Agenda

Santa Cruz Mid-County Groundwater Sustainability Plan

Advisory Committee Meeting #14

Wednesday, December 12, 2018, 5:00 – 8:30 p.m.
Simpkins Family Swim Center
Room B - 979 17th Avenue Santa Cruz CA 95062

Meeting Objectives

- Receive updates and guidance from the November 15, 2018 Mid-County Groundwater Agency (MGA) Board meeting.
- Receive briefing on current water management efforts in the Aromas Aquifer by the Pajaro Valley Water Management Agency, and discuss implications for the Mid-County Groundwater Sustainability Plan (GSP).
- Begin discussing groundwater modeling impacts and how these will influence the GSP.

Agenda

Item No.	Time[1]	Topic	Presenter & Materials
	4:30 p.m.	*Arrivals/Committee members collect food for dinner*	
1.	5:00 p.m.	Welcome, Introductions, Meeting Objectives, and Agenda Review • Review updated project timeline	• Ralph Bracamonte, Central Water District • Eric Poncelet, Facilitator *Materials:* *1.1 Agenda* *Refer to PowerPoint Presentation* • *Santa Cruz Mid-County Basin Groundwater Sustainability Plan Process Overview Timeline*
2.	5:10 p.m.	Oral Communications • *Members of the public to comment on non-agenda items*	• Public
3.	5:20 p.m.	Project updates • Outcomes of November 15, 2018 MGA Board meeting *(Jon Kennedy, David Baskin, or Allyson Violante), 15 min)* • Surface Water Interaction Working Group *(John Ricker, 3 min)*	• John Ricker, County of Santa Cruz • MGA/Advisory Committee member • Georgina King, Montgomery & Associates • Sierra Ryan, County of Santa Cruz

[1] The times allotted on this agenda are approximate and are subject to change.

Item No.	Time[1]	Topic	Presenter & Materials
		• January 12 Santa Margarita Basin meeting *(Sierra Ryan, 2 min)* • DWR?	
4.	5:40 p.m.	Briefing on current water management efforts in the Aromas Aquifer: challenges faced and actions taken • Presentation *(30 min)* • Discuss implications for Mid-County GSP *(30 min)*	• Ralph Bracamonte, Central Water District • Brian Lockwood, Pajaro Valley Water Management Agency • Advisory Committee *Refer to PowerPoint Presentation*
5.	6:40 p.m.	Public Comment	• Public
6.	*6:50 p.m.*	*Break*	
7.	7:05 p.m.	Primer on differences between the Aromas and Purisima Aquifers • Presentation (2*0 min)* • Discuss implications for Mid-County GSP *(25 min)*	• Georgina King, Montgomery & Associates • Advisory Committee *Materials:* *7.1 White Paper on Differences between Aromas and Purisima Aquifers*
8.	7:50 p.m.	Overview of impacts from pumping and how these influence the GSP	• Georgina King, Montgomery & Associates • Advisory Committee *Materials:* *8.1 Summary of Groundwater Modeling Assumptions and Scenarios* *Refer to PowerPoint Presentation*
9.	8:10 p.m.	Public Comment	• Public
10.	8:20 p.m.	Confirm: • October 23, 2018 GSP Advisory Committee Field Trip Summary • October 24, 2018 GSP Advisory Committee Meeting Summary	• Advisory Committee • Eric Poncelet, Facilitator *Materials:* *10.1 Draft Meeting Summary Groundwater Sustainability Plan Advisory Committee Field Trip, October 23, 2018* *10.2 Draft Meeting Summary Groundwater Sustainability Plan Advisory Committee Meeting #12, October 24, 2018*
11.	8:25 p.m.	Recap and Next Steps	• Eric Poncelet, Facilitator
	8:30 p.m.	*Adjourn*	

Santa Cruz Mid-County Basin
White Paper on Differences between the Aromas and Purisima Aquifers

This white paper provides a description of the differences between the Aromas and Purisima areas of the Santa Cruz Mid-County Basin. There are some ideas included that are intended to provoke discussion during the December 12, 2018 GSP Advisory Committee meeting.

Hydrogeologic Differences

The area called the "Aromas area" is the Aromas Red Sands surface outcrop shown on Figure 1. In the Aromas area, municipal wells are often screened in both the Aromas and underlying Purisima F unit. The Aromas Red Sands has variable thickness of between 10 and 1,000 feet. Shallower private wells may be screened entirely in the Aromas Red Sands. The underlying Purisima F unit is often grouped together with the Aromas Red Sands for groundwater supply management purposes. In addition to multiple municipal wells screened in both aquifers, there is no defined continuous aquitard between the Aromas Red Sands and Purisima F unit so the Purisima F unit is understood to be recharged by the overlying Aromas Red Sands.

The other deeper Purisima units (AA, A, BC and DEF) have smaller surface outcrops due to the tilted nature of the Purisima units towards the east (Figure 1 and Figure 2). The Aromas and Purisima F aquifers respond in a similar manner to natural recharge events.

Greater vertical hydraulic gradients between aquifers (i.e., differences between groundwater levels in different aquifers) in the Purisima units than in the Aromas/Purisima F units reflect the effects of leakage from overlying units. Figure 4 plots the groundwater levels for the three different SC-3 monitoring wells: there are differences of more than 20 feet between each of the aquifers. Figure 4 also includes the groundwater levels for SC-2A which has completions in both the Aromas Red Sands and Purisima F unit. The difference between groundwater levels (hydraulic gradient) is very small (less than 2 feet) compared to those in SC-3.

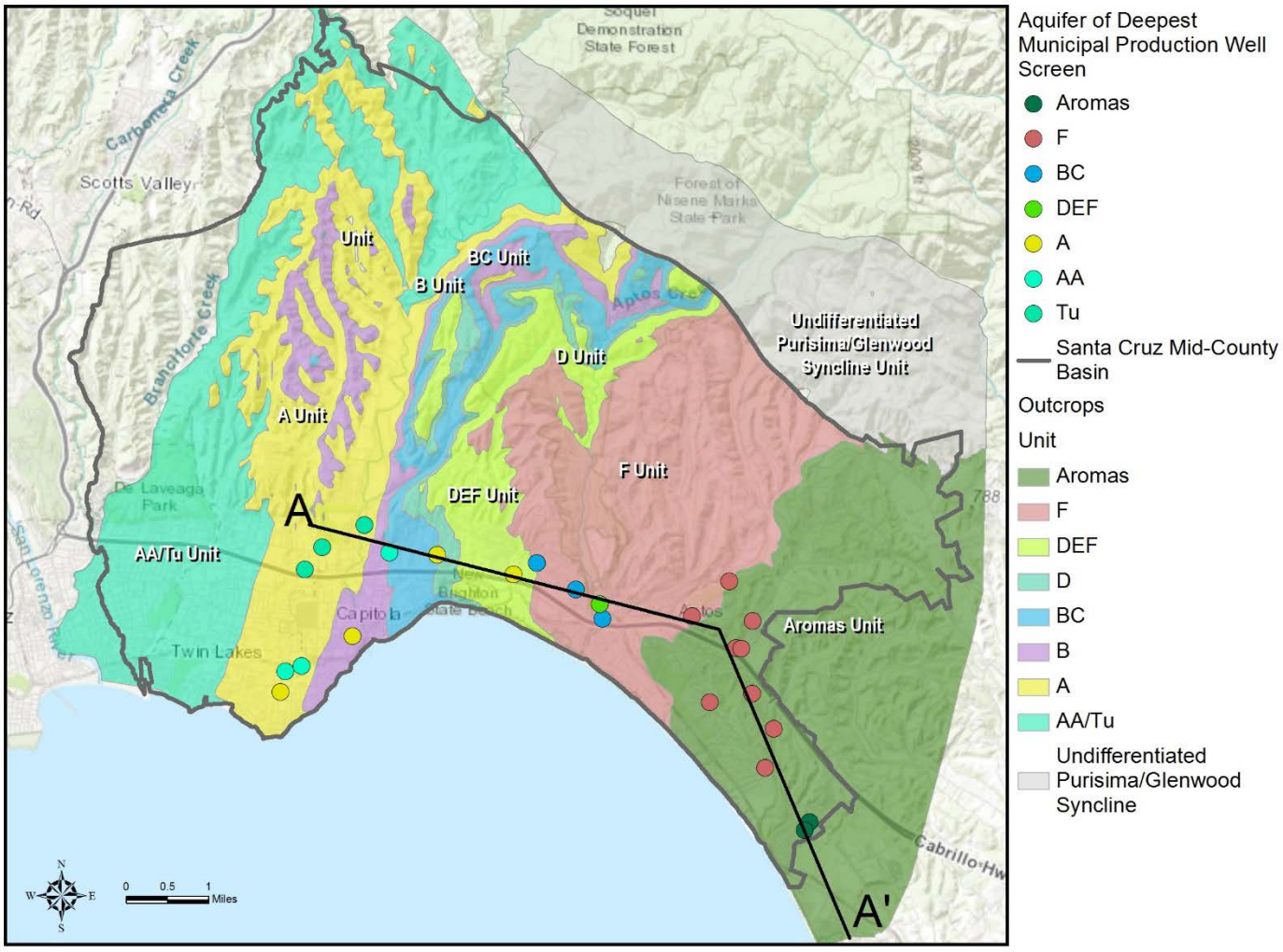

Figure 1. Aquifer Surface Outcrops in the Santa Cruz Mid-County Basin

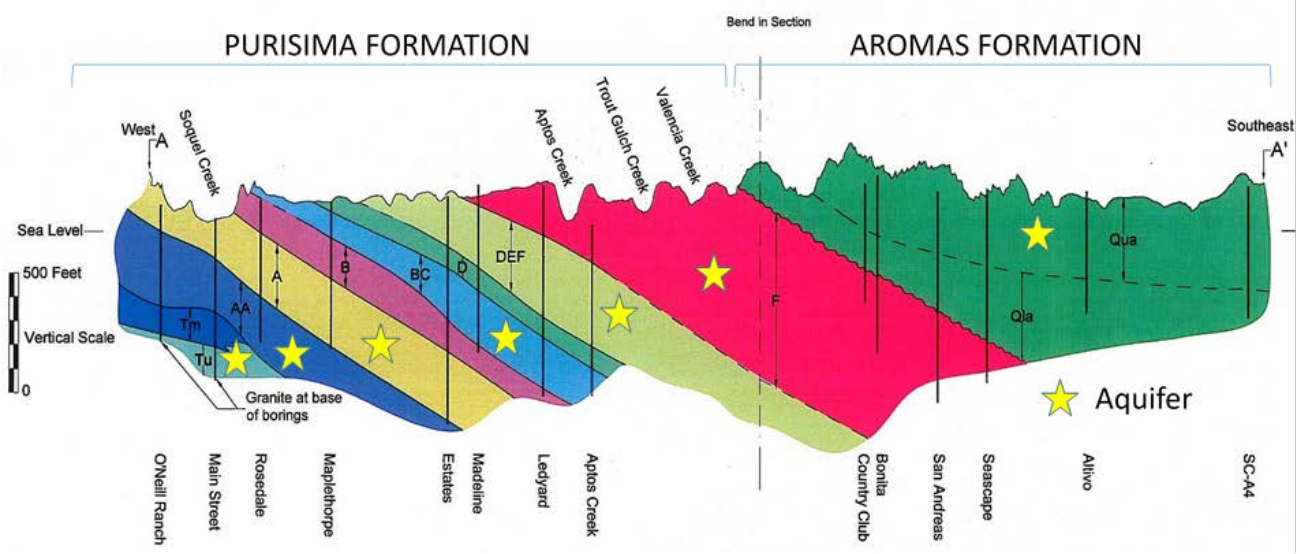

Figure 2. Hydrogeological Cross-Section Across the Santa Cruz Mid-County Basin

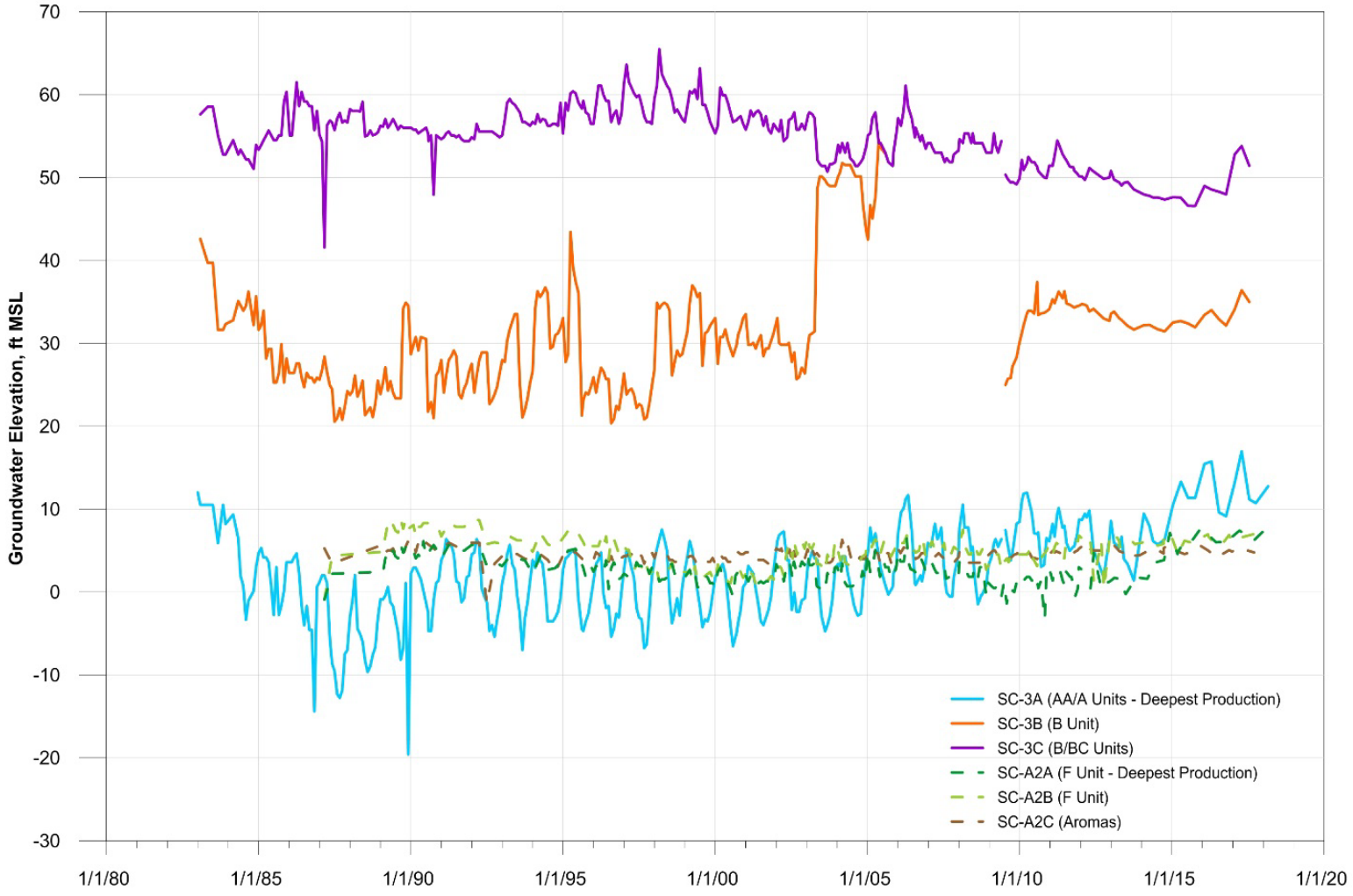

Figure 3. SC-3 and SC-2A Hydrographs

Groundwater Quality Differences

Where it is not intruded by seawater intrusion, the Aromas Red Sands aquifer has low background concentrations of chloride and TDS less than a quarter of the secondary drinking water standard (Figure 5). The Aromas Red Sands aquifer have slightly elevated concentrations of naturally occurring chromium VI that are below the current drinking water standards for total chromium (Figure 5). Where the overlying Aromas Red Sands have elevated chromium VI concentrations, the underlying Purisima F unit sometimes has very low detections of chromium VI because of downward leakage. Because it is an unconfined aquifer, the Aromas Red Sands are more susceptible to contamination from surface sources. Runoff and leaching from fertilizer use, and leaching from septic tanks into the Aromas Reds Sands has caused some localized nitrate concentrations to approach or exceed drinking water standards. One SqCWD production well in the La Selva area had nitrate above drinking water standards and has not been pumped since that occurrence several years ago. Widespread elevated nitrates are not observed which suggests that the production well impacted by nitrates is in close proximity to a localized nitrate plume form septic tanks. The same production well with elevated nitrates has very low detections of pharmaceutical contaminants of emerging concern (CECs), suggesting the nitrate and CEC contamination is coming from septic tanks as this area is unsewered, however, fertilizer use cannot be ruled out as a possible contributor. Perchlorate and 1,2,3-trichloropropane (TCP), which are associated with agriculture, have been found intermittently in a few Aromas area production wells (Figure 6).

Purisima area groundwater has slightly higher natural chloride and TDS concentrations than Aromas area groundwater, but still well below secondary drinking water standards, (Figure 5). Naturally occurring iron and manganese above secondary drinking water standards are widespread in the Purisima units. All groundwater extracted for municipal use is treated to lower iron and manganese concentrations to below drinking water standards. The confined nature of the Purisima units and the lower permeability of overlying soils protects the Purisima aquifers from surface sources of contamination and promotes denitrification in the soil; thus nitrate concentrations are mostly non-detect or well below drinking water standards.

Very low naturally occurring arsenic concentrations of less than 1 ug/L occurs throughout the Mid-County Basin, in both the Aromas and Purisima areas. In the Purisima units, there are localized occurrences of arsenic greater than 1 ug/L but generally less than the drinking water standard of 10 ug/L (Figure 6).

Because the Aromas Reds Sands are more susceptible to contamination, there is a need to improve management of overlying land uses as there are known impacts from these land uses. There may be a need to monitor the Aromas area differently from the Purisima area with respect to groundwater quality. For example, the Aromas area may have different constituents monitored, such as CEC monitoring, or an increased frequency of monitoring.

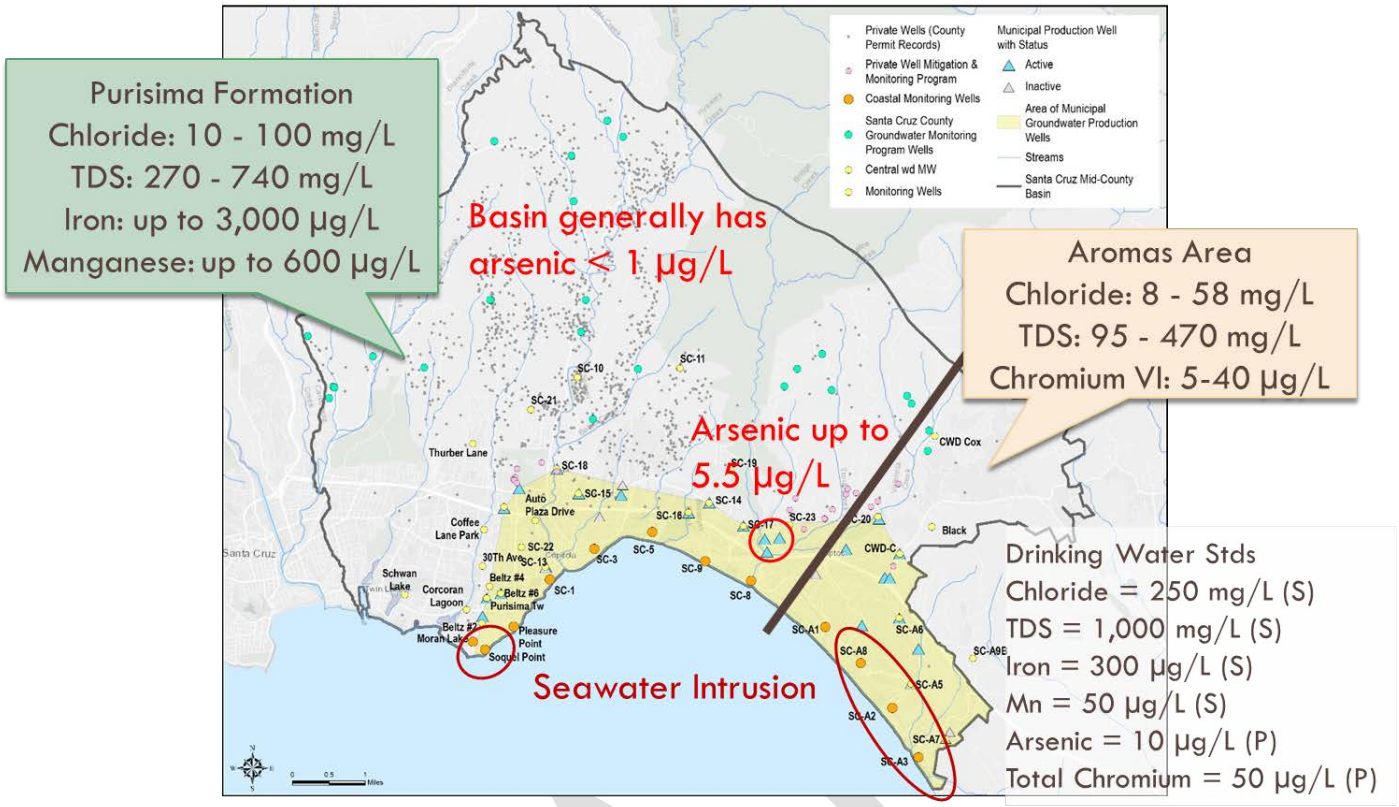

Figure 4. Natural Groundwater Quality in the Santa-Cruz Mid-County Basin

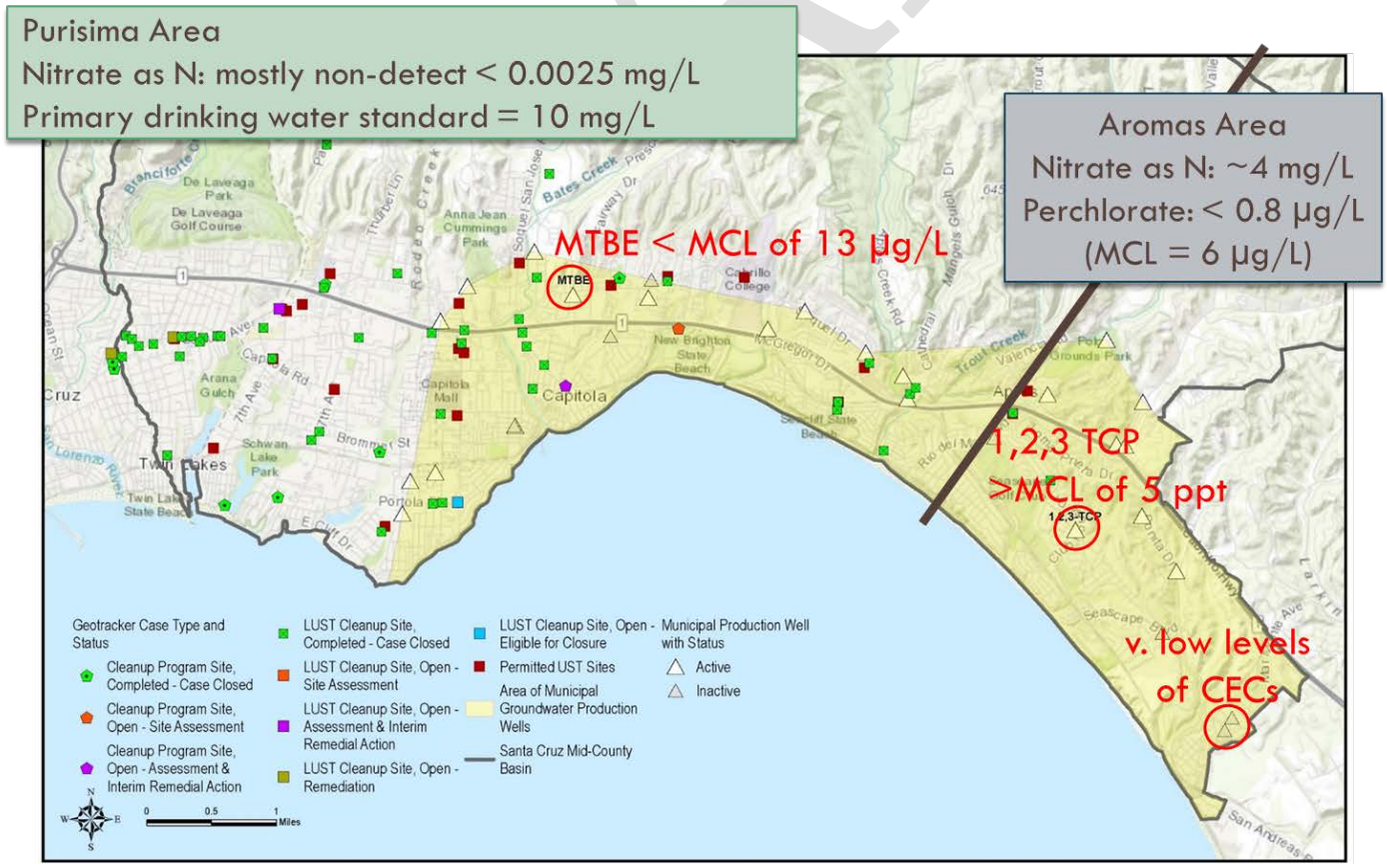

Figure 5. Contaminated Groundwater Quality in the Santa-Cruz Mid-County Basin

Surface Water Connection Differences

Due to greater depths to groundwater in the Aromas area, groundwater is generally not connected to creeks and streams. Where groundwater levels are well below creeks, there is natural streambed percolation that recharges the underlying aquifers. Pre-1980 groundwater level data for wells close to creeks in the Aromas Red Sands are limited, but at the time of drilling, Central Water District's (CWD) Cox wells located 350 feet from an unnamed drainage that is tributary to Valencia Creek, all had groundwater levels deeper than 100 feet below the nearby creek elevation (drilling dates ranging from 1953 – 1967). There are also limited pre-1980 depth to groundwater data for the Purisima F unit near creeks. One record available is that for Soquel Creek Water District's (SqCWD) Polo Grounds well located 400 feet from Valencia Creek, which had a depth to groundwater of greater than 100 feet below Valencia Creek at the time of drilling in 1980. Groundwater depths greater than 100 feet below nearby creeks/streams before peak groundwater extraction in the 1980's demonstrates that groundwater levels were deep in the Aromas Red Sands and Purisima F unit before those aquifers were extensively pumped and that groundwater was not connected to surface water.

The relative permeability of the more permeable Aromas Red Sands and less permeable Purisima units is the reason for the aquifers' difference in groundwater connection with creeks. The much more permeable Aromas Red Sands allows groundwater to move more rapidly down through the sediments and is hydraulically connected to the underlying formations. The less permeable Purisima units have relatively slow movement of groundwater and aquitards between the units. As a result, the groundwater levels in the Purisima units tend to mimic the overlying topography while in the Aromas area groundwater is much more unrestricted and does not stack up like the Purisima units.

Review of groundwater model output for the years between 1985 and 2015 on how often creeks/streams were connected to groundwater reveals that creeks/streams originating in the undifferentiated Purisima/Glenwood Syncline Unit are more connected to groundwater where they flow over the undifferentiated Purisima/Glenwood Syncline Unit, located north of the Zayante Fault delineating the Basin's northern boundary (Figure 7). Creeks/streams become less connected to groundwater as they flow over the Purisima F unit within the Mid-County Basin (Figure 7). An example of this is Valencia Creek which has some connection to groundwater at its head waters but then due to geological changes from the undifferentiated Purisima to the Purisima F unit, becomes disconnected from groundwater (Figure 7). Those creeks originating in the Purisima F unit, such as Trout Creek Gulch and various other unnamed drainages are rarely connected to groundwater (Figure 7).

Creeks west of Aptos Creek flow over older Purisima units (AA, A, B, DEF) and are more connected to groundwater (Figure 7). This connection may either be from the creek flowing though alluvium which is connected to the underlying Purisima units or the creek flowing directly over the Purisima unit where no alluvium exists (this occurs near the Main Street well site). Shallow monitoring wells located along Soquel Creek to monitor stream impacts from nearby municipal pumping have groundwater levels above the creek bed or up to 6 feet below the creek bed (Figure 8).

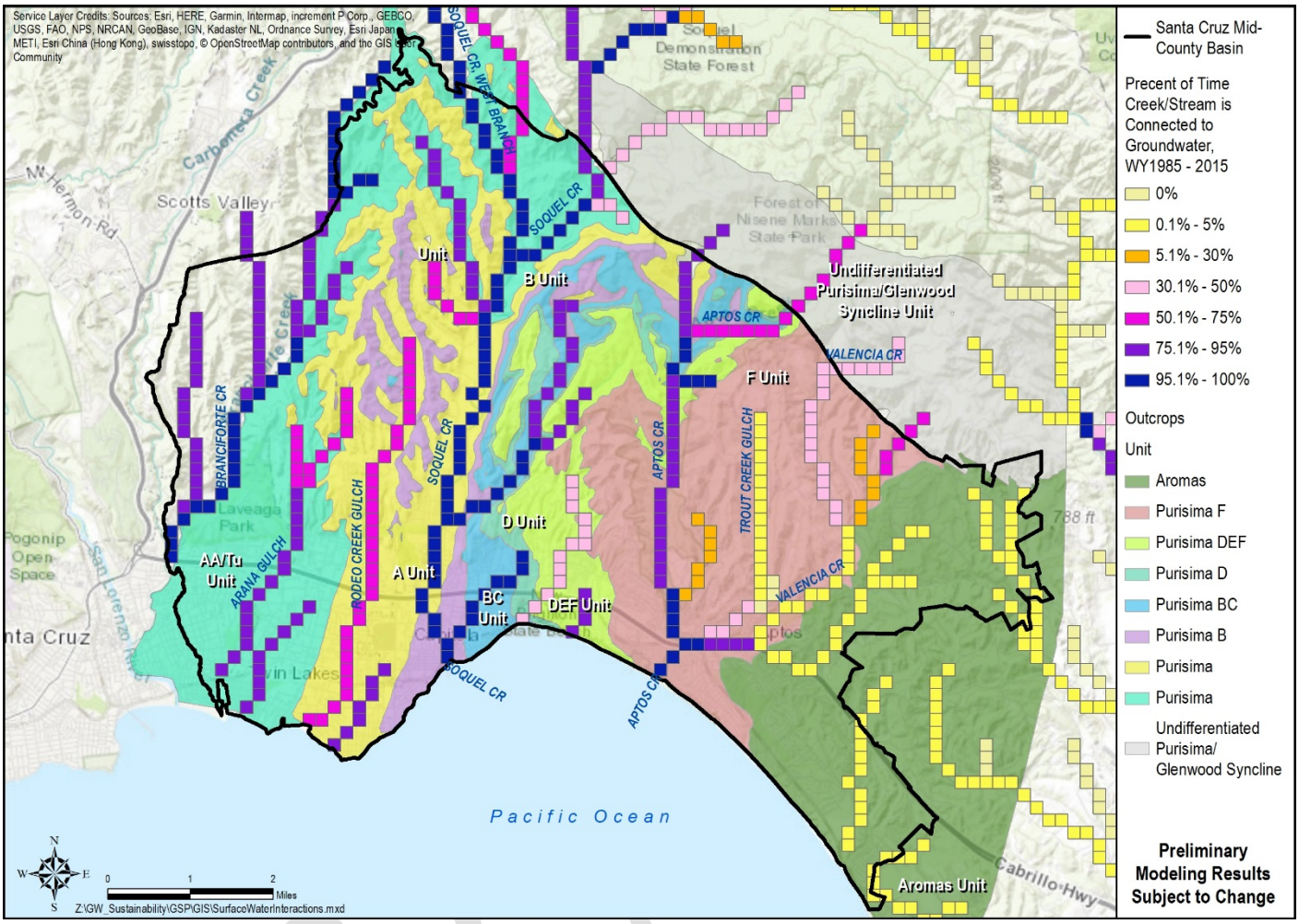

Figure 6. Percent of Time Creeks/Streams are Connected to Groundwater Based on Groundwater Model

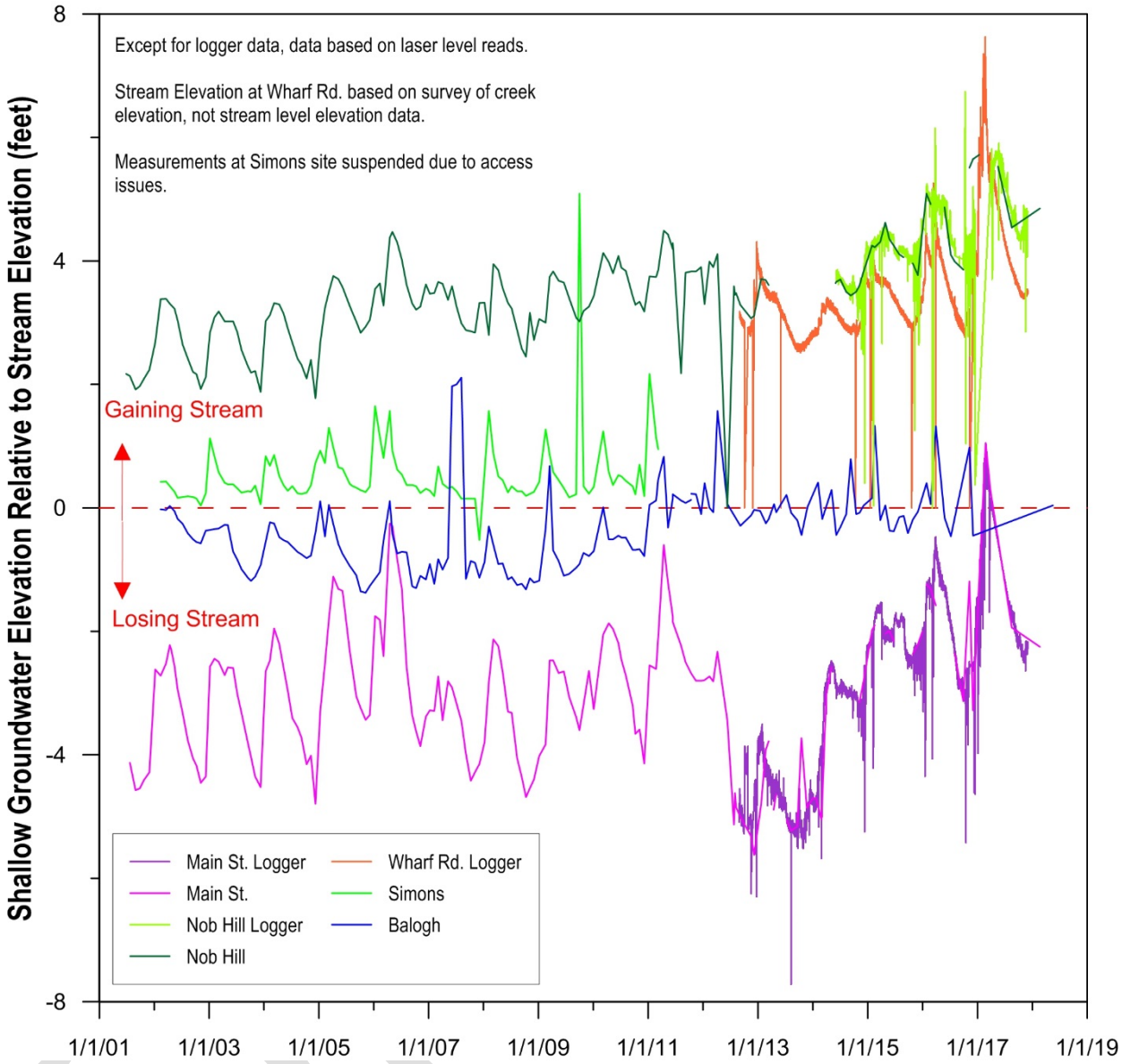

Figure 7. Shallow Groundwater Levels Compared to Soquel Creek Elevations

Sensitivity to Non-Municipal and Municipal Pumping

Soquel Creek Water District's municipal pumping in the Aromas Red Sands is limited to the Sells and Altivo wells located right next to the Basin's southern boundary with Pajaro Valley. However, neither of these wells are currently pumping because of elevated nitrate and coastal seawater intrusion in the Aromas aquifer. SqCWD production wells pumping from the Purisima F unit include: Seascape, San Andreas, Country Club, Bonita, Aptos Creek (currently not operational), Aptos Junior High, Granite Way, and Polo Grounds. CWD has three operating wells that are screened through both the Aromas and Purisima F unit: Rob Roy 4, Rob Roy 10, and Rob Roy 12.

There are large areas of the Aromas/Purisima F area west of Valencia Creek that have private wells mainly for domestic use, but also for some agricultural use (Figure 9). Several small water systems also provide water in this area from groundwater. There are fewer private wells in the Basin east of Valencia Creek because water supply is provided by CWD. Just outside of the Basin's eastern boundary with the Pajaro Valley, there is a higher density of wells for private domestic, agricultural, and small water system use (Figure 9) than just within the Mid-County Basin. Collectively these wells are referred to as non-municipal wells.

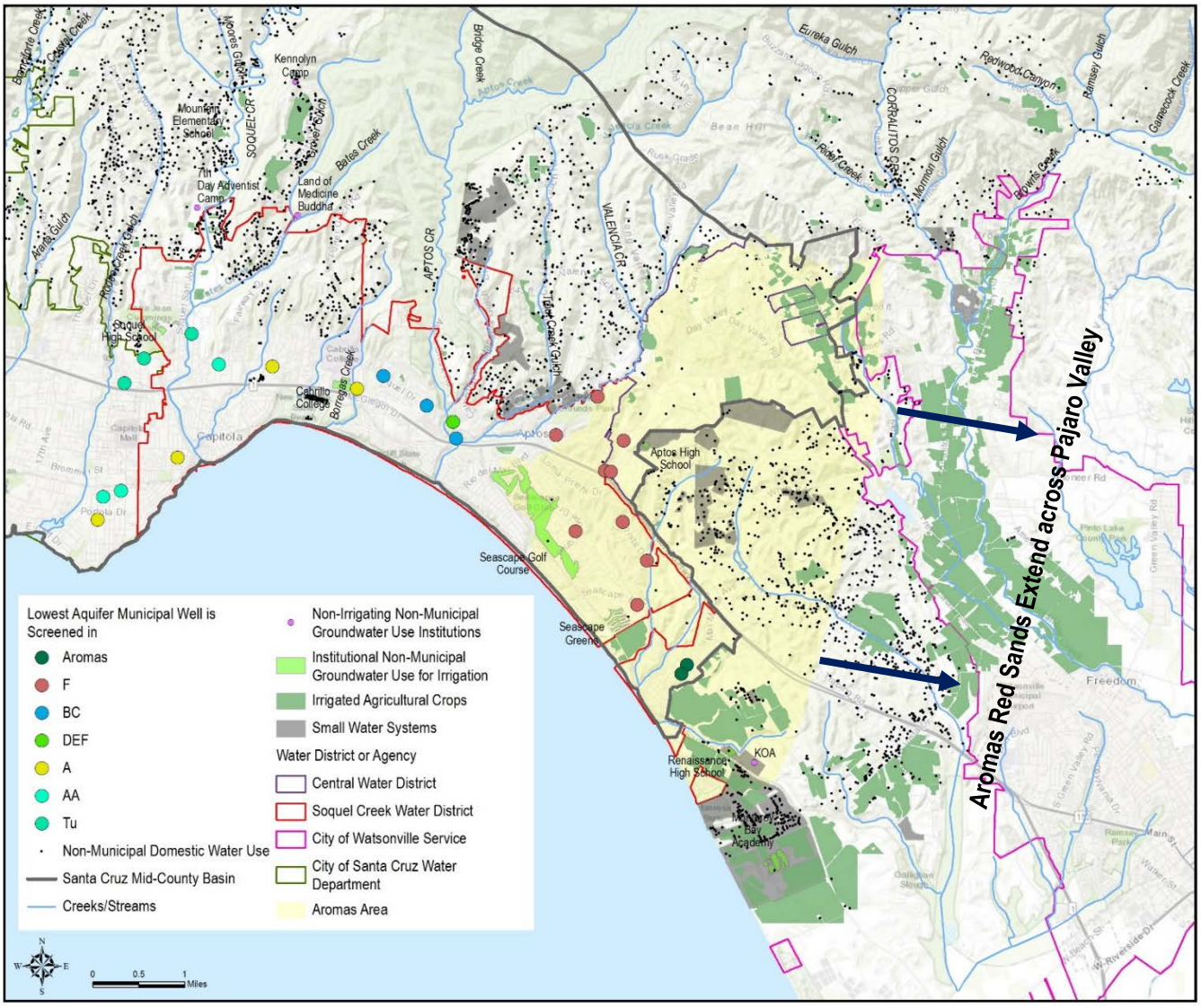

Figure 8. Locations of Non-Municipal, and Municipal Groundwater Use

Sensitivity model runs to test the influence on coastal groundwater levels from municipal and non-municipal pumping is summarized as:

- Purisima unit municipal wells, generally located within 1 mile of the coast, have a considerable influence on coastal groundwater levels;
- Inland Purisima unit non-municipal wells have little influence on coastal groundwater levels;
- Coastal Purisima unit non-municipal wells not yet evaluated;
- Coastal Aromas/Purisima F unit municipal wells (four SqCWD wells and two CWD wells projected to total 380-830 acre-feet per year in the latest redistribution) have an influence of between 2 - 4 feet (depending on redistribution and curtailment scenario used) on coastal groundwater levels at SC-A1B, SC-A8A and SC-A2A. The most southerly of the coastal monitoring wells, SC-A3A, in the Aromas Red Sands aquifer has little influence from Aromas/Purisima F municipal pumping;
- Coastal Aromas/Purisima F non-municipal wells (average production of 263 acre-feet per year) in the Mid-County Basin have an influence of around 1 foot on coastal groundwater levels at SC-A1B, SC-A8A and SC-A2A.Similar to the sensitivity of municipal pumping in this area, non-municipal wells have little influence on coastal groundwater levels at the most southerly of the coastal monitoring wells, SC-A3A in the Aromas Red Sands aquifer; and
- Coastal Pajaro Valley non-municipal pumping (average production of 2,533 acre-feet per year in the model, 70% of which is for agricultural irrigation) has an influence of up to 1.5 feet on the southernmost coastal monitoring well, SC-A3A in the Aromas Red Sands aquifer. This influence is greater than coastal Aromas/Purisima F non-municipal pumping at this well. Non-municipal pumping in the Coastal Pajaro Valley has decreased influence northwards into the Mid-County Basin.

Management Areas

A management area refers to an area within a basin for which a GSP may identify different minimum thresholds, measurable objectives, monitoring, or project and management actions based on unique local conditions for water use, water source, geology, aquifer characteristics, or other factors. The GSP must describe each management area, including the rationale behind the approach, and how it can be managed differently without causing undesirable results outside the area.

Questions to consider:

1. Reason for creation of each management area: do we need to manage certain areas differently to other areas within the Basin?
2. Level of monitoring and analysis: do the different management areas warrant different monitoring and analysis?

Potential Management Areas

1. Inland private well area (less monitoring because private domestic use has less influence on Basin sustainability, except maybe near surface water, therefore less management is needed. This area might already be sustainable (if not impacting surface water) and should be managed to remain this way. The sustainability management criteria for connected surface water will likely determine if management actions are needed in this area. We need to think about the possibility of future land use changes such as increased irrigated agriculture and if that may influence the establishment of management areas.

2. The Aromas area is where seawater intrusion currently occurs and therefore we have different sustainability management criteria set for this area. Because it is also hydraulically linked to the Pajaro Valley and thus the MGA does not have complete control over groundwater levels through its own management actions, it is a good candidate for a separate management area.

3. Area of municipal production (roughly up to 1- 2 mile inland) along the majority of the coastline of the Mid-County Basin is where all municipal wells are that influence coastal groundwater levels. This area also includes larger institutional groundwater uses: Cabrillo College and Seascape Golf Course. Think about extending inland a bit further to 50 ft above mean sea level groundwater elevation? This area is the most vulnerable to seawater intrusion and has the greatest impact on coastal groundwater levels. It is also the area where supplemental water supply projects are most likely to be implemented.

4. Do the alluvial channels of major creeks need their own management areas? Maybe warranted if pumping wells connected to shallow alluvium need to have meters to monitor groundwater extractions that may influence creek baseflows. This is an example of how a certain area may be managed differently to the rest of the Basin.

Summary of User Impacts

Since the indicators that are not currently sustainable are seawater intrusion and possibly depletion of interconnected surface water, these are indicators used to determine user impacts. Based on modeling completed thus far in work to develop Sustainable Management Criteria and required projects and management actions to achieve sustainability, the table below identifies relative impacts from users of groundwater in different parts of the Basin. Note that the modeling specific to surface water interactions is not complete yet and therefore no summary provided for those impacts.

The table below will be populated as more is learned from the groundwater model.

User	Coastal Groundwater Levels (Seawater Intrusion)	Surface Water	Other
Mid-County Basin			
Inland private wells (domestic, agricultural, and institutional)	Do not influence very much		
Coastal private domestic wells in Purisima units	Still to evaluate, but small pumping quantities not expected to have much effect		
Coastal private institutional wells in Purisima units: Seascape Golf Course Cabrillo College Seascape Greens	Still to evaluate		
Coastal agricultural wells in Purisima units	Still to evaluate		
Coastal non-municipal wells in Aromas area	Influence on Aromas area coastal groundwater levels		
City of Santa Cruz municipal wells	Influence		
Soquel Creek Water District municipal wells	Influence		
Aromas/Purisima F municipal wells (SqCWD & CWD)	Influence		
Outside of Basin			
Coastal private domestic, agricultural, and small water systems in Pajaro Valley	Influence on Aromas area coastal groundwater levels		
Pajaro Valley basin management	Influence on Aromas area coastal groundwater levels		

Summary of Groundwater Modeling Assumptions and Scenarios

Model Assumptions for Predictive Runs

The model assumptions provided below were discussed at the August and September GSP Advisory Committee meetings.

Model Assumptions with Water Supply Augmentation Options as Superscript	Assumptions	Follow up work
Pumping demand [1]	CWD: pre-drought average 2008-2011 SqCWD: 2015 Urban Water Management Plan projections that reduce over time City of Santa Cruz: cooperative agreement with SqCWD Pre-drought estimates for non-municipal pumping	SqCWD projected demand may be too low; test SqCWD demand that is stable over time
Return Flow	Municipal system losses from sewer and water pipes	
Santa Margarita/Pajaro Valley boundaries	No annual changes in heads	
Stream-aquifer interaction	Streamflow calculated by model and calibrated to gauge flow data	Calibration of stream alluvium to gradient between shallow groundwater level and stream level
Climate change	Catalog Climate: 10% less rainfall, 1.5 degree F increase in temps	Model TAC approved use of Catalog Climate as opposed to individual global circulation models; will need to check approach with DWR
Sea level rise	+1.5 ft	Model TAC advised updating to 2018 Ocean Protection Council updated guidance +2.3 feet in 2070 based on 5% probability
Surface water transfer [2]	2015 AFY pilot transfer to SqCWD continues indefinitely	

Modeled Basin Effects from Scenarios Reflecting Potential Management Actions and Projects

The modeled scenarios provided below were discussed at the September and October GSP Advisory Committee meetings.

Red font indicates added information since October GSP Advisory Committee meeting.

Model Scenario with Water Supply Augmentation Options as Superscript	Type	General Effect on Groundwater Levels	Follow up work
Eliminate non-municipal inland pumping in areas where simulated groundwater levels are > 50 ft above sea level	Sensitivity	small effect in coastal groundwater levels (< 1 ft increase)	Test effect of non-municipal pumping in Aromas area (Purisima F and Aromas)
Reduce septic tanks return flow from 90% to 50%	Sensitivity	small effect in coastal groundwater levels (~1 ft decrease)	
Pajaro Valley Boundary, groundwater increases 3 ft	Sensitivity	benefits groundwater levels in the Aromas area (up to 1.2 ft increase at protective elevation wells). Similar effect at SC-A3A in Aromas Red Sands to eliminating coastal Pajaro Valley Subbasin pumping and greater effect in Purisima F unit wells (SC-A1B, SC-A8A, and SC-A2A) than eliminating non-municipal Aromas area wells (see below).	
Effect of non-municipal pumping in alluvium	Sensitivity	In progress	Move pumping in aquifers below alluvium and Terrace Deposits to alluvium and Terrace Deposits
Effect of non-municipal pumping in Soquel Creek and Bates Creek Valleys	Sensitivity	In progress	Turn off pumping in these areas
Effect of vertical distribution of pumping near Soquel Creek	Sensitivity	In progress	Move municipal pumping in wells screened in AA and Tu to only Tu
Eliminate coastal Aromas/Purisima F unit municipal wells (four SqCWD wells and two CWD) on coastal groundwater levels	Sensitivity	Influence of between 2 - 4 ft (depending on redistribution and pumping curtailment scenario) on coastal Purisima F unit groundwater levels at SC-A1B, SC-A8A and SC-A2A. The most southerly of the coastal monitoring wells, SC-A3A in the Aromas Red Sands aquifer, has little influence from Aromas/Purisima F municipal pumping	
Eliminate coastal Aromas/Purisima F unit non-municipal wells on coastal groundwater levels	Sensitivity	Less of an influence on coastal Purisima F unit groundwater levels at SC-A1B, SC-A8A and SC-A2A than Aromas/Purisima F unit municipal pumping but still around 1 ft increase. The most southerly of the coastal monitoring wells, SC-A3A in the Aromas Red Sands aquifer, has little influence from Aromas/Purisima F non-municipal pumping	

Model Scenario with Water Supply Augmentation Options as Superscript	Type	General Effect on Groundwater Levels	Follow up work
Eliminate coastal Pajaro Valley non-municipal pumping	Sensitivity	Influence of up to 1.5 ft on the southernmost coastal monitoring well, SC-A3A, in Aromas Red Sands aquifer. This influence is greater than coastal Aromas/Purisima F non-municipal pumping at SC-A3A. Non-municipal pumping in the Coastal Pajaro Valley has decreased influence northwards into the Mid-County Basin.	
Remove surface water transfer to SqCWD	Management action	Lowers groundwater levels in coastal Purisima A unit and Tu unit up to 4 feet.	
Municipal pumping redistribution towards coast	Current operational limits	Lowers groundwater levels 1-4 feet in western coastal Purisima A unit. Increase groundwater levels 10+ feet in coastal Tu unit. Decreases groundwater levels <1 ft in coastal Aromas area.	
Reduce municipal pumping [1, 2a, 4a, 4bii, 4d, 5a, 5b]	Management action	- helps recover Purisima A-unit and BC unit, Purisima A/BC units can have increased pumping and still achieve sustainability - Aromas area/Purisima F unit pumping needs further reduction - Tu unit pumping needs further reduction - coastal elevations La Selva Beach area of Aromas aquifer (SC-A3A) are not impacted by reducing municipal pumping because municipal wells already inactive.	Redistribute municipal pumping further in an attempt to reach Minimum Thresholds and Measurable Objectives at more wells Test effect of non-municipal pumping in Aromas area (Purisima F and Aromas)
Aquifer storage and recovery by City of Santa Cruz [2b]	Project	Greater groundwater level declines near recovery wells for in-lieu scenarios compared to ASR injection scenarios	Continue feasibility evaluation by simulating different project configurations
Pure Water Soquel seawater intrusion prevention by SqCWD [4bi, 4c]	Project	see Draft EIR Project to be discussed at December 2018 GSP Advisory Committee meeting	

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

Groundwater is a vital resource, together let's protect it.

5180 Soquel Drive • Soquel, CA 95073 • (831) 454-3133 • midcountygroundwater.org

Draft Meeting Summary

Santa Cruz Mid-County Groundwater Sustainability Planning Advisory Committee Field Trip - Meeting #13

October 23, 2018, 9:00 am – 1:00 pm

This field trip served as the twelfth convening of the Santa Cruz Mid-County Groundwater Sustainability Planning (GSP) Advisory Committee. It took place on October 23, 2018 from 9:00 a.m. – 1:00 p.m. Committee members, Santa Cruz Mid-County Groundwater Agency (MGA) board members, members of the public, partner agencies, and consultants visited seven different sites in the Santa Cruz Mid-County Basin to learn about issues related to groundwater planning and monitoring, habitat restoration and various relevant projects. Staff from agencies throughout the Basin, including Soquel Creek Water District, City of Santa Cruz, County of Santa Cruz, and the Resource Conservation District of Santa Cruz County presented on the topics and addressed questions from the participants.

Meeting Objective: The primary objective of the field trip was to orient Advisory Committee members to the groundwater basin, especially issues related to groundwater planning and monitoring, habitat restoration, and relevant projects in the Mid-County Basin to inform their work on the groundwater sustainability plan.

Meeting Attendance

Advisory Committee members in attendance included:

1. Kate Anderton, Environmental Representative
2. John Bargetto, Agricultural Representative
3. Rich Casale, Small Water System Management
4. Keith Gudger, At-Large Representative
5. Dana Katofsky McCarthy, Water Utility Rate Payer
6. Jon Kennedy, Private Well Representative
7. Charlie Rous, At Large Representative
8. Allyson Violante, County of Santa Cruz
9. Thomas Wyner for Cabrillo College, Institutional Representative

Committee members who were absent included:

1. David Baskin, City of Santa Cruz
2. Bruce Jaffe, Soquel Creek Water District
3. Jonathan Lear, At-Large Representative

4. Marco Romanini, Central Water District

MGA Board members in attendance included:

1. Curt Abramson, Private Well Representative
2. Jim Kerr, Private Well Representative

Members of the public in attendance included, but were not limited to, the following:

1. Larry Freeman
2. Gary Lindstrom
3. Scott McGilvray
4. Becky Steinbruner
5. Randall Syler

Meeting Outcomes (linked to field trip schedule and presentations)

Following is a summary of the topics presented and discussed at each of the seven field trip sites.

***Stop 1*: 9:00 a.m. - Coastal Monitoring Well SC-1 Near Prospect and 49th Avenues in Capitola, CA**
Amanda Bunte, Soquel Creek Water District, presented on coastal water quality sampling and addressed participant questions outlined below.

- **Question (Q):** What is the water elevation level at this well?
  - **Response (R):** It is between 61 – 64 feet below ground level.
- **Q:** How far below sea level is this well?
  - **R:** It is five feet below sea level.
- **Q:** How deep is this well?
  - **R:** It is 320 feet below ground level.
- **Q:** Do you keep well logs and construction data for this well?
  - **R:** Yes, Soquel Creek Water District does have the well logs and construction data for this well, although, they are not on our website. We have graphed the data to show the protective elevation at four feet below ground level.
- **Q:** Do you map underground water levels?
  - **R:** We do map underground water levels on a contour map, with 3-dimensional animation showing the topography. These maps are based on chloride levels.
- **Q:** Are you using data to create a curtain barrier for seawater intrusion? How are you using this data?

  - **R:** We use the data to identify spots useful for injection and then compare the data to the protective elevation, which serves as an indicator of seawater intrusion protection. We have separate data for each well.
- **Q:** What do you mean by "purging" the well?
  - **R:** We purge a well when we pump out the water that has been standing in the well casing before we sample. We do this so we sample the water fresh from the aquifer, not the water that has been standing in the well. .
- **Q:** Which aquifers does this well monitor?
  - **R:** The Purisima Formation A Unit
- **Q:** To what extent do you sample from private versus municipal wells at this location?
  - **R:** There are very few private wells in this area, and the closest municipal well to this location is the one located is Soquel Creek Water District's Garnet Street production well.
- **Q:** Is the water here up to drinking water standards?
  - **R:** There are no signs of seawater intrusion at this well location.
- **Q:** Why do you not have readings for this well for 2006 – 2008? (Participant was referring to data readings on the graph that staff provided.)
  - **R:** I am not certain.
- **Q:** Is the purged water sampled before you conduct sampling in the aquifer?
  - **R:** We measure the PH and electro-conductivity levels to make sure the water is stable before sampling.
- **Q:** How much yield is there at the Soquel Garnet production well?
  - **R:** 516 gallons per minute (GPM), operating 6 hours/day. And at Beltz 8 and 9, it is less than 300 GPM at each, operating 24 hours/day, May through October.
- **Q:** When was Beltz installed?
  - **R:** 1998 – 1999.

***Stop 2*: 9:45 a.m. - City's Research Park Well, 2768 Research Park Drive in Soquel, CA**

Isidro Rivera, City of Santa Cruz Water Department, presented on production well and division of drinking water sampling and addressed participant questions as outlined below.

- **Q:** Do you inject and extract water from this well?
  - **R:** Yes.
- **Q:** How far is the O'Neill well from here?
  - **R:** Approximately 1,000 feet.
- **Q:** Does the injection process rely on gravity or pumping?
  - **R:** It uses the system's back pressure.
- **Q:** Do you treat the water once it is recovered again?
  - **R:** Yes, we inject treated water.

- **Q:** Is there additional cost associated with each treatment of water?
    - **R:** Yes, as we need twice as many wells to treat the water. We also need to treat the water for storage.
- **Q:** Is 250 – 350 GPM the minimum production at this location? What is the total production?
    - **R:** Production is 600 – 700 GPM in general and up to 800 – 900 GPM at peak levels. G roundwater provides approximately 5% of the total City production.
- **Q:** How confident are you that aquifer storage and recovery (ASR) will work? And what are the biggest challenges for the project?
    - **R:** Modeling shows that ASR will work. Some challenges for the project include: 1) the interaction between the seawater and groundwater; 2) when the anticipated production is lower than the target; and 3) potential risks to the project due to disinfection by-products.
- **Q:** Does the geochemical testing include testing the chloride levels in the water?
    - **R:** Yes.
- **Q:** Does this site have to contend with high ammonia levels like the O'Neill site?
    - **R:** No, this site does not have high ammonia levels.
- **Q:** Does the state require pumping permits for groundwater recharge?
    - **R:** Yes, in order to streamline groundwater recharge.
- **Q:** What would be the total annual generation for ASR?
    - **R:** It would depend on what is being extracted. ASR could generate between 11.5 billion gallons (BG) and 21.5 BG, drawn over two years.
- **Q:** If there is limited supply how is it determined how much goes to ASR vs in-lieu?
    - **R:** It is not prioritized currently.

***Stop 3*: 10:15 a.m. - Heart of Soquel Park, 4740 Soquel Drive behind the post office in Soquel, CA**

Sheryl Bailey, County of Santa Cruz and Angie Gruys, Resource Conservation District of Santa Cruz County, presented on low impact development in stream corridors and storm water management; they addressed participant questions as outlined below.

- **Q:** What is your calculation of the estimated recharge here?
    - **R:** We don't have that calculation, as we just try to maximize permeability.
- **Comment (C):** This is the nicest improvement in Soquel.
- **Q:** What was the timeline for construction of this park?
    - **R:** Construction for the park started in 2012.
- **Q:** Were there any eminent domain issues when the land transitioned from private to public ownership?
    - **R:** There were no eminent domain issues, as it was a land trade with a mobile home seller.
- **Q:** How do you maintain the pervious structures in the park?

  - **R:** We use a vacuum to clean and maintain the pervious structures. We are working on more collaborative partnerships and setting up a schedule of costs for maintenance.

- **Q:** Did county codes or requirements regarding land use change as a result of this project?
  - **R:** The County required that we prepare designs to show maintenance of run-off at pre-development levels.
- **Q:** Do you monitor infiltration water levels here as Scotts Valley does with its project?
  - **R:** We don't currently monitor infiltration levels.
- **Q:** Are there any seepage pits here?
  - **R:** No.
- **Q:** Is it reasonable that there's some recharge to the aquifer here?
  - **R:** This is not necessarily a recharge program. Conservation districts are looking for more recharge projects for parks throughout Santa Cruz. Andy Fisher at UCSC would be a good resource to discuss recharge projects.
- **Q:** Do you know of any projects that incorporate water harvesting and irrigation?
  - **R:** Yes, there are some projects that involve harvesting rainwater, but more opportunities are available for water storage-related projects.
- **C:** I would encourage inviting Andy Fisher to speak at an Advisory Committee meeting to identify the best recharge areas in the County.

***Stop 4*: 11:00 a.m. - Bridge near Bridge and N. Main Streets in Soquel, CA**

John Ricker, County of Santa Cruz, presented on stream gauge and shallow groundwater monitoring; he addressed participant questions as outlined below.

- **Q:** When you turned off the Main Street well, did the water level in the creek change?
  - **R:** It is a shallow creek, and the change is difficult to measure. It is critical to maintain the creek at a level of 200 GPM.
- **Q:** How have the fluctuations in the creek levels impacted fish?
  - **R:** Fish need as much water as possible to thrive. When there is an increase in stream flow, there is an increase in fish habitat.
- **Q:** Does the dropping of tree leaves reduce evapotranspiration?
  - **R:** Yes, when the leaves drop and when the temperatures drop going into fall, we see increased stream flow as a result of decreased evapotranspiration.
- **Q:** Does the public have access to stream flow readings?
  - **R:** No, the public does not have access to the gage, but the readings are publicly available real-time on the USGS internet site.
- **Q:** Is Soquel Creek feeding the aquifer at this location?

  - **R:** Yes, the water is coming from higher up in the basin, and in this reach the stream is generally considered to be feeding the aquifer, with the stream level higher than the groundwater level..
- **Q:** How much water do private users take out of the stream?
  - **R:** There is some direct private pumping from the creek, which has been adjudicated. Some may also draw water through alluvium, which tends to decrease during the dry season.
- **C:** Bruce Daniels indicated that when the Main Street well was turned off, his measurements showed an increase in the creek levels.
- **Q: Did Soquel Creek Water District consider pumping water directly from the creek?**
  - **R:** Soquel Creek did pursue diversion at one point, but then abandoned it as there was not adequate infrastructure for it and water right s issues were challenging.

***Stop 5*: 11:30 a.m. - Main Street Well near N. Main Street and Ladera Lane in Soquel, CA**

Taj DuFour, Soquel Creek Water District, presented on the production well at a creek location and water quality sampling; he addressed participant questions as outlined below.

- **Q:** How often is the filter media replaced?
  - **R:** It is usually back-washed after 20-35 hours of use. The media has a long use life of up to 20 years.
- **Q:** Do you have a back-up system for this well?
  - **R:** The pressure differential is our automatic back-up system.
- **Q:** Do you use chlorine to oxidize the iron and manganese that is found? And does this treatment change at each site?
  - **R:** Yes, the process is different at each well site depending on the substances found in the groundwater.
- **Q:** What is the required chlorine residual level?
  - **R:** The required residual level is between 0.2 and 0.5 ppm.
- **Q:** What is the capacity of the well here?
  - **R:** It is at about 180 GPM, operating 24 hours/day.
- **Q:** Does the water leaving here go directly to consumers?
  - **R:** Yes, and the wells run on a set clock.
- **Q:** Does gravity flow down to the tanks?
  - **R:** Yes.
- **Q:** What type of monitoring is done to prepare the water transfer to Santa Cruz? And does the well go offline?
  - **R:** We monitor the distribution system. And yes, the wells do go offline when they need to be maintained for wear and tear and corrosion.

***Stop 6*: 11:50 a.m. - Bargetto Winery 3535 N. Main Street in Soquel, CA**

Kristen Kittleson, County of Santa Cruz, discussed fisheries issues and viewed an accumulation of stream-wood in the creek (log jam); they addressed participant questions as outlined below.

- **Q:** What is the temperature range for fish attrition?
  - **R:** The temperature range is between 23 – 27 degrees Celsius.
- **Q:** Is there an oxygen issue?
  - **R:** This is not a problem locally.
- **C (John Bargetto):** Bargetto Winery partners with the County on monitoring effects on fish habitat and maintaining a balance between fish and people. The log jam in the creek provides that habit balance temporarily.
- **Q:** Does the Streamwood Program to maintain logs in the creek focus more on the upstream areas?
  - **R:** we want to see wood in many different places along the stream.
- **Q**: I've heard that the City is working to amend water rights for the San Lorenzo area, which will change the required volume of stream flow for fish habitat?
  - **R**: The City is updating their water rights to provide fish flows downstream from all of their diversions.
- **Q:** Why does Soquel Creek have so much attention with respect to fisheries, while Aptos Creek has relatively little?
  - **R:** Both Soquel Creek and Aptos Creek had watershed assessments done in 2004. Soquel Creek has more fish habitat and is more productive for fish. Aptos, which is smaller, also has fewer residential areas and more protected areas.
- **Q:** How far south do Steelhead Trout travel?
  - **R:** It is tough to tell with Steelhead.
- **Q:** Does the Santa Cruz community value Steelhead?
  - **R:** Yes. Although Santa Cruz lost the culture of fishing, Steelhead still have some economic benefits for the area.
- **Q:** Don Alley conducted a fish survey in the Lagoon and found only a few fish. Is this true?
  - **R:** I believe the survey located about six fish, which shows a decline in fish for the area.

***Stop 7*: 12:30 p.m. - Pringle Tank (last site visited)**

Vai Campbell and Taj DuFour, Soquel Creek Water District, presented on water infrastructure and addressed participant questions as outlined below.

- **Q**: What do the bigger tanks hold?
  - **R**: The bigger tanks hold between 500,000 and 1.2 million (M) gallons.
- **Q**: Are the tanks concrete underground, and do they need protective coating?
  - **R**: No they don't need the protective coating.

- **Q**: How quickly do the tanks draw down?
    - **R**: The tanks fill up based on hydraulics. We let them draw down 3-4 feet before we fill them up again.
- **Q**: Do you distribute old or new water from the tanks when they have been refilled?
    - **R**: We distribute a little bit of both old and new water, which prevents stratification in the tanks.
- **Q**: Is there any danger of disinfection by-product occurring if the water in the tanks is too old?
    - **R**: Yes.
- **Q**: Can you do injections with aged water?
    - **R**: The water will continue to age in the ground, which results in the reverse osmosis of water. Projects can be adjusted so that the water is not reactive.
- **Q**: Is the Quail Run tank made of concrete?
    - **R**: Yes.
- **Q:** How do you monitor the age of the water in the tanks?
    - **R:** We monitor the age of the water in the tanks through modeling. The water is cycled (through the same pipes), so not all of it is old.
- **Q:** How often do you have maintenance divers in the tanks?
    - **R:** Every five years.
- **Q:** Where does the water go when tanks are emptied for maintenance?
    - **R:** We let the customer use as much of it as possible, after it is de-chlorinated.
- **Q:** How many tanks do customers use each year?
    - **R:** One-quarter to one-third of an acre foot is used per household per year.
- **Q:** How old is the original (not patched up) part of this tank?
    - **R:** The tank was built in 1960s.
- **Q:** How are the tanks interconnected? If one tank is offline, how are the others impacted?
    - **R:** The other tanks will take in more water, but there is no overall change in the total amount of water contained in the system of tanks.

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

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Draft Meeting Summary

Santa Cruz Mid-County Groundwater Sustainability Planning Advisory Committee Meeting #12

October 24, 2018, 5:00 – 8:30 pm

This meeting was the thirteenth convening of the Santa Cruz Mid-County Groundwater Sustainability Planning (GSP) Advisory Committee. It took place on October 24, 2018 from 5:00 - 8:30 p.m. at the Simpkins Family Swim Center in Santa Cruz. This document summarizes key outcomes from Advisory Committee and staff discussions on the following topics: project updates; groundwater modeling Technical Advisory Committee (TAC) update and recommendations on addressing climate change effects on sea level rise in the Mid-County Basin Groundwater Sustainability Plan (GSP); groundwater modeling results for sustainability strategies; federal and state statutory and regulatory framework governing groundwater quality; and staff proposal for groundwater quality sustainable management criteria. It also provides an overview of public comment received. It is not intended to serve as a detailed transcript of the meeting.

Meeting Objectives

The primary objectives for the meeting were to:

- Receive an update on work of the Groundwater Modeling Technical Advisory Committee.
- Review and discuss groundwater modeling results for sustainability strategies:
  - Understand what we can learn from the results.
  - Evaluate results against Minimum Thresholds and Measurable Objectives.
  - Provide Advisory Committee feedback on Sustainable Management Criteria to inform future modeling iterations.
- Review federal and state statutory and regulatory framework governing potential GSP management actions and projects related to water quality, and discuss a staff proposal for groundwater quality sustainable management criteria.

Action Items

Key action items from the meeting include the following:

1. Technical staff to update the list of water quality constituents under the draft Groundwater Quality Sustainable Management Criteria as follows:

a. Include constituents in addition to the ones currently on the list that are naturally occurring.
b. Exclude treated iron manganese.
c. Include only constituents relevant to the Basin.

2. Staff to convene the next Surface Water Interactions working group in December or January and to report back to the Advisory Committee on this sustainability indicator in early 2019.
3. Technical staff to review modeling efforts on combined potential effects of larger volume injections and the PureWATER Soquel project and present to the Advisory Committee in early 2019.

Meeting attendance

Committee members in attendance included:

1. Kate Anderton, Environmental Representative
2. David Baskin, City of Santa Cruz
3. Rich Casale, Small Water System Management
4. Keith Gudger, At-Large Representative
5. Bruce Jaffe, Soquel Creek Water District
6. Dana Katofsky McCarthy, Water Utility Rate Payer
7. Jon Kennedy, Private Well Representative
8. Jonathan Lear, At-Large Representative
9. Marco Romanini, Central Water District
10. Charlie Rous, At-Large Representative
11. Allyson Violante, County of Santa Cruz

Committee members who were absent included:

1. John Bargetto, Agricultural Representative
2. Thomas Wyner for Cabrillo College, Institutional Representative

Meeting Key Outcomes (linked to agenda items)

1. Introduction and Discussion of GSP Process Timeline and Project Updates

Ron Duncan, Soquel Creek Water District, opened the meeting and welcomed participants. Mr. Duncan asked the GSP Advisory Committee members MGA Executive Team, and the consultant support team around the room to introduce themselves. He also addressed members of the public in attendance and asked them for self-introductions.

Eric Poncelet, Facilitator, reviewed the agenda, meeting objectives, and the updated GSP process timeline.

Mr. Poncelet then invited the following project updates:

- **Advisory Committee Field Trip**
  Darcy Pruitt, Regional Water Management Foundation (RWMF), updated the Committee on the October 23rd field trip, reporting that the group visited seven different sites in the Santa Cruz Mid-County Basin to learn about issues related to groundwater planning and monitoring, habitat restoration and various relevant projects. She emphasized that there was a good representation of staff from agencies throughout the Basin, including Soquel Creek Water District, City of Santa Cruz, County of Santa Cruz, and the Resource Conservation District of Santa Cruz County who presented on the topics and addressed questions from the participants. Participants included Advisory Committee members, Mid-County Groundwater Agency (MGA) Board members, project staff, and members of the public. Overall, Ms. Pruitt indicated that participants conveyed that the field trip was a fun and informative experience.

- **DWR Update**
  Amanda Peisch-Derby, DWR, reported that with the passage of Proposition 68, $50 million and $100 million of Sustainable Groundwater Management Act (SGMA) funding will possibly be allocated to groundwater sustainability planning and projects and management actions, respectively. She added that a draft funding report will be released in 2020.

2. Oral Communications (for items *not* on the agenda)

No public comments were provided on non-agenda items during this session.

3. Update on Santa Cruz Mid-County Basin Groundwater Modeling Technical Advisory Committee (TAC) Efforts

Cameron Tana, Montgomery & Associates, informed the Committee that the Groundwater Modeling Technical Advisory Committee (TAC) met on October 17, 2018 to discuss how it is using modeling to simulate climate change relating to sea level rise. Mr. Tana reported that the TAC made two recommendations at the meeting: 1) to continue using the historical catalog model for the climate change scenario in the GSP; and 2) to update sea level rise projections to match recently released state revised projections.

Following Mr. Tana's update, Committee members briefly discussed the logic behind the TAC selecting the 5% probability scenario (1 in 20 chance). Mr. Tana assured the Committee that the TAC is using a published probability scenario.

4. Groundwater Modeling Results for Sustainability Strategies

Mr. Tana presented key groundwater modeling result scenarios for sustainability strategies, including pumping impacts on key sustainability indicators, effects of stable water demand, pumping

redistribution of reduced pumping, and an example of modeling impacts of the City of Santa Cruz Aquifer Storage and Recovery (ASR) project. Mr. Tana also discussed evaluating such results against Minimum Thresholds and Measurable Objectives and posed the discussion question: What do the modeling results say about preferred management actions or projects to achieve sustainability? An audio recording of Mr. Tana's presentation is available on the Mid-County website.

Following Mr. Tana's presentation, the Advisory Committee and staff discussed the following issues and topics related to the groundwater modeling results:

- The relationship between the project water volume maximum related to the current municipal pumping data in the testing scenario where groundwater demand was reduced (5,000 AFY) to municipal pumping (3,450 AFY).
- The importance of referencing Pajaro Valley when testing pumping for the Aromas Aquifer.
- The current groundwater level recovery is not stable given assumptions of reduced rainfall and demand growth.
- The impact of demand growth at the coastal service areas versus at areas proximate to the coast.
- The effect of climate change on irrigation demand in the Basin.
- The baseline for the redistribution calculations and whether all of the redistribution scenarios are feasible.

With respect to the Santa Cruz ASR project, the Committee and staff discussed the following key points:

- Design criteria for the ASR project includes groundwater modeling in the Santa Cruz Mid-County and Santa Margarita areas.
- The differences between ASR/in-lieu strategy and ASR only strategy are related to well capacities and the amount and location of storage projected.
- Modeling results are preliminary, not cumulative, and are driven by the City's water supply planning priorities to obtain additional water supply to address supply shortfalls during multi-year drought.
- The state has not dictated a timeframe for addressing undesirable results for groundwater level proxies for seawater intrusion; in general, an average of ten years is used.
- A key question for the ASR and in-lieu strategies is whether the project can resolve the City's and the Basin's water-related issues.

5. Public Comment

During this session, Mr. Poncelet invited members of the public to comment on the Committee's discussions on groundwater modeling result scenarios for sustainability strategies, the City of Santa Cruz ASR project, and any other Advisory Committee work.

One participant requested clarification on information related to specific data on the monitoring well graphs presented.

6. Groundwater Quality

In this segment of the meeting, Rosemary Menard, City of Santa Cruz, reviewed the federal and state statutory and regulatory framework governing potential GSP management actions and projects related to water quality and their applicability to the Mid-County GSP. Related to the topic of degraded groundwater quality, Ms. King provided an update to the proposed Sustainable Management Criteria, including a list of constituents for Purisima wells, and presented a staff proposal for interim milestones.

The GSP Advisory Committee provided general input that it would like to see a more complete list of constituents, or at least a list of constituents of concern, in order to further consider the proposal, acknowledging that the constituents listed in the presentation are naturally occurring and are generally used to assess the health of the Basin.

7. Public Comment

During this final public comment session, Mr. Poncelet invited members of the public to focus comments on the Committee's discussion on groundwater quality, and on any other Advisory Committee work.

One participant asked for clarification from Ms. King whether each point on the staff proposal for interim milestones for degraded groundwater quality graph represents an average.

Another participant requested that the list of constituents for the draft groundwater quality Sustainable Management Criteria include disinfection byproducts and contaminants of emerging concern (CECs) levels.

A participant asked why the total dissolved solids (TDS) and Chloride levels on the constituent list is not elevated along the coast.

8. Confirm the September 26, 2018 Advisory Committee Meeting Summary

The Advisory Committee did not have any edits or comments on the draft September 26, 2018 Advisory Committee meeting summary. Mr. Poncelet confirmed it for submission to the MGA Board.

9. Next Steps

In closing, Mr. Poncelet provided an overview of the GSP process timeline for the remainder of 2018, noting that there will be no Advisory Committee meeting in November. He confirmed that for 2019, the Advisory Committee members will continue to meet every fourth Wednesday of the month.

Before the meeting adjourned, Committee members asked staff about when it plans to cover the topics of surface water interactions and the potential effects of the PureWATER Soquel project. Staff responded that it plans to convene the surface water working group in early 2019 and will report back to the Committee possibly at the February 2019 meeting. With respect to the PureWATER Soquel update, staff indicated that it may be able to address this topic in early 2019.

Executive Team members closed the meeting by thanking the attendees for their participation.