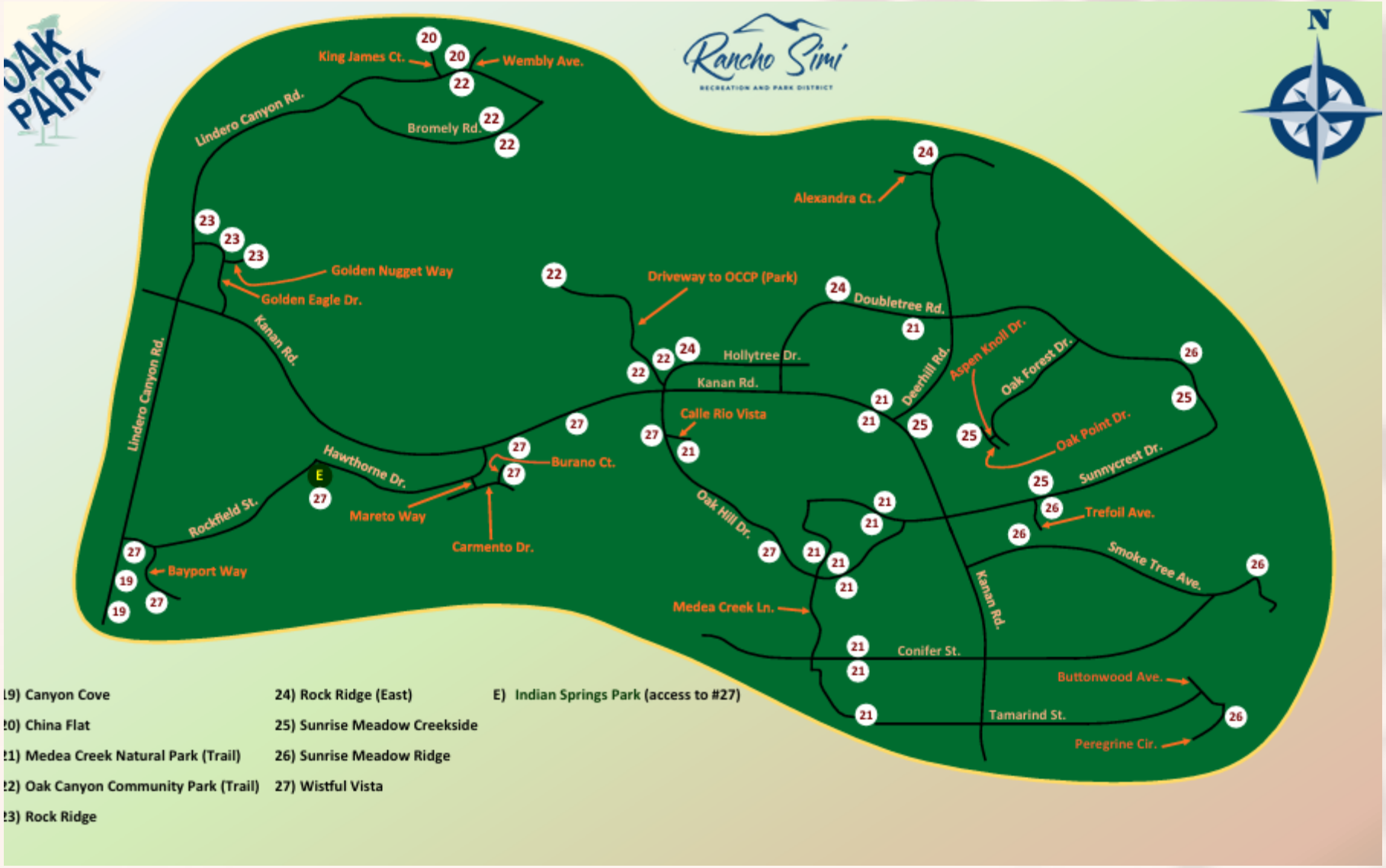
-End of Report -

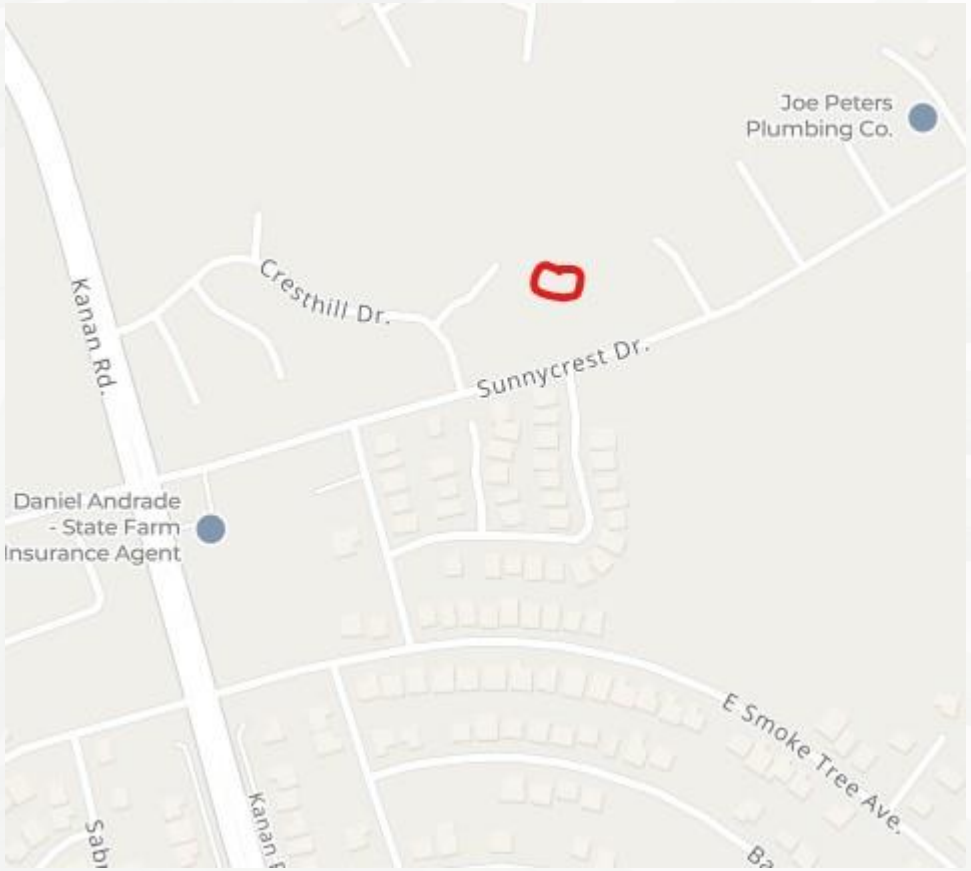
Sunrise Meadow trail concern

June 19, 2024 reported dumping on the trail

June 28, tires and plastic had been removed, but Brush and lumber remained.

Oct 10, reported that the natural water flow had been dammed


OAK PARK
Rancho Simi
RECREATION AND PARK DISTRICT
N
King James Ct.
Wembly Ave.
Lindero Canyon Rd.
Bromely Rd.
Alexandra Ct.
Golden Nugget Way
Golden Eagle Dr.
Kanan Rd.
Driveway to OCCP (Park)
Doubletree Rd.
Hollytree Dr.
Deerhill Rd.
Aspen Knoll Dr.
Oak Forest Dr.
Oak Point Dr.
Sunnycrest Dr.
Trefoil Ave.
Smoke Tree Ave.
Calle Rio Vista
Burano Ct.
Hawthorne Dr.
Rockfield St.
Mareto Way
Carmento Dr.
Bayport Way
Oak Hill Dr.
Medea Creek Ln.
Conifer St.
Buttonwood Ave.
Tamarind St.
Peregrine Cir.
19) Canyon Cove
20) China Flat
21) Medea Creek Natural Park (Trail)
22) Oak Canyon Community Park (Trail)
23) Rock Ridge
24) Rock Ridge (East)
25) Sunrise Meadow Creekside
26) Sunrise Meadow Ridge
27) Wistful Vista
E) Indian Springs Park (access to #27)


Joe Peters
Plumbing Co.
Cresthill Dr.
Kanan Rd.
Sunnycrest Dr.
Daniel Andrade
- State Farm
Insurance Agent
E Smoke Tree Ave.

Dec 31, 2024

Feb 26,2025

Water is continually blocked

What can we do to get this watercourse repaired?

Thank you

Brett Austin

805-910-8859

Brettaustin2240@gmail.com

16. Draft CSA4 Budget Review and Recommendation – 2nd and FINAL Round for MAC Input
    A. School District Crossing Guards: The MAC recommends approval of the Oak Park Unified School District Crossing Guard FY26 (2025-26) budget not to exceed $275,000.00, and that the District provide written reports at the October 2025 and March 2026 MAC meetings on its progress for obtaining grants and other available sources of funding for crossing guard services in 2026.
    B. County of Ventura Green Streets Program: The MAC recommends approval of the Green Streets Program FY26 (2025-26) budget not to exceed $40,000.00, and that the County Public Works Agency provide quarterly written reports to the MAC on all identified environmental problem areas, violations, corrective actions taken, and the state of environmental health in Oak Park as a result of the Green Streets Program.
    C. County of Ventura CSA 4 Landscape Services: The MAC recommends approval of the CSA 4 Landscape FY26 (2025-26) budget not to exceed $510,000.00, and that the County Public Works Agency provide a written report at the June 2025 MAC meeting, or sooner, identifying all cost reduction measures in the new Landscape RFP that will be taken starting July 1, 2025, and corresponding budget savings.
    D. MAC recommends approval of CERT and VIP for FY 26 (2025-26).
    E. Brianna Adams requested more information about the number of homes in Oak Park and the difference paid by each home to meet any deficit. For example, each home is paying $17 annually. What more would people need to pay to make sure there wouldn't be a deficit.
    F. A community member Deena Perry asked for more information about what $17 covers and what property tax covers for services in Oak Park. There was discussion that it would be helpful to have a presentation on the CSA and how other unincorporated areas manage services.

17. Ventura County Public Works Transportation Division Updates

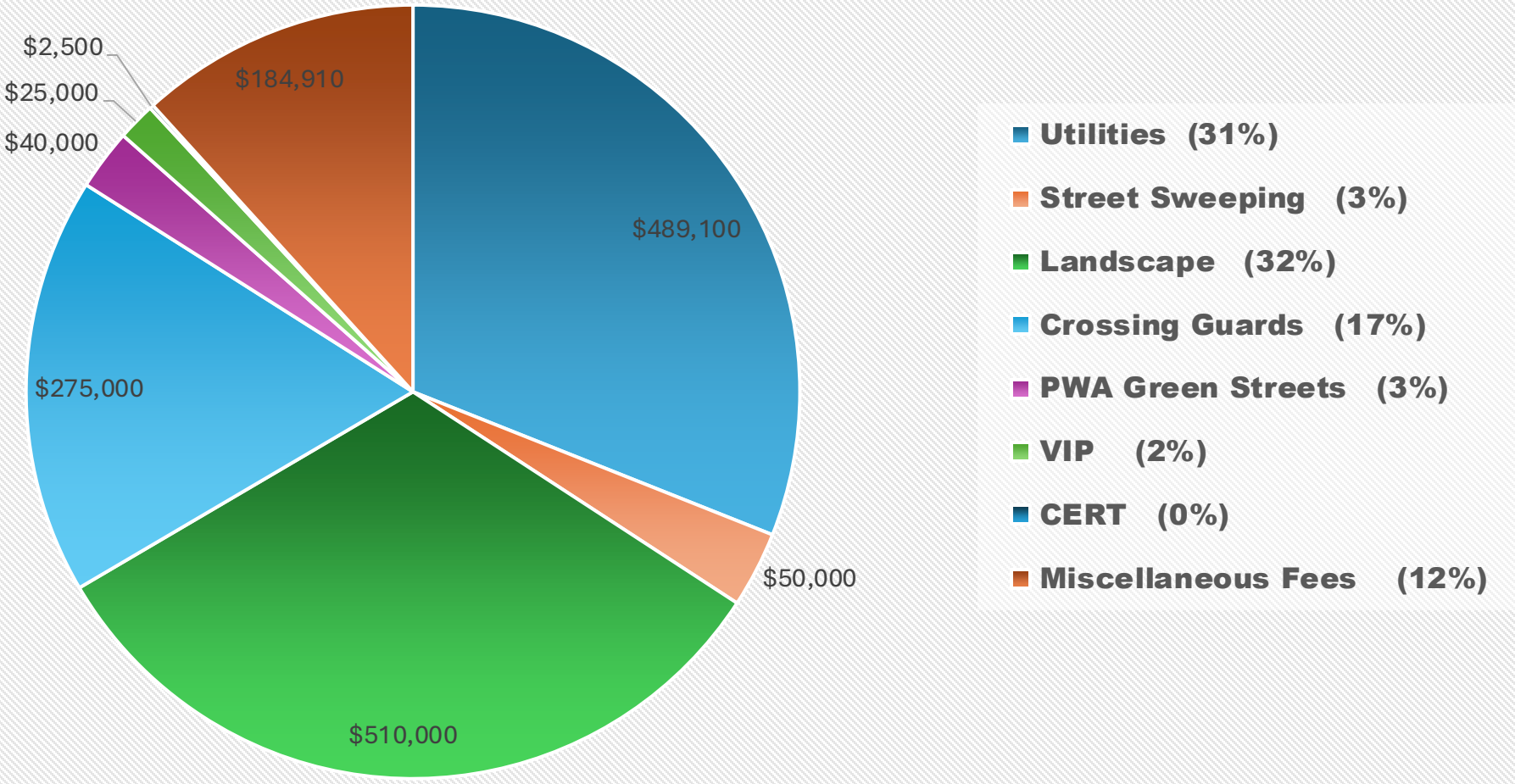
- Left turn at Los Arcos Drive & Kanan Road – safety study conducted. Recommendation of keeping the left turn lane closed. Power point provides photos and additional information.
- East Oak Park Paving and Signal Improvement Project included in power point.
- Rectangular Rapid Flashing Beacon across Conifer St. at Bayberry St. Included in power point.
- Signal monitoring cameras installed at Kanan and Sunnycrest and Kanan and Conifer to help in determining when signals are not working.
- New street paving and sidewalks are expected to be completed in 2026.

CLOSING

18. Adjournment 10:13 pm

    Next Oak Park MAC Meeting April 24, 2025, 7:00 pm OPHS High School G-9, 899 Kanan Rd, Oak Park.

Oak Park MAC
2025 – 2026 CSA 4 Budget Proforma



Revenue - $1,242,097 **Expenses - $1,576,510** **Overrun - $334, 413**

OAK PARK MAC - REQUEST TICKLER LOG (OPEN)

Ref #	Date Requested / Reported	Category	Sub Category	Request / Issue Description	Activity / Update	Priority / Time Sensitivity (Low, Med, High, Critical)	Responsible Party	Status	Estimated or Actual Completion Date
1	2023	Public Safety	Roads & Transportation	Street paving: It has been several years since main and residential streets have been repaved.	**Update 2/18/25:** Per Roads and Transportation, paving in the East Oak Park area is scheduled for summer 2026. A map of proposed locations is attached.	Low	VC Supervisor	Pending	December 2026
4	4/25/2024	Public Safety	Pedestrian Sidewalk	On Lindero Canyon Road there is no sidewalk causing pedestrians to walk in the street.	**Update 11/21/24:** Seema requested this item be reopened and for VC to work with LA County to have this addressed. The request is for the sidewalk to be extended, on the eastside of Lindero, from the Ventura and LA county line (where OP ends) to TO Blvd. **Update 5/30/24:** As reported by Dale Thomas, this is not in VC jurisdiction as it is not in Oak Park.	Low	VC Supervisor	Re-opened	TBD
5	5/30/2024	Construction / Real Estate	Enhancement - Community Signage	Requested estimate to install a "Welcome to Oak Park" monument, with solar lighting and planting on Lindero Canyon Road similar to that on Kanan Road.	**Update 9/26/24:** Request for cost estimate requested again after learning from Real Estate there is no budget and recommended private/community funding as an alternative. The MAC will consider this project during the 2025 CSA#4 budget process. **Update 7/25/24:** VC Real Estate reviewing request.	Medium	Public Works	Pending	2/27/2025
7	9/16/2024	Public Safety	ADA Compliance	Two of the four crosswalk curbs at the 4 way stop intersection of Medea Creek Lane and Oak Hills Drive are not ADA compliant. Public Works incident #15973354.	**Update 2/18/25:** Per Roads and Transportation, this will be included in the East Oak Park pavement resurfacing project. Construction is anticipated to be completed next year, in 2026. **Update 10/7/24:** The intersection will be part of a future pavement resurfacing project including upgrades to all 4 curb / curb ramps. Construction is anticipated to begin Summer 2026. **Update 9/17/24:** Incident assigned to / received by Design and Construction **Update 9/16/24:** Reported to Public Works via the portal.	High	Public Works	Pending	December 2026
8	9/26/2024	Public Safety	Crime Report	Request that beginning in January 2025 VCSO provide quarterly License Plate Readers (LPR) metrics, specifically regarding access as it directly relates to crime investigations in Oak Park, and the investigation results.		Low	VCSO	Pending	January 2025 April 2025 July 2025 October 2025
9	9/26/2024	MAC Meetings	Community Engagement	Resume using Live Streams at all MAC meetings regardless of there being a lack of public participation in the past. Without it, residents believe that meetings are not inclusive or transparent. Make the Live Streams interactive so that viewers can participate in the discussions.	**Update 10/1/24:** Supervisor Gorell's staff working to secure people resources required during live streaming sessions.	Medium	VC Supervisor	Pending	January 2025
11	9/26/2024	Public Safety	Medea Creek	Community members are very concerned about the lack of coordination, communication and permits regarding the clearing of Medea Creek. Most recent maintenance project, the impact and failures were outlined in an email from resident Steven Kozel to the new Public Works Director, Greg Strakluse, on 9/24/24. The MAC requests that the public have the opportunity to review and provide input on the DRAFT Watershed Protection District's 2025-2030 DRAFT CDFW Routine Maintenance Agreement for consideration and inclusion in the final Agreement submission to CDFW (due by year-end).	**Update 3/24/25:** During the January 2025 MAC meeting, PW expressed their committment in finding a balance between adhering to clearance safety protocol while respecting a natural aesthetic (e.g., not cutting everything back). The MAC goal remains to have a management plan for the area and the MAC is awaiting to receive a copy of the Approved 2025-2030 Routine Maintenance Agreement from PWA Waterhed. **Update 9/26/24:** DRAFT CDFW Routine Maintenance Agreement to be provided as part of the October meeting packet and Ashley will invite Watershed staff to attend to address community	High	VC Supervisor	Pending	~~10/21/2024~~ 06/30/2025
12	9/26/2024	Public Safety	Roads & Transportation	Publish Transportation Department's 2020-2025 CDFW Routine Maintenance Agreement on Supervisor Gorell's website and include in the October 2024 OP MAC meeting packet. The was previously requested at the June 27, 2024 and July 25, 2024 MAC meetings.	The 2020-2025 CDFW Routine Maintenance Agreement has been published on the VC website.	Medium	VC Supervisor	Closed	10/21/2024
13	9/26/2024	Public Safety	Roads & Transportation	Request that at the 09/25/2025 September 2025, MAC meeting, the public have an opportunity to review and provide comments for Transportation's consideration on their DRAFT 2026-2031 CDFW Routine Maintenance Agreement.	**Update 2/27/25:** The Oak Park MAC received and filed as a Consent Agenda item at the February 27, 2025, MAC meeting. This item will be brought back at the October 2025 MAC meeting as part deliberations for the draft 2026-2031 Ventura County Transportation Agreement with the California Department of Fish & Wildlife.	Medium	VC Supervisor	Pending	10/31/2025
14	1/30/2025	Public Safety	Roads & Transportation	Community member, Ms. Jackson, requested that the pine trees located along Los Arcos be considered for removal due to the fire danger they present.	**Update: 3/20/25:** Trees were trimmed in 2025 and maintenance will continue as scheduled, however they will not be removed. **Update 2/25/25:** PW ticket submitted #16560909 **Update 1/30/25:** Recommended Ms. Jackson to open a ticket with Public Works.	Medium	VC Supervisor	Closed	3/20/2025
15	1/30/2025	Public Safety	Roads & Transportation	Ask the appropriate city jurisdiction to consider reducing the speed limit on Lindero Canyon Road (Kanan Road to Lakeview Canyon Road) from 50 mph to 35 mph for safety purposes. Note: this concern was raised by Mr. Steven Kozel during the January 20, 2025 MAC meeting.	**Update 3/21/25:** County jurisdiction on Lindero is only north of Kanan Road. South of Kanan Road to Lakeview Canyon Road is within the City of TO jurisdiction. The City has been contacted to determine if this concern may be addressed.	Medium	VC Supervisor	Pending	4/30/2025
16	1/30/2025	Public Safety	Roads & Transportation	Ask the Ventura County Sheriff to continue to enforce laws that regulate the use of E-bikes, especially early and later evening hours, in the area surrounding Conifer Street (west and east of Kanan Road). Note: this concern was raised by Mr. Steven Kozel during the January 20, 2025 MAC meeting.	**Update 3/20/25:** There have been recent observations along Kanan and elsewhere. CHP acknowledged they have received complaints about reckless bike riding, and will continue to patrol area, with bike enforcement conducted the week of 3/17/25. The community is encouraged to continue to report violations as they occur. Additionally, the Office of Traffic and Safety is connecting with OPUSD to explore opportunities for further safety efforts with students. **Update 2/27/25:** The CHP patrols this area, not the VC Sheriff, and an inquiry has been submitted to them.	Medium	VC Supervisor	In Progress	4/30/2025
17	1/30/2025	Public Safety	Open Space	Ask the RSRPD Board to consider prohibiting public access to its open space areas during high wind/ Red Flag Warning events. Note: this concern was raised by Mr. Steven Kozel during the January 20, 2025 MAC meeting.	**Update 3/20/25:** RSRPD works in partnership with the Office of Emergency Services and if there are advisories in place per OES there would be access closures. Brian Trushinki will also be following up with RSRPD to explore other solutions. **Update 2/27/25:** Awaiting call from and discussion with Dan Paranick.	Low	RSRPD Liaison	Open	4/30/2025
18	1/30/2025	Communications	Community Engagement	Allow the Friends of Oak Park Open Space Board to coordinate with Supervisor Gorell's office to post the organization's community events on the website and on the Oak Park entry signs. Note: this request was raised by Mr. Steven Kozel during the January 20, 2025 MAC meeting.	**Update 3/20/25:** Friends of Oak Park Open Space have been contacted to have content added. **Update 2/27/25:** This can be accommodated, however, there may be character count limitation.	Low	VC Supervisor	Closed	3/20/2025
19	1/30/2025	Public Safety	Roads & Transportation	Advisory Council member, Brianna Adams, requested that the no left hand turn, from Los Arcos onto Kanan, restriction be reviewed.	**Update 3/20/25:** The prior decision, based on the traffic safety study conducted, will not be modified at this time. **Update 2/27/25:** Per the Public Roads and Transportation Traffic Engineering Manager, Matt Litvinas: After receiving several complaints regarding the intersection, a traffic study was performed in 2022. For reasons that include the restricted sight distance in both directions on Kanan as a result of the existing road geometry, combined with the average speed on Kanan Road, the number of vehicles making that left turn from Los Arcos compared to the extended cue of vehicles turning left from Kanan onto Los Arcos, and a safe left turn option at the adjacent signalized Churchwood intersection, it was determined that prohibiting the left turns from Los Arcos onto Kanan was the appropriate action to increase the safety at the intersection.	Low	VC Supervisor	Closed	3/20/2025

PUBLIC VENTURA COUNTY WORKS

Roads & Transportation Oak Park MAC Meeting

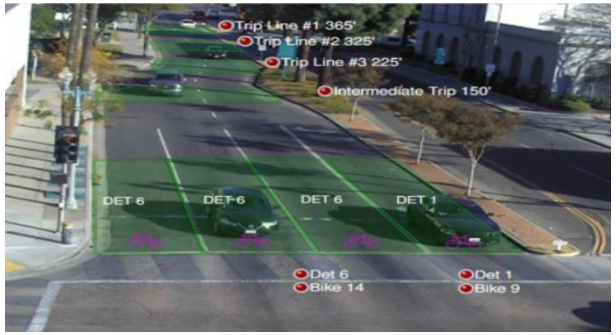
March 27, 2025

Systemic Signal Improvement Project
$6.8M overall, $5.8M from HSIP Grant

Traffic Management Center

Add retroreflective backplates to all signal heads

New signal controllers



Dilemma Zone Detection Cameras and High friction surface treatment At the Golden Eagle Dr, Hollytree Dr/ Oak Hills Dr, Deerhill Rd, Sunnycrest Dr, and Conifer St intersections

Backup power for signals

Systemic Signal Improvement Project Schedule – in Oak Park

- New Controllers have been installed
- Video detection cameras at Golden Eagle Dr, Hollytree Dr/ Oak Hills Dr, Deerhill Rd, Sunnycrest Dr, and Conifer St were installed during the weeks of March 3rd and March 17th.
- Mill & fill + Temporary striping at Golden Eagle Dr, Hollytree Dr/ Oak Hills Dr, Deerhill Rd, Sunnycrest Dr, and Conifer St
- High Friction Surface Treatment at Golden Eagle Dr, Hollytree Dr/ Oak Hills Dr, Deerhill Rd, Sunnycrest Dr, and Conifer St, 1 day each, mid to late May
- Striping restoration, 1 day
- Backplates and Signal Heads, half-day at each intersection planned for early May
- Anticipated project completion June 2025

Backup Power for Public Safety Power Shutoff Events

- Portable Gasoline Generators
  - Pros:
    - Inexpensive
    - Relatively quiet
  - Cons:
    - Manually deployed
    - Need refueling every 4 hours
    - Produce Emissions
    - High probability of theft

- Pad Mounted Gas or Diesel Generators
  - Pros:
    - Generally larger fuel capacity
    - Less susceptible to theft
    - Automatically turned on with power loss
  - Cons:
    - Produce Emissions
    - Need refueling every 8 to 12 hours

Backup Power for Public Safety Power Shutoff Events

- Solar Power
  - Pros:
    - No emissions or noise
  - Cons:
    - Power generation dependent on fair weather
    - Solar array can be large

- Super Capacitor (like a battery)
  - Pros:
    - About 10 hour run time
  - Cons:
    - Not effective for extended PSPS events

Backup Power for Public Safety Power Shutoff Events

- Hydrogen Fuel Cell
  - Pros:
    - Can provide 5+ days of power
    - No noise
    - Clean water vapor emissions
  - Cons:
    - Hydrogen gas cylinders

In Progress/Upcoming Projects

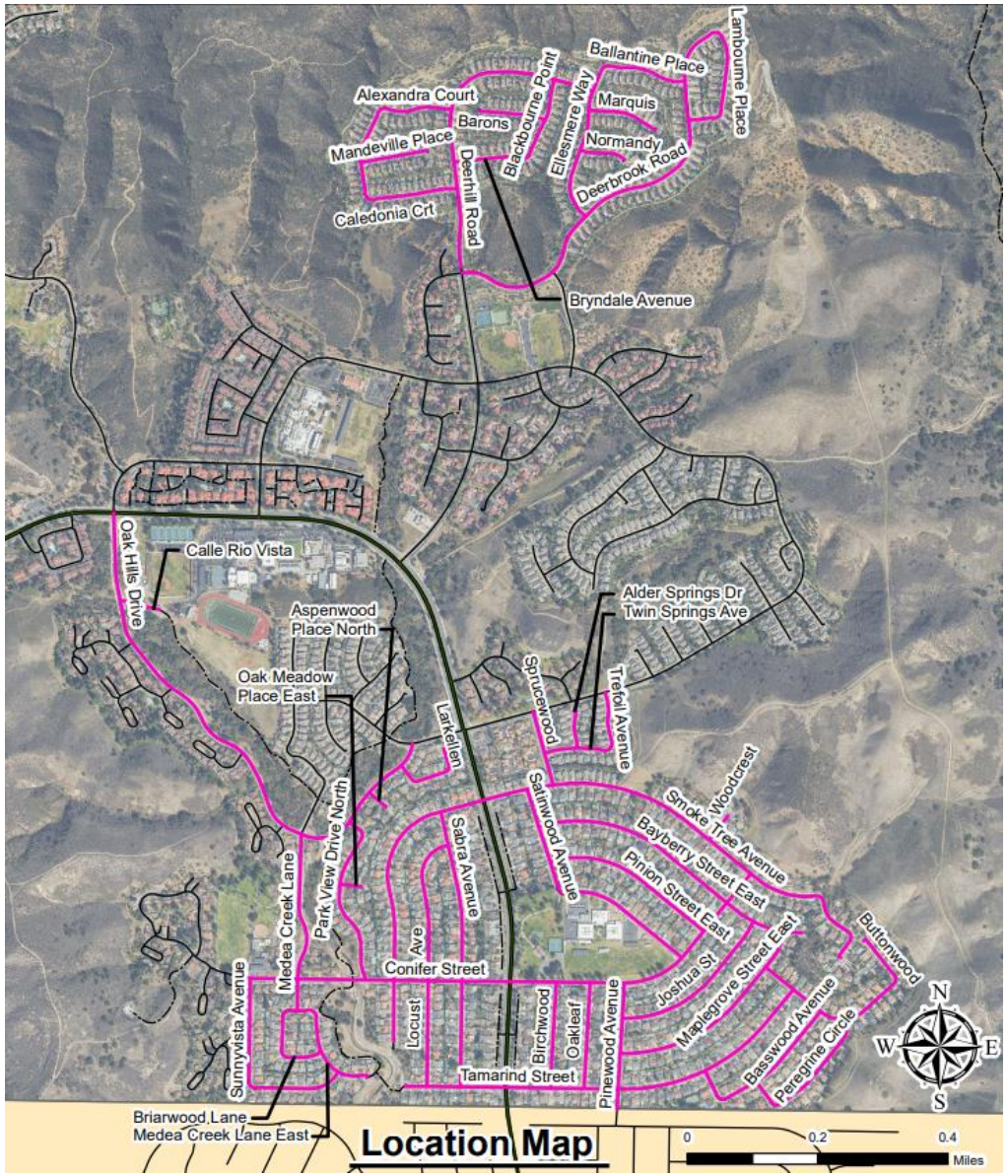
- Adaptive Corridor Study (Ongoing)
  - This is a County wide study to determine if the signalized corridors, including Kanan Road are compatible with an Adaptive Corridor design.
- Crosswalk Enhancements Countywide (HSIP Grant)
  - Install Rapid Rectangular Flashing Beacons (RRFBs) multiple locations Countywide
    - Locations are where there is no stop sign or traffic signal for the vehicular travel direction where pedestrians are crossing
    - Crossing Conifer Street at Bayberry Street
    - Additional locations can be evaluated for future Grant cycles

Oak Park Paving

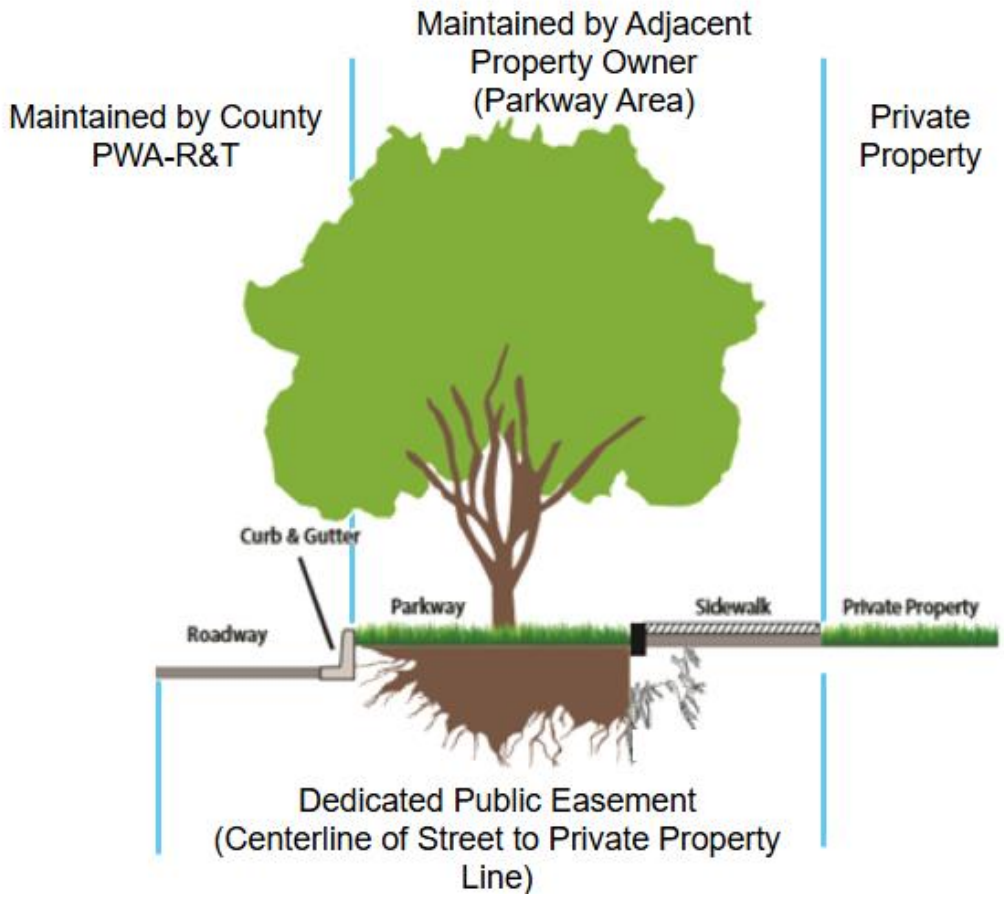
- Scheduled Summer 2026
- Work will include:
  - Pavement resurfacing
  - Repairing Curb & Gutter, Sidewalks & Ramps
- Inspectors and an arborist will begin making small marks to identify repairs
- In the event a repair or replacement is required, the adjacent property owner will be notified and presented with two options

1. Owner makes the repairs

2. Repaired w/ County's project and owner invoiced



Sidewalk & Tree Maintenance Responsibility



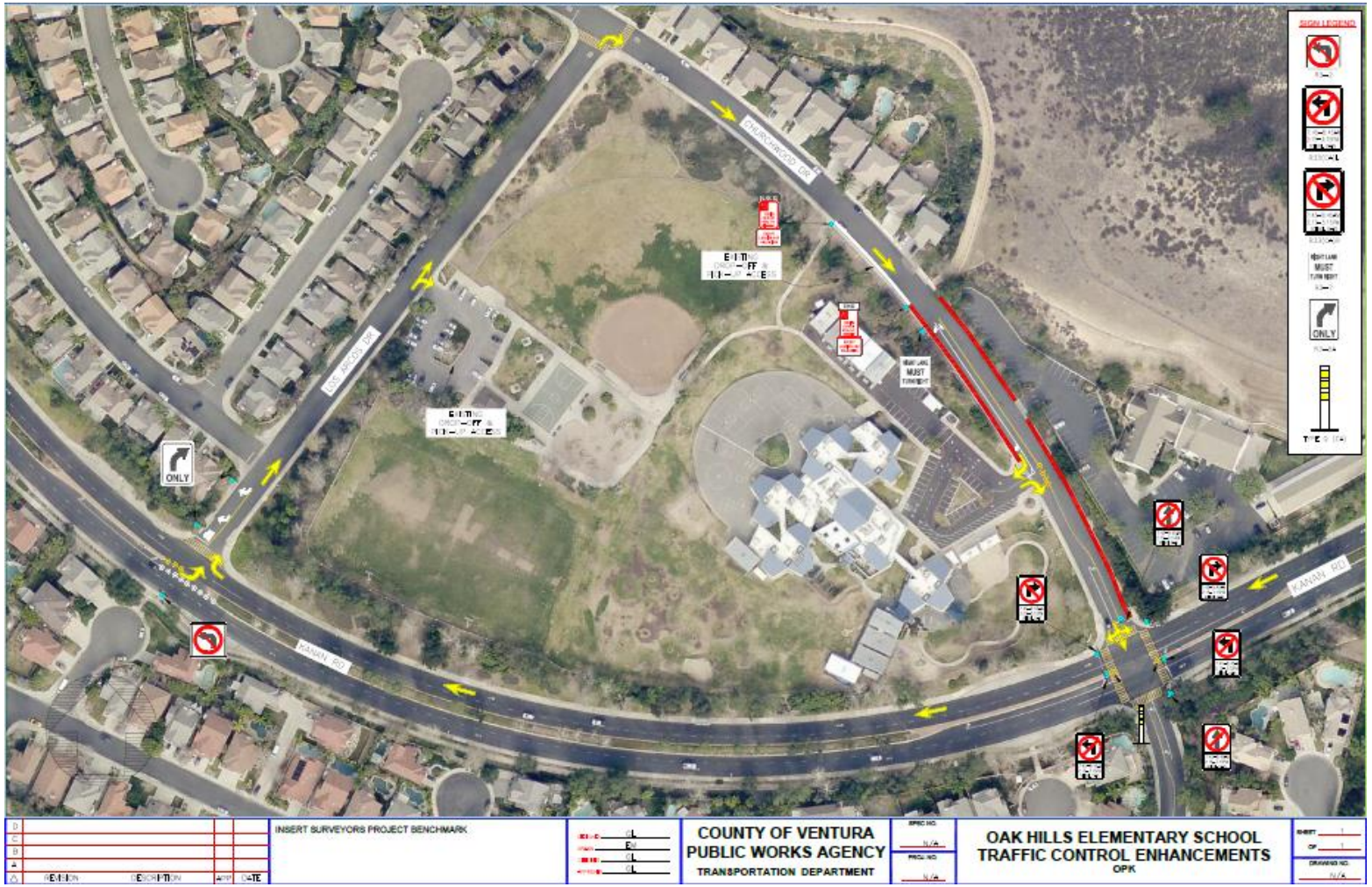
- CA S&H Code Section 5610 – Adjacent property owner is responsible for sidewalk maintenance
- County Ordinance 4355 – Sidewalk maintenance and liability
- 1/2" Maximum sidewalk displacement
- Priority is to protect trees wherever possible without creating a safety hazard

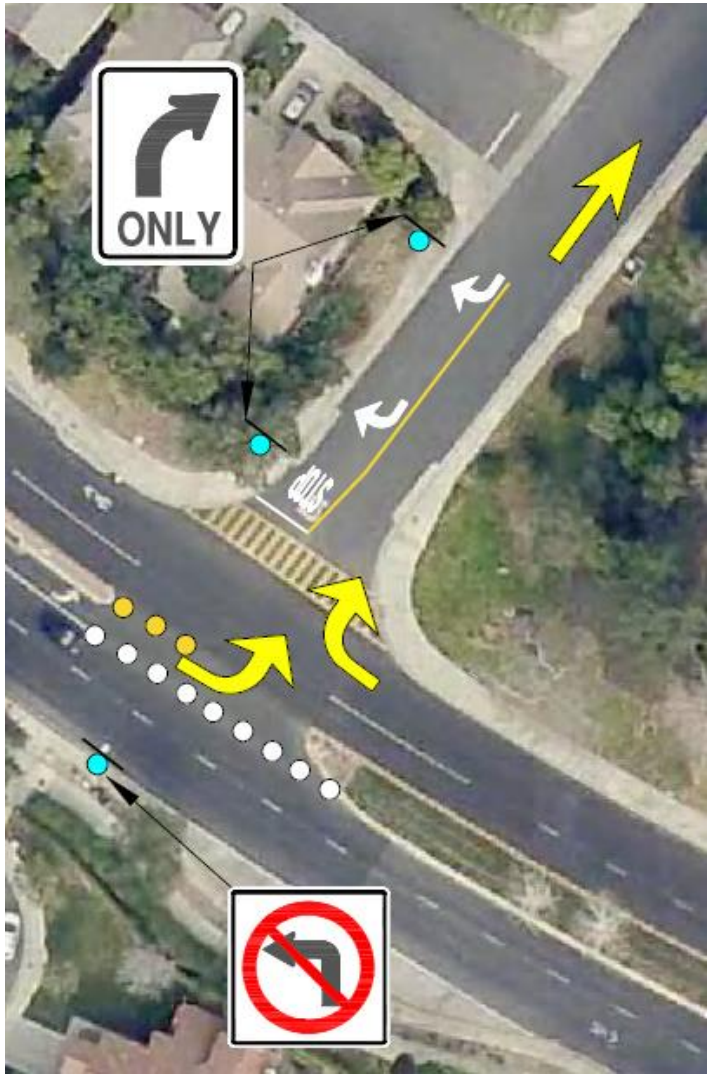
Los Arcos to Kanan No Left Turn

- Background
  - Oak Hills Elementary contacted PWA-RT to improve traffic safety and circulation in the neighborhood area
  - Traffic Team evaluated Kanan/Churchwood and Kanan/Los Arcos intersections with input from Oak Park Unified School District, Oak Hills Elementary, and CHP
    - Churchwood has a traffic signal
    - Los Arcos Dr is uncontrolled and situated on a curve with high traffic volumes (15,000 vehicles/day), high vehicle speeds (48.5 MPH), and below standard sight distances (350 ft, where 430 ft required for right turns and 600 ft required for left turns)
    - 5 collisions in the prior 10 years with 1 including injuries at Los Arcos

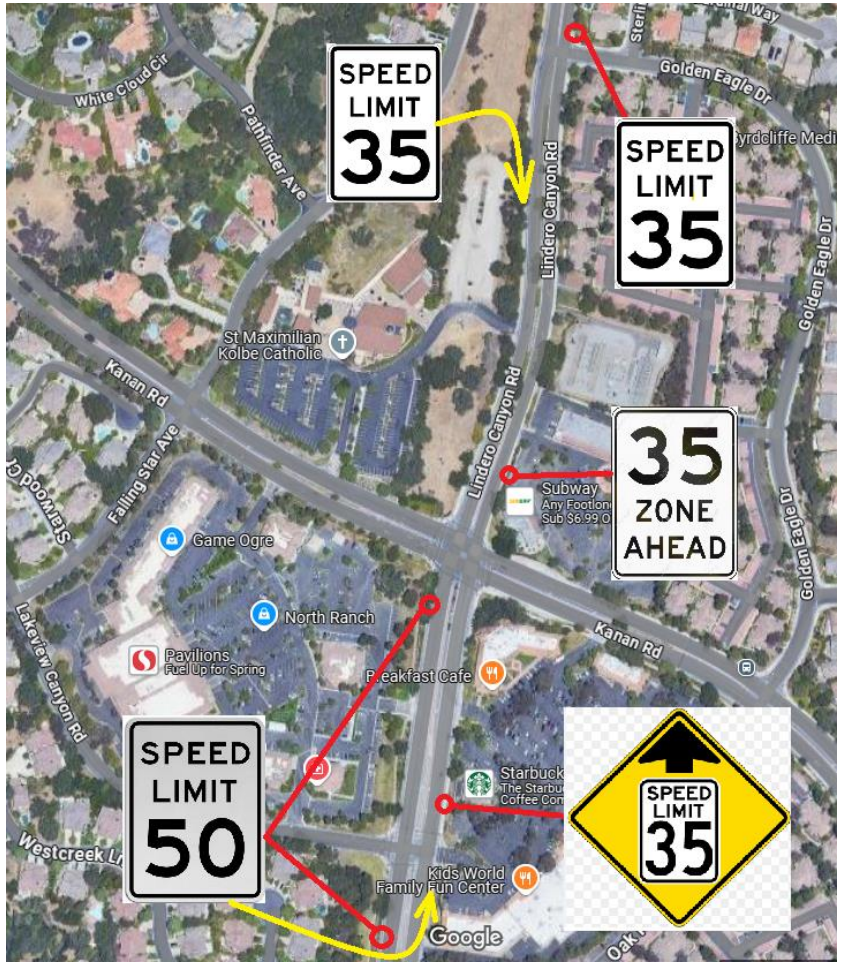
Los Arcos to Kanan No Left Turn

Los Arcos to Kanan No Left Turn





Lindero Canyon Road Speed Limit



Green Streets Program - Maintenance

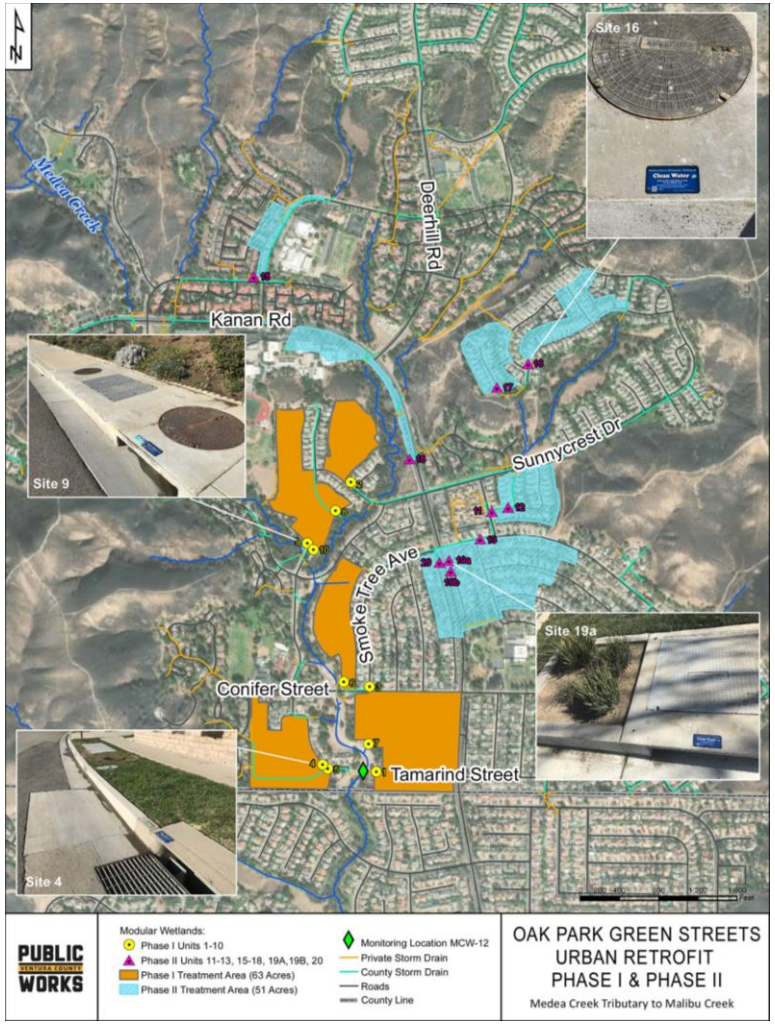
- Maintenance Costs ($76K for FY26)
  - CSA#4 funds 50% on going maintenance ($38K)
  - Other 50% is paid by the general fund contributions

- Maintenance cost covers:
  - Three maintenance events per year
  - Annual replacement of cartridge filters per project's O&M plan

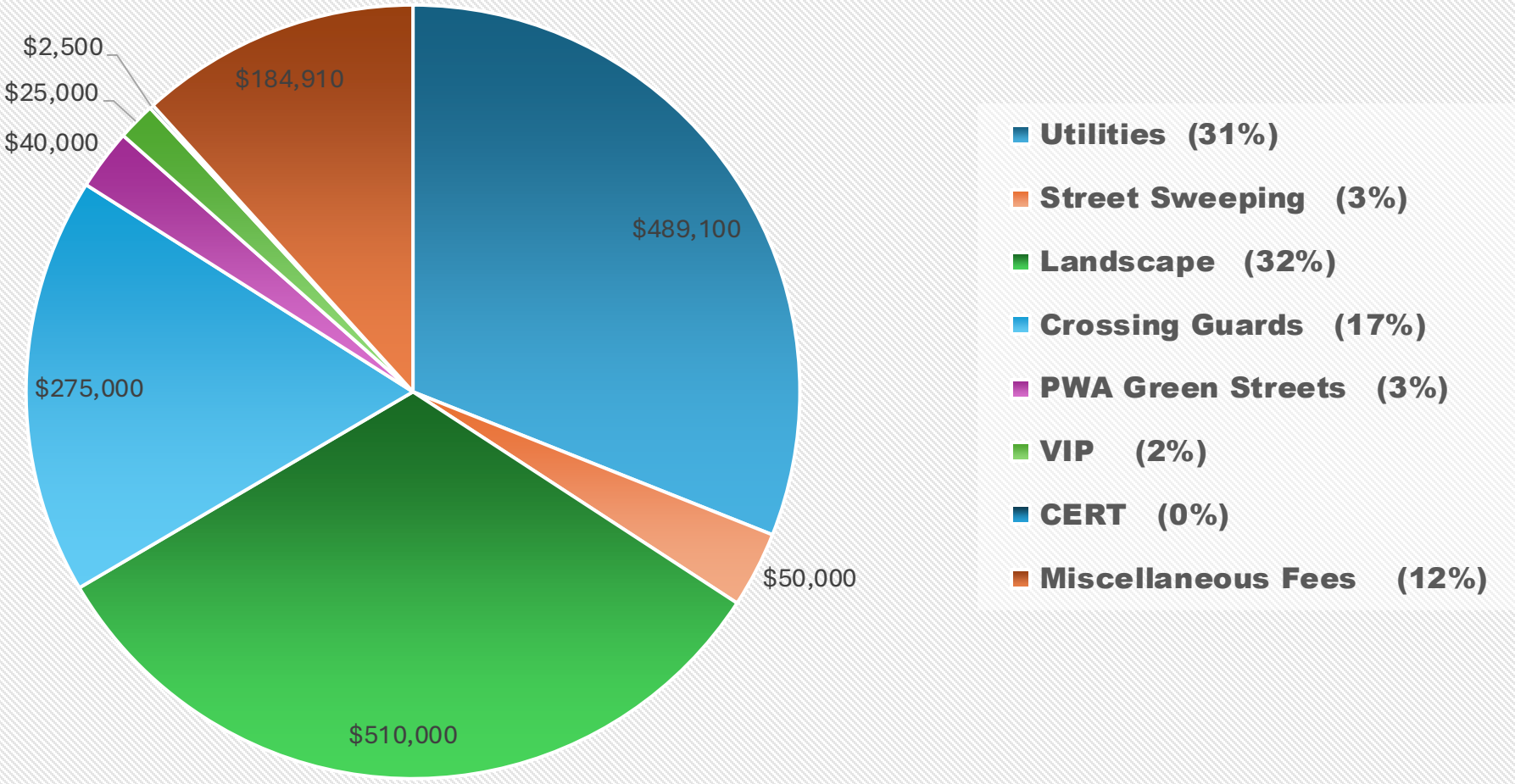
Information available on Project's public outreach website:
https://uninc.vcstormwater.org/oak-park-green-streets-urban-retrofit/.


Modular Wetland– Tamarind St


Modular Wetland– Parkview Dr & Conifer St



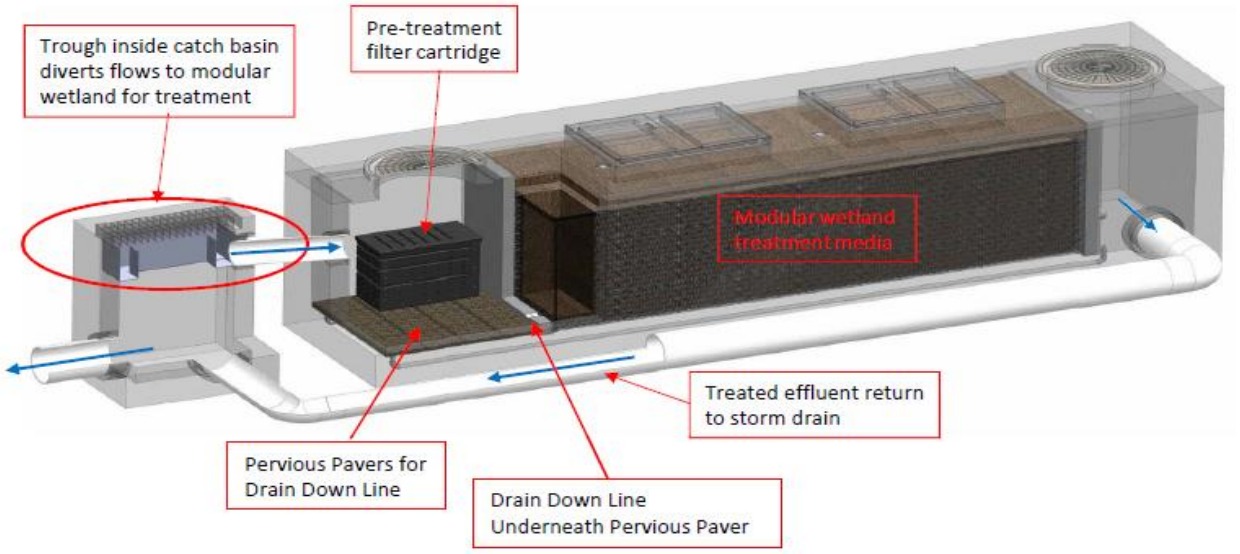
Oak Park MAC
2025 – 2026 CSA 4 Budget Proforma



Revenue - $1,242,097 **Expenses - $1,576,510** **Overrun - $334, 413**

Modular Wetland System

Modular Wetland System Diagram



Questions?

Consent Item D: Recommendation to Receive and File: Oak Park MAC Tickler Log

Summary of Updates

- Requests and Issues – Open

  There are a eleven (11) open / pending items. Refer to the log for additional details.

- Requests and Issues – Newly Closed

  Three (4) items have been closed and will be moved to the "Closed" worksheet for the April report. Refer to the log for additional details.

Appendix B: Water Quality Characterization

September 2023
UPDATED August 2024

PRESENTED TO

Los Angeles Regional Water Quality Control Board

PRESENTED BY

Ventura County MS4 Permittees

CONTENTS

Figures

Tables

Appendix B: Water Quality Characterization

INTRODUCTION

The agencies of the Ventura Countywide Stormwater Quality Management Program (VCSQMP, Group, or Program) are a vibrant quilt of communities at the urban-rural-undeveloped interface. Because of the diffuse urbanization and successfully managed minimum control measures (MCMs), the Program experiences relatively good water quality according to Ventura County's Water Quality Index and the latest Heal the Bay 2021-2022 Beach Report Card. The Group submitted an initial list of Water Body-Pollutant Combinations (WBPCs) across five watersheds—Calleguas Creek, Santa Clara River, Ventura River, Ventura County Coastal, and Malibu Creek—through their Notice of Intent (NOI) letter to participate in a Watershed Management Program (WMP) which was approved by the Regional Board on June 16, 2022. While the categorization of WBPCs in the NOI was based on data from VCSQMP and Total Maximum Daily Load (TMDL) Monitoring Programs, the water quality characterization provided herein leverages other available data sources and special studies to provide a more comprehensive picture of historical water quality conditions unique to each watershed. This analysis also prioritizes which WBPCs are specifically relevant to the Municipal Separate Storm Sewer System (MS4), including taking into consideration other large influences in these watersheds, such as agriculture and industrial facilities.

The goal of the Water Quality Characterization appendix is to summarize recent water quality monitoring conducted across the five watersheds to clearly define the WBPCs, inform pollutant source assessments, and focus the WMP water quality priorities.

The sections of this appendix are organized as follows:

- **Section 1 Data Review:** Reviews the available water quality monitoring data sources, summarizes the process for quality assurance/quality control of the initial Notice of Intent (NOI) submitted to the Regional Board, and summarizes how each data source was used in the WMP (e.g., exceedances analysis for WBPCs, cause or contribute analysis to distinguish MS4 responsibilities, watershed model parameterization or calibration, and/or potential alignment with compliance locations).
- **Section 2 Water Quality Characterization:** Summarizes existing water quality conditions as well as current regulatory drivers of the categorization of WBPCs via TMDLs, the California 2020-2022 Integrated Report listings (Clean Water Act Section 303(d) List), and exceedances and MS4 cause or contribute analyses.
- **Section 3 Source Assessment:** Describes the potential sources of priority pollutants in Ventura County, including historical and current sources, fate and transport of constituents, and their effects on human and aquatic health.
- **Section 4 Water Body-Pollutant Combinations:** Presents WBPCs addressed in the WMP classified into highest, high, or medium priority categories and further distinguished based on whether the MS4 causes or contributes to exceedances or whether it is unlikely that the MS4 is causing or contributing to exceedances according to Section IX.B.3 of the Regional MS4 Permit (Order No. R4-2021-0105).
- **Section 5 Water Quality Priorities:** Establishes the key pollutant categories addressed in the WMP and provides justification for how control measures identified in the WMP will address all pollutants in each priority category.

1 DATA REVIEW

1.1 Data Sources

This section details the monitoring datasets available within the Ventura County watersheds. The purpose of each monitoring program is described below in their respective sub-sections.

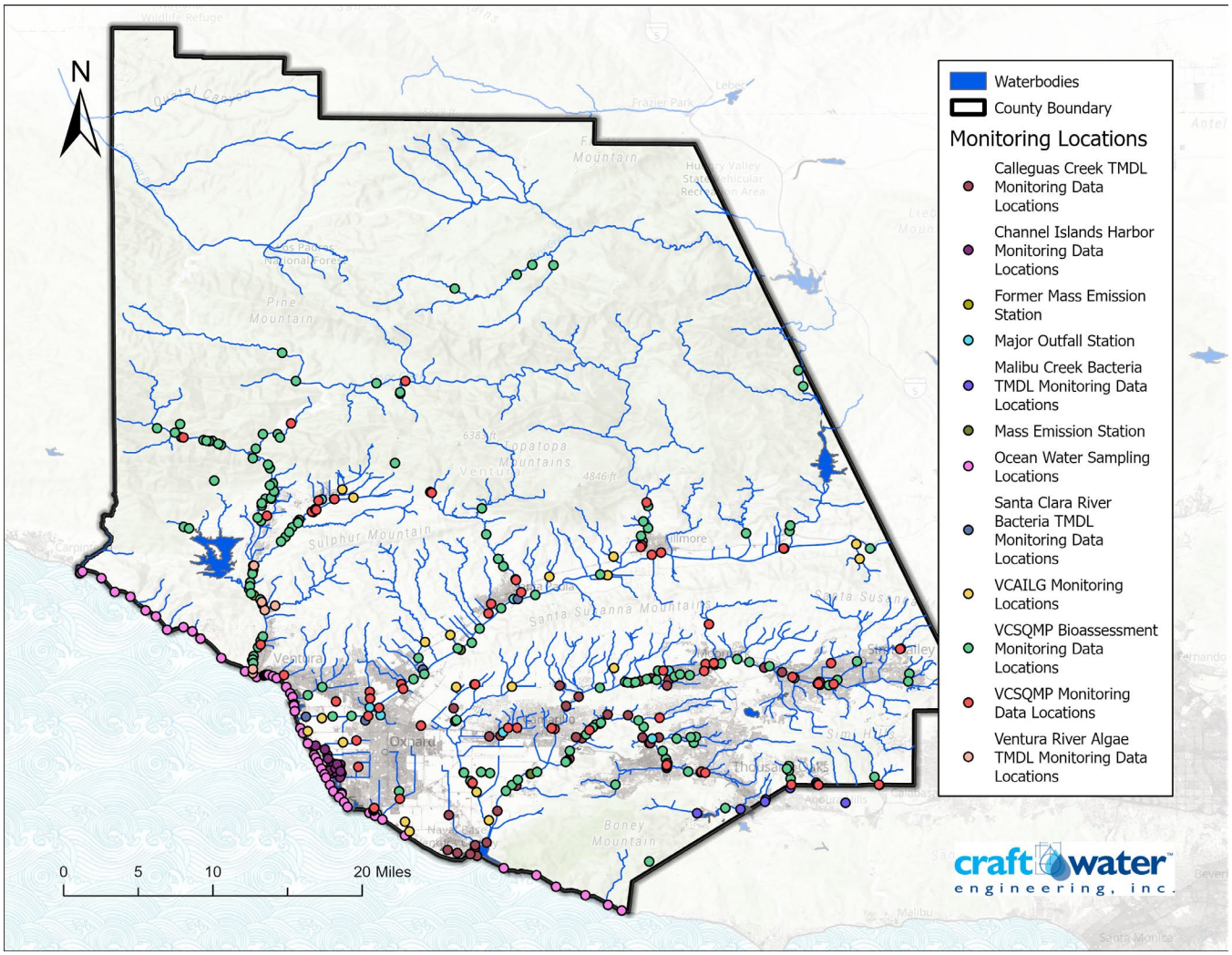


Figure 1-1. Historical and current monitoring locations in Ventura County.

1.1.1 Ventura County Stormwater Quality Monitoring Program

Under the previous Order R4-2010-0108 (Permit) issued July 8, 2010, the Stormwater Monitoring Program monitors water chemistry, toxicity, and biological communities of creeks, rivers, and channels within Ventura County during select dry and wet weather events (at least one dry weather event and three rain events), dating back to 1993. The primary monitoring locations for water chemistry and toxicity include three mass emission stations and eleven major outfall stations (**Figure 1-2**), which were used for RAA model calibration. Mass emission stations are in the lower reaches of three major watersheds in Ventura County (Ventura River, Santa Clara River, and Calleguas Creek) and are generally used to identify pollutant loads to the ocean and identify

long-term trends in pollutant concentrations. The monitoring conducted at the major outfall stations was useful in determining if the MS4 is potentially causing or contributing to exceedances of applicable water quality objectives observed in receiving water bodies at the mass emissions stations. Major outfall stations are in subwatersheds representative of each Permittee's contribution to downstream waters and were used to support the cause and contribute analysis. The Stormwater Monitoring Program has also collected five-minute flow timeseries at nearly all major outfall stations (apart from the major outfall stations at Fillmore and Port Hueneme due to site conditions), which can be leveraged for load calculations. However, due to operational constraints, the flow meters at the major outfall stations may miss dry weather flow readings at many sites.

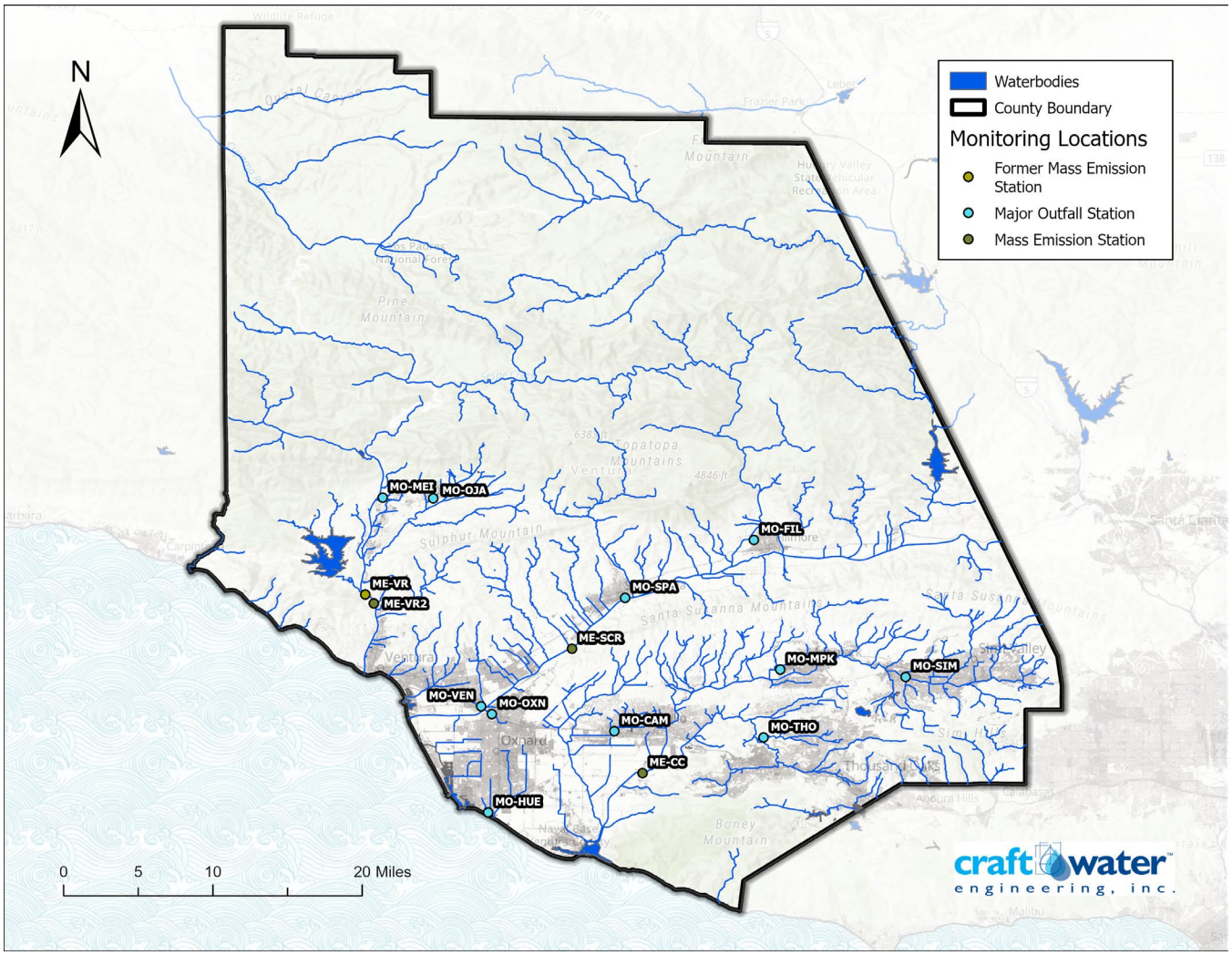


Figure 1-2. Mass emissions and major outfall stations in the VCSQMP.

In addition to the three mass emission stations and eleven major outfall stations, the monitoring program also samples at other locations such as alternative dry weather sites or sites used for special studies (**Figure 1-3**).

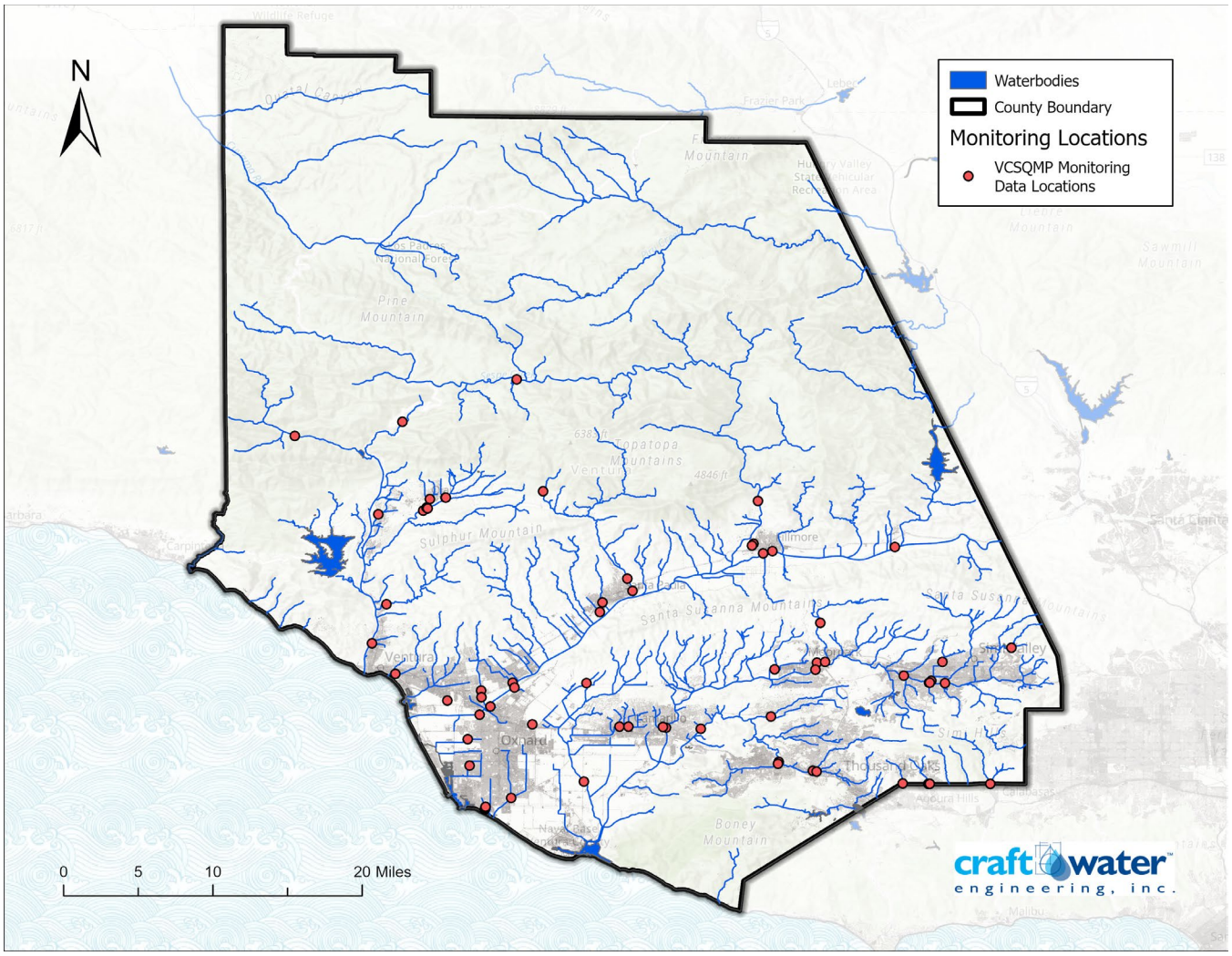


Figure 1-3. Additional locations sampled under the VCSQMP, including historical sites, dry weather monitoring sites, and sites used for special studies.

1.1.2 Calleguas Creek Watershed TMDL Monitoring Program

As part of the Calleguas Creek Watershed (CCW) TMDL Compliance Monitoring Program (CCWTMP), six TMDLs with associated monitoring include:

- Nitrogen Compounds and Related Effects in Calleguas Creek (Nitrogen or Nutrients TMDL)
- Organochlorine (OC) Pesticides, Polychlorinated Biphenyls (PCBs) and Siltation in Calleguas Creek, its Tributaries, and Mugu Lagoon (OC Pesticides TMDL)
- Toxicity, Chlorpyrifos, and Diazinon in the Calleguas Creek, its Tributaries and Mugu Lagoon (Toxicity TMDL)
- Metals and Selenium in Calleguas Creek, its Tributaries, and Mugu Lagoon (Metals TMDL)
- Revolon Slough and Beardsley Wash Trash TMDL (Trash TMDL)
- Boron, Chloride, Sulfate and TDS (Salts) in the Calleguas Creek, its Tributaries and Mugu Lagoon (Salts TMDL)

Monitoring for the CCWTMP commenced in August 2008. General water quality constituents, nutrients, organic constituents, and chronic aquatic toxicity is sampled quarterly during dry weather and twice during wet weather, while sediment and tissue sampling occurs annually or every three years in Mugu Lagoon.

As shown in **Figure 1-4**, the overall monitoring structure is broken down into two categories: (1) compliance monitoring and (2) investigation monitoring. Compliance monitoring sites are typically located in receiving water bodies where 303(d) listings occur and are considered points of compliance measurements to assess receiving water quality. The investigational sites are located throughout the watershed and include monitoring of drain outfalls. The purpose of these sites is not to measure compliance, but to assist with evaluating land use-specific contributions of various constituents to the watershed. The land use sites specific to urban land use are representative of contributions from MS4 Permittees and were used to support the cause and contribute analysis.

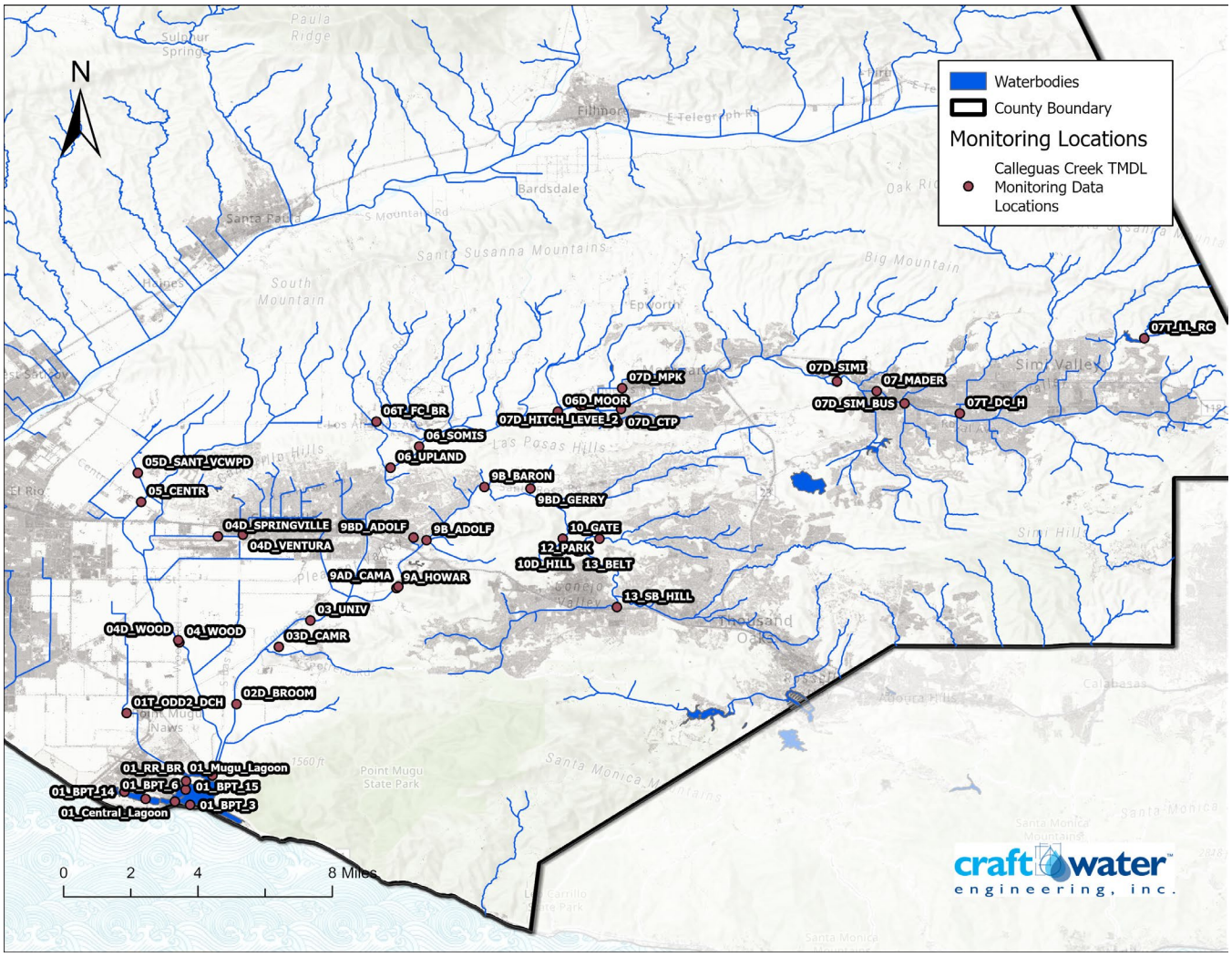


Figure 1-4. Receiving water and land use monitoring stations under the Calleguas Creek Watershed TMDL Monitoring Program.

1.1.3 Ventura River Algae TMDL Monitoring Program

As required by the Ventura River Algae TMDL, the Comprehensive Monitoring Plan prescribes year-round monthly water quality monitoring for nutrients and other water quality parameters at one site in the Ventura River Estuary, one site in each of the Ventura River Reaches 1–4, and in two main tributaries: Cañada Larga and San Antonio Creek. The following constituents are sampled: chlorophyll a, nitrate + nitrite as N, nitrate as N, nitrite as N, dissolved nitrogen, total nitrogen, phosphorus, and total Kjeldahl nitrogen. Monitoring occurs at least 72 hours after a rain event (>0.1" of precipitation in 24 hours) during dry weather. Nutrients and general water quality constituents are sampled monthly while continuous monitoring for dissolved oxygen, pH, temperature, and conductivity is executed quarterly. All seven monitoring locations are located within receiving waterbodies and receive drainages from diverse sources (**Figure 1-5**).

The data for this program was used to assess the receiving water quality.

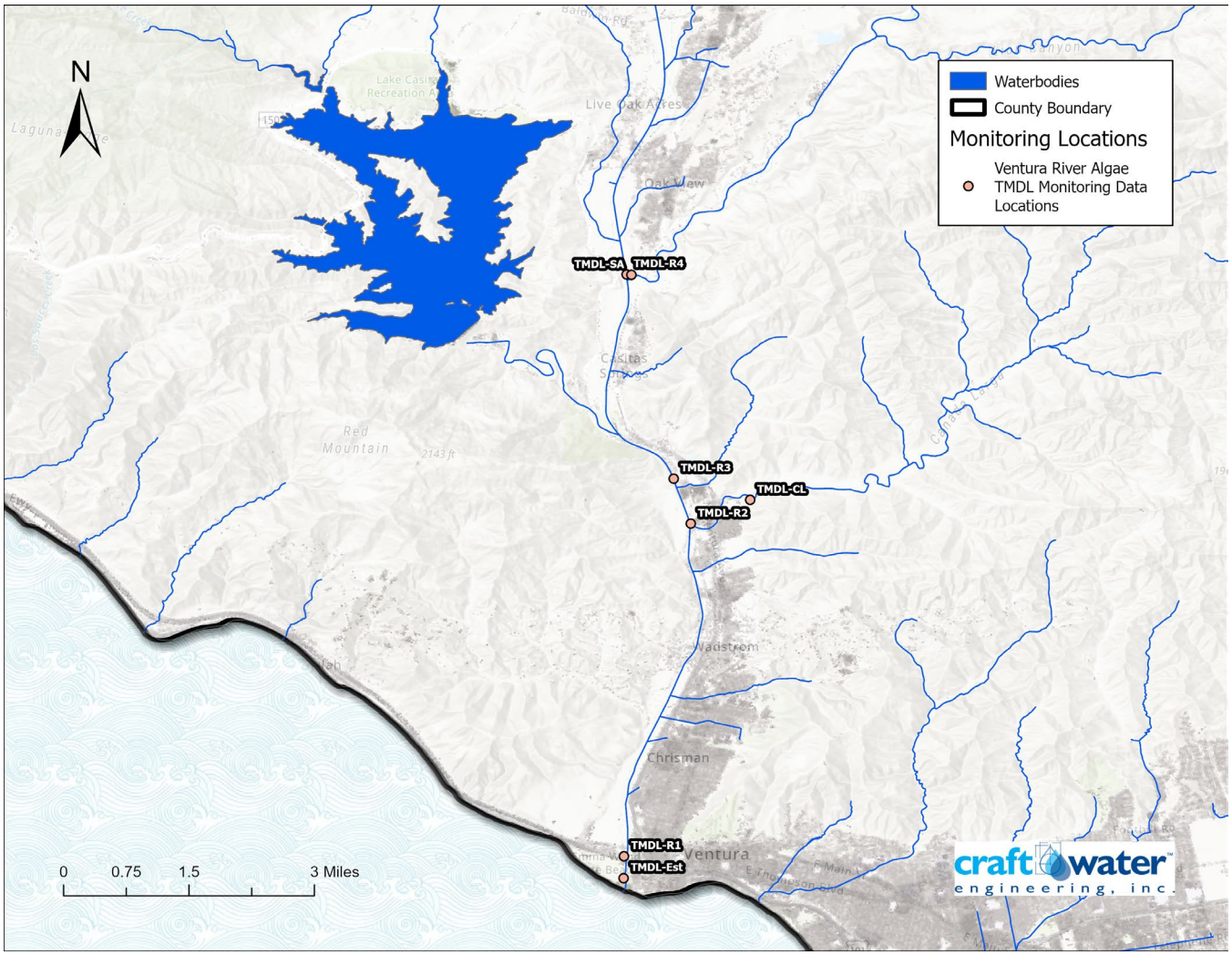


Figure 1-5. Receiving water stations under the Ventura River Algae TMDL Monitoring Program.

1.1.4 Lower Santa Clara River Bacteria TMDL Monitoring Program

The Cities of Fillmore, Oxnard, Santa Paula, and Ventura, and the County of Ventura work collaboratively to implement Bacteria TMDL requirements for the lower Santa Clara River to address impairments to the Santa Clara River Estuary and Reach 3. The Bacteria TMDL required an in-stream compliance bacteria water quality Monitoring Plan, as well as an Implementation Plan (including an Outfall Monitoring Plan). Weekly in-stream monitoring for Reach 3 (SCRR3-RW1) and the Estuary (SCRE-R005) has been conducted since October 2016 while monthly outfall monitoring has been conducted at five jurisdictional outfalls representative of MS4 contributions since September 2018 (**Figure 1-6**).

The data for this program was used to assess the receiving water quality as well as MS4 outfall discharge quality.

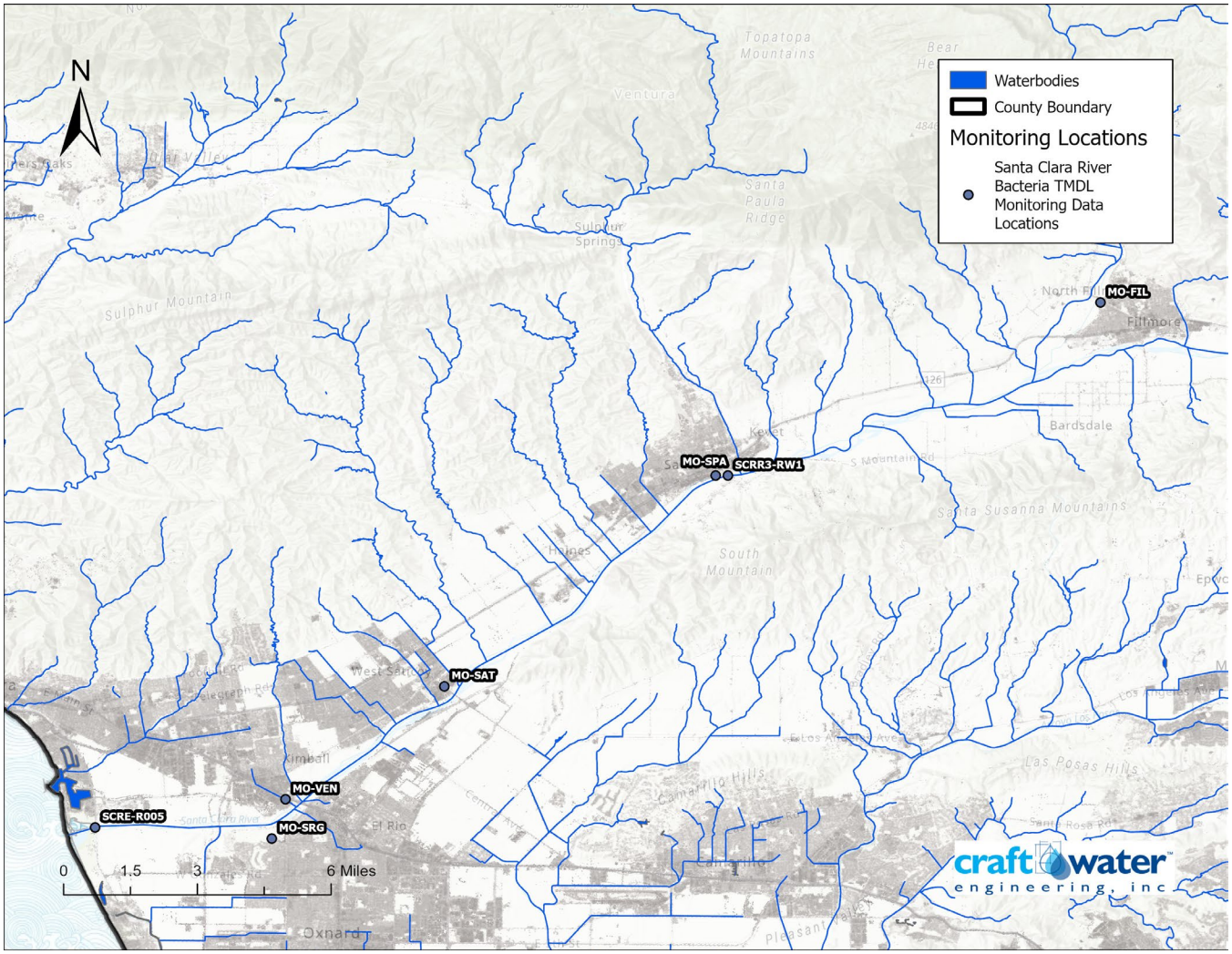


Figure 1-6. Receiving water and MS4 outfall stations from the Lower Santa Clara River Bacteria TMDL Monitoring Program. Note that MO-FIL, MO-SPA, and MO-VEN are major outfalls from the VCSQMP as well but are also used to monitor outfall discharges for the Lower Santa Clara River Bacteria TMDL Monitoring Program.

1.1.5 Malibu Creek Bacteria TMDL Monitoring Program

The Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Plan was prepared by the County of Los Angeles Department of Public Works on behalf of responsible parties and approved by the Regional Board in 2007. Seven of the eighteen sampling sites to be monitored are within the jurisdictions of the County of Ventura, Ventura County Watershed Protection District (VCWPD), and City of Thousand Oaks. Weekly monitoring for fecal coliform and *E. coli* began in March 2008; however, fecal coliform was discontinued as approved by the Los Angeles Regional Water Quality Control Board on October 31, 2014, in alignment with the Regional Board's removal of the fecal coliform objective for REC-1 freshwaters from the TMDL.

The data for this program was used to assess the receiving water quality.

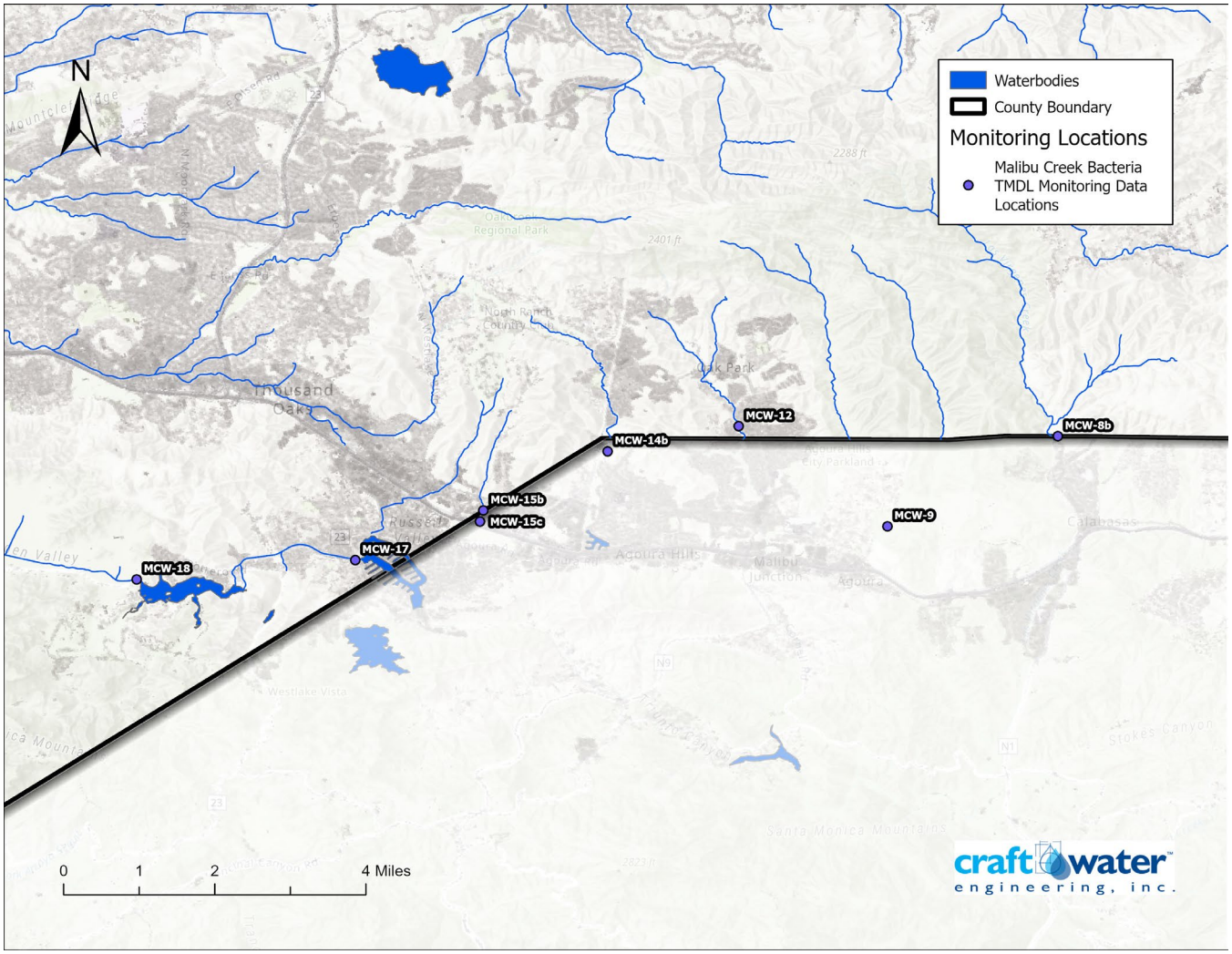


Figure 1-7. Receiving water monitoring stations from the Malibu Creek Bacteria TMDL Monitoring Program.

1.1.6 Bioassessment Monitoring Program

Bioassessment sampling is conducted as part of the Southern California Regional Bioassessment Program (RBP). Monitoring is designed and conducted within perennial and ephemeral streams (**Figure 1-8**) to look at both regional trends over time (by approximately annual revisits to selected sites) and current stream conditions

(single visits to randomly generated sites). To note, the dataset contains relatively less samples compared to other monitoring programs due to the low frequency of monitoring.

The data for this program was used to assess the receiving water quality.

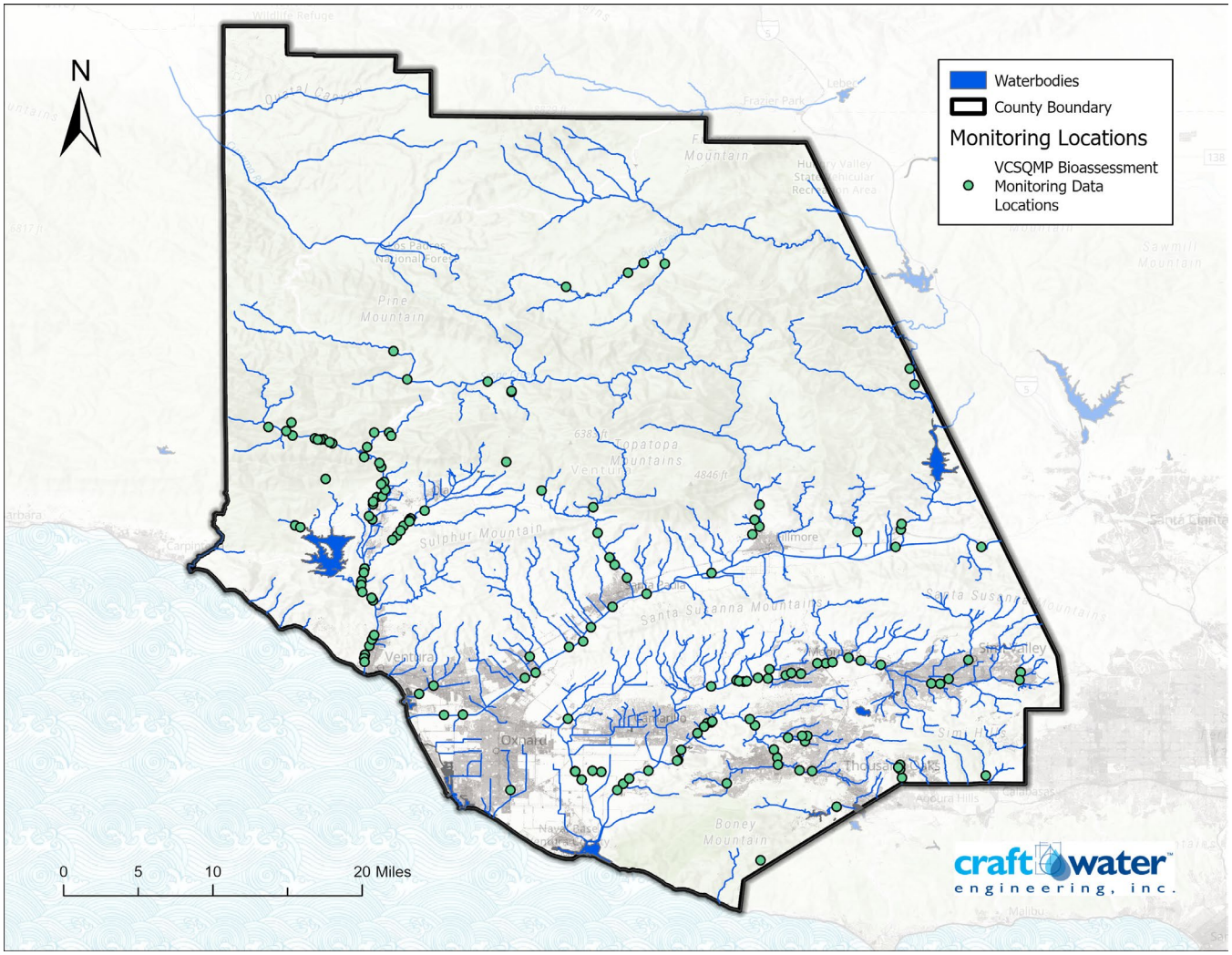


Figure 1-8. Bioassessment monitoring receiving water sites from the Southern California Regional Bioassessment Program.

1.1.7 Ocean Water Quality Monitoring Program

In 1997, AB 411 (Chapter 765, Statues of 1997) required that beaches with storm drains that discharge during dry weather and visited by more than 50,000 people per year be monitored at least weekly from April 1 through October 31 by the local health officer or environmental health agency. The purpose of the mandate is to ensure that ocean waters adjacent to the beach are safe for swimming and other recreational uses because when certain bacteria are present in sufficient concentrations, they can pose a health hazard for swimming and present risks for the tourism industry. Beginning in 1999, the Department of Health Services (DHS) implemented regulations requiring local officials to post warning signs if beaches exceeded the indicator bacteria standards.

The Ocean Water Quality Monitoring Program has two regular seasons (dry weather from April 1 through October 31 and wet weather from November 1 through March 31). During the dry weather season, samples are

collected from forty public beaches (**Figure 1-9**) weekly while during the wet weather season, samples are collected once per week at nineteen locations.

The water quality of the Harbor Beaches of Ventura County, Kiddie and Hobie, is regulated by a Bacteria TMDL for which the County of Ventura, VCWPD, and the City of Oxnard are some of the responsible parties. Kiddie and Hobie Beaches were designed and created as "surge beaches" by the Army Corps of Engineers to absorb the impact of tidal surges and consequently prevent infrastructure damage in the harbor. Although water contact recreation (REC-1) was not the original intent of these beaches, it has evolved to be one of the beneficial uses. The TMDL Implementation Plan requires that weekly beach monitoring occur at Ventura County Environmental Health Division (VCEHD) 36000 (at Hobie Beach) and VCEHD 37000 (at Kiddie Beach) consistent with AB411 compliance monitoring requirements.

The data for this program was used to assess the receiving water quality.

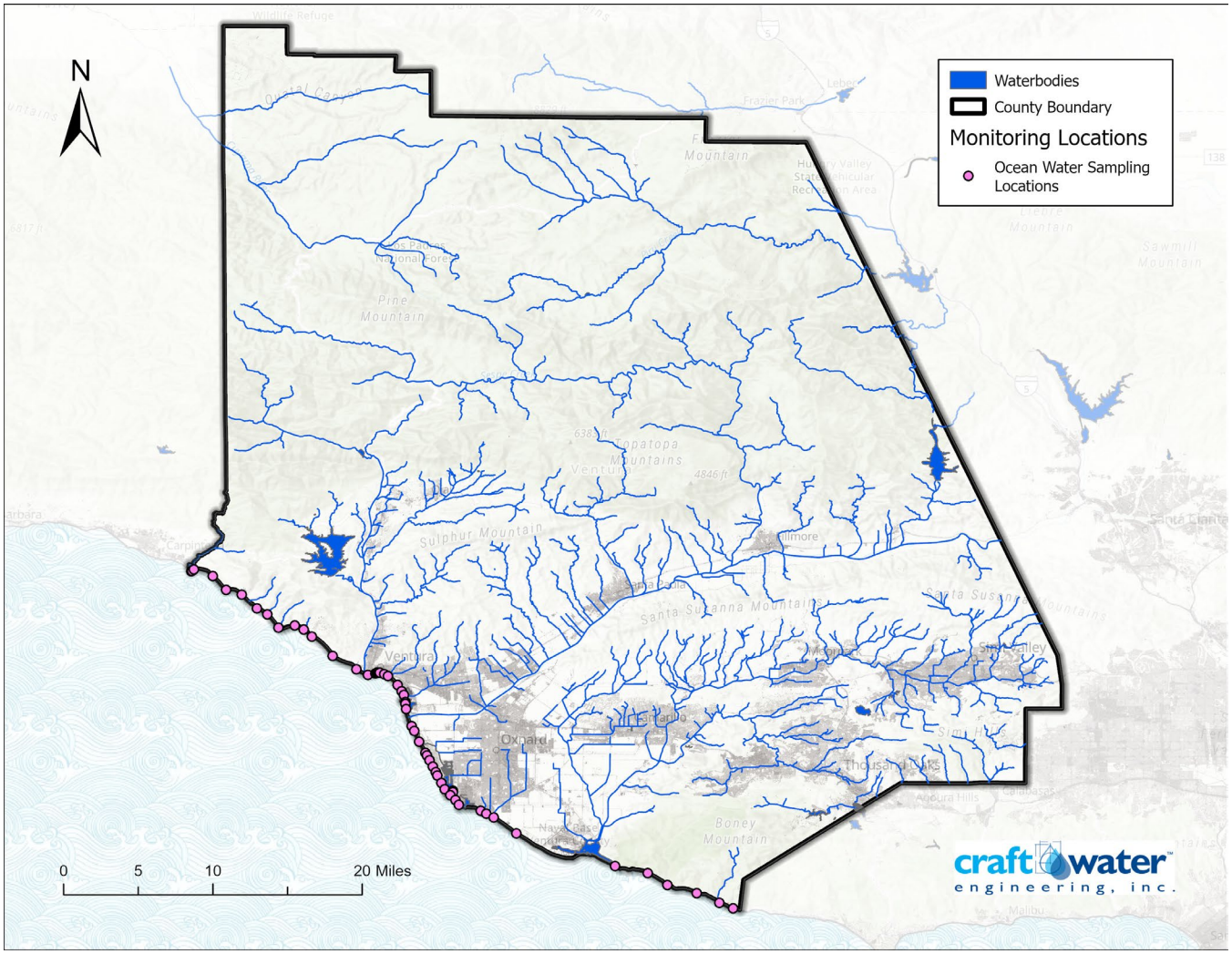


Figure 1-9. Beaches monitored as part of the Ocean Water Quality Monitoring Program.

1.1.8 Channel Islands Harbor Water Quality Program

The Channel Islands Harbor is the fifth largest harbor in California with a waterfront resort, recreation, and dining marketplace. Four residential communities—Seabridge, Westport, Mandalay Bay, and Harbour Island—surround the harbor waters. In June 2018, the Channel Islands Harbor experienced a massive algal bloom which was followed by a widespread depleted oxygen event related to bacterial composition of dying algae and animals killed by the anoxia. This event is suspected to be related to the decommissioning of the cooling water pumps of the Mandalay Power Generating Station on March 29, 2018.

In response to the water degradation event, the Channel Islands Neighborhood Council (CINC) and the City of Oxnard formed a citizen-science water quality monitoring team as part of the State Water Board's Surface Water Ambient Monitoring Program (SWAMP). Constituents sampled in the received data include nutrients, indicator bacteria, salts, and field parameters. In addition, City staff began performing daily water quality testing in 26 locations (**Figure 1-10**) for dissolved oxygen, temperature, salinity, and pH to assist with the anticipation of any additional degradation in the water which could potentially include an algal bloom.

The data for this program was used to assess the receiving water quality.

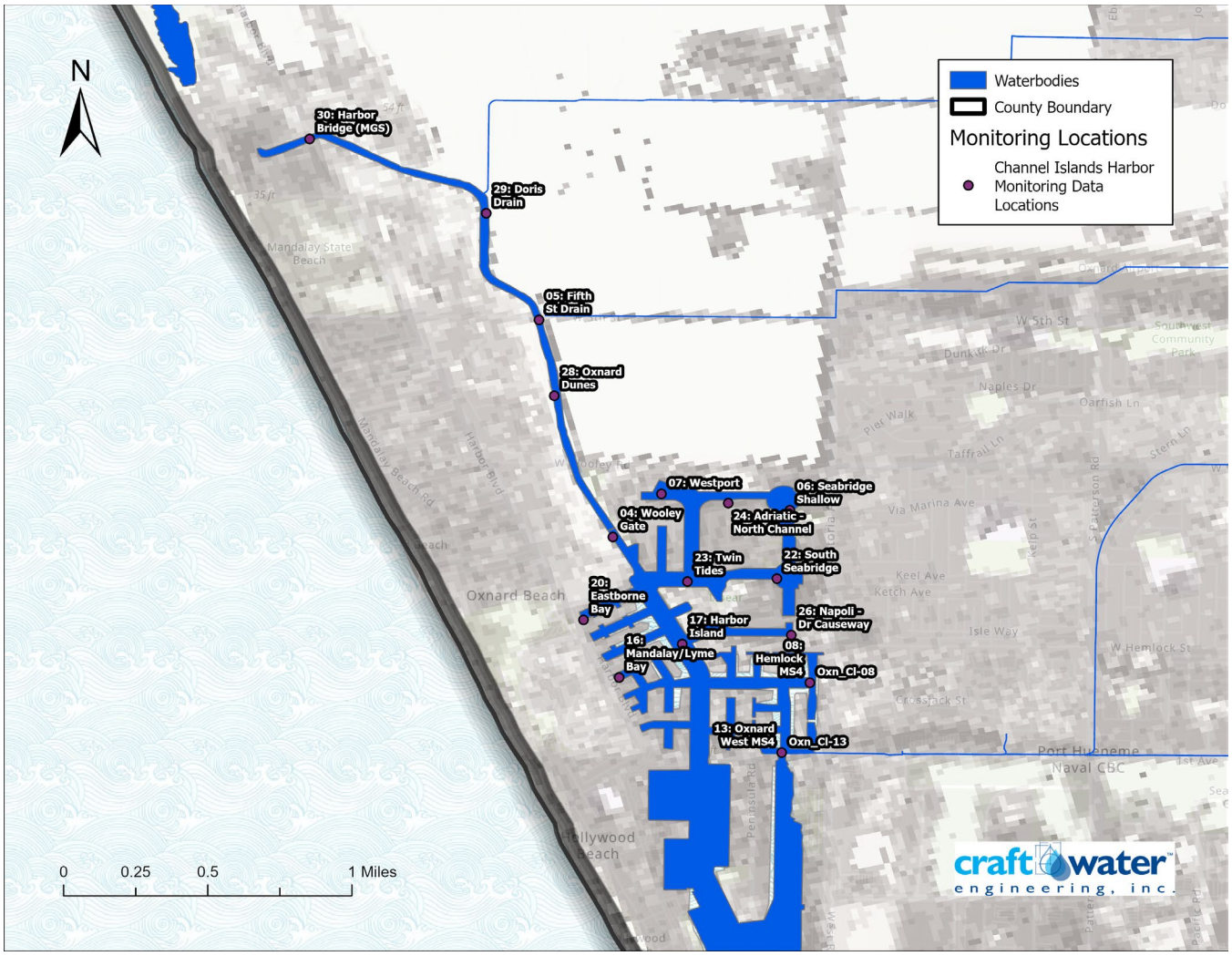


Figure 1-10. Receiving water monitoring stations from the Channel Islands Harbor Water Quality Monitoring Program.

1.1.9 Ventura County Agricultural Irrigated Lands Group (VCAILG) Monitoring Program

The Ventura County Agricultural Irrigated Lands Group (VCAILG) was initially formed to comply with the 2005 Conditional Agriculture (Ag) Waiver and subsequent iterations of the Conditional Ag Waiver. Group members represent irrigated acreage located throughout Ventura County watersheds. The purpose of the VCAILG Monitoring and Reporting Plan is to collect water samples from surface waterbodies influenced primarily by irrigated agriculture throughout Ventura County and analyze for constituents typically associated with agricultural activities, including general water quality constituents, nutrients, pesticides, metals, trash, bacteria, aquatic chronic toxicity, and field measurements. The constituents are sampled at a frequency of two wet and two dry weather events. According to the 2019-2020 VCAILG Annual Monitoring Report, there are eleven stations representative of tributaries to receiving waters and seven stations representative of agricultural drains (**Figure 1-11**). To note, some monitoring sites are TMDL sites that are monitored under the VCAILG Monitoring Program. The data provided through this Program was essential for distinguishing between MS4 responsible areas versus non-MS4 responsible areas that will instead be addressed through other Waste Discharge Requirement (WDR) Permits (i.e., Conditional Ag Waiver).

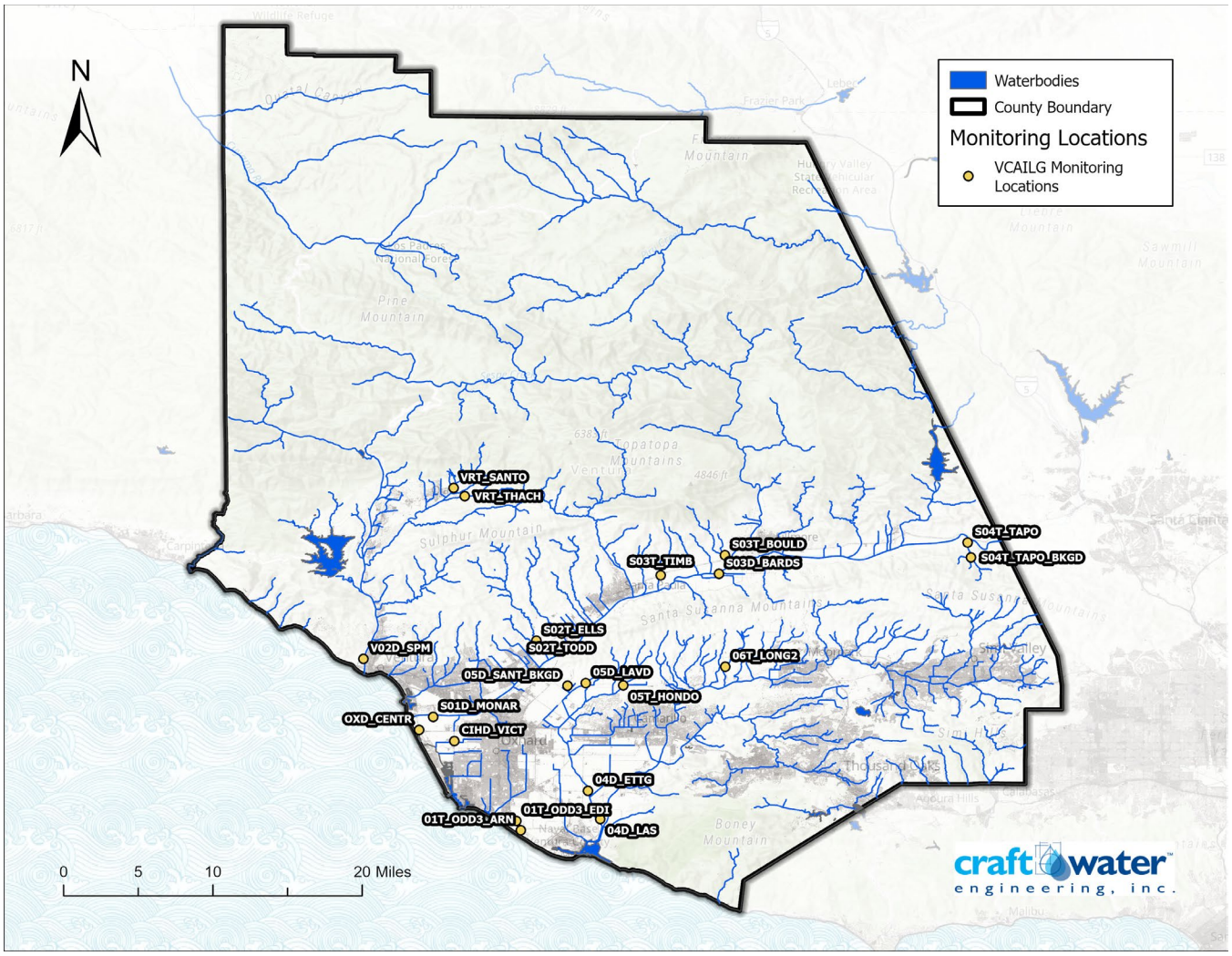


Figure 1-11. Receiving water and agricultural drain stations from the VCAILG Monitoring Program.

1.1.10 Santa Monica Bay Beaches Bacteria Monitoring Program

As part of the Santa Monica Bay Beaches Bacteria TMDL, monitoring is conducted per the Santa Monica Bay Beaches Bacterial TMDL Coordinated Shoreline Monitoring Plan. The Plan was developed by a Technical Steering Committee, which is co-chaired by the County and City of Los Angeles and consists of representatives from the TMDL's responsible agencies. Responsible agencies are allowed to conduct either daily or weekly sampling for indicator bacteria. One site is of interest for the Ventura County agencies—SMB MC-2. It is a point zero site representative of the Malibu Creek subwatershed. The site is situated at the breach point of Malibu Lagoon on Malibu State Beach.

1.2 Datasets Included in Water Quality Characterization

Table 1-1 summarizes the datasets referenced in the water quality characterization and how they were utilized in other elements of developing the WMP, such as for watershed model parameterization and calibration. The table also details the number of stations, constituents monitored, frequency sampled, and the period the data is available. All data provided by the Program were deemed sufficient to be included in the water quality characterization either as part of the evaluation of WBPCs or the source assessment.

Appendix B: Water Quality Characterization

Table 1-1. Summary of available data sources and utilization in WMP.

Monitoring Program	Number of Stations	Constituents Monitored	Program Period Data Available	Frequency	Use in WMP
Ventura County Stormwater Quality Monitoring Program	3 receiving water stations, 11 MS4 outfall stations	Water chemistry, toxicity	1993–present	Sampling occurs on at least 3 wet weather events and one dry weather event annually.	• Exceedance analysis for WBPCs • Cause and contribute analysis (distinguish MS4 responsibilities) • Watershed model parameterization & calibration
Calleguas Creek Watershed TMDL Monitoring Program	19 receiving water sites, 5 urban land use (MS4) sites, 7 agricultural land use sites, 3 Publicly Owned Treatment Works (POTW) sites (from Calleguas Creek 2019-2020 TMDL monitoring report)	Chronic aquatic toxicity, general water quality constituents, nutrients, organic constituents in water, metals and selenium in water, salts, chronic sediment toxicity, general sediment quality constituents, organic constituents in sediment, additional constituents for Mugu Lagoon sediment, tissue (varies by site)	2008–present	The monitoring frequency varies by constituent category (generally quarterly dry + two wet events for water chemistry, continuous for receiving water salts monitoring, or annually (every three years for Lagoon) for sediment/tissue chemistry).	• Exceedance analysis for WBPCs • Cause and contribute analysis (distinguish MS4 responsibilities) • Watershed model parameterization & calibration
Ventura River Algae	7 receiving water stations	Nutrients, water chemistry, field parameters	2015–present	According to the CMP, sampling occurs only after 72 hours of a rain event (>0.1" of precipitation in 24 hours) during dry weather conditions. The frequency is monthly for nutrients and other water quality parameters and quarterly continuous monitoring for dissolved oxygen, pH, temperature, and conductivity.	• Exceedance analysis for WBPCs • Watershed model calibration
Lower Santa Clara River Bacteria	2 receiving water stations, 5 MS4 outfall stations (including 1	Indicator Bacteria	2016–present	Weekly for receiving water sampling, monthly for outfall sampling	• Exceedance analysis for WBPCs • Cause and contribute analysis (distinguish MS4 responsibilities)

Appendix B: Water Quality Characterization

Monitoring Program	Number of Stations	Constituents Monitored	Program Period Data Available	Frequency	Use in WMP
	representative of Caltrans)				
Malibu Creek Bacteria	7 receiving water stations	Indicator Bacteria	2008–present	Weekly	• Exceedance analysis for WBPCs
Bioassessment Monitoring Program	N/A (streams throughout Southern California are sampled)	Biological indicators, habitat, sediment chemistry, water chemistry, benthic algae biomass	2009–present	Varies	• Exceedance analysis for WBPCs
Ocean Water Quality Monitoring Program	40 beaches	Indicator Bacteria	2009–present	Weekly	• Exceedance analysis for WBPCs
Channel Islands Harbor Water Quality Monitoring Program	26 receiving water locations	Nutrients, indicator bacteria, salts, field parameters	2018–present	Continuous monitoring in affected areas	• Exceedance analysis for WBPCs • Watershed calibration
Ventura County Agricultural Irrigated Lands Group Monitoring Program	11 tributary to receiving water locations, 7 agricultural drain stations (from VCAILG 2019-2020 annual monitoring report)	General water quality constituents, nutrients, pesticides, metals, trash, bacteria, aquatic chronic toxicity, field measurements	2011–present	Two dry and two wet events (first wet event and second dry event for aquatic chronic toxicity) annually	• Exceedance analysis for WBPCs • Cause and contribute analysis (distinguish MS4 responsibilities) • Watershed calibration
Santa Monica Bay Beaches Monitoring Program	1 beach station of interest (MC-2)	Indicator Bacteria	2012–present	Daily	• Exceedance analysis for WBPCs
Special Studies (Aluminum, Bacteria Source Markers,	N/A	N/A	N/A	N/A	• Source assessment

Appendix B: Water Quality Characterization

Monitoring Program	Number of Stations	Constituents Monitored	Program Period Data Available	Frequency	Use in WMP
Pyrethroid Insecticides, Local Staff Information)					

1.3 Water Body-Pollutant Combinations Identification Process

The WBPCs evaluated in the WMP are organized by the three categories defined in Section IX.B.3 of the MS4 Permit (Order No. R4-2021-0105):

- Category 1 (Highest Priority): Pollutants for which WQBELs and receiving water limitations are established in Part IV and Attachments K through S of the MS4 Permit to implement TMDLs.
- Category 2 (High Priority): Pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment.
- Category 3 (Medium Priority): Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in this Order and for which MS4 discharges may be causing or contributing to the exceedance within the last five years.

Subcategories of the three MS4 Permit defined categories were created to better categorize the WPBCs in the NOI (**Table 1-2**). Category 1 constituents are divided into subclasses based on the effective date of the final limitations and whether the TMDL was developed by USEPA. Categories 2 and 3 are each divided based on whether the constituent is a pollutant and the extent of current understanding of whether MS4s may be causing or contributing to the exceedances.

Table 1-2. Water body-pollutant combination (WBPC) subcategories.

Category	Water Body-Pollutant Combinations (WBPCs)
1	**Category 1A:** WBPCs with past due final TMDL deadlines.
	Category 1B: WBPCs with permit term (i.e., prior to Sept. 2026) final TMDL deadlines.
	Category 1C: WBPCs with post-permit term (i.e., beyond Sept. 2026) final TMDL deadlines.
	Category 1D: WBPCs addressed in USEPA TMDL without a Regional Board Adopted Implementation Plan.
2	**Category 2A:** 303(d) Listed WBPCs for which MS4 discharges may be causing or contributing to the impairment.
	Category 2B: 303(d) Listed WBPCs that are not a "pollutant"[1] (i.e., toxicity).
	Category 2C: 303(d) Listed WBPCs for which it is unknown if MS4 discharges may be causing or contributing to the impairment.
	Category 2D: 303(d) Listed WBPCs for which it is unlikely[2] that MS4 discharges are causing or contributing to the impairment.
3	**Category 3A:** All other WBPCs with receiving water exceedances in the past 5 years (on or after January 1, 2017) for which MS4 discharges may be causing or contributing to the exceedances.
	Category 3B: All other WBPCs with receiving water exceedances in the past 5 years (on or after January 1, 2017) for which it is unlikely[2] that MS4 discharges are causing or contributing to the exceedances.
	Category 3C: All other WBPCs with receiving water exceedances in the past 10 years, but not in the past 5 years (between January 1, 2012 to December 31, 2016).

1. While pollutants may be contributing to the impairment, it currently is not possible to identify the specific pollutant/stressor.
2. For WBPCs identified as an unlikely MS4 contribution, this is based on the cause and contribute analysis detailed in **Section 2.5**.

1.3.1 Notice of Intent Update Approach

Given the short turnaround to develop the Notice of Intent (NOI), the WBPCs submitted in the initial NOI to the Regional Board were reviewed to confirm or potentially adjust their placement. The following update process was established:

- **Category 1:** Relevant TMDLs were referenced to confirm placement of Category 1 pollutants. Specifically, the *Wasteload Allocations* and *Implementation Plan/Schedule* sections were reviewed. The *Wasteload Allocations* section documents the WBPCs subject to the TMDL while the final deadlines in the *Implementation Plan/Schedule* sections were compared relative to the WMP submittal deadline (September 2023) and end of permit term deadline (September 2026) for Category 1A, 1B, and 1C placements. Whether the TMDL was developed by the Regional Board or the U.S. Environmental Protection Agency (USEPA) was also taken into consideration for any Category 1D listings.
- **Category 2:** The 2020-2022 California Integrated Report (Clean Water Act Section 303(d) List) approved in May 2022 was reviewed to confirm placement of Category 2 pollutants.[1] If there was upstream or representative outfall monitoring discharge data for a WBPC demonstrating exceedances during the same weather condition as a receiving water exceedance, the pollutant was placed in Category 2A. On the contrary, if there was upstream or representative outfall discharge monitoring data for a WBPC that did not demonstrate exceedances (or upstream agricultural discharge monitoring data for a WBPC demonstrating exceedances) during the same weather condition as a receiving water exceedance, the pollutant was placed in Category 2D. If there were no upstream MS4 outfall stations, other MS4 outfall stations in watershed with similar land uses as well as MS4 outfall flows were referenced to decide between placing the WBPC in the likely or unlikely sub-category. If there was no MS4 outfall monitoring data for a WBPC (e.g., sedimentation), the WBPC would be placed in Category 2C. Any 303(d) listings not considered a pollutant (e.g., dissolved oxygen, pH, toxicity, etc.) were automatically placed in Category 2B. See **Section 2.4** and **2.5** for a detailed description of the exceedance analysis and cause and contribute analysis employed to distinguish between the Category 2 subcategories.
- **Category 3:** Any other receiving water exceedances observed in waterbodies where there is no existing TMDL or designation on the 303(d) list for the 2020-2022 California Integrated Report was placed in Category 3 and subsequently distinguished based on the dates of exceedances (within past 5 years or within past 10 years but not past 5 years for Categories 3A/3B vs. Category 3C) as well as the potential for the MS4 to cause or contribute to receiving water exceedances (Category 3A vs. Category 3B). See **Section 2.4** and **2.5** for a detailed description of the exceedance analysis and cause and contribute analysis employed to distinguish between the Category 3 subcategories.

[1] To note, the State Water Resources Control Board is in the process of drafting the 2024 California Clean Water Act Section 303(d) List which would include new listing and delisting recommendations for waterbodies in the regions of the San Francisco Bay, Los Angeles, Santa Ana, Central Valley, Central Coast, and San Diego Regional Water Quality Control Boards. It is expected that the 2024 303(d) List will be submitted to the USEPA in Spring 2024. Any updates to Category 2 WBPCs based on the adopted 2024 303(d) list will be integrated in future adaptive management submittals.

2 WATER QUALITY CHARACTERIZATION

The pollutants of concern in Ventura County's receiving waters vary between dry and wet weather and potential contributions from both stormwater and non-stormwater dischargers. In dry weather, the persistent pollutants of concern include indicator bacteria, salts, and nutrients while during wet weather, the persistent pollutants of concern include indicator bacteria, metals, and pesticides. Nutrients in receiving waters are episodically observed in Calleguas Creek waterbodies; however, MS4 Permittees are not considered responsible parties for implementing the Calleguas Creek Nitrogen Compounds and Related Effects TMDL.

The intent of this section is to summarize the current regulatory drivers of the categorization of WBPCs via TMDLs, the California 2020-2022 Integrated Report listings (Clean Water Act Section 303(d) List), and observed exceedances and MS4 cause or contribute analyses.

2.1 Total Maximum Daily Loads

TMDLs determine the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and continue to meet water quality standards for that pollutant to maintain or restore the beneficial use for the waterbody. The applicable TMDLs in Ventura County are the highest priority for stormwater quality compliance (Category 1 WBPCs) and set the final deadlines for standards to be achieved. They are summarized by watershed and corresponding responsible permittees in **Table 2-1** and graphically displayed in **Figure 2-1**.

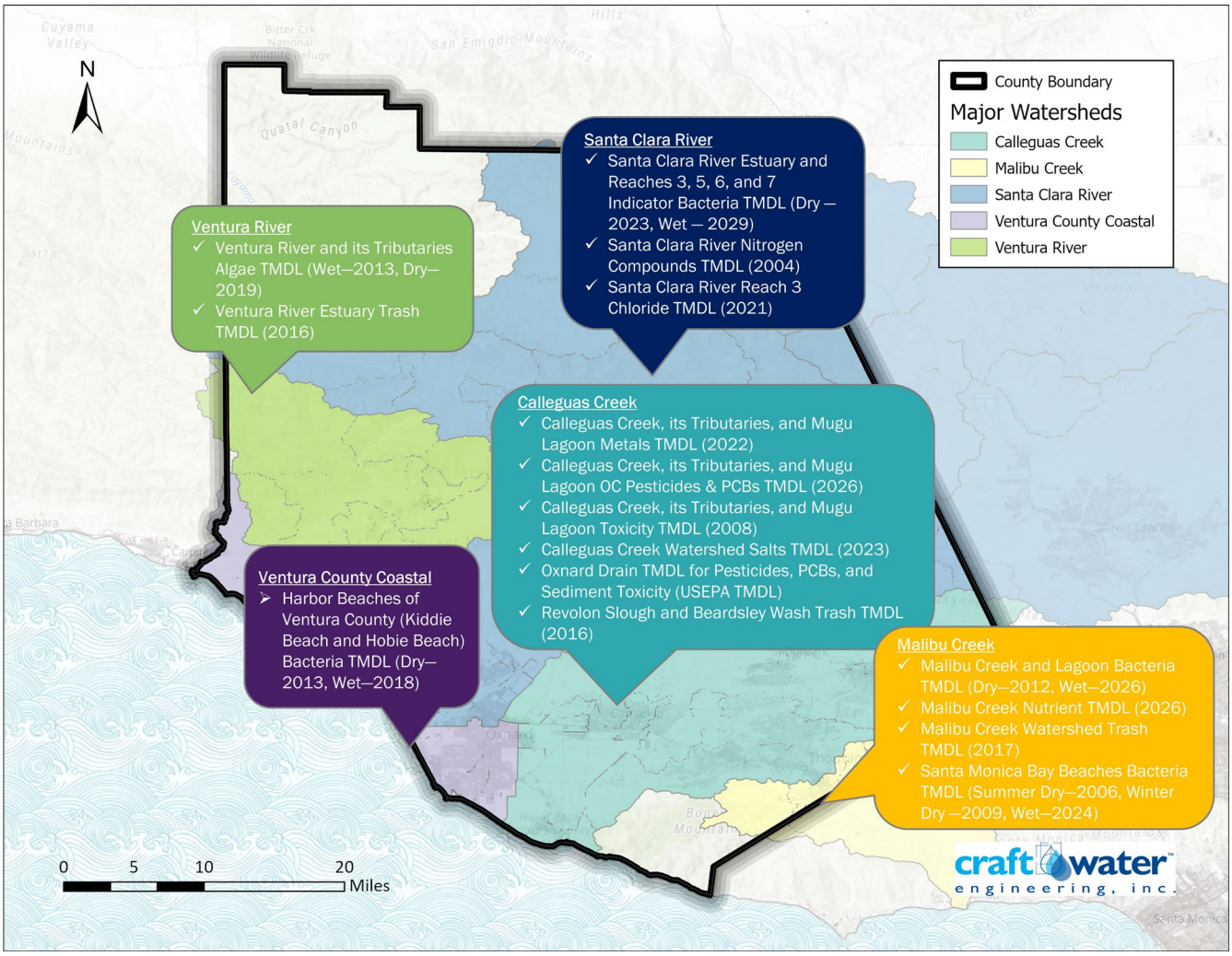


Figure 2-1. TMDLs and final deadlines by watershed.

Table 2-1. TMDLs by watershed and corresponding responsible permittees.

Watershed	TMDL	Responsible Permittees	Final Deadline
Calleguas Creek	Calleguas Creek, its Tributaries, and Mugu Lagoon Metals and Selenium TMDL (Metals TMDL)	City of Camarillo, City of Moorpark, City of Oxnard, City of Simi Valley, City of Thousand Oaks, County of Ventura, Ventura County Watershed Protection District	March 26, 2022
	Calleguas Creek, its Tributaries, and Mugu Lagoon Organochlorine (OC) Pesticides, Polychlorinated Biphenyls (PCBs), and Siltation TMDL (OC Pesticides & PCBs TMDL)	City of Camarillo, City of Moorpark, City of Oxnard, City of Simi Valley, City of Thousand Oaks, County of Ventura, Ventura County Watershed Protection District	March 24, 2026
	Calleguas Creek, its Tributaries, and Mugu Lagoon Toxicity,	City of Camarillo, City of Moorpark, City of Oxnard, City of Simi Valley, City of Thousand	March 24, 2008

Appendix B: Water Quality Characterization

Watershed	TMDL	Responsible Permittees	Final Deadline
	Chlorpyrifos, and Diazinon TMDL (Toxicity TMDL)	Oaks, County of Ventura, Ventura County Watershed Protection District	
	Calleguas Creek Watershed Salts TMDL	City of Camarillo, City of Moorpark, City of Oxnard, City of Simi Valley, City of Thousand Oaks, County of Ventura, Ventura County Watershed Protection District	December 2, 2023
	Oxnard Drain TMDL for Pesticides, PCBs, and Sediment Toxicity	City of Oxnard, County of Ventura	USEPA TMDL
	Revolon Slough and Beardsley Wash Trash TMDL	City of Camarillo, City of Oxnard, County of Ventura, Ventura County Watershed Protection District	March 6, 2016
Malibu Creek	Malibu Creek and Lagoon Bacteria TMDL	City of Thousand Oaks, County of Ventura, Ventura County Watershed Protection District	January 24, 2012 (dry) July 15, 2026 (wet)
	Malibu Creek Watershed Nutrients TMDL	City of Thousand Oaks, County of Ventura, Ventura County Watershed Protection District	September 11, 2026
	Malibu Creek Watershed Trash TMDL	City of Thousand Oaks, County of Ventura, Ventura County Watershed Protection District	July 7, 2017
	Santa Monica Bay Beaches Bacteria TMDL	City of Thousand Oaks, County of Ventura, Ventura County Watershed Protection District	July 15, 2006 (summer dry) November 1, 2009 (winter dry) July 15, 2024 (wet weather)
Santa Clara River	Santa Clara River Estuary and Reaches 3, 5, 6, and 7 Indicator Bacteria TMDL	City of Fillmore, City of Oxnard, City of Santa Paula, City of Ventura, County of Ventura, Ventura County Watershed Protection District	March 21, 2023 (dry) March 21, 2029 (wet)
	Santa Clara River Nitrogen Compounds TMDL	City of Fillmore, City of Santa Paula, County of Ventura, Ventura County Watershed Protection District	March 23, 2004
	Santa Clara River Reach 3 Chloride TMDL	City of Fillmore, City of Santa Paula, County of Ventura, Ventura County Watershed Protection District	September 11, 2021
Ventura County Coastal	Harbor Beaches of Ventura County (Kiddie Beach and Hobie Beach) Bacteria TMDL	City of Oxnard, City of Port Hueneme, County of Ventura, Ventura County Watershed Protection District	December 18, 2013 (dry) December 18, 2018 (wet)
Ventura River	Ventura River and its Tributaries Algae, Eutrophic Conditions, and Nutrients TMDL (Algae TMDL)	City of Ojai, City of Ventura, County of Ventura, Ventura County Watershed Protection District	June 28, 2013 (wet) June 28, 2019 (dry)
	Ventura River Estuary Trash TMDL	City of Ventura, County of Ventura, Ventura County Watershed Protection District	March 6, 2016

2.2 303(d) Listings

Under Section 303(d) of the Federal Clean Water Act, the states must review, make necessary changes and submit the 303(d) list to the USEPA. Every two years, the State and Regional Water Boards assess water quality monitoring data for California's surface waters to determine if they contain pollutants at levels that exceed protective water quality standards. The 303(d) list sets the Water Board's priorities for development of TMDLs and other regulatory programs aimed at resolving the impairments. There are seven different categories that WBPCs can be placed on the 303(d) list as listed below.

- **303(d) Category 1:** A water that fully supports at least one of its California beneficial uses, has other uses that are not assessed or lack sufficient information to be assessed, and no assessed uses are not supported.
- **303(d) Category 2:** A water with water quality information that is insufficient to determine an appropriate decision recommendation for reasons such as: monitoring data have poor quality assurance, not enough samples in a dataset, no existing numerical objective or evaluation guideline, the information alone cannot support an assessment, etc.
- **303(d) Category 3:** A water with water quality information that is insufficient to determine an appropriate decision recommendation, but the available data and information that does exist indicates beneficial uses may be potentially threatened.
- **303(d) Category 4a:** A water segment where all its 303(d) listings are being addressed and at least one of those listings is being addressed by a USEPA approved TMDL.
- **303(d) Category 4b:** A water segment where all its 303(d) listings are being addressed by action(s) other than TMDL.
- **303(d) Category 4c:** A water that is impacted by non-pollutant related cause(s).
- **303(d) Category 5:** A water segment where standards are not met and a TMDL is required, but not yet completed, for at least one of the pollutants being listed for the segment.

Listings in Categories 4a, 4b, and 5 on California's 2020-2022 Integrated Report (Clean Water Act Section 303(d) List) represent the next highest water quality priorities (Category 2 WBPCs) to address after TMDLs.[2] Impaired waterbodies are displayed in **Figure 2-2**.

[2] To note, the State Water Resources Control Board is in the process of drafting the 2024 California Clean Water Act Section 303(d) List which would include new listing and delisting recommendations for waterbodies in the regions of the San Francisco Bay, Los Angeles, Santa Ana, Central Valley, Central Coast, and San Diego Regional Water Quality Control Boards. It is expected that the 2024 303(d) List will be submitted to the USEPA in Spring 2024. Any updates to Category 2 WBPCs based on the adopted 2024 303(d) list will be integrated in future adaptive management submittals.

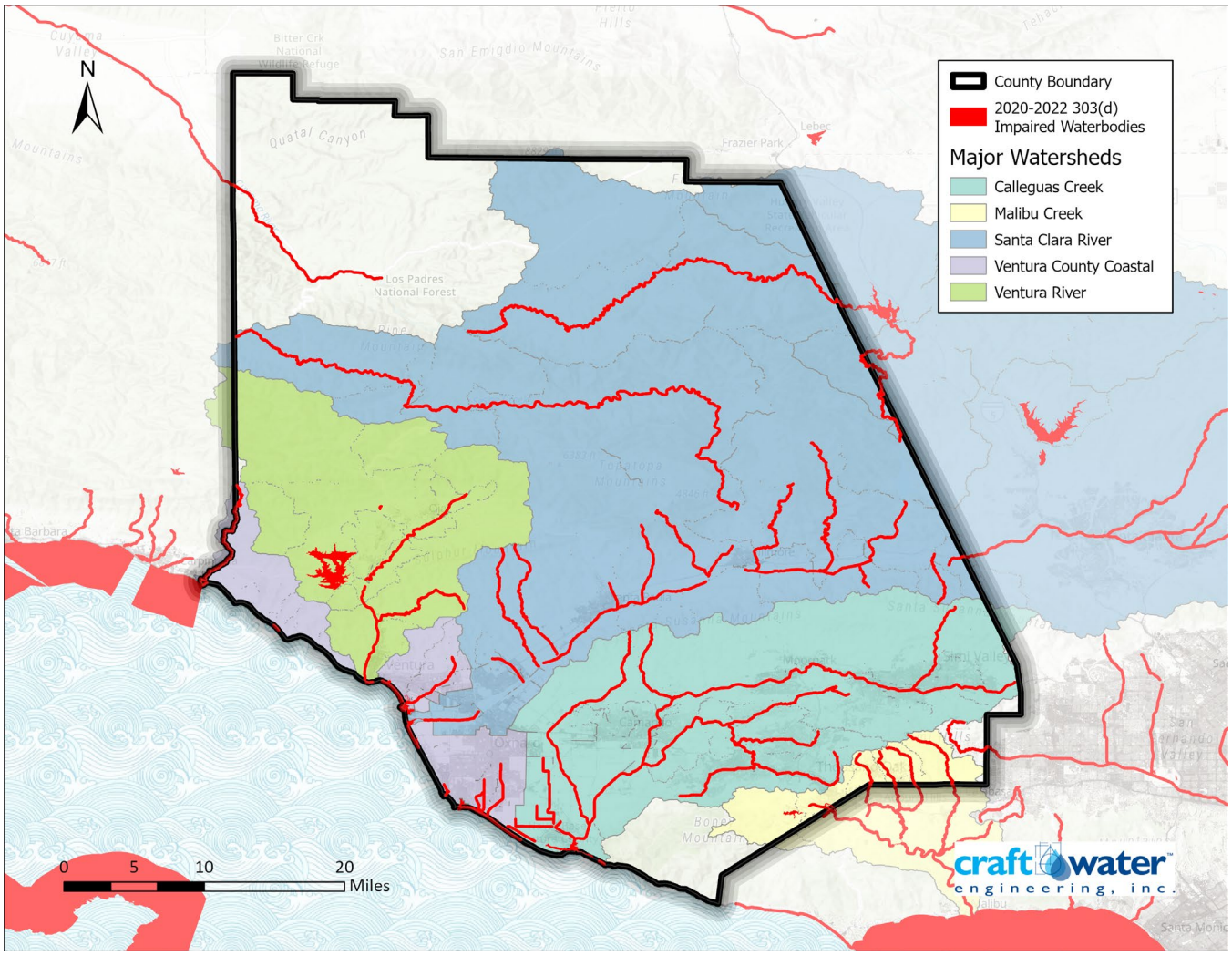


Figure 2-2. Impaired waterbodies on the 2020-2022 California 303(d) List.

Associated listings are summarized in **Table 2-2** through **Table 2-6** by the five watersheds.

Table 2-2. 303(d) listed pollutants on the 2020-2022 Integrated Report in the Calleguas Creek Watershed (excluding pollutants with established TMDLs from Section 2.1).

Waterbody	303(d) Listed Pollutants
Calleguas Creek Reach 1	Endosulfan (tissue); Zinc; Sedimentation/Siltation; Nitrogen
Calleguas Creek Reach 2	Endosulfan; Ammonia; Sedimentation/Siltation; Trash; Indicator Bacteria; ChemA
Calleguas Creek Reach 3	Ammonia; Nitrate and Nitrite; Indicator Bacteria; Sedimentation/Siltation; Trash
Calleguas Creek Reach 4	Endosulfan (tissue & sediment); Fecal Coliform; Trash; Nitrogen; Nitrate as Nitrate (NO3); Sedimentation/Siltation
Calleguas Creek Reach 5	Trash; ChemA (tissue); Endosulfan (tissue & sediment); Nitrogen; Sedimentation/Siltation
Calleguas Creek Reach 6	Ammonia; Indicator Bacteria; Nitrate and Nitrite; Nitrate as Nitrate (NO3); Sedimentation/Siltation

Waterbody	303(d) Listed Pollutants
Calleguas Creek Reach 7	Indicator Bacteria; Boron; Organophosphate Pesticides; Ammonia; Sedimentation/Siltation; Trash
Calleguas Creek Reach 8	Sedimentation/Siltation
Calleguas Creek Reach 9A	Nitrogen, Nitrate; Indicator Bacteria; ChemA (tissue); Endosulfan (tissue); Nitrate as Nitrate (NO3); Nitrogen, Nitrite; Trash; Lindane/gamma-Hexachlorocyclohexane (gamma-HCH) (tissue)
Calleguas Creek Reach 9B	Ammonia; Indicator Bacteria; ChemA (tissue); Endosulfan (tissue); Trash
Calleguas Creek Reach 10	Indicator Bacteria; ChemA (tissue); Ammonia; Nitrogen, Nitrite; Malathion; Trash
Calleguas Creek Reach 11	Indicator Bacteria; Sedimentation/Siltation; ChemA (tissue); Endosulfan (tissue); Ammonia
Calleguas Creek Reach 13	ChemA (tissue); Endosulfan (tissue); Ammonia
Duck Pond	ChemA; Nitrogen; Bifenthrin
Fox Barranca	Boron; Nitrate and Nitrite
Honda Barranca	Bifenthrin
Oxnard Drain #3	ChemA (tissue); Nitrogen; Ammonia

Table 2-3. 303(d) listed pollutants on the 2020-2022 303(d) list for Malibu Creek Watershed (excluding pollutants with established TMDLs from Section 2.1).

Waterbody	303(d) Listed Pollutants
Lake Sherwood	Mercury (tissue); Algae
Lindero Creek Reach 2	Selenium; Algae
Medea Creek Reach 2	Benthic Community Effects; Selenium; Sedimentation/Siltation; Trash; Indicator Bacteria; Algae; Invasive Species
Potrero Canyon Creek	Dissolved Oxygen
Westlake Lake	Algae; Ammonia; Organic Enrichment/Low Dissolved Oxygen; Lead

Table 2-4. 303(d) listed pollutants on the 2020-2022 303(d) list for Santa Clara River Watershed (excluding pollutants with established TMDLs from Section 2.1).

Waterbody	303(d) Listed Pollutants
Boulder Creek	Bifenthrin; Toxicity
Brown Barranca/Long Canyon	Nitrate and Nitrite
Ellsworth Barranca	Chlorpyrifos
Hopper Creek	Sulfates; Total Dissolved Solids
Piru Creek	Sulfates; Total Dissolved Solids
Pole Creek	Sulfates; Total Dissolved Solids
Santa Clara River Estuary	ChemA; Toxaphene; Ammonia; Toxicity
Santa Clara River Reach 1	Toxicity; Trash; Dissolved Oxygen; pH

Waterbody	303(d) Listed Pollutants
Santa Clara River Reach 3	Total Dissolved Solids; Trash; Selenium; Toxicity
Santa Clara River Reach 4A	Trash
Santa Clara River Reach 10	Trash
Santa Clara River Reach 11	Sulfates; Total Dissolved Solids; Boron; Specific Conductance
Santa Paula Creek Reach 1	Trash
Sespe Creek	Chloride
Tapo Canyon	Chlordane; Chloride; DDD; DDE; Malathion; Sulfates; Total Dissolved Solids; Toxicity
Timber Canyon	Chlorpyrifos
Torrey Canyon Creek	Nitrate and Nitrite
Wheeler Canyon/Todd Barranca	Sulfates; Total Dissolved Solids; Nitrate and Nitrite; Chlordane; Cypermethrin; DDT; Toxaphene; Toxicity

Table 2-5. 303(d) listed pollutants on the 2020-2022 303(d) list for Ventura River Watershed (excluding pollutants with established TMDLs from Section 2.1).

Waterbody	303(d) Listed Pollutants
Canada Larga	Dissolved Oxygen; Total Dissolved Solids; Indicator Bacteria
Lake Casitas	Mercury
San Antonio Creek	Total Dissolved Solids; Indicator Bacteria
Ventura River Estuary	Eutrophic; Algae; Trash; Indicator Bacteria
Ventura River Reach 1 and 2	Algae; Benthic Community Effects
Ventura River Reach 3	Indicator Bacteria; Toxicity
Ventura River Reach 4	Temperature

Table 2-6. 303(d) listed pollutants on the 2020-2022 303(d) list for Ventura County Coastal Watershed (excluding pollutants with established TMDLs from Section 2.1).

Waterbody	303(d) Listed Pollutants
Arundell Barranca	Indicator Bacteria
Channel Islands Harbor Beach[1]	Indicator Bacteria
Hueneme Beach Park	Indicator Bacteria[1]
Hueneme Drain	Trash; *E. coli*
J Street Drain	Trash
McGrath Beach	Indicator Bacteria[1]
McGrath Lake	DDT; Toxicity; Indicator Bacteria; Chlordane; Dieldrin (sediment); PCBs
Ormond Beach	Indicator Bacteria[1]
Ormond Beach Wetlands	Trash; Indicator Bacteria; pH
Oxnard Drain	Trash; *E. coli*; Nitrogen, Nitrate; pH

Waterbody	303(d) Listed Pollutants
Peninsula Beach	Indicator Bacteria[1]
Point Mugu Beach	Indicator Bacteria[1]
Port Hueneme Harbor	DDT; PCBs; Arsenic; Dieldrin; PAHs
Port Hueneme Pier	PCBs
Rincon Beach	Indicator Bacteria
Rincon Parkway Beach	Indicator Bacteria[1]
San Buenaventura Beach	Indicator Bacteria[1]
Sanjon Barranca Creek	Trash; *E. coli*
Surfers Point at Seaside	Indicator Bacteria[1]
Ventura Harbor: Ventura Keys	Arsenic; Coliform Bacteria; Dieldrin; Indicator Bacteria; PCBs
Ventura Marina Jetties	DDT; PCBs

1. 303(d) listing is based on impairment to both recreational and shellfish harvesting beneficial uses.

2.3 Trash

On April 7, 2015, the State Water Board adopted an Amendment to the Water Quality Control Plan for Ocean Waters of California (Ocean Plan) to Control Trash and Part 1 Trash Provision of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE Plan); these are colloquially known as the Trash Amendments. These amendments were adopted to provide statewide consistency for the Water Boards' regulatory approach to protect aquatic life and public health beneficial uses, and reduce environmental issues associated with trash in state waters, while focusing limited resources on high trash generating areas. These requirements are automatically adopted as part of the Permit requirements.

While several TMDLs have been established for trash in the region, trash is not eligible for deemed compliance status under the Permit. The agencies continue to be compliant with the three trash TMDLs (Malibu Creek Watershed Trash TMDL, Revolon Slough and Beardsley Wash Trash TMDL, and Ventura River Estuary Trash TMDL). For Trash WBPCs, compliance shall be determined as outlined in Part X.C of the Order. **Table 2-7** lists the waterbodies that need to address trash based on TMDLs or 303(d) listings.

Table 2-7. Waterbodies to address trash based on TMDLs or 303(d) listings.

TMDL/303(d)	Waterbody
Malibu Creek Watershed Trash TMDL	Malibu Creek
	Malibu Lagoon
	Malibou Lake
	Medea Creek
	Lindero Creek
	Lake Lindero
	Las Virgenes Creek
Revolon Slough and Beardsley Wash Trash TMDL	Beardsley Wash
	Revolon Slough

TMDL/303(d)	Waterbody
Ventura River Estuary Trash TMDL	Ventura River Estuary
303(d)	Calleguas Creek Reach 2
	Calleguas Creek Reach 3
	Calleguas Creek Reach 4
	Calleguas Creek Reach 5
	Calleguas Creek Reach 7
	Calleguas Creek Reach 9A
	Calleguas Creek Reach 9B
	Calleguas Creek Reach 10
	Hueneme Drain
	J Street Drain
	Lindero Creek Reach 2
	Medea Creek Reach 2
	Ormond Beach Wetlands
	Oxnard Drain
	Sanjon Barranca Creek
	Santa Clara River Reach 1
	Santa Clara River Reach 3
	Santa Clara River Reach 4A
	Santa Clara River Reach 10
	Santa Paula Creek Reach 1
	Ventura River Estuary

2.4 Exceedance Analysis

While the exceedances analysis was performed for all WBPCs (including for additional context for those in Category 1, if data was available), the focus of the exceedances analysis was on distinguishing between MS4 versus non-MS4 contributions in Category 2, as well as adding relevant WBPCs into Category 3, where exceedances have been observed in the past 5 years.

All monitoring data received was screened for QA/QC purposes. Monitoring stations were mapped to determine the appropriate receiving waters represented by the data. Information from annual reports, TMDL monitoring reports, and correspondence with Ventura County Stormwater Quality Management Program staff was used to assign appropriate receiving water versus MS4/non-MS4 designations for each monitoring station. The Basin Plan and 303(d) listings were utilized to identify the beneficial uses associated with each waterbody. In particular, the distinction between existing versus potential or intermittent municipal drinking water (MUN) beneficial use was important to denote because of its relation to using either the human health water and organisms (HHWO) California Toxics Rule (CTR) objective or the human health (HH) organisms only CTR objective. The relevant water quality objectives were referenced in the following order: TMDL numeric targets,

Basin Plan, CTR (Criterion Maximum Concentration (CMC), Criterion Continuous Concentration (CCC), HHWO, or HHO), and other applicable academic/scientific literature as used in the 303(d) listings. These water quality objectives are listed by watershed (**Table 2-8** through **Table 2-12**) for any constituent represented in the WBPC final tables in **Sections 4.1** through **4.2.** The result quality code was important for distinguishing between non-detects (NDs) or detected, but not quantified (DNQ) samples. Any sample marked as ND or DNQ was marked as a non-exceedance.

Only exceedances at designated receiving water stations were flagged in the WBPC tables in **Sections 4.1** through **4.2.** Data from other types of monitoring stations (i.e., MS4 outfalls or non-MS4 agricultural drains) was used to aid in the cause or contribute analysis described in **Section 2.5.**

Table 2-8. Applicable WQOs for Calleguas Creek Watershed.

Constituent	Applicable WQO	Units	Applicable WQO Reference
2,4'-DDD	4.88	ug/kg	Threshold effects concentration (TEC) from the Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (Macdonald, 2000)
2,4'-DDT	4.16	ug/kg	Threshold effects concentration (TEC) from the Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (Macdonald, 2000)
4,4'-DDD	0.00083; 0.00084	ng/L	CTR HH (HHWO or HHO, respectively)
	2	ng/g	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL (derived from sediment targets contained in National Oceanographic and Atmospheric Administration (NOAA) Screening Quick Reference Tables
	45,000	ng/kg	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL fish tissue numeric targets (derived from CTR HH criteria for consumption of organisms)
4,4'-DDE	0.00059	ug/L	CTR HH
	1.4–2.2	ng/g	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL (derived from sediment targets contained in National Oceanographic and Atmospheric Administration (NOAA) Screening Quick Reference Tables. Note, the Mugu Lagoon subwatershed has a sediment WQO of 2.2 ng/g while other subwatersheds have a sediment WQO of 1.4 ng/g.
	32,000	ng/kg	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL fish tissue numeric targets (derived from CTR HH criteria for consumption of organisms)
4,4'-DDT	0.00059	ug/L	CTR HH
	0.3	ng/g	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL (derived from sediment targets contained in National Oceanographic and Atmospheric Administration (NOAA) Screening Quick Reference Tables.
	32,000	ng/kg	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL fish tissue numeric targets (derived from CTR HH criteria for consumption of organisms)
Aluminum	1	mg/L	Basin Plan (Table 3-8)
Ammonia	3.2–9.5 (one-hour average) 1.7–3.5 (thirty-day average)	mg/L	Calleguas Creek Nitrogen Compounds and Related Effects TMDL (one-hour average or thirty-day average); note applicable WQOs are dependent on reach.

Appendix B: Water Quality Characterization

Constituent	Applicable WQO	Units	Applicable WQO Reference
			These objectives are derived from the Basin Plan, in which freshwater objectives are dependent on beneficial use, pH, and temperature (30-day average only) and saltwater objectives are dependent on temperature, salinity, pressure, and pH.
Bifenthrin	0.0006	ug/L	UC Davis Aquatic Life Criteria for Warm Freshwater Habitat 4-day average concentration; Oxnard Drain #3 USEPA TMDL
Bis(2-ethylhexyl) phthalate	1.8; 5.9	ug/L	CTR HH (HHWO or HHO, respectively)
Boron	1	mg/L	Calleguas Creek Salts TMDL (derived from Basin Plan)
Chloride	150	mg/L	Calleguas Creek Salts TMDL (derived from Basin Plan)
Chlorpyrifos	0.014 (freshwater dry) 0.025 (freshwater wet) 0.009 (saltwater dry) 0.02 (saltwater wet)	ug/L	Calleguas Creek, its Tributaries, and Mugu Lagoon Toxicity TMDL
Copper	Varies	ug/L	CTR hardness-based criteria (note there is a Calleguas Creek Metals TMDL which has static objectives)
Cyfluthrin	0.0003	ug/L	UC Davis Aquatic Life Criteria for Warm Freshwater Habitat
Cyhalothrin, lambda	0.0005	ug/L	UC Davis Aquatic Life Criteria for Warm Freshwater Habitat
Cypermethrin	0.002	ug/L	Interim Freshwater CMC from Department of Fish and Game (DFG) 00-6, 2000
Deltamethrin/Tralomethrin	0.02	ug/L	Maximum Acceptable Toxicant Concentration (MATC) from Office of Pesticide Programs (OPP) Pesticide Ecotoxicity Database
Diazinon	0.10 (freshwater dry) 0.10 (freshwater wet) 0.40 (saltwater dry) 0.82 (saltwater wet)	ug/L	Calleguas Creek, its Tributaries, and Mugu Lagoon Toxicity TMDL
Dieldrin	0.056	ug/L	CTR Freshwater CCC
	0.1–4.3	ng/g	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL (derived from sediment targets contained in National Oceanographic and Atmospheric Administration (NOAA) Screening Quick Reference Tables. Note, the Revolon Slough subwatershed has a sediment WQO of 0.1 ng/g, the Mugu Lagoon subwatershed has a sediment WQO of 4.3 ng/g, and the rest of the subwatersheds have a sediment WQO of 0.2 ng/g.
	650	ng/kg	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL fish tissue numeric targets (derived from CTR HH criteria for consumption of organisms)

Appendix B: Water Quality Characterization

Constituent	Applicable WQO	Units	Applicable WQO Reference
Dissolved Oxygen	>5	mg/L	Basin Plan
Endosulfan I	0.22 (wet) 0.056 (dry)	ug/L ug/L	CTR Freshwater CMC Freshwater target from Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL (derived from CTR Freshwater CCC)
	65,000,000	ng/kg	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL fish tissue numeric targets (derived from CTR HH criteria for consumption of organisms)
Endosulfan II	0.22 (wet) 0.056 (dry)	ug/L ug/L	CTR Freshwater CMC Freshwater target from Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL (derived from CTR Freshwater CCC)
	65,000,000	ng/kg	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL fish tissue numeric targets (derived from CTR HH criteria for consumption of organisms)
Hexachlorobenzene	0.00075; 0.00077	ug/L	CTR HH (HHWO or HHO, respectively)
Indeno(1,2,3-cd) pyrene	0.0044; 0.049	ug/L	CTR HH (HHWO or HHO, respectively)
Indicator Bacteria	320 (*E. coli*) 110 (Enterococcus) 400 (Fecal Coliform) 10,000 (Total Coliform)	CFU/100 mL (Statewide Bacteria Provisions); MPN/100 mL (Basin Plan)	Statewide Bacteria Provisions (*E. coli* and Enterococcus); Basin Plan (Fecal Coliform and Total Coliform)
Lindane/gamma-BHC	950	ng/L	CTR Freshwater CMC
	8,200	ng/kg	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL fish tissue numeric targets (derived from CTR HH criteria for consumption of organisms)
Malathion	0.1	ug/L	USEPA National Recommended Water Quality Criteria (maximum instantaneous concentration from freshwater aquatic life protection recommended criteria)
Mercury	0.051	ug/L	Calleguas Creek Metals TMDL
Nickel	Varies	ug/L	CTR hardness-based criteria (note there is a Calleguas Creek Metals TMDL which has static objectives)
Nitrate + Nitrite as N	10	mg/L	Basin Plan
Nitrate as N	10	mg/L	Basin Plan
Nitrate as Nitrate (NO3)	45	mg/L	Basin Plan
Nitrite as N	1	mg/L	Basin Plan
pH	6.5-8.5	N/A	Basin Plan

Appendix B: Water Quality Characterization

Constituent	Applicable WQO	Units	Applicable WQO Reference
Selenium	5	ug/L	CTR Freshwater CCC
Sulfate	250	mg/L	Calleguas Creek Salts TMDL (derived from Basin Plan)
Total Chlordane	0.0043	ug/L	CTR Freshwater CCC
	0.9–3.3	ng/g	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL (derived from sediment targets contained in National Oceanographic and Atmospheric Administration (NOAA) Screening Quick Reference Tables. Note, the Revolon Slough subwatershed has a sediment WQO of 0.9 ng/g while other subwatersheds have a sediment WQO of 3.3 ng/g.
	830	ng/kg	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL fish tissue numeric targets (derived from CTR HH criteria for consumption of organisms)
Total Dissolved Solids	850	mg/L	Calleguas Creek Salts TMDL (derived from Basin Plan)
Total PCBs	0.014	ug/L	CTR Freshwater CCC
	120–180	ng/g	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL (derived from sediment targets contained in National Oceanographic and Atmospheric Administration (NOAA) Screening Quick Reference Tables. Note, the Revolon Slough subwatershed has a sediment WQO of 130 ng/g, the Mugu Lagoon subwatershed has a sediment WQO of 180 ng/g, and the rest of the subwatersheds have a sediment WQO of 120 ng/g.
	5,300	ng/kg	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL fish tissue numeric targets (derived from CTR HH criteria for consumption of organisms)
Toxaphene	0.0002	ug/L	CTR Freshwater CCC
	0.6–360	ng/g	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL (derived from sediment targets contained in National Oceanographic and Atmospheric Administration (NOAA) Screening Quick Reference Tables. Note, the Revolon Slough subwatershed has a sediment WQO of 1.0 ng/g, the Mugu Lagoon subwatershed has a sediment WQO of 360 ng/g, and the rest of the subwatersheds have a sediment WQO of 0.6 ng/g.
	9,800	ng/kg	Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL fish tissue numeric targets (derived from CTR HH criteria for consumption of organisms)
Zinc	Varies	ug/L	CTR hardness-based criteria (note there is a Calleguas Creek Metals TMDL which has static objectives)

Table 2-9. Applicable WQOs for Malibu Creek Watershed.

Constituent	Applicable WQO	Units	Applicable WQO Reference
Algae	N/A	N/A	N/A
Ammonia as N	Varies	mg/L	Objectives are derived from the Basin Plan, in which freshwater objectives are dependent on beneficial use, pH, and temperature (30-day average only) and saltwater objectives are dependent on temperature, salinity, pressure, and pH. The Malibu Creek Nutrients TMDL lists the following acute/chronic numeric targets, respectively, by reach which were calculated using the 90th percentile of pH for the acute criteria and the 50th percentile pH and temperature for the chronic criteria: • Malibu Creek: 2.59 mg/L (acute); 1.75 mg/L (chronic) • Lake Sherwood: 6.7 mg/L (acute); 2.1 mg/L (chronic) • Westlake Lake: 8.5 mg/L (acute); 1.5 mg/L (chronic)
Benthic Community Effects	N/A	N/A	N/A
Dissolved Oxygen	>5 (for waterbodies designated as WARM); >7 (for waterbodies designated as COLD)	mg/L	Malibu Creek Nutrients USEPA TMDL
Eutrophic	N/A	N/A	N/A
Indicator Bacteria	235 (*E. coli*) 104 (Enterococcus) 400 (Fecal Coliform) 10,000 (Total Coliform)	MPN or CFU/100 mL	Malibu Creek and Lagoon Bacteria TMDL
Invasive Species	N/A	N/A	N/A
Lead	Varies	ug/L	CTR hardness-based criteria
Mercury	0.051	ug/L	CTR Freshwater CCC
Nitrate-N + Nitrite-N	1.0 (dry); 8.0 (wet)	mg/L	Malibu Creek Nutrients USEPA TMDL
Scum/Foam-unnatural	N/A	N/A	N/A
Sedimentation	N/A	N/A	N/A
Selenium	5	ug/L	CTR Freshwater CCC
Total Phosphorus	0.1 (dry)	mg/L	Malibu Creek Nutrients USEPA TMDL

Table 2-10. Applicable WQOs for Santa Clara River Watershed.

Constituent	Applicable WQO	Units	Applicable WQO Reference
2,4'-DDT	4.16	ug/kg	Threshold Effects Concentration (TEC) from Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (Macdonald, 2000)
4,4'-DDD	0.00083; 0.00084	ng/L	CTR HH (HHWO or HHO, respectively)
	4.88	ug/kg	Threshold Effects Concentration (TEC) from Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (Macdonald, 2000)
4,4'-DDE	0.00059	ug/L	CTR HH
	3.16	ug/kg	Threshold Effects Concentration (TEC) from Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (Macdonald, 2000)
4,4'-DDT	0.00059	ug/L	CTR HH
	4.16	ug/kg	Threshold Effects Concentration (TEC) from Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems (Macdonald, 2000)
Ammonia as N	Varies	mg/L	Objectives are derived from the Basin Plan, in which freshwater objectives are dependent on beneficial use, pH, and temperature (30-day average only) and saltwater objectives are dependent on temperature, salinity, pressure, and pH.
Bifenthrin	0.0006	ug/L	UC Davis Aquatic Life Criteria for Warm Freshwater Habitat
Bis(2-ethylhexyl) phthalate	1.8; 5.9	ug/L	CTR HH (HHWO or HHO, respectively)
Boron	Varies	mg/L	Basin Plan Site-Specific Objectives While Santa Clara River Estuary and Reach 1 do not have SSOs, Reaches 2 through 6 have a boron objective of 1.5 mg/L, Reach 7 has a boron objective of 1.0 mg/L, and Reach 8 has a boron objective of 0.5 mg/L.
Chlordane	0.00059	ug/L	CTR HH (HHO)
Chloride	Varies	mg/L	Santa Clara River Reach 3 Chloride TMDL; Basin Plan Site-Specific Objectives While Santa Clara River Estuary and Reach 1 do not have SSOs, Reach 2 has a chloride objective of 150 mg/L, Reaches 3 through 7 have a chloride objective of 100 mg/L, and Reach 8 has a chloride objective of 50 mg/L.
Chlorpyrifos	0.014 (dry), 0.02 (wet)	ug/L	California Department of Fish and Game

Appendix B: Water Quality Characterization

Constituent	Applicable WQO	Units	Applicable WQO Reference
Copper	Varies	ug/L	CTR hardness-based criteria
Cyfluthrin	0.0003	ug/L	UC Davis Aquatic Life Criteria for Warm Freshwater Habitat
Cyhalothrin, lambda	0.0005	ug/L	UC Davis Aquatic Life Criteria for Warm Freshwater Habitat
Cypermethrin	0.002	ug/L	Interim Freshwater CMC from Department of Fish and Game (DFG) 00-6, 2000
Dibenzo(a,h) anthracene	0.049	ug/L	CTR HH (HHO)
Dissolved Oxygen	>5	mg/L	Basin Plan
Indeno(1,2,3-cd) pyrene	0.049	ug/L	CTR HH (HHO)
Indicator Bacteria	235 (*E. coli*) 104 (Enterococcus) 400 (Fecal Coliform) 10,000 (Total Coliform)	MPN or CFU/100 mL	Santa Clara River Estuary and Reaches 3, 5, 6, and 7 Indicator Bacteria TMDL
Lead	Varies	ug/L	CTR hardness-based criteria
Malathion	0.1	ug/L	USEPA National Recommended Water Quality Criteria (maximum instantaneous concentration from freshwater aquatic life protection recommended criteria)
Mercury	0.051	ug/L	CTR Freshwater CCC
Methyl Parathion	0.08	ug/L	CA Department of Fish and Game Instantaneous Criteria
Nickel	Varies	ug/L	CTR hardness-based criteria
Nitrate as N	10	mg/L	Basin Plan
Nitrate-N + Nitrite-N	Varies	mg/L	The Santa Clara River Nitrogen Compounds TMDL notes the following objectives: • Reach 3: 4.5 mg/L • Reach 7: 4.5 mg/L • Reach 8: 9.0 mg/L The Basin Plan notes the following objectives. While Santa Clara River Estuary, Reach 1, and Reach 2 do not have SSOs, the upstream reaches have the following objectives: • Reach 3: 5 mg/L • Reach 4A: 5 mg/L • Reach 4B: 5 mg/L • Reach 5: 5 mg/L • Reach 6: 10 mg/L • Reach 7: 5 mg/L • Reach 8: 5 mg/L

Appendix B: Water Quality Characterization

Constituent	Applicable WQO	Units	Applicable WQO Reference
pH	6.5-8.5	N/A	Basin Plan
Selenium	5	ug/L	CTR Freshwater CCC
Sulfate	Varies	mg/L	Basin Plan Site-Specific Objectives While Santa Clara River Estuary and Reach 1 do not have SSOs, the upstream reaches have the following objectives: • Reach 2: 600 mg/L • Reach 3: 650 mg/L • Reach 4A: 600 mg/L • Reach 4B: 600 mg/L • Reach 5: 400 mg/L • Reach 6: 300 mg/L • Reach 7: 150 mg/L • Reach 8: 100 mg/L
Total Dissolved Solids	Varies	mg/L	Basin Plan Site-Specific Objectives While Santa Clara River Estuary and Reach 1 do not have SSOs, the upstream reaches have the following objectives: • Reach 2: 1,200 mg/L • Reach 3: 1,300 mg/L • Reach 4A: 1,300 mg/L • Reach 4B: 1,300 mg/L • Reach 5: 1,000 mg/L • Reach 6: 1,000 mg/L • Reach 7: 800 mg/L • Reach 8: 500 mg/L
Toxaphene	0.0002 0.00075	ug/L	CTR Freshwater CCC Conditional Waiver Water Quality Benchmarks for Organochlorine Pesticides (derived from CTR HHO)
Zinc	Varies	ug/L	CTR hardness-based criteria

Table 2-11. Applicable WQOs for Ventura River Watershed.

Constituent	Applicable WQO	Units	Applicable WQO Reference
4,4'-DDD	0.00083; 0.00084	ng/L	CTR HH (HHWO or HHO, respectively)
4,4'-DDE	0.00059	ug/L	CTR HH
4,4'-DDT	0.00059	ug/L	CTR HH
Algae	N/A	N/A	N/A
Aluminum	1	mg/L	Basin Plan (Table 3-8)
Benthic Community Effects	N/A	N/A	N/A
Bifenthrin	0.0006	ug/L	UC Davis Aquatic Life Criteria for Warm Freshwater Habitat
Bis(2-ethylhexyl) phthalate	1.8; 5.9	ug/L	CTR HH (HHWO or HHO, respectively)
Chloride	Varies	mg/L	Basin Plan Site-Specific Objectives While Ventura River Estuary and Reach 1 do not have SSOs, the upstream reaches have the following objectives: • Reach 2: 300 mg/L • Reach 3: 60 mg/L • Reach 4: 60 mg/L • San Antonio Creek: 60 mg/L • Reach 5: 50 mg/L
Chlorpyrifos	0.014 (dry), 0.02 (wet)	ug/L	California Department of Fish and Game
Copper	Varies	ug/L	CTR hardness-based criteria
Cyfluthrin	0.0003	ug/L	UC Davis Aquatic Life Criteria for Warm Freshwater Habitat
Cypermethrin	0.002	ug/L	Interim Freshwater CMC from Department of Fish and Game (DFG) 00-6, 2000
Dibenzo(a,h) anthracene	0.049	ug/L	CTR HH (HHO)
Dissolved Oxygen	>7	mg/L	Ventura River and its Tributaries Algae, Eutrophic Conditions, and Nutrients TMDL
Eutrophic	N/A	N/A	N/A
Indeno(1,2,3-cd) pyrene	0.049	ug/L	CTR HH (HHO)
Indicator Bacteria	320 (*E. coli*) 110 (Enterococcus) 400 (Fecal Coliform)	CFU/100 mL (Statewide Bacteria)	Statewide Bacteria Provisions (*E. coli* and Enterococcus); Basin Plan (Fecal Coliform and Total Coliform)

Appendix B: Water Quality Characterization

Constituent	Applicable WQO	Units	Applicable WQO Reference
	10,000 (Total Coliform)	Provisions); MPN or CFU/100 mL (Basin Plan)	
Mercury	0.051	ug/L	CTR Freshwater CCC
Nitrate-N + Nitrite-N	Varies	mg/L	Ventura River and its Tributaries Algae, Eutrophic Conditions, and Nutrients TMDL (derived from Basin Plan) • Reach 2: 10 mg/L • Cañada Larga: 10 mg/L • Reach 3: 5 mg/L • Reach 4: 5 mg/L • San Antonio Creek: 5 mg/L • Reach 5: 5 mg/L Note that these objectives apply during wet weather.
Sulfate	Varies	mg/L	Basin Plan Site-Specific Objectives While Ventura River Estuary and Reach 1 do not have SSOs, the upstream reaches have the following objectives: • Reach 2: 500 mg/L • Reach 3: 300 mg/L • Reach 4: 300 mg/L • San Antonio Creek: 300 mg/L • Reach 5: 300 mg/L
Temperature	Varies	°F	Dependent on beneficial use For waters designated WARM, water temperature shall not be altered by more than 5°F above the natural temperature. At no time shall these WARM-designated waters be raised above 80°F as a result of waste discharges. For waters designated COLD, water temperature shall not be altered by more than 5°F above the natural temperature.
Total Dissolved Solids	Varies	mg/L	Basin Plan Site-Specific Objectives While Ventura River Estuary and Reach 1 do not have SSOs, the upstream reaches have the following objectives:

Constituent	Applicable WQO	Units	Applicable WQO Reference
			• Reach 2: 1,500 mg/L • Reach 3: 1,000 mg/L • Reach 4: 800 mg/L • San Antonio Creek: 800 mg/L • Reach 5: 700 mg/L
Total Nitrogen	0.0025	lb/day/acre	Ventura River and its Tributaries Algae, Eutrophic Conditions, and Nutrients TMDL Staff Report (dry weather) During wet weather, the following objective for total nitrogen is applied to Ventura River Estuary and Ventura River Reach 1: 7.4 mg/L.
Total Phosphorus	4.7×10^{-5}	lb/day/acre	Ventura River and its Tributaries Algae, Eutrophic Conditions, and Nutrients TMDL Staff Report (dry weather)
Toxaphene	0.0002 0.00075	ug/L	CTR Freshwater CCC Conditional Waiver Water Quality Benchmarks for Organochlorine Pesticides (derived from CTR HHO)
Toxicity	N/A	N/A	N/A
Zinc	Varies	ug/L	CTR hardness-based criteria

Table 2-12. Applicable WQOs for Ventura County Coastal Watershed.

Constituent	Applicable WQO	Units	Applicable WQO Reference
4,4'-DDD	0.00083; 0.00084	ng/L	CTR HH (HHWO or HHO, respectively)
4,4'-DDE	0.00059	ug/L	CTR HH
4,4'-DDT	0.00059	ug/L	CTR HH
Ammonia as N	Varies	mg/L	Objectives are derived from the Basin Plan, in which freshwater objectives are dependent on beneficial use, pH, and temperature (30-day average only) and saltwater objectives are dependent on temperature, salinity, pressure, and pH.
Arsenic	36	mg/L	CTR Saltwater CCC
Benzo(a) anthracene	0.049	ug/L	CTR HH (HHO)
Benzo(a) pyrene	0.049	ug/L	CTR HH (HHO)
Benzo(b) fluoranthene	0.049	ug/L	CTR HH (HHO)
Benzo(k) fluoranthene	0.049	ug/L	CTR HH (HHO)

Appendix B: Water Quality Characterization

Constituent	Applicable WQO	Units	Applicable WQO Reference
Chlordane	0.00059	ug/L	CTR HH (HHO)
Chlorpyrifos	0.014 (dry), 0.02 (wet)	ug/L	California Department of Fish and Game
Chrysene	0.049	ug/L	CTR HH (HHO)
Dibenzo(a,h) anthracene	0.049	ug/L	CTR HH (HHO)
Dieldrin	0.00014	ug/L	CTR HH (HHO)
Dissolved Oxygen	>5	mg/L	Basin Plan
Indeno(1,2,3-cd) pyrene	0.049	ug/L	CTR HH (HHO)
Indicator Bacteria	**REC-1 Beneficial Use** 110 (Enterococcus—for waterbodies not subject to TMDL); 104 (Enterococcus—for waterbodies subject to TMDL) 400 (Fecal Coliform) 10,000 (Total Coliform) **SHELL Beneficial Use** 70 (Total Coliform)	MPN or CFU/100 mL	Statewide Bacteria Provisions (Enterococcus—for waterbodies not subject to TMDL) Harbor Beaches of Ventura County (Kiddie Beach and Hobie Beach) Bacteria TMDL Basin Plan for waters designated as impaired for shellfish harvesting (SHELL) Basin Plan (Fecal Coliform and Total Coliform—for waterbodies not subject to TMDL)
Malathion	0.1	ug/L	USEPA National Recommended Water Quality Criteria (maximum instantaneous concentration from freshwater aquatic life protection recommended criteria)
Nitrate as N	10	mg/L	Basin Plan
Nitrate as Nitrate (NO3)	45	mg/L	Basin Plan
PAHs	N/A	N/A	N/A
PCBs	0.00017	ug/L	CTR HH (HHO)
pH	6.5-8.5	N/A	Basin Plan
Selenium	5	ug/L	CTR Freshwater CCC
Toxicity	N/A	N/A	N/A

2.5 Cause and Contribute Analysis

The cause and contribute analysis primarily utilized monitoring data from MS4 outfalls, for both stormwater and non-stormwater discharges. Additionally, other land use stations (i.e., agricultural) were referenced as well as geospatial analysis to determine whether the MS4 is potentially causing or contributing to downstream receiving water exceedances. The Agricultural Preserves shapefile was retrieved from the Ventura County GIS Data Portal to represent agricultural area in Ventura County. Examples of this analysis are demonstrated in the following three scenarios below:

- **Scenario #1:** If a WBPC exceedance was observed at a receiving water monitoring station that drains predominantly agricultural area (e.g., no MS4 area contribution), then any applicable 303(d) listing (Category 2) or receiving water exceedance (Category 3) was put into a subcategory where the MS4 area was determined as unlikely to cause or contribute to exceedances.
- **Scenario #2:** If a WBPC exceedance was observed at a receiving water monitoring and an upstream MS4 outfall monitoring station has data available for the constituent or other flow observations during similar weather conditions, the monitoring data was utilized to determine whether the MS4 is potentially causing or contributing to exceedances. If there were exceedances observed at the upstream MS4 outfall monitoring station during the same weather condition (not necessarily on the same day as the receiving water exceedance), it was considered that the MS4 could potentially contribute to receiving water exceedances. For dry weather receiving water exceedances, MS4 outfall flow data was also referenced to determine if there was any hydraulic connectivity from the outfall to the receiving water at the same day and time.
- **Scenario #3:** If a WBPC exceedance was observed at a receiving water monitoring station and there are no upstream MS4 outfall monitoring stations that have data available for the constituent, geospatial analysis was used to determine the contributing drainage area. If the contributing drainage area is inclusive of any Ventura County jurisdictions or unincorporated MS4 area, outfall data extrapolated from other MS4 outfall stations in watersheds with similar land uses as well as flow data from the major outfalls from the VCSQMP Monitoring Program was utilized. If no MS4 outfall data was available across other watersheds, available literature was referenced.

3 SOURCE ASSESSMENT

The source assessment leverages historic investigations from the TMDLs, TMDL technical and staff reports, special studies conducted as part of any TMDL implementation schedule, 303(d) listing information, available literature as applicable, and the locations of MS4s to potentially contribute to any pollutant of concern in receiving waters in Ventura County. Both stormwater and non-stormwater discharges were evaluated as potential sources. If available, the fate and transport of the constituents in the environment is also described along with their effects on human and aquatic health, which are the primary beneficial uses to be protected in the Ventura County waterbodies. This section also details information about other sources outside of the MS4 that could contribute to receiving water exceedances, such as agricultural areas, publicly owned treatment works, or natural sources. Sources outside of the Permittees' jurisdictions may require coordination with the Regional Board if contamination of receiving waters is found to be persistent. Overall, the source assessment process helped create the WBPC tables and determining which pollutants to prioritize based on having the authority to control those pollutants.

The following subsections detail the source assessment for the relevant pollutants and pollutant categories.

3.1 Bacteria

The beneficial uses of surface waters are threatened by and susceptible to microbial pollution from a variety of potential sources, including but not limited to, runoff from the MS4 or non-MS4 (e.g., agricultural areas), wildlife, and untreated sewage discharges. Because direct measurement of pathogens is often costly and resource-intensive, microbial pollution is typically assessed using non-host-specific fecal indicator bacteria, including *Escherichia coli (E. coli),* enterococci, fecal coliform, and total coliform, which are present in the gut microbiomes of a variety of animals and can also be found in non-fecal sources, such as sand or vegetation (Goodwin, 2017). Although elevated levels of traditional fecal indicator bacteria (FIB) in waterbodies may indicate a higher potential for human health risks, it is *exposure* to elevated concentrations of *pathogens* (microorganisms such as protozoa, viruses, or bacteria known to cause disease) via recreational contact with waterbodies, consumption of shellfish, or drinking water that increases the risk of gastrointestinal illnesses (GI). The scientific understanding of risk to human health from recreational water exposure has evolved significantly over the last decade—in fact, it is now generally accepted that human contamination poses the greatest risk to human health from recreational exposures as compared to fecal contamination from other sources, such as gulls (Boehm et. Al., 2020).

While the majority of bacteria regulations to date have been established to address the recreational beneficial use, the 2020-2022 303(d) list includes several of Ventura County's coastal waters as having an existing impairment to the shellfish beneficial use. The commercial shellfish sanitary standard was set nearly a century ago and is not validated using local shellfish, with some regulatory agencies questioning whether the existing standard is supported by a sufficient technical foundation. The State Water Resources Control Board has identified the shellfish beneficial use standard as a strategic priority to address according to their 2019 Triennial Review of the Water Quality Control Plan for Ocean Waters of California. At the 2022 California Bacteria Summit hosted jointly by the State Water Resources Control Board and the California Stormwater Quality Association (CASQA), regulators acknowledged that (1) more research is needed to evaluate uses and objectives, (2) a desire for the California Department of Public Health (CDPH), Food and Drug Administration (FDA), local public health agencies, and Water Board to work together, and (3) interest in a shellfish index to communicate safely to the public. Currently, California uses the numeric food safety standard as the ambient water quality objective.

Recognizing that Ventura County agencies are subject to the shellfish standard via the 303(d) listings for several coastal waterbodies, the Reasonable Assurance Analysis analyzes the load reduction requirements to meet applicable total coliform standards.

According to the 2022 Heal the Bay Beach Report Card (**Figure 3-1**), the water quality at Ventura County beaches between April 2021 to March 2022 met applicable FIB standards in accordance with AB 411 most of the time, with 97 percent of beaches receiving "A" and "B" grades during summer dry weather and 87 percent of beaches receiving "A" and "B" grades during wet weather (Heal the Bay, 2022). Analysis of the water quality monitoring data from Ventura County's Ocean Monitoring Program from January 2017 to May 2022 indicate that samples are meeting applicable single sample objectives over 98 percent of the time (over 99 percent of the time in dry weather and over 88 percent of the time in wet weather).

VENTURA COUNTY

2021–2022	Summer Dry		Winter Dry		Wet Weather	
GRADE	#	%	#	%	#	%
A	34	97%	NO DATA	NO DATA	26	87%
B	0	0%	NO DATA	NO DATA	0	0%
C	1	3%	NO DATA	NO DATA	0	0%
D	0	0%	NO DATA	NO DATA	1	3%
F	0	0%	NO DATA	NO DATA	3	10%
A+B	34	97%	NO DATA	NO DATA	26	87%
C,D,F	1	3%	NO DATA	NO DATA	4	13%

5 YEAR AVERAGE	Summer Dry		Winter Dry		Wet Weather	
GRADE	#	%	#	%	#	%
A	39	99%	15	92%	23	73%
B	0	0%	1	4%	2	8%
C	0	1%	0	2%	3	8%
D	0	0%	0	2%	0	1%
F	0	0%	0	0%	3	9%
A+B	39	99%	16	95%	26	81%
C,D,F	0	1%	1	5%	6	19%

Figure 3-1. Ventura County's Heal the Bay Beach Report Card Grades in 2021-2022 compared to the 5-year average (Heal the Bay, 2022).

Across Ventura County's five watersheds, there are four indicator bacteria TMDLs:

- Harbor Beaches Bacteria TMDL
- Malibu Creek Bacteria TMDL
- Santa Clara River Estuary and Reaches 3, 5, 6, and 7 Indicator Bacteria TMDL

- Santa Monica Bay Beaches Bacteria TMDL

The staff reports for the above TMDLs enumerate the following potential sources of indicator bacteria:

- **Harbor Beaches Bacteria TMDL:** As of December 2006, there are four active NPDES discharges into Channel Islands Harbor, including the MS4, Ventura County Department of Airports, Reliant Energy Mandalay, and D.R. Horton Los Angeles Holding. Discharges from Caltrans are potentially a significant source of bacteria loading while discharges from general NPDES permits, individual NPDES permits, statewide Industrial Storm Water General Permit, and the Statewide Construction Activity Storm Water General Permit are not expected to be a significant source of bacteria. The source identification study conducted at Channel Islands Harbor indicated that local non-point sources are the majority contributor in summer dry weather while high bacteria densities and exceedances during wet weather may be more indicative of urban and agricultural runoff. Potential non-point sources of bacteria contamination include marina activities such as waste disposal from boats, boat deck and slip washing, swimmer "wash-off", and restaurant washouts; natural sources including birds, waterfowl, and feral cat; and agricultural sources.
- **Malibu Creek Bacteria TMDL:** Fecal indicator bacteria may be introduced from a variety of sources including storm water runoff, dry-weather runoff, onsite wastewater treatment systems, and animal wastes. It is noted that the CA Department of Parks and Recreation is the responsible agency for Malibu Lagoon and Malibu Creek State Park (outside of the Ventura County jurisdiction) and since the reference system approach in the TMDL is intended to make allowances for natural sources, the State Parks is responsible for conducting a study of bacteria loading from birds and coming into compliance with load allocations applicable to anthropogenic sources such as onsite wastewater treatment systems (OWTS). The staff report indicates that stormwater from commercial/industrial and high density development generate the highest annual bacteria loading because of episodic storm events while bacteria loads from onsite wastewater treatment systems, especially in the Malibu Civic Center area (outside of the Ventura County jurisdiction), are believed to contribute bacteria loading year round and may have a greater impact on impairments during dry weather. Major sources of FIB loading include urban runoff from residential and commercial areas (which includes bacterial sources such as fertilizer used for lawns and landscaping, organic debris, trash such as food wastes, domestic animal waste, and human waste from areas inhabited by the homeless population) as well as OWTS in the City of Malibu (outside of Ventura County jurisdiction). Other minor potential sources of FIB loading include the Tapia Wastewater Reclamation Facility (WRF), horse and livestock, wildlife, golf courses, tidal inflow to Malibu Lagoon, dry weather storm drain loads to Malibu Lagoon, sanitary sewer overflows, sewer exfiltration, and illicit connections.
- **Santa Clara River Estuary and Reaches 3, 5, 6, and 7 Indicator Bacteria TMDL:** Surface runoff loads from urbanized areas via the MS4 are a significant source of indicator bacteria to the Santa Clara River with MS4 mass emission stations and stations representative of urbanized industrial and residential land uses consistently demonstrating exceedances of applicable objectives. This may be due to sanitary sewer leaks and spills, illicit connections of sanitary lines to the storm drain system, runoff from homeless encampments, pet waste, illegal discharges from recreational vehicles, among others. Other point and nonpoint sources, such as water reclamation facilities, wildlife, golf courses, and horses and livestock, were analyzed and found to be less significant or did not have enough data to quantify their contribution.

- **Santa Monica Bay Beaches Bacteria TMDL**: Many of the canyon creeks and storm drains to Santa Monica Bay flow during both dry and wet weather. Dry weather flows are attributed to natural springs, over-irrigation of lawns, and other activities. For the dry weather source characterization, the TMDL staff report identified several data sources, including for Malibu Creek and Lagoon collected by Los Angeles County and Heal the Bay, which is the most applicable for Ventura County. The previous data collected indicated that the single sample objectives for total coliform, fecal coliform, and enterococcus were exceeded in 31%, 85%, and 23% of samples, respectively. In addition, data from the BeachKeeper monitoring program administered by the Santa Monica BayKeeper indicated that during dry weather, approximately half of the samples from 342 coastal drains from Point Dume to Malaga Cove exceeded the marine single sample total coliform and freshwater single sample *E. coli* objective between 1999 to 2001. For wet weather, data collected under the Los Angeles County Storm Water Monitoring Program for Malibu Creek (south of Piuma Road) indicated that the yearly geometric mean bacteria densities for all three indicators (total coliform, fecal coliform, and enterococcus) exceeded the thresholds for all six years between 1994–2000. Per data from the Santa Monica Bay Beaches Bacteria TMDL Coordinated Shoreline Monitoring Program within the past ten years, the MC-2 monitoring station has not had exceedances of the allowable wet weather days (17 days) in Water Years 2012, 2013, 2017, 2019, 2020, and 2021. However, the site continues to have exceedances of the allowable winter dry days (9 days) and summer dry days (0 days).

Recognizing elevated FIB concentrations within the MS4 and receiving waters as among its top water quality concerns, and that FIB derived from human waste poses higher risks to human health, the VCSQMP proactively conducted a special study between April and October 2014 to determine the importance of human, dog, and birds as sources of FIB to the Ventura County MS4 (County of Ventura Public Works Agency, 2015). Because the goal of the study involved a regional assessment of fecal sources, the sampling design included probabilistic sampling of MS4 locations as well as existing major outfall locations. At each location, grab samples were collected for analysis of *E. coli* and host-specific genetic markers including HF183 (human waste), DogBact (dog), and GFD SYBRAvian (bird). Human marker concentrations in all samples (including MS4, control, and field blank) were below detection limit while dog markers were detected in 10% of MS4 samples and bird markers were frequently detected in all samples (MS4, non-MS4 control, and field blank). The results demonstrated the absence of human markers countywide, suggesting the risk to human health associated with elevated *E. coli* levels in storm drains is lower than previously assumed. The dominant sources of *E. coli* countywide remain unclear, with the study hypothesizing that other sources may potentially contribute to exceedances of *E. coli,* including wildlife, biofilm growth, horses, and cattle.

In Southern California, there are ongoing bacteria-related studies including the Load Reduction Strategy (LRS) Adaptation led by the Upper Los Angeles River Watershed Management Group and the Comprehensive Human Waste Source Reduction Strategy (CHWSRS) led by the South Orange County Watershed Management Area. These studies are leveraging the use of microbial source tracking (specifically, human markers and other diagnostic tools) to conduct targeted monitoring investigations and identify abatement actions for potential human waste sources rather than using structural Best Management Practices (BMPs). While Ventura County's countywide study utilized a probabilistic sampling design, the LRS Adaptation and CHWSRS studies employed a targeted, risk-based catchment prioritization approach to help target monitoring/abatement efforts and focus resources on the potential highest human health risk areas given the scale of their watershed areas. Similar methods could be employed by the VCSQMP to improve local understanding of higher-risk potential bacteria sources. The catchment prioritization approach uses a combination of water quality condition assessments, GIS

desktop-based analysis of likely potential human waste sources, and hydraulic connectivity information to prioritize or deprioritize catchments for focused follow-up source identification and abatement actions. Potential human waste sources investigated in both studies include the following:

- Sanitary sewer exfiltration/MS4 infiltration;
- Onsite sewer system exfiltration/MS4 infiltration;
- Private lateral exfiltration/MS4 infiltration;
- Homeless encampments;
- Sanitary sewer overflows (SSOs);
- Fats, oils, and grease (FOG) impacts;
- Illicit connections/illicit discharges (IC/ID) and illegal dumping; and,
- Wastewater treatment plants.

3.2 Pesticides

According to the National Institute of Environmental Health Sciences, pesticides are agrochemicals used to kill, repel, or control certain forms of plant or animal life that are considered to be pests. Categories of pesticides include herbicides for controlling weeds and unwanted vegetation, insecticides for controlling insects, fungicides to control the growth of molds and mildew, disinfectants for preventing the spread of bacteria, and compounds to control mice and rats. Pesticides are used in agricultural lands, public health programs, and urban green areas to protect plants and humans from various diseases (Nicolopoulou-Stamati, 2016). In urban areas, pesticides can be discharged in urban runoff through storm events, over-irrigating, washing outdoor surfaces, vehicle wash water, and the drawdown of pools, spas, and fountains (LWA, 2008). However, a study conducted by stakeholders in the Calleguas Creek Watershed Area of urban sources of pesticides concluded that current potential urban sources of OC pesticides such as hazardous waste collection centers and hazardous waste clean-up locations are unlikely contributing to detections of pesticides at urban monitoring sites and may most likely be from legacy sources (LWA, 2008).

Pesticides are a challenging water quality problem due to their persistence in the environment decades after being used in a widespread and unrestricted manner and their ability to bioaccumulate and bioconcentrate in organisms, posing threats to human and aquatic life. There are numerous negative health effects associated with chemical pesticides, including but not limited to, dermatological, gastrointestinal, neurological, carcinogenic, respiratory, reproductive, and endocrine effects. Those who have high occupational, accidental, or intentional exposure to pesticides can result in hospitalization and death. The USEPA is responsible for regulating pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Food Quality Protection Act (FQPA). Policies currently in place to protect public health rely primarily on voluntary compliance from applicators on the amount and types of pesticides used, method and timing of application, and weather conditions at the time of pesticide spraying.

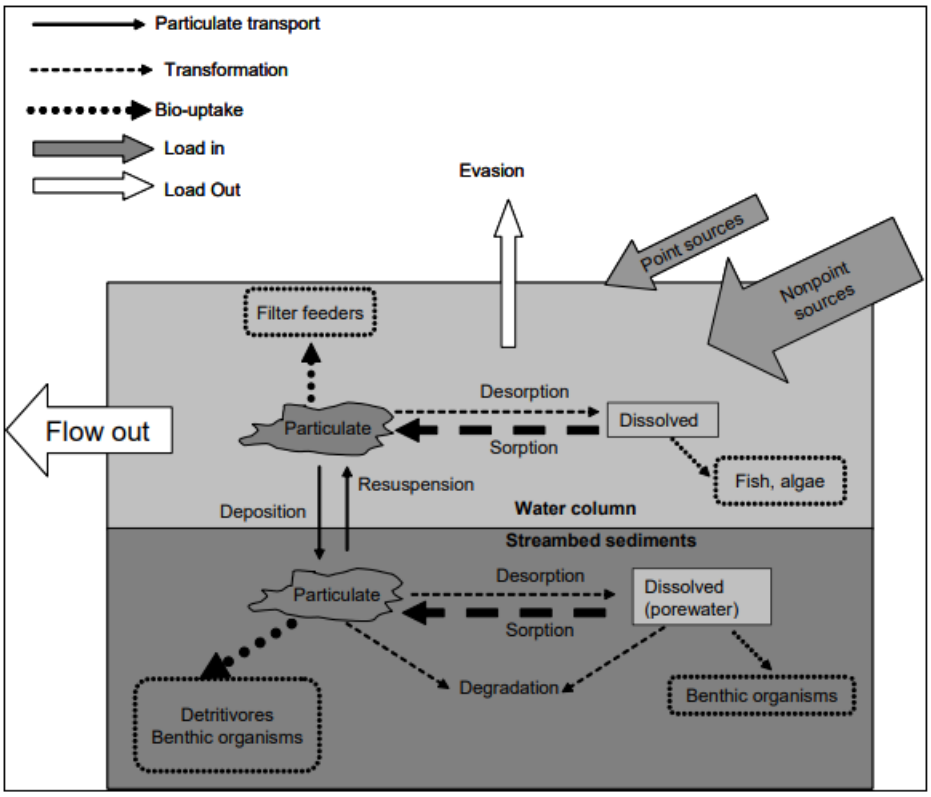


Figure 3-2. Conceptual model of the fate, transport, and transformation processes of OCs in surface waters of the Calleguas Creek Watershed, and entry points to the food chain (referenced from the Calleguas Creek OC Pesticides and PCBs TMDL Technical Report).

Within Ventura County, there are three TMDLs that focuses on pesticides: the Calleguas Creek Organochlorine (OC) Pesticides, PCBs, and Siltation TMDL, the Calleguas Creek Toxicity TMDL, and the Oxnard Drain #3 Pesticides, PCBs, and Sediment Toxicity TMDL. The first referenced Calleguas Creek TMDL regulates dieldrin, total chlordane, total DDTs, and toxaphene while the second referenced Calleguas Creek TMDL regulates chlorpyrifos and diazinon. Most sources of OC Pesticides to surface waters in the Calleguas Creek Watershed are related to the historical uses. The Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL Staff Report notes that the largest source of OC pesticides in 303(d) listed waters is from agricultural runoff while POTWs, groundwater, atmospheric deposition, and imported water do not appear to be significant contributors of OC pesticides in the watershed. In evaluating land-use runoff and discharge data for agricultural runoff, urban runoff, runoff from native land, pumped groundwater, and POTW effluent, it was observed that every OC summarized was detected most often in agricultural runoff. Some sediment samples from debris basins contained concentrations that exceed the Threshold Effects Level (TEL) numeric target. Residues from past use and present day applications of OC pesticides are responsible for some atmospheric deposition by means of drift from applications as well as volatilization, transport, and redeposition. While some OC pesticides are banned in the U.S., some countries are continuing the use of such pesticides. Imported water is not expected to contain high concentrations of OC pesticides since imported water undergoes treatment which removes many hydrophobic particle-associated contaminants. The OC pesticides of concern in the TMDL all sorb strongly to particles; however, site-specific factors that enhance solubility (especially in waters) need to be considered with regards to effects on beneficial uses.

As referenced in the Oxnard Drain #3 USEPA TMDL, chlorinated pesticides are broadly banned in the US but due to significant historic use for agricultural and pest control applications, they continue to persist in the environment. Specific areas of concern highlighted in the TMDL include waste facilities with old transformers, industrial sites, agricultural lands, and residences heavily treated for pests. Bifenthrin and chlorpyrifos are still used as pesticides and therefore agricultural fields are referenced as a primary ongoing source. Drainage from the County of Ventura and City of Oxnard MS4 system is minimal to this area. Specifically, the County of Ventura jurisdiction only includes a small section of road, with no MS4 system (e.g., pipes or catch basins). The pollutants in the Oxnard Drain 3 TMDL are focused on pesticides and toxics that are prevalent from agricultural uses. The combination of the very limited MS4 system in this area and the pollutants that are dominantly influenced by agricultural lands deprioritizes any further actions necessary from the MS4 Permittees in the WMP.

The following sub-sections details the historical use of pesticides of concern.

3.2.1 Chlorpyrifos

Chlorpyrifos is an organophosphate insecticide, acaricide, and miticide used primarily to control foliage and soil-borne insect pests since 1965 in both agricultural and non-agricultural areas (USEPA, 2022). It is very highly toxic to fish, aquatic invertebrates, and estuarine organisms (LWA, 2008). According to the Calleguas Creek Watershed Toxicity TMDL Staff Report, chlorpyrifos was banned for sale on non-agricultural uses on December 31, 2005 by federal regulation; specifically, it was banned from sale for home and construction at the end of 2001 and its use as a termiticide halted at the end of 2005 (LWA, 2008). As a result, the proportion of the loading from urban sources will likely decrease and is unlikely to be a long-term source to the Calleguas Creek Watershed as it will not be sold for non-agricultural purposes. In terms of its fate and transport, chlorpyrifos adsorbs strongly to soil particles and is not readily water soluble (LWA, 2008).

The Staff Report notes that in terms of agricultural use, areas with heavier use of chlorpyrifos is on citrus crops in the northwestern portion and truck crops in the lower portion of the Calleguas Creek Watershed. Specifically, these heavier uses lie along Revolon Slough, Beardsley Channel, Calleguas Creek Reaches 2 and 3, and Arroyo Las Posas (**Figure 3-3**). According to the TMDL, chlorpyrifos use in agriculture has remained relatively stable between 1998 and 2003 during the phase-out period. Past urban uses for chlorpyrifos had included structural pest control, landscape maintenance, rights of way maintenance, vertebrate control, and public health pest control. The spatial distribution of the amount of pesticides used for urban uses is unknown since reported urban use data only report the county in which the application is made. Other sources of chlorpyrifos potentially include POTWs via infiltration/inflow from stormwater runoff and inputs of pesticides from washing fruits, vegetables, and clothes. Groundwater, imported water from the State Water Project/Freeman Diversion, and native space runoff is unlikely to be a source of pesticides while the contribution from atmospheric and aerial deposition is unknown (LWA, 2005).

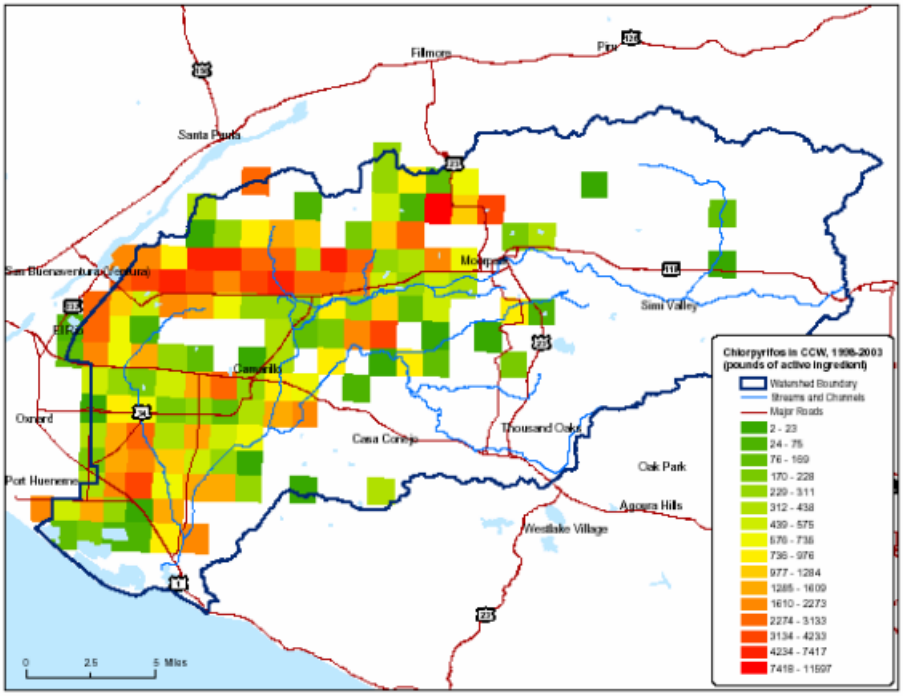


Figure 3-3. Cumulative agricultural chlorpyrifos use in the Calleguas Creek Watershed from 1998-2003 (referenced from the Calleguas Creek Watershed Toxicity TMDL Technical Report.

The Calleguas Creek Watershed Management Plan conducted a special study on alternative urban pesticides that have been used since the phasing of uses for chlorpyrifos. Replacement pesticides that were used locally include pyrethroids (bifenthrin, cyfluthrin, cypermethrin, deltamethrin, permethrin, pyrethrins), chloronicotinyl nitroguanidines (imidacloprid), phenylpyrazoles (fipronil), and synergists (piperonyl butoxide).

The USEPA recently issued letters to the registrants of chlorpyrifos for products with registered food uses confirming that tolerances for chlorpyrifos will expire as of February 28, 2022 and requesting registrants act to cancel these uses. In effect, chlorpyrifos is now banned from use on any food sold in the United States.

3.2.2 Diazinon

Diazinon is an organophosphate insecticide used in agriculture to control insects on fruit, vegetables, nuts, and field crops since 1956 (National Pesticide Information Center, n.d.). It is highly toxic to fish and aquatic invertebrates (LWA, 2008). Before the cancellation of residential uses in 2004, diazinon was used for household insects, lawn, and garden insect control, and to control insects on pets. Diazinon was phased out of use for indoor home-use at the end of 2002 and outdoor non-agricultural uses in April 2003. A buyback program of these products by manufacturers started in 2004. The proportion of the loading from urban sources is unlikely to the Calleguas Creek Watershed as it will not be sold for non-agricultural purposes. In terms of its fate and transport, diazinon has a low persistence in soil and is much more water soluble (LWA, 2008).

The Staff Report notes that in terms of agricultural use, the majority of agricultural diazinon use occurs in the lower watershed (e.g., Oxnard Plain is an area of concentrated agricultural activity). Areas of relatively heavier use lie primarily along Revolon Slough and Calleguas Creek Reaches 2 and 3 (**Figure 3-4**). According to the TMDL, use of diazinon in agriculture declined considerably between 1998 and 2003 during the phase-out period. Past urban uses for diazinon had included structural pest control, landscape maintenance, rights of way

maintenance, vertebrate control, and public health pest control. The spatial distribution of the amount of pesticides used for urban uses is unknown since reported urban use data only report the county in which the application is made. Other sources of diazinon potentially include POTWs via infiltration/inflow from stormwater runoff and inputs of pesticides from washing fruits, vegetables, and clothes. Groundwater, imported water from the State Water Project/Freeman Diversion, and native space runoff is unlikely to be a source of pesticides while the contribution from atmospheric and aerial deposition is unknown (LWA, 2005).

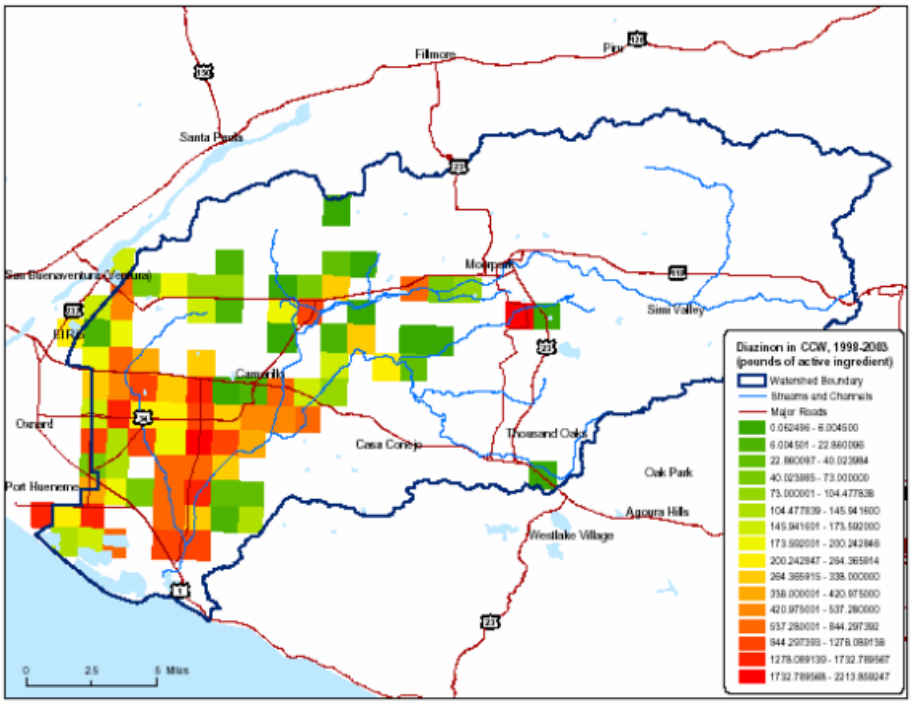


Figure 3-4. Cumulative agricultural diazinon use in the Calleguas Creek Watershed from 1998-2003 (referenced from the Calleguas Creek Watershed Toxicity TMDL Technical Report.

3.2.3 Dieldrin

Dieldrin is a chlorocarbon insecticide that was widely used from the 1950s to the 1970s as an alternative to DDT for crops such as corn and cotton (ACS, n.d.). Introduced in 1948, dieldrin is an oxidized version of aldrin, from which it is produced. In 1974, the USEPA banned all uses of aldrin and dieldrin in 1974 except to control termites because of concerns about damage to the environment and to human health (ATSDR, n.d.). In 1987, the USEPA banned all uses of dieldrin. Exposure to aldrin and dieldrin can potentially be via eating foods grown in contaminated soil, drinking contaminated water, living in homes treated for termites before 1989, or living near a hazardous waste site. Aldrin use was more concentrated in the Midwest while dieldrin was more used heavily in the south and on the west coast. According to the Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL Staff Report, over 50 percent of dieldrin produced in 1964 was used for pest control instead of agricultural (soil application for termite control and mothproofing during wool carpet and clothing manufacturing). The Staff Report notes that dieldrin can travel very long distances from where it was first applied according to atmospheric data.

3.2.4 Malathion

Malathion is a man-made organophosphate insecticide first registered for use in 1956 commonly used to control a variety of insects that attack fruits, vegetables, landscaping plants, and shrubs as well as to control ticks and insects indoors (NPIC, n.d.). It has also been used in public health mosquito control and fruit fly eradication programs. Malathion is known to be toxic to the nervous system. According to the Los Angeles Times, malathion was one of 183 chemical pesticides used in Ventura County to protect crops from pest damage in 1990 (Pascual, 1990). Specific to Ventura County, malathion was used in a fruit fly eradication program to control Mediterranean fruit flies found in eastern Camarillo in 1994 (Miller, 1994). Residents in Camarillo, Somis, Moorpark, and Thousand Oaks were expected to be in quarantine for at least six months. In terms of sources in urban runoff, CASQA concluded that the major source of malathion in urban runoff may be unreported uses of malathion concentrate products by unlicensed applicators in residential settings (CASQA, 2019).

Malathion is still regulated by the USEPA. According to the Center for Biological Diversity, federal analysis of the effects of malathion on wildlife have reversed course over the past few years. In 2017, the U.S. Fish and Wildlife Service had concluded that 1,284 species would be jeopardized by malathion; however in 2022, the agency announced that malathion does not pose an extinction risk to a single protected animal or plant (Center for Biological Diversity, 2022).

3.2.5 Total Chlordane

Chlordane is an organochlorine compound used as a pesticide for crops such as corn and citrus, home lawns and gardens, and termite control in the United States from 1948 to 1988 (USEPA, n.d.). All uses except termite control were banned in 1983, then in 1988, all approved uses of chlordane in the United States were canceled. According to the Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL Staff Report, chlordane was mainly used for lemons and oranges in the Calleguas Creek Watershed. In addition, pesticide use reporting (PUR) data indicated that chlordane was applied to the following crops: beans, citrus, tomatoes, peas, peppers, celery, and cabbage. For urban uses, PUR data indicate chlordane was used for the following: city agency, federal agency, other agency, recreational area, school district, state highway, and structural control for termites. Current exposure to chlordane is highest for those living in homes that were treated for termites with chlordane, while additional exposure to chlordane may occur from digging in soil around the foundation of homes where chlordane was applied or ingesting chlordane-contaminated food (USEPA, n.d.). Chlordane mainly affects the nervous system and liver in humans and animals (ATSDR, n.d.).

In terms of its fate and transport, chlordane does not degrade rapidly in soils and may persist for over 20 years. Chlordane has a high octanol-water partition coefficient, indicating that chlordane in water is likely to be sediment-associated and immobile in soil. It may also volatize; however, its rate of volatilization depends on the amount, size, and composition (e.g., percent organic matter) of the suspended material in water since adsorption to suspended solids and sediments attenuates the rate of volatilization (ATSDR, 2018).

3.2.6 Total DDTs

DDT (dichloro-diphenyl-trichloroethane) was developed as one of the first of the modern synthetic insecticides in the 1940s to combat malaria, typhus, and other insect-borne human diseases among military and civilian populations (USEPA, n.d.). The use of DDT in California ranged from control of agricultural pests to control of cockroaches in residences and mosquito abatement in neighborhoods. At its peak in 1962, DDT was used on 334 agricultural commodities (LWA, 2005). In 1972, most U.S. consumption of DDT was on cotton (remainder was

primarily used on peanuts and soybeans). According to the Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL Technical Report, although cotton, peanuts, and soybeans, accounted for most of nationwide DDT use, there is no indication that any of these crops have been grown in the Calleguas Creek Watershed in significant accounts. DDT is known to have been extensively used on walnut groves in the Calleguas Creek Watershed as well as beets, lima beans, and tomatoes. The primary non-agricultural use of DDT was for mosquito control; however, DDT is not known to have been used extensively for this purpose since malathion was sprayed for mosquito control for many years. DDT is known to have been used by private residents for a variety of home and garden uses prior to its ban. Other sources of DDT may include POTWs, where the influent may contain DDT originating from imported water sources because of land residues and atmospheric deposition in the regions from which water is drawn.

DDT was banned by the USEPA in 1972, except for control of emergency public health problems. A study conducted by the California Department of Food and Agriculture in August 1984 investigating the potential sources of contamination by DDT and/or breakdown products is from residues of previous legal applications of DDT. Today, DDT is classified as a probable human carcinogen by the United States and international authorities (USEPA, n.d.). DDT is known to be very persistent in the environment, accumulate in fatty tissues, and travel long distances in the upper atmosphere. It is suspected that DDT exposure have adverse reproductive effects in humans.

To note, there is an organochlorine miticide/pesticide derived from DDE (a breakdown product of DDT) known as dicofol. Dicofol is currently used on cotton, apples, citrus, strawberries, beans, peppers, tomatoes, pecans, walnuts, and non-residential lawns/ornamentals. It is considered a source of DDT although the sum of DDT, DDE, DDD, and chlorinated DDE allowed in dicofol products was reduced so as not to exceed 0.1 percent.

3.2.7 Toxaphene

Toxaphene is an insecticide containing over 670 chemicals first used in the 1940s on cotton, other crops, and in livestock and poultry (USEPA, n.d.). It was primarily used in the southern United States to control inspect pests on cotton and other crops. According to the Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL Technical Report, after the 1969 DDT ban, toxaphene became the mostly heavily used insecticide in the United States. EPA canceled registrations of toxaphene for most uses in 1982 and banned all uses in 1990. In the Calleguas Creek Watershed before 1990, toxaphene was applied for many years onto walnut groves and some other crops such as beans and celery according to Pesticide Use Reporting data.

The fate and transport of toxaphene is complicated which is influenced by individual physical and chemical properties in addition to those of the mixture. Acute exposure to toxaphene may affect the nervous system while chronic inhalation exposure to toxaphene in humans can cause reversible respiratory toxicity.

3.2.8 Pyrethroid Pesticides

Pyrethroids are a class of insecticides, many of which have been newly developed, to replace pesticides that were banned due to long-lasting environmental harm. Originating from chrysenthenum flowers, pyrethrin insecticides are relatively non-toxic to humans and animals but may be toxic to aquatic life when present in runoff into creeks and streams, where they could buildup in in sediments (LWA, 2008). Pyrethroids are the synthetic equivalent of pyrethrins, have been marketed since the 1960s, and are generally more stable and toxic than the natural equivalent. Generally, pyrethroid pesticides have low solubility and are most likely to attach to

sediment (LWA, 2008). Exposure to pyrethroids in aquatic environments occurs in the pore water rather than through the particulate phase of sediments.

The Calleguas Creek Watershed Management Group conducted a special study on alternative urban pesticides that have been used since the phasing of uses for diazinon. Replacement pesticides that are used locally include pyrethroids (bifenthrin, cyfluthrin, cypermethrin, deltamethrin, permethrin, pyrethrins), chloronicotinyl nitroguanidines (imidacloprid), phenylpyrazoles (fipronil), and synergists (piperonyl butoxide).

Every year, CASQA provides a water list for pesticides that are or may be of concern for urban waterways based on the latest scientific information. The watch list establishes priorities on the watch list as follows:

- **Priority 1**: Monitoring data exceeding benchmarks; linked to toxicity in surface waters; urban 303(d) listings.
- **Priority 2**: Monitoring data approaching benchmarks; modeling predicts benchmark exceedances; very high toxicity and broadcast application on impervious surfaces; urban 303(d) listing for pesticide, degradate, or contaminant that also has non-pesticide sources.
- **Priority 3**: Pesticide contains a Clean Water Act Priority Pollutant; 303(d) listing for pesticide, degradate, or contaminant in any watershed.
- **Priority 4**: High or unknown toxicity (parent or degradate) and urban use pattern associated with water pollution; synergist for higher tier pesticide; DPR urban monitoring priority.

According to the most recent water list, pyrethroids (20 chemicals[3]), fipronil, imidacloprid, and malathion are Priority 1 among those currently registered for outdoor urban use. Several pyrethroids were listed as Category 2 or 3 WBPCs for Calleguas Creek in several waterbodies.

Bifenthrin

According to the 2021 Pyrethroid Insecticides Study, bifenthrin is used in significant quantities for regulated applications for structural and agricultural pest control. However, it is also known to have unregulated applications for residential and industrial uses, which are not tracked. Bifenthrin is used as a restricted use pesticide in orchards, nurseries, and buildings. Some products with lower concentrations are available for unrestricted residential use for indoor and outdoor insect control. The study reported that bifenthrin was detected at monitoring sites that have both urban and agricultural influences but are in predominantly agricultural areas; however, no toxicity was found to have occurred. According to the Oxnard Drain #3 TMDL, bifenthrin can be toxic to aquatic invertebrates at very low concentrations and are known to preferentially bind to sediment where they are moderately persistent.

Others

This section briefly summarizes the most common formulations of the below pyrethroid pesticides according to the special study conducted on alternative urban pesticides by Larry Walker Associates in 2008:

- Cyfluthrin: Found in aerosols and ready-to-use liquids.
- Cypermethrin: Found in emulsifiable concentrates.

[3] Allethrins, Bifenthrin, Cyfluthrin, Cyhalothrin, Cypermethrin, Cyphenothrin, Deltamethrin, Esfenvalerate, Etofenprox, Flumethrin, Imiprothrin, Metofluthrin, Momfluorothrin, Permethrin, Prallethrin, Resmethrin, Sumethrin [d-Phenothrin], Tau-Fluvalinate, Tefluthrin, Tetramethrin, Tralomethrin

- Deltamethrin: Found in dust and granule formulations.

3.3 Organics

Organic pollutants are toxic molecular compounds primarily composed of carbon and hydrogen. These pollutants can cause adverse health impacts in humans and animals by damaging enzyme activity and gene expression and causing oxidative damage. Organic pollutants include the following categories of compounds: catalysts, solvents, stabilizers, surfactants, plasticizers, pigments, flame retardants, fillers, pesticides, pharmaceuticals, and petroleum compounds. These pollutants may enter waterways and degrade marine environments through improper disposal of household and industrial wastes, and stormwater runoff from sites where these pollutants compounds are present, including farms and factories (Kumar and Prasannamedha, 2021; Wilcox, 2005). Because organic contaminants are ubiquitous in the environment, available literature suggests that the sources of organic contaminants in urban runoff are difficult to elucidate, especially related to land use and temporal trends in associated land uses (Burant et al., 2018). It is important to note that while stormwater research has mostly focused on particle-associated organic pollutants, dissolved stormwater pollutants such as hydrophilic trace organic contaminants may be important to address in the near future (Spahr et al., 2020). However, the organic pollutants that have shown receiving water exceedances potentially contributed by the MS4 in Ventura County are known to be hydrophobic and thus more sediment-associated.

3.3.1 Bis(2-ethylhexyl) phthalate

Bis(2-ethylhexyl) phthalate is a plasticizer used to make a material softer and more flexible, increase its plasticity, decrease its viscosity, or decrease friction. It is known to have endocrine disrupting effects and pose toxicity to aquatic organisms. It is used in the manufacture of polyvinyl chloride (PVC) and has been identified as a common sampling and laboratory contaminant during monitoring data analysis. In terms of its fate and transport, bis(2-ethylhexyl) phthalate shows high affinity to suspended material in aquatic systems; thus, sediment is an important sink for these substances (Björklund et al., 2009). In addition to urban runoff sources, bis(2-ethylhexyl) phthalate exceedances may also be attributed to lab contamination possibly resulting from improper lab design and practices (WI DNR, 2002; Anselm et al., 2021).

While there are few, but rare, bis(2-ethylhexyl) phthalate exceedances observed in receiving waters in Ventura County, to date, no specific source assessment studies have been conducted for bis(2-ethylhexyl) phthalate in Ventura County watersheds since no TMDLs have been established for bis(2-ethylhexyl) phthalate. In addition, bis(2-ethylhexyl) phthalate is not listed on the 303(d) list for any Ventura County waterbodies.

3.3.2 Polycyclic Aromatic Hydrocarbons (PAHs)

Polycyclic aromatic hydrocarbons (PAHs) are a class of chemicals that occur naturally in coal and crude oil and are also generated during the incomplete combustion of organic materials such as coal, oil, gasoline, or wood. PAHs are typically toxic, mutagenic, and/or carcinogenic. The most prevalent anthropogenic sources of PAHs include coal-tar pitch and asphalt production, coke and aluminum production, petroleum refining, and motor vehicle exhaust (Abdel-Shafy and Mansour, 2015).

PAHs can enter surface waters through deposition of airborne PAHs, municipal wastewater discharge, stormwater runoff from roads with vehicular traffic and parking lots, runoff from coal storage areas, effluent from wood treatment plants, and oil spills. In the Los Angeles area, the predominant source of PAHs in urban stormwater is the aerial deposition and subsequent runoff of PAHs resulting from combustion (Stein et al., 2006). PAHs can be introduced to urban runoff and stormwater in Ventura County through similar fate and

transport processes. To date, no specific source assessment studies have been conducted for PAHs in Ventura County watersheds since no TMDLs have been established for PAHs yet; however, it is listed in Category 5A on the 303(d) list for Port Hueneme Harbor. While monitoring data has shown that there have been some receiving water exceedances of PAHs during dry weather where MS4 outfalls were dry on the same day, there have been exceedances of PAHs observed at MS4 outfalls without receiving water exceedances on the same day. Thus, stormwater is still considered a potential source of PAHs.

The following subsections present examples of specific PAHs that can be found in stormwater runoff.

Dibenzo(a,h) anthracene

Dibenzo(a,h) anthracene is found in gasoline exhaust, tobacco smoke, coal tar, soot, and smoked and barbecued foods. It is typically mixed with other PAHs in construction products such as coal tar, bitumen, and asphalt (PubChem, n.d., Government of Canada, n.d.). Its presence in receiving waterbodies can potentially be attributed to deposition of combustion byproducts such as vehicle exhaust particulates and fire ash, and subsequent runoff from contaminated surfaces. This is supported by research that identifies combustion and runoff as the predominant source of PAHs in the greater Los Angeles Area (Stein et al., 2006).

Indeno(1,2,3-cd) pyrene

Indeno(1,2,3-cd) pyrene is primarily found in certain foods, gasoline and diesel exhaust, cigarette smoke, coal tar and coal pitch, soot, and petroleum asphalt (PubChem, n.d.). Its presence in receiving waterbodies could potentially be attributed to deposition of combustion byproducts such as vehicle exhaust particulates and fire ash, and subsequent runoff from contaminated surfaces. This is supported by research that identifies combustion and runoff as the predominant source of PAHs in the greater Los Angeles Area (Stein et al., 2006).

3.3.3 Total PCBs

Polychlorinated biphenyls (PCBs) belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons with properties including non-flammability, chemical stability, high boiling point, and high electrical insulation, making them useful for hundreds of commercial and industrial applications (USEPA, n.d.). According to the Calleguas Creek OC Pesticides, PCBs, and Siltation TMDL Technical Report, commercial production of PCBs began in 1929 where PCBs were employed for nominally closed applications (capacitors, transformers, heat transfer fluids, hydraulic fluids) and in open-end applications (flame retardants, inks, adhesives, paints, pesticide extenders, plasticizers, polyolefin catalyst carriers, surface coatings, wire insulators, metal coatings). Domestic use of PCBs was restricted to nominally closed applications in 1974 and all manufacturing of PCBs stopped in 1977. PCBs were banned in 1979 by the Toxic Substances Control Act (USEPA, n.d.).

The TMDL Technical Report notes that atmospheric transport is the most important mechanism for long-range dispersion of PCBs. Although the dominant source of PCBs to surface waters is likely atmospheric deposition (both directly deposited to streams and transported from land by runoff), desorption of sediment-bound PCBs may contribute significantly to concentrations detected in water (LWA, 2005). The TMDL also notes that urban runoff and POTWs are minor sources of PCBs and that groundwater and imported water are not significant sources of PCBs. PCBs can be removed from the water column by sorption to suspended solids and sediments, volatilization from water surfaces, and by accumulation in the tissues of biota. In particular, the highly chlorinated congeners adsorb strongly to sediment and soil where they can persist for months to years.

3.4 Salts

Salts are chemical compounds consisting of an ionic assembly of positively charged cations and negatively charged anions which results in a compound with no net electric charge. In the environment, salts primarily impact the agriculture irrigation and groundwater recharge beneficial uses in Ventura County. High salts concentrations in receiving waterbodies can also impact aquatic life in freshwater ecosystems. In terms of its fate and transport, salts are considered conservative substances meaning that no generation or consumption of salts occur.

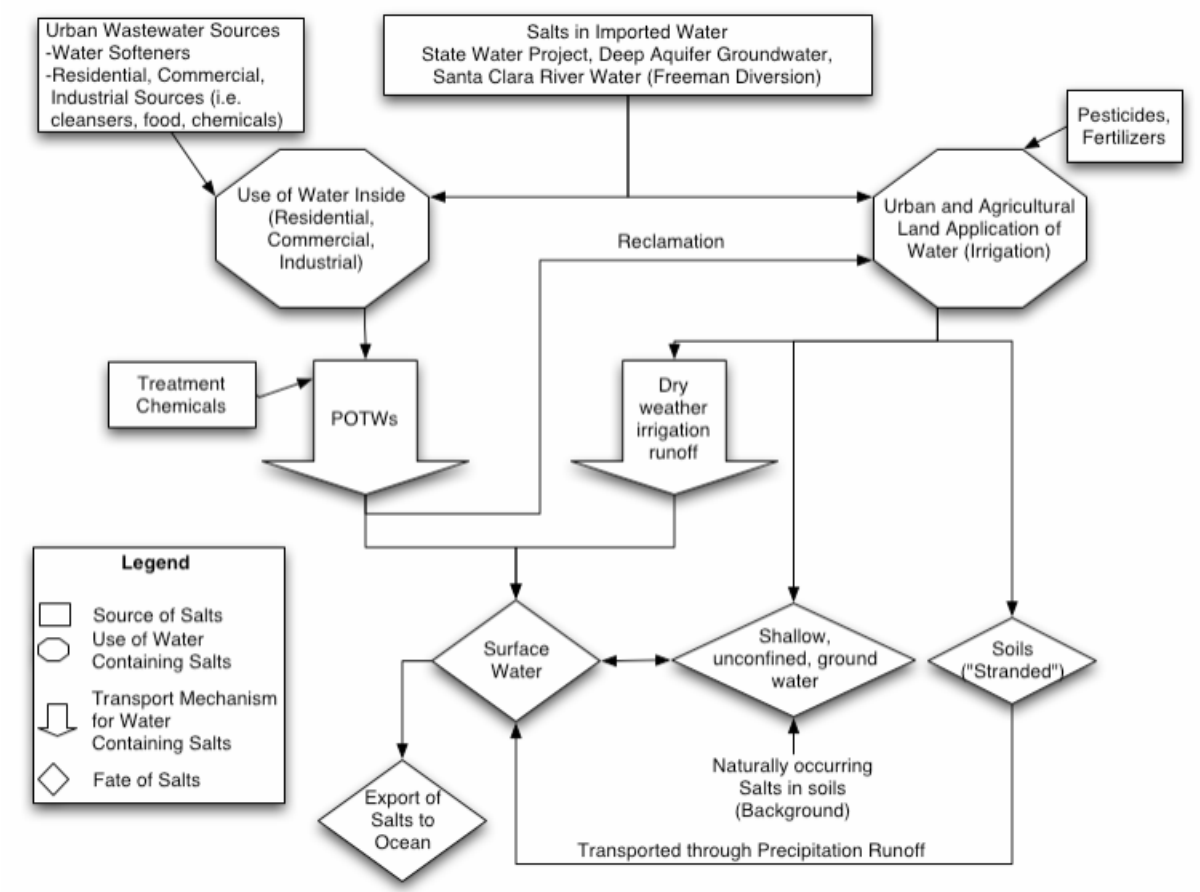


Figure 3-5. Generalized conceptual model of salts flow for the Calleguas Creek Watershed (referenced from the Calleguas Creek Watershed Salts TMDL Public Review Technical Report).

The primary salts of concern in Ventura County receiving waterbodies are boron, chloride, sulfate, and total dissolved solids (TDS). Across Ventura County's five watersheds, there are two TMDLs that address salts:

- **Calleguas Creek Salts TMDL**: Addresses boron, chloride, sulfate, and TDS
- **Santa Clara River Reach 3 Chloride TMDL:** Addresses chloride

Specific to the Calleguas Creek watershed, several crops grown in the Calleguas Creek watershed are sensitive to salts, including avocado, berry, citrus, strawberries, and nurseries, according to the Calleguas Creek Salts TMDL Public Review Technical Report. Often, agricultural growers rely on groundwater delivered through local mutual water companies as their primary source of water supply. In addition to groundwater, growers have also relied on imported water from sources including the Calleguas Municipal Water District, United Water Conservation

District (permanently closed but had combined local groundwater and water imported from the Santa Clara River at the Freeman Diversion), and Conejo Creek Diversion Project. Surface water is usually not diverted for use on salt sensitive crops in the watershed. In terms of the groundwater recharge beneficial use, salts concentrations across most groundwater basins have remained relatively stable since the importation of State Water Project water with the exception of the South Las Posas Basin. Because the South Las Posas Basin is usually completely full as a result of constant discharges to the Arroyo Simi/Las Posas prevents recharge of higher quality storm water flows. In addition, salts on the watershed have a number of geological origins from significant volcanic activity, large multi-layered sediment deposits, and ancient marine influence. The combination of high groundwater levels and natural background conditions appears to be increasing the salts concentrations in the South Las Posas Basin over time.

The Calleguas Creek Salts TMDL Public Review Technical Report identified six possible sources of salts to the watershed including water supply, water softeners that discharge to publicly owned treatment works (POTWs), POTW treatment chemicals, atmospheric deposition, pesticides and fertilizers, and indoor water use. In particular, the Staff Report noted that water supply, including water imported from the State Water Project or Freeman Diversion and deep aquifer pumping, is the greatest source of salts to the watershed. The amount of salts entering the watershed from imported State Water Project water is strongly linked to the hydrology in northern California as well as the volume imported into the watershed. Agencies, such as Thousand Oaks, have also recorded high concentrations of chloride, total dissolved solids, and sulfate above regulatory objectives through their groundwater identification database. Through this database, natural springs and artesian groundwater conditions have been flagged as one of the main contributors of salts. Salts can be transported to one of three endpoints: surface water, groundwater, or the land surface/salts. Mechanisms that can transport salts during dry weather to surface water include groundwater pumping, groundwater exfiltration, POTWs, and land use runoff (urban and agricultural).

Notably, local agencies' ability to control the source of salts in imported water is limited. The most effective actions municipalities can take to reduce salt concentrations are constructing groundwater desalters and wastewater treatment plants and reducing outdoor water use. MS4 Permittees have also banned the discharge of saltwater pools to the storm drain system (Anselm et al., 2021).

Specific to the Santa Clara River watershed, the Santa Clara River provides water for irrigation, support of aquatic life, and groundwater recharge. These beneficial uses are impacted by chloride, especially chloride-sensitive crops and groundwater recharge, which also supports agricultural uses. At the time that the Santa Clara River Reach 3 Chloride USEPA TMDL was written, the two major point sources of chloride discharge into Santa Clara River Reach 3 were the Santa Paula and Fillmore Water Reclamation Plants. The report noted that the WRP effluent comprised of two main sources, including chloride present in imported water supply and chloride added by residents, businesses, and institutions. Under low flow conditions, these two sources had comprised approximately 80% of the total estimated chloride load. Other minor point source discharges per the TMDL include stormwater regulated under the NPDES municipal stormwater permit, runoff regulated under the statewide construction general NPDES permit, stormwater regulated under the Caltrans statewide NPDES permit, runoff from industrial sites regulated under the statewide industrial facility general NPDES permit, and dewater operations regulated under NPDES permits. In addition, surface and irrigation runoff are potential diffuse sources of chloride.

Since the development of the Santa Clara River Reach 3 Chloride USEPA TMDL, Fillmore had decommissioned their wastewater treatment plant that was discharging treated effluent to the Santa Clara Estuary in 2009

according to their 2015 Urban Water Management Plan. Now, the WRP produces Title 22 compliant recycled water that is used for irrigation purposes and/or percolation into the groundwater basin at various locations throughout the City. Effluent is not currently, nor will it be discharged to a surface water body in the future. All treated effluent is either reused or disposed of (via percolation or evaporation) at the WRP site or reused at various other locations throughout the City. In addition, the City of Santa Paula's WRF currently discharges their treated wastewater onsite using percolation basins per the City's 2020 Urban Water Management Plan. While their WRF produces tertiary treated recycled water, the treated effluent does not meet the final effluent limitations for chloride listed in their Waste Discharge Requirements (WDR) (Order No. R4-2018-0022) and Cease and Desist Order (CDO) (Order No. R4-2018-0023). The City is currently performing a chloride source study, but has also secured funding and is pursuing the design and construction of an Advanced Water Treatment Facility (AWTF) at the WRF. The AWTF would utilize a reverse osmosis treatment process to reduce chloride levels in the effluent. Analysis of monitoring data from major outfalls in the Santa Clara River Watershed from the Ventura County Stormwater Quality Monitoring Program indicate that the MS4 has not been contributing to receiving water exceedances of chloride within the past five years.

In addition, the Lower Santa Clara River (LSCR) Watershed developed a salt and nutrient management plan (SNMP) for the Piru, Fillmore, Santa Paula, Mound and Oxnard Forebay sub-basins within the Lower Santa Clara River Groundwater Basin. The purpose of the document was to fulfill the requirements of the State Water Resources Control Board's Recycled Water Policy since recycled water contains salts and nutrients that may cause or contribute to exceedances of water quality objectives. As part of the plan, sources of salts and nutrients were identified. The document noted the following sources of salts and nutrients:

Non-Land Use Based Inflows

- Percolation of stream flows
- Managed aquifer recharge
- Recharge of precipitation
- Mountain front recharge
- Groundwater underflow from outside the LSCR basin
- Groundwater flow between subareas, with net flow from east to west
- Groundwater flow between Upper Aquifer System and Lower Aquifer System
- Naturally occurring salts

Land Use Based Inflows

- Irrigation
- Agricultural irrigation with surface water
- Agricultural irrigation with groundwater
- Urban irrigation with municipal supply
- Urban irrigation with recycled water
- Septic systems
- Wastewater treatment percolation ponds

According to the SNMP, existing management measures that have already been implemented in the watershed cover most source control and treatment activities that can be implemented at wastewater treatment plants to address salts and nutrients, apart from costly reverse osmosis treatment. In addition, management measures to control salts and nutrients in agricultural areas (e.g., fertilizer and irrigation management) have been implemented on most of the acreage in the planning area. Other source control measures to highlight include prohibitions on water softener installations, removing existing water softeners, bans of commercial and industrial discharges of brine or saltwater, and new development/redevelopment requirements.

Based on the source assessment, it was determined that salts are not a priority to be addressed by the MS4 as they are primarily contributed by natural occurrence in local groundwater or imported water.

The following sub-sections detail the specific sources of each type of salt, if any literature is available, found in receiving waterbodies in Ventura County.

3.4.1 Boron

Boron exceedances only occur in the Simi watershed and is only listed for the Arroyo Simi and Revolon Slough according to the Calleguas Creek Salts TMDL Public Review Technical Report. Because boron is a limited issue in the watershed and the current average concentrations are near the water quality objective, the discussion for boron in Calleguas Creek Watershed is limited.

Based on literature, abnormal levels of boron in streams and groundwaters have historically been attributed to wastewater and fertilizer inputs. For example, in the St. Louis, Missouri, area, it was found that abnormal boron levels can also be attributed to the use of municipal drinking water for lawn irrigation. In urban areas, surficial salts, including boron, accumulate after lawn irrigation and are mobilized during “first flush” events (Hasenmueller and Criss, 2016).

3.4.2 Chloride

Chloride salts are very soluble in water. Beside imported water supply as the major source of chloride which could contain between 45 mg/L to 120 mg/L of chloride, the Calleguas Creek Salts TMDL Public Review Technical Report notes that chloride can also be introduced through saltwater swimming pools and spas as well as water softeners in addition to residential, commercial, and industrial activities. In fact, saltwater pools are estimated to contain 2000 mg/L of chloride according to the City of Thousand Oaks. In addition, water softeners are often used to remove minerals from hard water using resin beads. POTWs also use chloride in the form of sodium hypochlorite for disinfection and ferric chloride for coagulation. Approximately 10 mg/L of chloride is added to effluent for disinfection and as a result, approximately 2300 pounds per day of chloride and TDS is added to the watershed. Finally, atmospheric deposition is another source of chloride input to the watershed based on local air quality monitoring stations.

3.4.3 Sulfate

Sulfate can be naturally introduced to water bodies through mineral weathering, decomposition and combustion of organic matter, and oxidation of sulfides (Zak et al., 2021). For example, sulfate exists naturally in the Monterey/Modelo Formation, a geologic formation in the headwaters of Malibu Creek, and is introduced to the watershed through weathering and erosion (Isaacs et al., 2009). Anthropogenic sources of sulfate in water bodies include fertilizer leaching from agricultural soils, wetland drainage, and industrial wastewater runoff (Zak et al., 2021).

Specific to Calleguas Creek, the Calleguas Creek Salts TMDL Public Review Technical Report notes that residential, industrial, and commercial sources; water softeners; wastewater plant treatment chemicals; pesticides and fertilizers; and atmospheric deposition as other potential sources of sulfate (LARWQCB and US EPA, 2007). For treatment chemicals, aluminum sulfate (colloquially known as alum) is used as a coagulant in Calleguas Creek Watershed wastewater plants. No information is readily available on the impact of alum on salt levels in the effluent. While chloride application in pesticides and fertilizers is unlikely due to its potential impacts of chloride on plants, sulfur is one the 17 essential plant nutrients essential for plant growth. Plants take sulfur up in the form of sulfate ions. In addition, sulfur is applied as both a fertilizer and a pesticide in agriculture. According to the USEPA, sulfur is registered for use as an insecticide, fungicide, and rodenticide on several hundred food, feed, ornamental, and turf crops and may be a significant source of sulfate for the

watershed. Based on analysis of Pesticide Use Reporting (PUR) data in 2005, it is estimated that over 102,000 pounds of sulfate is applied representing up to 98 percent of sulfur/sulfate applied in the watershed. Finally, atmospheric deposition is another source of sulfate input to the watershed based on local air quality monitoring stations.

3.4.4 Total Dissolved Solids (TDS)

Total dissolved solids is a measure of the dissolved combined content of all inorganic and organic substances present in a liquid in molecular, ionized, or micro-granular suspended form. It is dominated by salts and minerals, but also includes chlorides, metals, ions like bicarbonate and carbonate alkalinity, nitrogen compounds, and organics. Beside imported water supply as the major source of TDS which could contain between 250 mg/L to 500 mg/L of TDS, the Calleguas Creek Salts TMDL Public Review Technical Report notes that TDS can also be introduced through saltwater swimming pools and spas as well as water softeners in addition to residential, commercial, and industrial activities. In fact, saltwater pools are estimated to contain 3000 mg/L of TDS according to the City of Thousand Oaks. In addition, water softeners are often used to remove minerals from hard water using resin beads. In terms of treatment chemicals, approximately 2300 pounds per day of chloride and TDS are added to the watershed. Finally, atmospheric deposition is another source of TDS input to the watershed based on local air quality monitoring stations.

3.5 Metals

Elevated levels of metals and selenium in the environment can impact beneficial uses of receiving waterbodies, including uses for water supply, habitat-related uses, human consumption of aquatic organisms, and recreational uses. As a result of many anthropogenic activities, heavy metals are well-known environmental pollutants that can cause toxicity, persist in the atmosphere, and bioaccumulate in aquatic organisms and humans (Mitra et al., 2022). The bioaccumulation of these heavy metals can lead to a diversity of toxic effects on a variety of tissues and organs in aquatic life as well as humans. In particular, the speciation and bioavailability of metals affects its toxicity; for example, free metal ions and labile inorganic complexes are bioavailable and potentially toxic where metal bioavailability is defined as the fraction of the total concentration of metal which has the potential to accumulate in the body (Gheorghe et al., 2017). This is most represented by the dissolved fraction of metals in the water column. Different factors control the bioavailability of metals including organism biology, metal geochemistry, and physical and chemical factors. The primary metals of concern in Ventura County's receiving waterbodies include copper, mercury, nickel, selenium, and to a lesser extent, zinc. Because of the very low receiving water exceedances of zinc in the most recent five years, it is not discussed in this source assessment. If zinc is later determined as a pollutant of concern, the Group may address per the source control and pollution prevention recommendations from the State Water Resources Control Board's Strategy to Optimize Resource Management of Storm Water (STORMS) project. The source control recommendation is to continue tracking of the Department of Toxic Substances Control's (DTSC) Safer Consumer Products program review of the California Stormwater Quality Association's (CASQA) petition, aimed at initiating a process to evaluate zinc in tires and options to minimize or eliminate zinc in tires. The Water Boards may also consider establishing regulatory approaches that would create flexibility for NPDES permittees to meet their obligations to address zinc.

In general, the Calleguas Creek Metals TMDL Staff Report identifies agricultural runoff, urban runoff, open space runoff, groundwater seepage and dewatering, NPDES discharges, groundwater discharges, erosion and sediment transport, and atmospheric deposition as potential transport pathways of metals and selenium into receiving

waterbodies. The general sources which contribute metals and selenium to receiving waters include water supply, soils, mining/extraction, groundwater, debris basins, the Naval Air Weapons Station (NAWS) Point Mugu, and the Santa Susana Field Laboratory owned by Boeing. Urban stormwater dischargers, including the MS4, Caltrans, and the US Navy, were required to develop and submit an Urban Water Quality Management Plan (UWQMP) for copper, mercury, nickel, and selenium. This document, along with the Calleguas Creek Metals TMDL Staff Report, was used to describe the sources for each metal in the sub-sections below.

3.5.1 Copper

Copper is a soft, malleable, and ductile metal with very high thermal and electrical conductivity primarily found across a variety of sources in industries ranging from household, automotive, architectural, agricultural, and industrial. Sources potentially contributing to the concentrations discharged through the transport pathways of metals include automobile brake pads, corrosion of copper pipes, architectural copper, copper-containing pesticides, industrial copper use, vehicle fluid leaks, natural concentrations in soils, and water supply. Overall, Regional Board Staff concluded in their source assessment that agricultural runoff, urban runoff, and groundwater discharges are the most significant sources of copper loading.

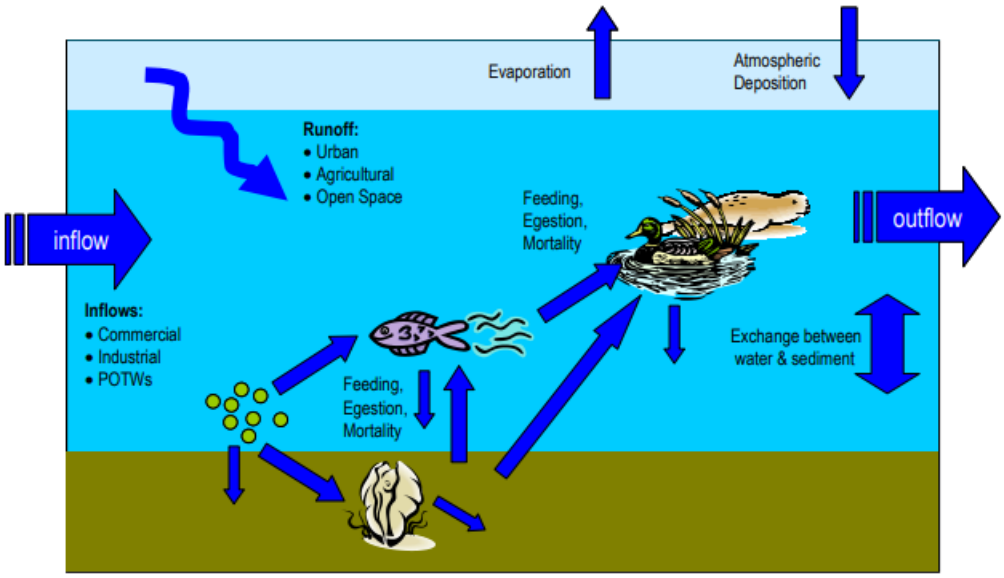


Figure 3-6. Environmental cycling of copper and nickel (referenced from the Calleguas Creek Watershed Metals and Selenium TMDL Technical Report).

Brake pad debris, vehicle fluids, tailpipe emissions and wear on vehicle exterior and engine are the primary automotive sources of copper deposits on the road infrastructure (Rosselot, 2006). In particular, brake pads are likely the largest vehicle associated source of copper and is released into the environment every time the brakes of a vehicle are used; thus, it is likely a significant source of copper. This debris can reach waterbodies by atmospheric deposition, wash-off by rain, or car washing. In 2010, the California State Senate passed SB 346, written by Senator Kehoe, to restrict the use of copper and other toxic chemicals in automobile brake pads. Specifically, the bill limits the use of copper in motor vehicle brake pads to no more than 0.5 percent by weight by January 2025 and is anticipated to decrease copper in runoff from roads. Brake pad manufacturers, beginning in 2014, are now required to obtain certification to demonstrate compliance with the requirements in SB 346 and include the certification of the content on the brake pads. The Department of Toxic Substances Control

(DTSC) is the enforcing agency that is required to remove non-compliant brake pads from sale. In addition, copper also finds its uses in the architectural sector as roofing sheets, roofing tiles, downspouts, handrails, etc. due to its appearance, fire resistivity and longevity (Larry Walker Associates, 2008). Among the agricultural sources, copper is found in over 26 pesticides and algaecides used in Ventura County for landscape maintenance and to control algae in swimming pools and ponds. It is considered a relatively non-toxic pesticide and can be used as part of an integrated pest management or organic pest control program. Copper is also used in industrial processes such as electroplating, metal finishing and semiconductor manufacturing. In households, copper is present in moto oil, root control chemicals, and pool/spa chemicals. In terms of loading to POTWs, corrosion of copper piping and cooling equipment in homes and businesses play a significant role. Finally, the soils and bedrock in the Calleguas Creek watershed contain higher concentration of copper and nickel, due to the influence from the Monterey formation and the volcanic bedrock present, and thus can be a potential source of copper in the waterbodies according to the special study conducted on metals concentrations in soils in Calleguas Creek watershed.

3.5.2 Mercury

Mercury is a shiny, silver-white metal, historically referred to as quicksilver, and is known to be a liquid at room temperature. Sources potentially contributing to the concentrations discharged through the transport pathways of metals include natural concentrations in soils, water supply, industrial activity, mining/extraction, consumer products containing mercury, and possibly residues from past use of agricultural chemicals containing mercury. Overall, Regional Board Staff concluded in their source assessment that natural soil concentrations, atmospheric deposition, and residues from past use of pesticides containing mercury are primarily responsible for mercury loading.

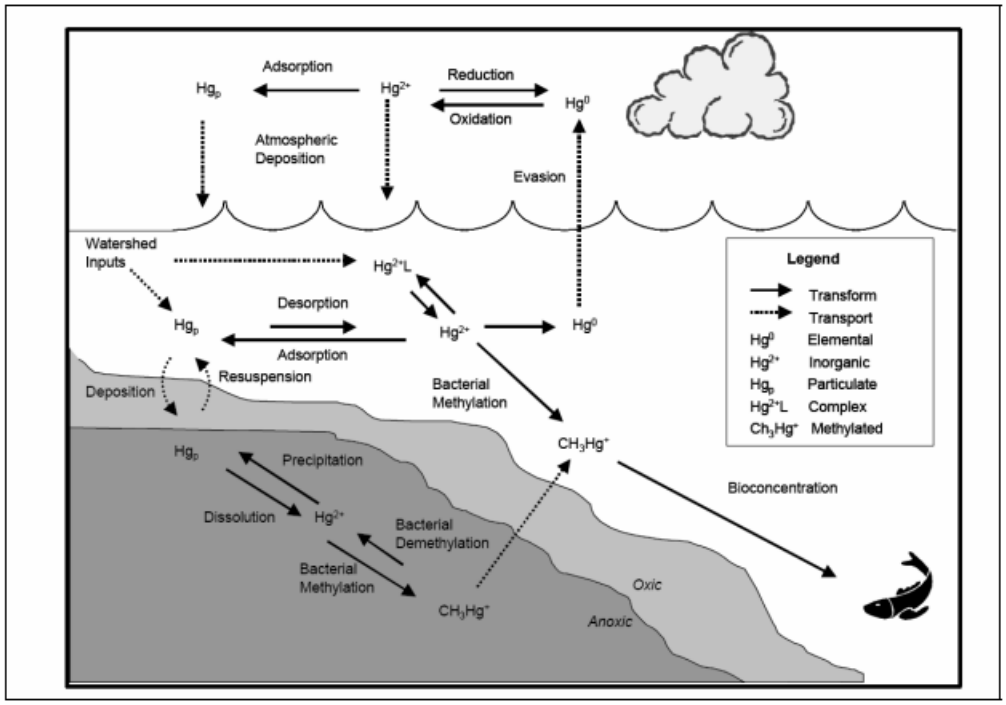


Figure 3-7. Complex biogeochemical cycling of mercury (referenced from the Calleguas Creek Watershed Metals and Selenium TMDL Technical Report).

Legacy uses of mercury include gold extraction in mining operations and the production of munitions, electronics, health care and conventional goods, and commercial products. It was also used as a fungicide, mildewcide, or pesticide; however, the USEPA banned most pesticide uses of mercury in 1976. Therefore, it is unlikely that past uses of mercury are contributing significantly to agricultural runoff. It is important to note that many sources of mercury seen today are a result of past uses. In addition, mercury concentrations in natural soils make up a significant portion of loading to receiving waters (approximately 76 percent). In terms of consumer products, mercury is found in products such as batteries, dental amalgam, fluorescent lamps, jewelry paint, thermometers, and thermostats. In particular, breakage of fluorescent lamp tubes can comprise a significant fraction of mercury air emissions potentially leading to contamination of urban runoff. Mercury can also be found in pesticides and paints. In the automotive sector, mercury switches are present in vehicles and vehicular emissions also contain mercury which are deposited as atmospheric deposits on the urban surface; however, the sources are likely to be insignificant compared to other sources. Mercury is also used in industry for semiconductor and related devices manufacturing and can be found in fluorescent lamps and thermometers used at industrial facilities.

3.5.3 Nickel

Nickel is a silvery-white lustrous metal with a slight golden tinge and is considered a hard and ductile transition metal. It is commonly used to make stainless steel. In addition, nickel compounds are used for nickel plating, to color ceramics, batteries, and catalysts that increase the rate of chemical reactions. Sources potentially contributing to the concentrations discharged through the transport pathways of metals include automobile related industries (dealers, car washes, and mechanic shops), motor oil, manufacturing sector that produce nickel alloy products, and natural concentrations in soil. Overall, Regional Board Staff concluded that the majority of nickel found is from agricultural areas and groundwater in which the primary suspected source is natural concentrations in local soils.

In terms of vehicle sources, nickel can be found in automotive parts such as motor oil, welded metal plating, engines, brake pads, grease, diesel, gasoline and vehicle exhaust particulates. In households, nickel is predominantly present in batteries. In industry, nickel is used in processes such as electroplating, plating, polishing, anodizing, fabricated pipe and pipe manufacturing, steel manufacturing and aircrafts due to its properties when combined with other metals such as corrosion resistance, strength, and special magnetic and electronic properties. In addition, the soils and bedrock in the Calleguas Creek watershed contain higher concentration of nickel, due to the influence from the Monterey formation and the volcanic bedrock present, making up approximately 10 percent of the average annual loading of total nickel to receiving waterbodies.

3.5.4 Selenium

Selenium is considered a nonmetal with properties that are intermediate between sulfur and tellurium and also has similarities to arsenic. Sources potentially contributing to the concentrations discharged through the transport pathways of metals include natural concentrations in local groundwater and soils, industrial activities, mining/extraction activities, and water supply. Overall, Regional Board Staff concluded in their source assessment that natural soil concentrations are the primary source of selenium to groundwater and agricultural discharges.

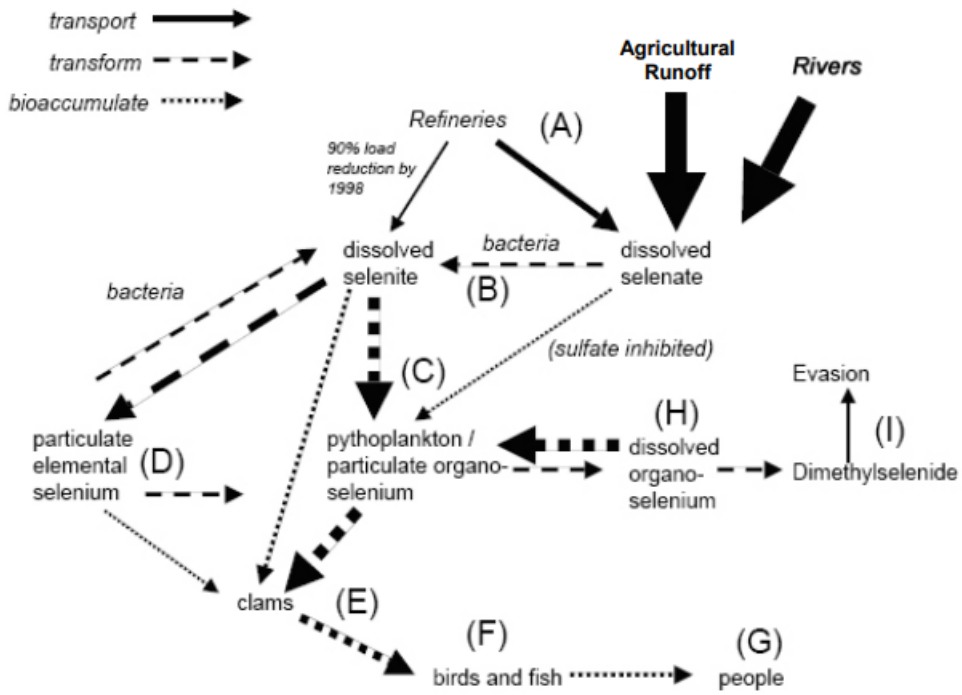


Figure 3-8. Graphical summary of selenium biogeochemical cycling where the arrow size indicates relative importance of a process) (referenced from the Calleguas Creek Watershed Metals and Selenium TMDL Technical Report).

Groundwater sometimes contains elevated levels of selenium due to weathering/leaching from rocks and soils and can be concentrated through irrigation practices in areas with seleniferous soils. Selenium occurs in sulfide deposits of Cu, Pb, Hg, Ag and Zn and can be released during mining and smelting of these ores. In addition, selenium is present in coal, crude oil, and oil shale and can be released to the atmosphere during combustion of these fuels. To note, no crude oil refineries currently operating in the Calleguas Creek watershed have been identified. Selenium may naturally occur in areas that are associated with oil production and be released into groundwater through natural processes not associated with mining and oil extraction. Among the household products, selenium is widely used in electronic and photocopier components, glass, pigments, rubber, metal alloys, textiles, medical therapeutic agents etc. Nurseries can also be a potential source of selenium; however, the Calleguas Creek Metals TMDL Staff Report notes that the contribution may be negligible compared to groundwater and may only be significant during storm events.

3.6 Nutrients

Nutrients, such as nitrogen and phosphorus, are biostimulatory substances that stimulate excessive aquatic growth which can lead to degradation of beneficial uses. For instance, too much nitrogen and phosphorus in receiving waterbodies can cause algae to grow faster than ecosystems can handle which can lead to depleted oxygen levels and a massive kill-off of aquatic organisms. In addition, some algal blooms can produce elevated levels of toxins and bacterial growth that can make humans sick if they come into recreational contact with the waterbody.

3.6.1 Ammonia as N, Nitrate + Nitrite as N, Total Phosphorous

The primary nutrients of concern in Ventura County receiving waterbodies are ammonia, nitrate and nitrite, and total phosphorus. Ammonia exists in two forms—un-ionized ammonia (NH_3) and the ammonium ion (NH_4^+). While both forms are toxic, the neutral, un-ionized ammonia species is highly toxic to fish and other aquatic life due to its ability to readily diffuse across gill membranes. The oxidation of ammonia consumes oxygen which can lower the dissolved oxygen content of waterbodies, further stressing aquatic organisms. The product of the oxidation of ammonia is nitrate which, if present in high levels, can cause health problems in humans. For example, infants are particularly sensitive to nitrate and can develop methemoglobinemia, or blue-baby syndrome. Finally, phosphorus is generally considered the limiting nutrient in aquatic ecosystems; however, if present in excess quantities, phosphorus can lead to water quality problems such as eutrophication and harmful algal growth.

In general, ammonia is found in the wastewater effluent of Publicly Owned Treatment Works (POTWs), in landfill-leachate, as well as in run-off from agricultural fields where commercial fertilizers and animal manure are applied. In urban areas, nitrite and nitrate and total phosphorous are primarily found in fertilizer used for lawns and landscaping; organic debris from gardens, landscaping, and parks; trash such as food wastes; domestic animal waste; and human waste from areas inhabited by the homeless. In agricultural areas, nutrients include fertilizers applied during cultivation; organic litter from the plants, grasses, or trees; erosion of the surface soils; waste accumulation from grazing animals; and soluble nutrients released during the decomposition and mineralization of plant litter and animal waste. Nutrient build up, particularly on impervious surfaces, can be discharged into the receiving waters through storm drains when it rains or by dry weather runoff.

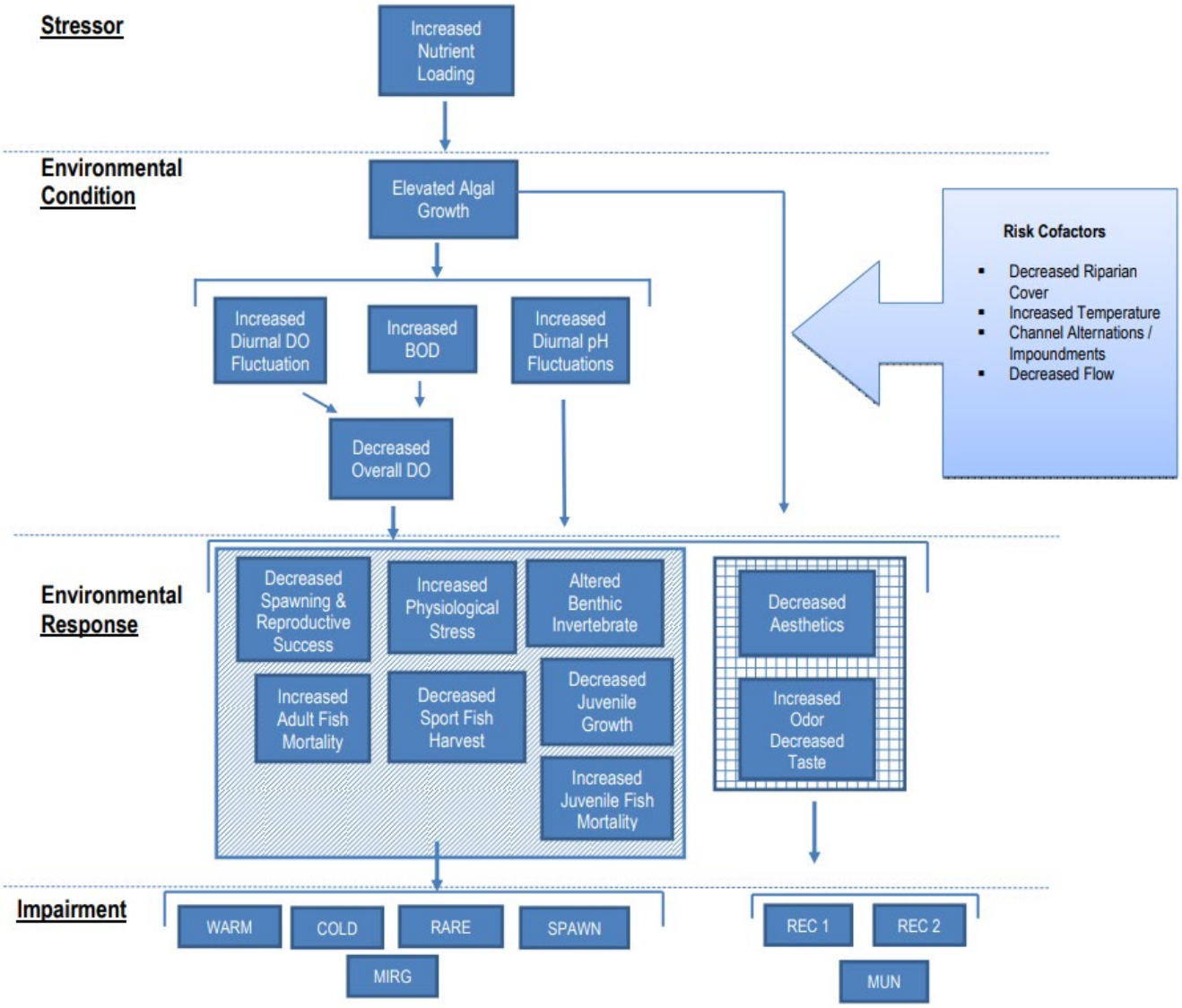


Figure 3-9. Conceptual model of the impact of increased nutrient loading on rivers (referenced from the Ventura River and its Tributaries Algae TMDL).

The following subsections describe the specific sources of nutrients in each watershed except for Ventura County Coastal based on source assessment studies conducted by Regional Board Staff.

Calleguas Creek

According to the Calleguas Creek Nitrogen Compounds and Related Effects TMDL Staff Report, the largest point sources of ammonia and oxidized nitrogen to Calleguas Creek are POTWs. At the time that the Staff Report was written, several POTW facilities such as Hill Canyon Wastewater Treatment Facility, Simi Valley Water Quality Control Facility, and Moorpark Wastewater Treatment Plant did not have fully nitrifying and denitrifying processes and were not yet able to meet the water quality objectives for ammonia, nitrate, and nitrite. Stormwater permitted discharges are considered minor point sources of nitrogen to the Calleguas Creek since the discharge flows associated with these permits are small. In terms of nonpoint sources, agriculture represents the most significant source of oxidized nitrogen loading in the watershed. In addition, the relative load of

oxidized nitrogen contributed from groundwater flow to surface water appears to be significant in Simi Valley and Santa Rosa Valley.

It is important to note that MS4 Permittees are not listed as a responsible party for implementing the Calleguas Creek Nitrogen Compounds and Related Effects TMDL.

Malibu Creek

According to the Malibu Creek Nutrients USEPA TMDL, the Tapia Water Reclamation Facility (WRF) contributes a large percentage of the nitrogen and phosphorus loadings. In addition, high nitrogen and phosphorus loadings are associated with wet weather runoff from commercial and residential land uses as well as undeveloped areas. During the summer, sources such as septic systems, golf course irrigation and fertilization, and urban runoff provide a greater percentage of the nutrients load.

The Upper Malibu Creek Watershed performed a dry weather source identification study in the urbanized Upper Medea and Lindero drainage areas in the summer of 2013. The purpose of the study was to identify sub-drainages contributing the highest loads of *E. coli*, anthropogenic inputs of fecal pollution, nutrients, and estimating the relative contributions of natural vs. anthropogenic sources of fecal pollution. The study identified that in-stream, non-MS4 sources, are contributing significantly to *E. coli* and potentially nutrient concentrations in receiving waters. Nitrogen and phosphorus loads measured at the downstream receiving water station exceeded nutrient TMDL load allocations assigned to the Upper Lindero Creek drainage area; however, the nitrogen numeric target was not exceeded. The phosphorus target was exceeded, and the study noted that total phosphorus concentrations were highest in reclaimed water. While County and City storm drains discharge relatively high nutrient concentrations into the creek, their impact on the receiving water is unclear, because the extent of natural attenuation and additional inputs by non-MS4 sources was not quantified.

Santa Clara River

According to the Santa Clara River Nitrogen Compounds TMDL Staff Report, direct sources of nutrients include reservoir releases and NPDES surface water dischargers such as POTWs. Percolation of nutrients in soil make up the subsurface discharges of nutrients. Septic systems, agricultural areas, wastewater treatment plants, and others can contribute to subsurface discharges. Land application sources involve irrigation, fertilization, and atmospheric deposition. Fertilizers are applied to the land surface for the purpose of being taken up by orchards and row crops and what is not taken up may be assimilated in the soil or transported to surface waters. The atmospheric deposition can be of two forms: wet deposition or dry deposition. Wet deposition is from pollutants present in rain whereas dry deposition is from gradual accumulation on the ground and leaf surfaces during dry weather.

The Staff Report notes that point source loads contribute almost all of ammonia, nitrate/nitrite, and phosphorus in the water quality impaired segments of the Santa Clara River watershed. The major point sources are POTWs—specifically the Saugus and Valencia Water Reclamation Plants and the Fillmore and Santa Paula POTWs—while the minor point sources include minor discharges enrolled under NPDES or WDR permits as well as MS4 and stormwater sources, including agricultural runoff. Since the development of the Santa Clara River Reach Nitrogen Compounds TMDL, Fillmore had decommissioned their wastewater treatment plant that was discharging treated effluent to the Santa Clara Estuary in 2009 according to their 2015 Urban Water Management Plan. Now, the WRP produces Title 22 compliant recycled water that is used for irrigation purposes and/or percolation into the groundwater basin at various locations throughout the City. In addition, the City of

Santa Paula's WRF currently discharges their treated wastewater onsite using percolation basins per the City's 2020 Urban Water Management Plan.

In June 2015, the Ventura County Watershed Protection District and the cities of Fillmore and Santa Paula submitted a comment letter requesting delisting of Santa Clara River Reach 3 for ammonia with supporting water quality data demonstrating that the delisting requirement has been met. The Los Angeles Water Board subsequently delisted ammonia from Santa Clara River Reach 3 in the 2018 California Integrated Report.

The LSCR SNMP (detailed in **Section 3.4)** also discusses sources of nutrients in the Lower Santa Clara River and existing management actions to address nutrients, especially through fertilizer and irrigation management.

Specifically for Brown/Todd Barranca (which potentially contains drainage from MS4 areas), while MS4s and other stormwater sources regulated under NPDES permits are considered minor loads of ammonia, nitrate, and nitrite to the Santa Clara River, an allocation of 20% concentration reduction for agriculture is considered sufficient to achieve compliance in Brown/Todd Barranca where loading is all from agricultural practices.

Ventura County Coastal

In June 2018, a massive algal bloom occurred in the water column of Channel Islands Harbor (CIH) resulting in a widespread depleted oxygen event presumably related to bacterial decomposition of dying algae and animals killed by the growing anoxia. It was deduced that these events were related to decommissioning of the cooling water pumps of the Mandalay Power Generating Station in March 2018. This resulted in the placement of nitrate as N as a Category 3 WBPC. A nutrient study was conducted to evaluate the relative importance of episodic input of nutrients from rain events and the main point sources of nutrients entering CIH. The study found that rain events and the consequent runoff into CIH constitute major episodic pulses of plant nutrients to CIH, with high contributions to the northern area of CIH from Edison Canal and to a much lesser extent the southeastern region of the harbor. The Edison Canal is not owned by the City of Oxnard; therefore, the city has limited jurisdiction over the canal. Implementation of nutrient source controls will require the inclusion of stakeholders from agriculture, regulatory and municipal agencies, and the public.

Ventura River

According to the Ventura River and its Tributaries Algae TMDL Staff Report, runoff from residential, industrial, commercial, and transportation areas is a significant source of nutrients to the Ventura River. Specifically, potential sources of nutrients from highways and transportation land uses include fallen leaves and other vegetation, vehicle exhaust, and atmospheric deposition. Nutrient loading from the Ojai Valley WWTP also constitute a large portion of overall loading during dry weather; however, it is almost negligible during wet weather. Nonpoint sources include inputs from agricultural lands, horses and livestock, onsite wastewater treatment systems, groundwater, undeveloped open space, wildlife, and atmospheric deposition. Wet and dry weather loading from agricultural inputs as well as from horse/livestock constitute less nutrient loading than runoff from municipal sources. Open space loading is a significant source of nutrients in wet weather and a smaller source of nutrients in dry weather due to decay of natural vegetation as well as nitrogen- and phosphorus-bearing rocks and soils.

The critical condition for Ventura River and its tributaries, as well as the estuary, is the dry season (May to October) since it results in water quality impairments. Within Ventura River and its tributaries, exceedances of dissolved oxygen and biostimulatory substances objectives are caused by increased nutrient loading and eutrophication during the dry season. In the estuary during the dry season , freshwater inputs dominate,

temperatures are higher, and there is a higher probability of a berm forming at the Estuary mouth which increases the residence time of nutrients in the Estuary. On the other hand, based on the linkage analysis using the River and Stream Water Quality Model (QUAL2K) from the TMDL staff report, wet-weather loads do not have a significant impact on receiving water quality in Ventura River and its tributaries or the Estuary and biostimulatory objectives are attained. Thus, wet-weather allocations for MS4 Permittees are set to attain site-specific water quality objectives from Table 3-8 of the Basin Plan. In fact, the Ventura River Algae TMDL Implementation Plan expects wet weather compliance for nitrate-N + nitrite-N. Permittees have been and are currently meeting wet weather objectives.[4] Regional Board staff noted that nutrient issues are in dry weather (which requires no MS4-required reductions per the Reasonable Assurance Analysis), not wet weather. Furthermore, the Basin Plan Amendments states "The watershed nutrient wet-weather leads are generally delivered directly to the ocean and thus do not contribute to exceedances of the biostimulatory substances objective in the river or Estuary, which occurs during the dry season when algae growth occur." Finally, historical and current receiving water and outfall monitoring data collected since 2009 has supported either attainment of wet weather receiving water limitations or waste load allocations for nitrate-N + nitrite-N.

As part of the California's Nonpoint Source Pollution Control Program Federal Clean Water Act Section 319(h) Grant, the Ventura County Environmental Health Division conducted a study of water impairments attributable to onsite wastewater treatment systems (OWTS) in the Ventura River watershed. The intent of the study was to determine relative risks or likelihood of OWTS areas which may be contributing to nutrient loading in Ventura River and its tributaries. The study determined that medium and high density OWTS (within 2,000 feet buffer of impaired reaches) are a high risk or potential risk of surface water contamination based on downgradient surface water nitrate levels observed in the study and historically. These areas are likely to influence TMDL-listed surface waters. The results suggested that groundwater is likely being influenced by OWTS and has the potential to impact surface waters, but there is not sufficient evidence of surface water impacts. These areas would be places to prioritize first for nutrient-reducing policies and technologies (e.g., sanitary sewer connection or requiring the installation of a nitrate-removal unit or OWTS upgrade).

In August 2021, the Ventura River Algae TMDL responsible agencies presented an evaluation of the first five years of TMDL monitoring data for the Ventura River Algae TMDL. Based on the analysis, winter hydrology was found to be a key driver of macroalgal cover. Winter discharge (total discharge and peak daily flows) explains canopy cover and macroalgal cover in summer. Specifically, higher winter flow results in lower canopy cover which results in higher macroalgal cover. Other channel changes caused by large winters (scour, channel width, and substrate) may also improve conditions for macroalgal cover. The relationships between nutrient concentrations and algae are weak; however, the analysis found that nitrogen loads in early summer (May and June) after very large winters may contribute to high macroalgal cover in those months, but the relationship is weak outside of this circumstance.

3.7 Other

The category of "other" impairments includes impacts to a waterbody that degrade its beneficial uses where a single pollutant or stressor cannot be identified. These impairments do not have TMDLs currently associated with them where previous source assessment studies have been performed; therefore, information from 303(d) listings and available literature were used to describe potential sources of such impairments.

[4] Annual reports can be found at https://www.vcstormwater.org/publications/reports/annual-reports-2010-present

3.7.1 Benthic Community Effects

Benthic community effects are assessed by the State Water Resources Control Board (SWRCB) via the Index of Biotic Integrity (IBI). The IBI employs multiple biological metrics that respond to a habitat or water quality impairment, including indicator organisms, analysis of species diversity, population diversity, and growth anomalies. The relevant water quality objective identified by the SWRCB is that all waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life (SWRCB, n.d.). Within Ventura County, the USEPA developed the Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to address Benthic Community Impairments in 2013, but other Ventura County water bodies are not subject to a benthic community-specific TMDL (USEPA, 2013).

The 303(d) list identifies hydromodification as a potential source of benthic community effects in California water bodies, including channelization and flow alteration/regulation/modification (SWRCB, 2019). Pollutants that may cause benthic macroinvertebrate community impairments include coliform bacteria, cyanide, nitrite, metals, trash, dissolved oxygen, and pH (SWRCB, 2010). The Malibu Creek Benthic Community TMDL identifies and addresses the following key stressors to the benthic community: sedimentation, total nitrogen, and total phosphorus (US EPA, 2013).

In Southern California, the San Diego Region has several 303(d) listings related to benthic community effects and is pushing towards the use of biological objectives in addition to physical and chemical numeric objectives. The Region 9 (San Diego) 303(d) Comprehensive Report identifies the following potential sources of benthic community effects: agriculture, contaminated sediments, hydromodification, illicit connections/illegal hook-ups, dry weather flows, removal of riparian vegetation, and urban runoff/storm sewers.

3.7.2 Dissolved Oxygen

Adequate dissolved oxygen levels are required to support aquatic life. In fact, depression of dissolved oxygen can lead to anaerobic conditions resulting in odors, or in extreme cases, in fish kills. Chemically, low dissolved oxygen results when there is insufficient aeration of water, when ammonia is oxidized to nitrate and nitrite, or when temperature and/or salinity is elevated (CCRWQCB, 2006). An indicator of low dissolved oxygen is benthic algae growth; factors limiting algae growth include nutrients, light, substrate, flowing water, and temperature (SWDE, 2013).

The 303(d) list includes the following potential sources of low dissolved oxygen in California water bodies: agriculture, domestic animals/livestock, grazing-related sources, and urban runoff/storm sewers (SWRCB, 2019).

3.7.3 pH

The hydrogen ion activity of water (pH) is measured on a logarithmic scale ranging from 0 to 14. In general, the pH of natural waters is usually slightly basic due to the solubility of carbon dioxide from the atmosphere. Deviations from natural conditions can harm aquatic life. Changes in pH are a potential result of excess algae growth, which could be influenced by elevated nutrient levels. Photosynthesis by algae causes pH to increase because it consumes carbon dioxide present in the water column (SWDE, 2013). Other potential causes of changes in pH include waste discharges, agriculture, and acid rain (SWRCB, n.d.).

3.7.4 Sedimentation

Sediment entering receiving waterbodies degrade the quality of water, wildlife, and the land surrounding streams in the following ways, such as increasing the turbidity which can prevent animals from seeing food,

preventing natural vegetation from growing in water, destroying habitat for the smallest stream organisms, and more. The 303(d) list includes the following potential sources of sedimentation in California water bodies: agriculture, channel erosion, construction, domestic animals/livestock, erosion/siltation, grazing-related sources, habitat modification, hydromodification, irrigated crop production, land development, removal of riparian vegetation, resource extraction, silviculture, and urban runoff/storm sewers (SWRCB, 2019).

3.7.5 Specific Conductance

Specific conductance of water depends on the concentration of ions and the temperature of the solution (USGS, 2019). It is an important water quality measurement because it gives a good idea of the amount of dissolved material in the water. The sources of specific conductance directly correlate to the sources of salts discussed in **Section 3.4**.

3.7.6 Temperature

Temperatures in streams and rivers are influenced by many atmospheric and hydrologic processes affecting the movement of heat and can play a fundamental role in shaping the structure and function of aquatic systems. According to the USEPA, sources and activities that can cause changes in temperature include discharge of heated effluents, removal of riparian vegetation, removal of upland vegetation, impervious surfaces, channel alteration, impoundments or dams, and removal of water from surface or groundwater. In particular, high temperatures in waterbodies can result from urban runoff, river impoundments, removal of riparian vegetation, and industrial water use such as power plants (USGS, 2018). For example, Ventura River Reach 4 is downstream of Matilija Reservoir, which currently stores nearly 150 acre-feet of water, allowing water temperature to increase before discharging to the river below. The Matilija Dam is to be removed through a public-private partnership under the leadership of the Ventura County Public Works Agency – Watershed Protection (Matilija Dam Ecosystem Restoration Project, n.d.).

3.7.7 Toxicity

Toxicity is the adverse response of organisms to chemical or physical agents. According to the Basin Plan, there are two types of toxicity assessed: acute and chronic. When the adverse response is mortality, the result is termed acute toxicity. When the adverse response is not mortality but instead reduced growth in larval organisms or reduced reproduction in adult organisms, a critical life stage effect has occurred. Aquatic bioassays is usually used to evaluate the toxicity of waste and receiving waters.

The SWRCB assesses the toxicity of the water bodies by conducting aquatic bioassays such as growth and reproduction of fathead minnow, survival and reproduction of *Ceriodaphnia dubia*, total cell count for *Selenastrum capricornutum*, cell density of *Thalassiosira pseudonana*, survival and reproduction of *Americamysis bahia*, survival of *Hyalella azteca*, survival of *Pimephales promelas*, and more. The 303(d) list identifies agriculture and urban runoff as potential sources of toxicity in California water bodies (SWRCB, 2019).

4 WATER BODY-POLLUTANT COMBINATIONS

Based on review of TMDLs and 303(d) listings and data analysis for the remainder of the WBPCs, WBPCs were classified into one of the three overarching Permit categories detailed in **Section 1.3**. To further support development of the WMP and focus on the MS4-responsible pollutants, the three Permit categories were further subdivided to clearly distinguish between 1) WBPCs for which the MS4 is responsible for and are addressed in the WMP, 2) WBPCs where it is unlikely MS4 discharges are causing or contributing, and 3) WBPCs for 303(d) impaired waterbodies that have no MS4 discharges into the receiving waters. These subdivided WBPCs were placed into separate tables for each Watershed Area in **Sections 4.1** through **4.2**.

Table 4-1 displays the jurisdictions applicable to each receiving waterbody based on examining their drainage contribution.

Table 4-1. Jurisdictions applicable to each receiving waterbody that likely contain MS4 discharges.

Receiving Waterbodies	Camarillo	Fillmore	Moorpark	Ojai	Oxnard	Port Hueneme	Santa Paula	Simi Valley	Thousand Oaks	Unincorporated County	Ventura
Calleguas Creek											
Calleguas Creek Reach 1	X		X		X			X	X	X	
Calleguas Creek Reach 2	X		X		X			X	X	X	
Calleguas Creek Reach 3	X		X					X	X	X	
Calleguas Creek Reach 4	X				X					X	
Calleguas Creek Reach 5	X									X	
Calleguas Creek Reach 6	X		X					X		X	
Calleguas Creek Reach 7			X					X		X	
Calleguas Creek Reach 8								X		X	
Calleguas Creek Reach 9A	X								X	X	
Calleguas Creek Reach 9B	X								X	X	
Calleguas Creek Reach 10									X	X	
Calleguas Creek Reach 11								X		X	
Calleguas Creek Reach 12									X	X	
Calleguas Creek Reach 13									X	X	
Duck Pond											
Honda Barranca										X	
Fox Barranca										X	

Receiving Waterbodies	Camarillo	Fillmore	Moorpark	Ojai	Oxnard	Port Hueneme	Santa Paula	Simi Valley	Thousand Oaks	Unincorporated County	Ventura
Oxnard Drain #3					X					X	
Malibu Creek											
Portrero Canyon Creek									X	X	
Lindero Creek Reach 2									X	X	
Medea Creek Reach 2										X	
Sherwood Lake										X	
Westlake Lake									X	X	
Santa Monica Bay									X	X	
Santa Clara River											
Santa Clara River Estuary		X			X		X			X	X
Santa Clara River Reach 1		X			X		X			X	X
Santa Clara River Reach 2		X			X		X			X	X
Santa Clara River Reach 3		X					X			X	
Santa Clara River Reach 4A		X								X	
Brown Barranca/Long Canyon										X	X
Pole Creek		X									
Piru Creek										X	
Ventura River											
Ventura River Estuary				X						X	X
Ventura River Reach 1				X						X	X
Ventura River Reach 2				X						X	X
Ventura River Reach 3				X						X	
Ventura River Reach 4				X						X	
San Antonio Creek				X						X	
Canada Larga										X	
Ventura County Coastal											
Arundell Barranca											X
Channel Islands Harbor					X	X				X	
Harbor Beaches					X	X				X	

Appendix B: Water Quality Characterization

Receiving Waterbodies	Camarillo	Fillmore	Moorpark	Ojai	Oxnard	Port Hueneme	Santa Paula	Simi Valley	Thousand Oaks	Unincorporated County	Ventura
Hollywood Beach										X	
Hueneme Beach Park						X					
Hueneme Drain						X					
Ormond Beach					X	X					
Ormond Beach Wetlands					X	X					
Oxnard Beach					X						
Oxnard Beach Park					X					X	
Oxnard Drain					X						
Peninsula Beach											X
Port Hueneme Harbor						X					
Port Hueneme Pier						X					
Promenade Park Beach											X
San Buenaventura Beach											X
Sanjon Barranca Creek											X
Silverstrand Beach						X				X	
Surfers Knoll											X
Surfers Point at Seaside											X
Ventura Harbor: Ventura Keys											X
Ventura Marina Jetties											X

4.1 Calleguas Creek Watershed Management Area

Table 4-2. Calleguas Creek Watershed Water Body-Pollutant Combination Categories Addressed in WMP.

Constituent	Calleguas Creek Reach														Duck Pond	Honda Barranca	Fox Barranca	Oxnard Drain #3
	1	2	3	4	5	6	7	8	9A	9B	10	11	12	13				
Category 1A: WBPCs with past due final TMDL deadlines.																		
Copper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Mercury	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Nickel	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Selenium				X	X											X		
Toxicity	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Diazinon	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Chlorpyrifos	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Boron				X	X		X	X								X		
Chloride			X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Sulfate			X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Total Dissolved Solids			X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Category 1B: WBPCs with permit term final TMDL deadlines.																		
Total Chlordane	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
4,4'-DDD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
4,4'-DDE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
4,4'-DDT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dieldrin	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Total PCBs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Toxaphene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Category 1D: WBPCs addressed in USEPA TMDL without a Regional Board Adopted Implementation Plan.																		
Bifenthrin																		X
Total Chlordane																		X
4,4'-DDD																		X
4,4'-DDE																		X
4,4'-DDT																		X
Dieldrin																		X
Total PCBs																		X

Appendix B: Water Quality Characterization

Constituent	Calleguas Creek Reach														Duck Pond	Honda Barranca	Fox Barranca	Oxnard Drain #3
	1	2	3	4	5	6	7	8	9A	9B	10	11	12	13				
Toxaphene																		X
Sediment Toxicity																		X
Chlorpyrifos																		X
Category 2A: 303(d) Listed WBPCs for which MS4s may be causing or contributing to impairment.																		
Indicator Bacteria		X	X	X		X	X		X	X	X	X						
Malathion											X							
Zinc	X																	
Category 2C: 303(d) Listed WBPCs for which it is unknown if MS4 discharges may be causing or contributing to the impairment.																		
Sedimentation	X	X	X	X	X	X	X	X				X						
Category 3A: All other WBPCs with receiving water exceedances in past 5 years, MS4 discharges may be causing or contributing to exceedances.																		
2,4'-DDD																		X
2,4'-DDT																		X
Bifenthrin	X		X	X		X	X		X	X	X			X				
Bis(2-ethylhexyl) phthalate													X					
Cyfluthrin	X		X	X		X	X			X	X			X				X
Cyhalothrin, lambda																		X
Cypermethrin	X		X	X		X	X			X	X			X				
Indicator Bacteria													X					X
Malathion	X		X	X			X											X
pH						X						X						

Appendix B: Water Quality Characterization

Table 4-3. Calleguas Creek Watershed Water Body-Pollutant Combination Categories Where it is Unlikely that MS4 Discharges are Causing or Contributing to the Impairment or Other Exceedances.

Constituent	Calleguas Creek Reach														Duck Pond	Honda Barranca	Fox Barranca	Oxnard Drain #3
	1	2	3	4	5	6	7	8	9A	9B	10	11	12	13				
Category 2D: 303(d) Listed WBPCs for which it is unlikely that MS4 discharges are causing or contributing to the impairment.																		
Ammonia		X	X			X	X			X	X	X		X				X
Bifenthrin															X	X		
Boron																	X	
Endosulfan	X	X		X	X				X	X		X		X				
Lindane/gamma-BHC									X									
Nitrate + Nitrite as N			X			X											X	
Nitrate as N									X									
Nitrate as Nitrate (NO3)				X		X			X									
Nitrite as N									X		X							
Nitrogen	X			X	X										X			X
Category 3B: All other WBPCs with receiving water exceedances in past 5 years, unlikely MS4 discharges causing or contributing to exceedances.																		
Bifenthrin					X													
Cyfluthrin					X											X		
Cyhalothrin, lambda																X		
Cypermethrin					X											X		
Deltamethrin/Tralomethrin						X										X		
Indicator Bacteria					X											X		
Malathion					X											X		
Nitrate + Nitrite as N				X					X									
Nitrate as N	X	X	X	X	X	X	X									X		X
Nitrite as N							X											
pH					X											X		
Selenium		X																
Category 3C: All other WBPCs with receiving water exceedances in past 10 years, but not in the past 5 years.																		
alpha-Endosulfan											X							
Aluminum	X		X	X														
Ammonia													X					
Bis(2-ethylhexyl) phthalate			X															

Appendix B: Water Quality Characterization

Constituent	Calleguas Creek Reach														Duck Pond	Honda Barranca	Fox Barranca	Oxnard Drain #3
	1	2	3	4	5	6	7	8	9A	9B	10	11	12	13				
Cyhalothrin, lambda	X		X	X		X	X			X	X			X				
Deltamethrin/Tralomethrin														X				
Dissolved Oxygen			X															
Hexachlorobenzene						X										X		
Indeno(1,2,3-cd)pyrene			X															
Malathion													X					
Nitrate + Nitrite as N					X													
Nitrite as N					X													
pH													X					
Selenium							X						X	X				

4.2 Upper Malibu Creek Watershed Management Area

Table 4-4. Malibu Creek Watershed Water Body-Pollutant Combination Categories Addressed in WMP.

Constituent	Portrero Canyon Creek	Lindero Creek Reach 2	Medea Creek Reach 2	Sherwood Lake	Westlake Lake	Santa Monica Bay
Category 1A: WBPCs with past due final TMDL deadlines.						
E. Coli (dry)	X	X	X	X	X	
Enterococcus (dry)						X
Fecal Coliform (dry)						X
Total Coliform (dry)						X
Enterococcus (wet)						X
Fecal Coliform (wet)						X
Total Coliform (wet)						X
Category 1B: WBPCs with permit term final TMDL deadlines.						
E. coli (wet)	X	X	X	X	X	
Algae	X	X	X	X	X	
Ammonia	X	X	X	X	X	
Dissolved Oxygen	X	X	X	X	X	
Nitrate+Nitrite	X	X	X	X	X	
Scum		X				
Total Phosphorus	X	X	X	X	X	
Category 2A: 303(d) Listed WBPCs for which MS4s may be causing or contributing to impairment.						
Selenium		X	X			
Category 2B: 303(d) Listed WBPCs that are not a "pollutant".						
Benthic Community Effects			X			
Invasive Species			X			
Category 2C: 303(d) Listed WBPCs for which it is unknown if MS4 discharges may be causing or contributing to the impairment.						
Sedimentation			X			

Table 4-5. Malibu Creek Watershed Water Body-Pollutant Combination Categories Where it is Unlikely that MS4 Discharges are Causing or Contributing to the Impairment or Other Exceedances.

Constituent	Portrero Canyon Creek	Lindero Creek Reach 2	Medea Creek Reach 2	Sherwood Lake	Westlake Lake	Santa Monica Bay
Category 2D: 303(d) Listed WBPCs for which it is unlikely that MS4 discharges are causing or contributing to the impairment.						
Lead					X	
Mercury				X[1]		

1. No cause or contribution from MS4 discharges per the Los Angeles Water Board.

4.3 Santa Clara River Watershed Management Area

Table 4-6. Santa Clara River Watershed Water Body-Pollutant Combination Categories Addressed in WMP.

Constituent	Estuary	Santa Clara River Reach				Brown Barranca/ Long Canyon	Pole Creek	Piru Creek
		1	2	3	4A			
Category 1A: WBPCs with past due final TMDL deadlines.								
E. Coli (dry)				X	X			
Total Coliform (dry)	X	X	X					
Fecal Coliform (dry)	X	X	X					
Enterococcus (dry)	X	X	X					
Total Ammonia-N[1]				X				
Nitrate-N + Nitrite-N				X				
Chloride				X				
Category 1C: WBPCs with post-permit term final TMDL deadlines.								
E. Coli (wet)				X	X			
Total Coliform (wet)	X	X	X					
Fecal Coliform (wet)	X	X	X					
Enterococcus (wet)	X	X	X					
Category 2A: 303(d) Listed WBPCs for which MS4s may be causing or contributing to impairment.								
Ammonia	X							
Selenium				X				
Sulfate							X	X
Total Dissolved Solids				X			X	X
Category 2B: 303(d) Listed WBPCs that are not a "pollutant".								
Toxicity	X	X		X				
Dissolved Oxygen		X						
pH		X						
Category 3A: All other WBPCs with receiving water exceedances in the past 5 years for which MS4 discharges may be causing or contributing to the exceedances.								
Dissolved Oxygen				X				
pH				X				
Selenium			X					
Sulfate			X	X				

1. Ammonia was delisted from the 303(d) list in the 2018 integrated report.

Appendix B: Water Quality Characterization

Table 4-7. Santa Clara River Watershed Water Body-Pollutant Combination Categories Where it is Unlikely that MS4 Discharges are Causing or Contributing to the Impairment or Other Exceedances.

Constituent	Estuary	Santa Clara River Reach				Brown Barranca/ Long Canyon	Pole Creek	Piru Creek
		1	2	3	4A			
Category 2D: 303(d) Listed WBPCs for which it is unlikely that MS4 discharges are causing or contributing to the impairment.								
Boron								X
Nitrate-N + Nitrite-N						X[1]		
Specific Conductance								X
Toxaphene	X							
Category 3B: All other WBPCs with receiving water exceedances in the past 5 years for which it is unlikely that MS4 discharges are causing or contributing to the exceedances.								
Chloride			X					
Dibenzo(a,h) anthracene				X				
Indeno(1,2,3-cd) pyrene				X				
Mercury				X				
Category 3C: All other WBPCs with receiving water exceedances in past 10 years, but not in the past 5 years.								
Chloride					X			
Cyfluthrin								X
Cypermethrin								X

1. The Santa Clara River Nitrogen Compounds TMDL and TMDL staff report notes the following: "An allocation of 20% concentration reduction for agriculture is considered sufficient to achieve compliance in Brown/Todd Barranca and Torrey Canyon where loading is all from agricultural practices."

Table 4-8. Santa Clara River Watershed Water Body-Pollutant Combination Categories Where No MS4 Discharges Contribute.

Constituent	Boulder Creek	Ellsworth Barranca	Hopper Creek	Sespe Creek	Tapo Canyon	Timber Canyon	Torrey Canyon Creek	Wheeler Canyon/ Todd Barranca
Category 1A: WBPCs with past due final TMDL deadlines.								
Chloride				X				
Category 2B: 303(d) Listed WBPCs that are not a "pollutant".								
Toxicity	X				X			X
Category 2D: 303(d) Listed WBPCs for which it is unlikely that MS4 discharges are causing or contributing to the impairment.								

Appendix B: Water Quality Characterization

Constituent	Boulder Creek	Ellsworth Barranca	Hopper Creek	Sespe Creek	Tapo Canyon	Timber Canyon	Torrey Canyon Creek	Wheeler Canyon/ Todd Barranca
Bifenthrin	X							
Chlordane					X			X
Chloride				X	X			
Chlorpyrifos		X				X		
Cypermethrin								X
DDD					X			
DDE					X			
DDT								X
Malathion					X			
Nitrate-N + Nitrite-N							X	X
Sulfate			X		X			X
Total Dissolved Solids			X		X			X
Toxaphene								X
Category 3B: All other WBPCs with receiving water exceedances in the past 5 years for which it is unlikely that MS4 discharges are causing or contributing to the exceedances.								
2,4'-DDT		X						
4,4'-DDD		X						X
4,4'-DDE	X	X						X
4,4'-DDT		X			X			
Bifenthrin		X			X	X		X
Chloride		X				X		X
Chlorpyrifos	X							X
Cyfluthrin	X							X
Cypermethrin		X			X			
Indicator Bacteria	X	X			X	X		X
Nitrate as N	X	X			X			X
pH					X			X
Sulfate	X	X		X		X		
Total Dissolved Solids	X	X				X		
Toxaphene		X				X		
Category 3C: All other WBPCs w/ RW exceedances in past 10 years, but not in the past 5 years.								

Appendix B: Water Quality Characterization

Constituent	Boulder Creek	Ellsworth Barranca	Hopper Creek	Sespe Creek	Tapo Canyon	Timber Canyon	Torrey Canyon Creek	Wheeler Canyon/ Todd Barranca
4,4'-DDD						X		
4,4'-DDE						X		
4,4'-DDT	X					X		
Chlorpyrifos					X			
Cyfluthrin						X		
Cyhalothrin, lambda					X	X		
Cypermethrin						X		
Methyl Parathion		X			X			
Toxaphene	X				X			

4.4 Ventura River Watershed Management Area

Table 4-9. Ventura River Watershed Water Body-Pollutant Combination Categories Addressed in WMP.

Constituent	Estuary	Ventura River Reach				San Antonio Creek	Canada Larga
		1	2	3	4		
Category 1A: WBPCs with past due final TMDL deadlines.							
Total Nitrogen (wet)	X	X					
Total Nitrogen (dry)	X	X	X	X	X	X	X
Total Phosphorus (dry)	X	X	X	X	X	X	X
Nitrate-N + Nitrite-N (wet)			X	X	X	X	X

Appendix B: Water Quality Characterization

Constituent	Estuary	Ventura River Reach				San Antonio Creek	Canada Larga
		1	2	3	4		
Algae	X	X	X				
Dissolved Oxygen							X
Category 2A: 303(d) Listed WBPCs for which MS4s may be causing or contributing to impairment.							
Indicator Bacteria	X			X		X	X
Total Dissolved Solids						X	X
Category 2B: 303(d) Listed WBPCs that are not a "pollutant".							
Benthic community effects		X	X				
Temperature					X		
Toxicity				X			
Category 3A: All other WBPCs with receiving water exceedances in the past 5 years for which MS4 discharges may be causing or contributing to the exceedances.							
Chloride						X	
Chlorpyrifos			X				
Indicator Bacteria			X				
Sulfate					X	X	

Table 4-10. Ventura River Watershed Water Body-Pollutant Combination Categories Where it is Unlikely that MS4 Discharges are Causing or Contributing to the Impairment or Other Exceedances.

Constituent	Estuary	Ventura River Reach				San Antonio Creek	Canada Larga
		1	2	3	4		
Category 3B: All other WBPCs with receiving water exceedances in the past 5 years for which it is unlikely that MS4 discharges are causing or contributing to the exceedances.							
4,4'-DDD						X	
4,4'-DDE						X	
4,4'-DDT						X	
Cyfluthrin						X	

Appendix B: Water Quality Characterization

Constituent	Estuary	Ventura River Reach				San Antonio Creek	Canada Larga
		1	2	3	4		
Cypermethrin						X	
Dissolved Oxygen			X				
Category 3C: All other WBPCs with receiving water exceedances in past 10 years, but not in the past 5 years.							
Aluminum			X				
Bifenthrin			X				
Bis(2-ethylhexyl) phthalate			X				
Chloride				X	X		
Chlorpyrifos						X	
Dibenzo(a,h)anthracene			X				
Indeno(1,2,3-cd)pyrene			X				
Toxaphene						X	

Table 4-11. Ventura River Watershed Water Body-Pollutant Combination Categories Where No MS4 Discharges Contribute.

Constituent	Lake Casitas
Category 2D: 303(d) Listed WBPCs for which it is unlikely that MS4 discharges are causing or contributing to the impairment.	
Mercury	X

4.5 Ventura County Coastal Watershed Management Area

Table 4-12. Ventura County Coastal Watershed Water Body-Pollutant Combination Categories Addressed in WMP.

Constituent	Arundell Barranca	Channel Islands Harbor[1]	Harbor Beaches[1]	Hollywood Beach[1]	Hueneme Beach Park[1]	Hueneme Drain	Ormond Beach[1]	Ormond Beach Wetlands	Oxnard Beach	Oxnard Beach Park	Oxnard Drain	Peninsula Beach[1]	Port Hueneme Harbor	Port Hueneme Pier	Promenade Park Beach	San Buenaventura Beach[1]	Sanjon Barranca Creek	Silverstrand Beach[1]	Surfers Knoll	Surfers Point at Seaside[1]	Ventura Harbor: Ventura Keys	Ventura Marina Jetties
Category 1A: WBPCs with past due final TMDL deadlines.																						
Total Coliform			X																			
Fecal Coliform			X																			
Enterococcus			X																			
Category 2A: 303(d) Listed WBPCs for which MS4s may be causing or contributing to impairment.																						
Indicator Bacteria	X				X	X	X	X			X	X				X	X			X	X[2]	
Category 2B: 303(d) Listed WBPCs that are not a "pollutant".																						
pH								X			X											
Category 3A: All other WBPCs with receiving water exceedances in the past 5 years for which MS4 discharges may be causing or contributing to the exceedances.																						
Dissolved Oxygen						X																
Total Coliform				X					X	X					X			X	X			
Fecal Coliform															X			X	X			
Enterococcus		X		X											X			X	X			

1. Indicator bacteria 303(d) listing is based on impairment to both recreational and shellfish harvesting beneficial uses.
2. The delisting of bacteria in Ventura Harbor: Ventura Keys is anticipated.

Appendix B: Water Quality Characterization

Table 4-13. Ventura County Coastal Watershed Water Body-Pollutant Combination Categories Where it is Unlikely that MS4 Discharges are Causing or Contributing to the Impairment or Other Exceedances.

Constituent	Arundell Barranca	Channel Islands Harbor[1]	Harbor Beaches[1]	Hollywood Beach[1]	Hueneme Beach Park[1]	Hueneme Drain	Ormond Beach[1]	Ormond Beach Wetlands	Oxnard Beach	Oxnard Beach Park	Oxnard Drain	Peninsula Beach[1]	Port Hueneme Harbor	Port Hueneme Pier	Promenade Park Beach	San Buenaventura Beach[1]	Sanjon Barranca Creek	Silverstrand Beach[1]	Surfers Knoll	Surfers Point at Seaside[1]	Ventura Harbor: Ventura Keys	Ventura Marina Jetties
Category 2D: 303(d) Listed WBPCs for which it is unlikely that MS4 discharges are causing or contributing to the impairment.																						
Arsenic													X								X	
Chlordane																						
DDT													X									X
Dieldrin													X								X	
Nitrate											X											
PAHs													X									
PCBs													X	X							X	X
Category 3B: All other WBPCs with receiving water exceedances in the past 5 years for which it is unlikely that MS4 discharges are causing or contributing to the exceedances.																						
Nitrate as N		X																				
Category 3C: All other WBPCs with receiving water exceedances in past 10 years, but not in the past 5 years.																						
Ammonia as N						X																
Benzo(a)anthracene						X																
Benzo(a)pyrene						X																
Benzo(b)fluoranthene						X																
Benzo(k)fluoranthene						X																
Chlorpyrifos						X																
Chrysene						X																
Dibenzo(a,h)anthracene						X																
Indeno(1,2,3-cd)pyrene						X																
Malathion						X																

Appendix B: Water Quality Characterization

Constituent	Arundell Barranca	Channel Islands Harbor[1]	Harbor Beaches[1]	Hollywood Beach[1]	Hueneme Beach Park[1]	Hueneme Drain	Ormond Beach[1]	Ormond Beach Wetlands	Oxnard Beach	Oxnard Beach Park	Oxnard Drain	Peninsula Beach[1]	Port Hueneme Harbor	Port Hueneme Pier	Promenade Park Beach	San Buenaventura Beach[1]	Sanjon Barranca Creek	Silverstrand Beach[1]	Surfers Knoll	Surfers Point at Seaside[1]	Ventura Harbor: Ventura Keys	Ventura Marina Jetties
Nitrate + Nitrite as N	X																					
Selenium	X																					

1. Waterbodies are subject to shellfish harvesting beneficial use for pathogens per the 2020-2022 303(d) List Appendix B.

Table 4-14. Ventura County Coastal Watershed Water Body-Pollutant Combination Categories Where No MS4 Discharges Contribute.

Constituent	County Line Beach[1]	Emma Wood State Beach[1]	Faria County State Beach	McGrath Beach[1]	McGrath Lake	Oil Piers Beach[1]	Point Mugu Beach[1]	Rincon Beach	Rincon Parkway Beach[1]	Solimar Beach	Staircase Beach[1]
Category 2B: 303(d) Listed WBPCs that are not a "pollutant".											

Appendix B: Water Quality Characterization

Constituent	County Line Beach[1]	Emma Wood State Beach[1]	Faria County State Beach	McGrath Beach[1]	McGrath Lake	Oil Piers Beach[1]	Point Mugu Beach[1]	Rincon Beach	Rincon Parkway Beach[1]	Solimar Beach	Staircase Beach[1]
Toxicity					X						
Category 2D: 303(d) Listed WBPCs for which it is unlikely that MS4 discharges are causing or contributing to the impairment.											
Chlordane					X						
DDT					X						
Dieldrin					X						
Indicator Bacteria				X	X		X	X	X		
PCBs					X						
Category 3B: All other WBPCs with receiving water exceedances in the past 5 years for which it is unlikely that MS4 discharges are causing or contributing to the exceedances.											
Total Coliform		X	X							X	X
Fecal Coliform	X	X	X							X	
Enterococcus		X	X			X				X	

1. Waterbodies are subject to shellfish harvesting beneficial use for pathogens per the 2020-2022 303(d) List Appendix B.

5 WATER QUALITY PRIORITIES

The water quality priorities addressed in each watershed are summarized by the major TMDL pollutant categories in **Table 5-1** through **Table 5-2**. These groupings include all Category 1 pollutants, Category 2 pollutants with potential contributions from the MS4 (Categories 2A/2B), and Category 3 pollutants with exceedances within the last 5 years with potential contributions from the MS4 (Category 3A). The tables summarize the justification for the groupings based on similar fate and transport mechanisms and provide details on potential control measures to address all the pollutants within the same grouping.

5.1 Calleguas Creek Watershed Management Area

Table 5-1 summarizes the water quality priorities, justification for pollutant groupings, and potential control measures to address the pollutant categories for the Calleguas Creek Watershed Management Area.

Table 5-1. Water quality priorities in the Calleguas Creek Watershed Management Area and justification for pollutant groupings.

Category 1 Pollutants (TMDLs)	Category 2/3 Pollutants	Justification for Grouping	Potential Control Measures
Metals (Copper, Mercury, Nickel, Selenium)	**Category 2** • Zinc	Zinc can be removed through its association with particulate matter similarly to other metals addressed in the Calleguas Creek Watershed Metals and Selenium TMDL. In addition, although the TMDL provides numeric targets for zinc, it does not establish a waste load allocation for zinc because information at the time of development of the TMDL indicated that numeric targets for zinc were attained.	Operational control measures (i.e., street sweeping) can remove the accumulation of debris and pollutants such as metals, organics, nutrients, and particulate matter from roadways. Structural control measures that include pre-treatment followed by infiltration and/or filtration have been demonstrated to show reasonable assurance of removing sediment-bound pollutants of which metals are associated to.

Appendix B: Water Quality Characterization

Category 1 Pollutants (TMDLs)	Category 2/3 Pollutants	Justification for Grouping	Potential Control Measures
Pesticides/Organics (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Bifenthrin, Chlorpyrifos, Diazinon, Dieldrin, Total Chlordane, Total PCBs, Toxaphene)	**Category 2** • Malathion **Category 3** • 2,4'-DDD • 2,4'-DDT • Bifenthrin • Bis(2-ethylhexyl) phthalate • Cyfluthrin • Cyhalothrin, lambda • Cypermethrin • Malathion	The organic carbon/water partition coefficient (K_{oc}) is an important parameter describing partitioning of chemicals in soil/water system and measuring their relative potential mobility in soils. The log soil organic carbon/water partition coefficients (log K_{oc}) for the Category 2/3 pollutants within the pesticides/organics category vary between 3.2 to 6.2 according to available literature indicating that these pesticides are most likely to be sediment-bound similarly to the TMDL pesticides/organics. Note that some pesticides/organics may also be moderately water-soluble.	Structural control measures that include pre-treatment followed by infiltration and/or filtration have been demonstrated to show reasonable assurance of removing sediment-bound pollutants of which pesticides/organic compounds are associated to. Non-structural control measures that focus on true source control efforts for non-banned pesticides include media outreach/fact sheets on alternatives to pesticides such as integrated pest management (IPM); minimization of irrigation discharges from landscapes, parks, and recreational facilities; and, implementing the IPM Program through the Public Agencies Program. In addition, operational control measures (i.e., street sweeping) can remove the accumulation of debris and pollutants such as metals, organics, nutrients, and particulate matter from roadways. It is important to recognize that the historical use of legacy pesticides may still affect present-day water quality due to the persistence of those pesticides.
Salts (Boron, Chloride, Sulfate, Total Dissolved Solids)	N/A	Salts are ionic compounds which, when dissolved in water, break up completely into ions. They arise by the reaction of acids with bases. Total dissolved solids is encompassing of ions such as chloride and sulfate. In terms of its fate and transport, salts are considered conservative substances meaning that no generation or consumption of salts occur.	Based on the source assessment, it was determined that salts are not a priority to be addressed by the MS4 as they are primarily contributed by natural occurrence in local groundwater or imported water. The primary course of action for MS4 Permittees to take is through non-structural control measures, such as reducing outdoor water use, thereby limiting the amount of runoff that may contain high salts from entering urban tributaries and receiving waters.
Toxicity (*Non-Pollutants*)	**Category 2** • Sedimentation **Category 3** • pH	N/A (individual grouping)	Toxicity, pH, and sediment are not considered pollutants but can be addressed through the removal or treatment of other TMDL pollutant categories (metals, pesticides/organics).

Appendix B: Water Quality Characterization

Category 1 Pollutants (TMDLs)	Category 2/3 Pollutants	Justification for Grouping	Potential Control Measures
N/A (*Indicator Bacteria*)	**<u>Category 2</u>** • Indicator Bacteria **<u>Category 3</u>** • Indicator Bacteria	Indicator bacteria has a complex fate and transport and is therefore designated its own category. Bacteria can be deposited, inactivated, proliferated, or more in the environment.	The removal of bacteria using structural control measures remains highly variable and unreliable. Therefore, the Group is emphasizing addressing bacteria using source investigations and abatement where possible. Microbial source tracking tools can be employed to track potential sources of human waste, which contain the highest concentration of pathogens and pose the most risk to human health. The minimum control measures detailed in Section VIII of the Permit, including the illicit connections and illicit discharges elimination program, the public agency activities program, the industrial/commercial facilities program, progressive enforcement, and public information and participation program, all remain key tools to control sources prior to entering receiving waters and provide valuable human waste source abatement. Where source control is not possible or investigations are inconclusive, structural control measures (e.g., sanitary sewer diversions, regional capture projects) may be employed to address targeted catchments to achieve load reduction targets.

5.2 Upper Malibu Creek Watershed Management Area

Table 5-2 summarizes the water quality priorities, justification for pollutant groupings, and potential control measures to address the pollutant categories for the Upper Malibu Creek Watershed Management Area.

Table 5-2. Water quality priorities in the Malibu Creek Watershed Management Area and justification for pollutant groupings.

Category 1 Pollutants (TMDLs)	Category 2/3 Pollutants	Justification for Grouping	Potential Control Measures
Indicator Bacteria (*E. coli*, Enterococcus, Fecal Coliform, Total Coliform)	N/A	Indicator bacteria has a complex fate and transport and is therefore designated its own category. Bacteria can be deposited, inactivated, proliferated, or more in the environment.	The removal of bacteria using structural control measures remains highly variable and unreliable. Therefore, the Group is emphasizing addressing bacteria using source investigations and abatement where possible. Microbial source tracking tools can be employed to track potential sources of human waste, which contain the highest concentration of pathogens and pose the most risk to human health. The minimum control measures detailed in Section VIII of the Permit, including the illicit connections and illicit discharges elimination program, the public agency activities program, the industrial/commercial facilities program, progressive enforcement, and public information and participation program, all remain key tools to control sources prior to entering receiving waters and provide valuable human waste source abatement. Where source control is not possible or investigations are inconclusive, structural control measures (e.g., sanitary sewer diversions, regional capture projects) may be employed to address targeted catchments to achieve load reduction targets.

Appendix B: Water Quality Characterization

Category 1 Pollutants (TMDLs)	Category 2/3 Pollutants	Justification for Grouping	Potential Control Measures
Nutrients (Total Phosphorus, Nitrate + Nitrite as N, Ammonia, Algae, Dissolved Oxygen)	N/A	By preventing or reducing the proliferation of nutrients in waterbodies, algae growth will be controlled.	Operational control measures (i.e., street sweeping) can remove the accumulation of debris and pollutants such as metals, organics, nutrients, and particulate matter from roadways. Phosphorus can be sediment bound; therefore, control measures that addresses the removal of sediment can remove phosphorus. Non-structural control measures that limit the use of fertilizers (true source control) or impose measures such as reduction of over-irrigating or elimination of non-stormwater discharges from lawns, etc. can be utilized to reduce nutrient exceedances. Structural control measures (e.g., redevelopment LID, regional projects) that incorporate biological communities, such as vegetation and bacteria, can be conducive to nutrient removal. Vegetation can uptake nutrients for plant growth through nutrient assimilation. Other biological processes, such as nitrifying and denitrifying bacteria used in conjunction, can remove ammonia and nitrate/nitrite, respectively.
N/A (*Metals*)	**<u>Category 2</u>** • Selenium	N/A (individual grouping)	Operational control measures (i.e., street sweeping) can remove the accumulation of debris and pollutants such as metals, organics, nutrients, and particulate matter from roadways. Structural control measures that include pre-treatment followed by infiltration and/or filtration have been demonstrated to show reasonable assurance of removing sediment-bound pollutants of which metals are associated to.

Appendix B: Water Quality Characterization

Category 1 Pollutants (TMDLs)	Category 2/3 Pollutants	Justification for Grouping	Potential Control Measures
N/A (*Non-Pollutants*)	**<u>Category 2</u>** • Benthic Community Effects • Invasive Species • Scum/Foam-unnatural • Sedimentation **<u>Category 3</u>** • Dissolved Oxygen	N/A (individual grouping)	Benthic community effects, dissolved oxygen, invasive species, scum, and sedimentation are not considered pollutants but can be addressed through the removal or treatment of other TMDL pollutant categories (i.e., nutrients) to restore the natural ecosystem.

5.3 Santa Clara River Watershed Management Area

Table 5-3 summarizes the water quality priorities, justification for pollutant groupings, and potential control measures to address the pollutant categories for the Santa Clara River Watershed Management Area.

Table 5-3. Water quality priorities in the Santa Clara River Watershed Management Area and justification for pollutant groupings.

Category 1 Pollutants (TMDLs)	Category 2/3 Pollutants	Justification for Grouping	Potential Control Measures
Indicator Bacteria (*E. coli*, Enterococcus, Fecal Coliform, Total Coliform)	N/A	Indicator bacteria has a complex fate and transport and is therefore designated its own category. Bacteria can be deposited, inactivated, proliferated, or more in the environment.	The removal of bacteria using structural control measures remains highly variable and unreliable. Therefore, the Group is emphasizing addressing bacteria using source investigations and abatement where possible. Microbial source tracking tools can be employed to track potential sources of human waste, which contain the highest concentration of pathogens and pose the most risk to human health. The minimum control measures detailed in Section VIII of the Permit, including the illicit connections and illicit discharges elimination program, the public agency activities program, the industrial/commercial facilities program, progressive enforcement, and public information and participation program, all remain key tools to control sources prior to entering receiving waters and provide valuable human waste source abatement. Where source control is not possible or investigations are inconclusive, structural control measures (e.g., sanitary sewer diversions, regional capture projects) may be employed to address targeted catchments to achieve load reduction targets.
Nutrients (Ammonia as N, Nitrate + Nitrite as N)	**Category 2** • Ammonia as N	By preventing or reducing the proliferation of nutrients in waterbodies, algae growth will be controlled.	Operational control measures (i.e., street sweeping) can remove the accumulation of debris and pollutants such as metals, organics, nutrients, and particulate matter from roadways. Non-structural control measures that limit the use of fertilizers (true source control) or impose measures such as reduction of over-irrigating or elimination of non-stormwater discharges from lawns, etc. can be utilized to reduce nutrient exceedances. Structural control measures (e.g., redevelopment LID, regional projects) that incorporate biological communities, such as vegetation and bacteria, can be conducive to nutrient removal. Vegetation can uptake nutrients for plant growth through nutrient assimilation. Other biological processes, such as nitrifying and denitrifying bacteria used in conjunction, can remove ammonia and nitrate/nitrite, respectively.

Appendix B: Water Quality Characterization

Category 1 Pollutants (TMDLs)	Category 2/3 Pollutants	Justification for Grouping	Potential Control Measures
Salts (Chloride)	**Category 2** • Sulfate • Total Dissolved Solids **Category 3** • Sulfate	Salts are ionic compounds which, when dissolved in water, break up completely into ions. They arise by the reaction of acids with bases. Total dissolved solids is encompassing of ions such as chloride and sulfate. In terms of its fate and transport, salts are considered conservative substances meaning that no generation or consumption of salts occur.	Based on the source assessment, it was determined that salts are not a priority to be addressed by the MS4 as they are primarily contributed by natural occurrence in local groundwater or imported water. The primary course of action for MS4 Permittees to take is through non-structural control measures, such as reducing outdoor water use, thereby limiting the amount of runoff that may contain high salts from entering urban tributaries and receiving waters.
N/A (*Metals*)	**Category 2** • Selenium **Category 3** • Selenium	N/A (individual grouping)	Operational control measures (i.e., street sweeping) can remove the accumulation of debris and pollutants such as metals, organics, nutrients, and particulate matter from roadways. Structural control measures that include pre-treatment followed by infiltration and/or filtration have been demonstrated to show reasonable assurance of removing sediment-bound pollutants of which metals are associated to.
N/A (*Non-Pollutants*)	**Category 2** • Dissolved Oxygen • pH • Toxicity **Category 3** • Dissolved Oxygen • pH	Dissolved oxygen, pH, and toxicity are grouped together in the same category since they are not considered pollutants.	Dissolved oxygen, pH, and toxicity are not considered pollutants but can be addressed through the removal or treatment of other TMDL/non-TMDL pollutant categories (metals, nutrients, organics).

5.4 Ventura River Watershed Management Area

Table 5-4 summarizes the water quality priorities, justification for pollutant groupings, and potential control measures to address the pollutant categories for the Ventura River Watershed Management Area.

Table 5-4. Water quality priorities in the Ventura River Watershed Management Area and justification for pollutant groupings.

Category 1 Pollutants (TMDLs)	Category 2/3 Pollutants	Justification for Grouping	Potential Control Measures
Nutrients (Total Nitrogen, Total Phosphorus, Nitrate + Nitrite as N, Algae, Dissolved Oxygen)		By preventing or reducing the proliferation of nutrients in waterbodies, algae growth will be controlled.	Operational control measures (i.e., street sweeping) can remove the accumulation of debris and pollutants such as metals, organics, nutrients, and particulate matter from roadways. Non-structural control measures that limit the use of fertilizers (true source control) or impose measures such as reduction of over-irrigating or elimination of non-stormwater discharges from lawns, etc. can be utilized to reduce nutrient exceedances. Structural control measures (e.g., redevelopment LID, regional projects) that incorporate biological communities, such as vegetation and bacteria, can be conducive to nutrient removal. Vegetation can uptake nutrients for plant growth through nutrient assimilation. Other biological processes, such as nitrifying and denitrifying bacteria used in conjunction, can remove ammonia and nitrate/nitrite, respectively.
N/A (*Salts*)	**Category 2** • Total Dissolved Solids **Category 3** • Chloride • Sulfate	Salts are ionic compounds which, when dissolved in water, break up completely into ions. They arise by the reaction of acids with bases. Total dissolved solids is encompassing of ions such as chloride and sulfate. In terms of its fate and transport, salts are considered conservative substances meaning that no generation or consumption of salts occur.	Based on the source assessment, it was determined that salts are not a priority to be addressed by the MS4 as they are primarily contributed by natural occurrence in local groundwater or imported water. The primary course of action for MS4 Permittees to take is through non-structural control measures, such as reducing outdoor water use, thereby limiting the amount of runoff that may contain high salts from entering urban tributaries and receiving waters.

Appendix B: Water Quality Characterization

Category 1 Pollutants (TMDLs)	Category 2/3 Pollutants	Justification for Grouping	Potential Control Measures
N/A (*Organics*)	**<u>Category 3</u>** • Chlorpyrifos	The organic carbon/water partition coefficient (K_{oc}) is an important parameter describing partitioning of chemicals in soil/water system and measuring their relative potential mobility in soils. The log soil organic carbon/water partition coefficients (log K_{oc}) for chlorpyrifos is 4.70 according to available literature indicating that chlorpyrifos is most likely to be sediment-bound.	Structural control measures (e.g., redevelopment LID) that include pre-treatment followed by infiltration and/or filtration have been demonstrated to show reasonable assurance of removing sediment-bound pollutants of which organics are associated to.
N/A (*Indicator Bacteria*)	**<u>Category 2</u>** • Indicator Bacteria **<u>Category 3</u>** • Indicator Bacteria	Indicator bacteria has a complex fate and transport and is therefore designated its own category. Bacteria can be deposited, inactivated, proliferated, or more in the environment.	The removal of bacteria using structural control measures remains highly variable and unreliable. Therefore, the Group is emphasizing addressing bacteria using source investigations and abatement where possible. Microbial source tracking tools can be employed to track potential sources of human waste, which contain the highest concentration of pathogens and pose the most risk to human health. The minimum control measures detailed in Section VIII of the Permit, including the illicit connections and illicit discharges elimination program, the public agency activities program, the industrial/commercial facilities program, progressive enforcement, and public information and participation program, all remain key tools to control sources prior to entering receiving waters and provide valuable human waste source abatement. Where source control is not possible or investigations are inconclusive, structural control measures (e.g., sanitary sewer diversions, regional capture projects) may be employed to address targeted catchments to achieve load reduction targets.
N/A (*Non-Pollutants*)	**<u>Category 2</u>** • Benthic Community Effects • Temperature • Toxicity	Benthic community effects, temperature, and toxicity are grouped together in the same category since they are not considered pollutants.	Benthic community effects, temperature, and toxicity are not considered pollutants but can be addressed through the removal or treatment of other TMDL/non-TMDL pollutant categories (metals, nutrients, organics).

5.5 Ventura County Coastal Watershed Management Area

Table 5-5 summarizes the water quality priorities, justification for pollutant groupings, and potential control measures to address the pollutant categories for the Ventura County Coastal Watershed Management Area.

Table 5-5. Water quality priorities in the Ventura County Coastal Watershed Management Area and justification for pollutant groupings.

Category 1 Pollutants (TMDLs)	Category 2/3 Pollutants	Justification for Grouping	Potential Control Measures
Indicator Bacteria (Enterococcus, Fecal Coliform, Total Coliform)	**Category 2** • Indicator Bacteria	Indicator bacteria has a complex fate and transport and is therefore designated its own category. Bacteria can be deposited, inactivated, proliferated, or more in the environment.	The removal of bacteria using structural control measures remains highly variable and unreliable. Therefore, the Group is emphasizing addressing bacteria using source investigations and abatement where possible. Microbial source tracking tools can be employed to track potential sources of human waste, which contain the highest concentration of pathogens and pose the most risk to human health. The minimum control measures detailed in Section VIII of the Permit, including the illicit connections and illicit discharges elimination program, the public agency activities program, the industrial/commercial facilities program, progressive enforcement, and public information and participation program, all remain key tools to control sources prior to entering receiving waters and provide valuable human waste source abatement. Where source control is not possible or investigations are inconclusive, structural control measures (e.g., sanitary sewer diversions, regional capture projects) may be employed to address targeted catchments to achieve load reduction targets.
N/A (*Non-Pollutants*)	**Category 2** • pH • Toxicity **Category 3** • Dissolved Oxygen	N/A (individual grouping)	pH and toxicity are not considered pollutants but can be addressed through the removal or treatment of other pollutant categories.

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Operation & Maintenance Plan for Oak Park Green Streets Urban Retrofit Project

Title:	Oak Park Green Streets Urban Retrofit Project
Date:	April 30, 2021
Proposition 84 Grant:	Agreement No. 14-439-550
Total Project Cost:	$2,061,648

The purpose of this Operation and Maintenance Plan is to document Operations and Maintenance (O&M) procedures for the Oak Park Green Streets Urban Retrofit Project (Project). In accordance with State Water Resources Control Board Grant Agreement No. 14-439-550, executed in August 2014, O&M must be continued to ensure functionality for the useful life of the Project.

Formalized herein are the O&M activities and frequencies for the County of Ventura (County). Phase I construction, consisting of ten (10) Modular Wetland Systems (MWS) was completed in October 2017. Phase II construction, consisting of an additional ten (10) units was completed in January 2021. At a minimum, the County will provide O&M for Phase I until October 2037, and Phase II until January 2041, per the grant requirements.

LOCATION

The Project is located in the County unincorporated urban area of Oak Park, CA (see Exhibit A). The purpose of this Project is to treat all dry weather flows from urbanized areas known to have high concentrations of bacteria in runoff and/or persistent dry weather flows. Phase I has a treatment area of 63 acres and Phase II has a treatment area of 51 acres. O&M will be required for the twenty (20) MWS installed during Phase I and Phase II (see Exhibit B).

MODULAR WETLAND SYSTEMS MAINTENANCE

All MWS will be cleaned a minimum of two times annually, before and after the wet season. A third, optional cleaning in the middle of the dry season may be completed at the discretion of the County, based on precipitation, debris accumulation, or device functionality.

Overview of Maintenance

Each maintenance event will consist of:

- Remove debris from the screening device
- Remove sediment/debris from the pretreatment/separation chamber
- Inspect wetland media
- Clean underdrain manifold if sediment or debris accumulation is present
- If present, trim vegetation and inspect irrigation system (for three (3) of the Phase II MWS)

- Inspect drainage appurtenances and structural integrity, replace interior pipes if deteriorated
- Submit maintenance log and photos to County of Ventura Watershed Protection District

In addition, the following maintenance shall occur as specified:

- Fall, Before Wet Season (once (1) per year): Replace cartridge filter. Pressure wash pervious pavers. Remove pervious paver on top of the drain down line. Insert pressure washer nozzle into the drain down line and thoroughly flush out any debris.
- Spring, End of Wet Season (once (1) per year): Inspect cartridge filter.

The cleanings will be completed with a pressure washer to loosen up collected sediment, break up minor debris, and flush out accumulated organics within catch basin troughs and storm drains leading from troughs to the vaults installed as part of the Project. All collected stormwater, pressure wash water, accumulated sediment, and debris within the MWS will be collected by a vacuum truck and disposed of off-site appropriately. MWS access hatches/manholes will be closed and bolted after cleanings utilizing the manufacturer-provided hex-bolts with an anti-seizing compound. Confined space entry may be required if extreme sediment loading occurs or collected large debris cannot be vacuumed.

Each MWS has filter cartridge(s) and a drain down line beneath pervious pavers installed within the pre-treatment chamber (see Exhibit B for count per MWS). The pervious pavers should be pressure washed and the drain down line should be flushed during each Fall event. Cartridge media will be replaced during the Fall maintenance events. Entry into the approximately four (4) foot deep unit is required.

The Project's primary purpose is to target dry weather flows. Historical irrigation practices in the Oak Park community indicate consistent daily dry weather flows. As such, the O&M frequencies are geared towards optimum functionality during the dry season.

Unless there is excessive precipitation over multiple years or an unforeseen system malfunction occurs, the wetland media in the MWS main biofiltration compartment should not need to be replaced for at least 20 years.

The Inspection Form found in Exhibit C will be used to document each cleaning. For each maintenance event, the Maintenance table in Exhibit C is to be filled out, signed, dated, and submitted to the Ventura County Public Works Agency (VCPWD). Photographs of maintenance items (as noted) are also required to be submitted to the County for every maintenance event.

Key Requirements:

- ✓ Frequency: minimum two (2) times a year (with third cleaning in summer, as needed).
  - Required: Between March 15th and April 15th (End of Wet Season)
  - Required: Between September 15th and November 15th (Before Wet Season)
  - Optional: Between July 15th and August 15th (Mid-point of Dry Season)
- ✓ Utilize a vactor truck to remove sediment, water, trash, and debris.

- ✓ Loosen sediment, break up minor debris, and flush out troughs and storm drains leading from the troughs to the vaults with a pressure washer.
- ✓ Annually replace the pre-treatment cartridge filter and conduct thorough flushing of the pre-treatment chamber drain down line during the "Before Wet Season" event, between September 15th and November 15th.

Required Equipment

The following equipment must be provided by the maintenance crew to maintain the MWS units:

- Vactor truck
- Pressure washer
- Replacement cartridge filter and drain down media – see specifications in Exhibit C.

Access

All MWS are located within the County street right-of-way or easements for which the County has maintenance jurisdiction. Thus, no access permission is required. In the event the County hires a contractor to complete the maintenance activities, an annual County Transportation Department Encroachment Permit will be obtained, accordingly.

Traffic control per the current edition of the Work Area Traffic Control Handbook must be implemented during all MWS maintenance.

Training

O&M designated staff will be given training on implementation of this O&M plan. The training will be provided at least annually due by June 30th in accordance with the Ventura Countywide Municipal Stormwater Permit No. CAS004002 (Order No. R4-2010-0108), or as amended, available at: https://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/ventura.html

County's online annual stormwater pollution prevention trainings are available at: https://www.vcpublicworks.org/wp/waterresourcesdivision/countystormwaterprogram/

Exhibit A

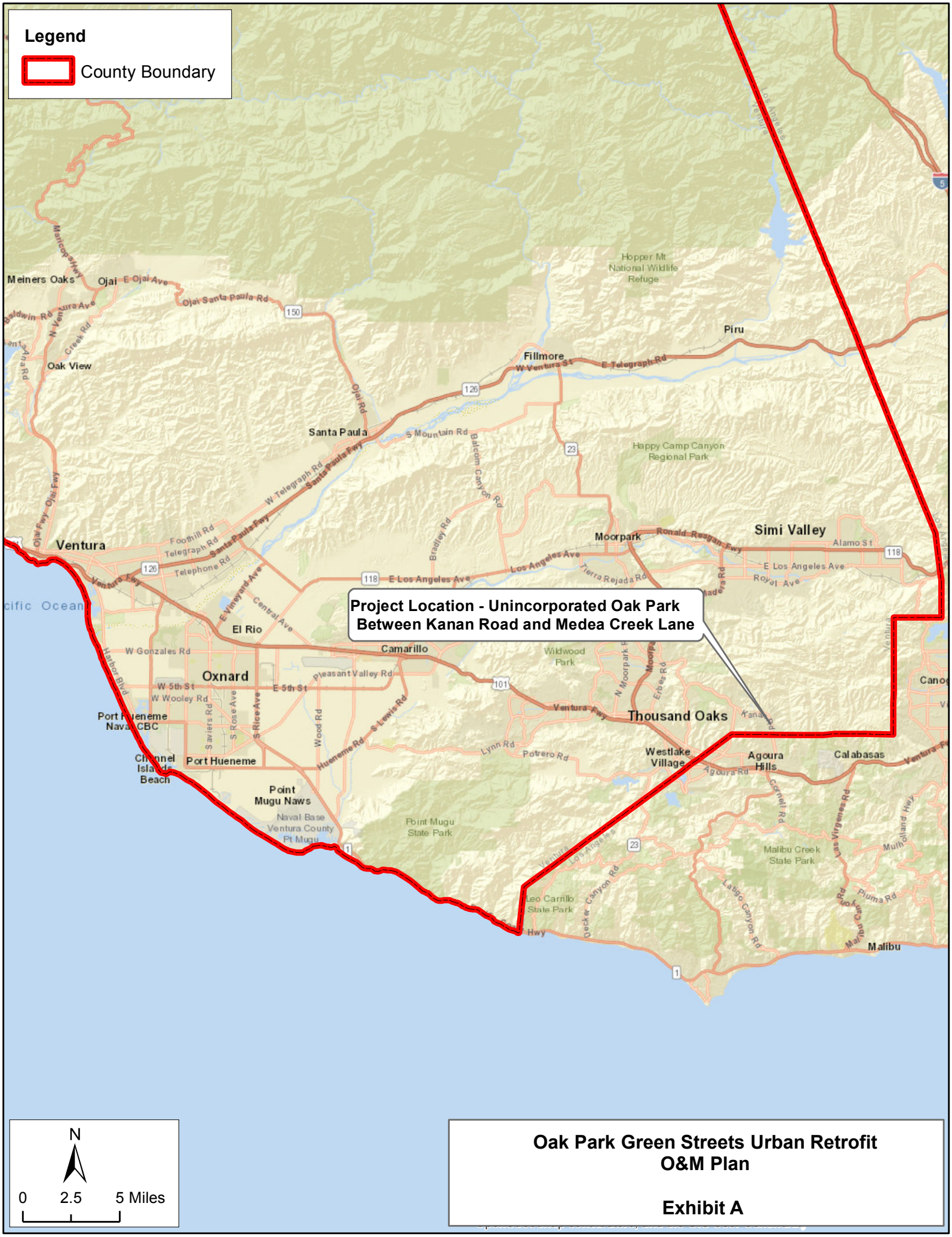
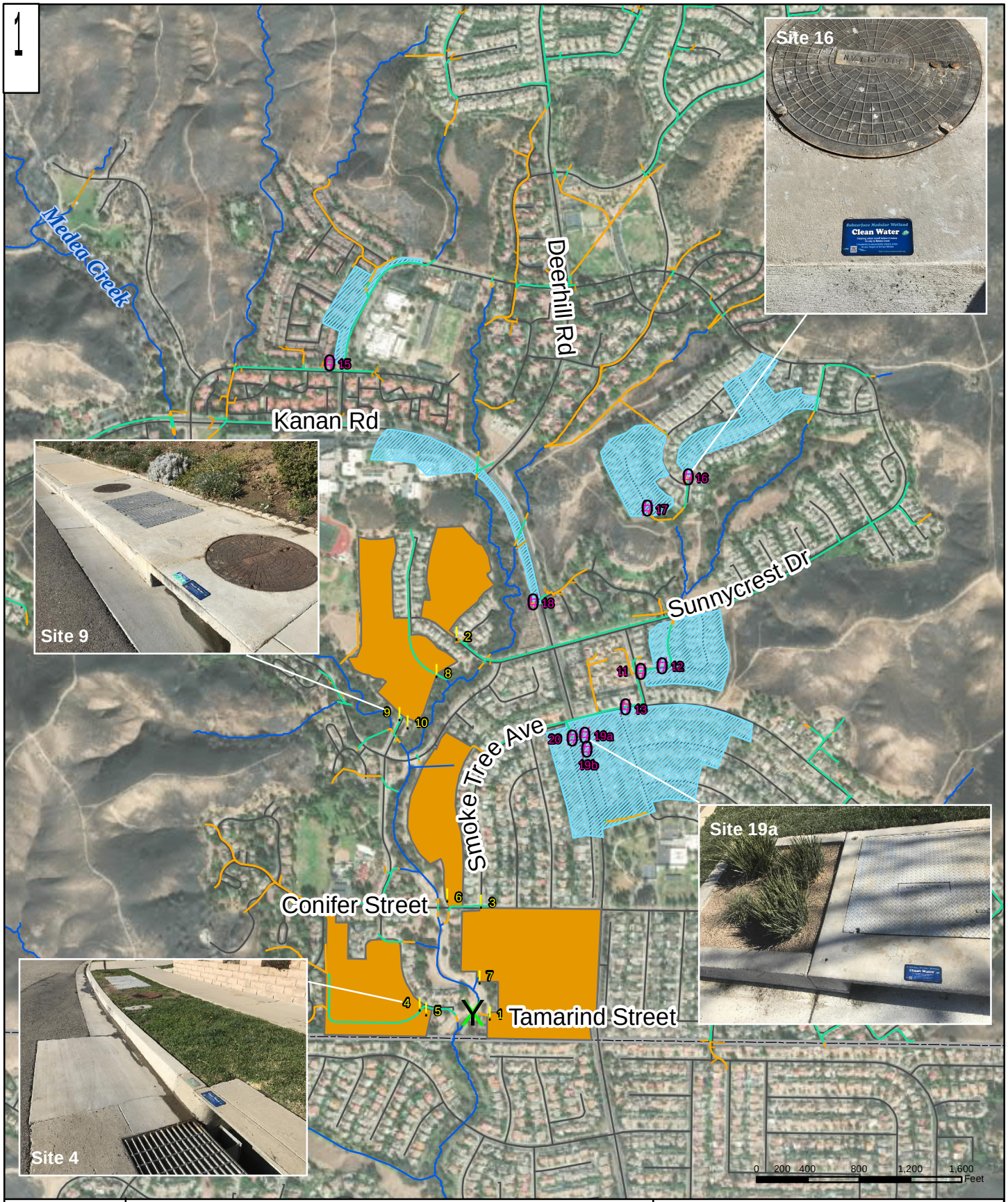

Legend
County Boundary
Project Location - Unincorporated Oak Park
Between Kanan Road and Medea Creek Lane
Meiners Oaks
Ojai
Oak View
Fillmore
Piru
Santa Paula
Ventura
Oxnard
El Rio
Camarillo
Moorpark
Simi Valley
Thousand Oaks
Westlake Village
Agoura Hills
Calabasas
Malibu
Port Hueneme
Channel Islands Beach
Point Mugu Naws
Point Mugu State Park
Leo Carrillo State Park
Malibu Creek State Park
Hopper Mt National Wildlife Refuge
Happy Camp Canyon Regional Park
Wildwood Park
Pacific Ocean
N
0
2.5
5 Miles
Oak Park Green Streets Urban Retrofit
O&M Plan
Exhibit A

Exhibit B



PUBLIC VENTURA COUNTY WORKS

Modular Wetlands:
- Phase I Units 1-10
- Phase II Units 11-13, 15-18, 19A,19B, 20
- Phase I Treatment Area (63 Acres)
- Phase II Treatment Area (51 Acres)

- Monitoring Location MCW-12
- Private Storm Drain
- County Storm Drain
- Roads
- County Line

OAK PARK GREEN STREETS URBAN RETROFIT PHASE I & PHASE II

Medea Creek Tributary to Malibu Creek

Kasraie Consulting, April 2021, JHL, Ventura County/GIS Requests/Projects/MedeaCreek.mxd

SITE 1

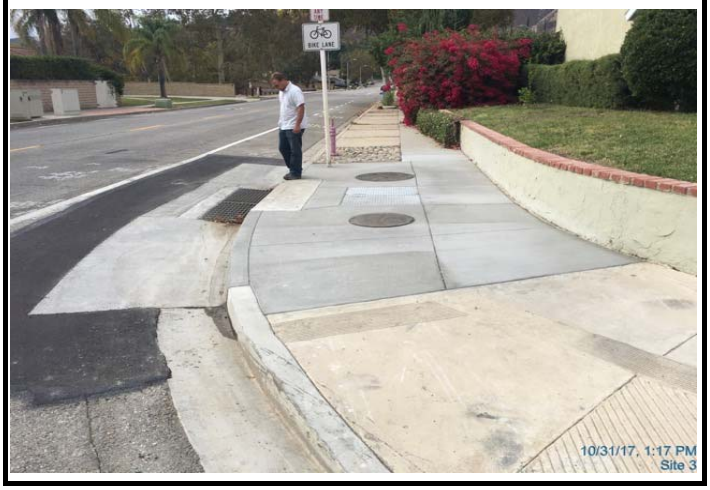
Road =	Tamarind Street Cul-De-Sac
Cross Street =	Locust Avenue
Location =	In Street
Modular Wetland =	MWS-L-8-16-V-UG
Pre-Treat Cartridges =	4
Est. Removal/Cleaning =	13.5 CF
Trough in Catch Basin =	**Yes**
Access = (hex-bolted)	(2) 24"x42" Hatches **(2) 30" ø MH (O&M Main)** (1) 24" ø MH

SITE 2

Road =	Sunnycrest Drive
Cross Street =	Countryside Road
Location =	In Street
Modular Wetland =	MWS-L-4-17-V-UG
Pre-Treat Cartridges =	2
Est. Removal/Cleaning =	5.3 CF
Trough in Catch Basin =	**Yes**
Access = (hex-bolted)	(1) 24"x42" Hatches (1) 30" ø MH **(1) 24" ø MH (O&M Main)**

SITE 3

Road =	Conifer Street
Cross Street =	Smoke Tree Avenue
Location =	In Sidewalk
Modular Wetland =	MWS-L-4-13-V-UG
Pre-Treat Cartridges =	1.5
Est. Removal/Cleaning =	5.3 CF
Trough in Catch Basin =	**Yes**
Access = (hex-bolted)	(1) 30"x48" Hatch **(1) 30" ø MH (O&M Main)** (1) 24" ø MH



SITE 4

Road =	Sunny Vista Avenue (N Side)
Cross Street =	Medea Creek Lane
Location =	In Grass Parkway
Modular Wetland =	MWS-L-4-21-V-UG
Pre-Treat Cartridges =	2
Est. Removal/Cleaning =	5.3 CF
Trough in Catch Basin =	**Yes**
Access = (hex-bolted)	(2) 30"x48" Hatches **(1) 30" ø MH (O&M Main)** (1) 24" ø MH

SITE 5	
Road =	Sunny Vista Avenue (S Side)
Cross Street =	Medea Creek Lane
Location =	In Grass Parkway
Modular Wetland =	MWS-L-4-8-G-UG
Pre-Treat Cartridges =	1
Est. Removal/Cleaning =	3.2 CF
Trough in Catch Basin =	**Yes**
Access = (hex-bolted)	(1) 36"x36" Hatch **(1) 30" ø MH (O&M Main)**

SITE 6	
Road =	Parkview Drive
Cross Street =	Conifer Street
Location =	In Sidewalk w/ Curb Opening
Modular Wetland =	MWS-L-4-8-G-UG
Pre-Treat Cartridges =	1
Est. Removal/Cleaning =	3.2 CF
Trough in Catch Basin =	No
Access = (hex-bolted)	**(1) 36"x36" Hatch (O&M Main)** (1) 30" ø MH

SITE 7	
Road =	Smoke Tree Avenue Cul-De-Sac
Cross Street =	Conifer Street
Location =	In Sidewalk w/ Curb Opening
Modular Wetland =	MWS-L-4-8-G-UG
Pre-Treat Cartridges =	1
Est. Removal/Cleaning =	3.2 CF
Trough in Catch Basin =	No
Access = (hex-bolted)	**(1) 36"x36" Hatch (O&M Main)** (1) 30" ø MH

SITE 8	
Road =	Southridge Drive Cul-De-Sac
Cross Street =	Sunnycrest Drive
Location =	In Street
Modular Wetland =	MWS-L-4-8-G-UG
Pre-Treat Cartridges =	1
Est. Removal/Cleaning =	3.2 CF
Trough in Catch Basin =	**Yes**
Access = (hex-bolted)	**(1) 36"x36" Hatch (O&M Main)** (1) 30" ø MH

SITE 9	
Road =	Medea Creek Lane (W Side)
Cross Street =	Oak Hills Drive
Location =	In Sidewalk w/ Curb Opening
Modular Wetland =	MWS-L-4-13-C-UG
Pre-Treat Cartridges =	1.5
Est. Removal/Cleaning =	5.3 CF
Trough in Catch Basin =	No
Access = (hex-bolted)	(1) 30"x48" Hatch **(1) 30" ø MH (Primary for O&M)** (1) 24" ø MH

SITE 10	
Road =	Medea Creek Lane (E Side)
Cross Street =	Oak Hills Drive
Location =	In Sidewalk w/ Curb Opening
Modular Wetland =	MWS-L-4-15-V-UG
Pre-Treat Cartridges =	2
Est. Removal/Cleaning =	5.3 CF
Trough in Catch Basin =	No
Access = (hex-bolted)	(1) 30"x48" Hatch **(1) 30" ø MH (Primary for O&M)** (1) 24" ø MH

SITE 11	
Road =	Twin Springs Avenue
Cross Street =	Sprucewood Avenue
Location =	In Sidewalk
Modular Wetland =	MWS-L-4-8-C-UG
Pre-Treat Cartridges =	1
Est. Removal/Cleaning =	3.3 CF
Trough in Catch Basin =	**No**
Access = (hex-bolted)	(1) 36"x36" Hatches **(1) 30" ø MH (O&M Main)**

SITE 12	
Road =	Twin Springs Avenue
Cross Street =	Alder Springs Drive
Location =	In Sidewalk
Modular Wetland =	MWS-L-4-8-V-UG
Pre-Treat Cartridges =	1
Est. Removal/Cleaning =	3.3 CF
Trough in Catch Basin =	**Yes**
Access = (hex-bolted)	(1) 36"x36" Hatches **(1) 30" ø MH (O&M Main)**

SITE 13	
Road =	Smoke Tree Avenue
Cross Street =	Satinwood Avenue
Location =	In Street
Modular Wetland =	MWS-L-4-8-V-UG
Pre-Treat Cartridges =	1
Est. Removal/Cleaning =	3.3 CF
Trough in Catch Basin =	**Yes**
Access = (hex-bolted)	(1) 36"x36" Hatches **(1) 30" ø MH (O&M Main)**

SITE 15	
Road =	Hollytree Drive
Cross Street =	Doubletree Road
Location =	In Sidewalk
Modular Wetland =	MWS-L-4-8-V-UG
Pre-Treat Cartridges =	1
Est. Removal/Cleaning =	3.3 CF
Trough in Catch Basin =	**No**
Access = (hex-bolted)	(1) 30"x48" Hatches **(1) 30" ø MH (O&M Main)**

SITE 16	
Road =	Oak Springs Drive
Cross Street =	Oak Forest Drive
Location =	In Sidewalk
Modular Wetland =	MWS-L-4-17-C-UG
Pre-Treat Cartridges =	2
Est. Removal/Cleaning =	5.3 CF
Trough in Catch Basin =	**No**
Access = (hex-bolted)	(1) 30"x48" Hatches **(1) 30" ø MH (O&M Main)** (1) 24" ø MH

SITE 17	
Road =	Oak Point Drive
Cross Street =	Southeasterly Cul-de-sac
Location =	In Street
Modular Wetland =	MWS-L-4-19-V-UG
Pre-Treat Cartridges =	2
Est. Removal/Cleaning =	5.3 CF
Trough in Catch Basin =	**Yes**
Access = (hex-bolted)	(2) 30"x48" Hatches **(1) 30" ø MH (O&M Main)** (1) 24" ø MH

SITE 18	
Road =	Kanan Road
Cross Street =	Cresthill Drive
Location =	In Sidewalk
Modular Wetland =	MWS-L-4-17-C-UG
Pre-Treat Cartridges =	2
Est. Removal/Cleaning =	5.3 CF
Trough in Catch Basin =	**No**
Access = (hex-bolted)	(1) 30"x48" Hatches **(1) 30" ø MH (O&M Main)** (1) 24" ø MH

SITE 19A	
Road =	Kanan Road
Cross Street =	Smoketree Avenue
Location =	In Road Median
Modular Wetland =	MWS-L-4-8-C
Pre-Treat Cartridges =	1
Est. Removal/Cleaning =	3.3 CF
Trough in Catch Basin =	**No**
Access = (hex-bolted)	**(1) 36"x36" Hatches (O&M Main)**

SITE 19B	
Road =	Kanan Road
Cross Street =	Smoketree Avenue
Location =	In Road Median
Modular Wetland =	MWS-L-4-21-C
Pre-Treat Cartridges =	2
Est. Removal/Cleaning =	5.3 CF
Trough in Catch Basin =	**No**
Access = (hex-bolted)	**(1) 30" ø MH (O&M Main)** (1) 24" ø MH

SITE 20	
Road =	Kanan Road (west side)
Cross Street =	Smoketree Avenue
Location =	In Grass Parkway
Modular Wetland =	MWS-L-4-8-V
Pre-Treat Cartridges =	1
Est. Removal/Cleaning =	3.3 CF
Trough in Catch Basin =	**Yes**
Access = (hex-bolted)	**(1) 36"x36" Hatches (O&M Main)**

Modular Wetland System Diagram

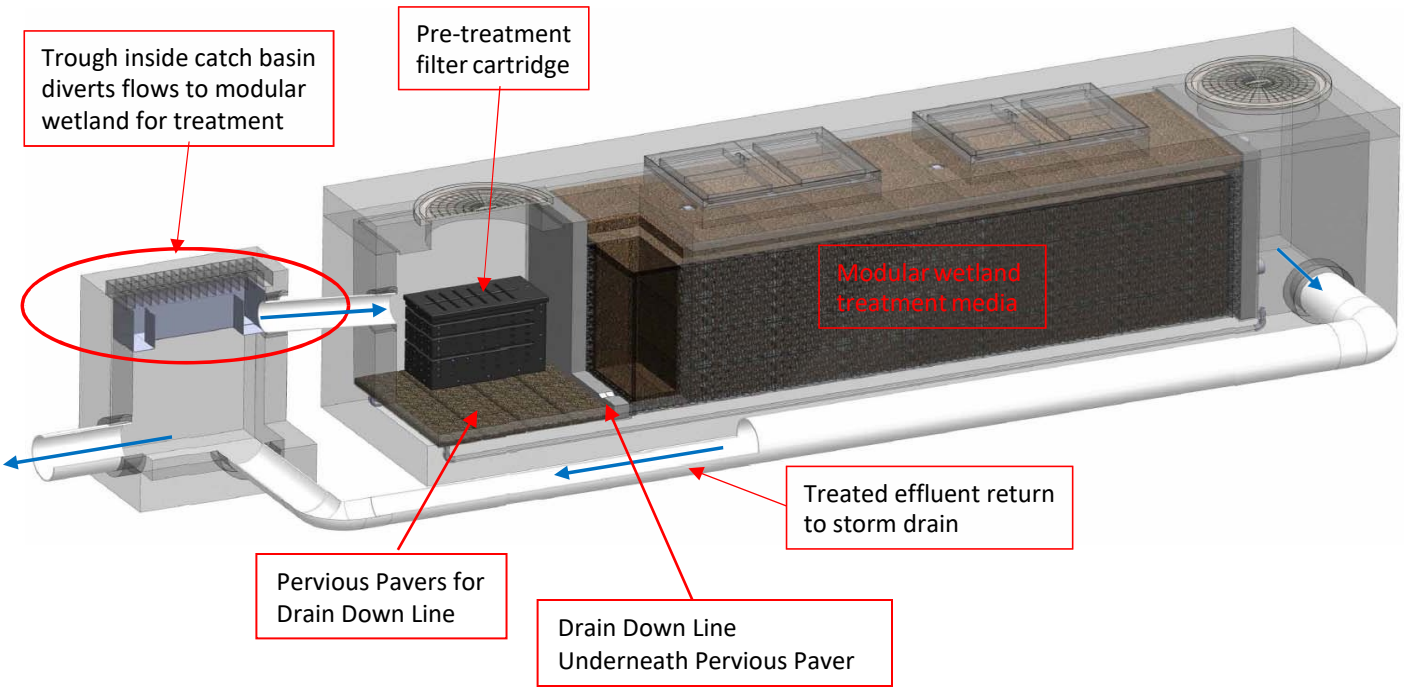


Exhibit C

EXHIBIT C. SPECIFICATIONS

CARTRIDGE FILTER

Media shall consist of 100% zeolite ceramic material produced by expanding and vitrifying select material in a rotary kiln. The media shall meet the following physical specifications:

- Approximate density (kg/dm^3) = 0.05
- Approximate porosity (%) = 98
- Approximate hydraulic conductivity = 0.005 m/s
- Approximate 80% water-holding capacity, 17% air holding capacity
- Sufficient strength to support water, sediment, and debris loads when the media is at maximum flow; with no slippage, breaking, or tearing.
- Stable, non-reactive, non-combustible, biodegradable, sterile.

The manufacturer can address questions about media specifications. The County of Ventura Public Works Department must approve alternative media prior to installation, including any media that varies from these requirements.

BIOFILTRATION CHAMBER MEDIA

Media shall consist of ceramic material produced by expanding and vitrifying select material in a rotary kiln. Media must be produced to meet the requirements of ASTM C330, ASTM C331, and AASHTO M195. Aggregates must have a minimum 24-hour water absorption of 10.5% mass. Media shall not contain any organic material. Flow through media shall be horizontal from the outer perimeter of the chamber toward the centralized and vertically extending underdrain. The retention time in the media shall be at least 3 minutes. Downward flow filters are not acceptable alternatives. The thickness of the media shall be at least 19" from influent end to effluent end. The loading rate on the media shall not exceed 1.1 gallons per minute per square foot surface area. Media must be contained within structure that spaces the surface of the media at least 2" from all vertically extending walls of the concrete structure. The County of Ventura Public Works Department must approve alternative media.

The wetland media shall be carefully loaded into the appropriate vault areas so as not to damage the Wetland Liner or Water Transfer Systems. The entire wetland area shall be filled to a level 9 inches below finished surface.

PLANT SUPPORT MEDIA (PHASE II MWS 19A, 19B, AND 20)

Planting for units with landscaping shall be native, drought tolerant species shown below or alternatives as approved by VCWPD. Plant support media shall be made of 3" thick moisture retention cell that is inert and contains no chemicals or fertilizers, is not made of organic material and has an internal void percentage of 80%. The County of Ventura Public Works Department must approve alternative media.

Where units with landscaping are specified, the planting layer shall be installed per the manufacturer's specifications and consist of a minimum 3" grow enhancement media that ensures greater than 95% plant survival rate, and 6" of wetland media. Planting shall be drip irrigated for at least the first 3 months to ensure long term plant growth. No chemical

herbicides, pesticides, or fertilizers shall be used in the planting or care and maintenance of the planted area.

Planting shall consist of the following.

MWS site:

- 19A:
    - 1-5 gal Muhlenbergia Rigens
    - 3-5 gal Dianella 'Little Rev'
- 19B:
    - 2-5 gal Muhlenbergia Rigens
    - 9-5 gal Dianella 'Little Rev'
- 20:
    - 1-5 gal Muhlenbergia Rigens
    - 3-5 gal Dianella 'Little Rev'

PLANT MAINTENANCE

Shrub Maintenance
Trimming, selective pruning, thinning and training of ornamental plants shall be performed as needed or required to maintain a pleasing appearance. At no time shall shrub growth be permitted to grow uncontrolled or to restrict pedestrian or vehicular passage along sidewalks, driveways, road and roadsides. At no time shall dead and declining flower stalks be left on plant material.

Weed Control
Areas shall be kept in "weed-free" appearance. Weeds shall be removed by hand. At no time shall weeds be allowed to become established.

Irrigation Maintenance
Visually and hydraulically inspect the irrigation system to ensure that no sprinkler breakage has occurred, no foreign matter is clogging the sprinkler heads, and that sprinkler coverage and arc of sprays is proper.

TO BE COMPLETED AND RETURNED TO VCWPD AFTER EACH INSPECTION
PROJECT CONTACT: EWELINA MUTKOWSKA PHONE: 805-645-1382

EXHIBIT C. OAK PARK MWS MAINTENANCE CHECKLIST

Inspector name:_____ Inspection date:_____

MWS Type (Curb, Grate, UG Vault):_____ MWS Number (1-20):_____

MWS model #/size:_____ Lat/Long:_____

Storm event in last 72hrs? _____ Current weather?_____

Inspection type (circle one): Routine Follow Up Complaint Storm

Additional Notes_____

MAINTENANCE ITEM

	Drainage structures (Spring, Summer, Fall)	**Completed? (Y/N)**	**Comments**
1.	Prior to maintenance, **photograph** MWS from street.		
2.	Check for damage to pretreatment or discharge chamber manholes, media hatch, inlet, surrounding concrete.		
3.	Can manholes or hatch be opened using normal lifting pressure?		
4.	Check for damage or clogging in inlet, outlet, or down drain pipes.		
	Pretreatment/Separation chamber (Spring, Summer, Fall)		
1.	Remove manhole over pretreatment chamber.		
2.	Screen device (if present): Remove trash, sediment, and debris by hand or vactor truck.		Debris quantity (circle one) 25% 50% 75% 100% full
3.	Remove and inspect screen device (if present).		
4.	**Photograph** pretreatment chamber.		
5.	Evidence of standing water?		
6.	Evidence of grease, oil, other auto fluids?		
7.	Note quantity of sediment/debris.		Debris quantity (circle one) 25% 50% 75% 100% full
8.	Pipes to media chamber clogged?		
9.	Use pressure washer to spray down the walls and outside of cartridge filters.		
10.	Vacuum out accumulated sediment and debris from chamber.		
11.	**Photograph** cleaned pretreatment chamber.		
12.	Inspect or replace cartridge media per instructions below.		
	Cartridge Filter Media Inspection (Spring)		
1.	Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.		
2.	Enter separation chamber.		
3.	Unscrew the two bolts holding the lid on each cartridge filter and remove lid.		
4.	**Photograph** cartridge media. Conduct replacement only if necessary.		
5.	Replace the cartridge filter lid and tighten down bolts. Replace screening device, grate or manhole cover.		
	Cartridge Filter Media Replacement (Fall)		
1.	Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.		
2.	Enter separation chamber.		
3.	Unscrew the two bolts holding the lid on each cartridge filter and remove lid.		
4.	**Photograph** cartridge media.		
5.	Remove each of 4 to 8 media cages holding the media in place.		
6.	Spray down the cartridge filter to remove any accumulated pollutants.		
7.	Vacuum out old media and accumulated pollutants.		
8.	Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase. Ventura County must approve alternate media.		
9.	**Photograph** media cartridge with new media.		
10.	Replace the cartridge filter lid and tighten down bolts. Replace screening device, grate or manhole cover.		

TO BE COMPLETED AND RETURNED TO VCWPD AFTER EACH INSPECTION
PROJECT CONTACT: EWELINA MUTKOWSKA PHONE: 805-645-1382

EXHIBIT C. OAK PARK MWS MAINTENANCE CHECKLIST

Inspector name:_____ Inspection date:_____

MWS Type (Curb, Grate, UG Vault):_____ MWS Number (1-20):_____

MWS model #/size:_____ Lat/Long:_____

Storm event in last 72hrs? _____ Current weather?_____

Inspection type (circle one): Routine Follow Up Complaint Storm

Additional Notes_____

MAINTENANCE ITEM

Wetland Media **Units with no vegetation (Spring, Summer, Fall)**			
1.	Remove hatch over wetland media.		
2.	Inspect surface of media for sediment, trash and debris.		Debris quantity (circle one) 25% 50% 75% 100% full
3.	If trash, debris, or sediment, **photograph** then remove by hand.		
4.	Note distance from cover to top of wetland media. If media is more than 2" below the cover, replace media per Exhibit C "Plant Support and Wetland Media."		Distance top of chamber down to media: _____
5.	Bad odor? Media discoloration?		
6.	Visually check vertical underdrains for clogging. If yes, **photograph** and clean by photograph and clean underdrain with industry standard means and methods. Do not disturb wetland media.		
7.	**If maintenance indicator such as bad odor or discoloration, photograph and notify County of Ventura.**		
Wetland Media **Units with vegetation (Spring, Summer, Fall)**			
1.	**Photograph** MWS vegetation and media.		
2.	Inspect surface of media for sediment, trash, debris, erosion.		Debris quantity (circle one) 25% 50% 75% 100% full
3.	If trash, debris, or sediment, remove by hand.		
4.	Note distance from cover to top of wetland media. If media is more than 2" below the cover, replace media per Exhibit C "Plant Support and Wetland Media," taking care not to harm vegetation.		Depth of plant media:_____ Depth of wetland media:_____
5.	Trim vegetation to as noted on landscape plans. Remove non-native weeds.		
6.	Check irrigation system: damage? Clogged?		
7.	Note plant health: good/fair/poor		Plant health: good/fair/poor
8.	Bad odor?		
9.	Visually check vertical underdrains for clogging. If yes, **photograph** and clean by photograph and clean underdrain with industry standard means and methods. Do not disturb wetland media.		
10.	**If maintenance needed for media, photograph and notify County of Ventura.**		
Discharge chamber (Spring, Summer, Fall)			
1.	Remove discharge chamber hatch or manhole cover and **photograph** chamber.		
2.	Inspect chamber, riser, drain down pipe, and outlet for sediment/debris. Note debris quantity.		Debris quantity (circle one) 25% 50% 75% 100% full
3.	**Spring and Fall only**: Enter chamber. Unlock and lift drain down filter housing and remove old media block. Inspect media block and replace if needed. Replacement is expected once per year in Fall. Lower drain down filter housing and lock into place. Exit chamber.		Replaced media? Y / N
4.	Remove trash, sediment, and debris by hand or vactor truck.		
5.	**Photograph** clean chamber.		
6.	Replace hatch or manhole cover.		

Composition of removals:

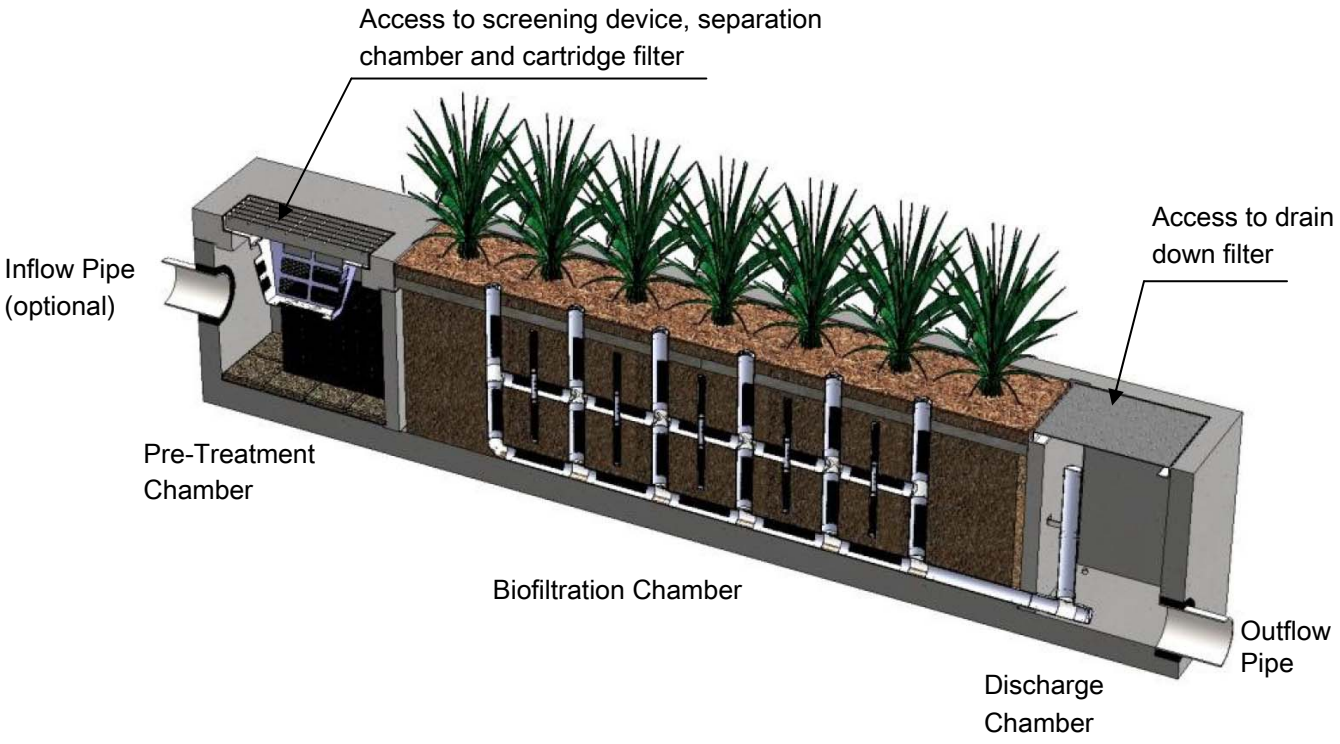
	Trash/Debris	Foliage	Sediment	Total Removals (lbs)
Example:	75%	10%	15%	

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Chamber.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.

Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.

Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.

Inspection Form

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Maintenance Report

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com