

DRAFT

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TECHNICAL MEMORANDUM

Date: September 26, 2025

From: Spencer Harris, HG 633

To: Los Osos BMC

SUBJECT: Sustainable Yield 2026 Baseline Scenario Results for the Los Osos Basin

As requested by the Los Osos Basin Management Committee (BMC), Cleath-Harris Geologists (CHG) has prepared this technical memorandum to report the results of the Sustainable Yield 2026 Baseline scenario for the Los Osos Basin using the Transient Model. The memorandum includes a brief background followed by sections on definition, methodology, and results.

BACKGROUND

CHG recently constructed and calibrated a density-dependent groundwater flow model (the Transient Model) for the Los Osos Basin to support the Water Recycling Funding Program (WRFP) Study. The purpose of the Transient Model is to provide an improved toolset for establishing estimates of Basin sustainable yield and for evaluating different recycled water / supplemental water supply opportunities to ensure that the Basin can provide a sustainable water supply for future conditions.

One of the scenarios developed for the WRFP study is the Sustainable Yield 2026 Baseline scenario. The BMC has previously relied on a steady-state numerical model for setting the Sustainable Yield of the Basin, as required annually by the Stipulated Judgement. This is the first application of the Transient Model to estimate Basin sustainable yield and may be utilized by the BMC in its determination of the Sustainable Yield estimate for 2026.

DEFINITION

The sustainable yield definition (as “safe yield”) is provided by the Stipulated Judgement:

For purposes of adjudication of a groundwater basin, “safe yield” is defined as “the maximum quantity of water which can be withdrawn annually from a ground water supply under a given set of conditions without causing an undesirable result.” An undesirable result means “a gradual lowering of the ground water levels resulting in



depletion of the supply” or other adverse impacts, such as permanent ground subsidence or seawater intrusion. (See *City of Barstow v. Mojave Water Agency* (2000) 23 Cal.4th 1224, 1234; *City of Los Angeles v. City of San Fernando* (1975) 14 Cal.3d 199, 278; *City of Pasadena v. City of Alhambra* (1949) 33 Cal.2d 908, 929; Water Code § 10721(w).) The concept of safe yield looks at the long-term sustainability of groundwater supplies and may include opportunities for capture of temporary surpluses that may be available. (See *City of Los Angeles, supra*, 14 Cal.3d at 279-281.)

The Sustainable Groundwater Management Act (SGMA) uses a similar definition for sustainable yield, although SGMA does not apply to the Basin plan areas covered by the Stipulated Judgement. SGMA definitions listed below are from California Water Code §10721 and are useful for context:

(w) *“Sustainable yield” means the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result.*

(x) *“Undesirable result” means on or more of the following effects caused by groundwater conditions occurring throughout the basin:*

- (1) *Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater level or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.*
- (2) *Significant and unreasonable reduction of groundwater storage.*
- (3) *Significant and unreasonable seawater intrusion.*
- (4) *Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.*
- (5) *Significant and unreasonable land subsidence that substantially interferes with surface land uses.*
- (6) *Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.*

(r) *“Planning and implementation horizon” means a 50-year time period over which a groundwater sustainability agency determines that plans and measures will be implemented to ensure that the basin is operated within its sustainable yield.*

The Transient Model was constructed and calibrated over a 45-year hydrologic base period. A hydrologic base period is a series of years covering wet and dry periods representative of long-



term conditions over which the cumulative departure from average rainfall is close to zero. Per the California Water Code sustainable yield definition, a hydrologic base period should be used for sustainable yield calculations.

METHODOLOGY

The most common symptom of groundwater basin overdraft is a chronic decline in water levels and the loss of groundwater storage over time. In coastal basins hydraulically connected to the ocean, however, overdraft conditions from excess pumping results in seawater intrusion, rather than chronic water level declines, as freshwater storage is replaced with seawater. Therefore, the evaluation of Basin sustainability in Los Osos considers movement of the seawater intrusion front, which was defined in the Los Osos Basin Plan (LOBP) as the position of the 250 milligrams per liter (mg/L) chloride concentration contour.

Adaptive Method

The methodology used for evaluating the sustainable yield with a numerical flow model is based on the Adaptive Method approved by the BMC at their October 27, 2021 meeting. The Adaptive Method set thresholds for limiting the maximum inland extent of the intrusion front to 2021 Basin conditions. Two threshold lines were drawn parallel to the coast, one for Zone D and one for Zone E, corresponding to the maximum inland extend of the observed intrusion front for Fall 2021.

The Transient Model is used to distribute and maximize community purveyor groundwater production over a planning horizon while not allowing seawater intrusion to encroach further inland of the 2021 threshold lines. The estimated sustainable yield is the resulting maximum Basin production achieved. This approach establishes that further degradation of Basin water quality is an undesirable result.

The Sustainable Yield 2026 Baseline Scenario used for the WRF study incorporates 2025 infrastructure, which includes existing purveyor wells and currently developed urban reuse. The estimated annual production for non-purveyor sectors (Agriculture, Private Domestic, and Community Facilities) used for the scenario are based on the 5-year average from 2019 to 2023, as presented in Table 1.



**Table 1. Baseline Groundwater Production Estimates (2019-2023)
for Non-Purveyor Sectors**

| YEAR | DOMESTIC ¹ | COMMUNITY ² | AGRICULTURE | TOTAL |
|---------|-----------------------|------------------------|-------------|-------|
| | ACRE-FEET | | | |
| 2019 | 110 | 60 | 630 | 800 |
| 2020 | 110 | 80 | 650 | 840 |
| 2021 | 110 | 130 | 620 | 860 |
| 2022 | 110 | 90 | 680 | 880 |
| 2023 | 110 | 60 | 500 | 670 |
| AVERAGE | 110 | 80 | 620 | 810 |

¹Domestic well production per recommended update value from 2023 Water Offset Study.

²Community facilities production consists of Golf Course, Memorial Park, and Community Park.

Planning Horizon

Based on input from the Technical Advisory Committee for the WRF Study and from BMC Staff, a 50-year base period was selected for evaluating the Sustainable Yield 2026 Baseline Scenario. The 50-year base period was selected to align with SGMA’s planning and implementation horizon (see definitions section above) and consist of climate conditions during the 45-year calibration base period (1979-2023) followed by five additional years of balanced hydrologic conditions from the record (2002-2006). As previously mentioned, the Transient Model was used to distribute and maximize community purveyor groundwater production while not allowing seawater intrusion to encroach further inland of the 2021 threshold lines.

RESULTS

The Sustainable Yield 2026 Baseline Scenario uses Year 2025 infrastructure and optimizes the pumping distribution between purveyor wells to maximize purveyor production while maintaining the seawater intrusion front west of the 2021 threshold lines. A sustainable yield scenario, per the Adaptive Method, does not allow the seawater intrusion front to extend inland of the 2021 threshold lines. Simulated pumping at individual purveyor wells were constrained by historical production records and purveyor operations. Based on the optimized distribution of pumping, a Basin yield of 2,020 AFY is sustainable over the 50-year planning horizon. Table 2 shows the mass balance results for the first 45-year pumping cycle for 50-year scenario, and Table 3 shows the pumping and recycled water reuse distribution.

Results of the 50-Year Sustainable Yield Baseline scenario are shown in Figures 1a and 1b (attached). Figure 1a shows Lower Aquifer Zone D chloride concentrations contours at the end of the calibration period (Summer 2023) and after 50 years of pumping. Figure 1b shows the



corresponding simulated concentration contours for Lower Aquifer Zone E.

**Table 2: Basin Mass Balance
50-Year Sustainable Yield 2026 Baseline**

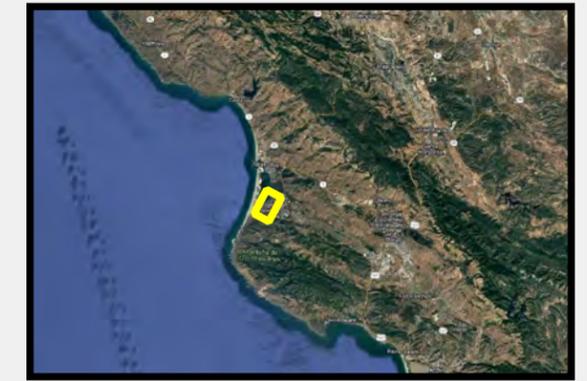
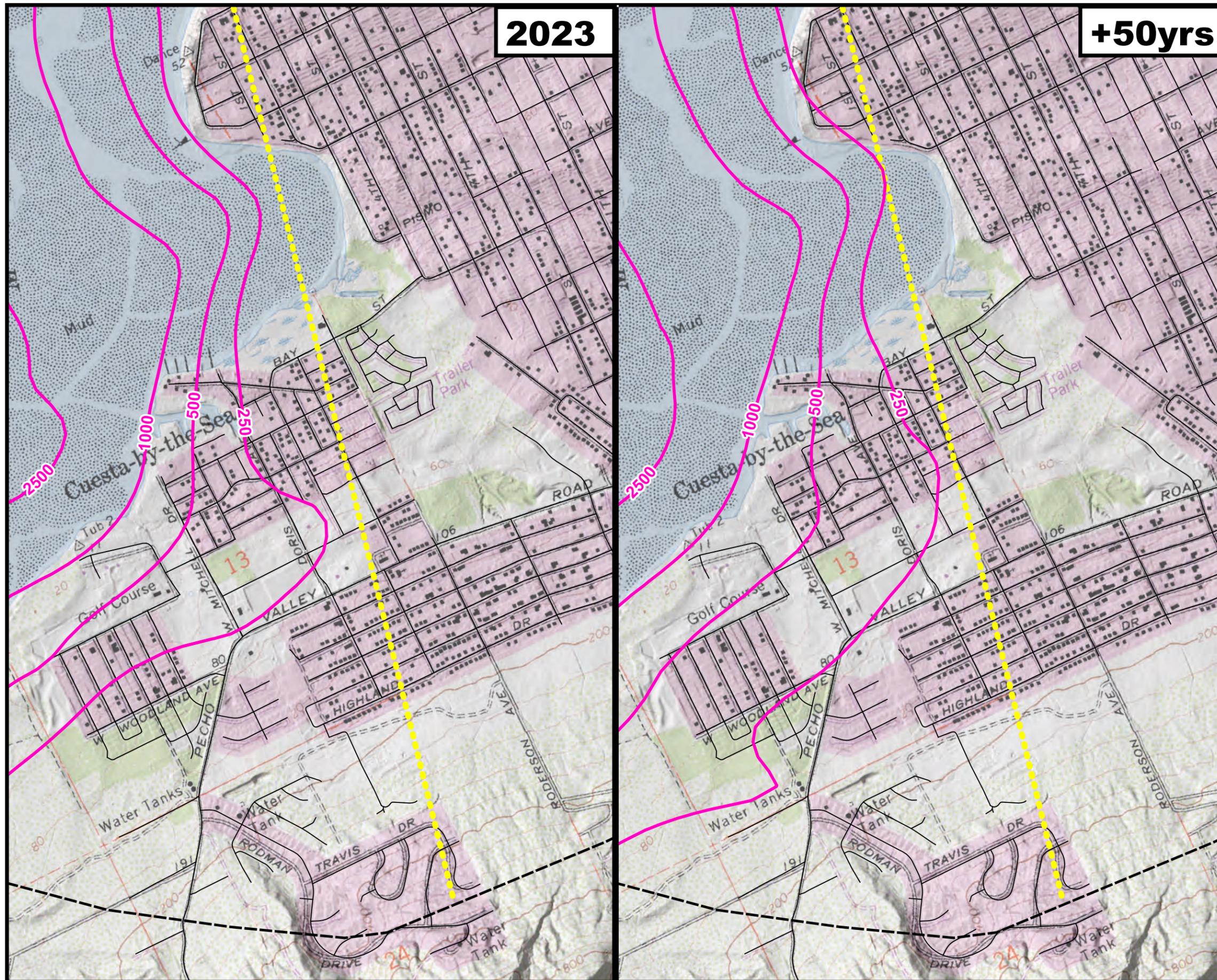
| SOURCE | DESCRIPTION | INFLOW (AFY) | OUTFLOW (AFY) | BALANCE (AFY) |
|----------|----------------------------------|--------------|---------------|---------------|
| GHB | Seawater intrusion | 108 | 16 | 92 |
| | Eastern Basin Boundary | 0 | 108 | -108 |
| RIVER | Bay and Ocean water bodies | 634 | 2,201 | -1,567 |
| STREAM | Los Osos Creek | 847 | 84 | 763 |
| RECHARGE | Deep percolation and return flow | 3,071 | 0 | 3,071 |
| ET | Phreatophyte consumptive use | 0 | 99 | -99 |
| DRAIN | Warden Creek and Sweet Springs | 0 | 107 | -107 |
| WELL | Groundwater Production | 0 | 2,020 | -2,020 |
| STORAGE | Groundwater in Storage | 1,568 | 1,593 | -25 |
| | TOTAL | 6,228 | 6,228 | 0 |



**Table 3: Pumping and Reuse Distribution
50-Year Sustainable Yield 2026 Baseline**

| ITEM | ACRE-FEET PER YEAR |
|--|--------------------|
| Production by Sector | |
| Purveyor | 1,225 |
| Community ¹ | 68 |
| Private domestic | 110 |
| Ag irrigation | 617 |
| TOTAL | 2,020 |
| Recycled Water Reuse Distribution | |
| Broderson | 448 |
| Bayridge | 22 |
| Golf | 66 |
| Ag Reuse | 77 |
| Urban reuse | 36 |
| TOTAL | 649 |
| Purveyor Distribution by Area | |
| Upper West | 75 |
| Upper Central | 467 |
| Lower West | 160 |
| Lower Central | 523 |

¹adjusted to match WRF study assumptions for Golf reuse



Explanation

- Basin Boundary (LOBP)
- Chloride Concentration Contour (mg/L Chloride)
- Threshold Line Lower Aquifer - Zone D Model Layer 3

Model predictive uncertainty with respect to the simulated intrusion front location is not currently quantified and is recommended as a future improvement

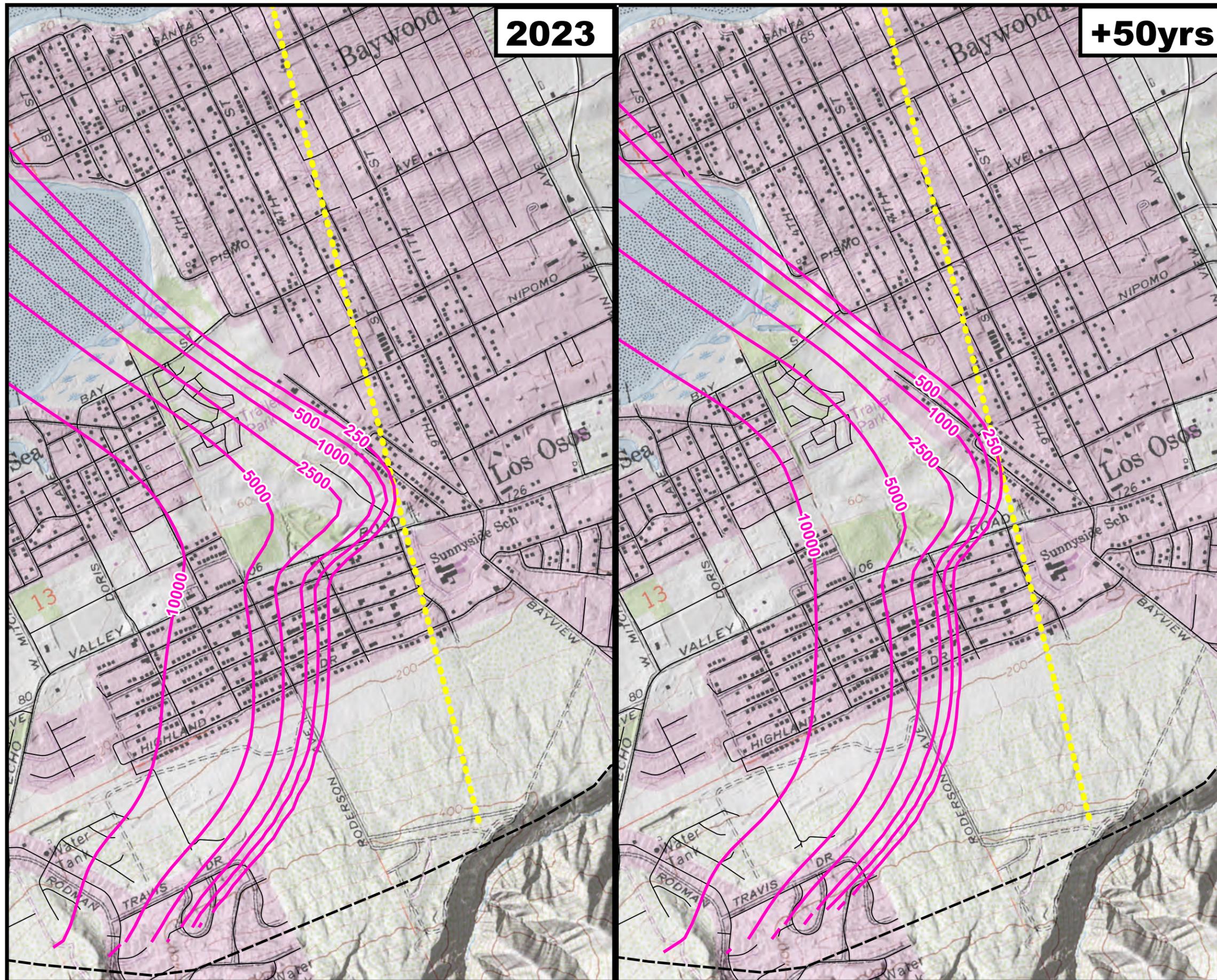


Figure 1a
Simulated Chloride Concentration
Lower Aquifer - Zone D

50-yr Sustainable Yield Baseline
Transient Model
Los Osos WRF Study

Los Osos BMC

Cleath-Harris Geologists



Explanation

- Basin Boundary (LOBP)
- Chloride Concentration Contour (mg/L Chloride)
- Threshold Line Lower Aquifer - Zone E Model Layer 7

Model predictive uncertainty with respect to the simulated intrusion front location is not currently quantified and is recommended as a future improvement



Figure 1b
Simulated Chloride Concentration
Lower Aquifer - Zone E

50-yr Sustainable Yield Baseline
Transient Model
Los Osos WRF Study

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