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## **Appendix G-2**

### Preliminary Groundwater Infiltration Memorandum



## MEMORANDUM

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**To:** David Graves, Vice President of Development at Shopoff Realty Investment, L.P.  
**From:** Trevor Jones, PhD and Sharllyn Pimentel, Dudek  
**Subject:** Preliminary Groundwater Infiltration Memorandum  
**Date:** November 19, 2024  
**cc:** Steven Stuart, PE, Dudek, Kristin Starbird, Dudek  
**Attachment(s):** Figures 1, 2, and 3

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Dudek was tasked with evaluating the potential impacts of the Mesa Verde Estates development (Project) and Cumulative Project areas (Cumulative Projects; Figure 1) on long-term groundwater sustainability in the Yucaipa Subbasin (Subbasin; DWR Basin No. 8-002.07). Within the Subbasin, the Project and Cumulative Project sites are located in the largely undeveloped regions of the Calimesa, Western Heights, and San Timoteo Management Areas (Dudek, 2022). Dudek understands that Project development will include commercial/industrial space, schools, public and private parks, and natural open space area.

### 1 Technical Approach

To evaluate the potential Project impacts on groundwater sustainability, Dudek used the Yucaipa Integrated Hydrologic Model (YIHM; Alzraiee et al 2021) to quantify the potential reduction in groundwater recharge to the Subbasin associated with the Project and Cumulative Projects. Dudek used the YIHM to calculate recharge to the Yucaipa Subbasin for the 51-year period from October 1, 2018 through September 30, 2069 (water years 2019 through 2069) under *Future Baseline* conditions. The *Future Baseline* conditions were simulated as part of the Groundwater Sustainability Plan for the Subbasin to estimate the sustainable yield of the Subbasin and to evaluate the potential impacts from climate change (Dudek, 2022).

The Yucaipa Subbasin is recharged via four primary sources:

- Deep percolation of precipitation;
- Return flows from irrigation, septic systems, and municipal system leaks;
- Infiltration of surface water through primary creeks that traverse the Subbasin; and
- Imported water recharged through a series of spreading basins in the North Bench Management Area.

There are no primary drainage features (e.g. creeks) that traverse the Project site and Cumulative Project areas. Additionally, the Project and Cumulative Projects will not impact operations of the North Bench Management Area spreading basins. Because of this, the potential impacts of the Project and Cumulative Projects on long-term sustainability were quantified by calculating the loss of precipitation and return flow recharge to the Subbasin through the Project and Cumulative Project areas.

## 2 Modeling Results

Under the *Future Baseline* conditions, the YIHM predicts that groundwater recharge to the Subbasin from precipitation, return flows, and surface water infiltration is estimated to range from approximately 18,636 to 41,080 acre-feet per year (AFY), and average approximately 25,626 AFY (Figure 2).

### 2.1 Estimated Project Impact

The estimated average annual groundwater recharge in the Project area is 55 AFY, or approximately 0.2% of the average annual recharge of 25,626 AFY in the Yucaipa Subbasin. The Project area is 1,463.1 acres with plans to grade and develop 1,121.1 acres (77% of the total Project area) while leaving the remaining 342 acres designated for open space use. Assuming that the developed 1,121.1 acres would be impervious and not contribute recharge from infiltrating rainfall, then the estimated loss in recharge to the Subbasin is 42.4 AFY, or approximately 0.17% of the average annual recharge to the Subbasin (Figure 2; Table 1)<sup>1</sup>. This estimate does not include incidental infiltration from within the developed footprint due to open spaces (e.g. pervious surfaces including landscaped areas), and does not account for runoff that would be temporarily detained in the 14 basins on the Project site and released back into the natural drainages that lead to downstream creeks. Therefore, the estimated loss in recharge to the Subbasin of 42.4 AFY may be an overestimation and the Project will not interfere substantially with groundwater recharge to the Yucaipa Subbasin.

### 2.2 Estimated Cumulative Projects Impact

Additional projects planned for development in the Yucaipa Subbasin include projects #41 (1257.9 acres), #27 (19.5 acres), #23 (7.24 acres) #20 (55.2 acres), and # 5 (239 acres). The smaller footprint projects include projects #22, #24, #25, #26, #28, and #29 which have a combined total area of 12.65 acres. These smaller projects' footprints do not impact the annual average recharge results; therefore, they were not assessed in YIHM estimates. The YIHM estimates an average annual recharge of 623 AFY in the Cumulative Project areas. At this time, no development plans for these projects have been prepared, so the ratio between developed and undeveloped, or open space, for each cumulative project is not known. However, assuming the same ratio (3.3:1) of developed/undeveloped area for the Project applies to the additional projects, then the estimated potential cumulative impact is an additional loss of 479.7 AFY, or approximately 1.87%, of the projected annual recharge in the Yucaipa Subbasin. (Table 1 and Figure 3). This estimated loss of recharge to the Subbasin of 479.7 AFY is likely an overestimate. The Cumulative Projects will not interfere substantially with groundwater recharge to the Yucaipa Subbasin.

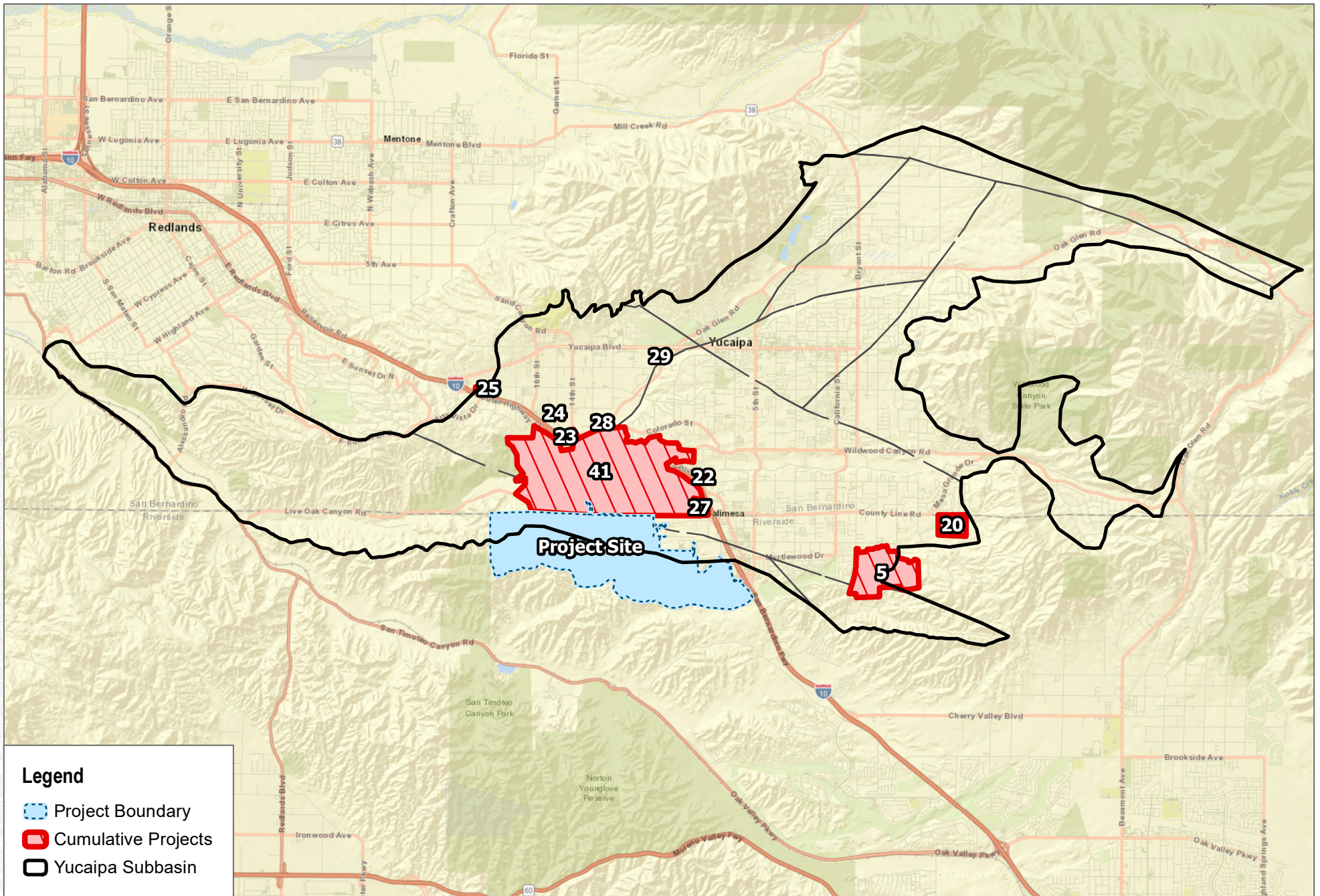
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<sup>1</sup> This assumes that the no recharge would occur through the impervious project areas and that runoff from the impervious project areas would not recharge the Subbasin.

**Table 1. Recharge through the Project and Cumulative Project Areas**

Area	Average Annual Recharge (Acre-Feet Per Year)	Estimated Impact of Development Average Annual Recharge (Acre-Feet Per Year)*	Estimated Impact of Development to Fraction of total Subbasin Recharge (%)
Yucaipa Subbasin	25,626	-	-
Project Site	55	42.4	0.17
Cumulative Project Areas	623	479.7	1.87

\*Assumes 76% impervious developed footprint

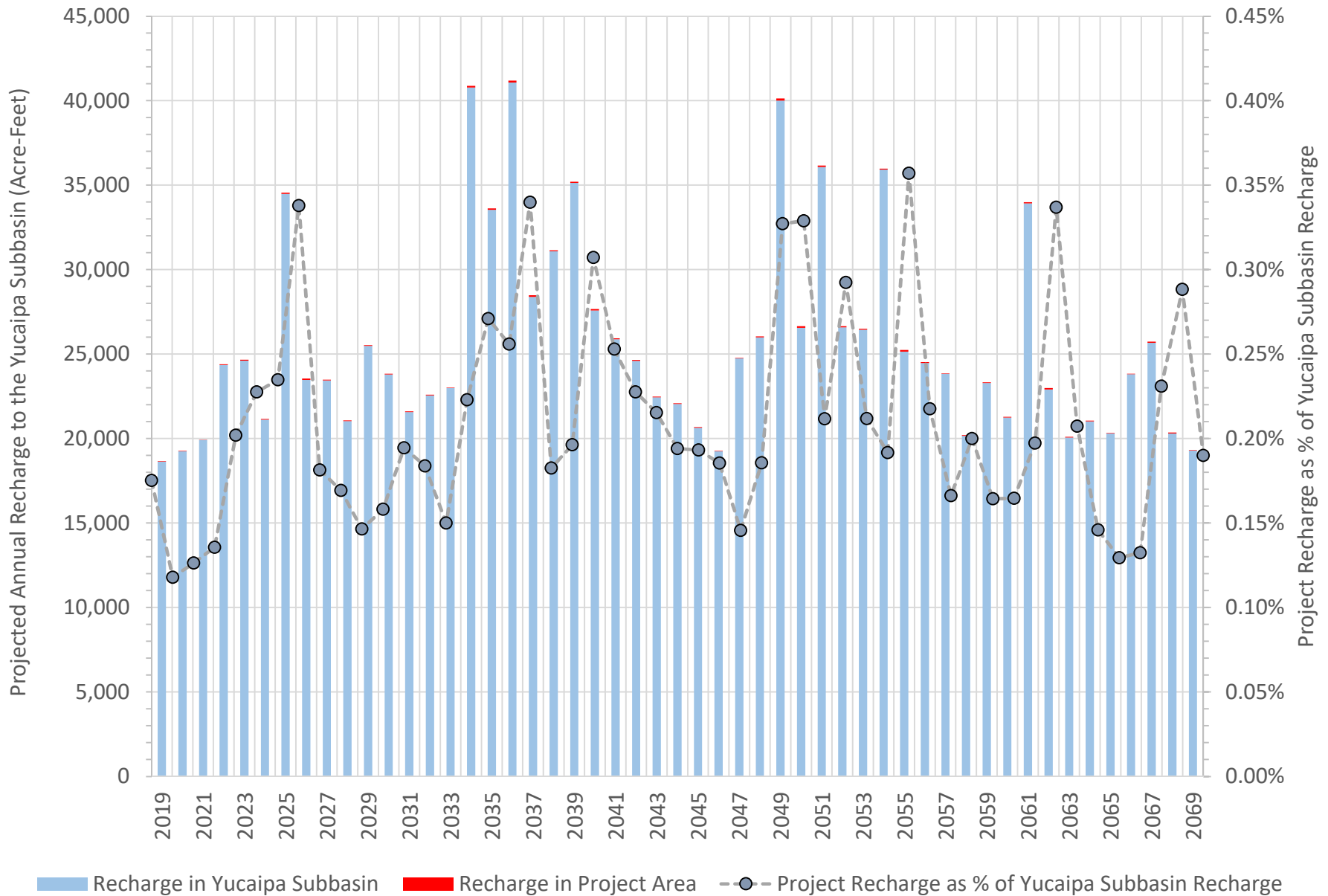


**FIGURE 1**

**Cumulative Projects**

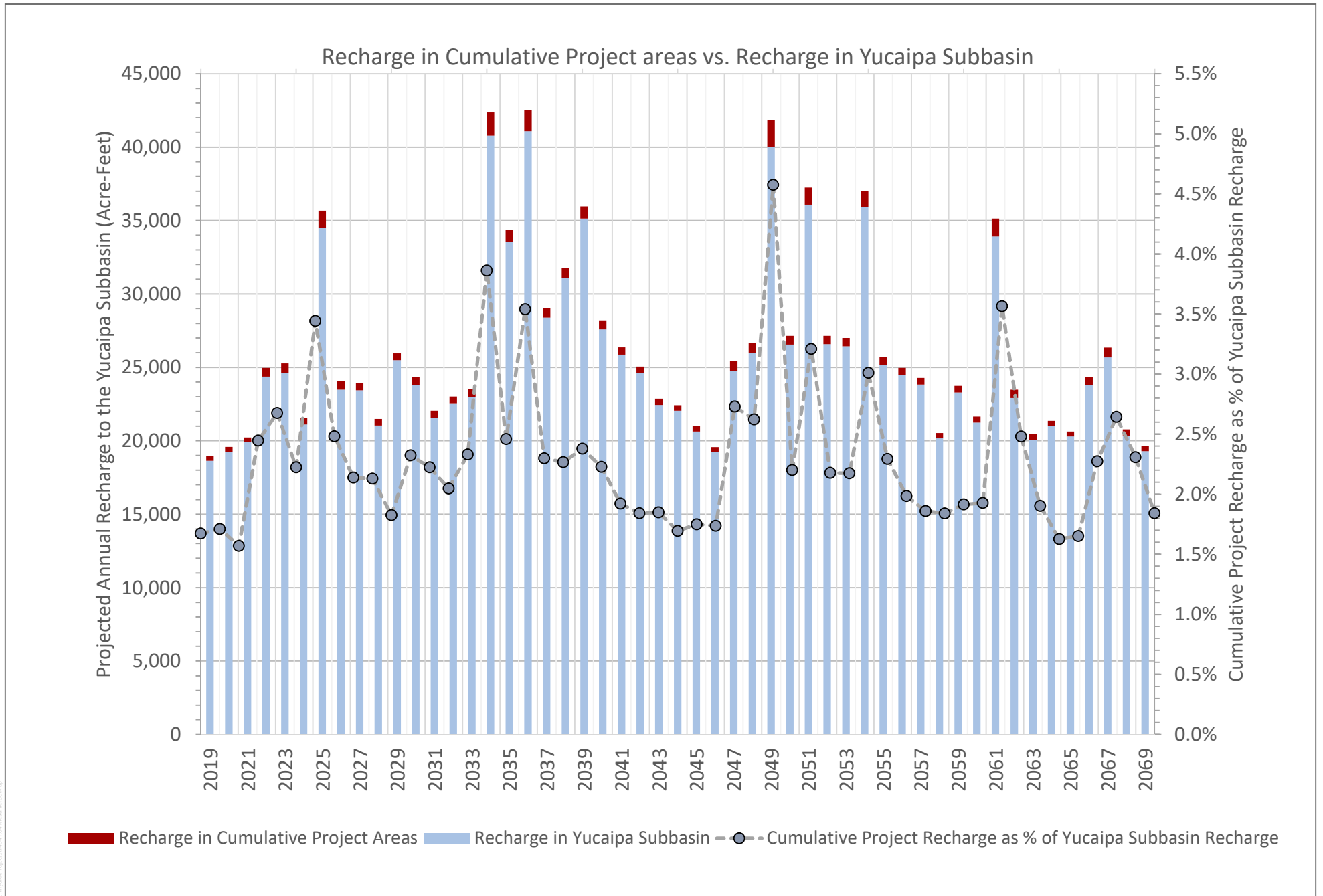
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## Recharge in Project Area vs. Recharge in Yucaipa Subbasin



SOURCE: YIHM

FIGURE 2



SOURCE: YIHM

FIGURE 3