



San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Technical Peer Review (TPR) Meeting
Meeting Summary

The following is a summary of the TPR discussion, comments, and questions. This summary reflects the general content and spirit of each discussion point, but is not a verbatim recording.

Date: Thursday January 9, 2020 from 9:00 to 11:30 am

Location: County Operations Center
5510 Overland Drive
San Diego CA 92123

Purpose: Technical Peer Review Meeting

Table with 3 columns: Attendees, Technical Peer Review details, and City/County/Consultant Team members.

Roll Call and Introductions

Patsy Tennyson, meeting facilitator, welcomed the group and invited everyone to introduce themselves.

Review

Patsy reviewed the meeting agenda and meeting objectives.

TPR members reviewed the previous meeting's summary. Adjustments will be made as follows:

- The Project Team (City, County, Consultant Team) will correct the spelling of L&S and Wiedlin.
Well construction and screen intervals were noted in the last paragraph of page 3.
"Seal depth" will be added to the summary's first paragraph.

Technical Input—Approach

John Ayres, Consultant Team, explained that the group would start with a discussion about technical approach, and then move on to preliminary results. John explained the interactive exercise that the Advisory Committee (AC) would complete later in the day about undesirable results. He gave a brief overview of the GSP sustainability indicators.

Undesirable Results

TPR members discussed their thoughts on undesirable results in the SPV Groundwater Basin (Basin). Remarks from TPR members are summarized below.

Water Quality

TPR members discussed water quality and salinity in the Basin. Much of the discussion centered around a question one TPR member asked: Does groundwater quality (i.e., a mass flux of salts and nutrients from the valley into Lake Hodges) affect water quality in the lake; if so, what criteria do we need to establish to manage/mitigate that?

- (PQ) Would need to look at surface water flux and contributions of these constituents to the lake.
- (MW) Need to focus on whether/how groundwater affects the lake. And we need to be mindful of surface water/groundwater flux into the Lake.
- (WH and John Ayres) Need to constrain things to SGMA. John reminded the TPR members that SGMA requires that conditions that were present on January 1, 2015 are maintained, and the Basin already had elevated salt concentrations at that time.
- (MW) Want to advocate for the agricultural community and be thoughtful when setting water quality criteria.
- (MW) It appears that salinity is highest at the downstream end of Basin. Is that significant?
- (PQ) Should this subject be addressed in a Coordination Agreement between adjacent Basins? (e.g. San Dieguito Basin is downstream of San Pasqual Valley Basin) In response, it was agreed that the San Dieguito Basin is a very low priority basin and a coordination agreement wouldn't be necessary.
- (PQ) Is the Project Team going to model flux in water quality as water leaves the Basin to Lake Hodges? If so, they may want to conduct a simple analysis of Basin salinity vs. lake salinity.
- (MW) The Project Team should try to understand whether water quality over maximum contaminant levels (MCLs) are a problem for the Lake.
 - The City has completed modeling of sources upstream of Lake Hodges, but the modeling focused on nitrogen and not total dissolved solids (TDS). The field testing will give us water quality data.

Groundwater Levels

Next, TPR members discussed groundwater levels in the Basin:

- (PQ) Chronic lowering of groundwater levels and loss of storage is a problem. This Basin historically empties out and fills up in El Niño years. Hydrographs for the GSP should be as complete as possible and date back to the 1950s to capture this action over time. Historically, the Basin has seen 80-100 foot swings in water levels which are important to capture to develop thresholds for undesirable results. The Basin has recovered from much lower lows than seen in current/recent data sets.
- (WH) Is the Project Team doing a cumulative departure from the mean, so we can pick a representative historical period? They should use a period that shows overall average historical conditions.
- County staff is concerned that water levels are lowered in wells at San Pasqual Academy.
- (County staff and MW) For historical salinity information, County staff encouraged use of the 1983 USGS report by Izbicki. In 1957, concentrations of salinity were not elevated with only one pocket of higher salinity, but the rest of the Basin was relatively good quality. By the 1980s, salinity had increased. In the 1983 report, there are wide swings in salinity that should be reported. It was suggested to compare the 1957 vs 1983 data.

- (WH) Be careful how far back in time you calibrate the numerical model, because that is a big effort and may require assumptions for other inputs the Project Team don't have. You still need to consider older data especially for establishing undesirable results for the basin, but not in the numerical model. County staff suggested that reviewing 1983 USGS report data to help us better understand historical lows (for undesirable results).

Groundwater Model Approach

The TPR members then discussed the approach for developing the groundwater model. Nate Brown, Consultant Team member, gave a brief introduction and overview of groundwater model approach. The Consultant Team recommends using MODFLOW-NWT with MT3D-USGS code. TPR members discussed the groundwater modeling approach:

- (WH) How would the MODFLOW-SURFAC model from the Salt and Nitrate Management Plan (SNMP) need to be modified to make it viable for a GSP? The model is not open-source, so we need to change modules.
 - Nate explained that the water quality aspects of the Basin are key. Fate and transport components will drive model code selection. Fate and transport information is generated when a model tracks solutes through a basin; this is necessary to understand how management actions might affect concentrations in the Basin.
- (PQ) Will the model be a fully integrated surface water/groundwater model, or a groundwater model with stream package?
 - Nate explained that the Project Team is still trying to determine that. We do need to anticipate changing boundary conditions for the stream network if a model with a stream routing package is selected. This type of model can simulate streamflow and solutes in surface water. With that approach, we could assess the contribution of salinity to Lake Hodges.
- (WH) Are there historical data sets of adequate frequency to establish a reasonable baseline?
 - Nate responded yes, all data are collected and available through the SNMP timeline, but that will need to be refreshed as the model is developed.
- City staff reminded the group that the City has streamflow data on three San Pasqual Valley streams, and these data include some water quality.
- Nate stated that the recommended model code can dynamically route water from wells to cells that represent irrigation. That limitation is resolved with this new model code.
- (PQ) Does the model concentrate evapotranspiration?
 - Nate explained that salinity will concentrate, and other nutrients will need a little more calibration due to plant uptake characteristics.
- (WH) Does the Project Team have data on land use applications?
 - Nate explained that we are starting with a good dataset from the SNMP. Ultimately, we will need to make assumptions about loading based on well data concerning changes in concentrations under crops. Per SGMA, the model is only required to be calibrated to the last 10 years. The addition of historical data is based on data availability and reliability only. The model needs data that goes far back enough to capture hydrologic variability. It is important that we not get too pre-occupied with historical data.
- (PQ) Is the Project Team planning to hold back years of data to use for validation to characterize uncertainty, or calibrate a subset of data?
 - Nate responded no, the philosophy for building the model would be to use all available historical data.
- (PQ) The model may then render a non-unique realization for the Basin. Will the Project Team develop additional realizations to help quantify uncertainty?

- Nate explained that sensitivity analysis would be completed, but only to the extent required by SGMA regulations; no static/probabilistic approach would be developed.
- (PQ) What do you propose for sensitivity analysis (i.e., local or global), which are required according to U.S. Environmental Protection Agency (EPA) guidance for numerical modeling?
 - Nate explained that details aren't available yet. The Project Team wanted to focus on a practical approach to forecasting. California Department of Water Resources (DWR) cares more for forecasting than history matching, and the model needs to focus on information to help establish realistic management actions.
- (PQ) If decisions are made that result in a reduction in pumping and have associated economic impacts, need to know that sustainable yield = $X \pm Y$, not just X.
- (WH) What calibration period was used for the SNMP model?
 - Nate explained that a steady-state solution was used for a non-hydraulic condition, transport component for the 1990s to current. The GSP model will be expanded to a full fate and transport model with monthly inputs.

AC Comments About Groundwater Model Approach

Attending AC members provided comments on the modeling approach:

- AC member noted that San Pasqual Basin is unique in its east/west salt gradient and export to Lake Hodges, and that it also swings in groundwater levels. On the east end of the Basin, levels have become more pronounced over the last 45 years. Ultimately, more recent uses are affecting the Basin on the eastern end and degrading water quality on the west end.
- AC member stated that well recovery doesn't seem to be as good as it used to; once the Basin recovers, the wells don't pump as well as they used to.

Land Subsidence

John explained that there is no documented evidence of land subsidence, and the Basin geology doesn't support the likelihood of subsidence. Following are TPR and AC member comments:

- (WH) Should the land subsidence criteria be based entirely on geology? Basin geology is not conducive to land subsidence, plus we lack available data indicating that subsidence is occurring.
 - John explained that our tentative approach for the GSP would be to use historical lows as a proxy for land subsidence. Historical lows did not result in observed subsidence, so that seems reasonable.
- AC member noted that Old Milky Way seemed to be flatter when he was a kid. Just an observation – a couple of dips on the roadway that weren't there historically.

Preliminary Analysis Results

John reviewed the mapping and analysis results for the Plan Area, the Hydrogeologic Conceptual Model (HCM), and Groundwater Conditions sections of the GSP. He also noted that he would add the 2014 to 2016 land use data from the SGMA Portal to the current mapping and analysis. TPR member discussion is summarized below:

- (PQ) Will the San Diego Association of Governments (SANDAG) land use be used as the basis for estimating historical pumping? This is the biggest data gap in the Basin.
 - Nate responded that the SANDAG land use maps would be used, along with crop types to estimate demands. We may also use DWR's Integrated Water Flow Model Demand Calculator (IDC). Additionally, the team may contract with California Polytechnic State University for a few years of metric study.

- (PQ) Is there a distinct difference in water use for field crops vs orchards? There are a few parcels where the land use needs to be corrected. For example, on a map shown, the green rectangle to the west of Rockwood Canyon (outside of Basin) is planted in avocado trees, not field crops.
- (WH) A comparison of the SANDAG maps to Google Earth does show some differences; this is important because this information will also be used to estimate solute loading.
 - City staff explained that AC members may be able to provide land use/crop data about the leased lands.
- (PQ) Will the Project Team be soliciting projected water demands from growers for the forecasts?
- (PQ) DWR well infrastructure maps are also incorrect; TPR members will provide comments (e.g., DWR's count of 22 wells in Rockwood Canyon must include data from wells outside of the Basin).
- (MW) Suggest adding the San Pasqual Valley fault to the geologic maps.
- (MW) What data were used for hydrographs?
 - John explained that data were collected from the DWR Water Data Library, the City's dataset, three U.S. Geological Survey multi-completion wells, and Rancho Guejito wells. The datasets go back to 2007 with monthly timestamp, though there are some gaps.
- John explained that the hydrographs tell us that the Basin's west end maps are shallow and relatively stable, and the east end shows clear decline through drought, but recovery during wet years.
- (PQ) The vertical gradients of the three multi-completion wells may be showing that all three layers are responding to the same climatic conditions, and they may not necessarily be interconnected. These wells show clear rainfall and summer conditions, not necessarily a response to pumping.
- (WH) They suggest there is a uniformly downward gradient (i.e., from alluvium to bedrock), and that sometimes reverses at the downgradient end of a Basin, but this information did not imply that reversal.

John asked the TPR members for their thoughts on what months should be contoured for groundwater quality? Project team recommends the 2014-15 water year to document January 2015 conditions per SGMA, as well as the 2018-19 water year for current conditions.

- (MW) Should 2019 data be included? 2019 groundwater elevations are likely to be relatively high due to above average rainfall and this data set should be used to help develop the conceptual model.
- (WH) Will the Consultant Team use groundwater contours in the groundwater model? Additional contour plots may be needed for model calibration.
 - Nate responded that the Consultant Team prefers to use point locations data since these are actually available.
 - John explained that data collected since 2007 shows that groundwater quality concentrations are flat for both TDS and for nitrogen.

AC Comments About Preliminary Analysis Results

Attending AC members comments on preliminary results are listed below:

- AC member suggested that TPR also consider well flow; most wells pump at 100 gallons per minute, but one of the TDS hydrographs is a 5-gallon per minute well, which is an extremely low flow well. This may affect concentrations.

Bottom of the Basin

John explained that the bottom of the SPV Basin is defined by Bulletin 118. He further explained SGMA guidance that pertains to determining the bottom of the Basin and discussed the pertinent DWR Best

Management Practices (BMP) Manual which suggests that the bottom of Basin could be the bottom depth of usable water. TPR member discussion is summarized below.¹

- (WH) Even if the TPR called the bottom of the Basin “residuum”, the group should not exclude the influence of pumping directly outside the Basin on Basin groundwater conditions.
 - (PQ) The boundary condition is firm as defined by Bulletin 118, and no pumping from outside the defined Basin should be considered in the analysis.
- (WH) We could define some amount of flux around the boundary condition that goes between the two units (residuum and underlying bedrock).
 - (PQ) We could use some general head (i.e., pressure) or specified flux.
 - (MW) In the model, the cells at the bottom of Basin could include a condition that assumes constant inflow/head.
- (PQ) On the boundary examples shown in the PowerPoint (pg. 37), the left image would produce water from the Basin and should be considered, the middle image may or may not affect Basin, and the right image needs to prove that pumping actually does affect Basin.
 - John suggested that we would want to see some type of barrier between residuum and fractured bedrock (for example, a clay layer) to confirm that pumping does not affect the Basin.
- (PQ) If, when drilling a well, a driller goes through 700 feet of granite before hitting fractured bedrock that supports pumping, then that indicates a barrier does exist. In general, fractured rock aquifers, sometimes people have drilled dry wells to 1,000 feet because they don't catch a fractured pocket.
- (MW) The best way to assess this is to get the aquifer tests completed, but the timeline does not appear to allow this.
 - The City is only aware of one deep well in the Basin.
 - The County has looked at Rancho Guejito wells and only found one well similar to the middle image. The County has no well log records in which Rancho Guejito wells are screened only in bedrock per the right image.
- (PQ) Rancho Guejito released well data for their alluvial wells and did not provide additional well logs for any wells that fell within the right image shown on the PowerPoint (pg. 37). DWR well completion reports for those other logs are available for wells in the third category. Rancho Guejito's TPR member will check with Counsel on release of those reports.
 - The Project Team will search for DWR well completion reports.
 - The County will look again within the County database.
- (PQ) Those wells are beneath the Basin boundary (not within).
- John explained that DWR may request the GSA to provide information for wells that may be impacting the Basin. For example, well logs must show that a well is sealed to below granite. If the TPR decides that the Basin bottom is at residuum/fractured bedrock, then the team needs to provide evidence that some wells are out. The burden of exemption would be on the people wanting the exemption.
- (WH) Shall we look at well logs to estimate what “bottom of Basin” is? There will be average range of well depth.

Nate asked if the issue is pumping volumes for the water balance? DWR may require additional data collection over the next 5 years.
- (PQ) It will be difficult to model bedrock; some wells produce high and some low. If the granite beneath the Basin were incorporated, would that go laterally all the way to the Elsinore Fault?

- (MW) We currently do not know how important pumping in underlying bedrock is to Basin water balance. A well inventory of key fractured rock wells is needed. Is it possible to make a site visit to see if those wells are active and, if they are, what volume they might be pumping?
 - John explained that GSP success will be demonstrated through the monitoring program. Whether the wells were included or not, monitoring will indicate how the Basin is doing. GSP implementation could include a more thorough well survey to better document the location and pumping volumes of all Basin wells.
- (WH) The Consultant Team should develop a contour map of well depths.
 - The City doesn't have drilling logs for all City wells; some were drilled too long ago.
 - The County believes that a preliminary step would be to collect and document well depths; no field investigations would be necessary at this time.
- John asked TPR members if this a valuable use of TPR time now, or should this be included in the GSP's implementation?
 - The Project Team will look at well log data and consider how much time this will take.
 - The Project Team will present to TPR a recommended approach at next meeting.

AC Comments About Bottom of the Basin

- AC member noted that there is an obvious deficiency in the SANDAG land use maps, and that data would need to be improved to better estimate/project water demands.
- AC member suggested that there is substantial edge-to-edge water quality variation across the Basin; how will the model estimate this variability? How do you model the effect of pockets of more saline water?
- AC member explained that a farmer on the west end of the Basin recently drilled a deep well to get better water quality (BeWise). This seems to indicate that alluvium and residuum don't interrelate strongly. He knows that some farmers also drill more wells to get better flow rates.
- (MW) TPR member contributed that the west end is the stagnant end of the Basin and that with time, the lower aquifer layer is likely to degrade, and maps should be reviewed carefully.

Data Request Check In

John explained that any additional water quality data and well construction data is requested from TPR members.

Next Steps

The next TPR Group meeting is scheduled for Thursday, April 9, 2020 from 9 to 11:30 am.

Comments about today's meeting must be received by Thursday, January 23, 2020.

The TPR meeting ended at 11:25 am.