CITY OF SANTA CRUZ
City Hall
809 Center Street
Santa Cruz, California 95060

Water Department

WATER COMMISSION

Regular Meeting

August 26, 2019

7:00 P.M. GENERAL BUSINESS AND MATTERS OF PUBLIC INTEREST, COUNCIL CHAMBERS

*Denotes written materials included in packet.

The City of Santa Cruz does not discriminate against persons with disabilities. Out of consideration for people with chemical sensitivities, please attend the meeting fragrance free. Upon request, the agenda can be provided in a format to accommodate special needs. Additionally, if you wish to attend this public meeting and will require assistance such as an interpreter for American Sign Language, Spanish, or other special equipment, please call Water Administration at 831-420-5200 at least five days in advance so that arrangements can be made. The Cal-Relay system number: 1-800-735-2922.

APPEALS: Any person who believes that a final action of this advisory body has been taken in error may appeal that decision to the City Council. Appeals must be in writing, setting forth the nature of the action and the basis upon which the action is considered to be in error, and addressed to the City Council in care of the City Clerk.

Other - Appeals must be received by the City Clerk within ten (10) calendar days following the date of the action from which such appeal is being taken. An appeal must be accompanied by a fifty dollar ($50) filing fee.

Call to Order

Roll Call

Statements of Disqualification - Section 607 of the City Charter states that ...All members present at any meeting must vote unless disqualified, in which case the disqualification shall be publicly declared and a record thereof made.The City of Santa Cruz has adopted a Conflict of Interest Code, and Section 8 of that Code states that no person shall make or participate in a governmental decision which he or she knows or has reason to know will have a reasonably foreseeable material financial effect distinguishable from its effect on the public generally.

Oral Communications - No action shall be taken on this item.

Announcements - No action shall be taken on this item.

Consent Agenda (Pages 1.1 - 4.3) Items on the consent agenda are considered to be routine in nature and will be acted upon in one motion. Specific items may be removed by members of the advisory body or public for separate consideration and discussion. Routine items that will be found on the consent agenda are City Council Items Affecting Water, Water Commission Minutes, Information Items, Documents for Future Meetings, and Items initiated by members for Future Agendas. If one of these categories is not listed on the Consent Agenda then those items are not available for action.

1. City Council Actions Affecting the Water Department (Pages 1.1 - 1.3)

   Accept the City Council Actions Affecting the Water Department.

2. Water Commission Minutes From June 3, 2019 (Pages 2.1 - 2.8)

   Approve the June 3, 2019 Water Commission Minutes.

3. Recycled Water Study - Phase 2 (Pages 3.1 - 3.16)

   Receive information on the draft Scope of Work for Phase 2 of the Recycled Water Study with Kennedy/Jenks Consultants.

4. Water Department Master Energy Plan (Pages 4.1 - 4.3)

   Receive information on the framework for a Water Department Energy Master Plan.

Items Removed from the Consent Agenda

General Business (Pages 5.1 - 6.4) Any document related to an agenda item for the General Business of this meeting distributed to the Water Commission less than 72 hours before this meeting is available for inspection at the Water Administration Office, 212 Locust Street, Suite A, Santa Cruz, California. These documents will also be available for review at the Water Commission meeting with the display copy at the rear of the Council Chambers.

5. Climate Change Workshop (Pages 5.1 - 5.24)

   Receive information and provide feedback to staff on the approach to the incorporation of climate change projections into water supply planning.

6. WSAC Plan Adaptation (Pages 6.1 - 6.4)

   Receive information about potential next steps for revising the Water Supply Augmentation Strategy.

Subcommittee/Advisory Body Oral Reports - No action shall be taken on this item.

7. Ad Hoc Committee on City of Santa Cruz- Soquel Creek Water District Contracting Related to the PWS Project

8. Santa Cruz Mid-County Groundwater Agency

9. Santa Margarita Groundwater Agency

Director's Oral Report - No action shall be taken on this item.

Information Items

Adjournment

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WATER COMMISSION
INFORMATION REPORT

DATE: 8/20/2019

AGENDA OF: August 26, 2019

TO: Water Commission

FROM: Rosemary Menard, Water Director

SUBJECT: City Council Actions Affecting the Water Department

RECOMMENDATION: Accept the City Council actions affecting the Water Department.

BACKGROUND/DISCUSSION:

June 11, 2019

Program Management Services with HDR Engineering, Inc. - Contract Amendment No. 2020-01 (WT)

Motion carried authorizing the City Manager to execute Contract Amendment No. 2020-01 with HDR Engineering, Inc. for Service Order No. 5 in the amount of $5,226,000 in a form to be approved by the City Attorney.

Motion carried authorizing the transfer of portion of previously authorized fee in the amount $442,557 from Service Order 4 to Service Order 5.

Annual Adjustment of Water Department Miscellaneous Fees (WT)

Resolution No. NS-29,540 was adopted adjusting the Water Department's miscellaneous fees for services due to labor cost increases and rescinding Resolution No. NS-29,354.

Graham Hill Water Treatment Plant Concrete Tanks Replacement Project – Adoption of a Mitigated Negative Declaration, Adoption of a Mitigation Monitoring and Reporting Program, and Project Approval (WT)

Resolution No. NS-29,541 was adopted adopting the Mitigated Negative Declaration for the Graham Hill Water Treatment Plant Concrete Tanks Replacement Project, adopting the Mitigation Monitoring and Reporting Program, and approving the Graham Hill Water Treatment Plant Concrete Tanks Replacement Project.

Motion carried to direct staff to evaluate noise resulting from current operations at the Graham Hill Water Treatment Plant and to implement best management practices as appropriate with all future projects.

Fiscal Year 2020 Proposed Budget Adoption (FN)

Motion carried to accept the Water Commission's recommendations regarding the Water Department's operating and CIP budget, and adopt revisions to Council Policy 1.3 regarding Risk Management.

June 26, 2019

Resolution Amending the City of Santa Cruz Personnel Complement and Classification and Compensation Plans for the Following Departments: Public Works, Water, Police, Parks and Recreation and City Manager Departments (HR)

Resolution No. NS-29,551 was adopted amending the Classification and Compensation Plans for the new FY 2020 Budget Personnel Complement by approving classification and position changes in five City departments.

Resolution Implementing the Approved FY2020 Budget Personnel Complement by Amending the Classification and Compensation Plans for the Following Departments: Planning and Community Development, Library, Public Works, Water, Police, and Human Resources (HR)

Resolution No. NS-29,552 was adopted amending the Classification and Compensation Plans for the new FY 2020 Budget Personnel Complement by implementing the approved FY 2020 Budget/Position changes in several departments.

Contract Amendment No. 1 for Professional Services Agreement with Trudy Cooper & Associates (WT)

Motion carried to approve Contract Amendment No. 1 for the Water Department Organizational Development and Strategy Implementation Support agreement with Trudy Cooper & Associates and authorize the City Manager to execute an agreement in a form approved by the City Attorney.

Agreement between the City of Santa Cruz and Soquel Creek Water District for Source Water and Design, Construction and Start-Up of the Tertiary Treatment Facility Component of the Pure Water Soquel Project (PW/WT)

Motion carried authorizing the City Manager to execute an agreement between the City of Santa Cruz and Soquel Creek Water District to provide source water from the Santa Cruz Regional Wastewater Treatment Facility (WWTF) for the Pure Water Soquel Project, and construct the Tertiary Treatment Component of the Pure Water Soquel Project at the WWTF, in a form acceptable to the City Attorney

August 13, 2019

Laguna and Majors Diversions: Condition Assessment and Conceptual Design Contract with Black & Veatch – Contract Amendment No. 1 (WT)

Motion carried to authorize the City Manager to execute Contract Amendment No. 1 for the Laguna and Majors Diversions: Condition Assessment and Conceptual Design with Black & Veatch of Rancho Cordova, CA in a form approved by the City Attorney in the amount of $299,740.

Grant Funding Application to Federal Emergency Management Agency National Dam Safety Program Administered by the California Department of Water Resources for Newell Creek Inlet Outlet Replacement Project (WT)

Motion carried to authorize the Water Director to submit grant application, and accept and appropriate funds if awarded, to the Federal Emergency Management Agency (FEMA) Rehabilitation of High Hazard Potential Dams Grant Program (HHPD) administered by the California Department of Water Resources (DWR) for a dam risk reduction project at the Newell Creek Inlet Outlet Replacement Project.

PROPOSED MOTION: Motion to accept the City Council actions affecting the Water Department.

ATTACHMENTS: None.

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Water Department

Water Commission
7:00 p.m. – June 3, 2019
Council Chambers
809 Center Street, Santa Cruz

Summary of a Water Commission Meeting

Call to Order: 7:00 PM

Roll Call

Present: D. Engfer (Chair), D. Baskin, J. Mekis, S. Ryan, L. Wilshusen

Absent: D. Schwarm with notification, W. Wadlow (Vice Chair) with notification

Staff: R. Menard, Water Director; J. Becker, Finance Manager; C. Coburn, Deputy Director/Operations Manager; K. Crossley, Senior Civil Engineer; H. Dalton, Water Quality Manager; A. Hogan, Wastewater System Manager; H. Luckenbach, Deputy Director/Engineering Manager; J. Martinez-McKinney, Associate Planner II; S. Easley Perez, Associate Planner II; B. Pink, Environmental Programs Analyst; K. Fitzgerald, Administrative Assistant III

Others: 6 members of the public.

Presentation: None.

Statement of Disqualification: None.

Oral Communications: None

1. Public Health Goals Report – Public Hearing

Hugh Dalton presented the Public Health Goals Report for the years 2016-2018.

Commissioners commented positively on the findings of the report.

Commissioner Engfer opened the Public Hearing on the Public Health Goals Report.

There were no public comments and Commissioner Engfer closed the Public Hearing.

Announcements: None

Consent Agenda

2. City Council Items Affecting the Water Department
3. Water Commission Minutes from May 6, 2019
4. Quarterly WSAS Work Plan Update
5. Santa Cruz Water Program - Service Order No. 5 with HDR, Inc.
6. 2019 Water Commission Meeting Schedule

Commissioners requested that page 3.6 of the May 6, 2019 Water Commission minutes be corrected to reflect that Commissioner Engfer suggested a motion and that Commissioner Schwarm actually made the motion.

What additional information did the State Water Resources Control Board request for the filing of the Petitions for Change and Petitions for Extension of Time for the Santa Cruz Water Rights Project, as mentioned on page 4.9 of the WSAS Quarterly Report?

- There were some issues with the mapping of the boundaries, which were drawn between the 1920s, 1950s and 1960s when the San Lorenzo Water Rights were originally authorized. Additional information was also requested on the fish flow agreements with National Marine Center and the Department of Fish and Wildlife, as well as clarification on statements of information.

Has a joint meeting between City Council and the Water Commission been rescheduled?

- That schedule will be discussed further under Item 9, but it is being planned for sometime this fall.

Why does there appear to be a slowing of planned work through the next decade on the chart on page 5.10?

- This schedule is still being smoothed out, but one of the goals is to spread out the work to help distribute the high costs that will be incurred over the next decade.

What was the final HDR, Inc. budget to actual spent for 2019?

- The actual spent amount was under budget by approximately $2.7 million.

Items removed from the Consent Agenda – None

Commissioner Baskin moved the Consent Agenda. Commissioner Wilshusen seconded.

VOICE VOTE: MOTION CARRIED
AYES: All
NOES: None
ABSTAIN: D. Baskin, due to absence

General Business

7. Recommendations on a Memorandum of Understanding with the Soquel Creek District Water Resource Water and Tertiary Treatment Facility

Commissioner Engfer and Ms. Menard introduced the discussion of the Memorandum of Understanding with Soquel Creek Water District. The recommended action on this item has changed from the initial recommendation in the staff report in that staff is now recommending that the Water Commission review the draft agreement and then direct staff to form an ad hoc Water Commission sub-committee to work with staff to develop an agreement for City Council approval.

What is the capacity of the new tertiary treatment plant?

- It is designed to be scalable which is one of the reasons the tertiary treatment facility is going to be located separately from the advanced treated water plant.

Is the District in charge of permits outside the City?

- Yes. The District is responsible for all of the permits inside the City that are related to this project at the Wastewater Treatment Plant and the portion of the pipeline that will be in the City as well as all of the required permits for the other elements of the project that are outside of the City.

Will the City employees from the Wastewater Treatment Plant be staffing this plant?

- Yes, the City Sanitation staff will be operating the plant that the District will construct and own.

How will the Water Department continue to be involved in this agreement?

- The Department will continue to be involved because of the upcoming work we have planned that includes advanced treated water, such as Phase 2 of the Kennedy Jenks study on Recycled Water.

Will the District have oversight over City employees who are operating in the tertiary treatment plant?

- No, the City will manage its own employees.

How does the agreement address who remains legally bound in the event of future changes in City leadership?

- This current draft of the agreement does not yet contain those details.

Commissioners commented that the project description on page 7.10 seems to limit the City's needs and should not say for "other uses as agreed."

Commissioners commented that items 5.2.3 and 5.2.8 on page 7.3 regarding unresolved disagreements need more details. Also, on page 7.16, item 6.3.5.2 seems redundant with item 6.3.5.3.

What is the administrative overhead expense rate referenced in item 6.3.3.6?

- The standard rate was changed to 10% which is the same as with the Santa Cruz County Sanitation District. The City does not have a standard overhead rate.

Will this MOU eventually develop into a contractual agreement?

- That is a possibility, but is not being determined at this point in time. As of now, this document will be classified as a MOU.

Are there known examples of other utilities operating another utility's facility?

- None that we are aware of.

Commissioners commented that the agreement needs to include the possibility and ability of the City to conduct its own recycled water studies.

Can staff distribute the final draft of the MOU to the Water Commission for final comments before it is submitted to City Council?

- Staff cannot guarantee that a final draft can be circulated in time before the June 25th Council meeting. Comments can be sent to Ms. Menard and the members of the ad hoc subcommittee that staff is recommending be formed tonight.

Will the Bay Cycle Plant project be considered for an end use in this agreement?

- It could be a potential end use in the future if that particular project was to move forward; it was not included in the original calculation of the sizing of the plant.

Why is it critical for the agreement to go to Council on June 26th?

Ron Duncan, General Manager, and Melanie Mow Schumacher, Special Projects - Communications Manager from Soquel Creek Water District, responded to the Water Commission regarding the time sensitivity of the draft agreement. They communicated that this agreement is critical in the District being able to meeting grant funding and permit filing deadlines.

Will the final agreement go to Council on June 25th without the recommendation of the Water Commission?

- Yes, due to the time constraint with City Council. For clarification, we are asking Commissioners to review the agreement now in principle, and, if so approved by the Commission tonight, appoint an ad hoc subcommittee to further develop the content and details.

Commissioners commented that the 3.2 million gallons per day (mgd) amount of treated water that the City could receive per the MOU should be reevaluated for it does not seem to be enough to alleviate the City's supply gap.

Staff responded that the 3.2 mgd number in the agreement was based on the initial assumption that the treatment plant would only be operational during the summer months when recent analyses actually show greater capacity and return if the treatment plant is run throughout the year with added flexibility with extraction/injection in the Mid-County and Santa Margarita basins.

Two members of the public spoke.

Commissioner Baskin made a motion to recommend in principle to Council that the City pursue an agreement with Soquel Creek Water District on the Pure Water Soquel project. Commissioner Wilshusen seconded.

VOICE VOTE: MOTION CARRIED
AYES: All
NOES: None
ABSTAIN: None

Commissioner Baskin made a motion to authorize the Chair to form an Ad Hoc subcommittee consisting of Commissioners Baskin, Engfer, and Wilshusen to work with staff to develop finer points of the MOU by June 13th. Wilshusen seconded.

Commissioners suggested an explanation be included in the staff report to City Council that states that the Water Commission supports the agreement in principle.

Ms. Menard commented that this item was also on the agenda of the Public Works/Transportation Commission meeting on May 20th.

VOICE VOTE: MOTION CARRIED
AYES: All
NOES: None
ABSTAIN: None

8. Graham Hill Water Treatment Plant Concrete Tanks Replacement Project Initial Study and Mitigated Negative Declaration (IS/MND)

Ms. Luckenbach introduced Mr. Coburn for the discussion of the IS/MND for the Graham Hill Water Treatment Plant Concrete Tanks Replacement Project.

Did the neighbors who submitted comments on the draft IS/MND have professional consultations?

- The neighbors have been well informed and some do have professional technical backgrounds.

Ms. Menard commented that communication and public outreach efforts with the nearby neighbors of the GHWTP has been a priority of the Department.

Commissioners suggested that staff conduct a noise survey that includes performance metrics to address concerns from nearby residents.

Has the Regional Water Control Board approved the diversion of storm water into the nearby creek?

- It is an existing condition, so the Regional Board already receives notifications of any discharge. The storm drains also have the capability to be shut off in the event that excess chemicals are spilled.

When will the fourth tank at the GHWTP need to be replaced?

- A cost analysis on the replacement and rehabilitation of this wash water tank was conducted in 2015 and it was determined that it is structurally sound and is not included in the CIP at this time.

What is the capacity of the storm drain valve?

- The pipe is being designed slightly larger, but we are planning to conduct further analysis to determine if there are any existing factors that could limit the capacity of the storm drain.

Two members of the public spoke.

Commissioner Wilshusen made a motion to support the staff recommendations that City Council adopt the Mitigated Negative Declaration, adopt the Mitigation Monitoring and Reporting Program and to approve the for the Graham Hill Water Treatment Plant Concrete Tanks Replacement Project. Commissioner Baskin seconded.

VOICE VOTE: MOTION CARRIED
AYES: All
NOES: None
ABSTAIN: None

Commissioner Wilshusen made a motion for staff to pursue a study to further analyze existing noise conditions and understand the potential impacts of any findings on the project and propose a mitigation plan to address major differences; that staff consider other possible improvements to mitigate noise at the Graham Hill Water Treatment Plant when conducting the noise study; and that staff bring a status report back to the Water Commission for discussion when appropriate. Commissioner Baskin seconded.

VOICE VOTE: MOTION CARRIED
AYES: All
NOES: None
ABSTAIN: None

9. WSAS Strategy and Work Plan

Ms. Menard introduced the presentation and discussion on the WSAS Strategy Work Plan. The discussion reiterated the staff summary from the April 1st meeting and outlined potential approaches to amending the WSAC recommended decision schedule and work plan.

Should Cameron Tana's ASR modeling work be included in the "continue work with" section of the staff report on page 9.3?

- It is possible, however, this work is already embedded in designing ASR using existing infrastructure in the Mid-County groundwater basin.

Can staff discuss the energy plan for the City?

- The City is developing a long-term energy plan to establish goals to offset greenhouse gas emissions in accordance with the Climate Action Plan.

Will this plan address the issue of the operational energy use for projects such as ASR and pipelines?

- Yes, it is providing opportunities to evaluate alternatives that could be more energy efficient.

What are the potential effects of taking Beltz 9 and Beltz 12 offline for ASR?

- These wells will not be taken offline and will be operational while they undergo retrofitting for injection and withdrawal capabilities.

What is the difference between prepping a well for pilot testing and permanent ASR?

- In order for the well to be fully operational with ASR capabilities, the City will need to have a groundwater storage supplement for the project approved by the State Water Resources Control Board. A groundwater storage supplement for the Beltz wells is being processed along with the other water rights modifications the City is working on with the State Board.

What is the benefit of an additional year of pilot testing for the Beltz 12 well?

- Beltz 12 is a full scale well, which gives us the ability to inject as much water into the ground as we can during the pilot phase. We cannot convert this well to be fully operational until the groundwater storage supplement has been approved but this delay gives us the opportunity to collect more data.

Commissioners commented that staff should explicitly state that they are working with the GSAs in both the Mid-County and Santa Margarita groundwater basins.

In regards to the energy plan, how could a PG&E power shut down affect operations and data collection?

- Although all of the key production facilities have backup generators in the event of a power outage, a potential problem could arise with refueling them should a long-term outage occur.

Was the WSAC work plan adjusted last fall when staff recommended the prioritization of recycled water over desalination to the City Council?

- The decision was made a year later than initially planned, but coming to that decision was a part of the work plan.

What will be the actual impacts of climate change on surface water?

- Unfortunately, the future impacts are not definite. However, we do know that our system is vulnerable to drought conditions as well as periods of heavy precipitation, which tells us that we cannot rely solely on historical data or climate predictions alone and further demonstrates that we must be proactive in seeking supplemental supply alternatives.

One member of the public spoke.

Commissioners suggested that staff include the water transfers with the District to the work plan to clarify that the project has not ended.

Subcommittee/Advisory Body Oral Reports

10. Santa Cruz Mid-County Groundwater Agency

The Mid-County Groundwater Agency with the Groundwater Sustainability Plan Advisory committee on May 16th, 2019 and discussed the sustainability criteria on measurable objectives, minimum thresholds, and undesirable results on all five key indicators including: groundwater storage, groundwater levels, water quality, seawater intrusion, and surface water and groundwater interaction. Seawater intrusion is a key driver in the Mid-County basin so there was a focus on that subject during the discussion. There will be one more meeting on sustainability planning committee on June 19th and at the a draft Groundwater Sustainability plan will be presented in July with a 60-day public comment period followed by a public hearing in November, and will be submitted by early December.

11. Santa Margarita Groundwater Agency

The last of the preliminary planning meetings took place in May. The technical consultant was engaged and Dave Ceppos' contract for facilitation will be likely be renewed to support the planning process as it moves forward.

Ms. Menard commented that Brian Lockwood, General Manager from the Pajaro Valley Water Management Agency gave a presentation to the Mid-County Groundwater Agency on their recycled water line.

One member of the public commented.

Director's Oral Report: Ms. Menard commented that the meeting packet contained the revised Water Commission meeting schedule for the remainder of 2019, and that the next Water Commission meeting will be held on August 26, 2019 at 7:00 pm.

Adjournment Meeting adjourned at 9:46 PM.

Respectfully submitted,

Katy Fitzgerald
Staff

WATER COMMISSION
INFORMATION REPORT

DATE: 8/19/2019

AGENDA OF: August 26, 2019

TO: Water Commission

FROM: Heidi Luckenbach, Deputy Director/Engineering Manager

SUBJECT: Recycled Water Study – Phase 2

RECOMMENDATION: That the Water Commission receive information on the draft Scope of Work for Phase 2 of the Recycled Water Study with Kennedy Jenks.

BACKGROUND: The Water Supply Advisory Committee (WSAC) completed its work in early October 2015 with a recommended packaged strategy to deliver long-term water supply security to the City of Santa Cruz water customers. On November 10, 2015, the City Council and City Water Commission held a joint meeting in which the citizen-led WSAC's Final Report on Agreements and Recommendations was presented and discussed. At its November 24, 2015 meeting, City Council accepted the Final Report, directed staff to integrate the WSAC recommended water supply packaged strategy into the Urban Water Management Plan update, directed the Water Commission to assume policy-level oversight of the implementation of the agreements and recommendations, and supported staff's continuing public information and engagement on water supply strategy.

Included in the WSAC Final Report on Agreements and Recommendations is the evaluation of Advanced Treated Recycled Water and desalination as a water supply alternative should the groundwater storage strategies prove insufficient to meet the plan's goals. Additionally, once sufficient information was known about recycled water and an updated evaluation of desalination, just one alterantive would be advanced for further study and comparative analysis with the other surface water alternatives.

Kennedy Jenks was hired in February 2016 to analyze opportunities for the use of recycled water in Santa Cruz. The Recycled Water Feasibility Plannng Study was completed in June 2018, and reduced a fairly broad list of alternatives to the few that met the study goals of offsetting potable water demand or otherwise finding beneficial use of treated wastewater. The final report recommended a suite of near and long term project alternatives for further evaluataion and implementation.

At their October 1 and November 5, 2018 meetings, the Water Commission heard updates from staff on the findings of the recycled water and desalination studies, as well as staff's recommendation to prioritize recycled water over desalination. With concurrence from the Water Commission, staff took an item to the City Council on November 27, 2018, recommending a motion to support staff's and Water Commission's recommendation to prioritize the further evaluation of recycled water at this time, pending outcomes of work on the other supply alternatives. City Council supported this recommendation. Council's motion was as follows:

1. Continue to evaluate the opportunities and benefits of replacement and expansion of the existing tertiary treatment facility at the Wastewater Treatment Facility (WWTF).

2. Continue to evaluate treating wastewater to advanced treatment standards for potential groundwater replenishment and/or as surface water augmentation by sending to Loch Lomond Reservoir.

3. Cease work on desalination for the foreseeable future, pending outcomes of work on the other supply options, understanding that if the other alternative water supply augmentation strategies being considered aren't able to meet the plan goal, then desalination would be reconsidered.

DISCUSSION: Since the November 2018, City Council action to prioritize recycled water over desalination, staff has continued to evaluate the opportunities and benefits of replacement and expansion of the existing tertiary treatment facility at the Wastewater Treatment Facility (SCWWTF). Specifically, staff is working with City Public Works staff and Soquel Creek Water District staff to develop the details of a shared tertiary plant at the SCWWTF for the purpose of replaceing existing tertiary infrastructure, providing feed water supply to the PureWaterSoquel Advanced Purification Facility, and planning for potential future expansion should recycled water opportunities be advanced in the City.

Staff has also drafted the Phase 2 scope of work with Kennedy Jenks to perform the additional analyses of recycled water alternatives as described in the final report and in bullet 2 above. As can be seen in the draft scope of work (attached), alternatives include regional opportunities with Soquel Creek Water District and Scotts Valley Water District. Regional projects, that maximize the use of this resource, could be the most cost-effective project yielding the broadest benefit.

The Phase 2 work is a 9-12 month effort. Similar to the Phase 1 work, project partners may include City Public Works, City Parks and Recreation, County of Santa Cruz – Water Resources Division, Santa Cruz County Sanitation District, Scotts Valley Water District, Soquel Creek Water District, and University of California Santa Cruz.

FISCAL IMPACT: Funding for Phase 2 of the Recycled Water Study has been included within the FY 2020 Capital Budget.

ATTACHMENT(S):
Attachment 1 – Draft Scope of Work

Appendix A

Kennedy Jenks

303 Second Street, Suite 300 South
San Francisco, California 94107
415-243-2150
FAX: 415-896-0999

21 August 2019

Heidi Luckenbach
Santa Cruz Water Department
212 Locust St., Suite C
Santa Cruz, CA 95060

Subject: Proposal for City of Santa Cruz Water Department
Santa Cruz Regional Recycled Water Facilities Planning Study (RWFPS): Phase 2

Dear Ms. Luckenbach,

This proposal is provided at your request for engineering and planning service to support Phase 2 of the Santa Cruz Regional Recycled Water Facilities Planning Study (RWFPS). Phase 1 of the RWFPS was completed by Kennedy Jenks, under Purchase Order #91-16041, with the City of Santa Cruz, Water Department. A final RWFPS was submitted to the State Water Resource Control Board in June 2018, fulfilling the Recycled Water Planning Grant contract requirements. The study included the evaluation of the following alternatives, as summarized below:

- Alternative 1A – Santa Cruz Public Works Department Title 22 Upgrade Project
- Alternative 1B – Maximize Tertiary Treatment
- Alternative 2 – Decentralized Non-Potable Reuse (NPR)
- Alternative 3A – Santa Cruz Participation in Soquel Creek Water District (SqCWD) led Groundwater Replenishment Reuse Project (GRRP)
- Alternative 3B – Santa Cruz Participation in SqCWD led GRRP with Tertiary NPR in Santa Cruz
- Alternative 3C – Santa Cruz Participation in SqCWD led GRRP with GRRP and NPR in Santa Cruz
- Alternative 3D – Santa Cruz Participation in SqCWD led GRRP with AWTF and NPR in Santa Cruz
- Alternative 3E – Santa Cruz Participation in SqCWD led GRRP with AWTF, GRRP, and NPR in Santa Cruz
- Alternative 4A – Santa Cruz Centralized GRRP
- Alternative 4B – Santa Cruz Decentralized GRRP
- Alternative 5 – Surface Water Augmentation Project
- Alternative 6 – Streamflow Augmentation
- Alternative 7 – Direct Potable Reuse (DPR)
- Alternative 8A – 4-Way Regional GRRP
- Alternative 8B – 3-Way Regional GRRP

The recommended projects identified for the RWFPS focused on non-potable reuse in the near-term, which included two projects, which could be constructed in the near-term.

- **Santa Cruz Public Works Department (SCPWD) Title 22 Upgrade Project (Alternative 1A)** – implement a near-term non-potable reuse project to meet in-plant demands, develop a bulk water station and serve the near-by La Barranca Park.
- **BayCycle Project (Alternative 1B Phase 4)** – expand the SCPWD Title 22 Upgrade Project to increase production and non-potable reuse to serve the University of Santa Cruz (UCSC) and City customers along the way**.**

The RWFPS further noted that the City is also committed to exploring other potable reuse opportunities in the mid-term, including:

- **Coordination with Pure Water Soquel** – continue to work closely with SqCWD to support the evaluation of the Pure Water Soquel project including, but not limited to, the delivery of source water and considerations for benefits of shared infrastructure.
- **Explore GRR at Beltz Wellfield** – to replenish the Santa Cruz Mid-County Groundwater Basin in the Beltz Wellfield area, through a collaborative project with Pure Water Soquel or as an independent City led project
- **Explore GRR in SMGB –** continue regional discussions related to the benefits and limitations for a Regional GRRP in the SMGB, which has the potential to make the region more resilient in the long term.

The City recognized that exploring these potable reuse opportunities would offer a unique opportunity to create a multi-beneficial project and work collaboratively with regional partners to develop local, sustainable supplies and increase resiliency in the region for the long term. These projects represent longer term efforts that would require more time to work collaboratively with regional partners and/or future studies to confirm the viability of groundwater replenishment. These projects are also aligned with the WSAC recommended strategies to address the water supply gap of 1.2 billion gallons per year (BGY) (3,700 AFY) during times of extended drought.

The Commission and the Council approved continued analysis on the sub-alternatives recommended for further near- and long-term study. The City now wishes to begin Phase 2, which includes the evaluation to support a RWFPS Update. Kennedy Jenks is pleased to support the City on this important project and has provided a Scope of Work and Not-to-Exceed fee (based on time and materials) for the work described herein.

Kennedy Jenks

Scope of Work

The proposed scope of work includes the following tasks:

- Task 1 – 2018 RWFPS Overview
- Task 2 – Recycled Water Regulatory Update
- Task 3 – Phase 2 Alternatives Development and Analysis
- Task 4 – Coordination with Aquifer Storage and Recovery Project
- Task 5 – 2019 RWFPS Update
- Task 6 – Project Management and Program Coordination
- Task 7 – As-Requested Additional Services

Work will be conducted in accordance with the terms and conditions set forth in the Professional Services Agreement, Purchase Order Document #_____, with the City of Santa Cruz, Water Department effective x March 2019.

Task 1 – 2018 RWFPS Overview

This task will provide an overview of the 2018 RWFPS, focused on the recommended projects and other potable reuse opportunities recommended for further exploration. This task will summarize the rational for the near- and mid-term recommendations at that time, describe changed conditions that may or may not alter these recommendations and provide supporting justification.

Kennedy Jenks will provide a brief summary of the methodology used in, and the results of, the 2018 RWFPS in Section 1 of the 2019 RWFPS Update. This section will include, but not be limited to a discussion of the screening process and the nexus with Pure Water Soquel Project and the implications of the advancement of that project to the City.

Task 1 Deliverable:

- Admin Draft Section 1 – 2018 RWFPS Overview

Task 2 – Recycled Water Regulatory Update

Since the completion of the 2018 RWFPS, the California State Water Resources Control Board has finalized Surface Water Augmentation (SWA) Regulations, completed a Direct Potable Reuse (DPR) Framework document and is near to releasing the updated Recycled Water Policy. Kennedy Jenks will review pertinent regulations and summarize the changes and how they may impact a recycled water project in Santa Cruz in Section 2 of the 2019 RWFPS Update.

Task 2 Deliverable:

- Admin Draft Section 2 – Recycled Water Regulatory Update

Task 3 – Phase 2 Alternatives Development and Analysis

This task will build on the recommended alternatives in the 2018 RWFPS and refine alternatives based on recent activities related to the evaluation of tertiary treatment at the Santa Cruz WWTF, the status of Pure Water Soquel (SqCWD's GRRP) and input from the November meeting with the City Council.

The purpose of this task is to identify the City's preferred recycled water project(s) to move forward. The phase 2 alternatives will be developed and analyzed to support the City's assessment of the potential financial impact of the preferred project(s). A potential timeline for implementation of the preferred alternative(s) will be developed, including identification of future studies, permits and potentially the need for an Independent Advisory Panel (IAP) should potable reuse be included as a preferred alternative.

The assumptions and outcomes of this task will be documented in Sections 3 and 4 of the 2020 RWFPS Update.

3.1 Develop and Evaluate Phase 2 Alternatives

The 2018 RWFPS evaluated alternatives at a concept-level and costs were provided an AACE Cost Estimate Classification Matrix at a Class 5 level (See Table 1). Task 3.1 will focus on a subset of those alternatives, as identified through discussions with the City, and refine the evaluation based on new information the progression of other projects and non-recycled water activities. Workshop #1 (included in Task 6) will focus on Phase 2 Alternative development and refining screening criteria. Major efforts and assumptions are listed below:

Define up to four (4) Phase 2 Alternatives, which may include, but not be limited to an update of the 2018 RWFPS Alternatives 1A, 1B, 5 and 7. The selection of this list will be developed through discussions with the City.
Define up to two Phase 2 City-Soquel Alternatives, which may include, but not be limited to an update of the 2018 RWFPS Alternatives 3B and 3C. The selection of this list will be developed through discussions with the City. Consideration as to the level of commitment to the Pure Water Soquel Project may include a range from minimal involvement (little risk), to reserving capacity for future (some risk), to committing to use (more risk). This task assumes one (1) face to face meeting with the Pure Water Soquel Project team to understand their assumptions regarding facilities located in the City, opportunities for partnering with the City and information and data they are willing and able to share with our team.
Develop up to four (max) Phase 2 City-SVWD Alternatives, which will consider regional solutions that may result if (A) the treatment capabilities at the Scotts Valley WWTP were to be limited/reduced, (B) SVWD required more recycled water and/or (C) the Santa Margarita Groundwater Agency were seeking project partners. Potential regional alternative concepts for a City-SVWD partnership may reflect:

1) SVWD pursuit of a new MBR facility to meet non-potable demands and a new AWT facility to provide groundwater replenishment, resulting in increased flows (and brine) conveyed to the SCWWTP,
2) Scotts Valley sending all wastewater to the SCWWTP and the City pumping tertiary flows back to SVWD to meet on-potable demands and provide source water for groundwater replenishment
3) A three-party solution with the City, SVWD and Soquel to maximize regional benefits.

Sub-alternatives may be developed to reflect varying levels of City use, including City led groundwater replenishment in the Santa Margarita Basin. This effort will build on some of the concepts and facility considerations developed for Alternatives 8A and 8B as well as ongoing work by SVWD. This task assumes two (2) face to face meetings with SVWD to understand their assumptions regarding options being considered, flows delivered and facilities that would need to be located in the City.

Evaluate Phase 2 Alternatives, which will include updates to treatment, pipeline alignments, pumping requirements, and supply and demand analysis based on information from the Pure Water Soquel Project, input from the SCPWD and updates from the Supply Augmentation Team, as appropriate. The refined analysis will be performed to provide sufficient design info to compare across in lieu, ASR and recycled water alternatives.

- **Santa Cruz WWTF Considerations.** Kennedy Jenks is currently working with SCPWD to identify high risk assets that will need rehabilitation and replacement in the next five years. Expansion of tertiary treatment capacity or the addition of advanced treatment will be considered within the identified rehab/replacement modifications to an existing process area to provide adequate space and incorporate other planned improvements. A more detailed assessment of the location and capacity of new facilities (pumps, storage, filters, disinfection, advanced treatment) will be performed, building on the initial assessment by the Pure Water Soquel Project, the rehabilitation and replacement work, and discussions with SCPWD. Power supply, distribution and instrumentation and control requirements will be looked at to identify potential needs and approaches to meter power usage for different purposes. This task includes 2 conference calls with the SCPWD and a site visit to the WWTF to identify available areas for new facilities.

- **Pipeline Alignment Considerations.** The Phase 1 pipeline evaluation will be updated based on the most recent information in the Pure Water Soquel Project EIR and design information that comes out of the bid process (if available). This task will focus on an assessment of City's share of costs for use of the transmission pipeline capacity, or the cost to upsize the pipeline beyond the capacity desired for the Pure Water Soquel Project. For distribution pipelines to convey recycled water to meet identified City demands, this task will revisit diurnal demands for non-potable reuse to optimize pipeline sizing and will include a driving study to visually identify preferred alignments and challenging intersections. A high-level environmental analysis using existing databases and information in the EIR will be used to identify potentially environmentally sensitive areas where permitting may be more limiting.

- **Updated cost estimate** will be developed at a Class 4/5 level (See Table 1). Cost sheets similar to those included in the 2018 RWFPS will be updated to reflect revised facility sizing, infrastructure requirements and current cost estimates from recent and similar projects (like One Water

Monterey and the San Jose Filter Rehabilitation Project). Treatment costs will be refined for site specific conditions, particularly for facilities at the Santa Cruz WWTF. Pipeline costs will be refined to reflect a desktop evaluation of special crossings and recent information from the Pure Water Soquel Project. For the purpose of screening alternative, Kennedy Jenks does not recommend spending the additional budget to design these alternatives to a level needed for a Class 3/4 analysis.

Refine screening criteria used for ranking the projects in the 2018 RWFPS and the Water Supply Advisory Committee (WSAC) reports. Screening tables will be updated with quantitative and qualitative tables from the evaluation. Included in the criteria should be a metric that can be used to compare potential water supply augmentation projects, including aquifer storage and recovery (ASR). The metric should, in some manner, comprise of the cost of the project and the amount of water that the project is expected to provide. The Economic Study Estimating the Benefits of the Pure Water Soquel Project (Dr. Bett Haddad) will be reviewed, if provided by SqCWD, to identify applicable metrics of information that could be used in screening. This task assumes 2 conference calls with the Supply Augmentation Team to vet criteria concepts and come to alignment on metrics that can be applied across all of the City's WSAC options.

Identify preferred project(s) based on the ranking of the Phase 2 Alternatives. Workshop #2 (included in Task 6) will focus on selection of preferred alternatives and discuss the recommended project(s) or next steps.

Assumptions and Exclusions:

- It is assumed that the City will obtain the most recent information from the Pure Water Soquel project, particularly related to proposed facilities at the Santa Cruz WWTF and pipeline alignments within the City's boundaries.
- Geotechnical, utility and surveying efforts are not included as part of this scope.
- A siting study for the AWPF location outside of the Santa Cruz WWTF is not included as part of this scope.
- Nutrient removal treatment technology evaluations are not included as part of this scope.
- Detailed economic analyses and rate studies would be performed under a separate contract and are not included in this scope.
- The City may consider engaging Dr. Brent Haddad regarding the "Economic Study Estimating the Benefits of the Pure Water Soquel Project" if it is deemed that there would be value in utilizing his work to compare alternatives for the City.

Table 1. AACE Cost Estimate Classification Matrix.

	Primary Characteristic	*Secondary Characteristic*		
	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES	**END USAGE**	**METHODOLOGY**	**EXPECTED ACCURACY RANGE**
ESTIMATE CLASS	*Expressed as % of completion definition*	*Typical purpose of estimate*	*Typical estimating method*	*Typical variation in low and high ranges*
Class 5	0% to 2%	Concept screening	Capacity factored parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tendter	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

3.2 Refine Preferred Recycled Water Project(s)

Based on the outcomes of Task 3.1, the preferred project(s) will be refined, as-needed, to provide a road map for how recycled water implementation would fit within the other possible WSAC projects and with Pure Water Soquel. Task 3.2 will focus providing information to allow the City to move forward with preliminary design and permitting in 2020. At this point Kennedy Jenks does not recommend updating the cost estimate to Class 3 level. However that may change depending upon the level of detail generated from other water supply alternatives e.g., aquifer storage and recoveryMajor efforts and assumptions are listed below:

- **Refine preferred recycled water projects,** which will include a plan layout of treatment facilities at the Santa Cruz WWTF, identification of alternative pipeline segments, and refinement of costs, as needed (at a Class 4/5 level). A discussion of how the preferred projects could be part of a portfolio of other WSAC projects will be provided.

- **Phasing for implementation** will consider how the preferred projects would be phased to meet the City's overall water supply goals. This task assumes 2 conference calls with the Supply Augmentation Team to align on other activities associated with the other options being explored by the City.
- **Identify recommended project(s)** to present to the Water Commission and City Council for moving forward. Efforts needed for the next step of preliminary design and permitting will be described.

Task 3 Deliverables:

- Admin Draft Section 3 – Phase 2 Alternatives Development
- Admin Draft Section 4 – Phase 2 Alternatives Analysis

Task 4 – Coordination with Aquifer Storage and Recovery (ASR) Project

The City is in the process of running several groundwater models to support the piloting and feasibility of an Aquifer Storage and Recovery (ASR) project. Because of the technical overlaps between ASR and potential GRRP projects, coordination is needed to confirm that the information provided by the groundwater model will also be sufficient to provide information about a potential GRRP. Under this task, Kennedy Jenks will develop a short scoping memorandum summarizing the groundwater modeling scenarios needed to evaluate GRRPs. This task includes two (2) calls with the groundwater modeling team to discuss current modeling efforts and recommended scope to evaluated GRR.

It is assumed that a description of the model assumptions, inputs, outputs and other parameters will be provided by the groundwater modeling team but a handoff of the model or a detailed walk through of the model is not anticipated to be needed.

Task 4 Deliverables:

- Draft Scoping Memo for Groundwater Modeling to Evaluate GRR
- Final Scoping Memo for Groundwater Modeling to Evaluate GRR

Task 5 – 2020 RWFPS Update

Work under all previous tasks will be compiled in a 2020 RWFPS Update. The report will incorporate the final tables and figures deliverables developed under Tasks 1 to 4 and provide a description of the assumptions, criteria, and methodology for creating alternatives and performing calculations. Background sections from the 2018 RWFPS will be referenced as needed but not repeated in the updated report.

An outline of the report will be developed and shared with the City early in the project to solicit input and obtain agreement with our approach for reporting on this effort. The 2019 RWFPS Update will include:

- Administrative draft sections for review by the City

- A draft of the compiled administrative draft sections, including responses to comments and an executive summary
- A final report for publication.

5.1 Outline and Admin Draft Sections

The following administrative draft sections will be developed as part of Tasks 1 to 3.

- Section 1 – Phase 1 RWFPS Overview
- Section 2 – Recycled Water Regulatory Update
- Section 3 – Phase 2 Alternatives Development
- Section 4 – Phase 2 Alternatives Analysis

This task will include the development of the report outline and populations of the following Sections to develop a comprehensive 2019 RWFPS Update

- Section 5 – Nexus with Other Projects
- Section 6 – Recommended Project(s)
- Section 7 – Next Steps

5.2 Draft 2020 RWFPS Update

Kennedy Jenks will submit draft submittal documents for review and comment by the City's project manager (PM) prior to final document submittal. Any draft documents submitted for preliminary review will bear visual marking of "draft" status on each page. Draft documents must be submitted with sufficient time for review prior to final document submission. The City's PM will determine how many days prior to final submission is required for review of each submittal. Draft documents submitted after this time may not receive full review and comment before final document submission.

5.3 Final 2020 RWFPS Update

Kennedy Jenks will submit final reports bearing the stamp, signature, and seal of an engineer licensed to practice in the state of California. The consultant will produce one hard copy and digital (PDF) copy of the Final 2019 RWFPS Update with any relevant supplemental information.

Task 5 Deliverables:

- Admin Draft Sections (digital in word, excel and pdf)
- Draft 2020 RWFPS Update (digital in word and pdf)
- Final 2020 RWFPS Update (digital in pdf and 5 hard copies)

Task 6 – Project Management and Program Coordination

Project management includes submittal of monthly project status reports, bi-monthly check in calls, internal coordination to keep the project on schedule and budget, development of a project schedule and QA/QC program to be applied throughout the duration of the project. The scope herein assumes an 8-month project duration to wrap up the project by December 2019.

6.1 Project Management

Kennedy Jenks will provide project management focused on control of project costs, maintaining project schedule requirements, identifying key issues and delivering quality documents. Project management will include directing the work of the team so that the work is accomplished on time and within budget. This subtask includes project setup, preparation of a project work plan, the development of a project schedule and periodic updates to discuss during check-in calls with the City.

6.2 Kickoff Meeting and Status Calls

The scope assumes the following meetings and calls:

- 1 kick-off meeting, in person
- Up to 16 status calls between the KJ Project Manager and/or Engineer and the City to discuss current activities and any needs for additional input or information, via conference calls.

KJ will provide conference call-in information and web-desktop sharing for conference calls. The City will provide meeting space for in person meetings. Supporting team members and/or subconsultants may be invited to participate as-needed. A running-action item list will be developed and updated during each call to keep track of the status of key action items. Kennedy Jenks will provide an agenda and supporting material in advance of the meetings and brief minutes following the meeting.

6.3 Workshops and Presentations

The scope assumes the following workshops with City departments:

- Workshop #1: focused on Phase 2 Alternative development and refining screening criteria
- Workshop #2: focused on selection of a preferred project(s) and discuss the recommended project(s) or next steps.
- Presentation of Draft 2019 RWFPS: to Commission and/or City Council

Workshops to be attended by the Kennedy Jenks Team Project Manager and up to two technical staff (depending on the focus topic). Kennedy Jenks will provide an agenda and supporting material in advance of the meetings and brief minutes and the post-meeting presentation following the meeting

6.4 Monthly Reporting and Invoices

Communications with the City will include monthly project status reports describing the work accomplished and status of the budget and schedule. The scope assumes a 12-month contract duration with submittal of 12 status reports and invoices. The monthly project status reports will describe the following, as-appropriate:

- Work performed, and milestones achieved,
- Estimated earned value,
- Actual cost separated by task, and
- Other metrics (as appropriate) including, planned value, cost performance index, cost variance, schedule performance index, and schedule variance.

Monthly reports will utilize the City's "Invoice Activity Summary" and "Earned Value" templates or an agreed upon format. Kennedy Jenks will work with the City to define an appropriate level-of-detail for a study of this nature.

6.5 Quality Assurance/Quality Control

Quality assurance and quality control (QA/QC) activities are integrated into Kennedy Jenks' project management system from project inception, through execution to final document submission. Kennedy Jenks uses experienced senior staff, familiar with, but not directly involved in the project work, to provide QA/QC review of work products and project deliverables.
All submittals will be reviewed by senior engineers prior to submittal to the City.

Task 6 Deliverables:

- Monthly invoices with required backup.
- Monthly progress status reports utilizing the City's templates or an agreed upon format.
- Baseline and monthly schedule updates in Microsoft Project or an agreed upon format.
- Health and Safety Plan (HASP) and Hazard Appraisal and Recognition Plan (HARP) for site visit if needed.
- Project Work Plan.
- Meeting agendas, supporting materials, and meeting minutes.

Task 7 – As-Requested Additional Services

A specific scope of work for additional services would be developed collaboratively with the City's PM and the proposed budget would be authorized on an as-needed basis. As-requested services may include, but not be limited to:

- Additional Meetings/Workshops
- Additional Design Efforts
- Field Surveys/Geotech/Utility work
- Environmental Site Surveys
- Other As-needed Activities

Anticipated Project Schedule

Table 2: Status of Upcoming Work Task Deliverables

Deliverable	Anticipated Start Date*	Anticipated End Date	Status
Executed Agreement	TBD		
Notice to Proceed	TBD		
Data Request	Month 1		
Kick-off Meeting	Month 1		Coordinate meetings on same day or back to back if possible
SqCWD Meeting	Month 1		
Workshop #1	Month 2		Alt development and criteria
Site Visit	Month 2		Santa Cruz WWTF
Site Visit	Month 3		Drive pipeline alignments
Workshop #2	Month 5		Select preferred project
Presentation	Month 8		Present Draft Report
Admin Draft RWFPS Sections			
Section 1 – Phase 1 RWFPS Overview		Month 3	Summary tables/figures for these Sections will be presented during calls/meetings. Anticipated completion date is for Admin Draft Sections. Draft and Final will be included in the 2020 RWFPS Update submittals.
Section 2 – RW Regulatory Update		Month 3	
Section 3 – Phase 2 Alt Development		Month 4	
Section 4 – Phase 2 Alt Analysis		Month 6	
Section 5 – Nexus with Other Projects		Month 7	
Section 6 – Recommended Project(s)		Month 7	
Section 7 – Next Steps		Month 7	
Outline 2020 RWFPS		Month 2	
Admin Draft RWFPS Sections		See above	
Draft 2020 RWFPS		Month 8	
Final 2020 RWFPS		Month 9	

** Actual dates to be confirmed upon NTP*

Budget

A summary of the budget and work completed is provided in provided in Table 3 and a detailed fee estimate is included in Attachment B.

Table 3: Summary of Budget

Tasks	Total Est Hours	Total KJ Labor	Total Expenses	Total Labor + Expenses
Task 1 – 2018 RWFPS Overview	35	$7,855	$105	$7,960
Task 2 – Recycled Water Regulatory Update	26	$5,530	$78	$5,608
Task 3 – Phase 2 Alternatives Development and Analysis	403	$89,515	$5,059	$94,574
Task 4 – Coordination with Aquifer Storage and Recovery Project	46	$11,660	$138	$11,798
Task 5 – 2020 RWFPS Update	236	$48,500	$1,258	$49,758
Task 6 – Project Management and Program Coordination	277	$64,740	$5,231	$69,971
Task 7 – As-Requested Activities	0	$0	$0	$0
Task 1 - 7 Total	**1023**	**$227,800**	**$11,869**	**$239,669**

* For Task 7, A scope and budget will be developed and authorized on an as-needed basis to support additional meetings/workshops, design efforts, field surveys or other as-needed activities.

Closing

We look forward to continuing to work with you to support Phase 2 of your RWFPS. Please do not hesitate to contact me with any questions on this proposal.

Very truly yours,

KENNEDY JENKS

Dawn Taffler, PE, LEED®
Project Manager

Pete Talbot, PE
Principal-in-Charge

Kennedy Jenks

WATER COMMISSION
INFORMATION REPORT

DATE: 8/19/2019

AGENDA OF: August 26, 2019

TO: Water Commission

FROM: Heidi Luckenbach, Deputy Director/Engineering Manager

SUBJECT: Water Department Energy Master Plan

RECOMMENDATION: That the Water Commission receive information on the framework for a Water Department Energy Master Plan.

BACKGROUND and DISCUSSION: The Water Department is committed to an energy efficient operation as is demonstrated by the design and operation of its infrastructure, installation of energy generation devices, and the ongoing commitment to carbon neutral water supply projects. Similar to the declaration made by the scwd2 Task Force when evaluating the scwd2 Desalination Project, the Water Supply Advisory Committee (WSAC) also expressed their interest and commitment to a carbon neutral water supply in their Final Report on Agreements and Recommendations (October 2015): "The Committee developed consensus that energy requirements for any new water supply augmentation project should be met with power from renewable sources."

Water Department staff has been implementing the Water Supply Augmentation Strategy Work Plan and is in the timely position to develop an Energy Master Plan. To this end staff has been working on the basic elements of a scope of work and has met on several occasions with Tiffany Wise-West, the City's Sustainability and Climate Action Manager, to incorporate her expertise and experience into this project and develop an approach that would meet the Department's goals and be consistent with the efforts and goals of the City. The attached draft framework sets out the goals of the project. Dr. Wise-West will be at the Water Commission's August 26th meeting and available for additional discussion. Staff anticipates completing the Request for Proposals in September, bid solicitation in October, and awarding the contract in early 2020.

FISCAL IMPACT: Funding for an Energy Master Plan has been included in the FY 2020 Capital Budget.

ATTACHMENT(S):
Attachment 1 – Draft Scope of Work

CITY OF SANTA CRUZ WATER DEPARTMENT

ENERGY MASTER PLAN

DRAFT SCOPE OF WORK

The Water Department is committed to providing carbon neutral[i] water supply as recommended by the Water Supply Advisory Committee and adopted by City Council. The goal of the Energy Master Plan is to identify the most cost effective energy investment pathway for carbon-neutral water supply by establishing a strategic vision for the Department's management of energy as it relates to the supply, production, transmission and distribution of potable water in the City.

The scope of work for the project includes administrative (or policy-related) tasks, as well as technical tasks that will be accomplished with City staff as well as subject matter experts as needed. The study will consider current and future performance of infrastructure; new technologies for the supply, production, transmission and distribution of water; new technologies for energy generation and storage; and dovetail with efforts of the City as described below.

Preliminary Tasks

1. Develop Water Department goals, commitments, and/or policy around energy management and carbon neutrality that are achievable, measureable, and consistent with those of the City.
2. Assess organizational roles and responsibilities with respect to energy management.
3. Address procurement of energy and energy-related equipment.
4. Benchmark: Develop an inventory of existing facilities and their historic electricity, natural gas, and diesel use as well as verifying the carbon footprint. Determine Water Department's contribution to the City's prior greenhouse gas emissions inventories, harmonizing them across consistent protocols if necessary.
5. Set energy consumption targets, key performance metrics to measure success, and establishing clear decision-making metrics (e.g., metric tonnes carbon dioxide equivalent per dollar spent, etc.).
6. Evaluate opportunities for demand side management, load shifting, fuel switching, high performance building design and retrofit, building/energy management systems' integration into the Supervisory Control and Data Acquisition (SCADA) system, energy efficiency, battery storage and fuel cells, and renewable energy (e.g., solar PV and hydroturbines) under different performance contracting and ownership models.
7. Develop monitoring/tracking and verification systems to assess performance (e.g., online dashboards enabling quick reporting and graphical presentation of data).
8. Develop reporting template for quantitative and qualitative summary of progress toward achieving the Department's and City's goals.
9. Prepare narrative on implications of recommendations on equitable distribution of costs and rates.

Optional Task

An optional scope item which the Water Department may elect to include is the development of a climate and energy scenario analysis tool. This techno-economic analysis tool will evaluate the impact of anticipated increases in water demand (and revenue) over time, implementation of the Department's Capital Improvement Program, and investments in energy efficiency, high performing buildings, renewable energy projects and greenhouse gas instrument procurement (e.g., biogas, allowances, offsets and renewable energy credits). Anticipated tool outputs could include projected emissions, emissions savings for implementing specific sets of energy efficiency and renewable energy projects, cash flow, net present value and simple payback on scenarios, and cost per metric ton of carbon dioxide equivalent as well as include simple graphic visualizations of key decision making metrics and trends. The tool shall be designed to include the adjustable parameters such as utility escalation costs, financing rates, CIP project details and etc.

Notes:

- Recommendations should include short- and long-term operational modifications, technology investments based on the performance analysis' findings, specific policies to be adopted, and identification of funding mechanisms to fund the recommendations. Recommendations should also take into consideration the City's climate change vulnerabilities and exposed assets as articulated in the City's Climate Adaptation Plan Update (adopted in 2018) and original Climate Adaptation Plan's vulnerability assessment (adopted in 2012).
- The Plan will identify how recommendations connect to municipal-wide energy and emissions reduction planning and decision-making and as they relate specifically to the upcoming Climate and Energy Action Plan 2030 process as well as the Monterey Bay Community Power Electrification Plan (to be released in the fall of 2019).

[ii] Carbon neutrality or having a net zero carbon footprint, refers to achieving net zero carbon emissions by balancing a measured amount of carbon released with an equivalent amount sequestered or offset, or buying enough carbon credits to make up the difference. For the purpose of this planning effort, carbon neutrality will only address Scope 1 and Scope 2 emissions (excluding transportation-related emissions). Scope 1 emissions are principally the result of the following activities: production of electricity, heat, or steam, transportation of materials, products, waste, and employees, e.g. use of mobile combustion sources, such as: trucks, and cars; fugitive emissions: intentional or unintentional releases such as: equipment leaks from joints, seals; and HFC emissions during the use of air conditioning equipment. Scope 2 accounts for indirect emissions associated with the generation of imported/purchased electricity, heat, or steam.

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WATER COMMISSION
INFORMATION REPORT

DATE: 8/22/2019

AGENDA OF: August 26, 2019

TO: Water Commission

FROM: Heidi Luckenbach, Deputy Director/Engineering Manager

SUBJECT: Incorporation of Climate Change into Water Supply Planning

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RECOMMENDATION: That the Water Commission receive information and provide feedback to staff on the approach to the incorporation of climate change projections into water supply planning.

BACKGROUND: At their April 2019 Joint Study Session with the former Water Supply Advisory Committee (WSAC), the Water Commission received information on the current progress and status in implementing the Water Supply Augmentation Strategy recommended by the WSAC and unanimously accepted by the Santa Cruz City Council in November 2015. The discussion covered a variety of topics relevant to informing decisions about water supply planning, project selection, and implementation scheduling. Among these topics was "Climate Change - How projecttions are evolving and what it means." An excerpt of that item is attached to remind the Commission of the items covered with respect to climate change and where the discussion ended. Some of the key takeaways include:

- WSAC identified two approaches to consider impacts to water supply: an extended drought that coupled 1976-1977 with 1987-1992, and changes in precipitation and temperature captured by developing hydrology using the GFDL 2.1 A2 downscaled global climate model.
- Two additional climate change projections have been utilized since 2015 in an attempt to characterize a range of potential futures. These are referred to as CMIP 5 or Four Model Ensemble and the Climate Catalog.
- The worst drought under GFDL projection is a two year, while CMIP5 is three years. The Climate Catalog is also two years but a bit deeper than the GFDL.
- It is impossible to deal with the worst-drought shortage under the Climate Catalog with feasible levels of ASR because, while not the driest when compared with GFDL and CMIP 5, in many years nearly half the annual flow is concentrated in a single month.
- These three climate projections seem to cover a decent range of conditions in that the worst year drought shortages in the three climate scenarios is similar enough, especially

given the uncertainty associated with the downscaling or formation of the Climate Catalog, to conclude that the potential impacts of climate change identified are reasonable in terms of what may be experienced.

- The next steps would be to try and identify how we will know if we are headed towards one outcome vs another, and how would we respond.

DISCUSSION: To further this analysis, the city has re-engaged several members of the former WSAC technical team. The scope of the work is to do our best to understand how climate change has and will affect our water resource portfolio and how we should respond in order to maintain reliable service. More specifically, the project team is working to answer the following three questions.

1. Have we sufficiently modeled potential future outcomes given the information available?

   As stated previously, we have looked at a number of climate change projections/scenarios and they all produce larger shortages than we see looking at historical hydrology. The degree of influence we see looking at the three climate projections/scenarios is different, but not so totally different as to make us believe that we are not seeing a reasonable range of outcomes, at least based on what we have seen so far.

   That being said, a few things we do know about our water system: it is vulnerable to a 2 year severe droughts such as 1976-1977, temperatures are already increasing, higher temperatures have an implication for hydrologic cycles and hence available streamflows. To understand the impact of temperature increase on our resources we are introducing an additional potential outcome by applying temperature increases to the historic precipitation pattern to see how this impacts supply availability.

   Regardless of how many futures we take in to account, we must recognize the high degree of uncertainty associated with a "top-down" down scaling approach to developing climate scenarios. While we may be able to reduce the uncertainty over time as more information is available, there will remain a high degree of uncertainty with this approach.

2. What are the signals that will indicate climate changes and trigger action?

   It is a valuable exercise to model for a variety of climate futures that have varying impacts on water supply; however, from a practical standpoint it is difficult to definitively know when we need to take actuion, such as accelerating and/or up-sizing ASR, and/or steering towards reuse or desalination. As we have seen with historic weather patterns, climate change will not present itself in a clear way. We will not have a clear tracjectory in terms of weather patterns that indicate "we will be there in three years so better take action." Rather we will likely see trends towards warmer years, sprinkeled with normal and wet years. We will have to reconcile project implementation schedules that will take years, during which time we may have wet years that will challenge our decisions. And, we may make wrong decisions that leave us either under or over prepared to meet future challenges.

As we work to better develop decision criteria, there are several actions that if take could produce more efficient implementation of projects: phase implementation of ASR over time to benefit from the feedback loop of operational data; continue refining our understanding of climate change impacts; develop and implement CEQA and permitting strategies; strategically purchase properties.

3. How much can our existing system of water supply and infrastructure yield to accommodate future climate changes and related water supply shortages?

   Our system is heavily dependent on surface water and we want to understand more about how much climate change would have to occur to fundamentally undermine our current strategy of depending on surface water for 95% of our supply. In contrast to the top-down approach, this bottom-up approach will lead to a greater understanding of the current system's vulnerabilities

Presentation of this item to the Commission will cover our climate change modeling and what it is inferring, decision making with large uncertainties, and city-wide efforts towards climate adaptation. Presenters include: Water Department staff; Dr. Tiffany Wise-West, the City's Sustainability and Climate Action Manager; Dr. Robert (Bob) S. Raucher, Director of Water Economics and Planning, Corona Environmental Consulting; and Dr. Shawn Chartrand, Balance Hydrologics, Inc.

FISCAL IMPACT: None. Funding for ongoing work on supplemental supply options has been included in the FY 2020 Operating and Capital Budgets.

ATTACHMENT(S):

1. April 2019 Joint Study Session Staff Report
   a) Attachment 1: Climate Change – how projections are eveolving and what it means
2. Insights from On-going Explorations of Plausible Climate Change Impacts for Santa Cruz's Long-Term Water Supply Planning
   a) Attachment 1: Departure of Historical Annual Total Precipitation and Mean Annual Air Tempertaure form Long-Term Annual Averages, Period: 1900-2018, Santa Cruz, CA Histogram
   b) Attachment 2: What does the Paleo Climate Record Suggest About Future Droughts in Santa Cruz?
   c) Attachment 3: The Anticipated Role of Higher Temperatures on Santa Cruz's Future Water Supply

WATER COMMISSION
INFORMATION REPORT

DATE: 3/27/2019

AGENDA OF: April 1, 2019

TO: Water Commission

FROM: Rosemary Menard

SUBJECT: Joint Workshop with Former Water Supply Advisory Committee

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RECOMMENDATION: That the Water Commission receive a comprehensive informational briefing on current progress and status in implementing the Water Supply Augmentation Strategy recommended by the Water Supply Advisory Committee and unanimously accepted by the Santa Cruz City Council in November 2015 and provide feedback to staff on issues and questions related to the materials presented.

BACKGROUND: Between April 2014 and October 2015, the City Council-appointed Water Supply Advisory Committee (WSAC) met to develop agreements and recommendations to the City Council about what actions the City should take to improve the reliability of the Santa Cruz water supply. The WSAC's recommendations were presented to and unanimously accepted by the Santa Cruz City Council in November 2015.

Since that time, the Water Department has been implementing the Water Supply Augmentation Strategy (WSAS) Work Plan developed during the WSAC process and approved as part of the City Council action. A companion effort to establish the financial sustainability strategy necessary to support implementation of both the WSAS work plan and necessary capital investments in critical water system infrastructure was completed in 2016.

A high level summary of progress to date both in accomplishing the WSAS work plan and moving forward with the capital program is provided below.

WSAS Work Plan[1]

- Pilot testing of both water transfers and aquifer storage and recovery in the mid county basin

[1] For additional information, the WSAS March 2019 Quarterly Update can be found at this link under Item 5. http://www.cityofsantacruz.com/Home/ShowDocument?id=75237

- Groundwater modeling that is informing the scope and size of groundwater storage alternatives
- Improved understanding of the opportunities and limitations of recycled water and desalination

Capital Investments Infrastructure Improvements

- Treatment/Graham Hill Water Treatment Plant
  - evaluating treatment plant improvements for current capacity and water quality regulations as well as potential future demands, conjunctive use, water quality regulatory changes
  - completed rehabilitation of granular media filters
  - under contract to replace tube settlers
  - in 75% design for replacement of concrete tanks (construction begins 2020)

- Raw water diversions
  - evaluating diversion capacities for current and potential future needs
  - condition assessment of both Laguna and Majors diversions complete
  - replaced bladder dam at Felton Diversion

- Raw water pipeline
  - evaluating capacity requirements for current and potential future needs and uses
  - condition assessment of Newell Creek Pipeline underway
  - replacement of raw water pipeline under river at Tait Street under construction fall 2019

- Other
  - U5 tank demolished and being replace – complete end of 2019
  - 90% plans for Newell Creek Dam Inlet/Outlet Replacement project under review

Similarly, the Department's analytical work has evolved considerably using a greater range of parameters that help produce results to better inform decision-making. For example, our modeling work includes a large range of potential conditions as summarized in the table on the following page. Those in bold are newer considerations.

Parameter	Value
Demands	• WSAC 3.2BG • **2016-2018 2.6 BG**
Climate Change	• Historical • GFDL2.1 A2 • **CMIP5** • **Catalog**
GHWTP Treatment Water Quality	• **Ability to treat more turbid water at GHWTP**
GHWTP Treatment Capacity	• 16.5mgd • **18mgd**
Infrastructure Sizing for Drought Supply Created by In-Lieu, ASR or a Combination	• **Infrastructure required to meet historic and climate change scenarios for 3.2 BG demand, with and without treatment plant improvements** • **Infrastructure required to meet historic and climate change scenarios for 2.6 BG demand, with and without treatment plant improvements**
Supplemental Water Supply for Soquel Creek Water District (In-Lieu)	• **300mgy (off-peak season)** • **500mgy (off-peak season)** • **1,500mgy (year round)**
ASR Scope	• WSAC Project • **Beltz – Existing infrastructure** • **Beltz – New infrastructure**
In Lieu & ASR Operations	• Year Round • **Seasonal (Nov – April Inject; May – Oct Withdraw)**
Project Alternatives	• In-Lieu • ASR • In-Lieu plus ASR • **ASR plus PureWaterSoquel**

DISCUSSION: The goal of this Water Commission agenda item is to provide a comprehensive update on the status of the work to date, laying out and integrating information directly produced as a result of implementing the WSAS work plan and the Department's ongoing financial and capital improvement planning and connect this work with other analyses being conducted as part of ongoing work of regional bodies working to comply with the Sustainable Groundwater Management Act, and develop Groundwater Sustainability Plans for both the Santa Cruz Mid-County and the Santa Margarita Groundwater basins.

The written materials prepared for this agenda item are specifically designed to take the readers through the evolution of the information that staff is familiar with and how staff has viewed this material when taken as a whole. Our purpose in sharing these details is to be transparent about

the various inputs and analytical results that are informing our thinking. Our purpose is also to "paint a picture" of where the information that has developed takes us, including how those of us who are actively engaged in both the City's own work as well as the work of other regional partners are seeing some opportunities for early "no-regrets" actions that could substantially improve supply reliability in the near term and ahead of the scheduled WSAC decision process in 2020. In addition, staff has identified a need to take more time to consider the implications of climate change and any trends in local water demand prior to pursuing strategies that could be needed in a second phase of work to ensure long term supply reliability. We want to share these perspectives, explain our thinking, and hear your questions, concerns and alternate views that may further inform recommendations that would be developed and brought forward for Water Commission action at a future meeting on recommendations to the City Council.

To support this discussion, we've prepared a series of topic-specific summary technical memos and provided relevant back-up documentation for each topic as appropriate. The topics covered include the following:

1. Climate Change
2. Water Demand
3. Water Treatment
4. Surface Water Augmentation
5. Recycled Water and Desalination
6. Infrastructure and Water Rights
7. Financial Challenges and Opportunities
8. Synthesis and Possible Next Steps.

FISCAL IMPACT: None at this time.

PROPOSED MOTION: Motion to accept the information on current progress and status in implementing the Water Supply Augmentation Strategy recommended by the Water Supply Advisory Committee and unanimously accepted by the Santa Cruz City Council in November 2015 and provide feedback to staff on issues and questions related to the materials presented.

ATTACHMENTS:

1. Climate Change – how projections are evolving and what it means
2. Water Demand – how it's changing
3. Water Treatment
4. Improving Supply Reliability through Surface Water Augmentation
5. Recycled Water and Desalination
6. Infrastructure and Water Rights
7. Financial Challenges and Opportunities
8. Synthesis and Possible Next Steps

Attachment 1

Climate Change – how projections are evolving and what it means.

The Water Supply Advisory Committee recognized the potential for climate change to occur and have impacts to water supply availability. In their efforts to grapple with this, they identified two alternative ways to characterize climate change, one being an extended drought and the other being changes in ongoing hydrology[1]. The extended drought was fabricated by coupling the region's most extreme drought years, 1976-1977, with the longest drought years, 1987-1992. Confluence®, the department's water supply model, used this extended drought sequence to examine a longer, but not more severe drought than seen in the 73 year history of data. In addition to considering longer droughts, the WSAC considered how to address the potential for increasing temperatures and changes to precipitation patterns. To this end, the WSAC adopted, for planning purposes and subject to change with additional information, the use of warmer and drier results of the downscaled global climate model GFDL model. Specifically GFDL2.1 A2.

Since that time (~2015) staff has been asking the question "what if climate change does not follow the GFDL2.1 A2 trajectory?" Staff and its technical team have been working to increase our understanding around climate change projections to consider a range of potential future climate change conditions so as to be able to make timely and sound decisions.

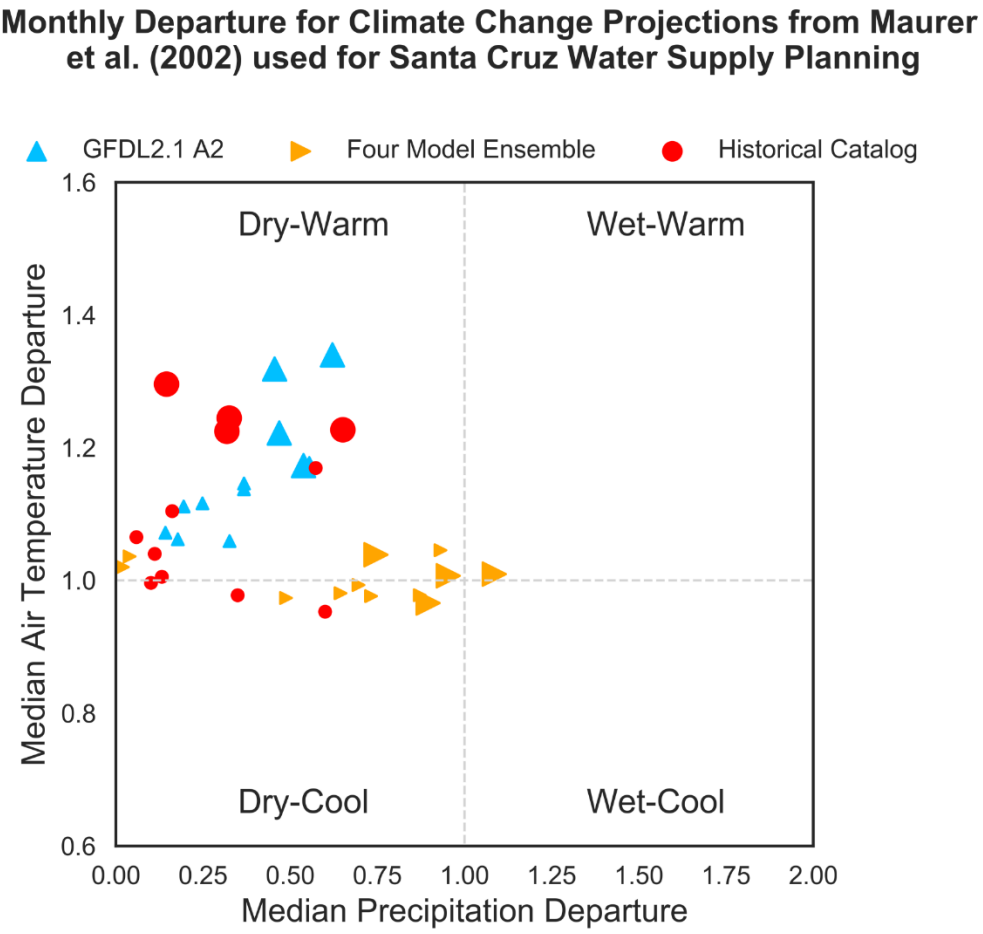
The figure on the following page illustrates estimates of the joint precipitation and air temperature probability distributions for three different climate projections we have analyzed for water supply, including the GFDL2.1 A2. The figure provides a way to visualize how the distributions are spread relative to the historical mean monthly precipitation and air temperature, centered around 1.0/1.0. The three projections represent

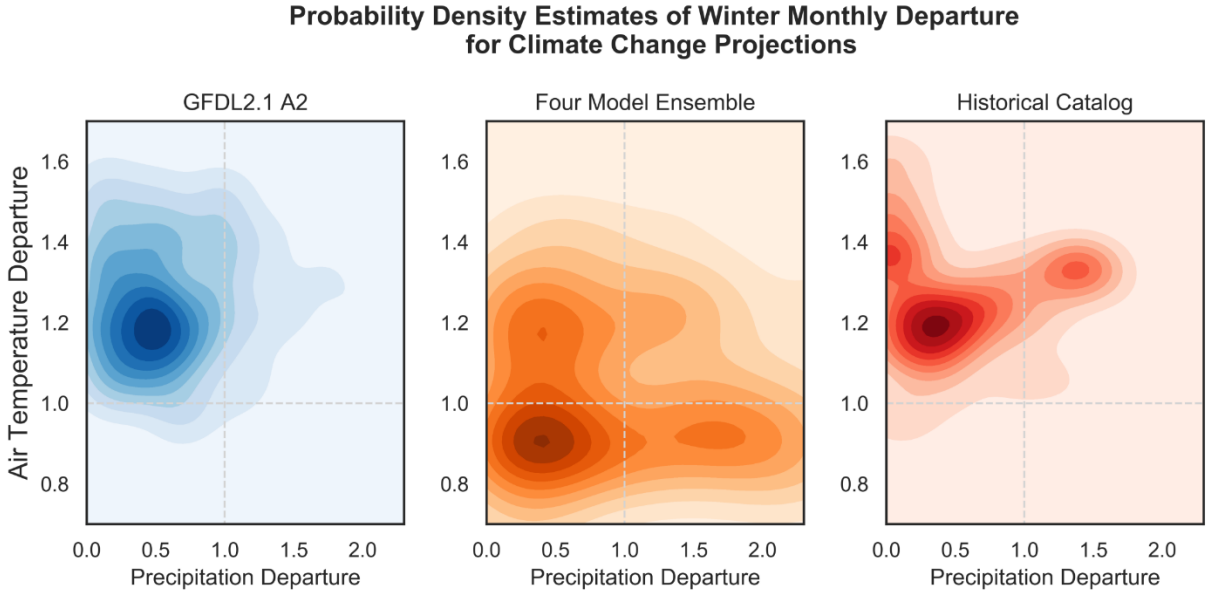
a. a specific climate that is thought to represent stressful conditions relative to historical conditions [GFDL],
b. a more contemporary combination of four climate projections which, when combined, provide a plausible range of future conditions, and importantly a high amount of variability [Four Model Ensemble]
c. a synthetic climate constructed from historical records picked because they are dry and hot [Climate Catalog].

The figure indicates that the three climate projections are both similar and different. Similarities include rather dry projected conditions [focus on the where the darkest colors occur - higher probability], differences include quite warm conditions, but also cool conditions. By combining the darkest colors for each projection visually, it is possible to conclude that the projected conditions are quite warm and dry relative to historical - this means our analysis assumes that the probability of a warmer and drier climate is high. Additional evidence of this is being developed for the Santa Cruz Mid-County Groundwater Agency. Attachment 1A is an excerpt from work presented at the March 27, 2019 GSP Advisory Committee meeting. The first few slides of the

[1] Reference pages 21-25 of the WSAC's Final Report on Agreements and Recommendations at: http://www.santacruzwatersupply.com/meeting/wsac-final-reportrecommendation-appendices

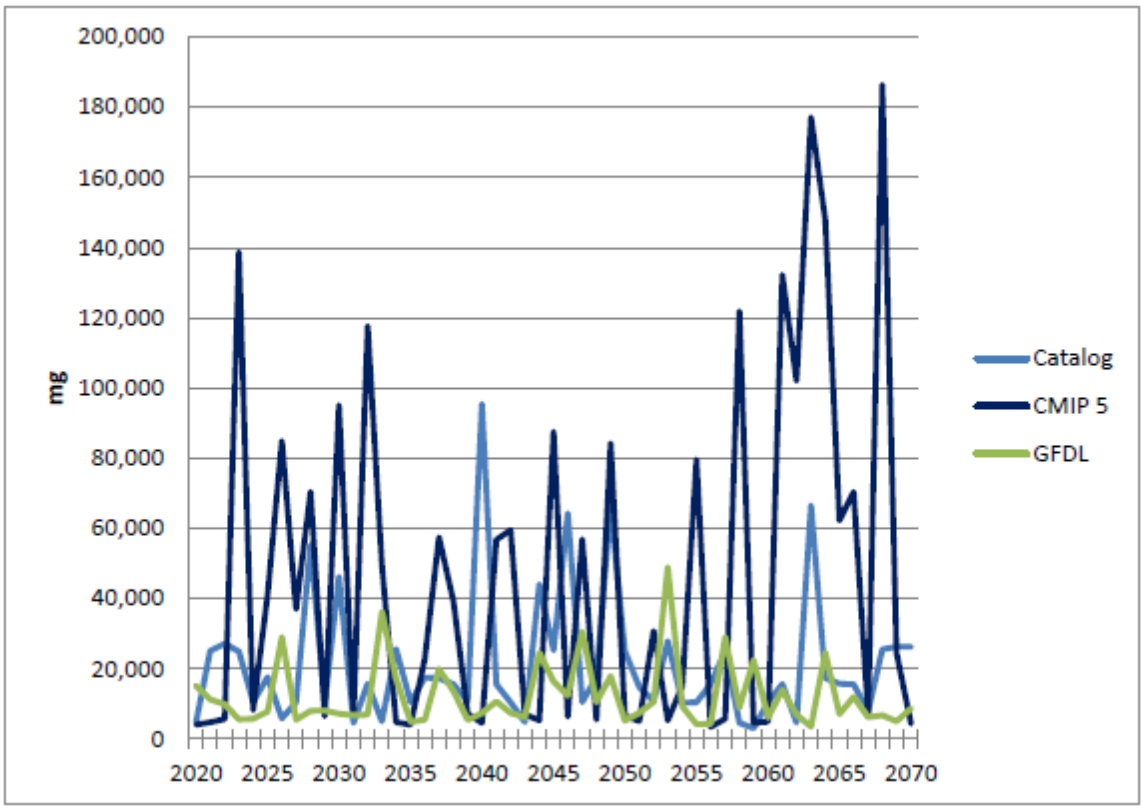
abbreviated deck are for context. Pages 4-9 show trends towards dry and warm, and certainly unpredictable and variable. The full presentation will be available at the link below.





Gary Fiske has also modeled peak season shortages using these three climate scenarios. Included in his memo (attachment 1B) is the following figure in which we can see the extreme variabilities in river flows of these three potential climate outcomes with CMIP5 being the wettest, GFDL the driest, and the Catalog in between.

Figure 1. Annual Flows at Big Trees



Several key conclusions made by Gary include:

- the worst drought of the GFDL projection is of two year duration, while the CMIP5 projection has a three year drought. Similar to GFDL, the Catalog has a two year drought that is perhaps a bit deeper than GFDL
- it is impossible to deal with the worst-drought shortage with feasible levels of ASR in the Catalog climate scenario with 3.2 billion gallon per year demand. This appears to be due to the fact that, while not the driest when compared with GFDL and CMIP5, nearly half the annual flow is concentrated in to a single month. (Note the use of "NA" in several cells in Table 2 of the attached memo indicating an infeasible situation.)
- the worst drought tells only part of the story - the pattern of rainfall is equally, and sometimes more important.

The future climate is not predictable: climate models are imperfect, they are models, and climate is a "chaotic phenomenon." In response to this unpredictable future, we spread and reduce risk by planning with several different projections that stress the water supply in different ways, and then use what we learn to develop comprehensive and achievable strategies for supply sustainability. The three projections we have analyzed seem to cover a decent range of conditions, so we can have some confidence in the decisions we are making based on those conditions. The question we are now asking is how do we know if we are headed towards one prediction vs another, and how do we respond? Bob Raucher is assisting staff to refine the adaptive management strategy adopted by the WSAC, with more specific triggers and actions. More on this topic is in Attachment 8.

Attachment(s)

Attachment 1-A Excerpt Santa Cruz Mid-County Groundwater Agency, Groundwater Modeling presentation, March 27, 2019. Visit http://www.midcountygroundwater.org/ for full presentation.

Attachment 1-B Catalog Flows Memo, Gary Fiske, March 6, 2019. (Note that references to a 2.6billion gallon demand associated with the 2016-2018 water years is described in attachment 2 to the staff report.)

Attachment 1-C A Confluence Primer

CORONA | ENVIRONMENTAL CONSULTING

Memo

From: Bob Raucher, Director, Water Economics & Planning, Corona Environmental Consulting

To: Heidi Luckenbach, Deputy Director, and Rosemary Menard, Director, City of Santa Cruz Water Department (SCWD)

Cc: Joel B. Smith, Climate Change Adaptation Consultant Expert; Gary Fiske, Gary Fiske and Associates; Shawn Chartrand, Balance Hydrologics

Date: 14 August 2019

Topic: Insights from On-going Explorations of Plausible Climate Change Impacts for Santa Cruz's Long-Term Water Supply Planning

This memo provides an abbreviated summary of key findings regarding climate change and its potential impacts, as relevant to the City of Santa Cruz's examination of long-term water supply strategies. This overview draws on the continuing work efforts and related insights developed by Joel Smith, Shawn Chartrand, Gary Fiske, and others. The summary provided here briefly focusses on the potential implications for Santa Cruz, and the attachments provide additional information on the scientific and related analytical efforts that led to our findings.

Before delving into the climate change insights *per se*, we present several key findings on how specific climate outcomes may significantly impact the long-term reliability of the Santa Cruz water supply portfolio in terms of meeting service area water demands into the future (e.g., for the coming 20 to 50 years). Examining the SCWD system's supply vulnerabilities provides relevant context with which to interpret the emerging findings from climate change science.

Past Experience and Modeling Insights Identify Key Climate-related Water System Vulnerabilities for Santa Cruz

The City's experience over recent decades, as well as insights gleaned from the extensive work performed by Gary Fiske using the *Confluence* model, reveal a couple of key climate-related vulnerabilities for the City of Santa Cruz Water Department's water supply portfolio and its anticipated ability to meet the City's water demands in the decades to come. The two key observations are:

1. Multi-year severe drought conditions (e.g., as few as 2 consecutive years of extremely low streamflow) create significant challenges, with a high probability of significant supply shortfalls relative to demand. A repeat of the 2-year drought of 1976 – 1977 (i.e., a repeat of the recorded precipitation and temperature patterns) would severely stress the SCWD water system, more so than other longer but less severe droughts the City has experienced. This is so even with the lower near-term demand forecast, and reflects the agreed-upon Habitat Conservation Plan (HCP) flow rules. The simulation shows that the city would experience significant peak-season shortages in the second drought year

(e.g., 50% of peak season demands).[1] As described below, at higher anticipated future temperatures, we expect a repeat of the 1976-1977 precipitation pattern would result in appreciably greater peak season shortages.

2. One of the anticipated effects of climate change is a precipitation pattern of less frequent but more severe storm events. If a significant portion of winter precipitation occurs within a relatively narrow timeframe – which is a plausible outcome according to climate scientists -- there will be limits on how much winter flow water may be captured for potential storage. For example, during periods of intense rainfall, it may not be feasible to capture all the available San Lorenzo River flows for off-stream storage (such as via ASR).

Observations from the Historic Record Reveal Increased Temperatures and Increased Variability in Annual Precipitation

Shawn Chartrand has conducted an in-depth review of the recorded precipitation and temperature data for Santa Cruz, dating back to the 1880s. This is depicted in Attachment 1, in which the center of the graph reflects the average annual precipitation and temperature over the period from 1900 to 1960, and the colored dots reflect observed annual precipitation and temperature results for each year through 2018. The historical data reveal that:

1. A general warming trend is already evident, especially since the 1960s. The observed increase in daily average and daily minimum temperatures is consistent with global trends and expectations associated with continued elevation of atmospheric carbon dioxide (CO_2) levels.[2]

2. Variability in annual precipitation levels appears to have increased in recent decades, with drier dry years and wetter wet years, and large swings between the two (seen in Figure 1) as the dots for more recent years moving further away from the historical centroid.

3. The recent drought of water years 2014 – 2016 (Nov 2013 through Oct 2016) appears to be the most severe drought period evident in the recorded period since 1900, for which we have instrument-based data (in terms of precipitation levels). The increase in drought severity is consistent with what the climate change science is finding (see below). [3]

Based solely on the documented historical record, which extends back to 1884, there is roughly a 4-in-100 probability of a *severe* drought that extends for 2 years. A severe drought is defined when total

[1] Confluence modeling shows a peak-season shortage of almost 800 million gallons, or 50% of peak-season demand, when the 1976 – 1977 water hydrology is coupled with the HCP and current demand levels.
[2] Somewhat surprisingly, the daily maximum air temperature does not show a clear increasing trend for the station analyzed
[3] Note that Gary Fiske's Confluence modeling to date has not incorporated water year 2016.

annual precipitation for each of two or more years is less than the 20th-percentile historical precipitation annual total.

The Paleo record indicates droughts of long duration have been experienced in the region within the past millennium.

The Paleo record is developed by a branch of science that attempts to reconstruct past climates through analysis of tree rings, sediment deposits, cave speleothems, ice cores, and other data. While much less precise than the instrumental record, the Paleo climate reconstructions offer insight into the length and, to some degree, intensity, of past weather events, pre-dating the available period in which instrumental records were established.

Joel Smith has been communicating with leading Paleo climate scientists and reviewing the latest scientific literature (see Attachment 2), and has found the following relevant findings:

1. Drought intensity: Reconstructions of climate going back about 1,000 years before the present find that the most severe drought years were experienced in recent decades (e.g., water years 2014 – 2016, as well as 1976-1977). Therefore, using recent droughts as an indication of the worst short-term drought that have been recorded seems reasonable. However, as noted in the next section, higher temperatures are expected to make future droughts even more intense than what has been recently experienced (resulting in reduced stream flows and, hence reduced water supply availability). Thus, it seems prudent to consider planning for future droughts that may be more intense than those experienced in past decades.

2. Drought duration. The Paleo climate record finds that droughts in past centuries in California may have lasted much longer than droughts observed since 1900. The reconstructed droughts drawn from the Paleo evidence for the region suggests that droughts in the 12th, 13th, and 16th century lasted decades. However, it is not feasible to assign probabilities to such events, or to ascertain the intensity of the droughts during those extended dry periods.

Note that there are two key limitations to using the Paleo record:

- The available data have a relative lack of precision. Tree rings, for example, indicate the relative level of soil moisture during growing seasons, but it is challenging to infer past temperatures and precipitation levels.

- The Paleo record is from a pre-industrial climate. For tens of thousands of years before the mid-19th century, carbon dioxide concentrations in the atmosphere were generally below 280 ppm. Currently, atmospheric concentrations of CO_2 are more than 410 ppm. The degree to which future climate will respond to higher greenhouse gas concentrations -- in terms of changing drought frequency and intensity -- is uncertain, and this limits how much we can infer from the distant past.

Climate scientists expect higher temperatures to increase current and future drought severity for any given level of precipitation, as well as heightening the seasonality of a more abbreviated future wet season.

Emerging insights from the scientific community, including Dr. Noah Diffenbaugh at Stanford University, is that rising temperatures may already be playing a larger role in affecting precipitation, runoff, and drought severity. This is because rising temperatures are accelerating the hydrologic cycle.

Joel Smith's review of recent scientific publications, and discussions with UCLA and National Center for Atmospheric Research (NCAR) scientist, Dr. Daniel Swain, reveal that many climate scientists believe rising temperatures are already affecting California's climate (see Attachment 3). The impact of rising temperatures is already evident in three critical ways:

1. Increased potential for more extreme drought. Dr. Swain concludes the 2014-16 drought was more intense than preindustrial conditions because of the effect of higher temperatures. Assuming similar precipitation levels as in past droughts, future droughts are expected to have less runoff and lower soil moisture, resulting in lower stream flows and less water available in streams for water supply diversion. (We currently are in the process of examining how elevated temperatures would impact the severity and water supply outcomes experienced from past droughts, such as the how the precipitation patterns from 1976 and 1977, coupled with an elevated temperature, would impact streamflows and water supply yields for Santa Cruz.)

2. Increased variability in inter-annual precipitation. Variability of annual precipitation in California has already increased this decade, and it is projected to continue increasing. In the future we expect to see more years being either extremely wet or extremely dry, and fewer years being "normal." There also is a projected increase in "whiplash" events, defined as a very wet year followed by a very dry year and vice-versa. This is what happened when the water year 2014-2016 drought was followed by the very wet 2017 water year. This "whiplash" pattern will likely increase in future years, particularly in northern California.

3. Changes in intra-annual precipitation patterns, with increased potential for a shorter and more intense wet season followed by a longer and more intense dry season. Projections suggest precipitation in November is likely to decrease, but increase in January and February, with little anticipated changes for December and March. Thus, the wet season would be of shorter duration, and precipitation during that shorter wet season would be more intense. The dry season then becomes longer. This has many implications for water supply planning, including the challenge of capturing more intense precipitation during the shorter wet season. In addition, the longer dry season could result in more demand for water, and increased fire risk.

The first two outcomes are already evident from examining the trends from recent decades, as shown in Shawn Chartrand's work (as illustrated in per Attachment 1)

Implications for Santa Cruz Long-Term Water Supply Planning

Our existing knowledge of the Santa Cruz water supply system indicates that consecutive intense drought years (e.g., persisting for 2 or more years, such as experienced in 1976 - 1977), coupled with Habitat Conservation Plan requirements for instream flows, pose considerable strain on the ability to avoid large-scale curtailments. Increasingly severe droughts, as well as the potential for longer duration drought periods, also pose a significant challenge for the system.

Evidence from climate change science suggests that:

- Consecutive years of severe drought have been relatively rare in the instrumental period covering the past 140 years; However, there is approximately a 4-in-100-year risk of a 2 consecutive critically dry years event, based solely on observed, historical climate data for Santa Cruz.

- Empirical evidence from recent decades reveals that drought severity, and temperatures, have both been increasing in Santa Cruz.

- Climate change science suggests the severity of future droughts in the region will likely continue to increase in coming decades, caused in part by the anticipated continuing increases in temperature.

- Extended duration droughts (e.g., of up to a decade or longer in duration) appear to have occurred in the region multiple times over the past 600 to 800 years (based on the Paleo reconstructions). Since longer duration droughts have happened, a repeat of such events cannot be ruled out, but the likelihood is difficult to project.

Given the apparent vulnerability of the SCWD's water supply yields from extended severe droughts of 2 or more years, we recommend that scenarios for long-term water supply planning and options evaluation include: a) a more intense short-term drought (e.g., what 1976 – 1977 would look like at higher temperatures); and b) longer-duration droughts (e.g., what would happen in a consecutive 3-year severe drought period of particular severities).

Additional climate change projections and scenarios developed and applied for Santa Cruz

Climate change modeling simulations, and additional climate scenarios, have been developed for the Santa Cruz Water Department and neighboring entities, for use in water supply planning and water resource management purposes (including the San Lorenzo Habitat Conservation Plan, and the Groundwater Sustainability Plan for the mid-County Groundwater Basin). The various climate modeling and scenarios approaches developed and applied to date, and their

implications for long-term water supply reliability, will be summarized in a future memorandum.

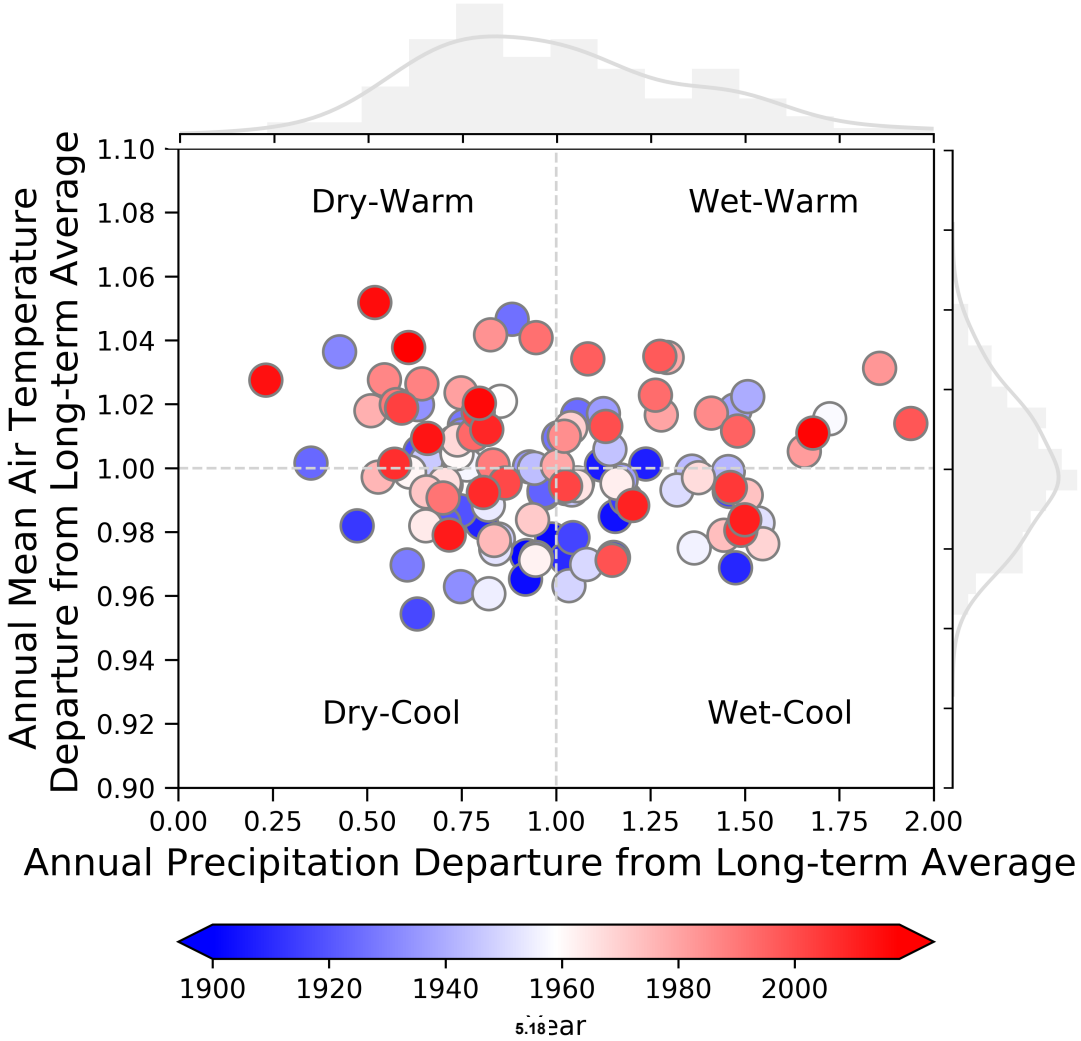
Attachments

1. Graphic depiction of deviations from annual average long-term temperature and precipitation levels, for the period 1900 – 2018, as developed by Shawn Chartrand

2. Summary of information derived from a review of the Paleo record, by Joel Smith.

3. Summary of insights provided by Dr. Swain and related work on the impact of elevated temperatures on precipitation event intensity and whiplash, developed by Joel Smith.

Departure of Historical Annual Total Precipitation and Mean Annual Air Temperature from Long-term Annual Averages, Period: 1900-2018, Santa Cruz, CA



Attachment 2: What Does the Paleo Climate Record Suggest About Future Droughts in Santa Cruz?

Prepared by Joel B. Smith, May 2019

Summary:

Reconstructions of climate going back about 1,000 years before the present find that the most severe drought years (e.g., in terms of soil moisture or runoff) were experienced in recent decades. In addition, the Paleo record reveals that droughts could last longer than 2, 3, or even 7 years, and extend to possibly decades long. However, it is not feasible to assign probabilities to such events. Further, higher temperatures are expected to make droughts more intense (apparently contributing the severity of recent droughts).

What is the Paleo-Climate Record?

Observations of actual weather in California date back to the late 19th century. This one hundred-plus years of recorded climate can tell us a lot about average climate, variability and extremes. But it only can tell us so much about infrequent and very severe extreme weather such as a 500- or 1,000-year flood or droughts. There is a branch of science that attempts to reconstruct past climates through analysis of tree rings, sediment deposits, caves, ice cores, and other data. These sources of information indicate what past weather was like. While clearly not as precise as the instrumental record, they give some insight into the length and, to some degree, intensity of past weather events.

Why Look at the Paleo Record for Evidence of Drought (and Flood) Risk faced by Santa Cruz?

The main reason to consider the paleo record is that the observed time of instrument-recorded data is relatively short. If we are concerned about the potential for infrequent but very severe events such as the 1:500 or 1:1000 year drought, then the instrumental record provides an overly myopic perspective.

However, there are two key limitations to using the paleo record. One as noted above is the relative lack of precision in the records. Tree rings for example indicate the relative level of soil moisture during growing seasons, but it is challenging to infer exact temperatures and precipitation levels.

A second key limitation is that the paleo record is from a pre-industrial climate. For tens of thousands of years before the mid-19th century, carbon dioxide concentrations in the atmosphere were generally below 280 ppm (unless we go back millions of years). How climate will respond to higher greenhouse gas concentrations may be different. Nonetheless, the paleo record can give useful insight into climate variability and extreme events. But finding that an extreme event such as a sustained drought occurred hundreds of years ago does not tell exactly how likely such a drought is in the next 50 or 100 years.

In this paper, I describe what the paleo climate record suggests about two aspects of drought: intensity and persistence. The question I explore is whether droughts that happened before about 1900 were more intense and/or lasted longer than what we have seen since about 1900.

Drought Intensity

The droughts in the recent memory may be the most intense droughts in the last 1,000 years. One study by Griffin and Anchukaitis[1] (2014) found that over a 1200-year period, three-year droughts in the western US were common, but the 2012-2014 drought was the most severe of the entire period, particularly the third year of the drought.

In addition, Wise (2016)[2] used tree ring data to examine a 500 years of drought history across the west coast. She found that 1976-77 is the driest event since the year 1500.

What these studies find is that droughts in the observed record may be as severe as any in the climate reconstructions going back as far as a thousand years. So, using recent droughts as an indication of the worst short-term drought seems reasonable. However, as our summary of Swain's work discusses (in Attachment 3), higher temperatures could make future droughts even more intense than what has been recently experienced.

Drought Duration

The paleo climate record finds that droughts in past centuries in California may have lasted much longer than droughts observed since 1900. Stahle et al. (2000)[3] state "These reconstructions suggest that the drought of the 16th Century exceeded the severity, persistence, and coverage of any drought witnessed in the United States during the period of instrumental meteorological or hydrological observation." (page 121). The discussion and figures in the article suggest that droughts in the 16th century lasted decades, although a precise length is not given. Stahle et al. (2000) examine all of North America and there seems to be significant variation in timing, intensity, and persistence of droughts at regional and local scales.

Stine (1994)[4] examined droughts over the last Millennium and found that in the 12th and 13th centuries there were very long periods of drought. These droughts may have persisted for decades, apparently longer than what Stahle et al. (2000) found for the 16th century. Stine wrote "The mediaeval period in California was thus marked not only by severe and prolonged drought, but by abrupt and extreme hydroclimatic shifts – from inordinate dryness, to inordinate wetness, and back to dryness." (Page 549). One note of caution is that a paleo climatologist whom I communicated with said reconstructions going back 1,000 are less reliable than those going back hundreds of years. So, Stahle's results for the 16th century may be more reliable than Stine's for the 12th and 13th centuries.

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[1] Griffin, D. and K. J. Anchukaitis. 2014. "How Unusual is the 2012-2014 California Drought?" *Geophysical Research Letters*. 41: 9017-9023.

[2] Wise, E. K. 2016. "Five Centuries of U.S. West Coast Drought: Occurrence, Spatial Distribution, and Associated Atmospheric Circulation Patterns." *Geophysical Research Letters*. 43: 4539-4546.

[3] Stahle et al. 2000. "Tree Ring Data Document 16th Century Megadrought Over North America." *EOS* 81 (12) 121-132.

[4] Stine, S. 1994. "Extreme and persistent drought in California and Patagonia during mediaeval time." *Nature* 369: 546-549.

The takeaway is the paleo record does, on the whole, find that droughts hundreds to a thousand years ago may have been much longer than what has been documented in the instrumental record.

A key question is if a climate event happened hundreds of years ago, can it happen now? Most paleo climatologists say yes, it can happen again. There are two key caveats to this conclusion. One is that the chemistry of the atmosphere before 1850 was different than today; mainly because greenhouse gas concentrations were lower. It is unknown what the difference in atmospheric chemistry and subsequent changes to temperature and the hydrologic cycle imply for drought persistence (not intensity as discussed above). The second limitation is that it does not seem possible to attach a probability to such events. Thus, it seems we cannot say whether the droughts of the 16th century are the 1 in 500 year events and the droughts the early Millennium characterize the 1 in 1000 year events.

One question for Santa Cruz is what probably event is too low to consider in planning for the next half-century or so. On the other hand, it would also not be wise to conclude that droughts in Santa Cruz cannot be longer than X years based only on what has been observed in the instrumental record. So, one may be left with the conclusion that there is a potential for longer droughts -- and possibly much longer droughts -- than what has been seen since 1900. However, that potential is difficult, if not impossible to quantify.

Attachment 3: The Anticipated Role of Higher Temperatures on Santa Cruz's Future Water Supply

Prepared by Joel B. Smith; August, 2019

Synthesis

Based on a review of Swain et al., (2018) and a meeting with Dr. Daniel Swain, there are three emerging changes in climate that may cause challenges for water supply management in Santa Cruz:

1. ***Potential for more extreme drought in the future***. Dr. Swain said that higher temperatures alone have already substantially increased drought intensity.
2. ***Increased interannual variability of precipitation***. Very wet and very dry years are projected to become more frequent with a concurrent decrease in frequency of "normal" years. There also could be more "whipsawing" wherein a very dry (or wet) period is followed by a very wet (or dry) period.
3. ***Change in seasonality of precipitation***. The length of the wet season is projected to become shorter. That means potentially more intense rain in January and February, followed by a longer dry season.

Four years ago, I gave a presentation in Santa Cruz about implications of climate change for Santa Cruz's water resources. I also presented some thoughts on how to address adaptation.

One of the points that I made in that presentation was that the California drought of 2012-2014 may have been one of the most severe -- not only in the 20th century, but possibly in the last 1,000 years. The insight that was emerging then from scientists such as Dr. Noah Diffenbaugh at Stanford University, was that rising temperatures may be playing a larger role in affecting precipitation, runoff, and drought.

I have been tasked with examining what the science of climate change can tell us about the potential for future drought in Santa Cruz. The focus of this brief paper is on the role of temperature on Santa Cruz's precipitation patterns and drought potential. I am basing most of this information on a 2018 paper by Daniel Swain and colleagues[1] and a meeting I had with Dr. Swain, on Wednesday, April 10. Swain developed his Ph.D. under Dr. Diffenbaugh at Stanford University. Following that he was a post-doc at UCLA, where he wrote the 2018 paper cited here. He now works at the National Center for Atmospheric Research.

Dr. Swain's contention is that rising temperatures are already affecting California's climate. This is being seen in three critical ways:

- Increased potential for more extreme drought;
- Increased variability of interannual precipitation; and
- Increased potential for a shorter and more intense wet season followed by a longer and more intense dry season.

[1] Swain, D. L., B. Langenbrunner, J. D. Neelin, and A. Hall. 2018. "Increased Precipitation Volatility in Twenty-First Century California." *Nature Climate Change* 8: 427-433. https://www.nature.com/articles/s41558-018-0140-y

Before diving in on these three outcomes, I briefly review the role of temperature in the hydrologic cycle. The hydrologic cycle is the flow of water molecules through the oceans and freshwater, cryosphere, land, and the atmosphere. Higher temperatures increase both evapotranspiration (evaporation and transpiration, which is the consumption of water by vegetation) and precipitation intensity. With higher temperatures we get more of both. This has very important implications.

Potential for more extreme drought

Because higher temperatures increase evaporation (a warmer atmosphere can hold more water vapor), it makes droughts worse. Essentially a warmer atmosphere pulls more water from water bodies, soils, and vegetation. Dr. Swain said that the 2012-16 drought was about 20 to 40% more intense than preindustrial conditions[2] because of the effect of higher temperatures. Future droughts would be even more severe because of the higher temperatures we expect to happen. The 20-40% figure is quite significant but perhaps should be vetted before being widely used.

Increased variability of interannual precipitation

Dr. Swain was the lead author on a paper that found that the variability of annual precipitation in California had already increased this decade and is projected to continue increasing (Swain et al., 2018, see footnote 1). The paper points to very dry years that California has experienced, followed by years with record snowpack in the Sierra, as evidence of increased interannual precipitation variability. The climate models project that the frequency of very high precipitation during the wet season (historically from November to March) will increase as will the frequency of extremely low precipitation during the wet season. As Swain put it, one could take a historic record and identify the frequency of extremely wet and dry years as well as "normal" years [which I take to mean neither extremely wet or dry]. He thinks in the future we will see more years being either extremely wet and dry, and fewer years being "normal."

The 2018 paper also projects an increase in "whiplash" events. These are defined as two consecutive very wet years followed by two consecutive very dry years. This is what happened when the 2012-2016 drought was followed by the very wet 2016-2017 years. The paper finds that this "whiplash" will likely increase, particularly in northern California.

Dr. Swain's view is that rising temperatures are what is causing the increase in interannual variability and whiplash because of the acceleration of the hydrologic cycle.

Increased Seasonality of Precipitation

The 2018 paper examined how monthly precipitation patterns might change. It projects that precipitation in January and February will rise, precipitation in December and March may change little, and precipitation decreasing in the rest of the months. What this means is the wet season, historically November through March, would be of shorter duration and precipitation during that shorter wet season would be more intense. The paper shows January and February having more intense precipitation. December and March are projected to either or increase (possibly increase in some years decrease in others) and November to decrease. The dry season thus becomes longer. This has many

[2] Dr. Swain added there is not much difference between pre-industrial temperatures and the 1970s as global temperatures started to rise significantly in the decade of the 1970s. So one might also say that had the 1976-77 drought happened this decade, it would be more severe by a similar magnitude.

implications including the challenge of capturing more intense precipitation or snowmelt during the shorter wet season. The longer dry season could result in more demand for water, particularly for irrigation, and increased fire risk. Dr. Swain noted that the Camp Fire started in November, which in the past had been when California's wet season had started.

In general, Dr. Swain feels these changes are not so much the result of decreases in precipitation but are the result of higher temperatures. Where and when precipitation patterns fall in Santa Cruz's watersheds will still have a major influence on water supplies. But, the relative role of temperature in affecting California's water resources seems to be becoming more important. One thing we are highly confident of is that temperatures will continue rising this century, so we can expect these changes to continue.

WATER COMMISSION
INFORMATION REPORT

DATE: 8/22/2019

AGENDA OF: August 26, 2019

TO: Water Commission

FROM: Rosemary Menard, Water Director

SUBJECT: WSAC Plan Adaptation

RECOMMENDATION: That the Water Commission provide feedback to staff on its draft recommendation to propose an Adaptation to the Council approved Recommendations developed by the Water Supply Advisory Committee.

BACKGROUND: At the Water Commission's April 1st Joint Study Session with the former members of the Water Supply Advisory Committee, and the June 3rd , 2019 Water Supply Augmentation Strategy quarterly report, staff presented detailed status reports on its work to date in implementing the Water Supply Augmentation Strategy that was developed by the 2014-2015 Water Supply Advisory Committee (WSAC) and accepted by the City Council in November 2015. At the end of the presentations, staff's synthesis of the work to date and some ideas about possible next steps were described. The goal for the discussion at both of the earlier meetings was not to have the Water Commission take action, but rather to provide Commissioners and the public with a preview of the staff's thinking and ideas for moving forward as a prelude to planned further discussion in subsequent Commission meetings.

The WSAC's Water Supply Augmentation Strategy Work Plan describes a series of actions through a fairly discrete 5-year planning phase, followed by 5 years of implementation of a project or series of projects. This plan was focused on making a major decision on a water supply augmentation project or portfolio of projects during calendar year 2020, and included provisions for adjusting or adapting the WSAC work plan, in the event that new information had been developed, as part of the planning process made it appropriate to do so.

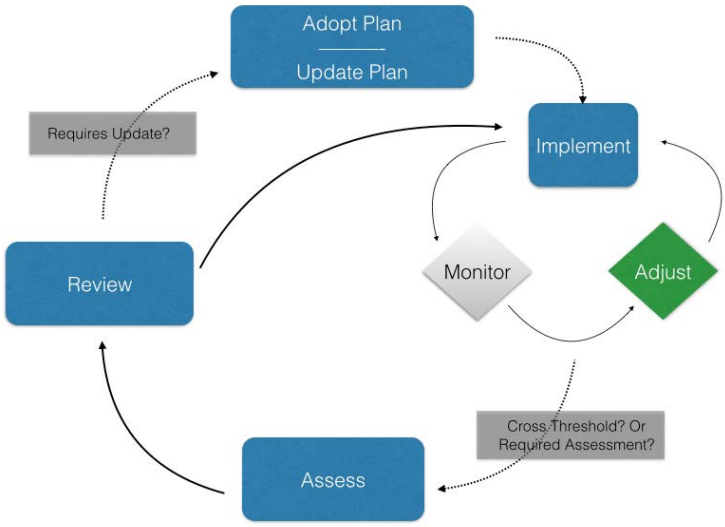
Updating and Modifying the WSAC Work Plan

WSAC members were wise and realistic about the potential need for modifying or adapting the work plan they had developed. They knew that developing new information could lead to a need to adapt the plan and they created a mechanism to support that process, ensuring that any efforts to change the agreed-upon strategy and approach would be done in a transparent way and would

be criteria based. Specifically, the WSAC recommended three threshold criteria be considered, cost, yield, and timeliness, and also identified other criteria to be considered in the WSAC recommended Guiding Principles. System robustness, resilience, redundancy and adaptive flexibility were specifically identified by the WSAC as important values when considering an Adaptation.

The goal of the agreed upon change management strategy was to avoid trying to address each possible eventuality, and to focus on overall program goals rather than implementation specifics. Once a threshold issue has prompted an assessment, other considerations captured in the Guiding Principles, such as regional collaborations or the collateral benefits of an approach, may be taken into consideration.

The figure below was included in the WSAC's Final Report on Agreements and Recommendations[1]. The figure is an elaboration on the standard "Plan, Do, Check, Act" approach to project or program development and implementation.



The model contemplated two kinds of change: an **adjustment**, which was defined as a change in implementation that helps the Plan stay on track. In a continuous feedback loop, the Water Department will make adjustments to help achieve (or exceed) performance targets for the various Plan Elements. Adjustments were contemplated as being part of the small circle shown on the right-hand side of the figure.

An **adaptation**, on the other hand, was defined as a shift from an Element or a set of Elements to another Element or set of Elements within the Plan's Adaptive Pathway. An adaptation may be recommended when certain thresholds are reached. **Thresholds** were defined as the set of information that leads to an Assessment of the Plan and possible adaptation.

[1] See Section 3.24 of the WSAC report, which you can find at: http://www.santacruzwatersupply.com/meeting/wsac-final-reportrecommendation-appendices

The Committee identified thresholds for the key issues that need to be considered during decision-making about a possible Adaptation. The thresholds are:

- Cost
- Yield
- Timeliness

The WSAC Final Report on Agreements and Recommendations identified specific steps for an Adaptation of the Plan. It includes three components: Assessments, Reviews and Update to Plan

1. An **Assessment** is performed by the Water Department and includes updated information and a recommendation about whether a change to the Plan is needed.
2. The Water Department submits the Assessment to the Water Commission for its **Review** and action. The Assessment includes the proposed work plan revisions that are needed due to changed assumptions for one or more of the Threshold criteria. The Water Commission then develops its **Recommendation** to the City Council for an update to the Plan.
3. The City Council considers the Water Commission's recommendation and, if approved, takes action to **Update the Plan**.

DISCUSSION: Water Department staff is recommending that the Water Commission approve an Adaptation to the WSAC Work Plan (also known as the Water Supply Augmentation Strategy) for the following reasons:

1. Cost – as noted in the Water Commission materials for the April 1st and June 3rd meetings, costs for the work the Department is doing to improve the resiliency of the water system in the face of climate change as well as those associated with improving system reliability through improving the robustness of the City's surface water treatment process are reducing the Department's ability to fully fund all potential planned investments in supplemental water supply.
2. Yield – the reality of near term financial constraints make it unlikely that the full yield required to address worst year water shortages can be produced in the timeline provided. However, it is likely that an increment of supplemental supply can be developed in the very near term and that, due to leveraging existing facilities and systems, the additional supply that can be developed will be quite cost-effective.
3. Timeliness – a delay in completing all the supplemental supply projects necessary to address the projected shortage under the worst year hydrologic conditions represents a threshold condition for the Timeliness criteria.

As noted in the April 1st and June 3rd Water Commission meetings, the Department staff is recommending two changes to the WSAC work plan:

1. Move to immediate implementation of two "no regrets" actions that, given the lower near term demand that has been observed, will contribute to reducing the worst year water shortage and increase both water supply and water system reliability. The two actions are:
    a. Move forward with further pilot testing and implementation of aquifer storage and recovery in the City's portion of the Purisima basin, which is part of the Santa Cruz

Mid-County Groundwater Basin, by leveraging the existing infrastructure of the Beltz groundwater system and investing in further wells if and as needed to help close the worst year shortage gap; and

b. Move forward with planned investments in the Graham Hill Water Treatment Plant that will produce an enhanced ability to treat available resources under a larger range of both wet weather and dry weather conditions.

2. Develop a revised work plan for a continuing work on additional supplement water supply options for future development to include the following:
    a. Retain the elements of the current WSAS relating to in-lieu water transfers to support ongoing regional discussions about the potential for working with regional entities on in-lieu water transfers or exchanges;
    b. Continue exploring additional opportunities for developing ASR in the Santa Margarita Basin;
    c. Design and implement an approach to evaluating the sensitivity of the City's surface water resoures to the impacts of climate change with a goal of providing the information necessary to appropriately compare the long-term viability of additional surface water development with other available alternative strategies identified by the WSAC;
    d. Given the results of the climate change analyses, develop feasible supplemental water supply projects using surface water as the source of supply to be used in the WSAC recommended comparative analysis methodology;
    e. Complete the planned Phase II Recycled Water Study, including developing feasible supplemental water supply projects using recycled water as the source of supply; and
    f. Plan to make decisions about any additional supplemental supply project based on all the information developed in items a through e above, and by using the WSAC recommended comparative analysis methodology.

Should the Water Commission support staff's recommendation, the schedule for Council consideration would be as follows:

- Water Commission review of the proposed Adaptation: August 26th
- Final Water Commission action on its recommendation: October 7th
- Staff/Water Commission presentation of proposed Adaption to the Council and Joint Water Commission/City Council session: November 12th.

FISCAL IMPACT: None. Funding for ongoing work on supplemental supply options has been included in the FY 2020 Operating and Capital Budgets.

PROPOSED MOTION: Motion to provide feedback to staff on the Adaptation analysis and the draft updated WSAS work plan.