# Salinas Valley Basin GSA

## Langley GSP Overview

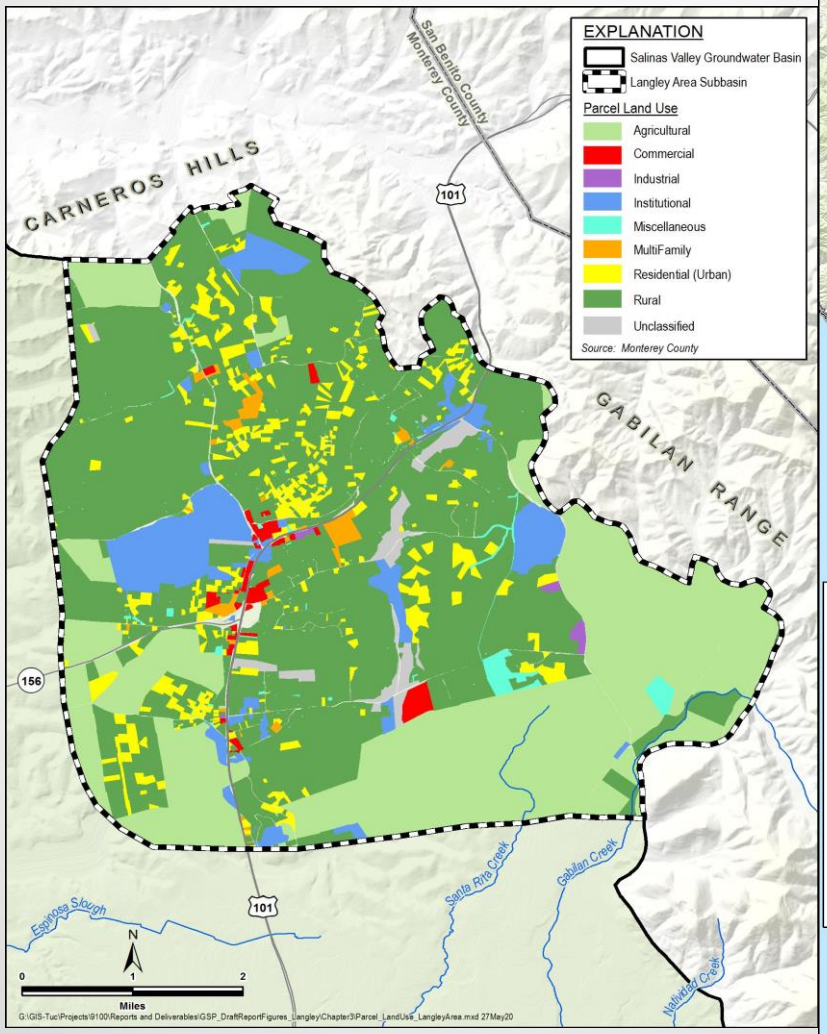
Presented to SVBGSA Advisory Committee
June 17, 2021

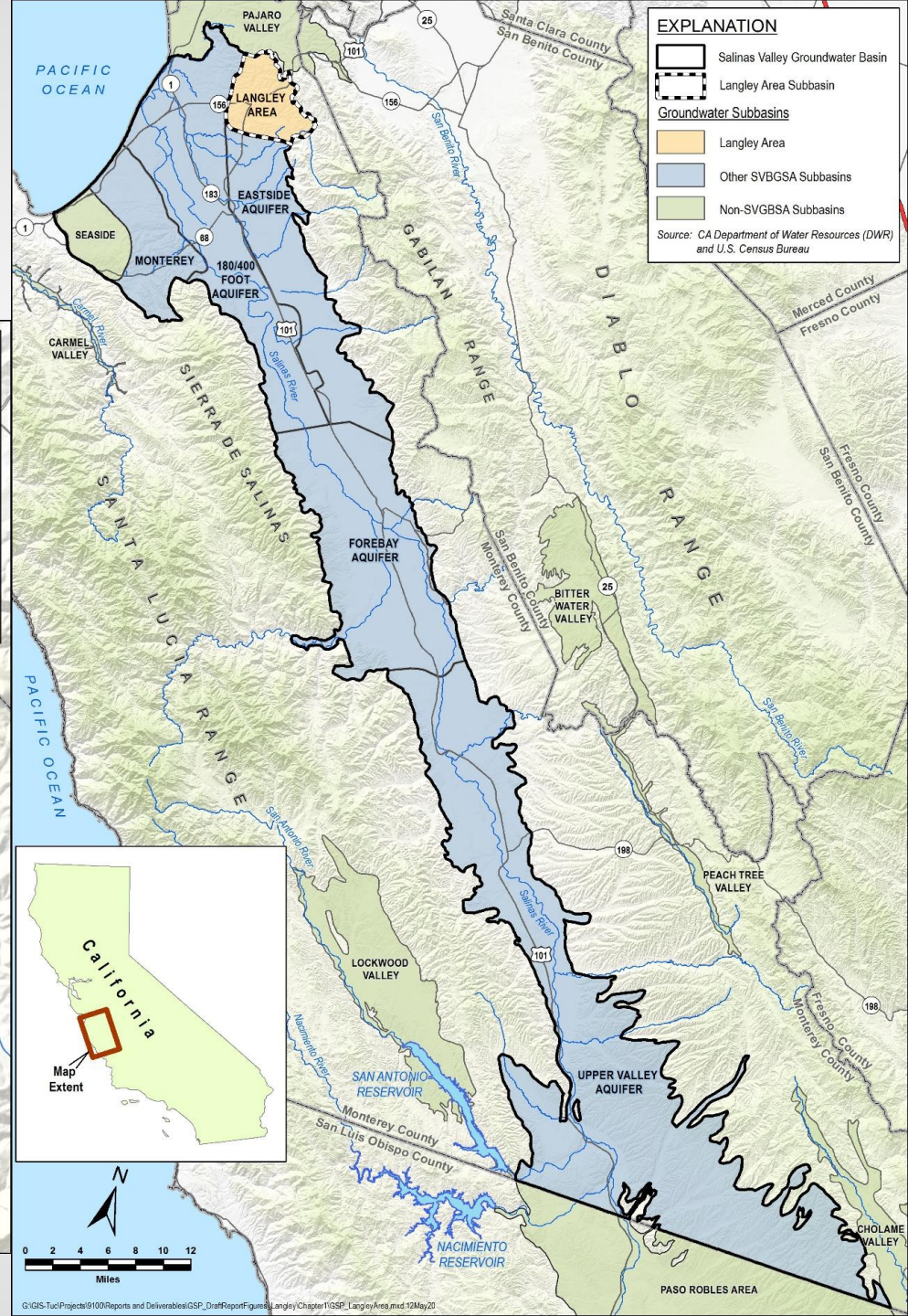
Prepared by

MONTGOMERY & ASSOCIATES

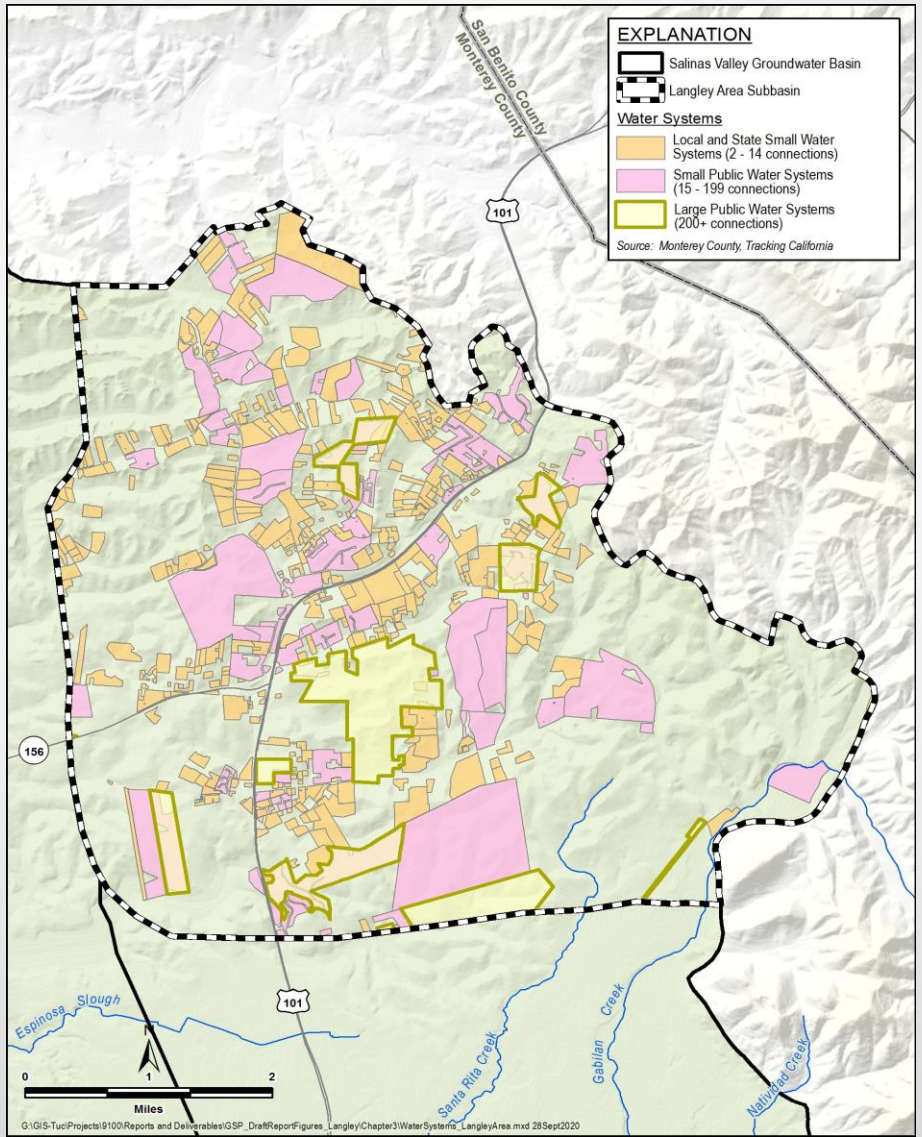
# Langley Area Subbasin

- 17,600 acres
- Most land designated rural (8,862 acres)



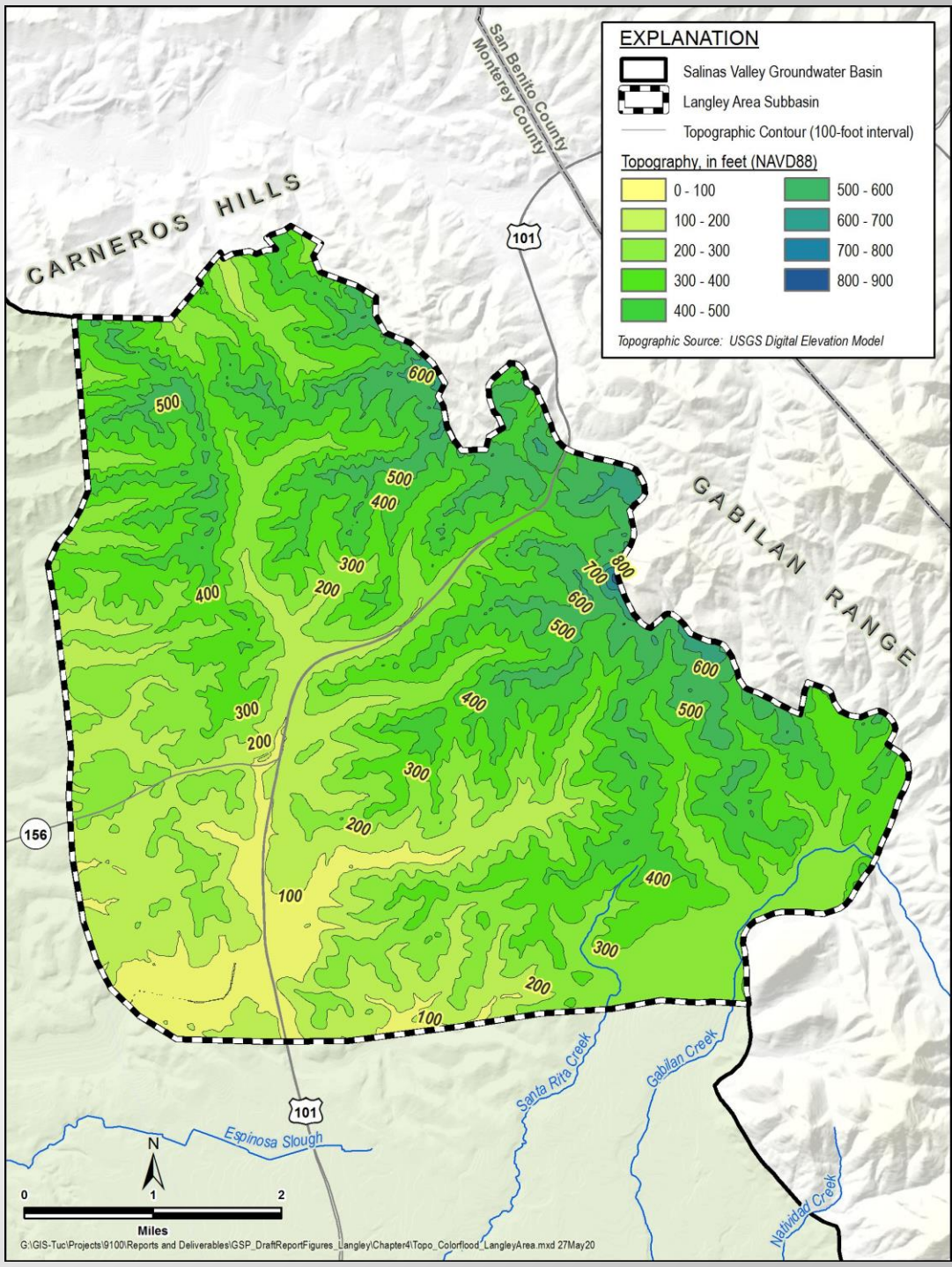



# Communities Dependent on Groundwater

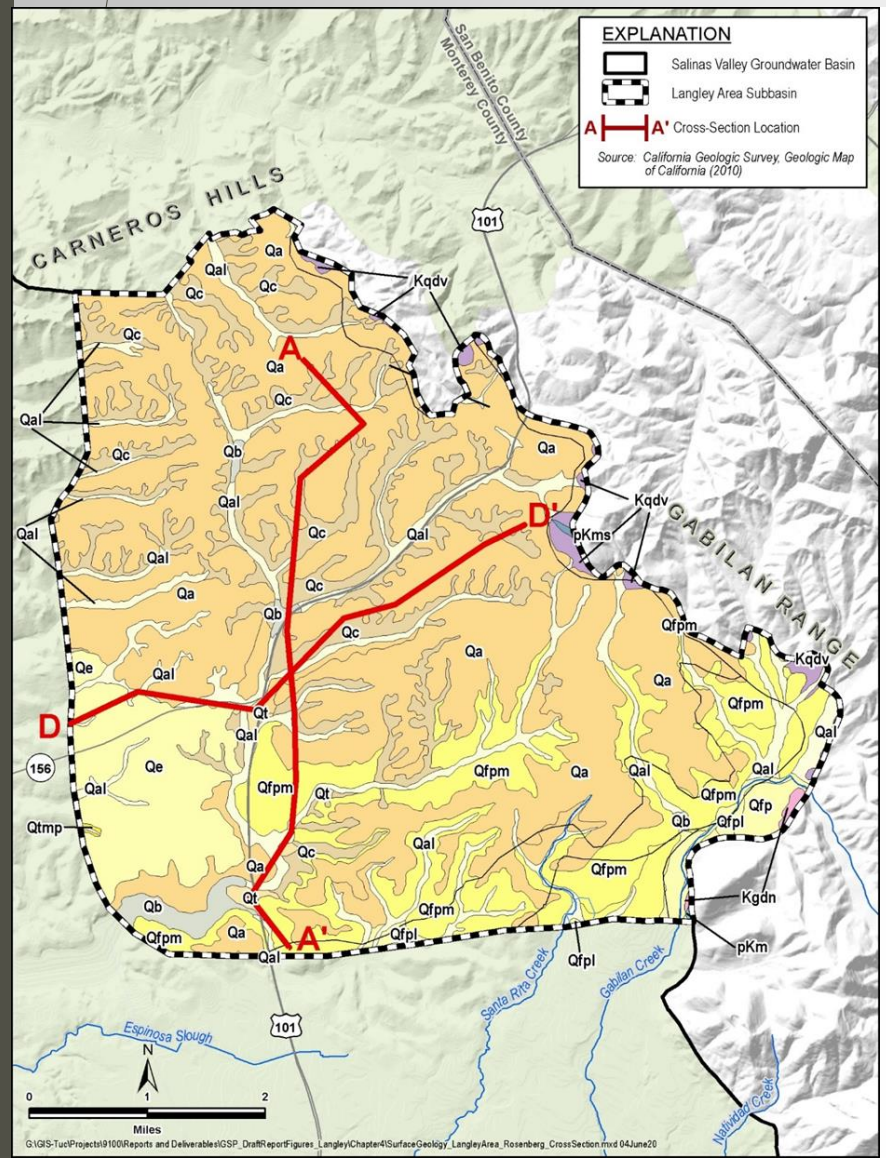


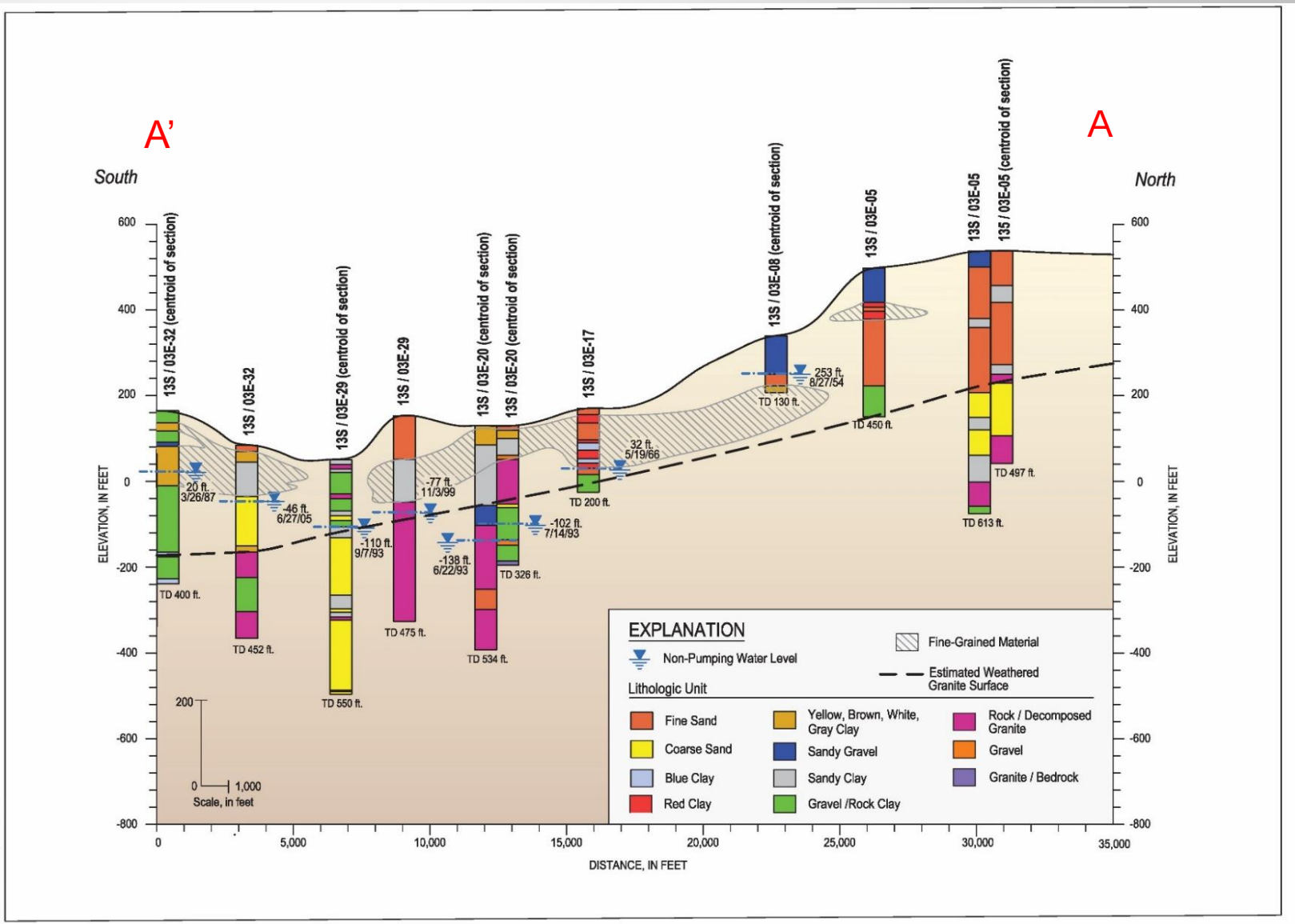
# Basin Setting - Topography

- Hilly area
- Not like the other subbasins
- Underlain by fractured granite bedrock



# Hydrogeologic Conceptual Model



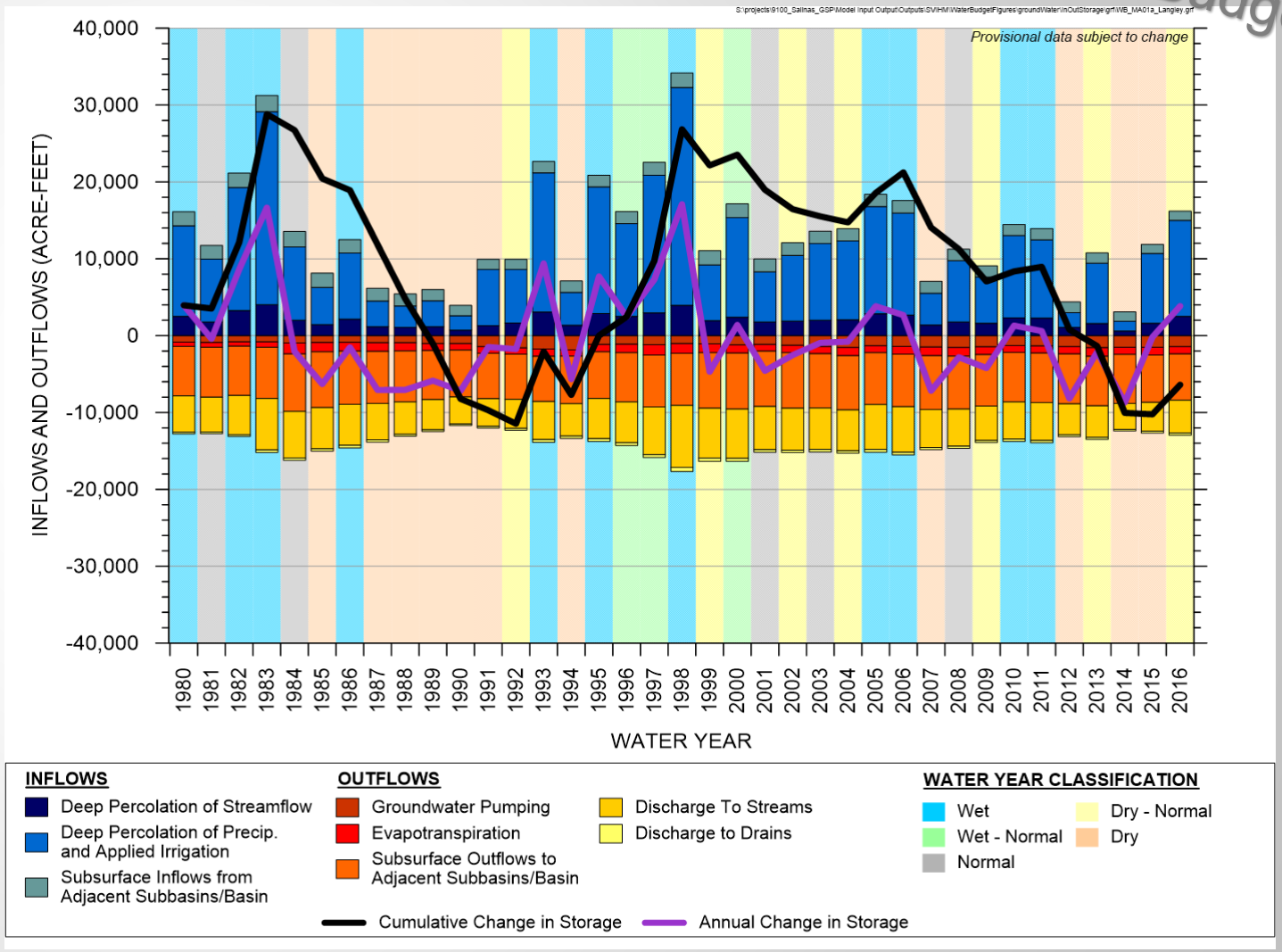



# Groundwater Budget

Updated Water Budget

| | Historical Average (WY 1980-2016) | 2030 | 2070 |
|---|---|---|---|
| Groundwater Pumping | -1,200 | -1,300 | -1,400 |
| Flows from Drains | -300 | -600 | -600 |
| Net Stream Exchange | -3,000 | -900 | -1,100 |
| Deep Percolation of Precipitation & Applied Irrigation | 9,800 | 10,600 | 11,600 |
| Net Flow from Eastside | -1,100 | -900 | -900 |
| Net Flow from Outside Areas | 100 | 100 | 100 |
| Net Flow from Pajaro | -300 | -300 | -300 |
| Net Flow from 180/400-Foot | -3,700 | -4,100 | -4,300 |
| Groundwater Evapotranspiration | -1,000 | -1,900 | -2,100 |
| Net Storage Gain (+) or Loss (-) | -700 | 800 | 1,000 |

Provisional data subject to change.
Units are acre-feet per year.
Negative values indicate a loss of groundwater.



# Sustainable Yield = pumping + change in storage

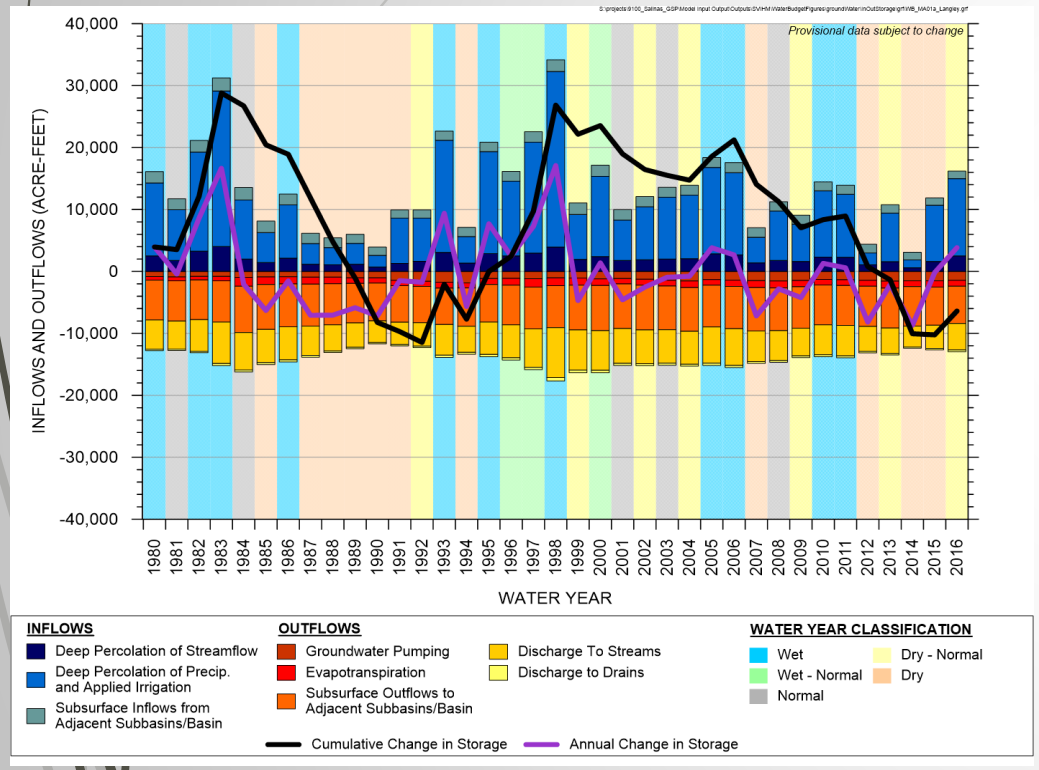
Updated Water Budget

| | Historical Sustainable Yield | 2030 Projected Sustainable Yield | 2070 Projected Sustainable Yield |
|---|---|---|---|
| **Groundwater Pumping** | 1,200 | 1,300 | 1,400 |
| **Seawater Intrusion** | 0 | 0 | 0 |
| **Change in Storage** | -700 | 800 | 1,000 |
| **Projected Sustainable Yield** | 500 | 2,100 | 2,400 |
| **% Pumping Change** | 58% decrease | 62% increase | 71% increase |

Provisional data subject to change.
Units are acre-feet per year.
Negative values indicate a loss of groundwater.

***Sustainable yield from Model is in the process of being adapted based on historical extraction data***

# Groundwater Budget




- Overall – there is no chronic decline in water levels and Langley is roughly in balance
- Historical and future are both averages of many years/hydrologic periods
- Current is a snapshot and does not tell us much since it only views change from one year to the next
- Future change in storage is likely overestimated because it starts from a low point.
- Future water budget incorporates average climate change, but does not represent short-term climate change effects

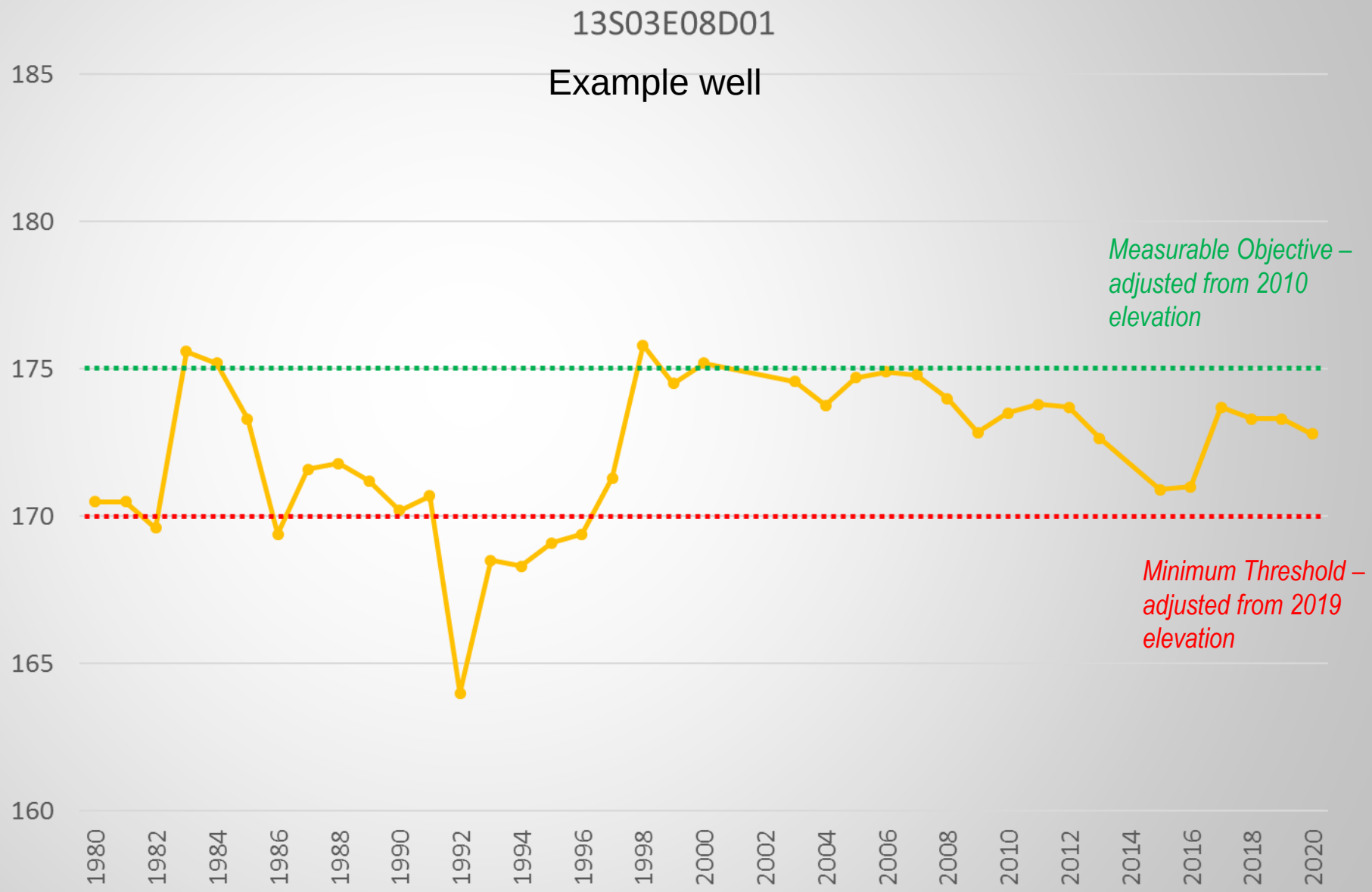
# Groundwater conditions/SMC – **Groundwater Levels**

**1. Chronic lowering of groundwater levels SMC**

**Measurable Objective (MO):**
2010 groundwater elevations adjusted based on well-specific elevation assessments.

**Minimum Threshold (MT):**
2019 groundwater elevations adjusted based on well-specific elevation assessments.

**Undesirable Result:**
More than 15% of groundwater elevation minimum thresholds are exceeded.



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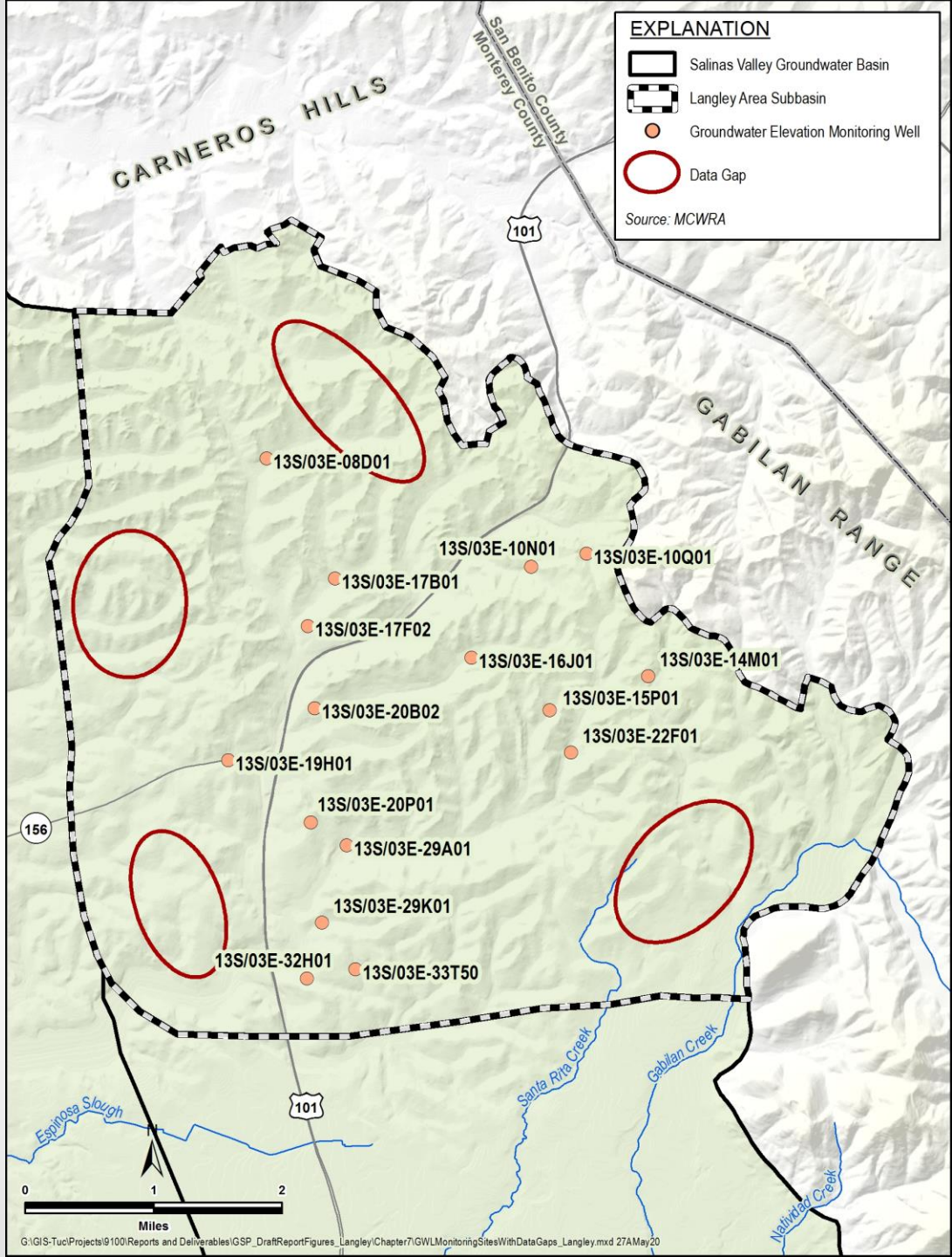
***All wells currently have water levels between the MO and MT***



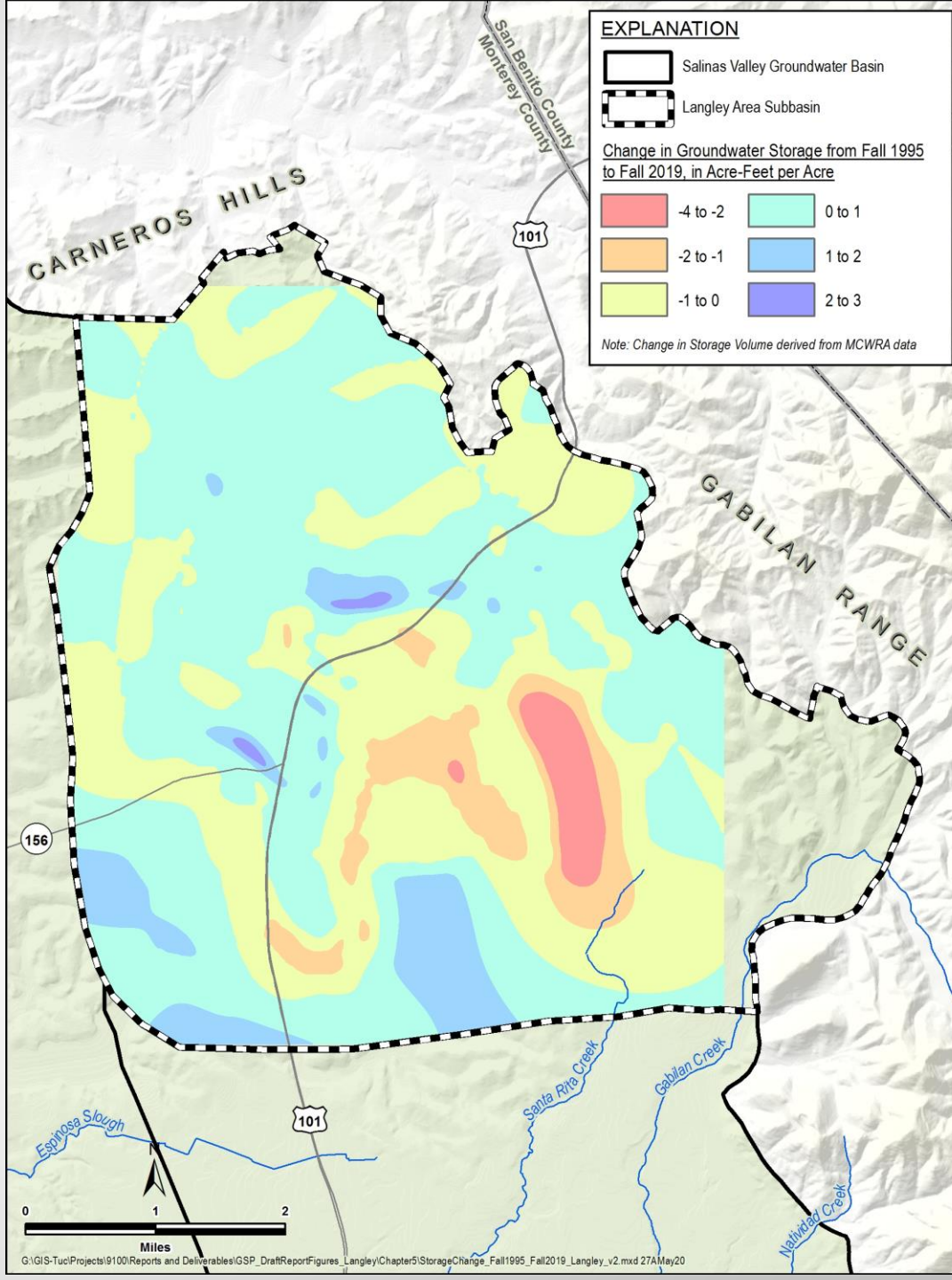
# Groundwater conditions/SMC – **Groundwater Storage**

## 2. Reduction in Groundwater Storage

**Measurable Objective (MO):**
Established by proxy using groundwater elevations. Set to the same as groundwater levels measurable objectives.

**Minimum Threshold (MT):**
Established by proxy using groundwater elevations. Set to the same as groundwater levels minimum thresholds.

**Undesirable Result:**
More than 15% of groundwater elevation minimum thresholds are exceeded..



# Groundwater conditions/SMC – **Seawater Intrusion**

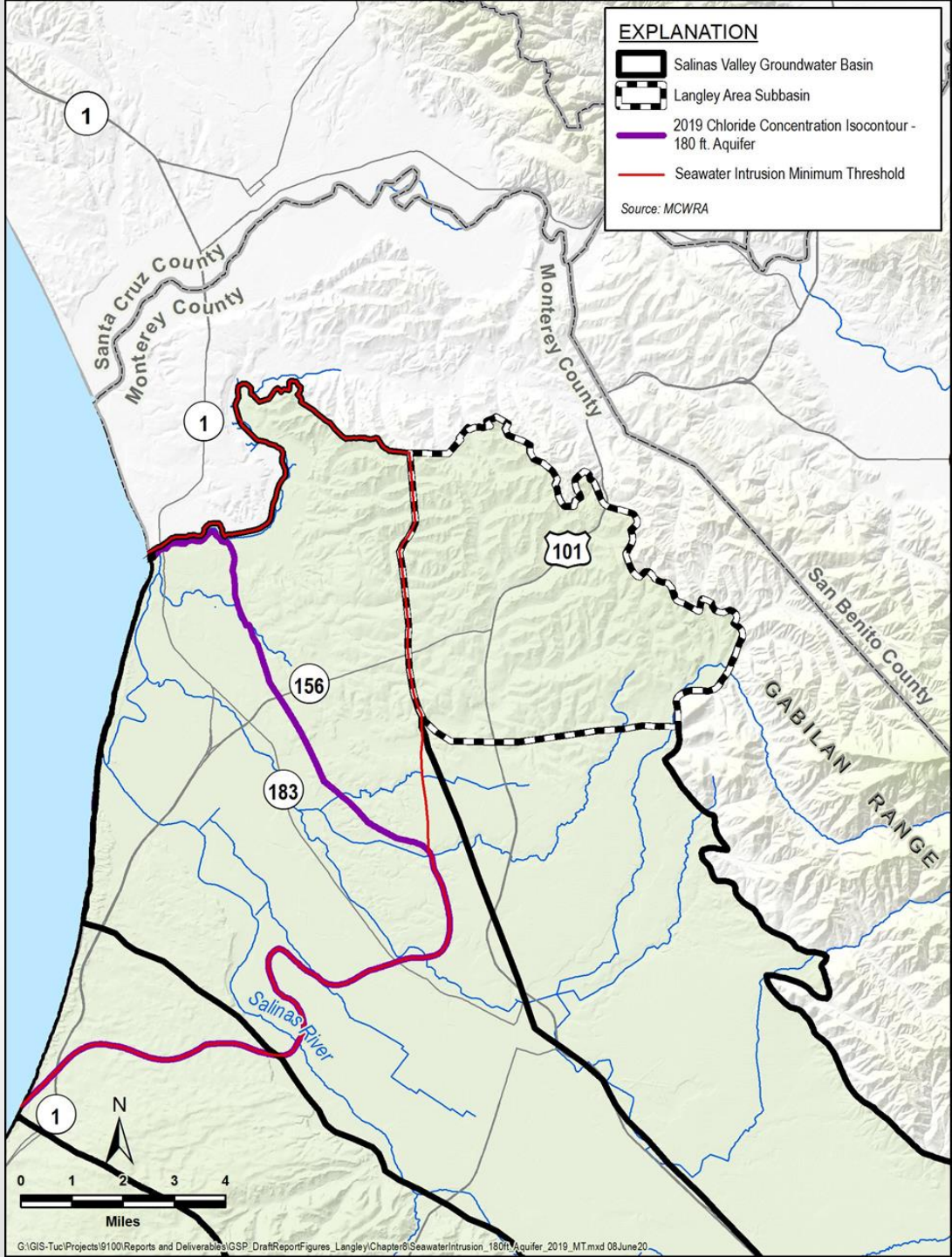
**3. Seawater Intrusion**

**Measurable Objective (MO):**
The 500 mg/L chloride isocontour at the Subbasin boundary, resulting in no seawater intrusion in the Langley Subbasin.

**Minimum Threshold (MT):**
Same as the measurable objective

**Undesirable Result:**
Any exceedance of the minimum threshold, resulting in mapped seawater intrusion within the Subbasin boundary.

- No seawater intrusion in the subbasin
- Minimum threshold is at the subbasin boundary



# Groundwater conditions/ SMC **Water Quality**

## 4. Degraded Groundwater Quality

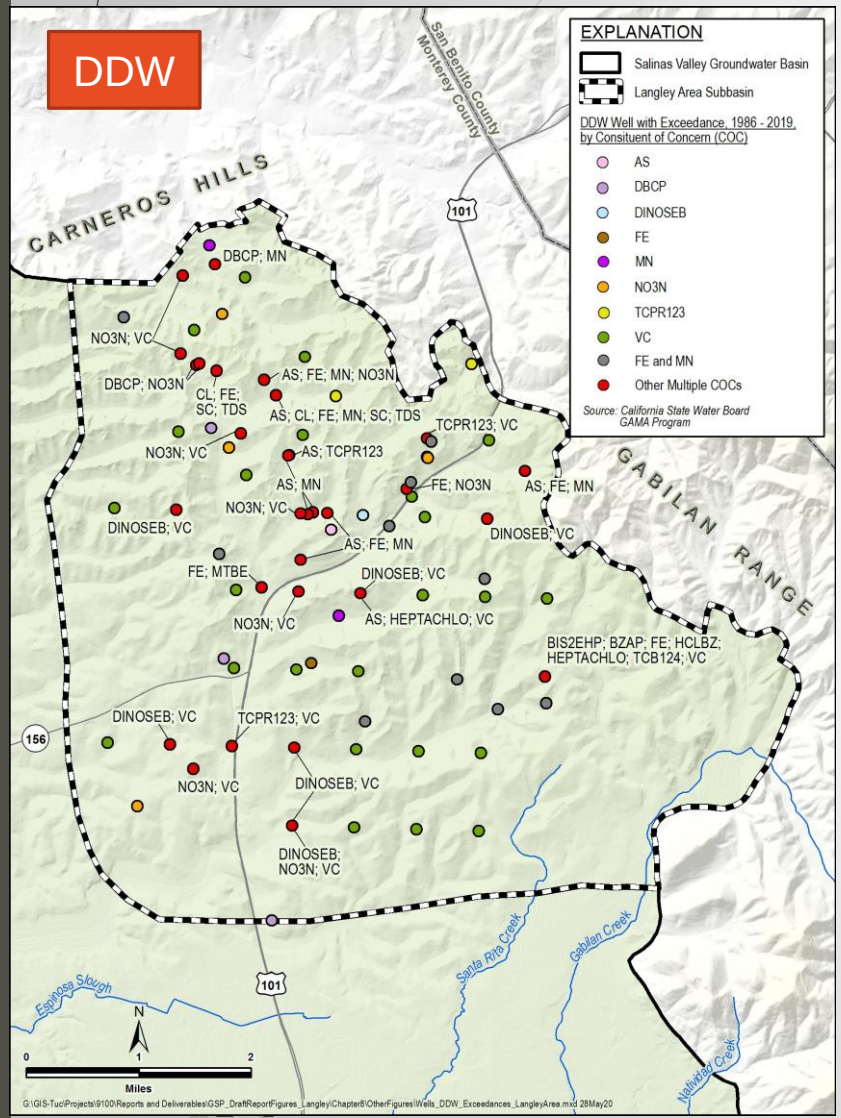
### Measurable Objective (MO)
Zero additional exceedances of either the regulatory drinking water standards (potable supply wells) or the Basin Plan objectives (irrigation supply wells) beyond those observed in 2019 for groundwater quality constituents of concern.

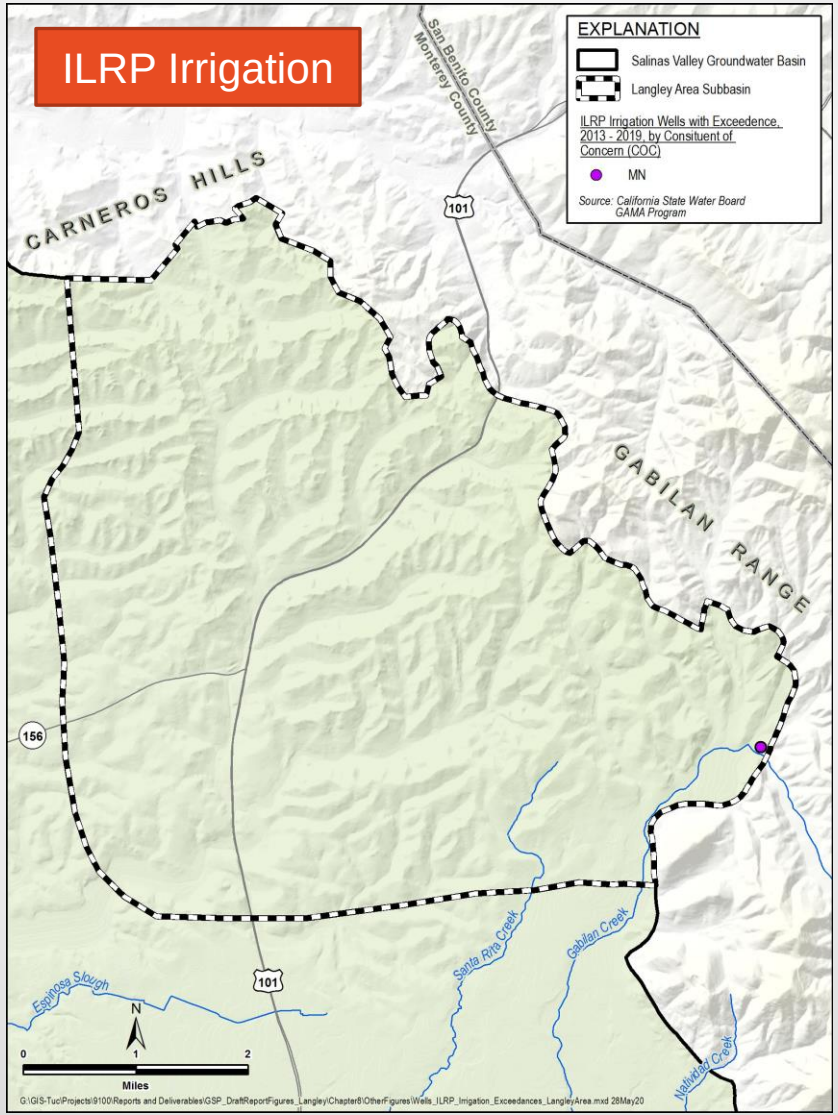
### Minimum Threshold (MT)
Same as the measurable objective

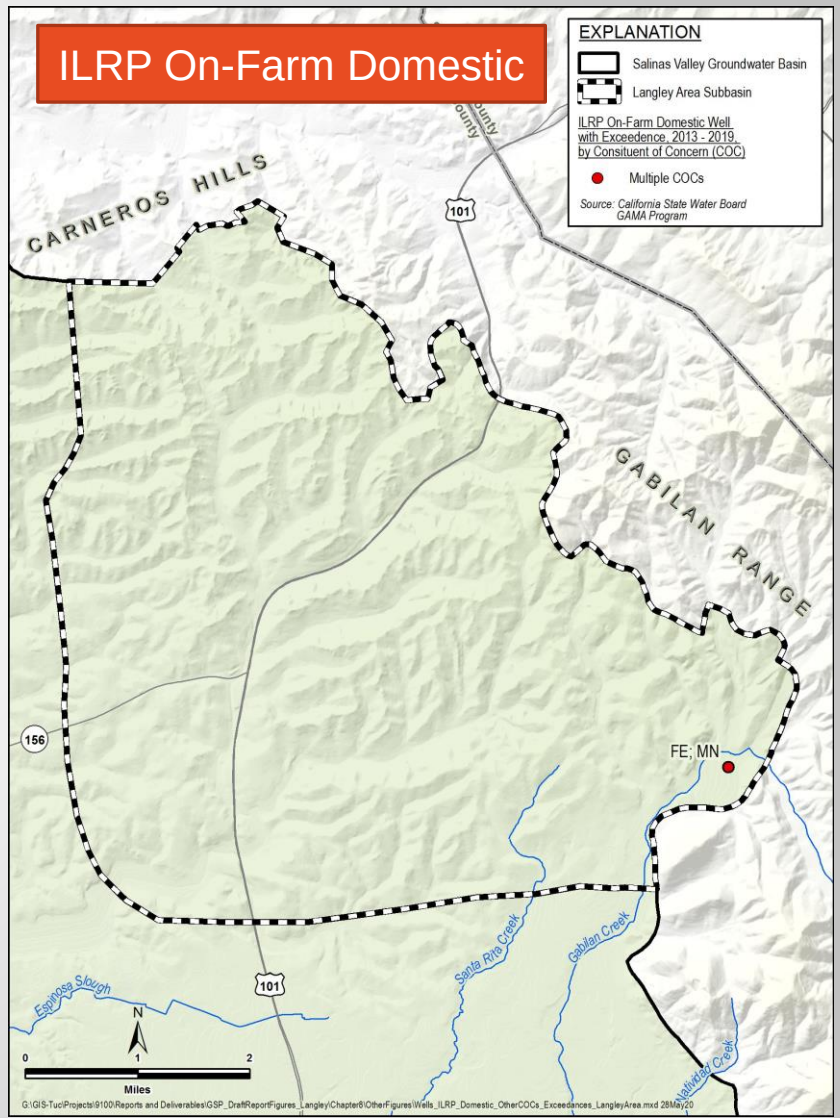
### Undesirable Result:
The minimum threshold is exceeded as a direct result of projects or management actions taken as part of GSP implementation.

| Constituent of Concern (COC) | Number of Wells Sampled for COC | Minimum Threshold/Measurable Objective – Number of Wells Exceeding Regulatory Standard from latest sample |
|---|---|---|
| **DDW Wells** | | |
| Arsenic | 86 | 3 |
| Di(2-ethylhexyl) phthalate | 56 | 1 |
| Benzo(a)Pyrene | 56 | 1 |
| Chloride | 76 | 2 |
| 1,2 Dibromo-3-chloropropane | 33 | 6 |
| Dinoseb | 87 | 8 |
| Iron | 78 | 17 |
| Hexachlorobenzene | 31 | 1 |
| Heptachlor | 31 | 2 |
| Manganese | 76 | 15 |
| Methyl-tert-butyl ether (MTBE) | 85 | 1 |
| Nitrate (as nitrogen) | 164 | 14 |
| Specific Conductance | 88 | 2 |
| 1,2,4-Trichlorobenzene | 84 | 1 |
| 1,2,3-Trichloropropane | 89 | 6 |
| Total Dissolved Solids | 76 | 2 |
| Vinyl Chloride | **188** | **88** |
| **ILRP On-Farm Domestic Wells** | | |
| Iron | **1** | **1** |
| Manganese | **1** | **1** |
| **ILRP Irrigation Wells** | | |
| Manganese | 9 | 1 |

# Groundwater conditions/SMC – Current Water Quality Exceedance Maps



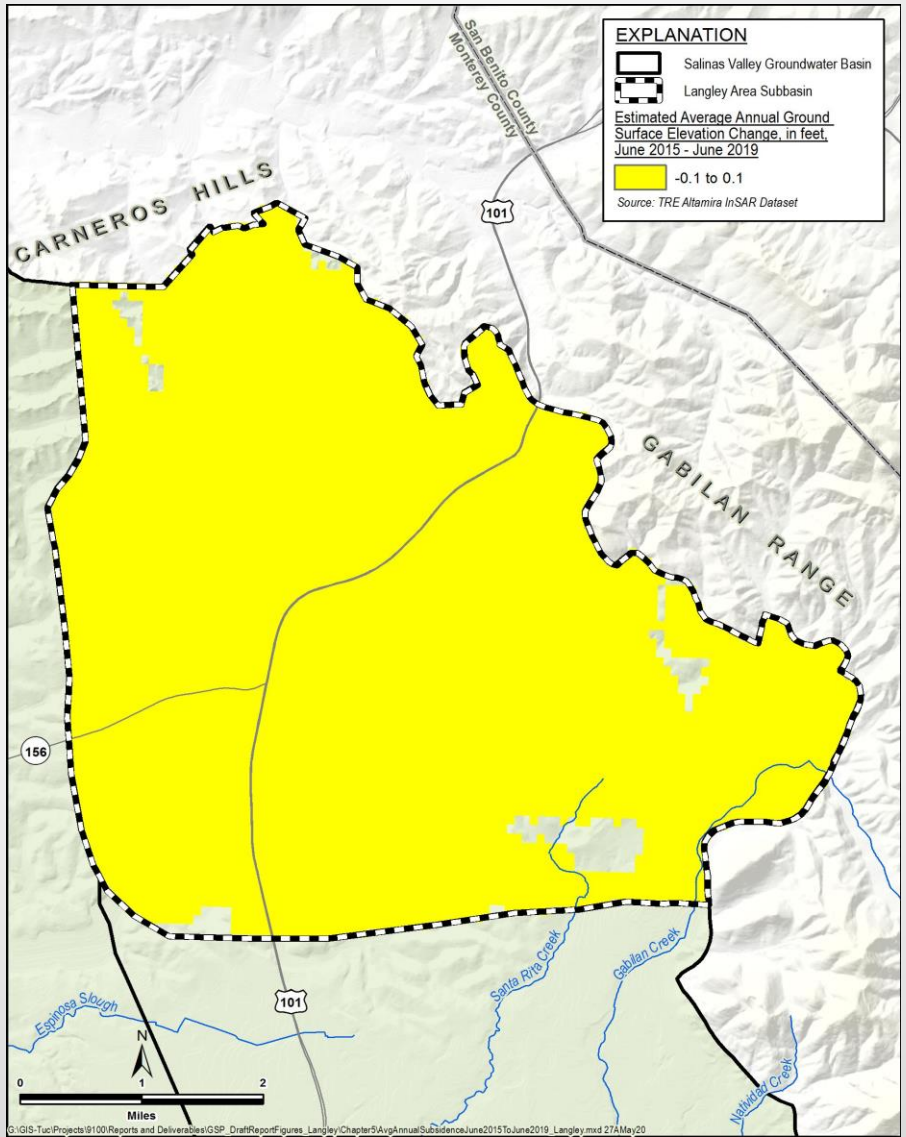
# Groundwater conditions/SMC – **Subsidence**

## 5. Subsidence

**Measurable Objective (MO):**
Zero net long-term subsidence, with no more than 0.1 foot per year of estimated land movement to account for InSAR errors

**Minimum Threshold (MT):**
Same as the measurable objective

**Undesirable Result:**
There is an exceedance of minimum thresholds for subsidence.




Negligible current subsidence

Future subsidence due to groundwater conditions is unlikely

# Groundwater conditions/SMC – **Interconnected Surface Water**

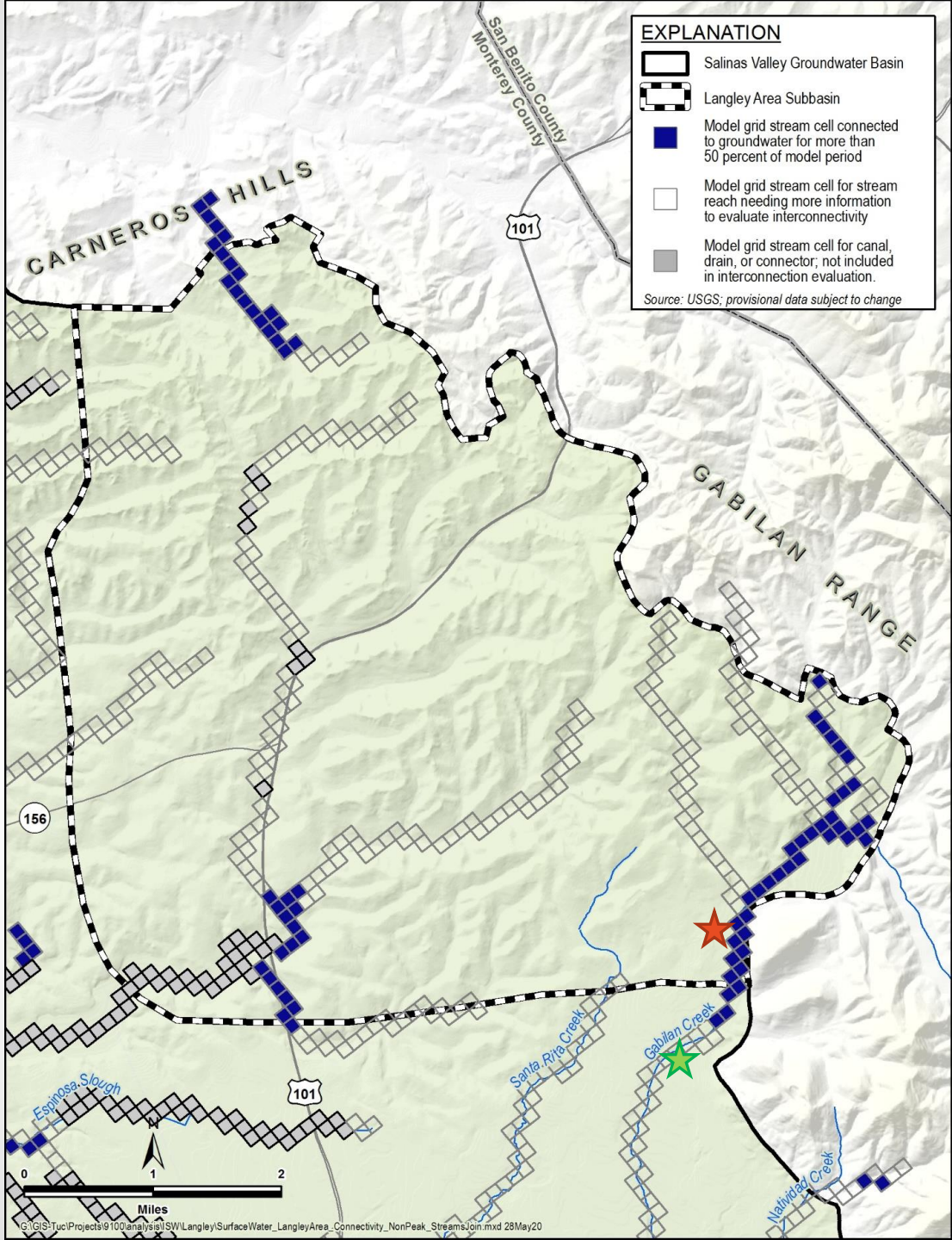
**6. Depletion of Interconnected surface water (ISW)**

**Measurable Objective (MO):**
Established by proxy using shallow groundwater elevations observed in 2010 near locations of ISW, adjusted based on well-specific elevation assessments.

**Minimum Threshold (MT):**
Established by proxy using shallow groundwater elevations observed in 2019 near locations of ISW, adjusted based on well-specific elevation assessments.

**Undesirable Result:**
There is an exceedance of the minimum threshold in a shallow groundwater monitoring well used to monitor ISW.

- No interconnected surface water monitoring points yet
- One shallow well will be added on Gabilan Creek (orange star) and will be paired with USGS gauge in Eastside (green star)



# Summary of Current Conditions

- Langley Area Subbasin has not historically been in overdraft
- From 1980 to 2016, the basin was in overdraft during only 9 years
- Calculation of the mitigation of overdraft is not needed at this time
- Given that the Subbasin's extraction is currently close to the sustainable yield, this chapter includes a robust set of potential projects and management actions that could be undertaken if needed

# Projects & Management Actions

## RECHARGE PROJECTS

- Decentralized Residential Recharge Projects
- Decentralized Stormwater Recharge
- MAR Overland Flow
- Surface Water Diversion from Gabilan Creek

## DEMAND MANAGEMENT

- Pumping Allocations and Controls

Projects & Management Actions

## CROSS BOUNDARY PROJECTS

- Floodplain Enhancement and Recharge
- CSIP Expansion

## IMPLEMENTATION ACTIONS

- Well Registration
- GEMS Expansion
- Local Groundwater Elevation Trigger
- Domestic Water Partnership



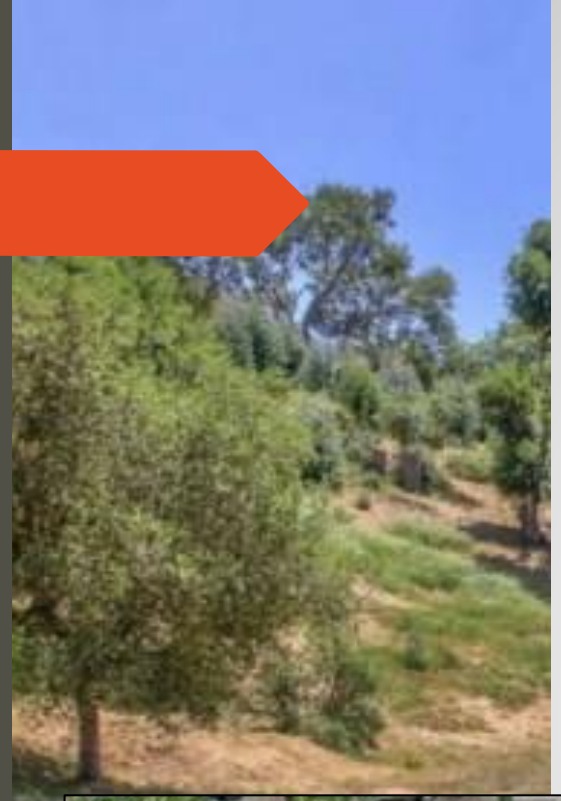
# Decentralized In Lieu Recharge Projects

**Rain barrels:**

- If 500 of the 3000 households attend a workshop and 15% implement a 5000-gallon rain barrel to provide water in lieu of pumping, it would result in **4 AF/yr. benefit**
- 5 workshops with 100 households each would cost about $50,000
- GSA cost would be $50,000, not including any monetary incentive
- Cost to homeowner to implement a 5000-gallon rain barrel is $10,000, which would be $15,000 if used over 25 years
- *Costs and benefits are variable depending on # workshops, size of rain barrels implemented, number of rain barrels implemented, if other in lieu recharge features are implemented*

**Laundry to Landscape:**

- If 500 of the 3000 households attend a workshop and 15% implement a laundry-to-landscape system to provide water in lieu of pumping, it would result in **0.94 AF/yr. benefit**
- 5 workshops with 100 households each would cost about $50,000
- GSA cost would be $50,000, not including any monetary incentive
- Cost to homeowner to implement a laundry-to-landscape system is $2,100, which would be approximately $15,960 if used over 25 years
- *Costs and benefits are variable depending on # workshops, amount of laundry done, and number implemented*



# Decentralized Stormwater Capture

- Incentivizing installation of stormwater capture features for groundwater recharge
- Stormwater is directed to small recharge basins, flood plains, and bioswales for recharge, or for immediate irrigation application
- **Project benefit:** increased groundwater elevations and storage
  - Secondary flood hazard mitigation benefits
  - Stormwater capture off 1% of Langley land area (176 acres) would result in up to ~279 AF/yr.
- **GSA program cost (to do outreach, preliminary studies, and encourage implementation):** *still refining estimated cost*
- **Cost to implement:** varies widely, very site-specific
- **Example of potential project under this program:** stormwater capture from Prunedale shopping center
  - 9 AF/yr captured for recharge
  - Capital cost = $3.3 million

# Pumping Allocations and Controls

- Management action to enable Subbasin to pump within sustainable yield
- Not water rights, but rather an approach to divide up sustainable yield among beneficial users
- They can be used to:
  - Underpin management actions that manage pumping
  - Generate funding for projects and management actions
  - Incentivize water conservation and/or recharge projects
- Subbasin Committee preferred establishing the allocation structure based on a per connection allocation for small parcels and per acreage for large parcels. If sustainable yield is reduced, all users reduce proportionately except *de minimis* users

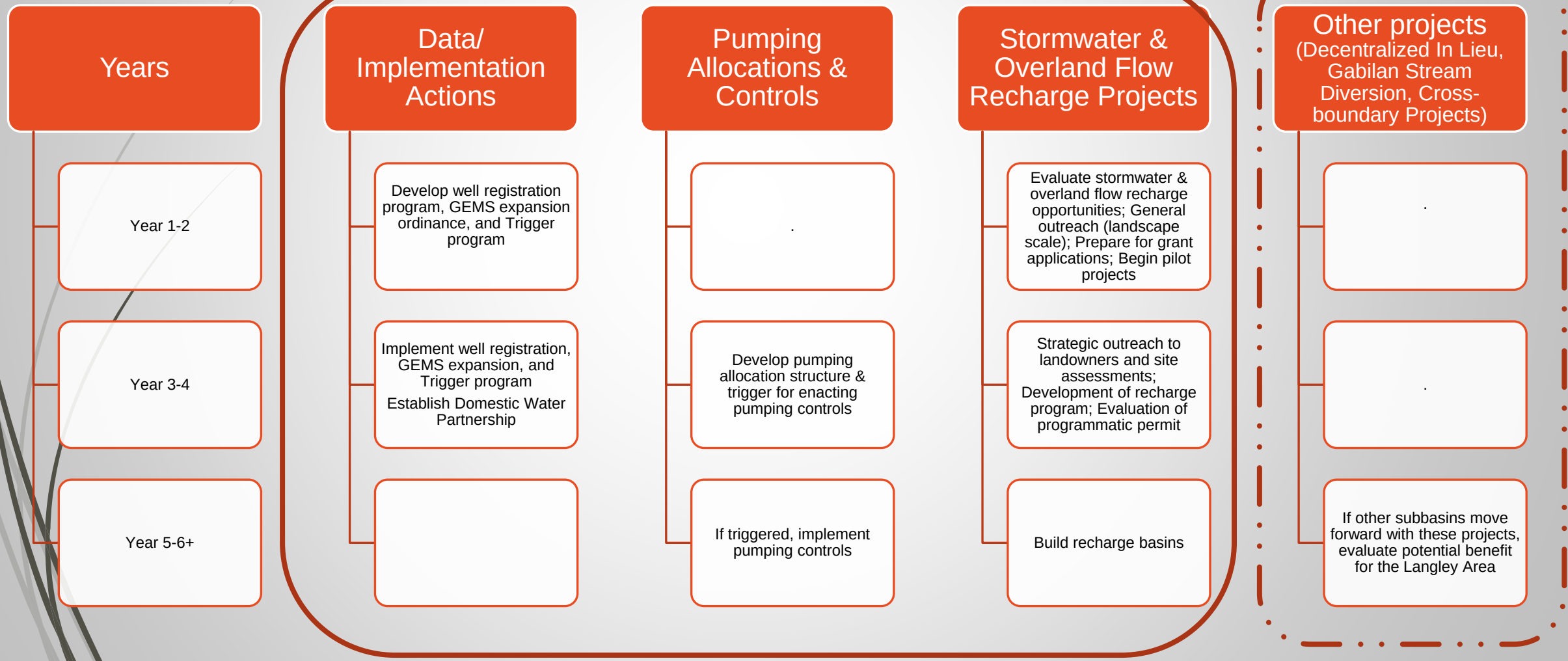
# Summary of Projects & Management Actions

| Project Number | Name | Description | Project Benefits | Quantification of Project Benefits | Cost |
|---|---|---|---|---|---|
| RECHARGE PROJECTS | | | | | |
| A1 | Decentralized Residential Recharge Projects | Small-scale projects initiated by homeowners and business owners, including rooftop rainwater harvesting, rain gardens, and graywater systems | Less domestic groundwater use, Groundwater recharge | If 75 households install 5000-gallon rain barrels, up to 4 AF/yr. rainwater harvested, and 1.6 AF/yr. from graywater systems installed by 75 houses | Cost to GSA (not for homeowner implementation or incentives): $50,000 for 5 workshops on rainwater harvesting and $50,000 for 5 workshops on graywater reuse |
| A2 | Decentralized Stormwater Recharge | Medium-scale bioswales and recharge basins on non-agricultural land | Groundwater recharge, less flooding, | If 1% of the Subbasin is converted from an area of runoff to an area of recharge, 279 AF/yr. | Cost to GSA (not for implementation or incentives): $150,000 - $200,000 to encourage projects through outreach, site assessments, and assistance with planning |
| A3 | Managed Aquifer Recharge with Overland Flow | Constructs basins for managed aquifer recharge of overland flow before it reaches streams | Groundwater recharge, less stormwater and erosion, more regular surface temperature | 400 AF/yr. in groundwater recharge | Capital Cost: $4,128,000<br>Unit Cost: $870/AF |
| A4 | Surface Water Diversion from Gabilan Creek | Build a new facility on Gabilan Creek that would be allowed to divert water when streamflow is high | Collects streamflow that would otherwise be lost to the ocean | On average, 350 AF/yr. of excess streamflow is saved for later use. | Capital Cost: $5,477,000<br>Unit Cost: $1,800/AF |

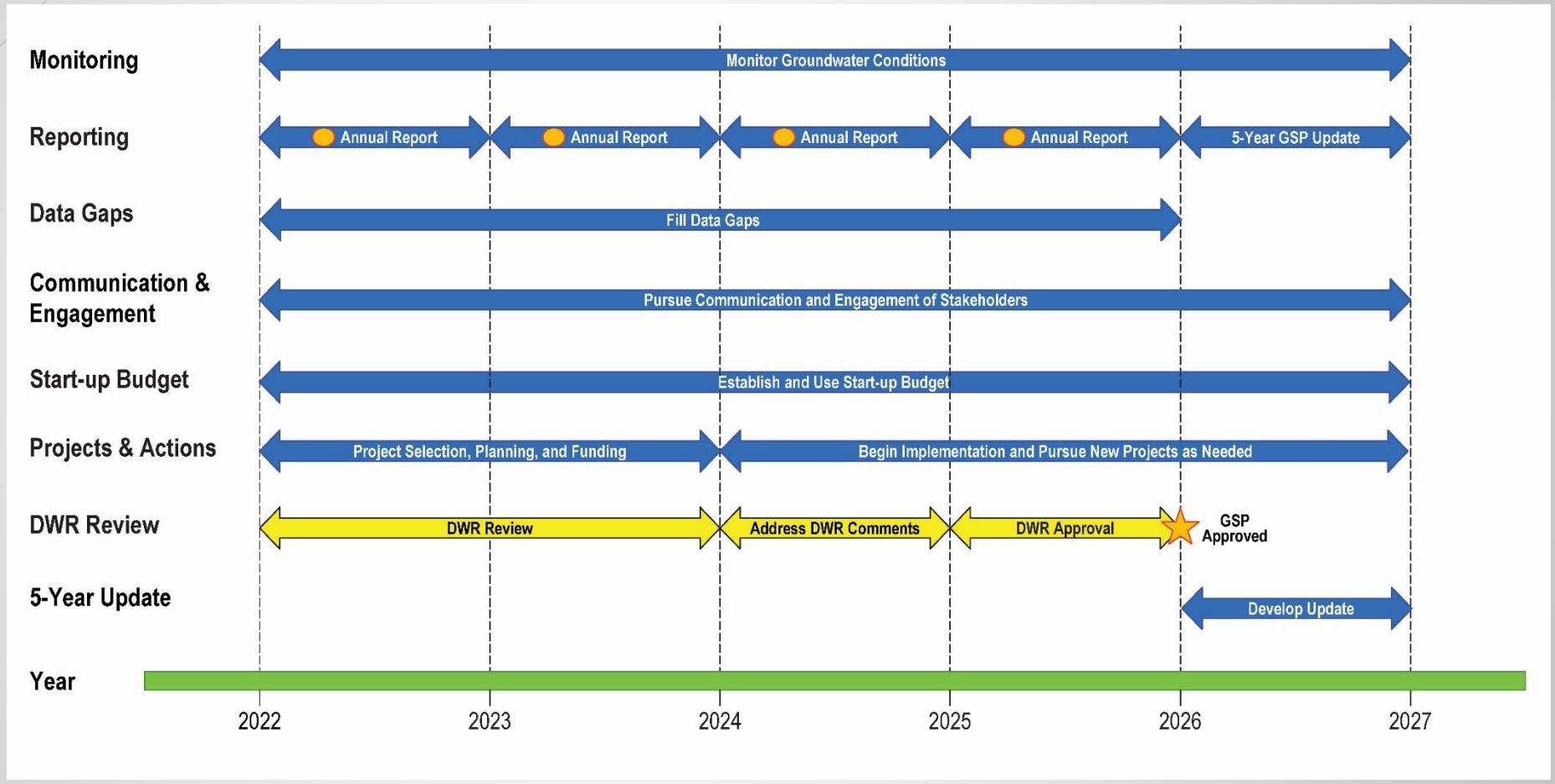
# Summary of Projects & Management Actions

| Project Number | Name | Description | Project Benefits | Quantification of Project Benefits | Cost |
|---|---|---|---|---|---|
| DEMAND MANAGEMENT | | | | | |
| B1 | Pumping Allocations and Control | Proactively determines how extraction should be fairly divided and controlled if needed. | Decreases extraction | Range of potential project benefits | Approximately $300,000 for establishment of pumping allocations and pumping controls |
| CROSS BOUNDARY PROJECTS | | | | | |
| C1 | Floodplain Enhancement and Stormwater Recharge | Restore creeks and floodplains to slow the flow of water | Groundwater recharge, less erosion, less flooding | Multi-subbasin: 2,600 AF/yr. in groundwater recharge | Multi-subbasin Capital Cost: $12,596,000<br>Unit Cost: $400/AF |
| C2 | Castroville Seawater Intrusion Project (CSIP) Expansion | Expand CSIP into the southwest corner of the Langley Area Subbasin | Less groundwater pumping | Multi-subbasin: 9,900 AF/yr. of recycled and river water provided for irrigation | Multi-subbasin Capital Cost: $73,366,000<br>Unit Cost: $630/AF |
| IMPLEMENTATION ACTIONS | | | | | |
| D1 | Dry Well Notification System | Develop a system for well owners to notify the GSA if their wells go dry. Refer those owners to resources to assess and improve their water supplies. Form a working group if concerning patterns emerge. | Support affected well owners with analysis of groundwater elevation decline | N/A – Implementation Action | Not estimated at this time |
| D2 | Groundwater Elevation Management System (GEMS) Expansion | Update current GEMS program, by collecting groundwater extraction data from wells in areas not currently covered by GEMS and enhance data collection | Better informed decisions | N/A – Implementation Action | Not estimated at this time |
| D3 | Well Registration | Register all production wells. Monitor flowmeters on all non- *de minimis* wells. | Better informed decisions, more management options | N/A – Implementation Action | Not estimated at this time |
| D4 | Domestic Water | Form a working group for different agencies to | Better access to quality | N/A – Implementation | Not estimated at this |

# Langley P&MA Road Map



# Implementation Schedule



# Adaptive Management

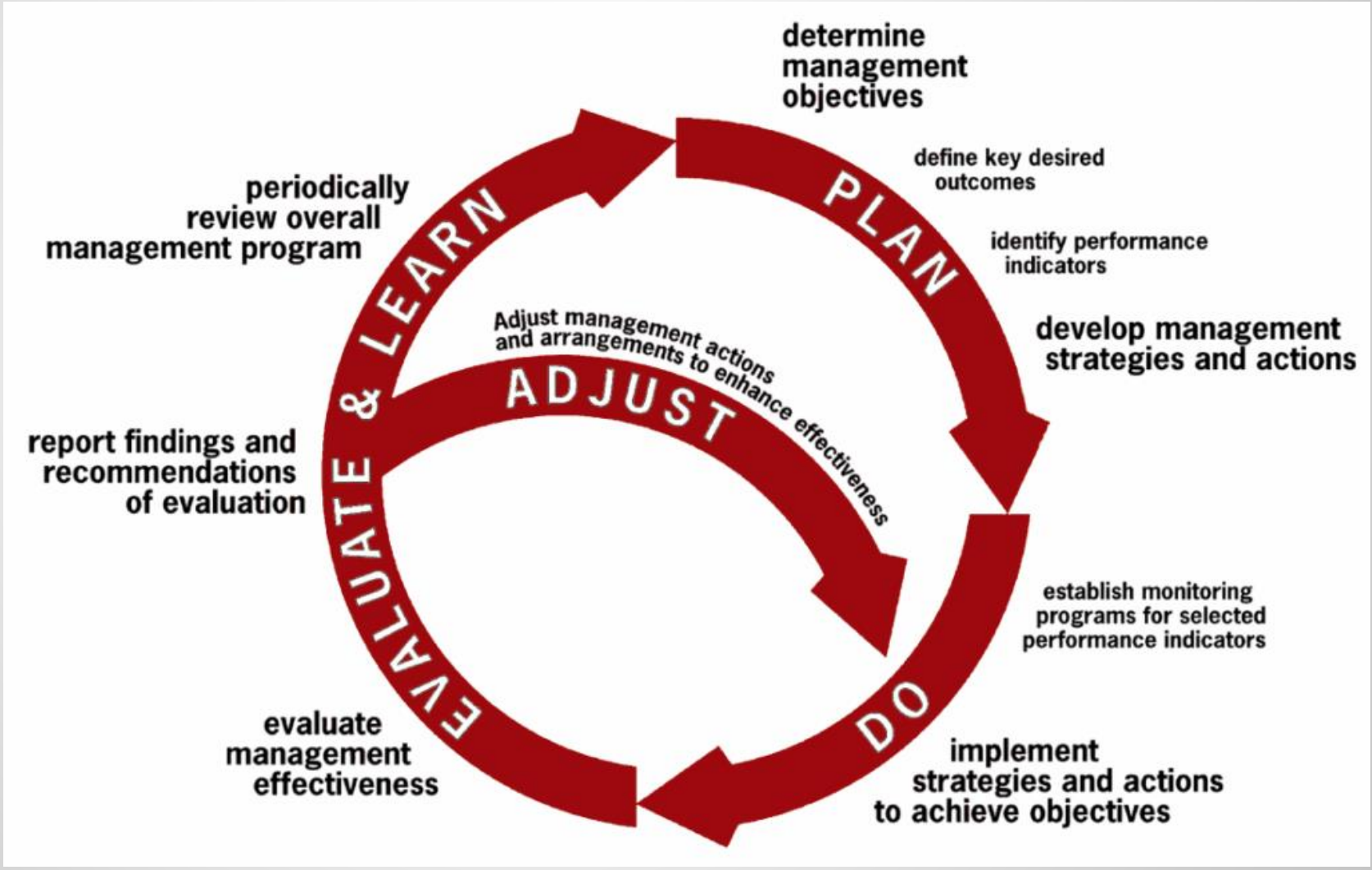



Image source: https://reefresilience.org/management-strategies/marine-protected-areas/adaptive-management

# Questions