

## UPDATE ON CLIMATE CHANGE ADAPTATION

### Climate Change Adaptation

This attachment updates information provided to the Board on May 24, 2016 related to major district climate change adaptation efforts underway. It is organized by the core functions of the District. Following this discussion is a table that includes more details on strategies employed.

#### 1. Activities Related to Water Supply (Water Utility Enterprise)

##### Long-term Efforts – Water Supply Master Planning

To address the challenges of an uncertain future and potential risks to water supplies, the District relies on its long-term planning efforts. Long-term planning efforts strive to develop and improve resilient and adaptable water supplies and strategies, while considering changing conditions. The District is currently updating its Water Supply Master Plan. The plan is reviewed annually and updated every five years to evolve to changing conditions. The Water Supply Master Plan Update 2018 builds on Board approved strategies to secure and optimize the use of existing supplies and infrastructure, and to meet future increases in demands with conservation and recycling. The Water Supply Master Plan will continue to develop elements that adapt well to future climate changes. The current plan elements are presented below.

- a. Manage water use demands - Current and planned water conservation programs, including the recent Board approved No Regrets package of water conservation and stormwater projects, are projected to achieve nearly 110,000 acre-feet per year (AFY) of water savings per year by 2040.

- b. Provide drought-proof supplies - Non-potable recycled water use is projected to expand from about 22,000 AFY in 2014 to 30,000 AFY by 2040. The District is also developing potable reuse, which is anticipated to provide up to 24,000 AFY of drought-proof supply for groundwater recharge.
- c. Secure imported water supplies - About 40 percent of the county's water supply is conveyed through the Sacramento-San Joaquin Delta. Increasing temperatures, changing precipitation patterns, more extremes and sea level rise are all significant threats to the reliability of these supplies and the Delta ecosystem. The District is working with local, state, and federal agencies to develop solutions to address climate change and other threats to the Delta environment and water supply reliability. The Board recently approved principles for participation in California WaterFix, which is intended to add reliability in the face of climate change and other challenges in the Bay Delta.
- d. Increase system flexibility - The District's integrated water system provides significant flexibility in managing supplies. Maintaining and rehabilitating the system, including dam retrofits, will be critical for managing the increased frequency of extreme events that are anticipated in a changing climate. In addition, the 2012 Water Supply and Infrastructure Master Plan included developing a new reservoir pipeline and additional groundwater recharge ponds to better utilize existing water supplies, especially during high storm flows and wet years. Future strategies may include additional surface and/or groundwater storage.
- e. Compile and analyze data - The District continues to compile and analyze data that could provide insights into potential local changes in supplies and water use demands. The uncertainty analysis for the Water Supply Master Plan Update 2018 included a climate analysis for late century, since most of our water supply strategies and facilities are needed for many decades to come.

## Near-term Operational Adjustments

In addition to the District's long-term strategies presented above, we are also continually adjusting our water supply and treatment operations to ensure a high quality reliable water supply in the face of near term challenges. These ongoing operations efforts will also be useful in the face of a changing climate.

- a. Continue to work with retailers and end users related to water quality issues.
- b. Continue to optimize water quality by protecting source waters to the treatment plants and switching or blending source water as needed.
- c. Continue to maintain SFPUC intertie for emergencies.
- d. Continue the Rinconada water treatment plant upgrade.
- e. Reduce wildfire risk near water utility assets.
- f. Maintain emergency preparedness plans and back-up generators.
- g. Consider adjustments to reservoir operations to increase operational flexibility.
- h. Continue to conduct groundwater management programs and well ordinance programs to reduce risk of saltwater intrusion.

## 2. Activities Related to Fluvial and Tidal Flood Protection

- a. In order to better understand the potential impacts of climate change on flood hydrology, the District contracted with Santa Clara University (SCU) to downscale global climate modeling results to the Santa Clara County area. Various climate-change scenarios for different target years and greenhouse-gas emission levels were considered. This allowed the District to assess statistically the impact of climate change on precipitation amounts. The results gave a preliminary snapshot on possible

precipitation changes in the future and a valuable data point. It is expected that additional studies may be commissioned as the science matures.

- b. The District completed coastal flood mapping for various sea level rise (SLR) scenarios and has been shared with the Cities to help quantify flooding risk. Several projects have already utilized this data in planning and design.
- c. Continuing San Francisco Bay Shoreline Project Efforts with the Army Corps of Engineers (Corps).

This project is a partnership with the California State Coastal Conservancy, the U.S. Army Corps of Engineers (Corps), and regional stakeholders to provide coastal flood protection, restore and enhance tidal marsh and related habitats, and provide recreational and public access opportunities.

- Economic Impact Area (EIA) 11 of the Corps project concluded the Feasibility phase in Dec 2015 and is in the design phase. EIA 11 is the urban area of North San José and the community of Alviso. Reach 1 design is nearly complete and we received permits for that Reach. We are working closely with San Jose, and the Corps is waiting for construction new start and appropriations.
  - EIAs 1-10. We completed a preliminary feasibility study in March 2017 funded by a State Department of Water Resources Local Levee Evaluation Grant. The preliminary study's goal was to identify a preliminary 1% coastal levee alignment with related benefits and costs for the EIAs 1-10 coastal area. A preliminary alignment was identified in consultation with all cities and key stakeholders. Levee heights were developed for the three Sea Level Change scenarios. We are working on partnering with the South Bay Salt Pond Restoration Project for EIAs 4 & 5 and EIA 10. Sunnyvale is interested in progressing forward as well with us.
  - The Resilient By Design challenge – Bay Area Challenge has also occurred, and they selected the Sunnyvale area to explore their Bay Towns concept.
- d. The Flood Forecast and Warning System is maturing as an operational product, with five areas being forecasted. We are scaling up to include

more forecast points to assist in both flooding and water supply as the general modeling structure has been determined. Once these forecast points are up, we will focus on the web service and warning system.

- e. The District partnered with Colorado State University and NOAA as a part of the Advanced Quantitative Precipitation Information project, funded by State and Federal grants, to expand the national weather radar coverage by installing the first X-Band Radar in the Bay Area on District property. The data will improve real-time precipitation forecasting for use in the District's Flood Forecast and Warning System.
- f. The District is continuing to prepare working guidelines for staff to incorporate rising sea levels into planning and design of flood protection projects. This guidance will provide a consistent approach for considering the effects rising sea levels on design of District's flood protection projects.

### **3. Activities Related to Ecosystem Resiliency**

The District has multiple restoration and enhancement projects that strive to improve vegetative communities for local wildlife and native plant diversity, increase native canopy cover and carbon dioxide (CO<sub>2</sub>) sequestration to reduce climate change effects, increase in-stream shading to lower water temperatures for fish, and enhance habitat connectivity for wildlife migration. These projects utilize adaptive management strategies to more readily address changing climatic conditions in the future.

- a. Current projects that support ecosystem resiliency include the South Bay Salt Pond Restoration Project which will minimize bayfront impacts from sea level rise by providing a wetland buffer and attenuation of high tides.

- b. The San Francisco Bay Shoreline Project will not only enhance flood protection for our bayfront communities but also provide improved ecotones and habitat connectivity for wildlife.
- c. The District awarded the San Francisco Bay Bird Observatory a grant of \$690,000 to plant native vegetation on the South Bay Salt Pond levee slopes to enhance wildlife habitat connectivity and reduce wave damage.
- d. The District's water conservation program provides rebates to homeowners and businesses for converting high water use landscapes to climate appropriate plants and permeable landscapes.
- e. The District recently completed all required land preservation for its Stream and Watershed Preservation Program. Over 3,600 acres of upper watershed lands in various parts of Santa Clara County have been protected as a part of this program. Ongoing monitoring and land management activities continue to ensure that the conservation values of the preserved land are maintained.

#### **4. Training and Communication**

Through a combination of technical trainings and general updates, the District is working to ensure that all staff are informed of and engaged with the climate change conversation.

- a. The Climate Change budget milestones include providing training to key climate change team subject matter experts. This fiscal year, we completed Module 5: Climate Action Planning, and Module 6: Technical Sessions (climate and vulnerability analyses). We will continue to seek out and provide appropriate training staff. Training in FY18 included:

- July 2017 - Strategic Planning: *A Systematic Approach to Climate Change Action Planning and Implementation*
  - September 2017 – Vulnerability Assessments – *Case studies for rising sea levels, tidal marshes and South Bay Salt Ponds*
  - October 2017 – Sea Level Rise Modeling
  - March 2018 – Climate Modeling and Risk
- b. The District has an ongoing effort to enhance climate literacy for all staff. This project includes giving unit presentations, sending updates to all staff through News You Can Use, and updating management and leadership. In addition, a Climate Café series is being developed. Several Climate Café sessions will be held in CY18, during which staff will have the opportunity to discuss topics such as greenhouse gas emission reductions, adaptation techniques, climate change impacts on the District, and techniques for communicating climate change.

## **5. Climate Change Action Plan Development**

The CCAP will be a framework and plan to adapt to a changing climate and to further reduce greenhouse gas (GHG) emissions. The adaptation component will look for ways to reduce risks associated with a changing climate, and the GHG reduction element will document and add to existing GHG reduction and carbon neutrality efforts. These two areas will be combined to find strategies that are synergistic between the two and look for conflicts. The CCAP is being developed using a three-pronged approach. In the first phase, completed in January 2018, we met with all district leadership and managers to gain a baseline understanding of unit goals, climate risks and efforts, and GHG components of their work. The second phase takes this information into Gap Assessments and Risk Assessments. Staff will then develop strategies that reduce risk and reduce GHG emissions. The final phase will be to compile and prioritize the strategies and create a plan to implement them back into the organization. The CCAP will include an implementation and monitoring framework, which includes periodic review and updates to the CCAP. The early stage of the CCAP included an internal stakeholder outreach plan. An external outreach plan, including a social equity focus (which will include Environmental Justice and Disadvantaged Communities components), will be developed in CY2018. The CCAP is scheduled to be complete by FY 2019.





Project or Program	Linkage to Climate Change (Why)	Outcome (What)	Schedule (When)	Status
<b>FLOOD PROTECTION – Lead = Liang Xu</b> Climate change is expected to generate more severe storms for Northern California, and the sea level will continue to rise as a result of global warming. More uncertainty in storm pattern and severity renders the need for flood forecast and emergency operations to reduce flood damage. Continuous sea level rise, with uncertainties in greenhouse gas (GHG) abatement effects, necessitates regional coordination and adaptive designs of flood protection facility. District's work is developed to address these needs.				
1. Develop policy to incorporating sea level rise to projects in the tidal zone	Have a consistent approach to design facilities to protect against sea level rise	A regionally coordinated engineering procedure for planning and design	Draft memo is completed and final version of the guidance is expected to be completed in FY19.	Compiling information from other local, state and federal agencies
2. Augment rain and streamflow gauge systems	Need rain and streamflow gauges to monitor climate change effects, facilitate emergency flood-fighting actions and enable flood warning systems	Install streamflow and rain gauges at key locations to allow hydrologic and hydraulic modeling.	We are reaching saturation for the gauges to balance maintenance and data needs. Several more gauges are slated for CY2018	Installed 5 new streamflow & 1 rain gauge in CY 2017
3. Develop fluvial flood maps	Present flood maps of various flood levels to communicate flood risks to residents and affected critical infrastructures	Map floodplain boundaries for 1% (100-yr), 0.5% (200-yr) & 0.2% (500-yr) floods for major creeks	FY17: Lower Silver Creek & Tributaries FY18: Coyote, Berryessa, Upper Penitencia FY19: Uvas, Guadalupe, Lower Peninsula FY20: Llagas	Coyote and Upper Penitencia are wrapping up, and Guadalupe and Uvas are under way.
4. Develop flood warning systems	Alert residents of imminent flooding to reduce flood damage. Prior Flood protection projects designed for 1% flood may not be sufficient for the future.	Develop flood warning systems to forecast flooding and allow residents time to prepare for and reduce flood damage.	Future: San Tomas, Berryessa, Reservoir Inflows	Current: Guadalupe, San Francisquito, Uvas, West Little Llagas, Upper Penitencia, Coyote
5. Develop coastal flood maps for FEMA	Identify risks of sea level rise and tidal flooding and collaborate with FEMA in developing	Coastal modeling results for FEMA review and incorporation into updated coastal flood maps	Complete	Complete

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	flood maps			
6. Coordinate with San Francisco Bay Conservation and Development Commission (BCDC), Coastal Conservancy & other agencies	Coordinate among agencies to maintain consistent approach to adapt to the regional effect of sea level rise	Coordinate for continuous and consistent design of levees through neighboring counties.	Completed the preliminary SLC analysis for the remaining county area which was consistent with Corps SLC policy to identify the required levee height for the FRM component.	Completed
7. Acquire global warming downscaled climate data	Needed to compare possible local changes to precipitation and temperature under global warming different scenarios	Downscaled temperature and precipitation projections for more than a dozen locations within Santa Clara County.	Dec 2015	On target
<p><b>WATER SUPPLY – Lead = Tracy Hemmeter</b></p> <p>Potential effects of climate change on the core service area of water supply include the potential for reduced imported and local surface water availability, increased water demand, changes in hydrology, and increased drought and heat waves. The Board approved 2012 Water Supply and Infrastructure Master Plan strategy is to secure and optimize the use of existing supplies and infrastructure and meet future increases in demands with conservation and recycling. The Water Supply Master Plan Update 2018, which is currently being developed, will build on the 2012 strategy. This strategy includes the following elements that adapt well to future climate changes:</p>				
8. Manage water use demands	The 2018 No Regrets package of water conservation and storm water projects is a sustainable response to increasing water demands and threats to water supply reliability that may be associated with climate change.	Current and planned water conservation programs are projected to achieve about 110,000 AFY of water savings per year by 2040	Ongoing. Approved by the BOD on September 19, 2017.	On target
9. Provide drought-proof supplies	Increased recycled and purified water use is an all-weather	Non-potable recycled water use is projected to increase from about	Ongoing. Approved by the BOD on December	On target

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	year response to increasing water demands and threats to water supply reliability that may be associated with climate change.	22,000 AFY in 2014 to 30,000 AFY by 2040. Developing potable reuse, which could provide an additional 24,000 AFY of drought-proof supply for groundwater recharge by 2025.	12, 2017.	
<b>10.</b> Increase water supply system flexibility	Managing the increased frequency of extreme events that are anticipated in a changing climate existing water supplies, especially during high storm flows and wet years.	Maintaining and rehabilitating the system, including dam retrofits.	Almaden Dam Improvements – FY 24 Anderson Dam Seismic Retrofit – FY 25 Calero and Guadalupe Dams Seismic Retrofit – FY 22 Main and Madrone Pipelines Restoration – FY 19	On target
<b>11.</b> Increase water supply system flexibility	Managing the increased frequency of extreme events that are anticipated in a changing climate	Developing a new reservoir pipeline and additional groundwater recharge ponds	In Planning	

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<b>12.</b> Improve the reliability of imported water supplies	Sea level rise and reduced precipitation are threats to imported water reliability and the Delta ecosystem	Pursuing Delta solution(s) to achieve the coequal goals of providing a more reliable water supply and protecting and restoring the Delta ecosystem.	Ongoing	The Board recently approved principles for participation in California Water Fix
<b>13.</b> Rinconada Water Treatment Plant Reliability Project	Climate change threatens source water quality affecting water treatment effectiveness	The RWTP Reliability Project will convert the primary disinfection process to ozone, which will allow the RWTP to be more flexible and adaptable to poor source water quality.	Project completion scheduled for FY 22.	On target.
<b>14.</b> Water Utility Infrastructure Reliability Assessment	Climate change and extreme storms have the potential to damage or disrupt infrastructure and related operations.	Completed a vulnerability assessment of the major water utility infrastructure classes for several extreme climate scenarios. The assessment will inform the Infrastructure Reliability Plan and Asset Management Program.	Complete 2015	Complete

Project or Program	Linkage to Climate Change (Why)	Outcome (What)	Schedule (When)	Status
15. Compile and analyze data	Data collection and analysis is needed to better understand and plan for climate change uncertainties	Compile and analyze data that could provide insights into potential local changes in runoff, water quality, and water use demands. The uncertainty analysis for the Water Supply Master Plan Update 2018 included a climate analysis for late century, since most of our water supply strategies and facilities are needed for many decades to come	On-going	
<b>ENVIRONMENTAL STEWARDSHIP- Ecosystem Resilience– Lead = Lisa Porcella</b> <i>Monitor effect of climate change on vegetation and wildlife. Collaborate in water resources master plan to preserve environmental benefits under climate change and sea level rise.</i>				
16. Environmental database development	Changes in climate and weather can compromise weakened or unhealthy ecosystems.	<p>Develop a habitat conditions database to monitor effects of climate change and develop adaptive measures.</p> <p>See habitat condition data on EcoAtlas – <a href="http://www.ecoatlas.org/regions/ecoregion/bay-delta">http://www.ecoatlas.org/regions/ecoregion/bay-delta</a></p> <p>Ecological Monitoring – Information Management System (EM-IMS) is a District environmental database</p>	FY14-28: SCW D5 FY15: Uvas-Llagas FY16: L. Peninsula FY17: W. Valley	FY13: Completed California Rapid Assessment Method (CRAM) ecosystem health measures for the Coyote and Guadalupe watersheds FY14: Water quality (stream temperature s) module created for EM-IMS database FY16: Completed field work for the Uvas-Llagas (north

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				Pajaro) watershed Began development of EM-IMS wildlife module
<b>17.</b> Maintain and enhance ecosystem	Changes in climate and weather can compromise weakened or unhealthy ecosystems.	A healthier ecosystem	Integrated Water Resource Master Plan FY14-28: SCW D3 FY15-16: priority plan FY17-28: implementation Stream and Watershed Protection Program (SWPP) – completed FY16; long-term management in perpetuity	FY16: Completing the <i>Interim Countywide Overview Report</i> ; part of a Countywide water resources master plan. Begin developing Stream Corridor Priority Plans SWPP: acquisition of final 1700 acre property completed FY2016. Through the course of the program, approx. 3600 acres of upper watershed lands have been preserved.
<b>18.</b> Invasive species issues	Invasive species compete with native species' ability to adapt to a changing climate and may be more prevalent in a	Removing invasive plants to allow native plants to survive, and maintaining riparian and fresh and tidal wetland habitat.	FY14-28: SCW D2 FY15-19: SMP	FY14: revitalized 10 acres of native riparian habitat

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	changed climate			FY15: revitalized 4 acres of salt marsh FY16: developing partnerships with County and State agencies

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