

## LOS OSOS GROUNDWATER BASIN, BASIN MANAGEMENT COMMITTEE

### NOTICE OF MEETING

**NOTICE IS HEREBY GIVEN** that the Los Osos Groundwater Basin, Basin Management Committee Board of Directors will hold a **Regular Board Meeting at 1:30 P.M. on Wednesday, March 20, 2024** at the **Los Osos Community Services District Boardroom**, located at 2122 9th Street, Suite 106, Los Osos, CA 93402. Members of the public may participate in this meeting in person or via teleconference and/or electronically.

For quick access, go to <https://us04web.zoom.us/j/778762508>

(This link will help connect both your browser and telephone to the call)

**If not using a computer**, dial 1 (669) 900-6833 or 1 (346) 248-779 and enter **778 762 508**

All persons desiring to speak during any Public Comment can submit a comment by:

- Email at danheimel@ConfluenceES.com by 5:00 PM on the day prior to the Committee meeting.
- Teleconference by phone at 1 (669) 900-6833 and enter **778 762 508**
- Teleconference by phone at 1 (346) 248-7799 and enter **778 762 508**
- Teleconference meeting at <https://us04web.zoom.us/j/778762508>
- Mail by 5:00 PM on the day prior to the Committee meeting to:

Attn: Dan HeimeI (Basin Management Committee)  
2122 9th St.  
Suite 110  
Los Osos, CA 93402

*Directors: Agenda items are numbered for identification purposes only and may not necessarily be considered in numerical order.*

*NOTE: The Basin Management Committee reserves the right to limit each speaker to three (3) minutes per subject or topic. In compliance with the Americans with Disabilities Act, all possible accommodations will be made for individuals with disabilities, so they may participate in the meeting. Persons who require accommodation for any audio, visual or other disability in order to participate in the meeting of the BMC are encouraged to request such accommodation 48 hours in advance of the meeting from Dan HeimeI at danheimel@ConfluenceES.com.*

### BASIN MANAGEMENT COMMITTEE BOARD OF DIRECTORS AGENDA

1. **CALL TO ORDER**
2. **ROLL CALL**
3. **PLEDGE OF ALLEGIANCE**
4. **BOARD MEMBER COMMENTS**

Board members may make brief comments, provide project status updates, or communicate with other directors, staff, or the public regarding non-agenda topics.

**5. SPECIAL PRESENTATION**

No Special Presentation.

**6. CONSENT AGENDA**

The following routine items listed below are scheduled for consideration as a group. Each item is recommended for approval unless noted and may be approved in their entirety by one motion. Any member of the public who wishes to comment on any Consent Agenda item may do so at this time. Consent items generally require no discussion. However, any Director may request that any item be withdrawn from the Consent Agenda and moved to the "Action Items" portion of the Agenda to permit discussion or to change the recommended course of action. The Board may approve the remainder of the Consent Agenda on one motion.

- a. **2023 and 2024 Budget Update and Invoice Register**
- b. **Approval of Minutes from January 17<sup>th</sup>, 2024 BMC Meeting**

**7. PUBLIC COMMENTS ON ITEMS NOT APPEARING ON THE AGENDA**

The Basin Management Committee will consider public comments on items not appearing on the agenda and within the subject matter jurisdiction of the Basin Management Committee. The Basin Management Committee cannot enter into a detailed discussion or take any action on any items presented during public comments at this time. Such items may only be referred to the Executive Director or other staff for administrative action or scheduled on a subsequent agenda for discussion. Persons wishing to speak on specific agenda items should do so at the time specified for those items. The presiding Chair shall limit public comments to three minutes.

**8. EXECUTIVE DIRECTOR'S REPORT**

**9. ACTION ITEMS**

- a. **Los Osos Basin Agriculture Water Demand Estimate Methodology Comparison Technical Memorandum**

Recommendation: Receive a Technical Memorandum from Cleath-Harris Geologists on an evaluation of two different Agriculture Water Demand Estimate Methodologies for the Los Osos Groundwater Basin and provide direction to staff.

**10. ADJOURNMENT**

**TO:** Los Osos Basin Management Committee

**FROM:** Daniel Heimel, Executive Director

**DATE:** March 20, 2024

**SUBJECT:** Item 6 – Approval of Budget Update/Invoice Register and Meeting Minutes

## Recommendations

Staff recommends that the BMC review and consider approval of Budget/Invoice Register and Meeting Minutes or provide alternate direction to Staff.

## Discussion

BMC Staff has prepared a summary of costs incurred as compared to the adopted budget and a running invoice register and Meeting Minutes from previous BMC Meetings (see Attachments).



**Attachment 2: Invoice Register for Los Osos BMC for Calendar Year 2023**

Vendor	Invoice No.	Amount	Month of Service	Description	Budget Item	Date Executive Director Approved	Date BMC Chairperson Approved	Date BMC Approved
CHG	20221205	\$2,342.00	Dec-22	Annual Report Preparations	6	Jan-23		
CHG	20230104	\$11,508.60	Jan-23	Annual Report Preparations	6	Feb-23		
CHG	20230105	\$1,005.00	Jan-23	Technical Support: AEM Survey	4			Feb-23
ConfluenceES	1073	\$5,197.50	Jan-23	BMC Executive Director Services	1		Feb-23	
AGP	6252	\$200.00	Feb-23	Meeting expenses: Audio and video services	3	Mar-23		
CHG	20230206	\$12,688.00	Feb-23	Annual Report Preparations	6	Mar-23		
CHG	20230207	\$6,511.00	Feb-23	Los Osos Creek Flow Measurements	9	Mar-23		
ConfluenceES	1083	\$6,525.00	Feb-23	BMC Executive Director Services	1		Mar-23	
CHG	20230307	\$22,153.50	Mar-23	Annual Report Preparations	6	Apr-23		
CHG	20230308	\$8,001.50	Mar-23	Los Osos Creek Flow Measurements	9	Apr-23		
CHG	20230309	\$2,422.00	Mar-23	Technical Support: Skyline Monitoring Well	4			May-23
CHG	20230310	\$2,437.50	Mar-23	Groundwater Monitoring	5	Apr-23		
ConfluenceES	1085	\$7,331.25	Mar-23	BMC Executive Director Services	1		Apr-23	
CHG	20230405	\$7,027.50	Apr-23	Annual Report Preparations	6	May-23		
CHG	20230406	\$1,120.00	Apr-23	Technical Support: Skyline Monitoring Well	4			May-23
CHG	20230407	\$500.00	Apr-23	Los Osos Creek Flow Measurements	9	May-23		
CHG	20230408	\$20,348.80	Apr-23	Groundwater Monitoring	5	May-23		
ConfluenceES	1095	\$7,606.25	Apr-23	BMC Executive Director Services	1		May-23	
CHG	20230504	\$320.00	May-23	Technical Support: Skyline Monitoring Well	4			Jun-23
CHG	20230505	\$1,937.50	May-23	Los Osos Creek Flow Measurements	9	Jun-23		
CHG	20230506	\$3,421.20	May-23	Groundwater Monitoring	5	Jun-23		
ConfluenceES	1100	\$7,670.00	May-23	BMC Executive Director Services	1		Jun-23	
CHG	20230605	\$259.50	Jun-23	Annual Report Preparations	6	Jul-23		
CHG	20230606	\$480.00	Jun-23	Technical Support: Water Offset Study	4			Aug-23
ConfluenceES	1108	\$6,386.25	Jun-23	BMC Executive Director Services	1		Jul-23	
CHG	20230620	\$6,450.00	Jun-23	New "Skyline" Monitoring Well	8	Aug-23		
CHG	20230723	\$1,288.00	Jul-23	New "Skyline" Monitoring Well	8	Aug-23		
AGP	\$9,236.00	\$1,000.00	Aug-23	Meeting expenses: Audio and video services	3	Sep-23		
ConfluenceES	1111	\$1,825.00	Jul-23	BMC Executive Director Services	1		Aug-23	
CHG	20230838	\$2,788.50	Jun-23	Annual Report Preparations	6	Sep-23		
ConfluenceES	1118	\$6,755.00	Aug-23	BMC Executive Director Services	1		Sep-23	
RWG	244283	\$140.00	Aug-23	BMC Legal Counsel	2	Oct-23		
CHG	20230908	\$6,246.00	Sep-23	Los Osos Creek Flow Measurements	9			Dec-23
CHG	20230909	\$3,480.00	Sep-23	Groundwater Monitoring	5	Oct-23		

RWG	244677	\$175.00	Sep-23	BMC Legal Counsel	2	Oct-23		
ConfluenceES	1126	\$3,391.25	Sep-23	BMC Executive Director Services	1		Oct-23	
CHG	20231005	\$15,537.46	Oct-23	Groundwater Monitoring	5	Nov-23		
RWG	244677	\$630.00	Oct-23	BMC Legal Counsel	2	Dec		
ConfluenceES	1131	\$8,770.00	Oct-23	BMC Executive Director Services	1		Dec-23	
CHG	20231104	\$3,251.50	Nov-23	Groundwater Monitoring	5	Dec-23		
ConfluenceES	1134	\$5,051.25	Nov-23	BMC Executive Director Services	1		Dec-23	
GSI	02136.00-1	\$4,600.00	Nov-23	WRFPP Study Peer Review - Year 1	7	Dec-23		
RWG	245636	\$210.00	Nov-23	BMC Legal Counsel	2	Dec-23		
CHG	20231116	\$2,311.70	Nov-23	New "Skyline" Monitoring Well	8	Jan-24		
F&T	37702	\$79,191.00	Dec-23	New "Skyline" Monitoring Well	8	Jan-24		
CHG	20231211	\$12,446.90	Dec-23	New "Skyline" Monitoring Well	8	Jan-24		
ConfluenceES	1137	\$5,521.25	Dec-23	BMC Executive Director Services	1			Jan-24
RWG	245879	\$525.00	Dec-23	BMC Legal Counsel	2	Jan-24		
AGP	9373	\$400.00	Dec-23	Meeting expenses: Audio and video services	3	Jan-24		
CHG	20240114	\$4,922.30	Dec-23	New "Skyline" Monitoring Well	8	Feb-24		
	<b>2023 Total</b>	<b>\$322,306.96</b>						<b>To be approved</b>

**Los Osos Basin Management Committee**

Balance Sheet  
As of 2/29/2024

		Current Period Balance
<b>Assets</b>		
Current Assets		
Cash & Cash Equivalents		
General Checking Account	1012	213,794.51
Total Cash & Cash Equivalents		213,794.51
Total Current Assets		213,794.51
Total Assets		213,794.51
<b>Liabilities</b>		
Short-term Liabilities		
Accounts Payable		
Vendor Payable (Control Account)	2000	23,486.25
Total Accounts Payable		23,486.25
Total Short-term Liabilities		23,486.25
Total Liabilities		23,486.25
<b>Net Assets</b>		
Current YTD Net Income		
		215,842.50
Total Current YTD Net Income		215,842.50
Total Net Assets		215,842.50
<b>Total Liabilities and Net Assets</b>		<b>239,328.75</b>

**Los Osos Basin Management Committee**

Check/Voucher Register - Warrant Register

1012 - General Checking Account

From 1/1/2024 Through 12/31/2024

<u>Check Number</u>	<u>Vendor Name</u>	<u>Transaction Description</u>	<u>Document Date</u>	<u>Check Amount</u>
0001	CONFLUENCE ENGINEERING SOLUTIONS, INC.	1/1/24-1/31/24 Executive Director Services	3/4/2024	9,436.25
0002	CLEATH-HARRIS GEOLOGISTS, INC.	1/1/24-1/31/24 2023 Annual Report	3/4/2024	10,490.00
	CLEATH-HARRIS GEOLOGISTS, INC.	12/1/23-12/31/23 2023 Annual Report	3/4/2024	2,335.00
0003	Robert Stilts, CPA	12/1/23-1/31/24 Accounting services	3/4/2024	1,225.00
ACH_Delux2.21.24	DELUXE	2/17/24 Deluxe Checks and Envelopes	2/21/2024	357.99
ACH_Strmlne2.16.24	STREAMLINE SOFTWARE, INC.	2/16/24 Streamline Website Hosting & Migration Fee	2/16/2024	1,690.00
Report Total				<u>25,534.24</u>



**Los Osos Basin Management Committee**

Statement of Revenues and Expenditures

100 - BMC

From 12/1/2023 Through 12/31/2023

	Current Period Actual	Current Year Actual	Total Budget \$ - Original	Total Budget \$ Variance - Original	Percent Total Budget Remaining - Original
	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>
Operating Revenue					
Contributions					
4010	0.00	0.00	134,459.00	(134,459.00)	(100.00)%
4020	0.00	0.00	134,459.00	(134,459.00)	(100.00)%
4030	0.00	0.00	70,768.00	(70,768.00)	(100.00)%
4040	0.00	0.00	14,154.00	(14,154.00)	(100.00)%
	<u>0.00</u>	<u>0.00</u>	<u>353,840.00</u>	<u>(353,840.00)</u>	<u>(100.00)%</u>
Total Contributions					
Total Operating Revenue	<u>0.00</u>	<u>0.00</u>	<u>353,840.00</u>	<u>(353,840.00)</u>	<u>(100.00)%</u>
Total Revenue	<u>0.00</u>	<u>0.00</u>	<u>353,840.00</u>	<u>(353,840.00)</u>	<u>(100.00)%</u>
Expenditures					
Program Expenses					
5010	0.00	0.00	75,000.00	75,000.00	100.00%
5020	0.00	0.00	1,690.00	1,690.00	100.00%
5030	875.00	875.00	6,300.00	5,425.00	86.11%
5040	0.00	0.00	20,000.00	20,000.00	100.00%
5050	0.00	0.00	2,000.00	2,000.00	100.00%
5060	0.00	0.00	15,000.00	15,000.00	100.00%
5070	0.00	0.00	64,000.00	64,000.00	100.00%
5080	2,335.00	2,335.00	68,000.00	65,665.00	96.57%
5090	0.00	0.00	15,000.00	15,000.00	100.00%
6000	0.00	0.00	70,000.00	70,000.00	100.00%
Improvements					
Total Program Expenses	<u>3,210.00</u>	<u>3,210.00</u>	<u>336,990.00</u>	<u>333,780.00</u>	<u>99.05%</u>
Total Expenditures	<u>3,210.00</u>	<u>3,210.00</u>	<u>336,990.00</u>	<u>333,780.00</u>	<u>99.05%</u>
Net Revenue Over Expenditures	<u>(3,210.00)</u>	<u>(3,210.00)</u>	<u>16,850.00</u>	<u>(20,060.00)</u>	<u>(119.05)%</u>

**Los Osos Basin Management Committee**

Statement of Revenues and Expenditures

100 - BMC

From 1/1/2024 Through 1/31/2024

	Current Period Actual	Current Year Actual	Total Budget \$ - Original	Total Budget \$ Variance - Original	Percent Total Budget Remaining - Original
	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>	
Operating Revenue					
Contributions					
4010	0.00	0.00	134,459.00	(134,459.00)	(100.00)%
4020	0.00	0.00	134,459.00	(134,459.00)	(100.00)%
4030	0.00	0.00	70,768.00	(70,768.00)	(100.00)%
4040	0.00	0.00	14,154.00	(14,154.00)	(100.00)%
	<u>0.00</u>	<u>0.00</u>	<u>353,840.00</u>	<u>(353,840.00)</u>	<u>(100.00)%</u>
Total Contributions					
Total Operating Revenue	<u>0.00</u>	<u>0.00</u>	<u>353,840.00</u>	<u>(353,840.00)</u>	<u>(100.00)%</u>
Total Revenue	<u>0.00</u>	<u>0.00</u>	<u>353,840.00</u>	<u>(353,840.00)</u>	<u>(100.00)%</u>
Expenditures					
Program Expenses					
5010	9,436.25	9,436.25	75,000.00	65,563.75	87.42%
5020	0.00	0.00	1,690.00	1,690.00	100.00%
5030	350.00	350.00	6,300.00	5,950.00	94.44%
5040	0.00	0.00	20,000.00	20,000.00	100.00%
5050	0.00	0.00	2,000.00	2,000.00	100.00%
5060	0.00	0.00	15,000.00	15,000.00	100.00%
5070	0.00	0.00	64,000.00	64,000.00	100.00%
5080	10,490.00	10,490.00	68,000.00	57,510.00	84.57%
5090	0.00	0.00	15,000.00	15,000.00	100.00%
6000	0.00	0.00	70,000.00	70,000.00	100.00%
Improvements					
Total Program Expenses	<u>20,276.25</u>	<u>20,276.25</u>	<u>336,990.00</u>	<u>316,713.75</u>	<u>93.98%</u>
Total Expenditures	<u>20,276.25</u>	<u>20,276.25</u>	<u>336,990.00</u>	<u>316,713.75</u>	<u>93.98%</u>
Net Revenue Over Expenditures	<u>(20,276.25)</u>	<u>(20,276.25)</u>	<u>16,850.00</u>	<u>(37,126.25)</u>	<u>(220.33)%</u>

**Los Osos Basin Management Committee**

Statement of Revenues and Expenditures

100 - BMC

From 2/1/2024 Through 2/29/2024

	Current Period Actual	Current Year Actual	Total Budget \$ - Original	Total Budget \$ Variance - Original	Percent Total Budget Remaining - Original
	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	
Operating Revenue					
Contributions					
4010	67,229.50	67,229.50	134,459.00	(67,229.50)	(50.00)%
4020	134,459.00	134,459.00	134,459.00	0.00	0.00%
4030	0.00	0.00	70,768.00	(70,768.00)	(100.00)%
4040	14,154.00	14,154.00	14,154.00	0.00	0.00%
	<u>215,842.50</u>	<u>215,842.50</u>	<u>353,840.00</u>	<u>(137,997.50)</u>	<u>(39.00)%</u>
	<u>215,842.50</u>	<u>215,842.50</u>	<u>353,840.00</u>	<u>(137,997.50)</u>	<u>(39.00)%</u>
Total Revenue	<u>215,842.50</u>	<u>215,842.50</u>	<u>353,840.00</u>	<u>(137,997.50)</u>	<u>(39.00)%</u>
Expenditures					
Program Expenses					
5010	0.00	9,436.25	75,000.00	65,563.75	87.42%
5020	1,690.00	1,690.00	1,690.00	0.00	0.00%
5030	357.99	707.99	6,300.00	5,592.01	88.76%
5040	0.00	0.00	20,000.00	20,000.00	100.00%
5050	0.00	0.00	2,000.00	2,000.00	100.00%
5060	0.00	0.00	15,000.00	15,000.00	100.00%
5070	0.00	0.00	64,000.00	64,000.00	100.00%
5080	0.00	10,490.00	68,000.00	57,510.00	84.57%
5090	0.00	0.00	15,000.00	15,000.00	100.00%
6000	0.00	0.00	70,000.00	70,000.00	100.00%
	<u>2,047.99</u>	<u>22,324.24</u>	<u>336,990.00</u>	<u>314,665.76</u>	<u>93.38%</u>
Total Program Expenses	<u>2,047.99</u>	<u>22,324.24</u>	<u>336,990.00</u>	<u>314,665.76</u>	<u>93.38%</u>
Total Expenditures	<u>2,047.99</u>	<u>22,324.24</u>	<u>336,990.00</u>	<u>314,665.76</u>	<u>93.38%</u>
Net Revenue Over Expenditures	<u>213,794.51</u>	<u>193,518.26</u>	<u>16,850.00</u>	<u>176,668.26</u>	<u>1,048.48%</u>

**BASIN MANAGEMENT COMMITTEE BOARD OF DIRECTORS**

**Agenda Item 6b: Minutes of the Meeting of January 17, 2024**

The following is a summary of the actions taken at the Basin Management Committee Board of Directors Meeting.  
The official record for the meeting is the recording that can be found at:

<https://www.losososbmc.org/board-meetings>

Agenda Item	Discussion or Action
<b>1. Call to Order</b>	Chair Zimmer called the meeting to order at approximately 1:30 PM (00:00:00).
<b>2. Roll Call</b>	Daniel Heimel, Executive Director, called roll to begin the meeting. Director Cesena, Director Zimmer, and Director Reineke were present. Director Gibson was absent (00:00:30).
<b>3. Pledge of Allegiance</b>	(00:01:30)
<b>4. Board Member Comments</b>	<b><u>Board Discussion</u></b> (00:02:00)  <b><u>Public Comment</u></b> None.
<b>5. Special Presentation</b> None.	None.
<b>6. Consent Agenda</b>  <b>6a. Approval of Minutes from December 6th, 2023 Special BMC Meeting</b>	<b><u>Board Discussion</u></b> (00:06:30)  <b><u>Public Comment</u></b> None.  <b><u>Board Action on Consent Agenda</u></b> (00:07:45) Approval of Minutes from December 6th, 2023 Special BMC Meeting. <b>Motion:</b> Director Cesena <b>Second:</b> Director Reineke <b>Ayes:</b> Director Cesena, Director Reineke <b>Nays:</b> None <b>Abstain:</b> Director Zimmer
<b>7. Public Comments on Items Not Appearing on the Agenda</b>	<b><u>Public Comment</u></b> Written statement - Andrea Peck (00:08:40) Deborah Howe (00:09:50) Jeff Edwards (00:10:30) Linde Owen (00:12:00) Becky McFarland (00:14:30)  <b><u>Board Discussion</u></b> (00:16:15)
<b>8. Executive Director's Report</b>  <b>8a. Joint Purveyor Title 19 Amendment Comment Letter</b>	<b><u>Board Discussion</u></b> (00:27:00)  <b><u>Public Comment</u></b> Deborah Howe (00:43:30) Jeff Edwards (00:44:00) Linde Owen (00:46:15)

<p><b>8b. BMC Website Notification</b></p> <p><b>8c. Future/Historic BMC Initiatives Review</b></p>	<p>Becky McFarland (00:48:15)</p> <p><b><u>Board Discussion</u></b> (00:50:15)</p>
<p><b>9. Action Items</b></p>	
<p><b>9a. Appointment of BMC Officers for Calendar Year 2024</b></p>	<p><b>Recommendation:</b> For the BMC to review the existing officer positions and appoint officers for CY 2024 or provide alternative direction to staff.</p> <p><b><u>Board Discussion</u></b> (01:02:00)</p> <p><b><u>Public Comment</u></b> Becky McFarland (01:04:30)</p> <p><b><u>Board Action for 9a</u></b> (01:05:15) BMC reviewed the existing officer positions and appointed the same officers for CY 2024. <b>Motion:</b> Director Cesena <b>Second:</b> Director Reineke <b>Ayes:</b> All <b>Nays:</b> None <b>Abstain:</b> None</p>
<p><b>9b. Fall 2023 Los Osos Basin Lower Aquifer Water Quality Monitoring Results and Updated Chloride Metric</b></p>	<p><b>Recommendation:</b> Receive an update on the Draft Fall 2023 Los Osos Basin Lower Aquifer Water Quality Monitoring Results and Updated Chloride Metric.</p> <p><b><u>Board Discussion</u></b> (01:05:30)</p> <p><b><u>Public Comment</u></b> Lindee Owen (01:17:00) Becky McFarland (01:18:30)</p> <p><b><u>Board Discussion</u></b> (01:19:30)</p> <p><b><u>Board Action for 9b</u></b> No board action required.</p>
<p><b>10. Adjournment</b></p>	<p>Meeting adjourned at approximately 3:08 PM (01:38:00). The next regularly scheduled meeting for Wednesday, February 21, 2024.</p>

**TO:** Los Osos Basin Management Committee

**FROM:** Dan Heimel, Executive Director

**DATE:** March 20, 2024

**SUBJECT:** Item 8 – Executive Director’s Report

## Recommendations

Staff recommends that the Basin Management Committee (BMC) receive and file the report and provide staff with any direction for future discussions. Sections of the Executive Director’s Report that have been updated or significantly changed from the previous meeting’s version are underlined and sections of the report that have not had any recent or anticipated updates have been removed.

## Discussion

This report was prepared to summarize administrative matters not covered in other agenda items and to provide a general update on staff activities.

## Presentations

No recent or planned presentations

## Funding and Financing Programs to Support Basin Plan Implementation

**WRFP Grant:** On February 11<sup>th</sup>, 2022 the Los Osos Community Services District (Los Osos CSD) submitted an application for a WRFP grant to develop a transient model and analyze recycled water and supplemental water projects to improve the sustainability of the Los Osos Basin (WRFP Study). Los Osos CSD was notified of the award of the grant in January 2023 and all the required documents were signed and fully executed. On May 17<sup>th</sup>, 2023 the BMC approved Cleath-Harris Geologist (CHG) to complete the WRFP Study and the WRFP Study is underway.

BMC Staff will continue to monitor potential additional grant funding opportunities and bring information on these opportunities to the BMC for consideration as they become available.

## Status of BMC Initiatives

**BMC Website:** On January 10<sup>th</sup>, 2024, the BMC launched its new website hosted at: [www.lososobmc.org](http://www.lososobmc.org). This will be the new platform for obtaining information regarding BMC Meetings, Annual Reporting and other initiatives. The interested parties email distribution list from the previous BMC website, hosted by the County of San Luis Obispo, has been transferred to the new website and will continue to be utilized to notify subscribers when information related to BMC Meetings and other initiatives is available.

**DWR AEM Survey:** On December 2022, BMC Staff were notified that the Los Osos Basin would be included in the Department of Water Resources (DWR) upcoming Statewide Airborne Electromagnetic (AEM) Survey in Spring 2023. To assist DWR in preparing flight lines for the AEM Survey, BMC Staff provided DWR with lithologic information for the Los Osos Basin and prepared an Area of Interest Map. The data collected during the AEM survey will improve DWR and the BMC's understanding of Los Osos Basin hydrogeology and seawater intrusion. The AEM Survey for the San Luis Obispo and Santa Barbara County basins was initiated on April 26<sup>th</sup>, 2023, however, due to weather conditions and the need to support emergency flood response efforts elsewhere in the State, DWR was not able to complete the survey of the Los Osos Basin. DWR returned to complete the survey in November 2023 and anticipates that the survey results will be available in Q3 2024. Additional information on DWR's Statewide AEM Survey Project can be found here:

<https://water.ca.gov/Programs/Groundwater-Management/Data-and-Tools/AEM>

**Sustainable Yield:** At its October 27<sup>th</sup>, 2021 Meeting, the BMC unanimously approved an updated Sustainable Yield estimate of 2,380 Acre-Feet per Year (AFY) for Calendar Year 2022 and at its December 6<sup>th</sup>, 2023 Meeting, the BMC unanimously approved retaining the current Sustainable Yield estimate of 2,380 AFY for CY 2024 for the following reasons: 1) No new infrastructure, not already considered in the 2022 Sustainable Yield Estimate, has been constructed; 2) estimates for the development of the Broderson Mound and long-term average rainfall were updated and incorporated into the CY 2022 Sustainable Yield Estimate and are not anticipated to change significantly on a year-over-year basis; 3) no significant hydrogeologic investigations have been conducted that would warrant an update to the steady-state groundwater model utilized to develop the Sustainable Yield Estimate.

**Los Osos Basin Well Database:** Cleath-Harris Geologists (CHG) completed the development of the Los Osos Basin Well Database and it is being utilized to support the development of the Transient Groundwater Model.

**Basin Monitoring Program Improvement:** In December 2023, construction of the Skyline Monitoring Wells was completed at the east end of Skyline Drive. The construction of these wells will allow the BMC to more accurately monitor seawater intrusion and groundwater conditions in Zones D & E of the Lower Aquifer at this critical location for the basin. In 2024, the BMC is working on modifying two existing wells (LA 14 and 16) to become dedicated Zone E monitoring Wells. The BMC is partnering with the National Estuary Program to gain access to available grant funding to fund a portion of these well modifications. To complete the modifications the BMC will be releasing solicitations for design and construction oversight hydrogeologic support services and for drilling services to complete the modifications.

**Basin Metric Evaluation:** Analysis of potential modifications to the Basin Metric's is currently on hold. Proposed modifications to the metrics were provided to BMC Party Staff for review. However, BMC Party Staff requested that potential improvements to the existing BMC Monitoring Program (i.e. modifications to an existing wells or a new monitoring well) be evaluated prior to modifying the Basin Metrics. The BMC recently completed construction of two new monitoring wells at the eastern end of

Skyline Drive. These new wells could be incorporated into the updated Basin Metrics. BMC Staff will develop recommendations on potential modifications to the Basin Metrics and bring them to the BMC for their consideration at a future date.

**Transient Groundwater Model:** See update under WRFP Grant above.

**Lower Aquifer Nitrate Investigation:** On October 19<sup>th</sup>, 2022 the BMC authorized Calendar Year (CY) 2022 funding to perform additional Nitrate Source Investigation to better understand the source of Nitrate impacting lower aquifer production wells. However, due to the inability to obtain well owner permission to sample the desired wells, much of that work was not completed in 2022. Subsequently, the Regional Water Quality Control Board (RWQCB) staff reviewed the investigation information and findings available to date and provided a presentation to the BMC at its March 15<sup>th</sup>, 2023 Meeting. BMC Party Staff is working with RWQCB Staff to identify potential additional investigations to help better inform the sources of the nitrate in the LA8 Well. On March 8<sup>th</sup>, 2024 BMC Staff received an update from RWQCB Staff on the status of their investigation into the source of nitrate impacting water supply wells in the western Los Osos Valley Groundwater Basin, see attached correspondence from the RWQCB.

**BMC Initiatives Status Update:** In 2020, the BMC completed an Implementation Plan evaluation exercise to identify and prioritize the use of the BMC's limited available staffing and funding resources. The outcome of this exercise was a prioritized list of Planning and Implementation initiatives that the BMC utilized to develop its workplan for 2021, 2022, 2023 and beyond. In 2024, the BMC intends to revisit the Implementation Plan and develop an updated, prioritize list of potential projects/initiatives to help inform the BMC's work plan for 2025 and beyond.

## Land Use Planning Process Update

### **Guide to Planning Information for Development in Los Osos:**

This website is intended to provide relevant planning information and an outline of what type of development is currently allowed within Los Osos:

<https://www.slocounty.ca.gov/Departments/Planning-Building/Grid-Items/Community-Engagement/Communities-Villages/Los-Osos.aspx>.

Topics covered include but are not limited to:

- Types of permit applications currently being accepted for processing
- Status of the building moratorium and waitlist for undeveloped parcels in the sewer service area (still in place)
- Status of the Communitywide Habitat Conservation Plan

### **Los Osos Retrofit-to-Build Program (Title 19 Water Offset Requirement) Update:**

On February 27<sup>th</sup>, 2024, the County Board of Supervisors updated the Los Osos Water Offset Program to reflect the results of the Los Osos Water Offset Study ("Study") by Maddaus Water Management, Inc. through amending Title 8 (Health and Sanitation Ordinance) and Title 19 (Building and Construction



Ordinance) of the County Code. The amendments update the program requirements to account for significant changes in water savings technology, water consumption patterns, and water conservation efforts of the community since the program was implemented in 2008. The update becomes effective March 29<sup>th</sup>, 2024.

The February 27<sup>th</sup>, 2024 County Board of Supervisors hearing was recorded and can be viewed at: [Meetings-Calendar - County of San Luis Obispo](#)

**Los Osos Community Plan:**

The Los Osos Community Plan (LOCP) is being reviewed by the California Coastal Commission (Commission) and a hearing date has not yet been scheduled by the Commission. In the meantime, the County is meeting with BMC and BMC Party Staff to discuss potential policy changes considering ongoing basin monitoring and Basin Plan program implementation efforts. The Los Osos Community Plan update and Final Environmental Impact Report ("FEIR") considered by the Board on December 15, 2020 are available at: <https://www.slocounty.ca.gov/LosOsosPlan-1.aspx>.

**Los Osos Habitat Conservation Plan (HCP):**

On February 15<sup>th</sup>, 2024, the U.S. Fish and Wildlife Service (USFWS) approved the Los Osos HCP and issued an incidental take permit (ITP) to the County of San Luis Obispo, authorizing take of Morro shoulderband snail that would result from covered activities in the Community of Los Osos in San Luis Obispo County. The HCP includes conservation measures and actions to avoid and offset impacts to the federally threatened Morro shoulderband snail and Morro manzanita, and the federally endangered Morro Bay kangaroo rat and Indian Knob mountainbalm. The ITP has been issued for a 25-year term.

In the coming months, the Department will be going to the Board of Supervisors to ask for a General Fund loan to begin implementing the LOHCP through land acquisition and habitat restoration projects. This will allow the Department to accrue LOHCP credits that can be issued as "certificates of inclusion" to mitigate against infrastructure and development project habitat impacts.

To see a list of frequently asked questions by the USFWS, visit this website: [Frequently Asked Questions Regarding the Final Los Osos Habitat Conservation Plan, Incidental Take Permit, and Environmental Assessment \(fws.gov\)](#)

## Los Osos Water Recycling Facility Project Update

The following table summarizes flows from the LOWRF based on the available data.

### 2023 LOWRF Wastewater and Recycled Water Flows (Acre Feet)

Year	Month	Influent	Broderson	Bayridge	Sea Pines	Ag Users	Effluent
2023	Jan	46.78	50.82	1.45	0.03	0.00	55.24
2023	Feb	41.07	41.90	1.10	1.26	0.00	42.92
2023	Mar	62.28	52.37	1.19	0.02	0.00	53.58
2023	Apr	55.94	42.44	1.16	2.35	0.14	46.09
2023	May	55.07	40.84	1.23	0.21	0.34	42.62
2023	Jun	50.97	21.81	1.23	18.31	0.38	41.74
2023	Jul	53.67	40.14	1.32	4.11	0.46	47.05
2023	Aug	58.03	28.85	1.39	10.58	0.72	41.55
2023	Sept	56.67	24.48	0.92	6.23	0.75	32.49
2023	Oct	59.15	40.52	1.25	6.24	0.58	48.59
2023	Nov	58.11	38.36	1.26	3.22	0.21	43.05
2023	Dec	58.89	43.00	1.24	3.01	0.14	47.38
Total		656.63	465.53	14.74	55.57	3.72	542.30

### 2024 LOWRF Wastewater and Recycled Water Flows (Acre Feet)

Year	Month	Influent	Broderson	Bayridge	Sea Pines	Ag Users	Effluent
2024	Jan	57.71	44.63	1.18	2.23	0.00	48.05
2024	Feb	56.06	45.34	1.06	0.92	0.00	47.37
2024	Mar						
2024	Apr						
2024	May						
2024	Jun						
2024	Jul						
2024	Aug						
2024	Sept						
2024	Oct						
2024	Nov						
2024	Dec						
Total							

### **LOWRF Project Updates:**

- The County has projects for connecting the Los Osos Community Park, Los Osos Middle School, and Monarch Grove Elementary. The connections for the community park and middle school are anticipated to occur Summer 2024. . The County has received some funding through the ARPA grant program.
- The Broderson Flow Meter Project was awarded by the Borad of Supervisors and the contractor is procuring materials. Construction is expected to begin April 2024. The project includes a flow meter and two isolation gate valves for maintenance. The current method for calculating the volume of water at Broderson Leach Field is a calculation based on other meters in the recycled water distribution system. The flow meter will improve the accuracy of water discharged here and will be connected to the LOWRF’s SCADA system through the existing local control panel. The project is funded by ARPA grant money.
- The County has awarded the project, and the contractor is procuring materials for the effluent pump station VFD installation. . VFDs will allow the pumps to ramp up and down based on the need in the recycled water distribution system and the plant return water supply. Currently the pumps only have the capability to run at one speed and that leads to increased wear and tear on the motor and impellers. The VFDs will be set to specific pressure setpoints that will be determined using the recycled water distribution model. The expected outcome from installing the VFDs is decreased energy consumption and recirculated water within the system.

**Enforcement:** A list of properties that were not connected were transferred to County Code Enforcement and Notice of Violations were issued last year in Feb. 2019. That list was about 70 properties. As of 5/12/2021, the sewer service area has a 99.4% connection status with a total of 36 properties not yet connected. Of those, one is not required to connect because there is no structure (demolished), 18 have expired building permits, and the rest have an open Code Enforcement case.

The County has assigned staff in code enforcement to Los Osos. Expired permits did not receive a Code Enforcement case because those properties have their own noticing process through the Building Department which, if not corrected, could result in a Notice of Violation.

## **Sustainable Groundwater Management Act (SGMA)**

**SGMA Overview:** SGMA took effect on January 1, 2015.<sup>1</sup> SGMA provides new authorities to local agencies with water supply, water management or land use responsibilities and requires various actions be taken in order to achieve sustainable groundwater management in high and medium priority groundwater basins. Los Osos Valley Groundwater Basin (Los Osos Basin) was subject to SGMA based on the 2014 Basin

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<sup>1</sup> On September 16, 2014, Governor Jerry Brown signed into law a three-bill legislative package, composed of [AB 1739 \(Dickinson\)](#), [SB 1168 \(Pavley\)](#), and [SB 1319 \(Pavley\)](#), collectively known as SGMA

Prioritization by the California Department of Water Resources (DWR) that listed the Los Osos Basin as high priority and in critical conditions of overdraft.<sup>2</sup>

**Basin Prioritization:** On December 18, 2019, DWR released the SGMA 2019 Basin Prioritizations. Basins or subbasins reassess to low or very low priority basins or subbasins are not subject to SGMA regulations. A summary of DWR’s Final SGMA Prioritizations for the Los Osos Area Subbasin and Warden Creek Subbasin are listed below:

- Los Osos Area Subbasin is listed as **very low** priority for SGMA<sup>3</sup> and in critical conditions of overdraft<sup>4</sup>
- SGMA does not apply to the portions of Los Osos Basin that are adjudicated provided that certain requirements are met (Water Code §10720.8).
- Warden Creek Subbasin is listed as **very low** priority for SGMA<sup>3</sup>

For more information on DWR’s basin boundary modification and prioritization process, please visit: <https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization>

## Additional Attachments:

1. Updated Status of Basin Plan Programs
2. Update on Central Coast Water Board’s investigation into the source of nitrate impacting water supply wells in the western Los Osos Valley Groundwater Basin (RWQCB, 3/8/24)

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<sup>2</sup> SGMA mandates that all groundwater basins identified by DWR as high- or medium-priority by January 31, 2015, must have groundwater sustainability agencies established by June 30, 2017. The act also requires that all high- and medium-priority basins classified as being subject to critical conditions of overdraft in Bulletin 118, as of January 1, 2017, be covered by groundwater sustainability plans, or their equivalent, by January 31, 2020. Groundwater sustainability plans, or their equivalent, must be established for all other high- and medium-priority basins by January 31, 2022.

<sup>3</sup> As noted by DWR, the priority for the subbasin has been set to very low (0 total priority points) as a result of conditions being met under sub-component C of the Draft SGMA 2019 Basin Prioritizations.

<sup>4</sup> Critical conditions of overdraft have been identified in 21 groundwater basins as described in Bulletin 118 (Water Code Section 12924). Bulletin 118 (updates 2003) defines a groundwater basin subject to condition of critical overdraft as: “A basin is subject to critical conditions of overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts.”

**Update on Status of Basin Plan Infrastructure Projects**

Program Name	Project Name	Parties Involved	BMC Budgeted Amount	Funding Status	Anticipated Planning/Pre-Construction Cost	Anticipated Capital Cost	Status/Notes
<b>Program A –</b> Shift groundwater production from Lower Aquifer to Upper Aquifer	Water Systems Interconnection	LOCS D/ GSWC	NA	NA	NA	NA	<b>Completed</b>
	Upper Aquifer Well (8 <sup>th</sup> Street)	LOCS D	NA	Fully Funded	NA	\$307,000	<b>Completed</b>
	South Bay Well Nitrate Removal	LOCS D	NA	NA	NA	NA	<b>Completed</b>
	Palisades Well Modifications	LOCS D	NA	NA	NA	NA	<b>Completed</b>
	Blending Project (Skyline Well)	GSWC	NA	NA	NA	NA	<b>Completed</b>
	Water Meters	S&T	NA	NA	NA	NA	<b>Completed</b>
<b>Program B -</b> Shift groundwater production from Lower Aquifer to Upper Aquifer	LOCS D Wells (Upper Aquifer)	LOCS D		Not Funded	TBD	BMP: \$2.7 mil	Project not initiated
	GSWC Wells (Upper Aquifer)	GSWC		Not Funded	TBD	BMP: \$3.2 mil	Project not initiated
	Community Nitrate Removal Facility	LOCS D/GSWC/S&T	TBD	Partial, GSWC portion funded	TBD	GSWC: \$1.23 mil	GSWC’s Program A Blending Project might be capable of expanding to be the first phase of the Program B Community Nitrate Removal Facility.
<b>Program C -</b> Shift production within the Lower Aquifer from the Western Area to the Central Area of the Basin	Expansion Well No. 1 (Los Olivos)	GSWC	NA	NA	NA	NA	<b>Completed</b>
	Expansion Well No. 2 (Lower Aquifer)	LOCS D		LOCS D	TBD	BMP: \$2.5 mil	<u>The well construction is complete and the water transmission main construction activities are currently underway. Completion of all phases of the project is estimated to occur in late 2024.</u>
	Expansion Well 3 (Lower Aquifer) and LOVR Water Main Upgrade	GSWC/LOCS D		Cooperative Funding	TBD	BMP: \$1.6 mil	
	LOVR Water Main Upgrade	GSWC		May be deferred	TBD	BMP: \$1.53 mil	Project may not be required, depending on the pumping capacity of the drilled Program C wells. It may be deferred to Program D.
	S&T/GSWC Interconnection	S&T/ GSWC		Pending	TBD	BMP: \$30,000	Currently on hold pending further evaluation of the project.
<b>Program D -</b> Shift production within the Lower Aquifer from the Western Area to the Eastern Area of the Basin							Currently being considered for deferment through Adaptive Management. BMC to review on an annual or semi-annual basis.
<b>Program M –</b> Groundwater Monitoring Plan	New Zone D/E lower aquifer monitoring well in Cuesta by the Sea	All Parties	NA	NA	NA	NA	<b>Completed</b>

Program Name	Project Name	Parties Involved	BMC Budgeted Amount	Funding Status	Anticipated Planning/Pre-Construction Cost	Anticipated Capital Cost	Status/Notes
Program U - Urban Water Reinvestment Program	Creek Discharge Program	All Parties				TBD	These activities are currently on hold.
	8 <sup>th</sup> and El Moro Urban Storm Water Recovery Project	All Parties				TBD	These activities are currently on hold.

**From:** [Bishop, James@Waterboards](mailto:Bishop_James@Waterboards)  
**To:** [Daniel Heimel](mailto:Daniel_Heimel)  
**Cc:** [Epp, Jennifer@Waterboards](mailto:Epp_Jennifer@Waterboards); [Packard, Harvey@Waterboards](mailto:Packard_Harvey@Waterboards)  
**Subject:** Update on Central Coast Water Board's investigation into the source of nitrate impacting water supply wells in the western Los Osos Valley Groundwater Basin.  
**Date:** Friday, March 8, 2024 2:18:31 PM

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Hi Dan,

Below is an update on our efforts as it relates to the nitrate investigation at the S&T and Golden State wells. Can you please include in the BMC agenda packet?

The California Regional Water Quality Control Board, Central Coast Region (Central Coast Water Board) continues to work towards identifying the source of nitrate impacting water supply wells in the western Los Osos Valley Groundwater Basin. The Central Coast Water Board has determined that dedicated monitoring wells, installed in the upper aquifer and proximal to the impacted supply wells, are needed to identify the source or sources of nitrate. To that end, the Central Coast Water Board continues to work with San Luis Obispo County to identify parties responsible for the installation and sampling of these monitoring wells.

Once the source of nitrate has been determined, the Central Coast Water Board will identify next steps. If it is determined that the source of nitrate is primarily or entirely from historical septic system discharges from now-sewered portions of Los Osos, then the Central Coast Water Board's regulatory authority to require nitrate source control has already been employed by the adoption of Resolution 83-18, which created the septic discharge prohibition zone. If the source of nitrate impacting the supply wells is partially or wholly from ongoing discharges, the Central Coast Water Board will work with the Los Osos Basin Management Committee and the County of San Luis Obispo to determine next steps.

Thanks,  
James

James Bishop, PG  
Engineering Geologist  
Central Coast Water Board  
Waste Discharge Requirement (WDR) Program  
(805) 542-4628  
895 Aerovista Place, Suite 101  
San Luis Obispo, CA 93401

**TO: Los Osos Basin Management Committee**

**FROM: Dan Heibel, Executive Director**

**DATE: March 20, 2024**

**SUBJECT: Item 9a – Los Osos Basin Agriculture Water Demand Estimate Methodology Comparison Technical Memorandum**

## Recommendations

Receive a Technical Memorandum from Cleath-Harris Geologists on an evaluation of two different Agriculture Water Demand Estimate Methodologies for the Los Osos Groundwater Basin and provide direction to staff.

## Discussion

The County of San Luis Obispo commissioned Cleath-Harris Geologists to compare estimates of agriculture water use and groundwater pumping for the Los Osos Groundwater Basin (Basin) utilizing two different methodologies: Soil Moisture Budget; and OpenET remote sensing (satellite).

The attached Technical Memorandum provides a summary of each of the methodologies, compares the agriculture water demand and groundwater pumping estimate results and provides recommendations for next steps. Based on the results of the methodology comparison, it is recommended that the Basin Management Committee (BMC) consider: 1) implementing a program to provide field-verification of the water use and groundwater pumping estimates; and 2) consider combining the best elements of both methodologies to develop a new methodology for estimating agriculture water demand and groundwater pumping for the Basin.

## Attachments

Los Osos Basin Agriculture Water Demand Estimate Methodology Comparison Technical Memorandum





## Technical Memorandum

**Date:** July 17, 2023

**From:** Spencer Harris, HG 633

**To:** Blaine Reely, PhD, P.E.  
Director, Groundwater Sustainability Department  
San Luis Obispo County

**SUBJECT:** **Agricultural Water Demand Comparison, Los Osos Groundwater Basin, Los Osos.**

Cleath-Harris Geologists (CHG) has completed a comparison of water demand estimates for agricultural water use in the Los Osos groundwater basin (Basin). The purpose of the work is to compare methodologies for estimating irrigation water demand in order to evaluate the strengths and weaknesses of the methodologies and to assist the County in decision-making related to remote sensing data acquisition and water resources planning.

### INTRODUCTION

Agricultural water use is a major component of Basin groundwater use, currently estimated at 34 percent of 2022 Basin Production (680 acre-feet out of a total of 2,010 acre-feet). No water meter data are available from agricultural wells, so the production is estimated. The current methodology for agricultural irrigation water use estimates used for Los Osos Basin management involves a daily soil-moisture budget (SMB). An alternative methodology, used by OpenET, is based on open-source remote sensing (satellite) data and a surface energy balance. Agricultural water demand estimates using two methodologies are compared over three years (2020, 2021, and 2022).

### METHODOLOGIES

#### Daily Soil-Moisture Budget (SMB) Methodology

Groundwater production estimates for agriculture and turf irrigation are currently developed using a daily SMB with local data input. Sources of data included:

- Land use/cropping data sets from LandIQ for estimating irrigated acreages (2022).
- Daily rainfall from County Rain Gage 727 (former Los Osos Landfill).



- Daily reference evapotranspiration from the California Irrigated Management Information System (CIMIS) Station 160 (San Luis Obispo West - Chorro Valley) located in DWR Climate Zone 6, which is the same climate zone as the Los Osos Valley.
- Water holding capacity and rooting depths from UC Davis Cooperative Extension.
- Crop Coefficients (Kc) for Central Coast valleys based on prior work.

The SMB methodology accounts for soil holding capacity, crop rooting depth, leaching fraction, irrigation efficiency, local precipitation, and local reference evapotranspiration. The following equation, modified from a general formula for irrigation water requirements, was used for the soil-moisture budget:

$$\text{Applied Irrigation Water} = (\text{ETc} - \text{ER}) / (\text{EF})$$

Where:

ETc [Crop evapotranspiration] = ETo [reference evapotranspiration] x Kc [crop coefficient]

ER [effective rainfall] = rainfall stored in soil and available to crop

EF [efficiency factor] = (1-LF[leaching fraction]) x IE [irrigation efficiency]

Assumes no frost protection for crops in the Los Osos Creek Valley.

### OpenET Methodology

Description from OpenET website: <https://openetdata.org/methodologies/>

OpenET provides satellite-based estimates of the total amount of water that is transferred from the land surface to the atmosphere through the process of evapotranspiration (ET). This is also referred to as ‘actual ET’, since it represents an estimate of the actual amount of ET that occurred over a specified time period. OpenET provides ET data from multiple satellite-driven models, and also calculates a single “ensemble value” from those models. The models currently included are shown in the table below. All of the models included in the OpenET ensemble have been used by government agencies with responsibility for water use reporting and management in the western U.S., and some models are widely used internationally. All models currently use Landsat satellite data to produce ET data at a spatial resolution of 30 meters by 30 meters (0.22 acres per pixel). Additional inputs include gridded weather variables such as solar radiation, air temperature, humidity, wind speed, and in some cases, precipitation.

The majority of the models that make up the OpenET ensemble are based on full or simplified implementations of the surface energy balance (SEB) approach. The SEB approach accounts for the energy used to transform liquid water in plants and soil into vapor that is released to the atmosphere. The SEB approach relies on satellite measurements of surface temperature and surface reflectance combined with other key land surface and weather variables to estimate components of the energy balance—net radiation, sensible heat flux, ground heat flux, and latent heat flux, which is the energy consumed through ET.



## Evapotranspiration and Irrigation Water Use

When comparing the results of the above methodologies, it is helpful to keep in mind the differences between reference evapotranspiration (ET<sub>o</sub>), crop evapotranspiration (ET<sub>c</sub>), applied water evapotranspiration (ET<sub>aw</sub>), and water use. ET<sub>o</sub> is amount of water a reference crop (typically turfgrass) requires for healthy growth, given the climatic conditions present. ET<sub>c</sub> is the amount of water other crop types require for healthy growth, given the climatic conditions present. The relationship between ET<sub>o</sub> and ET<sub>c</sub> has been studied extensively for different crop types, and most crop types have published crop coefficients (K<sub>c</sub>), whereby ET<sub>c</sub> can be approximated as  $ET_c = ET_o * K_c$ . ET<sub>aw</sub> is ET<sub>c</sub> minus effective rainfall (ER), and assumes 100 percent irrigation system efficiency. ER will vary based on a number of factors, but generally ranges from about 30 to 60 percent of rainfall in California (Burt et al., 2002). Water use is the total amount of irrigation water needed, and factors in water system efficiency, leaching fraction requirements, and frost control.

## **WATER DEMAND ESTIMATES COMPARISON**

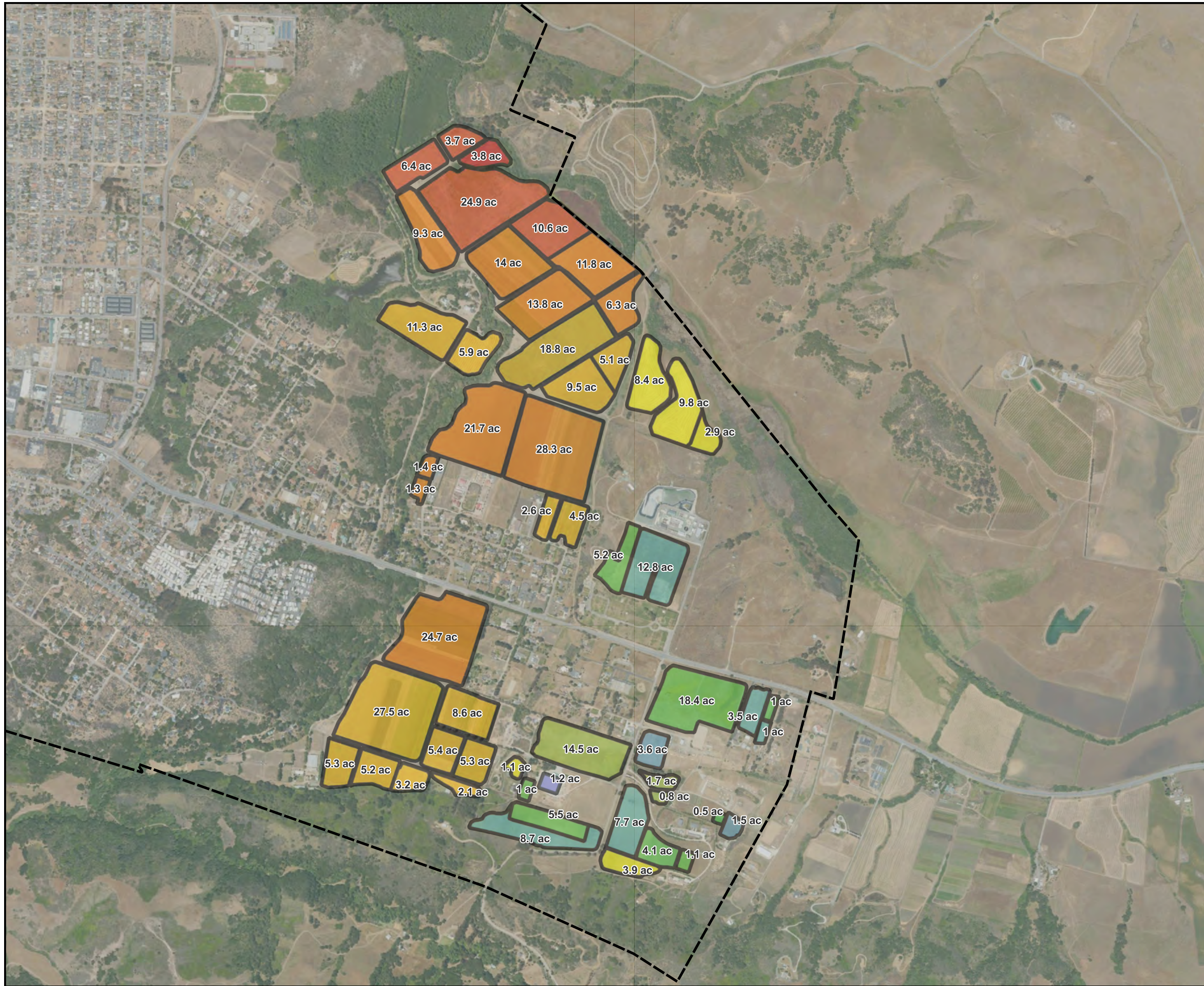
The OpenET methodology provides local crop evapotranspiration (ET<sub>c</sub>). It does not report ET<sub>o</sub>, K<sub>c</sub>, ER, ET<sub>aw</sub>, or applied water use. The SMB methodology estimates ET<sub>o</sub>, K<sub>c</sub>, ET<sub>c</sub>, ER, and ET<sub>aw</sub>.

Agricultural water use in the Los Osos basin is currently estimated from ET<sub>aw</sub> (as output from the daily SMB) by applying a calibration factor (substituting for the efficiency factor), which maintains consistency with historical water use estimates (CHG, 2023).

Vegetables (row crops) is the main agricultural crop in the Basin, accounting for over 95% of the planted acreage. The DWR Land IQ database was used to develop acreages for vegetables, with some minor modifications to exclude fields irrigated with bedrock wells. OpenET also provides field-specific data, but for the comparison with SMB methodology the OpenET data was indexed to represent the weighted average of all fields. Figure 1 shows the Basin OpenET data set for crop ET in 2022 (all fields shown).

### ET<sub>c</sub> Comparison

A comparison between OpenET and SMB reported monthly ET<sub>c</sub> values for calendar years 2020, 2021, and 2022 is summarized in Table 1 below. The Los Osos Basin Management Committee reports all production on a calendar year basis.



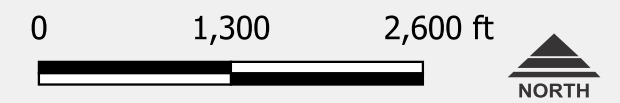
**Explanation**

Los Osos Adjudicated Plan Area

**Annual Crop ET by Agricultural Field from OpenET [inches]**

- 18 - 20
- 20 - 22
- 22 - 24
- 24 - 26
- 26 - 28
- 28 - 30
- 30 - 32
- 32 - 34
- 34 - 36
- 36 - 38
- 38 - 40

Basemap: NAIP 2022  
 ET data from OpenET Data Explorer  
 Ag field boundaries from LandIQ  
 (All crop types shown including non-irrigated fields)



**Figure 1**  
**ETc 2022**

**Water Demand Comparison**  
**County of San Luis Obispo**

**Los Osos Groundwater Basin**



**Table 1. ETc Comparison**

Month	2020 ETc (in)		2021 ETc (in)		2022 ETc (in)		Average ETc (in)	
	OpenET	SMB	OpenET	SMB	OpenET	SMB	OpenET	SMB
Jan	1.22	0.96	1.16	1.13	1.27	1.09	1.22	1.06
Feb	1.51	1.39	1.60	1.32	1.35	1.46	1.49	1.39
Mar	2.08	1.80	2.24	2.24	2.63	2.37	2.32	2.13
Apr	3.06	2.38	3.05	2.40	3.73	2.79	3.28	2.52
May	3.64	4.73	3.83	4.24	4.08	4.96	3.85	4.65
Jun	3.94	5.54	4.21	5.64	4.39	6.16	4.18	5.78
Jul	3.90	5.24	4.26	5.30	4.36	5.45	4.17	5.33
Aug	4.21	4.18	3.71	4.31	3.90	4.84	3.94	4.44
Sep	3.03	3.10	2.59	3.28	3.12	3.66	2.91	3.35
Oct	1.75	2.40	1.79	2.32	1.89	2.00	1.81	2.24
Nov	1.02	1.43	1.44	1.44	1.30	1.30	1.26	1.39
Dec	0.87	0.89	0.76	0.57	0.77	0.53	0.80	0.66
Total	30.23	34.03	30.65	34.18	32.81	36.62	31.23	34.94
Difference (inches)		-3.80		-3.53		-3.81		-3.71
AFY (vegetables)	710	800	650	730	700	780	670	750
Difference (AFY)	-90		-80		-80		-80	

Notes: ETc = Crop evapotranspiration; in = inches; AFY = acre-feet per year; vegetable AFY based on acreages from DWR Land IQ.

The results in Table 1 shows a consistent difference of roughly 3.7 inches of additional evapotranspiration per year for the SMB methodology, compared to OpenET. This difference is expected, since the SMB methodology uses ETo from a CIMIS station in the Chorro Valley, where the coastal fog influence is lower than the Los Osos Creek valley, despite being in the same DWR Climate Zone 6. SMB estimates 80 acre-feet per year (AFY) greater crop water demand than OpenET (before effective rainfall adjustments).

### Applied Water Use Comparison

As mentioned above, OpenET only provides ETc, therefore, any further comparison with SMB methodology requires come assumptions for effective rainfall and irrigation system efficiencies. Communications with the OpenET developer and a review of annual reports for two local groundwater basins indicates effective rainfall is typically being estimated (for the purposes of processing OpenET data) based on a fixed percentage of total rainfall that offsets ETc on a monthly basis. The OpenET developer suggested 90 percent as a default rate, while the annual reports reviewed used total rainfall as effective rainfall (100 percent ETc offset on a monthly basis). For this comparison, effective rainfall was assigned as 50 percent and 100 percent of total rainfall to gauge the sensitivity.



The other assumption for estimating applied water use from the OpenET data is for water system efficiencies and leaching fraction requirements. Frost control is not necessary in the Los Osos creek valley. The leaching fraction is the amount of irrigation and rainfall that drains below the root zone. For typical irrigation water salinity of 900  $\mu\text{mhos/cm}$  in the Los Osos Creek valley, and relatively cool conditions with coastal fog influences, the leaching fraction for local vegetables is estimated at close to 10 percent (ANR Publication 8550, 2015). This amount of leaching fraction is assumed to be satisfied by rainfall for the Los Osos area (Carollo, 2012). Water system efficiencies vary, and is assumed to be 80 percent based on good design and management by experienced growers.

A comparison between OpenET and SMB applied water use assuming 50 percent and 100 percent effective rainfall (with 80 percent system efficiency) is summarized below in Table 2 and Table 3, respectively.

**Table 2. Applied Water Use Comparison – 50% ER and 80% EFF**

Month	2020 Water Use (in)		2021 Water Use (in)		2022 Water Use (in)		Average	
	OpenET	SMB	OpenET	SMB	OpenET	SMB	OpenET	SMB
Jan	1.40	0	0	0	1.47	0	0.95	0
Feb	1.87	0	1.76	0	1.59	0	1.74	0
Mar	0.00	0	1.89	0	2.02	0.53	1.30	0.18
Apr	2.62	0	3.59	0.59	4.18	1.11	3.46	0.57
May	4.48	2.64	4.49	4.6	4.80	5.40	4.59	4.20
Jun	4.90	5.98	4.96	6.1	5.17	6.69	5.01	6.27
Jul	4.88	5.69	5.01	5.8	5.13	5.93	5.01	5.79
Aug	5.23	4.50	4.36	4.7	4.59	5.26	4.73	4.82
Sep	3.78	3.37	3.04	3.6	3.13	2.98	3.32	3.31
Oct	2.19	2.61	0.53	2.0	2.20	2.13	1.64	2.25
Nov	0.98	1.03	1.51	0	0.76	0.17	1.08	0.40
Dec	0.00	0.48	0	0	0.00	0	0	0.16
Total	32.32	26.30	31.14	27.32	35.04	30.20	32.83	27.94
Difference		6.02		3.82		4.84		4.89
AFY (vegetables)	760	620	660	580	750	650	700	600
Difference (AF)	140		80		100		100	

Notes: ER = effective rainfall; EFF = irrigation system efficiency; in = inches; AFY = acre-feet per year; vegetable AFY based on acreages from DWR Land IQ



**Table 3. Applied Water Use Comparison – 100% ER and 80% EFF**

Month	2020 Water Use (in)		2021 Water Use (in)		2022 Water Use (in)		Average	
	OpenET	SMB	OpenET	SMB	OpenET	SMB	OpenET	SMB
Jan	1.27	0	0	0	1.53	0	0.93	0
Feb	1.84	0	1.74	0	1.69	0	1.76	0
Mar	0.00	0	1.21	0	0.99	0.53	0.73	0.18
Apr	1.42	0	3.82	0.59	4.21	1.11	3.15	0.57
May	4.41	2.64	4.74	4.57	5.10	5.40	4.75	4.20
Jun	4.87	5.98	5.27	6.13	5.49	6.69	5.21	6.27
Jul	4.88	5.69	5.32	5.76	5.45	5.93	5.22	5.79
Aug	5.21	4.50	4.63	4.68	4.87	5.26	4.90	4.82
Sep	3.78	3.37	3.23	3.57	2.75	2.98	3.26	3.31
Oct	2.19	2.61	0	2.03	2.32	2.13	1.50	2.25
Nov	0.68	1.03	1.40	0	0	0.17	0.69	0.40
Dec	0.00	0.48	0	0	0	0	0	0.16
Total	30.54	26.30	31.37	27.32	34.41	30.20	32.11	27.94
Difference		4.24		4.05		4.21		4.17
AFY (vegetables)	720	620	670	580	740	650	690	600
Difference (AF)	100		90		90		90	

Notes: ER = effective rainfall; EFF = irrigation system efficiency; in = inches; AFY = acre-feet per year; vegetable AFY based on acreages from DWR Land IQ

The results shown in Table 2 and Table 3 indicate that the use of a fixed percentage (of total rainfall) for effective rainfall results in less offset to crop ETC than the use of a daily SMB. After adjustment for effective rainfall (and system efficiency), the applied water use on vegetables based on OpenET with 50 percent and 100 percent ER averages 4.17 to 4.89 inches more than SMB values. The OpenET methodology estimates water use for vegetables in the Los Osos basin between 2020 and 2022 averaged 700 AFY at 50 percent ER and 690 AFY at 100 percent ER, which is 90 to 100 AFY more than estimated by SMB methodology.

Offsetting ETC by a fixed percentage of total rainfall on a monthly basis does not provide the same credit as a SMB does, especially coming out of the rainy season. Soil holding capacity provides up to 4 inches of carryover moisture from month to month in the SMB, and allows seasonal rains to offset ETC through March and April. A fixed ER effectively resets soil moisture to zero every month, regardless of the amount of rainfall.



## DISCUSSION

The strength of the OpenET methodology is that the estimates of ET<sub>c</sub> are based on processing local remote sensing data that account for the actual field-level climatic conditions, basically measuring ET<sub>c</sub> directly. The SMB methodology derives ET<sub>c</sub> from ET<sub>o</sub> calculated at a nearby climate station and various estimates for K<sub>c</sub>. OpenET methodology appears to be more accurate than the SMB methodology for reporting ET<sub>c</sub>. The weakness of the OpenET methodology is the current practice of applying effective rainfall as a fixed percentage of total rainfall on a monthly basis. That is not actually a part of OpenET, but it has been accepted by the developer and others.

By comparison, the strength of the daily SMB methodology is a robust process for estimating effective rainfall. By allowing rainfall to be stored in the soil and balancing incremental ET<sub>c</sub> and rainfall on a daily basis, the full range of actual rainfall distributions can be more accurately modeled to estimate effective rainfall. The weakness of the SMB methodology is the ET<sub>c</sub> estimate, which is dependent on several assumptions and data that is not locally field-based.

With respect to estimating irrigation system efficiency, both the OpenET and SMB are on equal terms. In the Los Osos basin, however, a calibration factor was substituted for the efficiency factor in order to match historical work which used detailed cropping data from County records between 2006 and 2008. In theory, if the OpenET ET<sub>c</sub> data is used with the SMB effective rainfall, providing the best of both methodologies, this combination of methods (referred to herein as “SEB+SMB” for “surface water balance and soil moisture budget”), along with an assumed efficiency factor of 80 percent, should be the best available estimate for water use.

The ET<sub>c</sub> data from OpenET is available on a monthly basis, while effective rainfall is estimated on a daily basis by the SMB. In order to combined the methods, the daily effective rainfall from the SMB is summed for each month and applied to offset the monthly ET<sub>c</sub> from OpenET. Table 4 provides the results of this combined methodology.





**Table 4. Applied Water Use Comparison – SEB with SMB and 80% EFF**

Month	2020 Water Use (in)		2021 Water Use (in)		2022 Water Use (in)		Average	
	SEB+SMB	SMB	SEB+SMB	SMB	SEB+SMB	SMB	SEB+SMB	SMB
Jan	0.32	0	0.05	0	0.22	0	0.20	0.00
Feb	0.15	0	0.34	0	0.00	0	0.16	0.00
Mar	0.36	0	0.01	0	0.94	0.53	0.44	0.18
Apr	0.85	0	1.50	0.59	2.45	1.11	1.60	0.57
May	1.67	2.64	4.74	4.57	5.10	5.40	3.84	4.20
Jun	4.87	5.98	5.27	6.13	5.49	6.69	5.21	6.27
Jul	4.88	5.69	5.32	5.76	5.45	5.93	5.22	5.79
Aug	5.21	4.50	4.63	4.68	4.87	5.26	4.90	4.82
Sep	3.78	3.37	3.23	3.57	2.75	2.98	3.26	3.31
Oct	2.19	2.61	1.67	2.03	2.32	2.13	2.06	2.25
Nov	0.68	1.03	0.00	0	0.20	0.17	0.29	0.40
Dec	0.53	0.48	0.23	0	0.30	0	0.36	0.16
Total	25.49	26.30	27.00	27.32	30.09	30.20	27.53	27.94
Difference		-0.81		-0.32		-0.10		-0.41
AFY (vegetables)	600	620	570	580	640	650	590	600
Difference (AF)	-20		-10		-10		-10	

Notes: SEB = surface energy balance; SMB = soil moisture budget; EFF = irrigation system efficiency; in = inches; AFY = acre-feet per year; vegetable AFY based on acreages from DWR Land IQ

Table 4 shows that the combined SEB+SMB methodology, which combines OpenET and SMB, is a close match for the stand-alone SMB methodology, and supports current estimates of applied water use in Los Osos annual reports.

## CONCLUSIONS AND RECOMMENDATIONS

Based on comparison and analysis of the results of two methodologies, OpenET and SMB, the OpenET data appears to be a better method for obtaining ETc values, while SMB provides the best estimates for effective rainfall. A proposed composite method, SEB+SMB, has the potential to combine the best of the two methodologies for estimating agricultural water use, and would allow replacement of the calibration factor with an actual efficiency factor.

Field-based verification of the results of water use estimates is recommended. CHG can work with the County to find grower(s) who would be willing to share any irrigation well production data over the last three years, and/or would allow meter installation for future data collection on groundwater production.