Date Posted: 1/21/2022

NORTH MARIN WATER DISTRICT

NORTH MARIN WATER DISTRICT
AGENDA - REGULAR MEETING
January 25, 2022 – 6:00 p.m.
Location: Virtual Meeting
Novato, California

Information about and copies of supporting materials on agenda items are available for public review at 999 Rush Creek Place, Novato, at the Reception Desk, or by calling the District Secretary at (415) 897-4133. A fee may be charged for copies. District facilities and meetings comply with the Americans with Disabilities Act. If special accommodations are needed, please contact the District Secretary as soon as possible, but at least two days prior to the meeting.

ATTENTION: This will be a virtual meeting of the Board of Directors pursuant to Assembly Bill 361 issued by the Governor of the State of California.

There will not be a public location for participating in this meeting, but any interested member of the public can participate telephonically by utilizing the dial-in information printed on this agenda.

Video Zoom Method

CLICK ON LINK BELOW:		**SIGN IN TO ZOOM:**
Go to: https://us02web.zoom.us/j/82191971947	**OR**	Meeting ID: 821 9197 1947
Password: 466521		Password: 466521

Call in Method:

Dial:
+1 669 900 9128
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Meeting ID: 821 9197 1947#

Participant ID: #

Password: 466521#

For clarity of discussion, the Public is requested to MUTE except:
1. During Open Time for public expression item.
2. Public comment period on agenda items.

Please note: In the event of technical difficulties during the meeting, the District Secretary will adjourn the meeting and the remainder of the agenda will be rescheduled for a future special meeting which shall be open to the public and noticed pursuant to the Brown Act.

All times are approximate and for reference only.
The Board of Directors may consider an item at a different time than set forth herein.

Date Posted: 1/21/2022

Est. Time	Item	Subject
6:00 p.m.		***CALL TO ORDER***
	1.	***OPEN TIME: (Please observe a three-minute time limit)***
		This section of the agenda is provided so that the public may express comments on any issues not listed on the agenda that are of interest to the public and within the jurisdiction of the North Marin Water District. When comments are made about matters not on the agenda, Board members can ask questions for clarification, respond to statements or questions from members of the public, refer a matter to staff, or direct staff to place a matter of business on a future agenda. The public may also express comments on agenda items at the time of Board consideration.
	2.	***LOCAL WATER SUPPLY ENHANCEMENT STUDY WORKSHOP***
7:30 p.m.	3.	***ADJOURNMENT***

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2

WEST YOST
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NORTH MARIN WATER DISTRICT

Board Workshop: Water Supply Alternative Options and Evaluation Criteria & Ranking

Local Water Supply Enhancement Study

January 25, 2022

Purpose

- Provide the Board and the Public a preview

- Review the following:
  - Developed water supply options
  - Criteria for evaluation
  - Criteria scoring and weighting
  - Next steps

Introductions

North Marin Water District

- Project Manager: Tony Williams, Assistant General Manager/Chief Engineer
- Drew McIntyre, General Manager
- Robert Clark, Operations/Maintenance Superintendent

West Yost

- Project Manager: Rhodora Biagtan
- Project Engineer: Megan McWilliams

- Technical Experts:
  - Groundwater and ASR: Ken Loy
  - Recycled Water: Anita Jain
  - Indirect Potable Reuse: Charles Hardy
  - Stormwater: Doug Moore
  - Treatment Plant Optimization: Craig Thompson, Charles Hardy
  - Treatment Optimization and Desalination: Kathryn Gies
  - Permitting and Regulation Compliance: Sandi Potter

Water Supply Alternatives

Developed Water Supply Alternatives/Variations

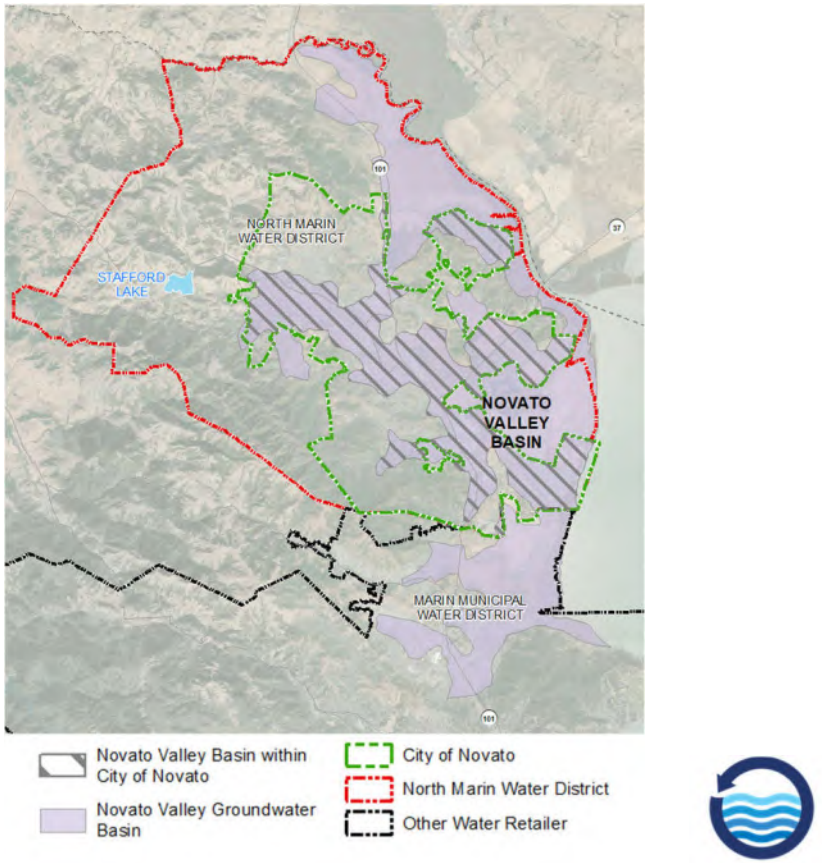
- Aquifer Storage Recovery in Novato Basin
- Recycled Water System Expansion
- Indirect Potable Reuse
- Improve Stafford Treatment Plant Process Water Recapture Efficiency
- Divert Captured Stormwater Into Stafford Lake
- Increase Stafford Lake Storage Capacity
- Desalination

Aquifer Storage Recovery in Novato Basin

Ken Loy

Aquifer Storage Recovery in Novato Basin

- Aquifer storage is very low
  - Estimated at 50-100 acre-feet (AF)
  - Estimate accounts for potentially usable acreage of the Novato Basin, basin thickness, and aquifer characteristics
- Storage and recovery rates are low
- Tens of gallons per minute
  - Estimate based on existing wells
- Costs per acre-foot would be infeasibly high



Regional Aquifer Storage Recovery

- NMWD may benefit from a regional ASR program, if excess treated water allocated to NMWD can be stored and recovered when needed.

- Regional groundwater banking on other basins (Santa Rosa Plain, Sonoma Valley, Petaluma)

Aquifer Storage Recovery

Preliminary Conclusions and Recommendations

- Continued regional coordination is recommended
- Estimated yield – 50 to 100 AF
- Cost estimate for local ASR is in progress

Discussion and Questions

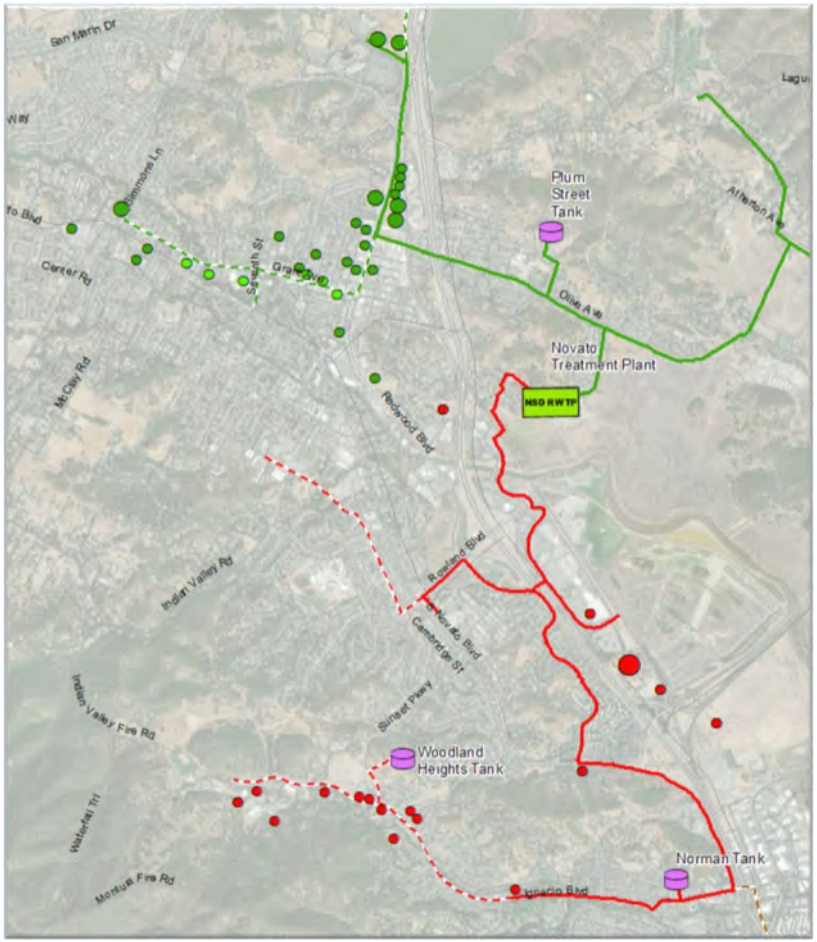
Recycled Water System Expansion

Anita Jain

Recycled Water Expansion

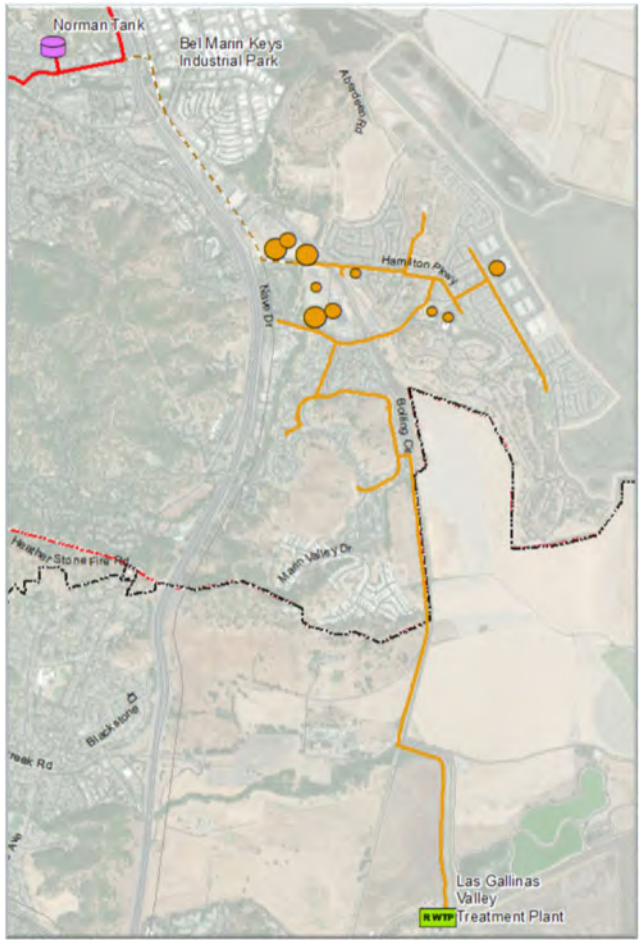
- Focus of this effort:
  - Evaluate expansion of the existing distribution system
  - Explore other opportunities to increase recycled water use without expanding the existing distribution system

Recycled Water Expansion North and Central



Service Area	Projected Recycled Water Demand, AFY
North	100
Central	100
Total	**200**

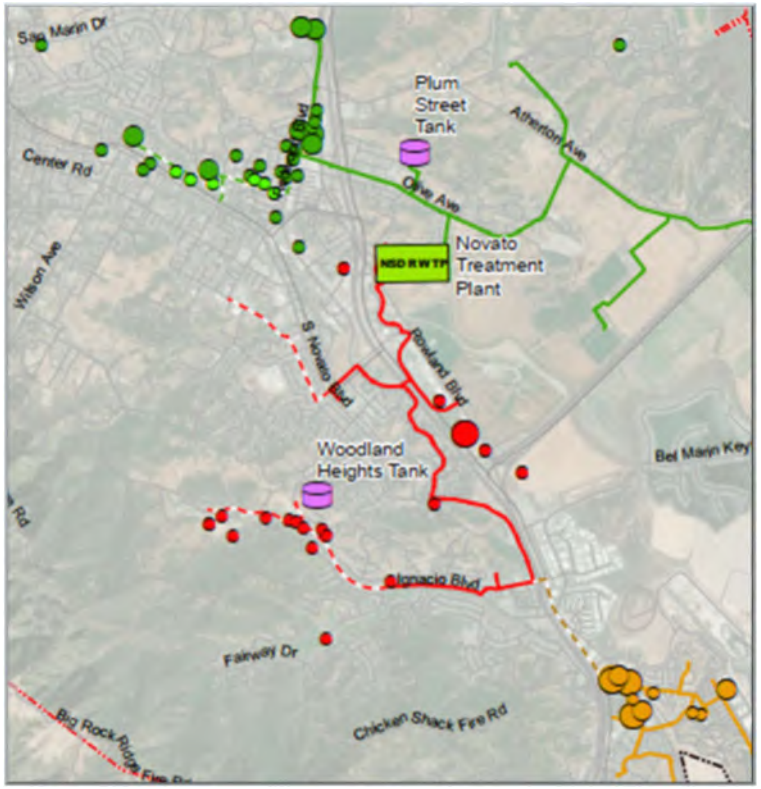
Recycled Water Expansion South



Service Area	Projected Recycled Water Demand, AFY
South	20

- Less Than 1
- 1 - 3 AFY
- 3 - 5 AFY
- Central Service Area Pipeline
- Northern Service Area Pipeline
- Southern Service Area Pipeline
- Recycled Water Proposed Pipeline
- R WTP Recycled Water Treatment Plant
- Plum Street Tank
- North Marin Water District
- Marin Municipal Water District

Recycled Water Expansion



Service Area	Projected Recycled Water Demand, AFY
North	100
Central	100
South	20
Total	**220**

Potential potable water offset of 220 AFY

Other Near-Term Opportunities Without Distribution System Expansion

- Construct additional hydrants or commercial fill stations
  - NMWD installed two new hydrants in 2021
- Optimize residential fill station operations to increase use
- Facilitate connection of in-fill sites
  - Update District regulations (Reg 18)
- Assess dual-plumbing requirements for toilet flushing

Recycled Water Use Opportunities for Future Study

- Privately-owned recycled water storage tanks
- Delivery of recycled water to residential customers
- Livestock watering
  - Prohibited by current regulations

Recycled Water System Expansion
Next Steps

- Conduct planning level hydraulic analysis to determine infrastructure sizing

- Work with the District to prioritize alignments and phasing plan for construction

- Develop planning level cost estimate

- Future Study – pending expansion timeline, confirm recycled water supply reliability to meet demand

Recycled Water Expansion

Preliminary Conclusions and Recommendations

- Potential potable water offset of up to 220 AFY with distribution system expansion
- Cost estimate for expanding the distribution system is in progress
- Continue to assess opportunities for increasing recycled water use within existing distribution system

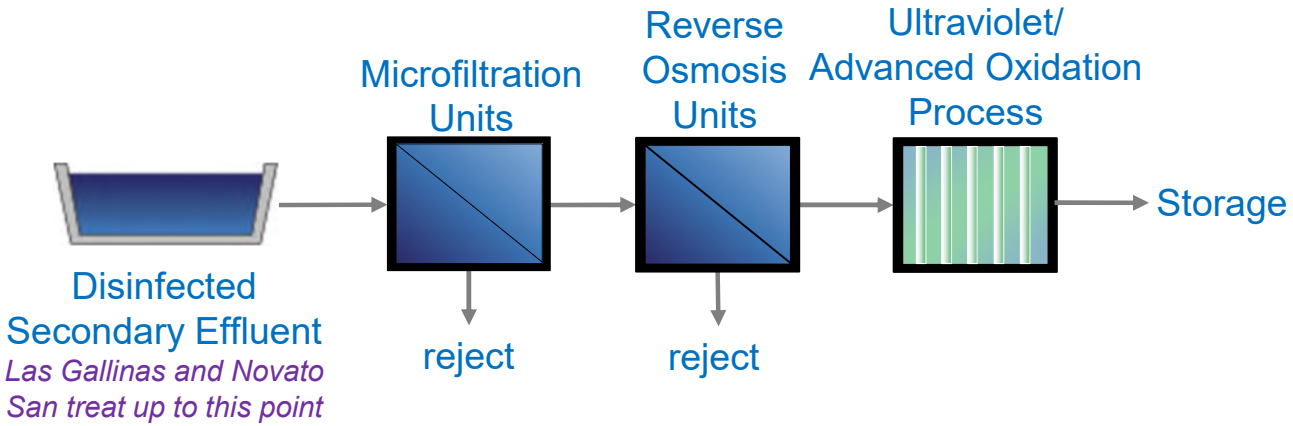
Discussion and Questions

Indirect Potable Reuse

Charles Hardy

Indirect Potable Reuse Requirements

- State regulations allow “indirect” potable reuse through:
  - Groundwater replenishment (augmentation)
  - Surface water source augmentation
- “Full Advanced Treatment” required:



Indirect Potable Reuse Feasibility

- IPR water cannot mix directly with potable water
- No viable local IPR storage options
  - Groundwater aquifer
  - Surface water storage
- Groundwater Augmentation (in local groundwater basin)
  - Limited local aquifer storage available ~50-100 AF
- Surface Water Source Augmentation (at Stafford Lake)
  - Regulations require blending ratio of ≤ 10 percent and retention time ≥ 60 days
  - IPR limited by volume of Stafford Lake, even if the lake is kept full
  - Maximum potential is approximately 100 - 400 AF

Indirect Potable Reuse Infrastructure

- Unit cost of treatment prior to storage at least $3,000 per AF without economy of scale seen by other agencies with IPR

- Additional costs for groundwater recharge, injection and extraction wells and associated infrastructure

- New conveyance pipeline would be required for Stafford Lake augmentation
  - Estimated pipeline length – 28,000 linear feet
    - From Novato San to Stafford Lake
  - Estimated cost - $20 million +
    - 16-inch diameter transmission pipeline

Indirect Potable Reuse

Preliminary Conclusions and Recommendations

- Suggest no further analysis of (local) IPR
  - Groundwater Augmentation ~ 50 – 100 AF
  - Surface Water Augmentation ~ 100 – 400 AF
- Unit cost of treatment prior to storage ~ $3,000 per AF
  - No economy of scale seen by other agencies with IPR
- Regional IPR may be viable: potentially ~ 3,100 AFY from Novato San
- *Direct* potable reuse potentially viable option in future as regulations and public acceptance evolve (at least 10+ years out)

Discussion and Questions

Improve Stafford Treatment Plant Process Water Recapture Efficiency

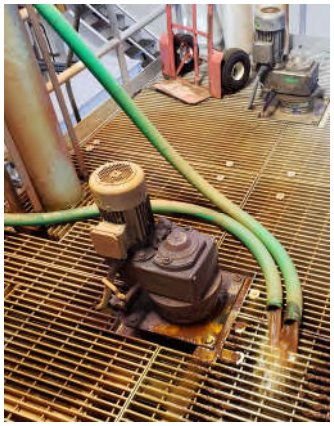
Charles Hardy

Improve Stafford Treatment Plant Process Water Recapture Efficiency

- STP potable water production limited by wastewater discharge permit.
- STP has several reject water streams:
  - Hydrocyclone return accounts for 80-90% of total wastewater discharge
  - Potential hydrocyclone modifications could reduce discharge by 50-75%
- Modifications subject to performance testing and regulatory approval
- Additional yield of at least 100 AFY by 50% reduction of hydrocyclone discharge during a dry year
- Potentially achieve additional yield of 600 AFY
  - During average rainfall year
  - Or, if supplemental water stored during a dry year

Improve Stafford Treatment Plant Process Water Recapture Efficiency

- District staff previously conducted plant-scale study of modifying hydrocyclone return to reduce reject flow volume
- Recommend additional plant-scale study of modified hydrocyclone operation with external technical support to confirm capital/operations changes needed*:*
  - Change to sludge diversion point
  - Change to diversion return point
- Raw water intake also may need modifications for more consistent intake water quality
- Should account for replacing 4-inch discharge pipeline to Novato San sewer to reduce maintenance efforts



Improve Stafford Treatment Plant Process Water Recapture Efficiency

Preliminary Conclusion and Recommendations

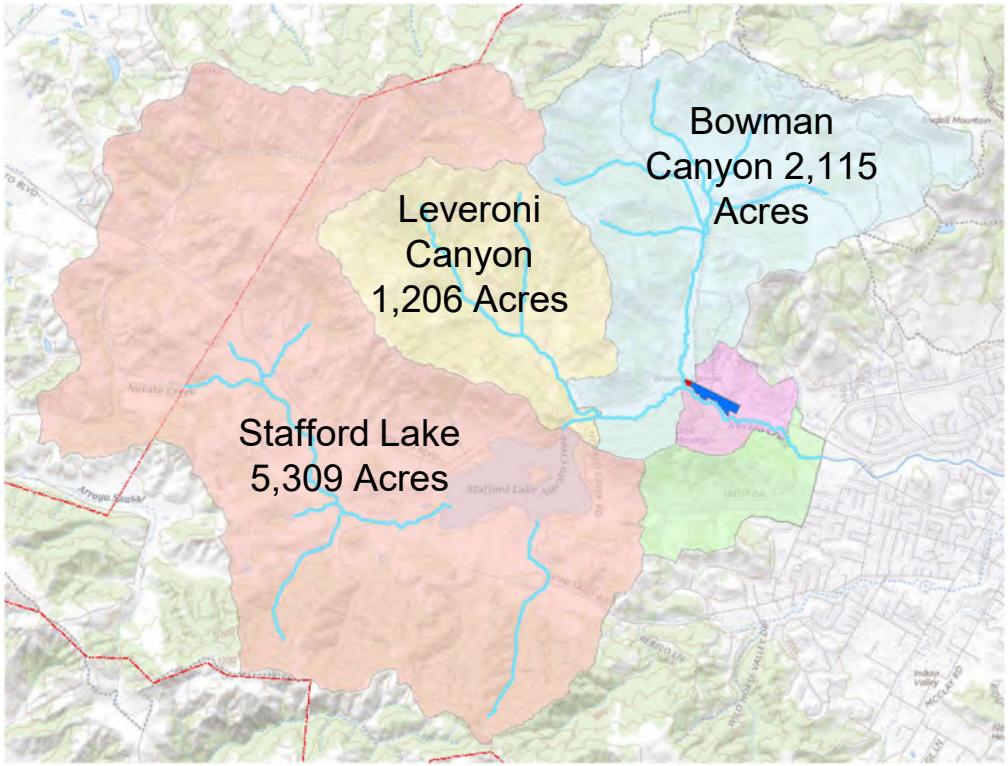
- Recommended for District to conduct additional plant-scale testing with technical support
- Potential estimated yield ~ 100 - 600 AFY
- Cost estimate is in progress

Discussion and Questions

Divert Captured Stormwater Into Stafford Lake

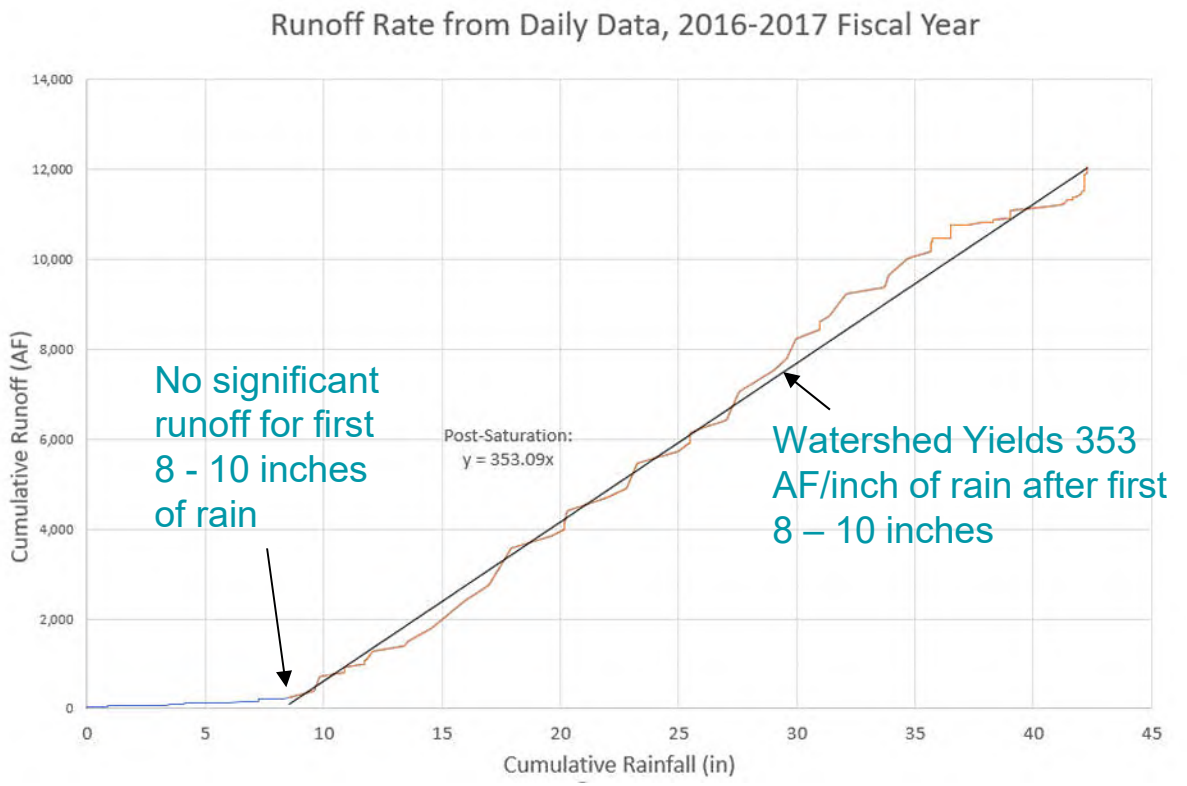
Doug Moore

Divert Captured Stormwater Into Stafford Lake



- **Delineate Watersheds**
- Quantify Rainfall to Runoff Relationship
- Calculate Leveroni and Bowman Canyon Yield (Runoff)
- Evaluate Increased Water Supply to Stafford Lake
- Evaluate Costs

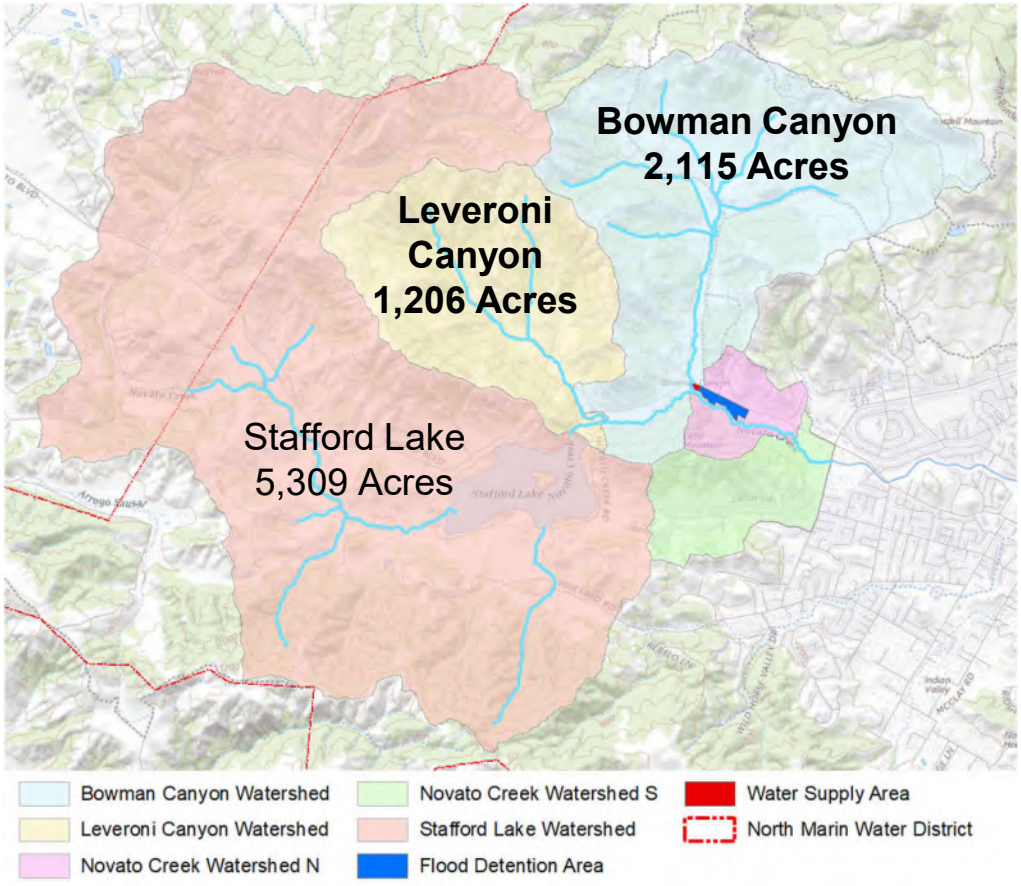
Divert Captured Stormwater Into Stafford Lake



- Delineate Watersheds
- **Quantify Rainfall to Runoff Relationship**
- Calculate Leveroni and Bowman Canyon Yield
- Evaluate Increased Water Supply to Stafford Lake
- Evaluate Costs

Stafford Lake 2016-2020 Average Watershed Yield: 4,000 AFY from 5,309 acres

Divert Captured Stormwater Into Stafford Lake



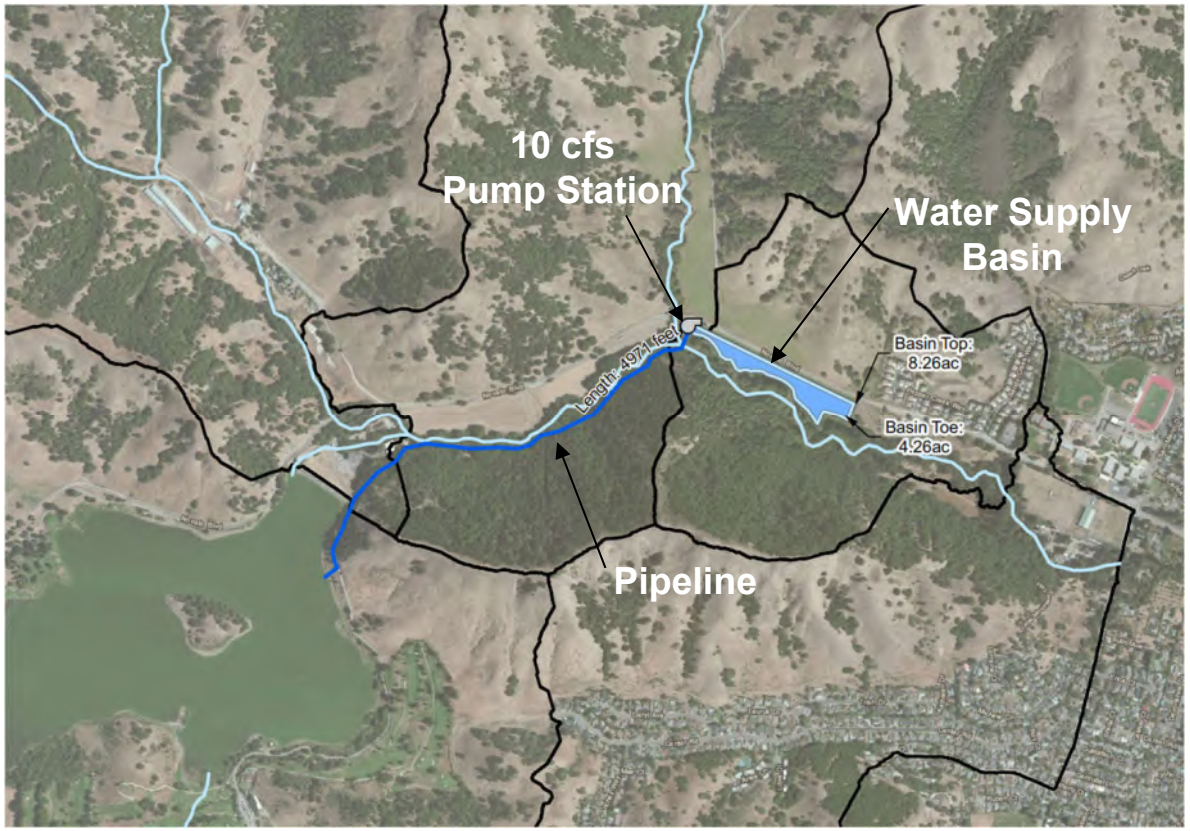
- Delineate Watersheds
- Quantify Rainfall to Runoff Relationship
- **Calculate Leveroni and Bowman Canyon Yield**
- Evaluate Increased Water Supply to Stafford Lake for a Range of Pump Station Capacities
- Evaluate Costs

2016-2020 Estimated Yields:

- **Leveroni: 910 AFY**
- **Bowman: 1,590 AFY**
- **Combined: 2,500 AFY**

Alternative only works if there is stormwater runoff available

Divert Captured Stormwater Into Stafford Lake



- Delineate Watersheds
- Quantify Rainfall to Runoff Relationship
- Calculate Leveroni and Bowman Canyon Yield
- **Evaluate Increased Water Supply to Stafford Lake**
- Evaluate Costs

Leveroni and Bowman Canyon Annual Water Supply with Basin and 10 cfs Pump: 788 AFY

Divert Captured Stormwater Into Stafford Lake

Capital Costs

Infrastructure	Cost, $ million
Basin (80 AF)	9.6
Pump Station (10 cfs)	1.5
Pipeline (15-inch)	1.6
Total	**12.7**

Total Annual Cost per AF (O&M plus Annual Cost of Capital)

Infrastructure	Cost, $ per AF
Combined (788 AF w/ Basin)	$1,352 per AF
Leveroni Canyon (no basin)	$182 per AF for 245 AF
Bowman Canyon (no basin)	$143 per AF for 433 AF
Combined (no basin)	$101 per AF for 628 AF

- Delineate Watersheds
- Quantify Rainfall to Runoff Relationship
- Calculate Leveroni and Bowman Canyon Yield
- Evaluate Increased Water Supply to Stafford
- **Evaluate Costs**

Divert Captured Stormwater Into Stafford Lake

Preliminary Conclusions and Recommendations

Conclusions

- Use of Leveroni and Bowman Canyon water is cost feasible
- Use of the detention basin is cost prohibitive (unless there is cost sharing)

Future Considerations

- Evaluate long-term benefit of Bowman and Leveroni Canyon flow diversion using 20-40 years of rain data, but adjusted for future climate change
- Begin monitoring flows and water quality from Leveroni and Bowman Canyons

Discussion and Questions

Increase Stafford Lake Storage Capacity

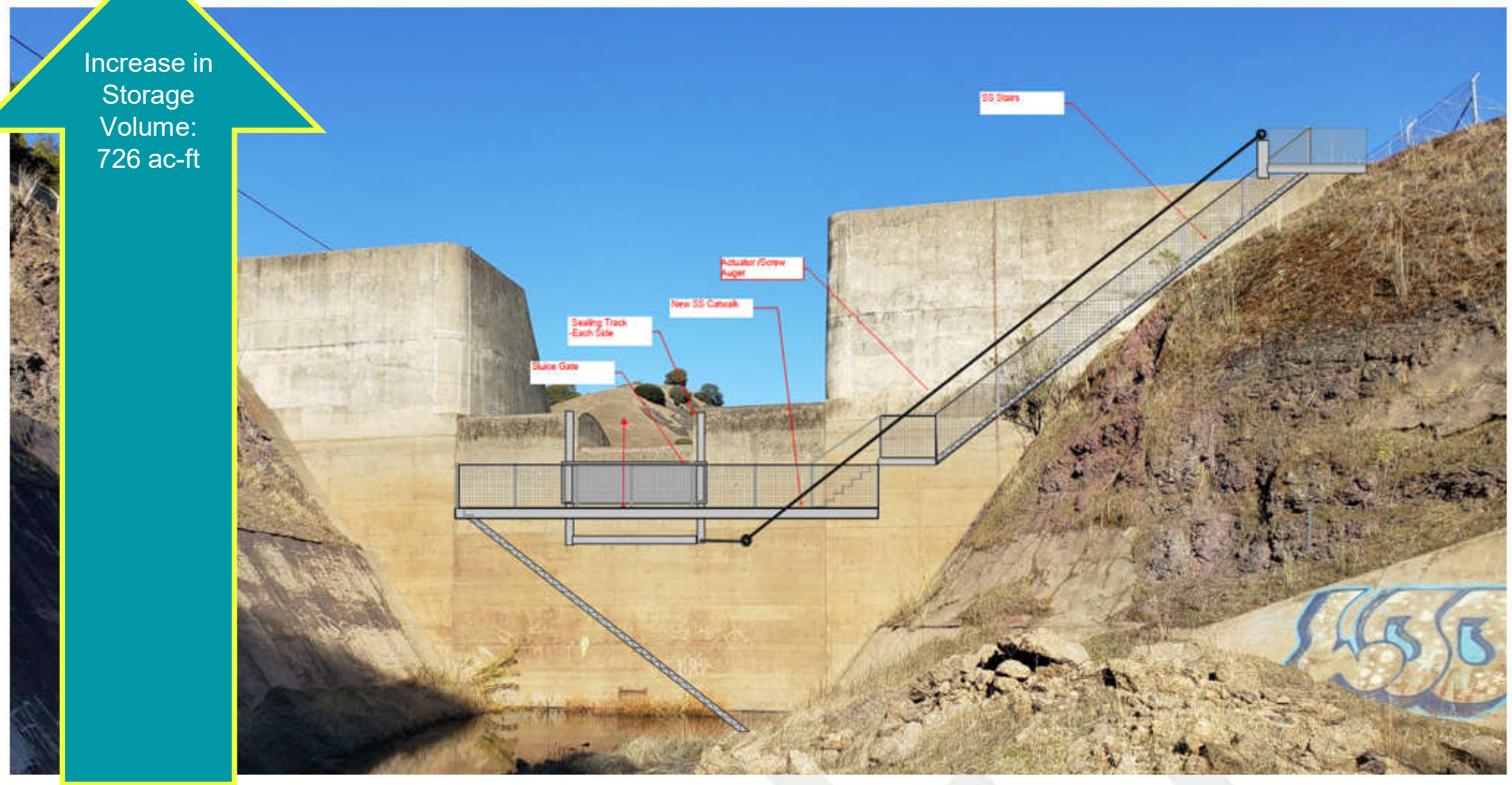
Modify Spillway

Remove Sediment

Doug Moore

Increase Stafford Lake Storage Capacity
Slide Gate on Spillway Notch

Increase in Storage Volume: 726 ac-ft



Increased storage volume is only useful when there is enough rain to overtop the spillway notch

Increase Stafford Lake Storage Capacity Slide Gate on Spillway Notch

- Total Capital Cost: $710,000
- Capital Cost per AF of Increased Storage Volume: $1,000 per AF

An Inverted Slide Gate is a Standard Product from Waterman Industries (and other manufacturers)

Increase Stafford Lake Storage Capacity – Remove Sediment, Excavate Lake Bottom

Excavation Depth, feet	Storage Volume, AF	Cost, $ million
1	49	2.4
10	411	19.9
15	551	26.7

Capital Cost per AF of Increased Storage Volume (for 15 ft Depth): $48,500 per AF

- Location is based on constructability of the sediment removal
- Minor Benefit: Removal of nutrient rich soils temporarily helps the treatment process

Modify Spillway Preliminary Conclusions and Preliminary Conclusions and Recommendations

Conclusions

- The Slide Gate is cost feasible
- Excavation of sediment from the lakebed is cost prohibitive

Future Considerations

- Evaluate long-term benefit of slide gate using 20-40 years of rain data, but adjusted for future climate change
- Evaluate long-term benefit of slide gate combined with Leveroni and Bowman Canyon flow diversion using 20-40 years of rain data, but adjusted for future climate change

Discussion and Questions

Desalination

Kathryn Gies

Desalination

- Must be pursued as a regional partnership to be viable
  - Economy of scale
  - Environmental considerations
  - No viable intake or brine discharge locations for NMWD

Desalination

- MMWD
  - Completed study in 2008, opted not to pursue
  - Reviewed again in 2021, opted not to pursue
  - Currently investigating a pipeline connection with EBMUD for emergency supply
  - Proceeding with an EIR, which looks at desalination as an alternative
    - 2021 estimated 15 MGD desal plant at approximately $230 million
  - Any desalination partnership would be a long-term project (15+ years)

- Sonoma Water is preparing a regional study
  - Desalination is one opportunity being evaluated at the regional level
  - If Sonoma Water Study is not available, findings cannot be incorporated into this local study

Discussion and Questions

Evaluation Criteria

Evaluation Criteria

Cost

Water Supply Yield and Reliability

Operational Impacts

Regulations and Permitting

Public and Institutional Considerations

Other Considerations

Cost

Planning level cost estimate:

- Capital Cost + Operations and Maintenance cost estimate
- Cost estimates to include additional labor, materials, energy, and chemicals needed, as applicable
- Compare using $ per AF for each water supply alternative
- Translatable to NMWD's rates
- Revenue impacts will be relative to the volume of water generated, except for new recycled water uses

Water Supply Yield and Reliability

- Estimate of the expected water supply yield
- Reliability: Likelihood of the water supply alternative producing the anticipated yield
  - Climate change may impact the reliability

Operational Impacts

- Evaluate the impact to distribution and treatment operations

- Consider the following items:
  - Challenges to blending from different supply sources
  - Additional chemicals required to produce and maintained high-quality of water
  - Energy intensity
  - Additional staff resources or special certifications required

Regulations and Permitting

- Identify required permits
- Evaluate applicable regulations and anticipated permitting requirements
- Considerations:
  - Environmental impacts
  - Conformance with CEQA
  - Permitting requirements specific to the water supply alternative
  - Water rights (only for alternatives that may have water rights issues)

Public and Institutional Considerations

- Public acceptance
- Coordination and collaboration with other entities
- Need for partnerships or agreements
- Required easements from other entities

Other Considerations

- Each water supply alternative is unique
  - May have other important considerations that are relevant to each water supply alternative

- Will be discussed but not scored

Discussion and Questions

Criteria Ranking/Weighting

Criteria Scoring

- Quantitative Criteria:

Criteria	Measure	Units
Cost	Quantitative	$ per AF
Water Supply Yield	Quantitative	Volume, AF

- Qualitative Criteria:

Criteria	Measure	Low Score (1)	Medium Score (3)	High Score (5)
Reliability	Degree of Reliability	Least Reliable	Moderately Reliable	Most Reliable
Operational Impacts	Operational Demands	Most Impacted	Moderately Impacted	Least Impacted
Regulations and Permitting	Complexity	Most Complex	Moderately Complex	Least Complex
Public and Institutional Considerations	Challenges	Most Challenging	Moderately Challenging	Least Challenging

Qualitative Criteria Priorities and Weight

Criteria	Weight (%)
Water Supply Reliability	40
Operational Impacts	30
Regulations and Permitting	20
Public and Institutional Considerations	10
Total	100

Discussion and Questions

Next Steps

Next Steps

Prepare
Evaluations and Complete Study

Present
Findings to Board and Public (Spring 2022)

Board Acceptance

Discussion and Questions