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TECHNICAL MEMORANDUM

DATE: March 22, 2021 **PROJECT #:** 9100

TO: Eastside Aquifer Subbasin Planning Committee

FROM: Abby Ostovar, Ph.D.

PROJECT: Eastside Aquifer Subbasin Groundwater Sustainability Plan

SUBJECT: Demand Management Options

INTRODUCTION

Under the Sustainable Groundwater Management Act (SGMA), basins must include sufficient projects and management actions to show they can reach and maintain sustainability, including pumping within their sustainable yield. The Eastside Aquifer Subbasin (Eastside) is in overdraft, and it will need projects that increase overall supply and recharge and/or demand-side management. Projects and management actions can be included in the groundwater sustainability plan (GSP) in differing stages or as priority/alternative; however, under SGMA, basins that are in overdraft must quantify how they will mitigate overdraft in their GSPs. Demand-side management projects could reduce the total volume of supply that needs to be generated to reach sustainability.

Multiple types of demand-side management exist. These include, but are not limited to:

1. Further agricultural and urban conservation
2. Pumping reductions, such as a certain percentage reduction in pumping across all wells, or a certain percentage reduction by sector
3. Pumping allocations and controls

These actions could be pursued individually or together. One other subbasin is considering developing a process through which pumping controls are developed if certain triggers are met; however, that approach would not work for subbasins like the Eastside that are in overdraft and have to quantify their mitigation of overdraft.

Due to its complexity, this memo focuses on the third type of demand-side management – pumping allocations and controls. Pumping allocations divide up the sustainable yield among beneficial users. Pumping allocations are not water rights and cannot determine water rights. Instead, they are a way to plan for future growth and/or land use changes and regulate groundwater extraction. They can be used to:

- Underpin management actions that manage pumping
- Generate funding for projects and management actions; however, other options exist for generating funding for projects
- Incentivize water conservation and/or recharge projects

On November 18, 2020, Valerie Kincaid presented an overview of pumping allocations in a valley-wide workshop. In December 2020/January 2021, committee members and other stakeholders completed a survey on their preferences for a pumping allocation structure. At the February 2021 Eastside Aquifer Subbasin Planning Committee meeting, members discussed whether and what type of pumping allocation structure would be appropriate in the Eastside Subbasin. At the end of the meeting, members asked Montgomery & Associates (M&A) to distill the main options. This memo presents three decision points to be considered in the development of allocations.

BACKGROUND

Eastside Aquifer Subbasin covers 57,000 acres, of which almost 70% are agricultural (Figure 1 and Figure 2). Land use from the Monterey County Assessor's Office and water system boundaries is combined and aggregated into categories that align with allocation structures. This is included as an example, and a more refined analysis will be done before an allocation structure is developed.

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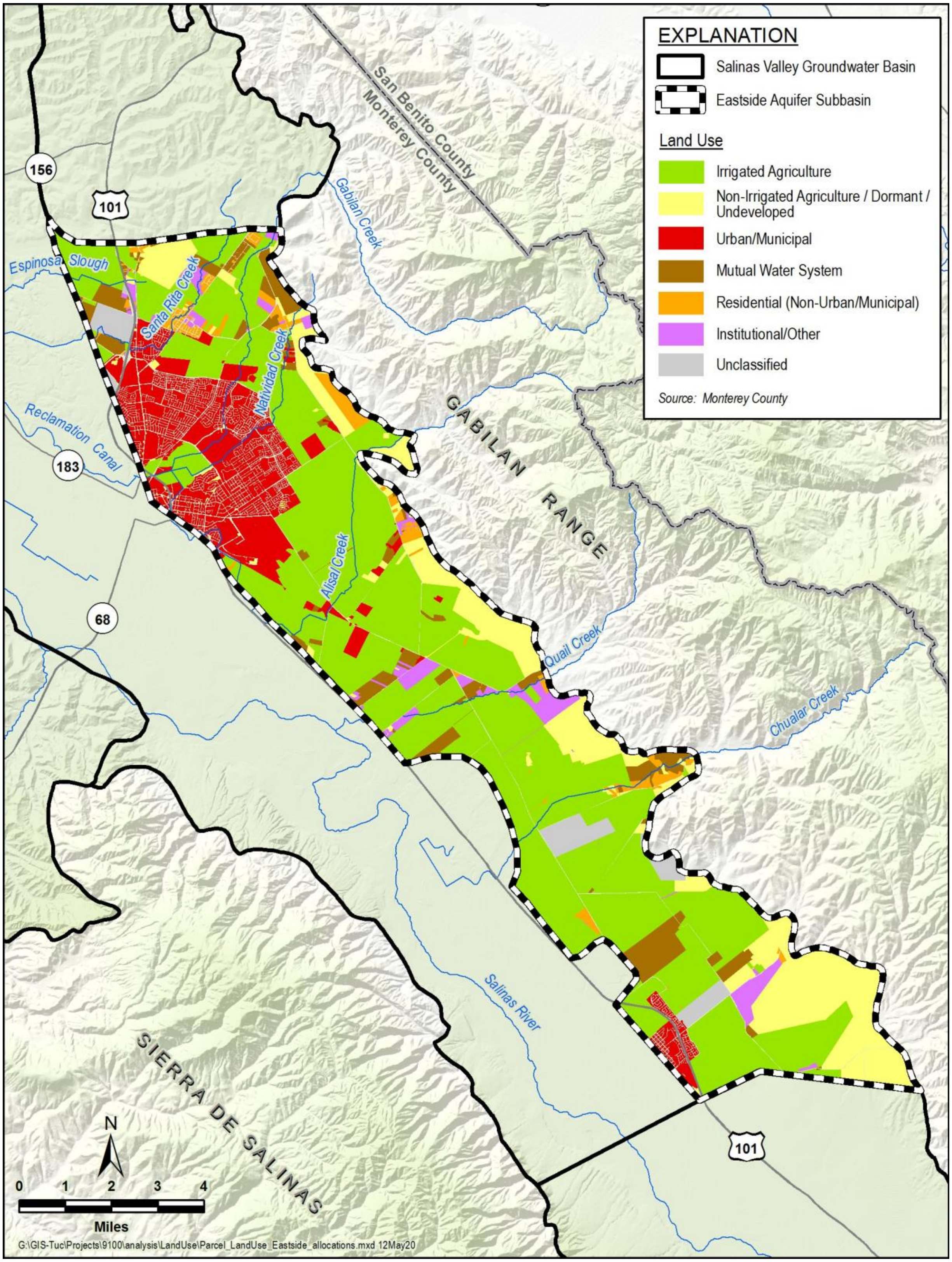

Figure 1. Map of Land Use by Allocation Category in Eastside Aquifer Subbasin

Land Use	Acres	Percent
Irrigated Agriculture	31,045	54%
Non-irrigated Ag / Vacant / Undeveloped	8,997	16%
Mutual Water Systems	3,231	6%
Urban/Municipal	7,323	13%
Residential (Non-Urban/Municipal)	1,406	2%
Institutional/Other	1,597	3%
Unclassified	1,454	3%
Not in Parcel Layer	2,414	4%
Total	**57,468**	100%

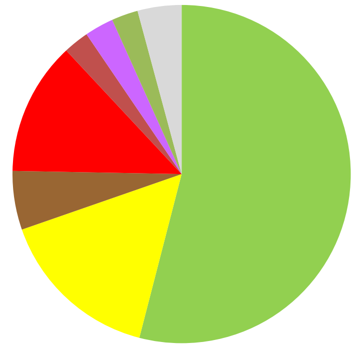

Figure 2. Chart and Table of Land Use by Allocation Category in Eastside Aquifer Subbasin

Figure 3 shows the average annual extraction in the Eastside as an example of how much water is extracted by each category of user. Based on 2016-2018 Groundwater Extraction Management System (GEMS) data collected by the Monterey County Water Resources Agency (MCWRA), irrigated agriculture uses 84% of pumped groundwater in the Eastside (MCWRA, 2016-2018). *De minimis* water use was estimated based on GIS analysis. Mutual water systems and *de minimis* water users use too little to be visible on the figure.

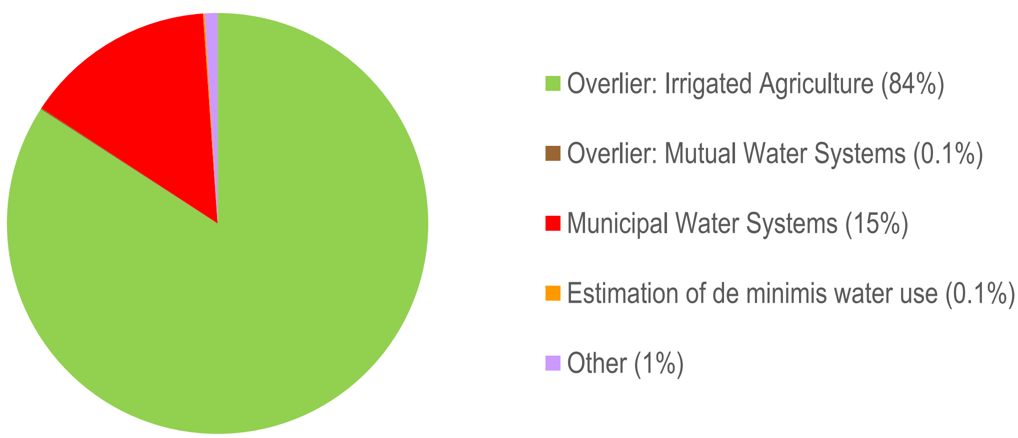

Figure 3. Average 2016-2018 Groundwater Extraction in Eastside Aquifer Subbasin

ALLOCATION APPROACH OPTIONS

GSPs must show that a basin can meet sustainability within 20 years and maintain sustainability for an additional 30 years. Each GSP also requires a plan to fund these efforts.

There is no requirement under SGMA to develop pumping allocations; however, inclusion of an allocation program may be beneficial to demonstrate that a GSA has sufficient contingency actions, should preferred projects and actions not achieve sustainability or conditions change. Projects and management actions can be ranked by priority to show that an allocation structure is not a preferred action.

Allocations can be developed based on various criteria. Based on subbasin committee members' responses to the Pumping Allocations Survey, meeting discussion, and legal consultation, three key decisions in an allocation approach are outlined here. This is not an exhaustive list but provides the basic options. These options and figures are intended to be conceptual. If an allocation structure is pursued during GSP implementation, greater analysis and stakeholder engagement would occur as part of its establishment.

DECISION POINT 1: HOW SHOULD ALLOCATIONS FOR IRRIGATED LAND OCCUR?

The first decision focuses only on the basis for allocation for irrigated land. It poses two options: distribute the agricultural allocation equally amongst irrigated acres or determine agricultural allocation by historical cropping.

For equal allocation, every pie slice of irrigated agricultural allocation in Figure 4 is an identical size, indicating that every acre is allocated the same amount of water regardless of crop type or irrigation technique. Figure 4 includes a set aside for future planting on land that is currently dormant, so as to be comparable to the second option, but set asides are addressed in Decision Point 2.

The second option, historical cropping, takes into account that not all crops use the same amount of water per acre. This option is an allocation structure based on historical crop type, whereby irrigated acres that historically grew crops that required more water would receive greater allocations than acres that grew crops that used less water. 2017 spatial crop type data was derived from the Salinas Valley Integrated Hydrologic Model (SVIHM) *(Provisional data subject to revision*)*. Using the crop acreage and estimated water use per acre for each type of crop (MCWRA, 2014), Figure 4 groups crop types into vegetables, berries, grapes, and other crops to include in an example allocation structure. All pie slices for vegetables in Figure 4 are the same size, indicating that every acre that was historically cropped with vegetables would receive an equal allocation. While just an example, Figure 4 shows that irrigated acres growing vegetables would receive a larger allocation than irrigated acres growing grapes. A dormant set aside is required with this approach so as to not eliminate the right of unirrigated land from using water in the future; however, the size of the set aside could be adjusted.

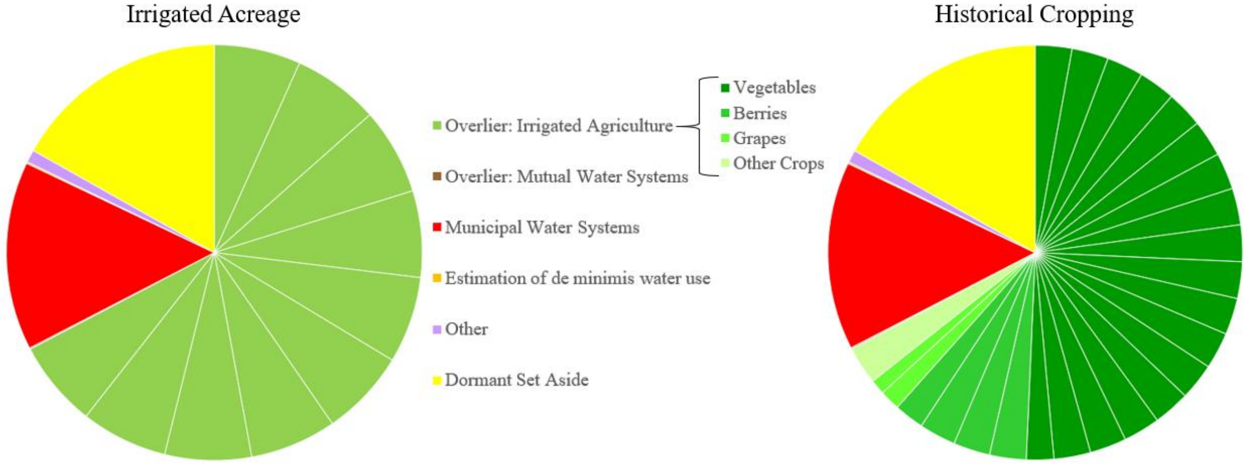

Figure 4. Allocation by Irrigated Acreage (left-hand pie chart) and Historical Cropping (right-hand pie chart)

DECISION POINT 2: HOW IS URBAN AND IRRIGATED AGRICULTURE GROWTH PLANNED FOR?

Allocation structures should plan for future growth that may occur, such as from urban growth or land coming into irrigated agricultural production. One method is to reallocate the sustainable yield when growth occurs, as portrayed in the left-hand pie chart in Figure 5, with equal growth for urban (municipal water system) and irrigated agriculture. If one of those categories of users grows more than the other, then the corresponding allocation (percent of the pie) would increase.

A second method, shown by the right-hand pie chart, is to plan for potential growth through set-asides. This example establishes the agricultural and urban growth set asides at 20% of current agricultural and urban production, thus reducing the current agricultural and urban pumping each by up to 20%. However, until growth occurs, the set-aside allocations could be reallocated to existing extractors, thus making distribution no different than the base allocation.

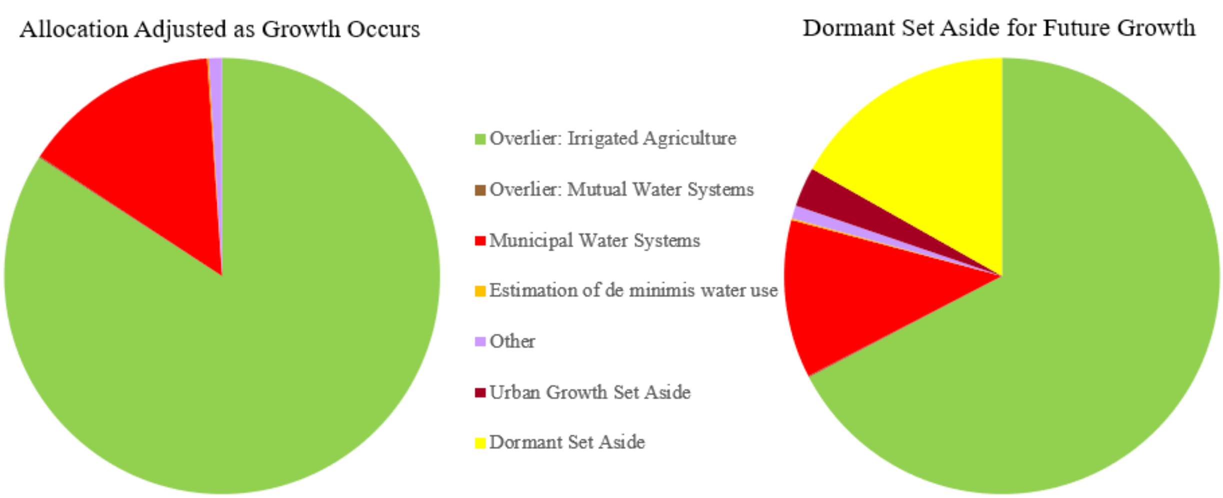

Figure 5. Options for Urban and Irrigated Agriculture Growth

DECISION POINT 3: WHAT OCCURS WHEN PUMPING HAS TO BE REDUCED TO MEET THE SUSTAINABLE YIELD?

Along with the basis for allocation (Decision Point 1), an allocation structure must define how adjustment occurs to bring extraction in line with the sustainable yield (e.g. adjusting the size of the pie). Figure 3 shows an allocation structure that mirrors current (2016-2018) groundwater extraction, which is larger than the sustainable yield (e.g. the subbasin is in overdraft). Using that as the base allocation, Decision Point 3 outlines three options for which category of water users would have priority as adjustment occurs. For each option, two pie charts are included – one that roughly reflects the allocation approach applied to total current pumping and the other that reflects pumping within the sustainable yield that is a smaller volume. These examples are conceptual, and the details of an allocation structure and the extent of reductions would be determined when the allocation structure is actually established during GSP implementation. For simplicity of these conceptual examples, de minimis water use, mutual water systems, and other water uses are not adjusted because they constitute 1% or less of groundwater extraction.

The first option assumes drinking water systems have priority, and therefore agricultural pumping would be curtailed first, or to a greater extent, to bring pumping in line with a sustainable yield that is less than current pumping. Figure 6 shows allocation based on current pumping in the left-hand pie chart and allocation within the sustainable yield in the right-hand pie chart. In the latter, municipal and mutual water systems continue to use approximately the same amount of groundwater, while agriculture has a smaller usage.

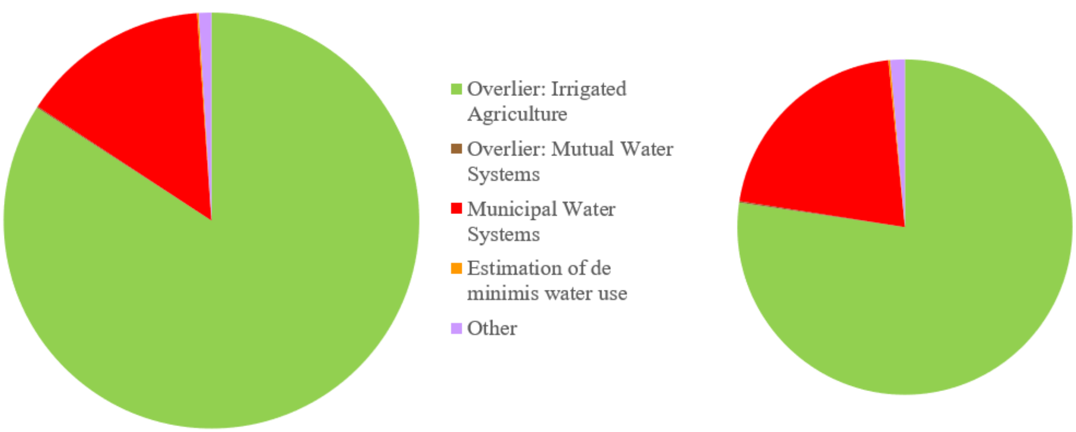

Figure 6. Drinking water systems have priority

The second option assumes users with overlying groundwater rights have priority, which consists mainly of irrigated agriculture and mutual water systems. In this allocation structure, municipal pumping would be curtailed first, or to a greater extent, as shown in Figure 7. Allocation based on current pumping is shown in the left-hand pie chart and allocation within the sustainable yield in the right-hand pie chart. In the latter, irrigated agriculture and mutual water systems continue to use approximately the same amount of groundwater, while municipal water systems reduce their extraction.

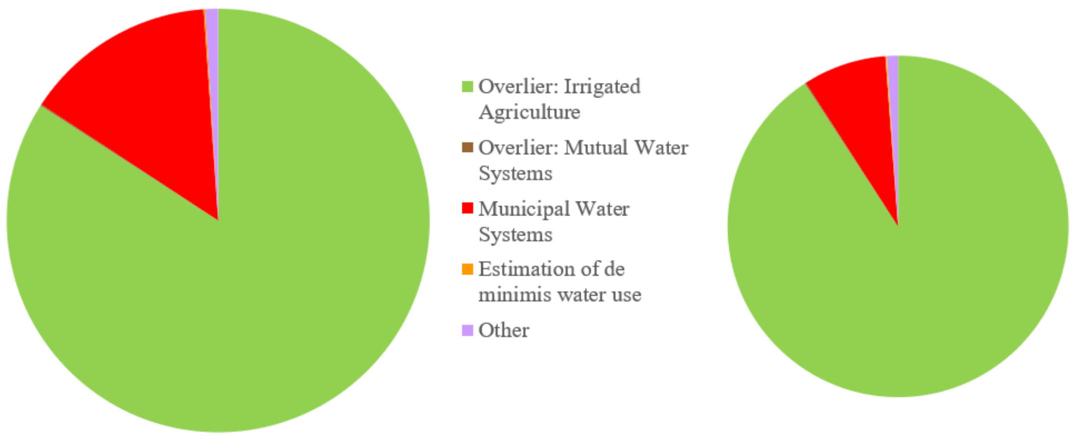

Figure 7. Overliers have priority

The third option treats all groundwater users equally, requiring proportional adjustments, as shown in Figure 8. Reductions in groundwater extraction are correlatively applied such that all reduce their extraction proportionally if the sustainable yield is less than current extraction. The only exception is *de minimis* users, who are estimated and therefore are estimated to use the same amount of water even if the sustainable yield is less than current extraction.

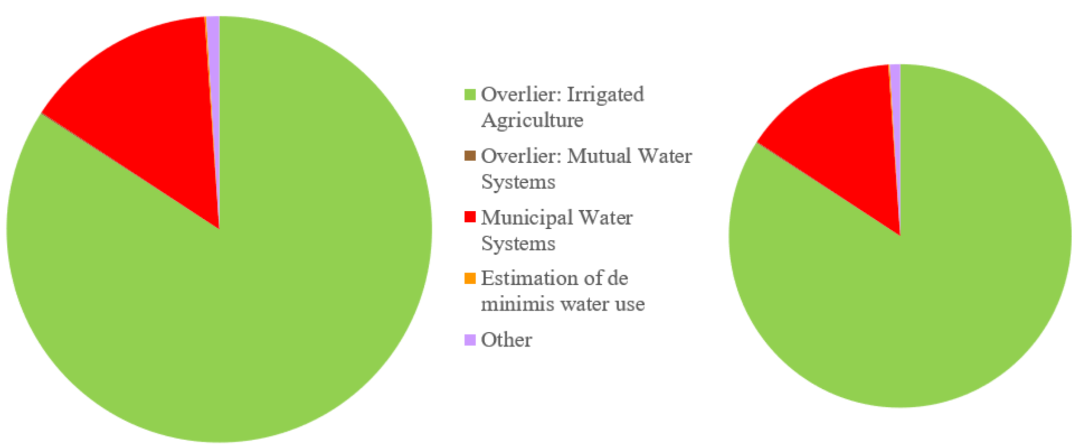

Figure 8. Correlative Reduction

CONCLUSIONS

This memo presents demand-side management options that could be included in the Eastside Aquifer Subbasin GSP. It focuses on the most complex, pumping allocations, and outlines three key decision points for the development of pumping allocations. These are not the only decision points and options, but are intended to provide a starting point for discussion. The Subbasin Planning Committee has the option of achieving sustainability through pumping allocations, or through other projects and management actions. Allocations can also provide the basis for funding or a water market. These options were derived from stakeholder input but are not the only options and can be altered or refined by the Committee.

Including pumping allocations in the GSP would show that allocations are a potential management tool that can be used if needed, but it will not establish pumping allocations. Additionally, pumping allocations can be identified as a management action that would only be implemented if after exhausting all other project and management action options. During the GSP implementation period, a full stakeholder engagement process would need to be undertaken prior to the establishment of pumping allocations.

**NOTE: These data (model and/or model results) are preliminary or provisional and are subject to revision. This model and model results are being provided to meet the need for timely best science. The model has not received final approval by the U.S. Geological Survey (USGS). No warranty, expressed or implied, is made by the USGS or the U.S. Government as to the functionality of the model and related material nor shall the fact of release constitute any such warranty. The model is provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the model.*

REFERENCES

Association of Monterey Bay Area Governments (AMBAG). 2018. *2018 Regional Growth Forecast*. https://ambag.org/sites/default/files/2020-01/08-AMBAG_MTP-SCS_AppendixA_PDFA.pdf

Groundwater Extractions Management System (GEMS). 2016-2018. Data provided by Monterey County Water Resources Agency.

Monterey County Water Resources Agency (MCWRA). 2014. *2013 Ground Water Summary Report*. https://digitalcommons.csumb.edu/hornbeck_cgb_6_a/2/

Sustainable Groundwater Management Act. California Assembly Bill 1739 (Dickinson), Senate Bill 1168 (Pavley), and Senate Bill 1319 (Pavley). September 16, 2014. http://www.waterboards.ca.gov/water_issues/programs/gmp/docs/sgma/sgma_20190101.pdf

Salinas Valley Integrated Hydrologic Model (SVIHM). 2021. Provisional data provided by U.S. Geological Survey and subject to revision.