Salinas Valley Basin GSA

Langley GSP Overview

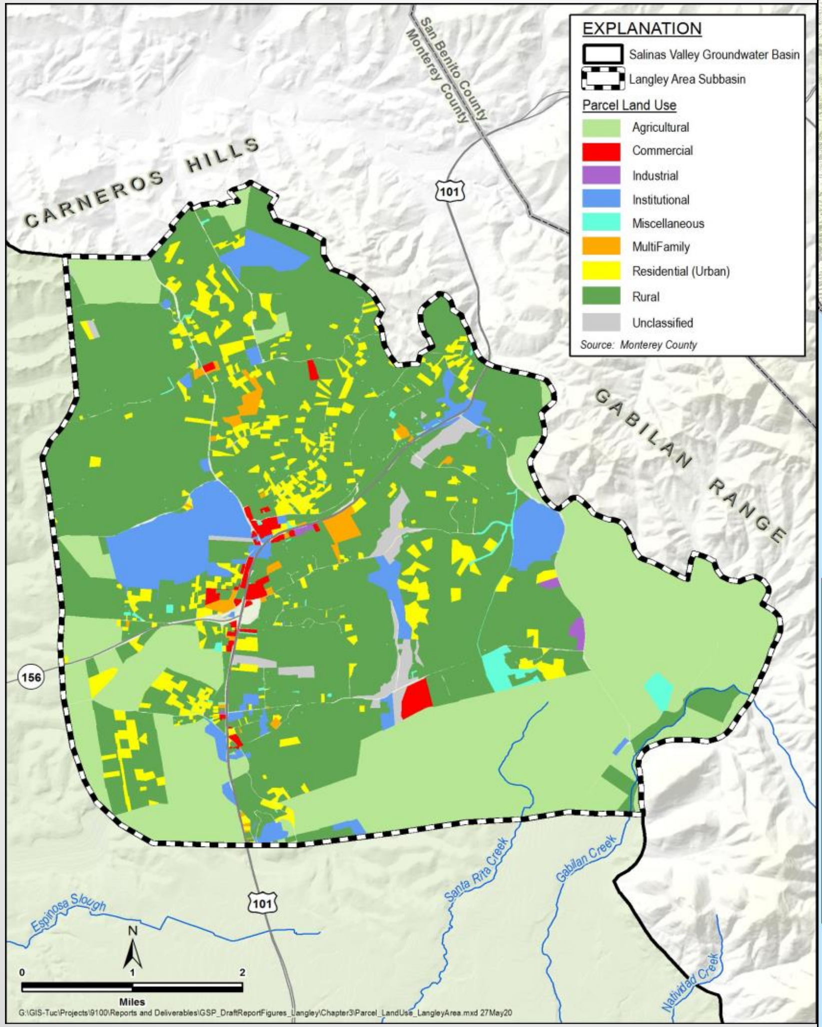
Presented to SVBGSA Board of Directors
August 12, 2021

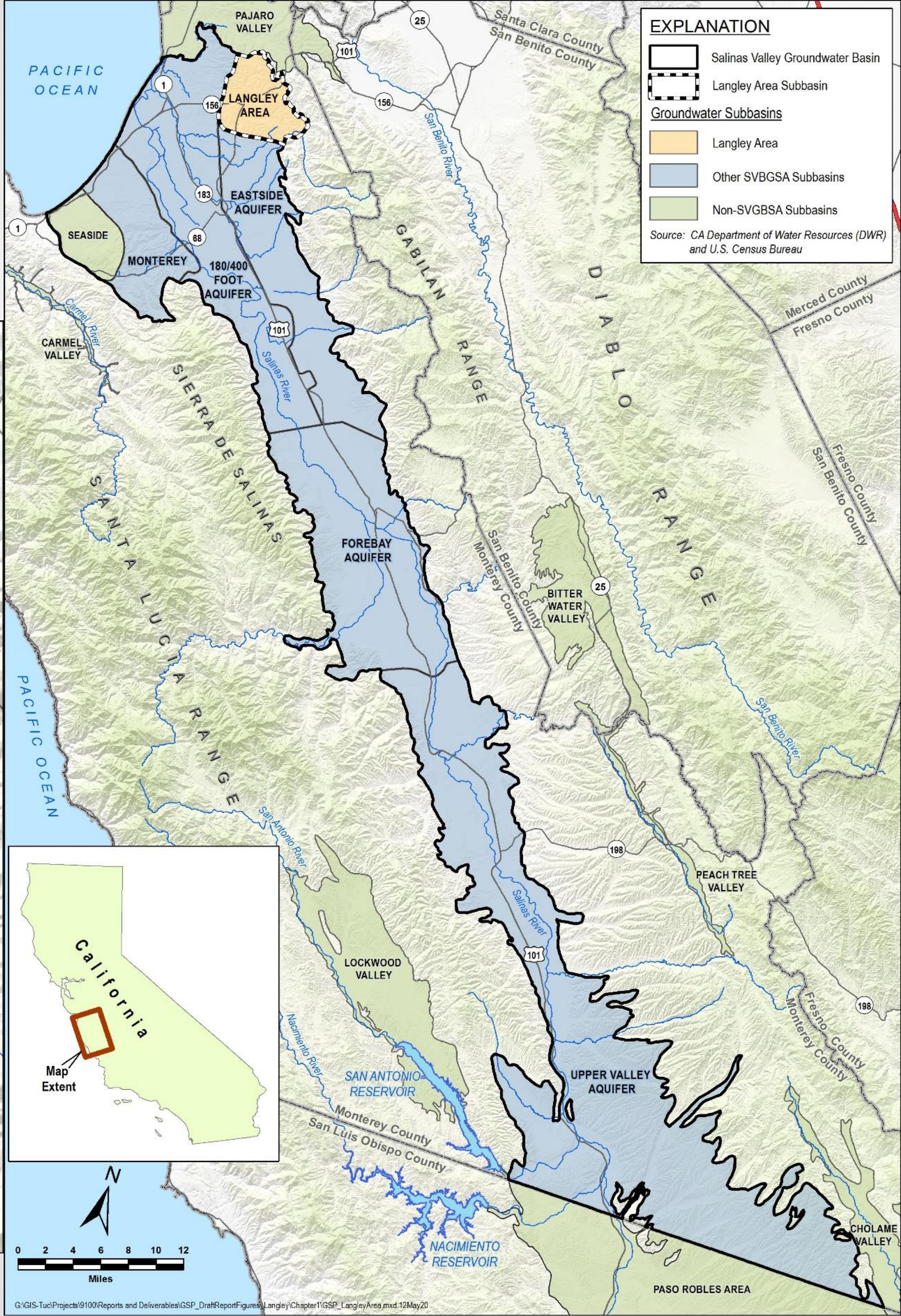
Prepared by

MONTGOMERY & ASSOCIATES

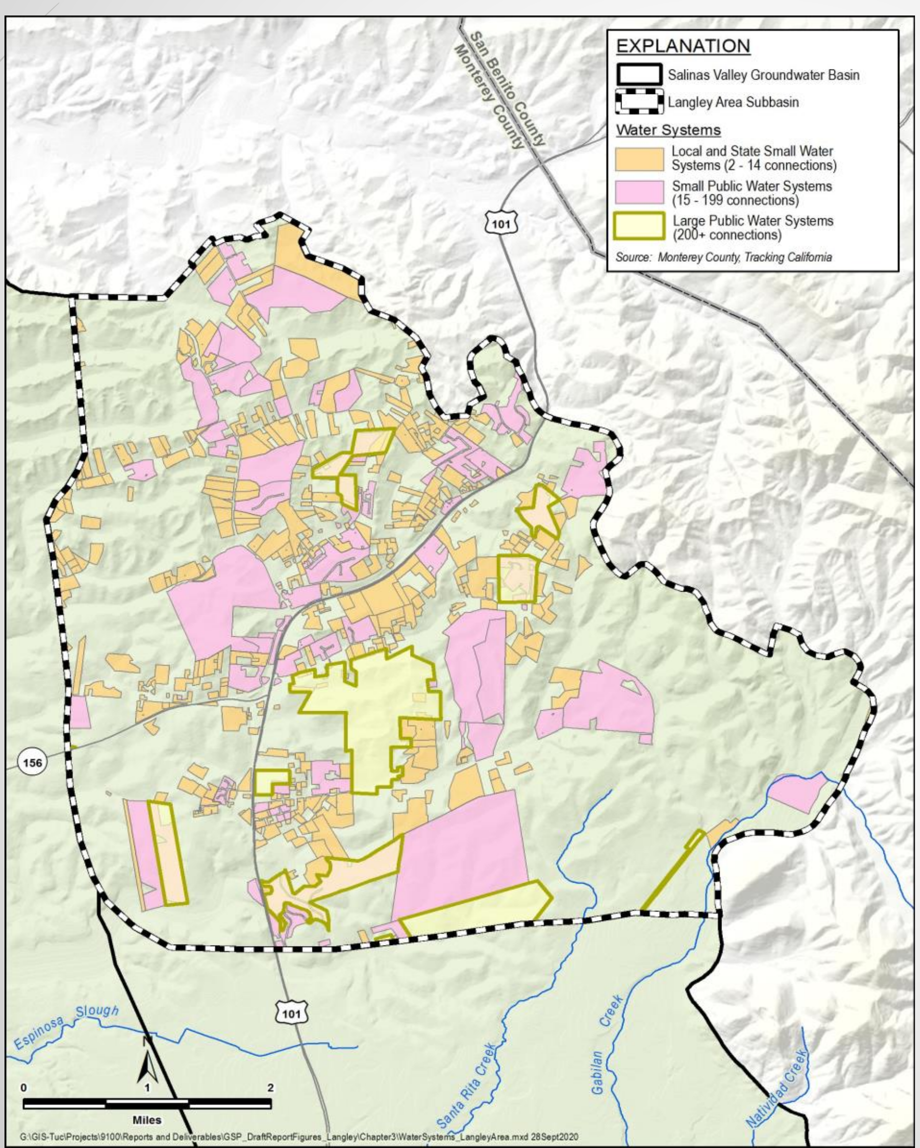
Langley Area Subbasin

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





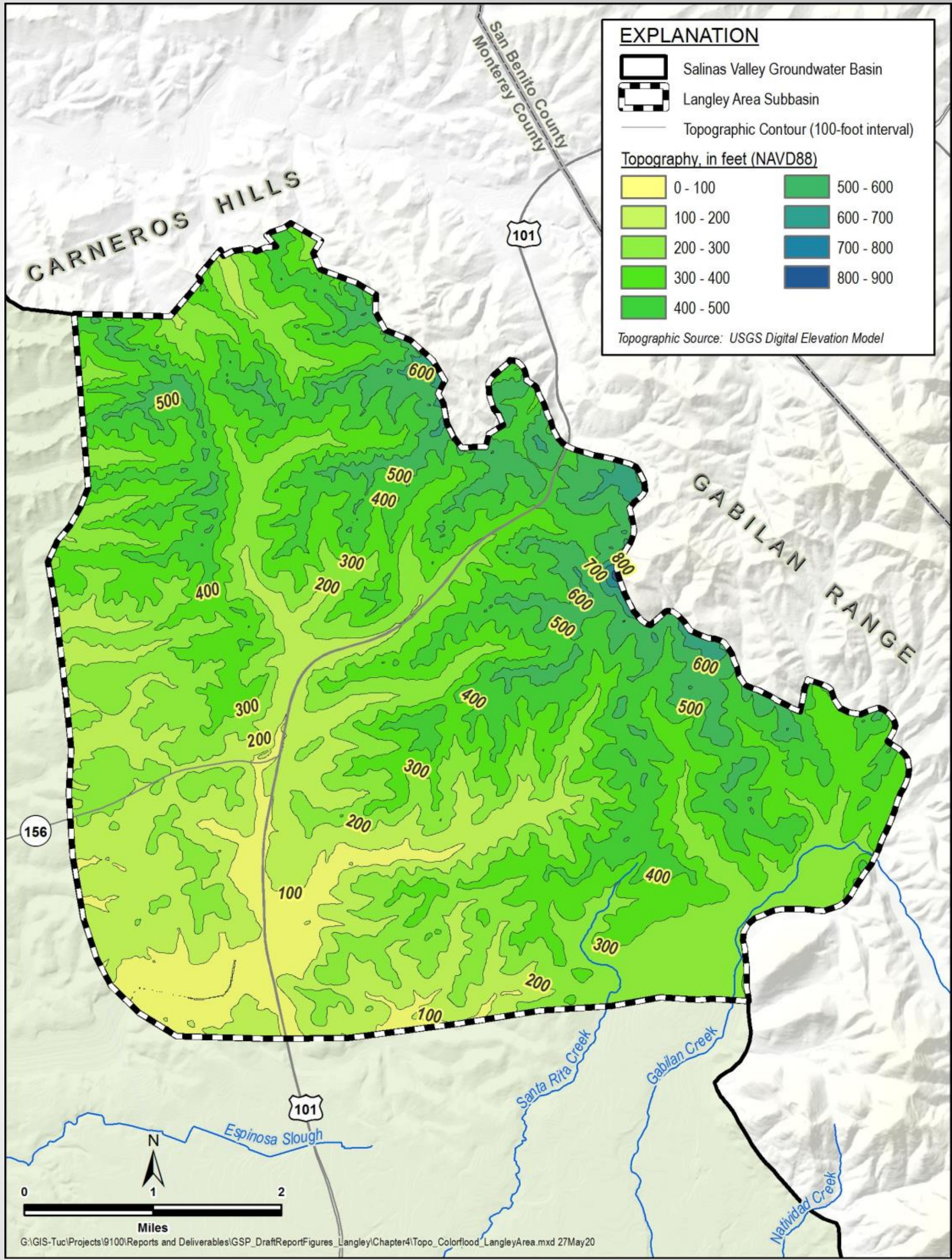
Communities Dependent on Groundwater



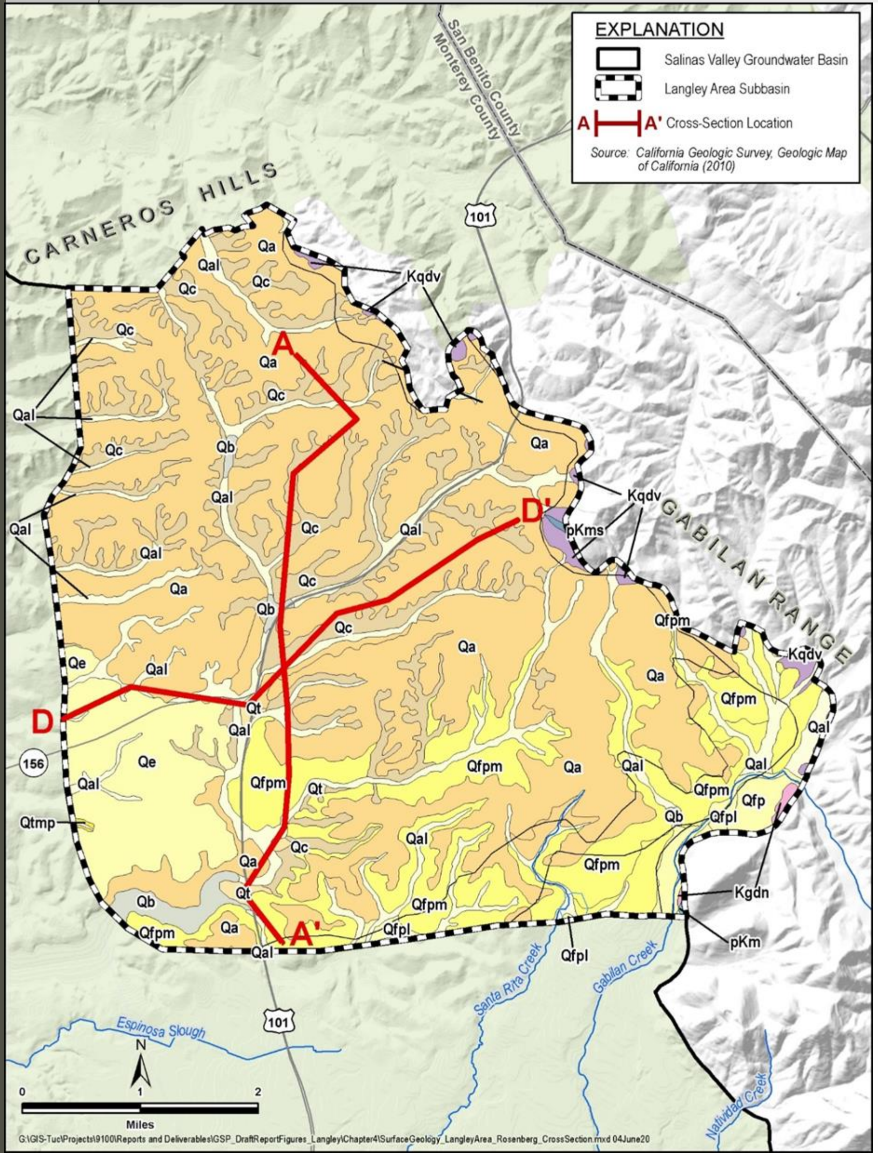
Water Systems	
Local and State Small (2 – 14 connections)	350
Small Public (15 – 199 connections)	59
Large Public (200+ connections)	3

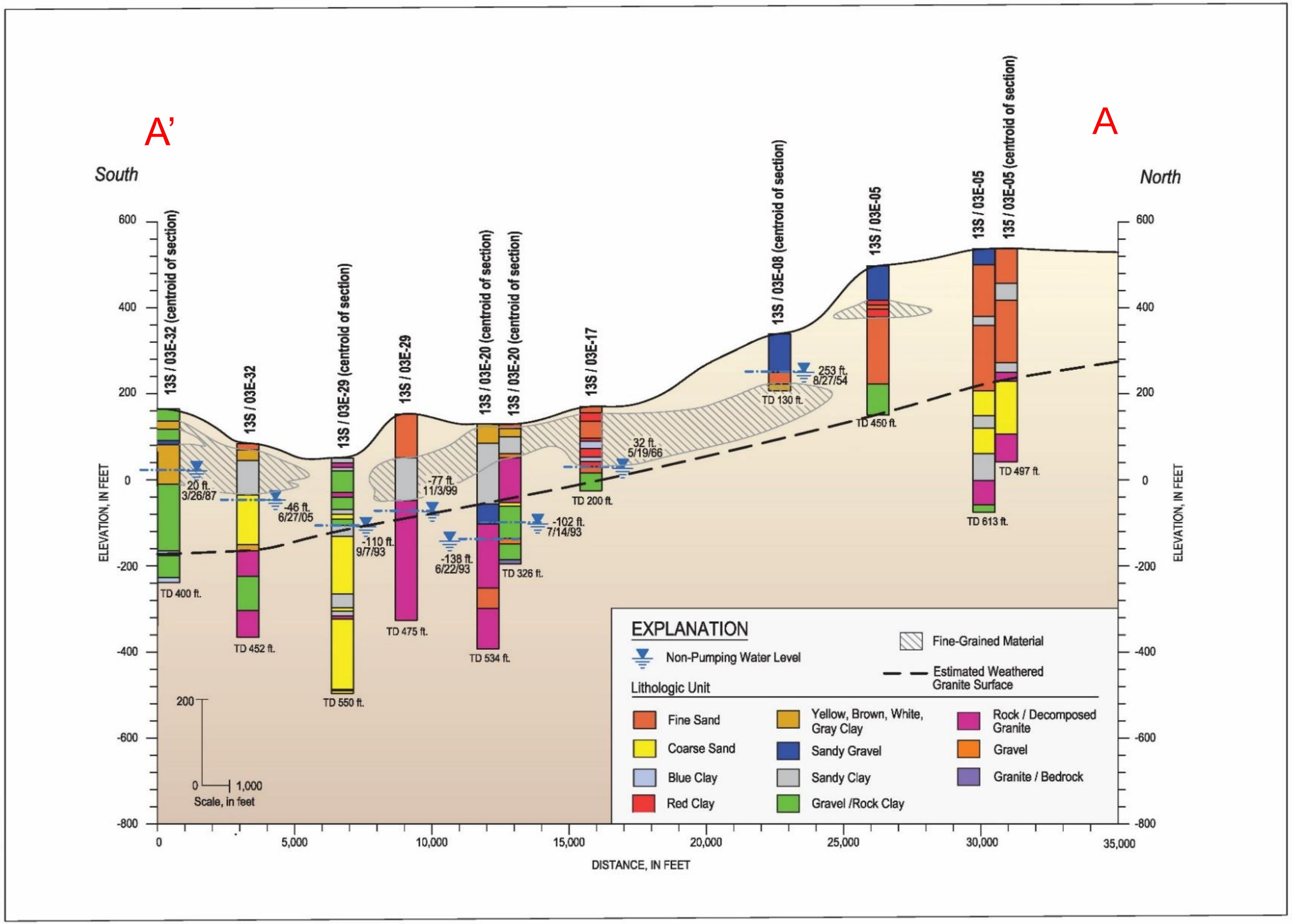
Basin Setting - Topography

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

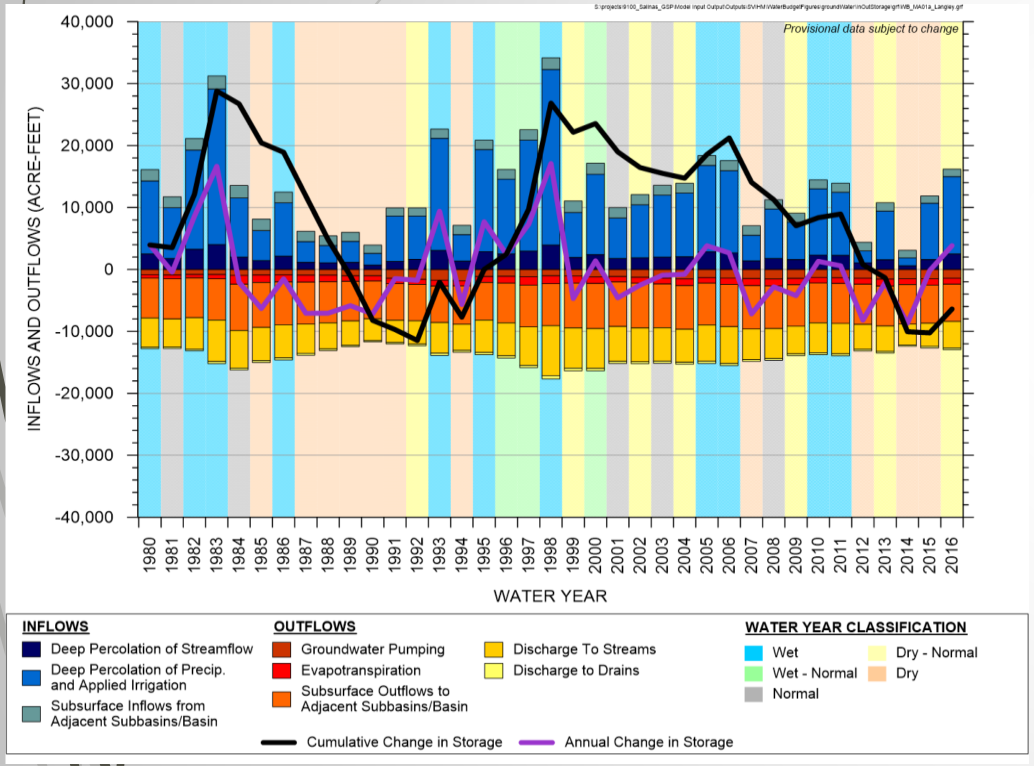


Hydrogeologic Conceptual Model





Groundwater Budget



- Overall, the Langley has been in overdraft historically (300 AF/yr.)
- 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

Langley Chapter 6 – Water Budgets

Groundwater levels show the Subbasin historically has been in overdraft on the order of 300 AF/yr. Due to uncertainty, the water budget contains a range of +/- 1 standard deviation of the GEMS reported pumping

Historical Water Budget (AF/yr.)

	Modeled Historical Average (WY 1980-2016)
Groundwater Pumping*	-1,200
Flow to Drains	-300
Net Stream Exchange	-3,000
Deep Percolation	9,800
Net Flow from Eastside	-1,100
Net Flow from Surrounding Watersheds	100
Net Flow from Pajaro	-300
Net Flow from 180/400-Foot	-3,700
Groundwater Evapotranspiration	-1,000
Net Storage Gain (+) or Loss (-)	-800

Historical Sustainable Yield (AF/yr.)

	Model Estimate (WY 1980-2016)	Low GEMS Estimate (WY 1995-2016)	High GEMS Estimate (WY 1995-2016)
Total Subbasin Pumping*	1,200	800	1,400
Change in Storage	-800	-300	-300
Estimated Sustainable Yield	400	500	1,100

\+ Indicates increase in storage

\- Indicates decrease in storage

*Pumping numbers include an extra 600 AF/yr. to account for rural domestic water use

Langley Chapter 6 – Water Budgets

Future Water Budget

	Model Estimate 2070
Groundwater Pumping*	-1,400
Flow to Drains	-600
Net Stream Exchange	-1,100
Deep Percolation	11,600
Net Flow from Eastside	-900
Net Flow from Surrounding Watersheds	100
Net Flow from Pajaro	-300
Net Flow from 180/400-Foot	-4,300
Groundwater Evapotranspiration	-2,100
Net Storage Gain (+) or Loss (-)	1,000

Future Sustainable Yield

	Model Estimate 2070	GEMS Estimate 2070
Total Subbasin Pumping*	1,400	1,200
Change in Storage	1,000	-300
Estimated Sustainable Yield	2,400	900

*Pumping numbers include an extra 600 AF/yr. to account for rural domestic water use

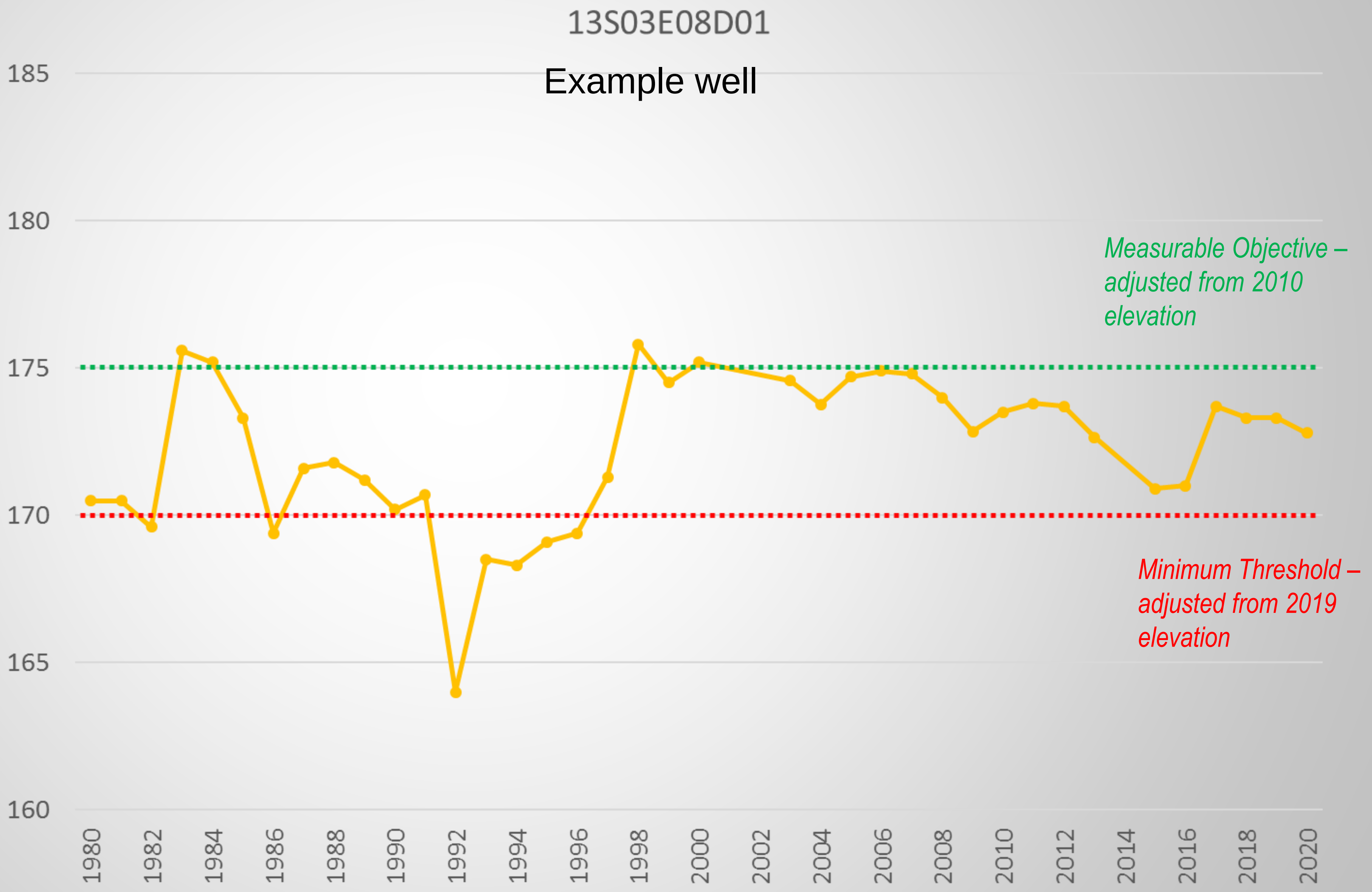
Groundwater conditions/SMC – **Groundwater Levels**

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.



Groundwater conditions/SMC – **Groundwater Levels**

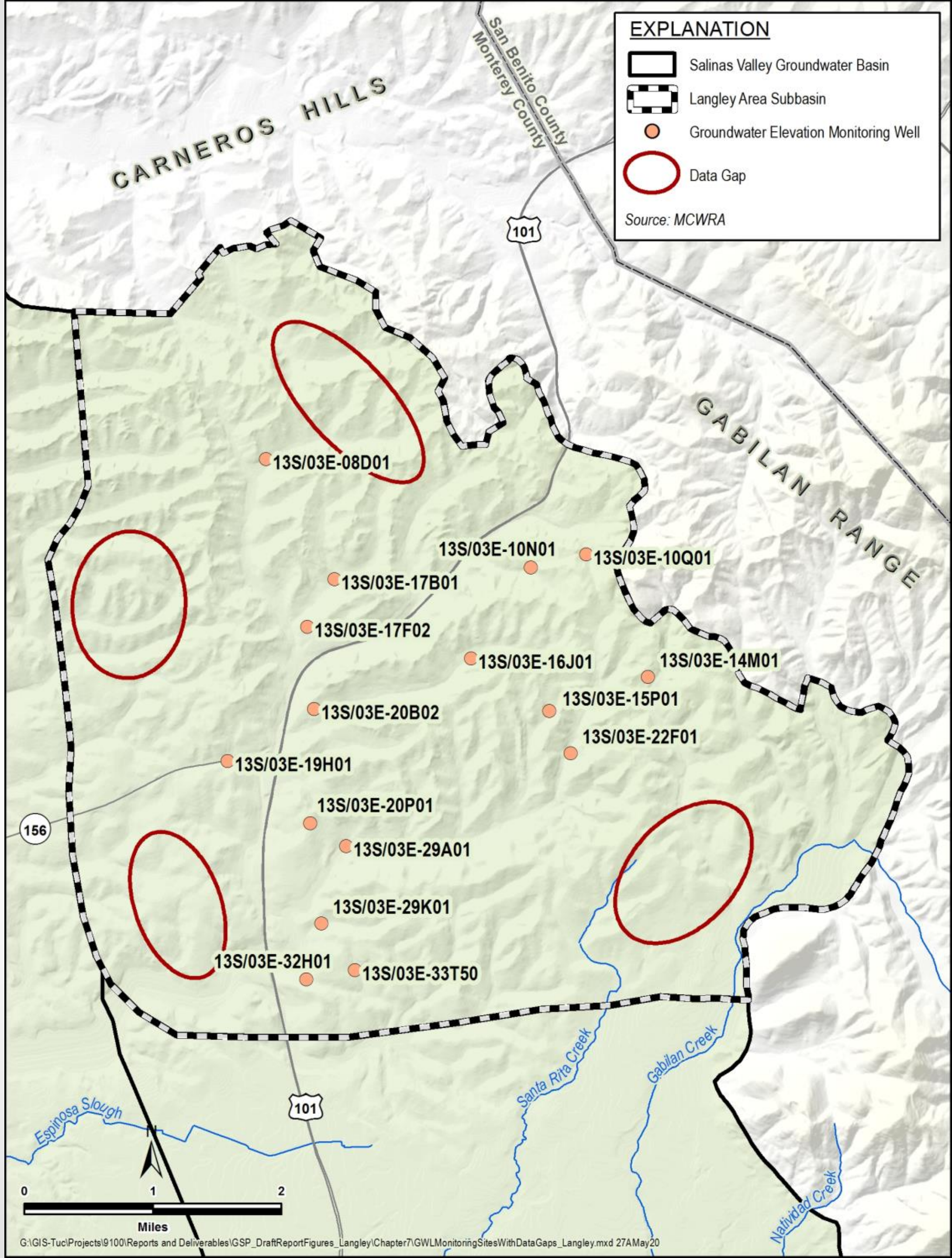
1. Chronic lowering of groundwater levels SMC

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.

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



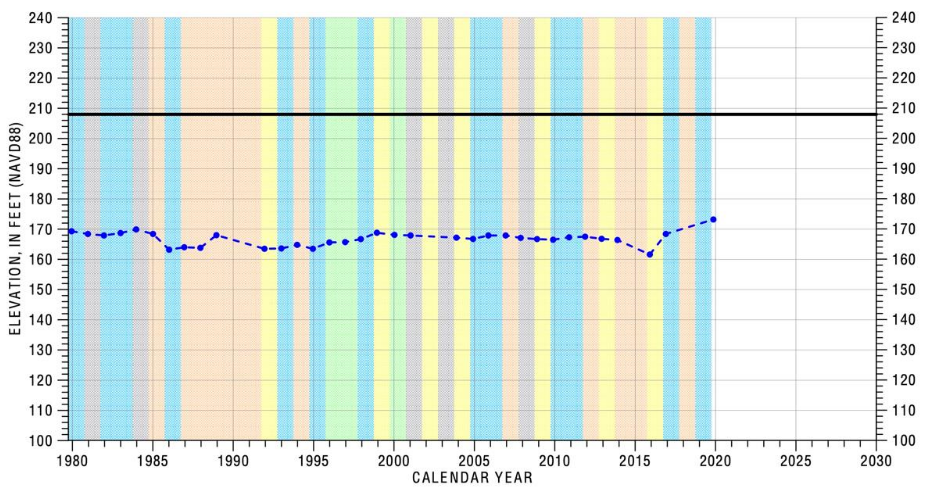
Groundwater conditions/SMC – **Groundwater Storage**

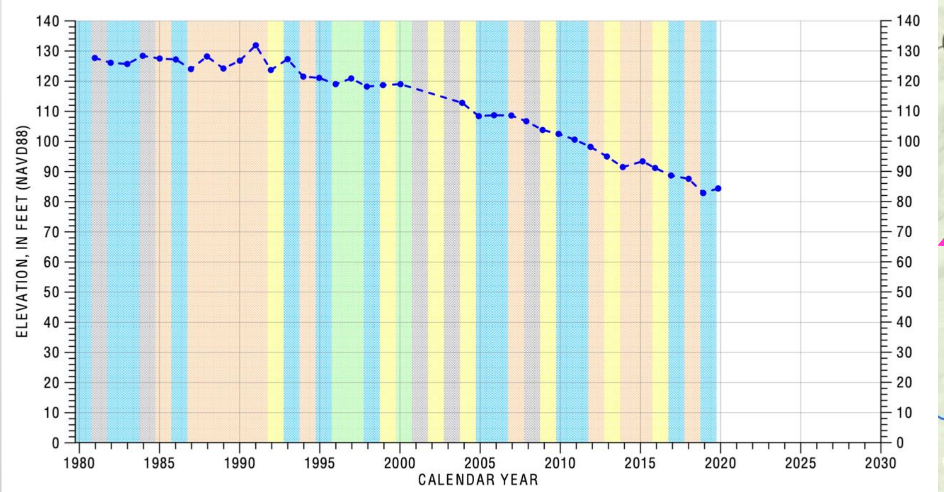
2. Reduction in Groundwater Storage

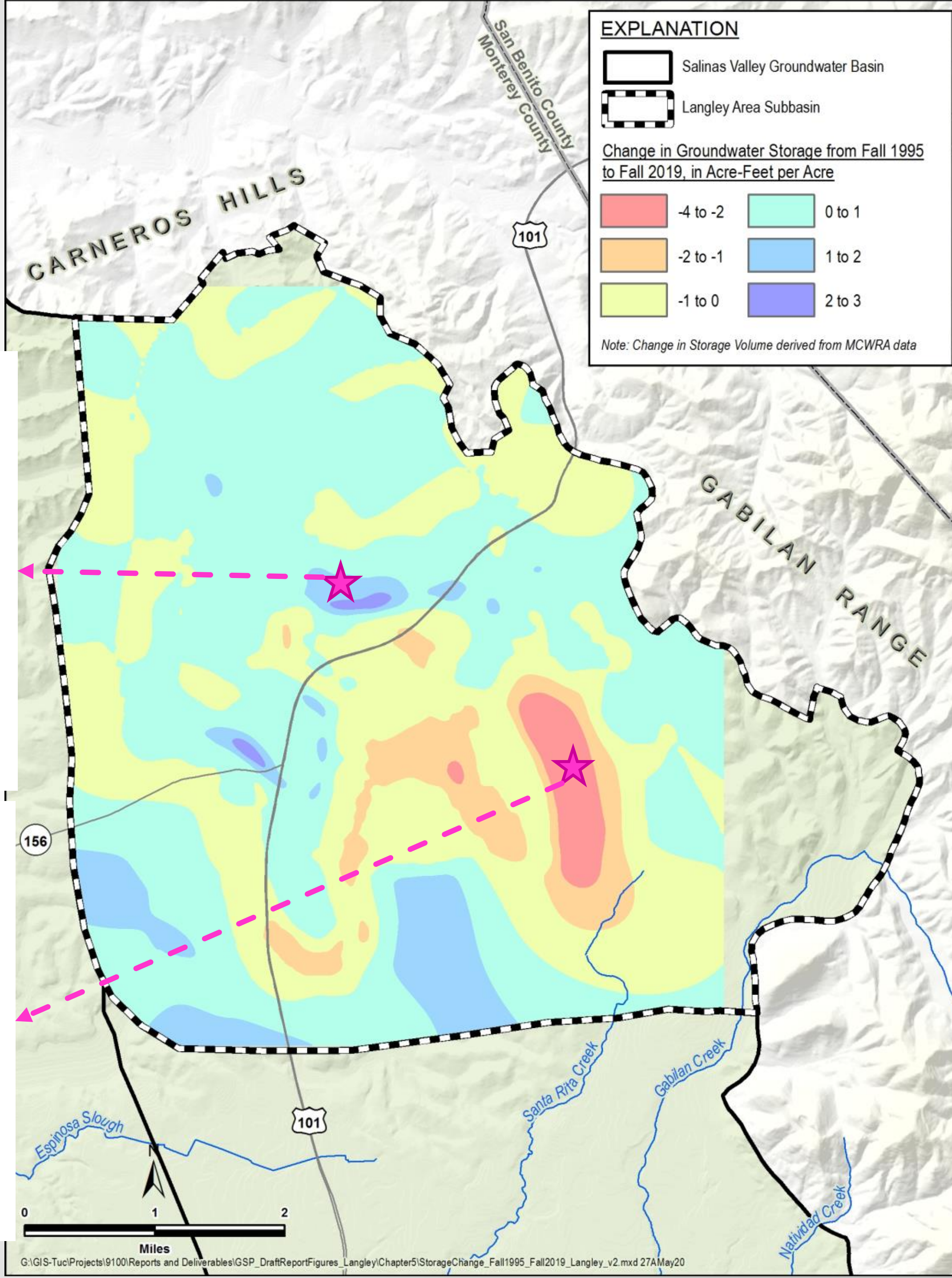
Measurable Objective (MO):
Established by proxy using groundwater elevations. Set to the same as groundwater levels measurable objectives.

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**

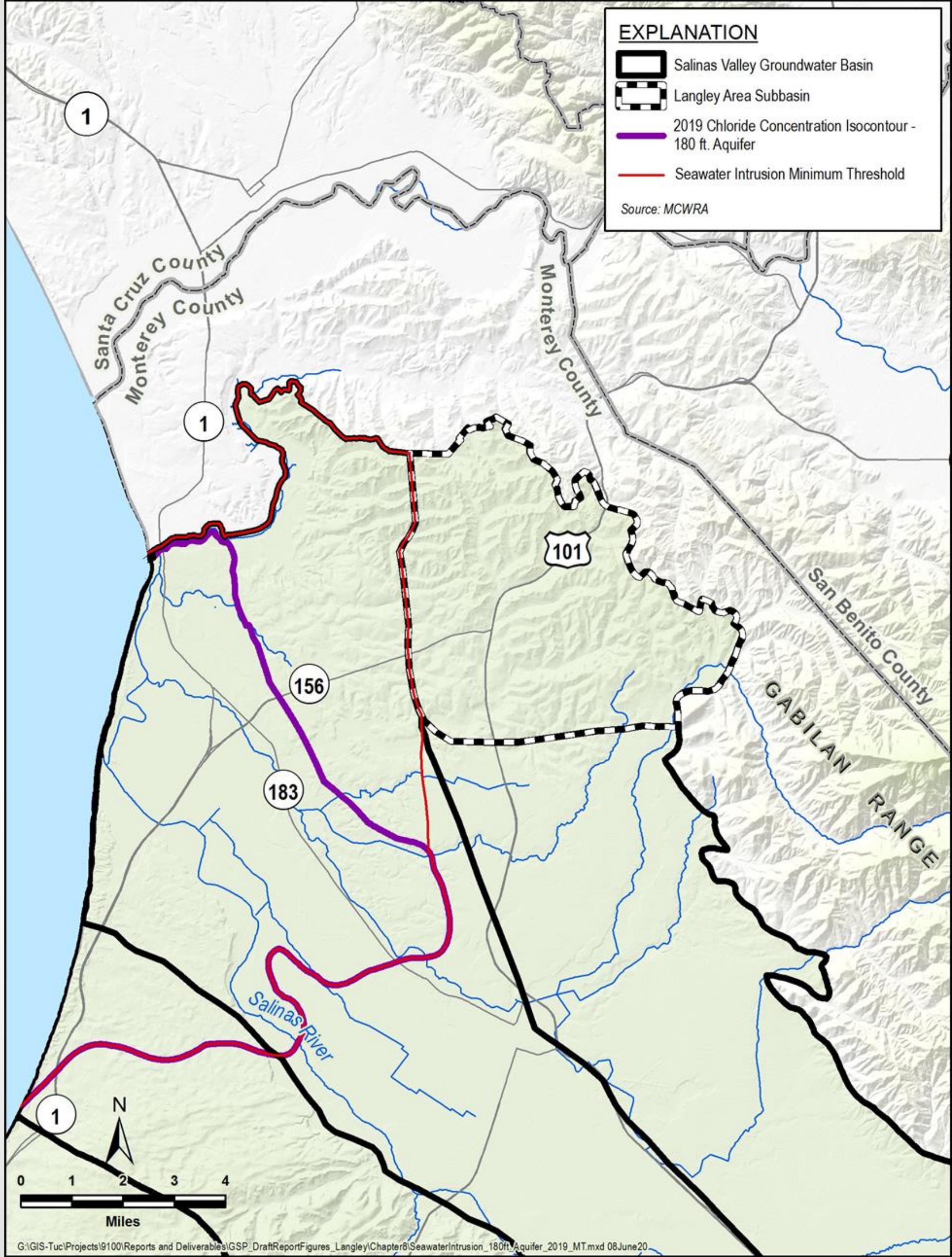
3. Seawater Intrusion

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.

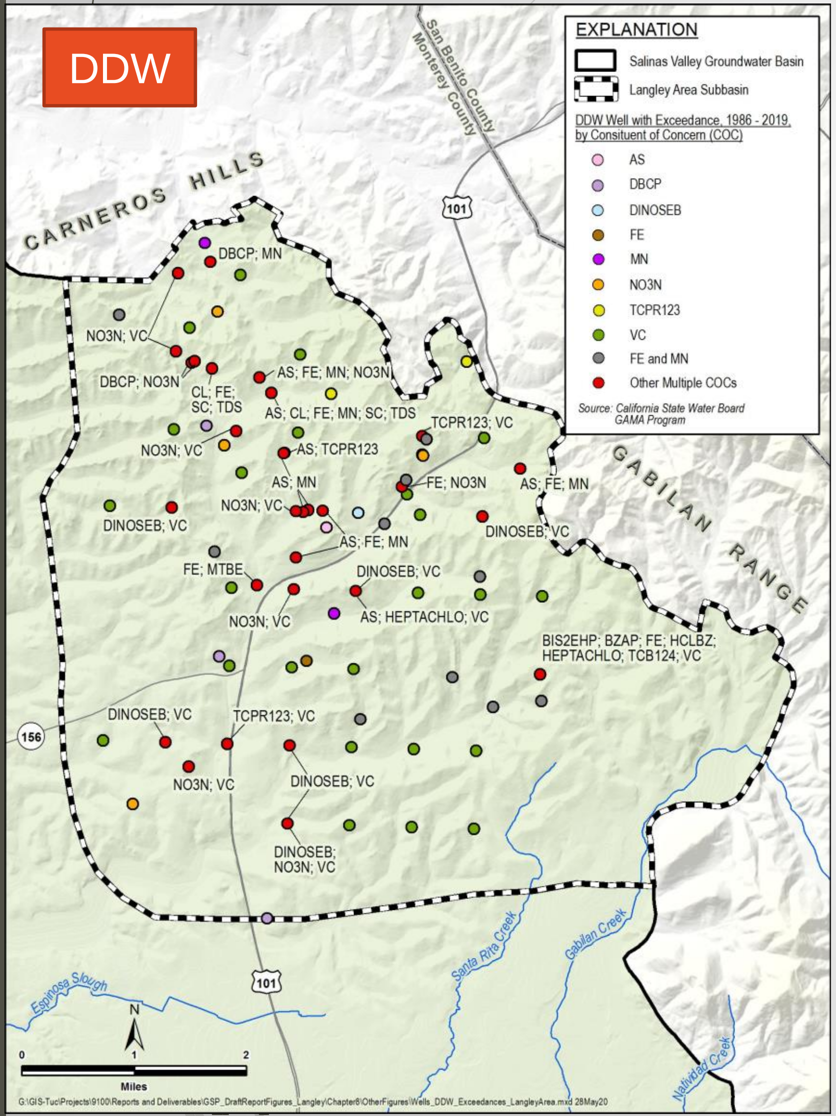
Minimum Threshold (MT)
Same as the measurable objective

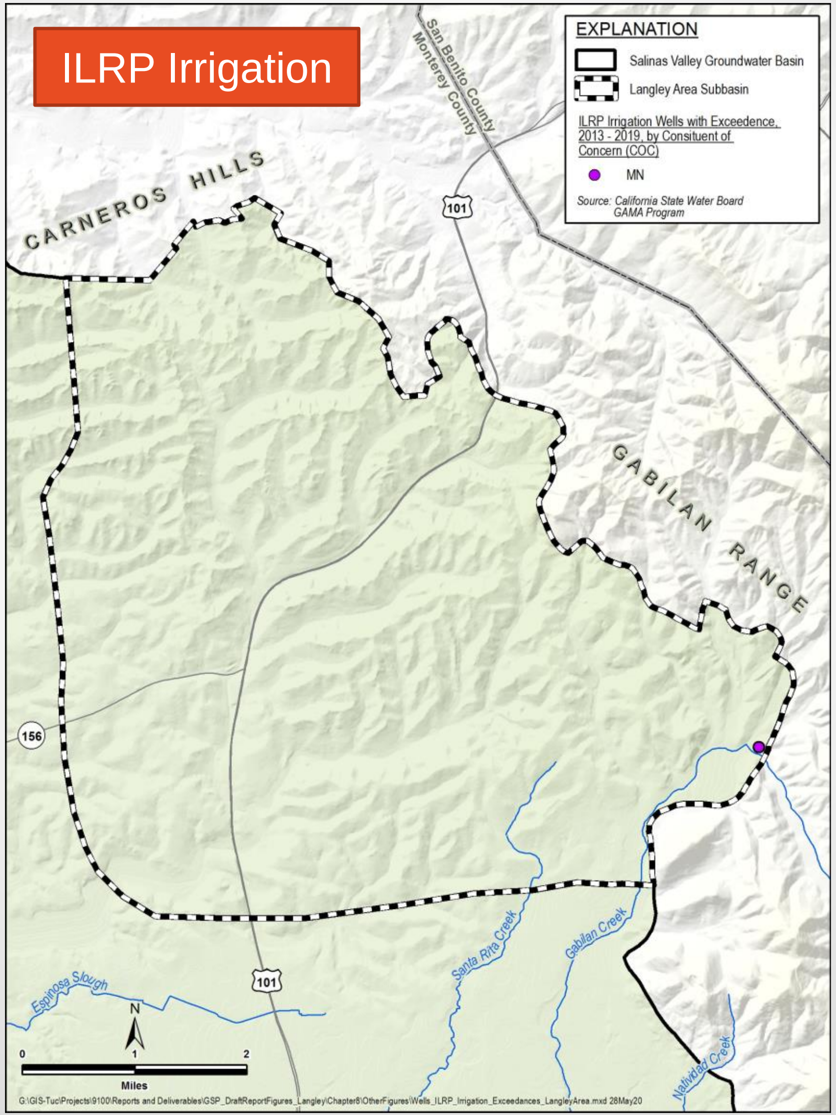
Undesirable Result:
The minimum threshold is exceeded as a direct result of projects or management actions taken as part of GSP implementation.

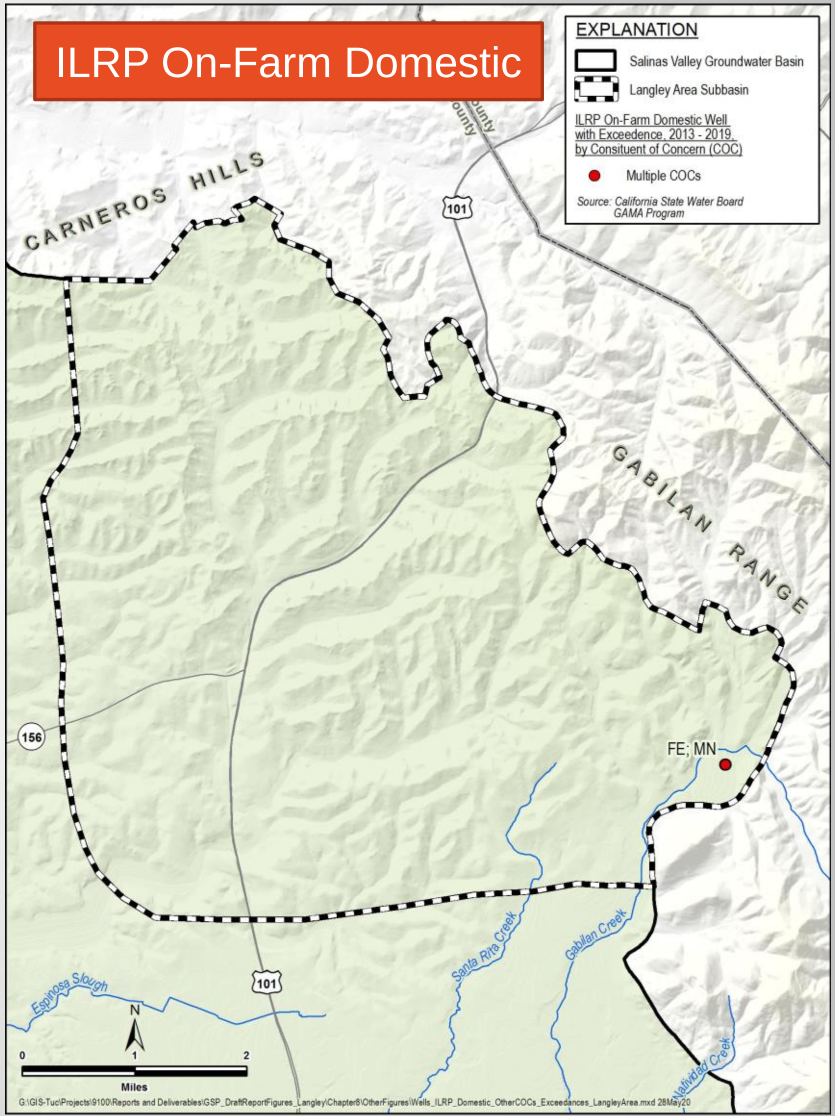
- *How to address DWR comments on 180/400 GSP with respect to groundwater quality is still under discussion*

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







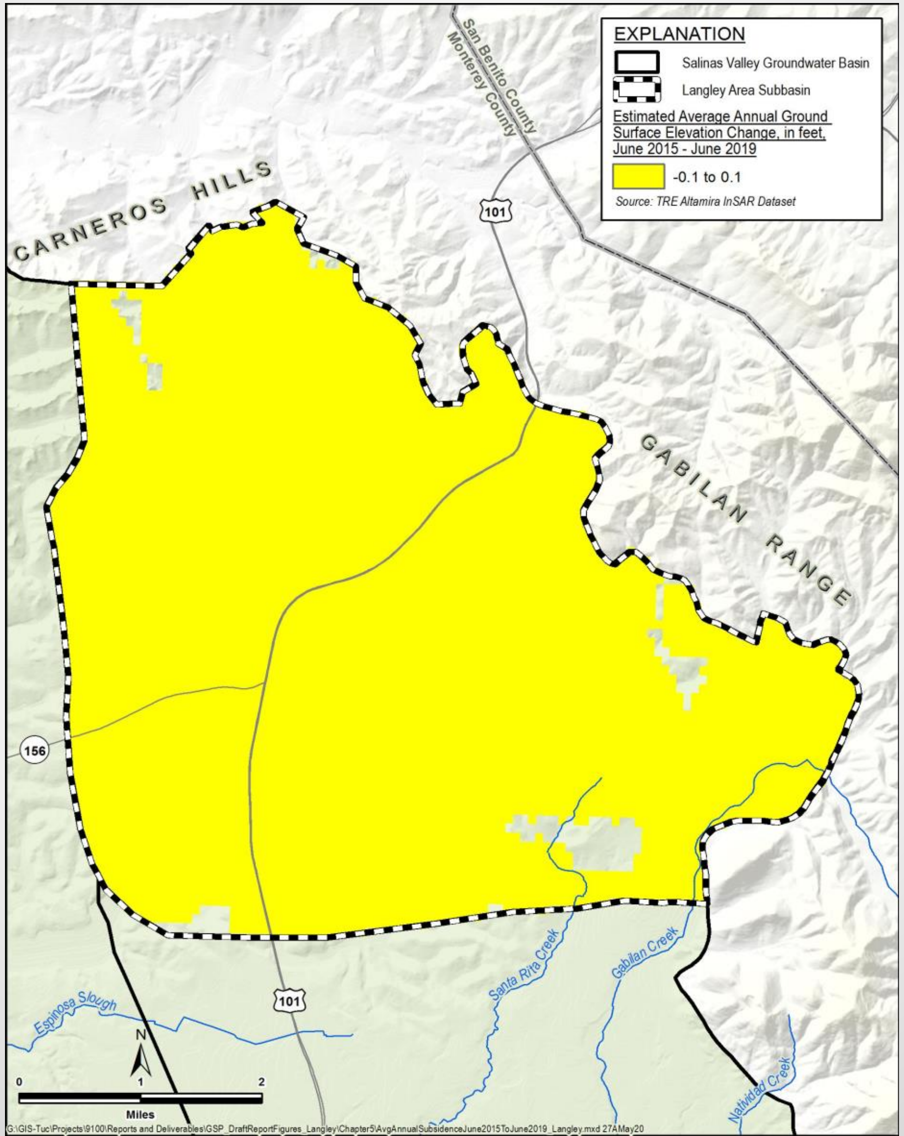
Groundwater conditions/SMC – **Subsidence**

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**

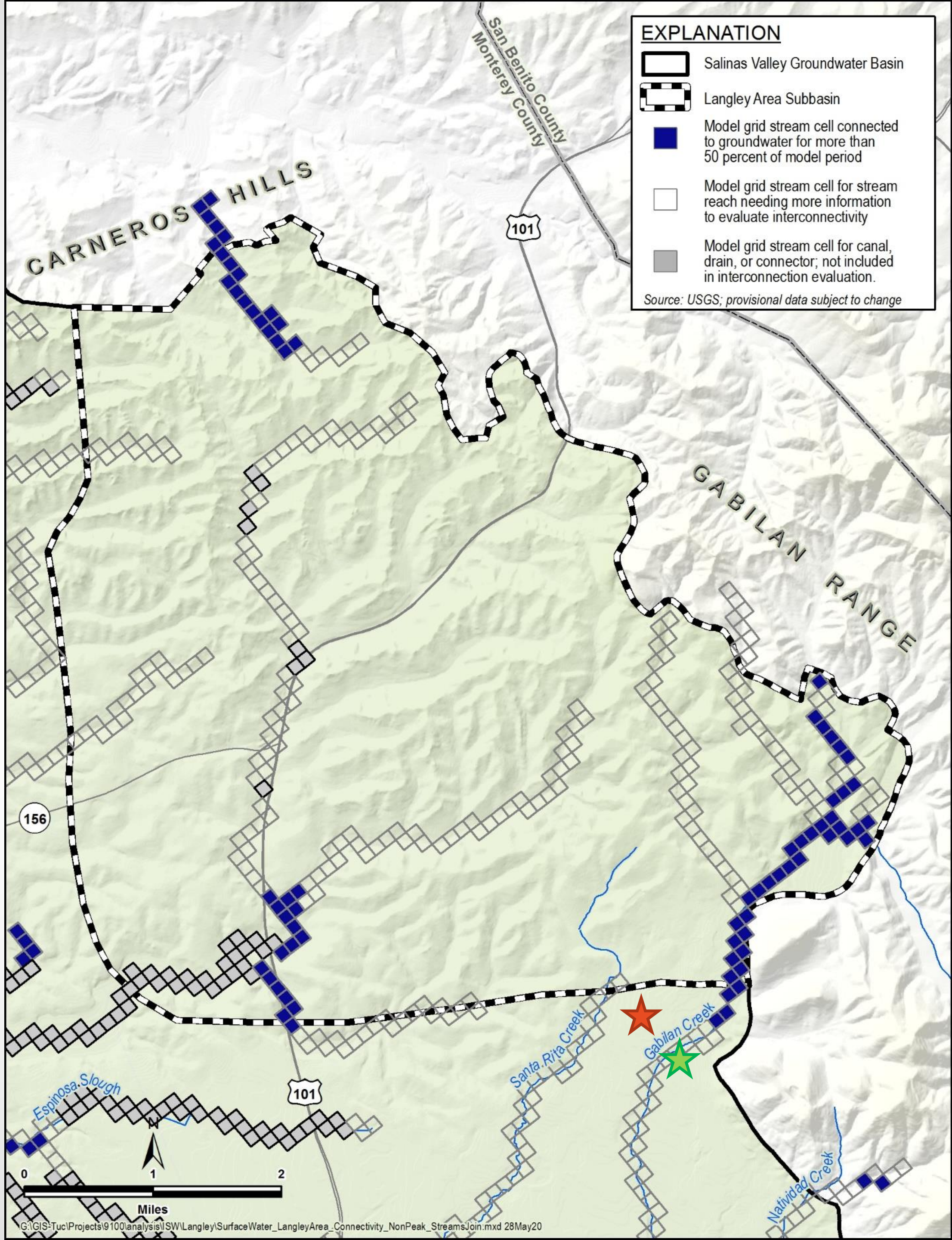
6. Depletion of Interconnected surface water (ISW)

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 is mostly residential, dependent on small state and local water systems, except for the southern part where agriculture is predominant
- There are no known hydraulic divides with adjacent subbasins, but due to the fractured granite bedrock, groundwater management may be localized
- Langley Area Subbasin has historically been in overdraft on the order of 300 AF/yr.
- From 1980 to 2016, the basin was in overdraft during 9 years
- This GSP includes a robust set of potential projects and management actions that are sufficient to mitigate overdraft

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
- Fallowing, Fallow Bank, and Agricultural Land Retirement

Projects & Management Actions

CROSS BOUNDARY PROJECTS

- Floodplain Enhancement and Recharge
- CSIP Expansion

IMPLEMENTATION ACTIONS

- Well Registration
- GEMS Expansion
- Dry Well Notification System
- Water Quality Partnership

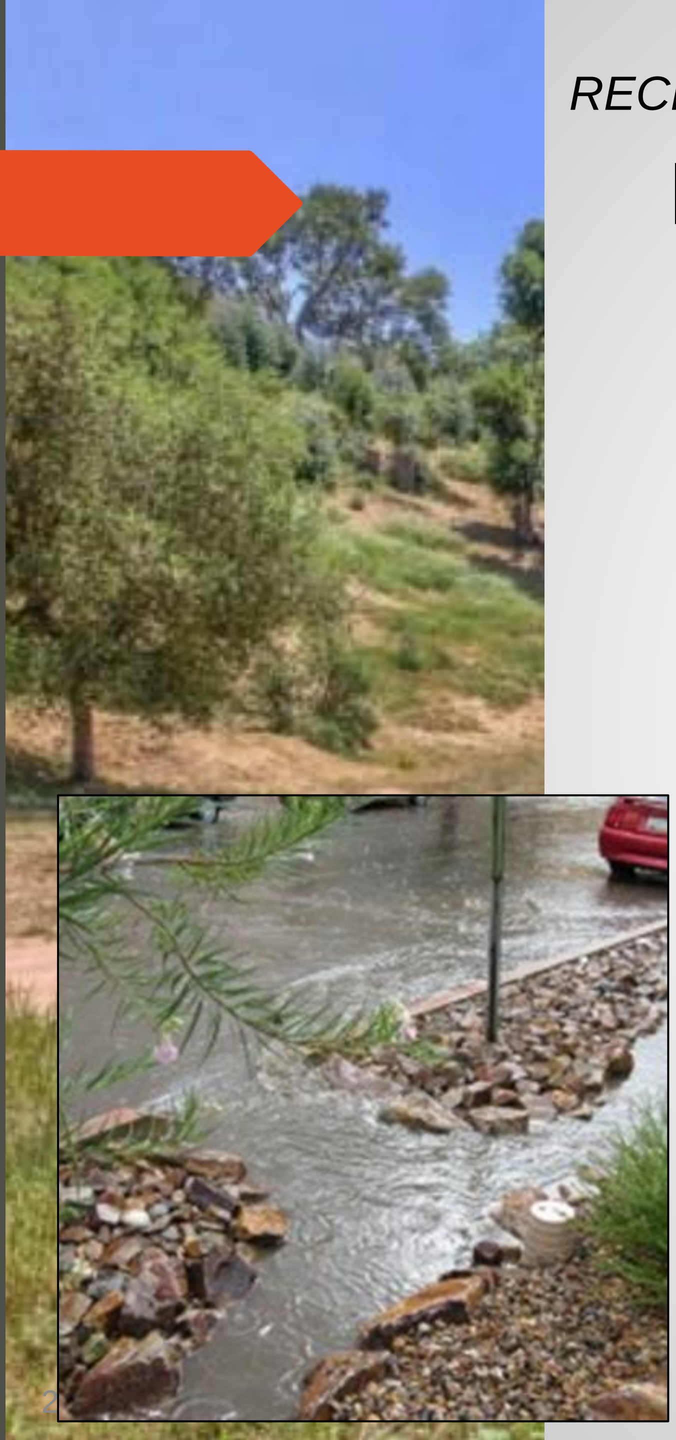
Decentralized In Lieu Recharge Projects

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 :** $150,000 - $200,000 to encourage projects through outreach, site assessments, and assistance with planning (not for implementation)
- **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

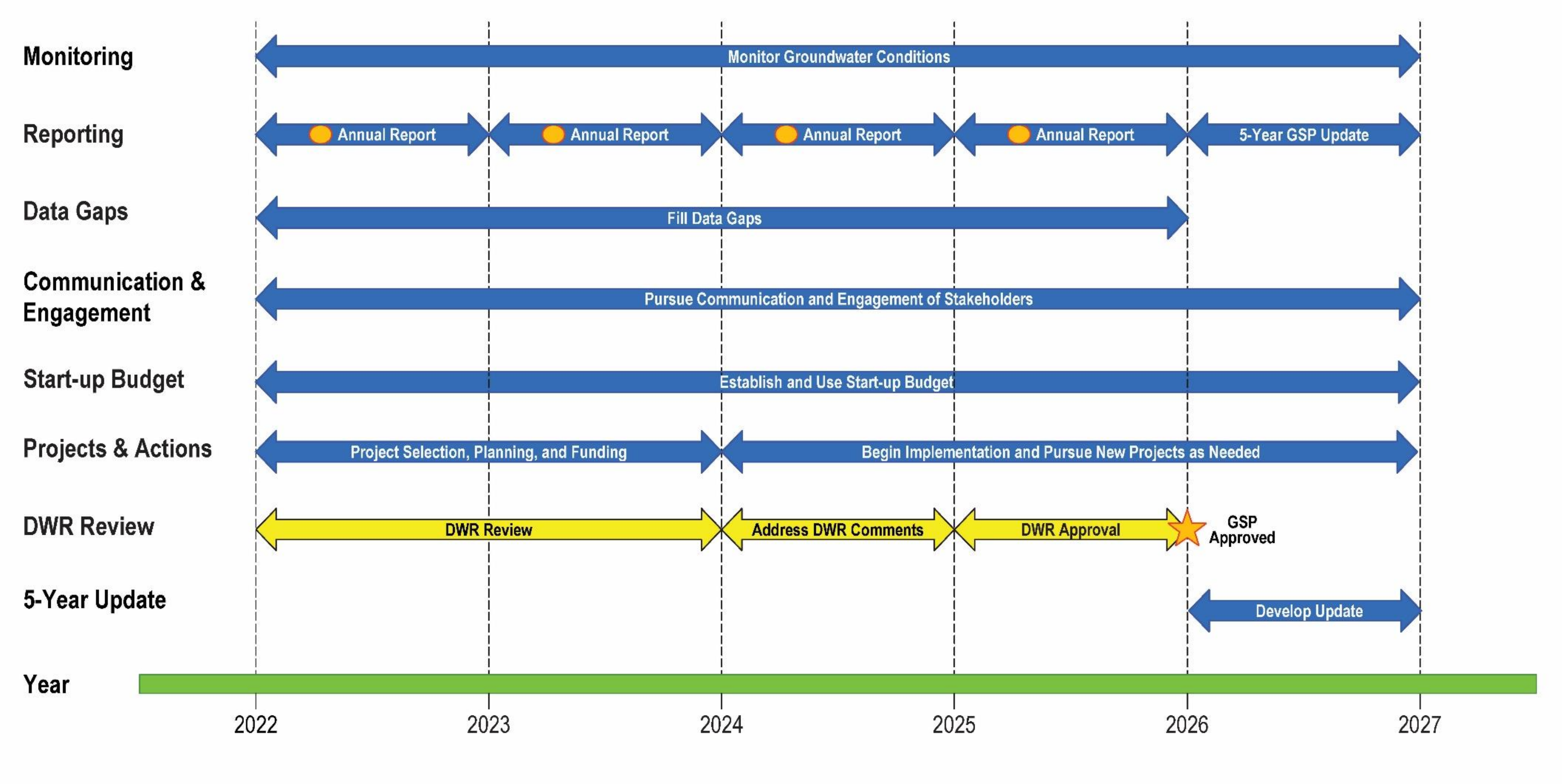
Project Number	Name	Description	Project Benefits	Quantification of Project Benefits	Cost
RECHARGE PROJECTS					
A1	Decentralized Residential Recharge Projects	Small-scale projects initiated by homeowners and business owners, including rooftop rainwater harvesting, rain gardens, and graywater systems	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 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 Unit Cost: $1,800/AF

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
B2	Fallowing, Fallow Bank, and Agricultural Land Retirement	Includes voluntary fallowing, a fallow bank whereby anybody fallowing land could draw against the bank to offset lost profit from fallowing, and retirement of agricultural land	Decreased groundwater extraction for irrigated agriculture	Dependent on program participation	$590-$1,730/AF if land is fallowed $1,140-$2,820/AF if land is retired
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: 2,300 AF/yr. in groundwater recharged for gw benefit of 1,000 AF/yr	Multi-subbasin Capital Cost: $12,596,000 Unit Cost: $1,050/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 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	Water Quality Partnership	Form a working group for different agencies to coordinate on water quality issues	Better access to quality drinking water	N/A – Implementation Action	Not estimated at this time

Langley P&MA Road Map

Years	Data/ Implementation Actions	Demand Management	Stormwater & Overland Flow Recharge Projects	Other projects (Decentralized In Lieu, Gabilan Stream Diversion, Cross-boundary Projects)
Year 1-2	Develop well registration program, GEMS expansion ordinance, and Dry Well Notification	.	Evaluate stormwater & overland flow recharge opportunities; General outreach (landscape scale); Prepare for grant applications; Begin pilot projects	.
Year 3-4	Implement well registration, GEMS expansion, and Dry Well Notification System Establish Water Quality Partnership	Develop pumping allocation structure & trigger for enacting pumping controls	Strategic outreach to landowners and site assessments; Development of recharge program; Evaluation of programmatic permit	.
Year 5-6+		If triggered, implement pumping controls; Consider voluntary fallowing if needed	Build recharge basins	If other subbasins move forward with these projects, evaluate potential benefit for the Langley Area

Implementation Schedule



Adaptive Management

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

Questions