

Committee Member Packet Wednesday, November 12

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Water Supply Advisory Committee November Meeting

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Water Supply Advisory Committee November Meeting

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	9b	3 rd draft of Recon Model
	9c	Copy of Nov-Dec MCDS Schedule 141106
16. Triple Bottom Line Illustrations	16a	TBL Illustrations
19. Technical Work Plan	19a	Update on the Technical Work Plan-1
21. December Agenda Items	21a	December Agenda Items
22. Materials from October Meeting	22a	October Meeting Action Agenda
Unnumbered Item		Modeling and Forecasting Working Group Schedule and Locations

TO: WATER SUPPLY ADVISORY COMMITTEE (WSAC)
FROM: HEIDI LUCKENBACH
SUBJECT: UPDATE ON SOQUEL CREEK WATER DISTRICT ACTIVITIES
DATE: NOVEMBER 14, 2014

Soquel Creek Water District Board Meetings

October 21, 2014. The Board considered a scope of work for peer review of the Supplemental Supply Options considered by the District in the previous 12 months. The peer review is to have a third party firm review the work done by Kennedy/Jenks on the water supply alternatives analysis, evaluate for fatal flaw(s), and the level of reasonableness on the assumptions used.

November 10, 2014 – Kick off and Notice to Proceed

February 17, 2015 – Present report to Board for acceptance

November 4, 2014. The Board received an informational update on the water supply efforts that included status update on the County's surface water study, the City's WSAC convention (including river storage options), and recycled water (pursuing of state grant funding and next steps for feasibility of recycled water evaluation). The board has agreed to further discuss a phased approach to feasibility work on recycled water and a discussion on customer acceptability of recycled water for groundwater replenishment for its December 16th meeting.

Collaborative Groundwater Work

The first of two scoping meetings for the Soquel-Aptos Groundwater Model was held on October 28th. Discussions focused on clarifying the funding partner's expectations and requirements for the groundwater model, what scenarios to model, and how far west into the City's service area should be modeled. Discussions will continue at the second scoping meeting which will be held on December 1.

The Basin Implementation Group (BIG) last met on September 23rd at which time they decided not to pursue the USGS led study on the fresh water/saltwater interface and further the study efforts that are currently underway with Stanford University and University of Vancouver. This effort may still go forward, but with possibly a different scope and budget.

Attachments

Memo to the Board of Directors Agenda Item No. 6.5 October 21, 2014

Memo to the Board of Directors Agenda Item No. 6.2 November 4, 2014

October 21, 2014

MEMO TO THE BOARD OF DIRECTORS

Subject: Agenda Item No. 6.5

Approve Scope of Work for Peer
Review of Supplemental Supply
Options

Attachments: 1. Scope of Work from Black and Veatch

Background

Soquel Creek Water District conducted a yearlong process (September 2013-August 2014) of evaluating back-up water supply options that included fourteen public board meetings focusing on topics or projects related to demand management and/or supplemental water supply.

At the March 18, 2014 meeting, the board identified desalination, surface water transfers, and recycled water to be carried through for conceptual analysis. At the July 15, 2014 meeting, staff presented four technical memos by Kennedy/Jenks Consultants that included six different projects: TM#1 - Desalination Alternatives (Mid-County Desalination and Deep Water Desalination), TM#2 - Recycled Water Alternatives (Mid-County and Santa Cruz Regional Groundwater Replenishment with Recycled Water), TM#3 - Surface Water Transfer Alternatives (San Lorenzo River Surface Water using Existing and Improving Infrastructure at Graham Hill Treatment Plant), and TM#4 - Alternatives Evaluation Criteria and Weighting. On August 26, 2014, Kennedy/Jenks Consultants and staff conducted a dedicated workshop with the Board to evaluate the six alternatives using a criteria-based approach. Upon completion of the evaluation exercise, the Board directed staff to further evaluate groundwater replenishment using recycled water and surface water transfers.

Peer Review of Back-Up Options

At the September 2, 2014 meeting, the Board directed staff to agendize an action item to conduct a peer review of the six supplemental water supply options (listed above). Also of interest was the financial information (and how it changed from the original presentation) and to continue looking at the viability of other options.

During the course of the back-up options evaluation, conceptual design components and associated costs were presented at the single topic meetings and were further refined during the development of the technical memos by Kennedy/Jenks Consultants. Estimated costs and conceptual designs were initially presented, if

available, by presenters at the topical discussion meetings. These costs may have differed with the estimated costs by Kennedy/Jenks Consultants in their technical memorandums due to the changes in the conceptual design, assumptions, and contingency. (For example, in February 2014, Todd Reynolds presented groundwater replenishment options combined with irrigation and seawater barrier options that provided over 2,000 acre-feet per year of water with capital costs between \$134-190M. For K/J TM#2, projects were narrowed to only look at groundwater replenishment that would provide 1,500 afy with capital costs around \$54M.)

Black and Veatch Corporation is one of the two Engineering On-Call Consultants that have been retained by the District. Staff requested the firm prepare a proposal to provide professional engineering services to conduct an independent peer review of the reasonableness of the project definitions/assumptions and associated cost estimates for the six back-up options. Attached is their proposed scope of work that includes an estimated cost of \$16,280 (based on time and material) and assumes a final report will be prepared in 12 weeks.

POSSIBLE BOARD ACTION

1. By MOTION, approve the attached scope of work to conduct a peer review of the reasonableness of the project definitions/assumptions and the associated cost estimates for the six back up options.
2. No action taken.

By



Melanie Mow Schumacher
Special Projects Engineer

By



Kim Adamson
General Manager



October 14, 2014

Ms. Melanie Schumacher
Soquel Creek Water District
5180 Soquel Drive
Soquel, CA 95073

Subject: Peer Review Assessment of Back-up Options Evaluation

Dear Melanie:

We appreciate the opportunity to provide professional engineering services associated with the peer review of your water supply back-up options. Enclosed is our proposed scope of work and associated fee.

We look forward to working with you on this project. Should you have any questions, please contact me at 916-832-2953.

Very truly yours,
BLACK & VEATCH CORPORATION

David J. Carlson
Vice President

10/13/2014

Soquel Creek Water District

Scope of Work to Provide Peer Review Assessment of Back-Up Options Evaluation

The Soquel Creek Water District recently completed evaluating back-up supplemental water supply options that could be pursued should the scwd2 Regional Seawater Desalination Project with the City of Santa Cruz no longer be considered. Through the process, the District discussed numerous projects and conceptually evaluated six options. This evaluation was based on a series of technical memoranda prepared by Kennedy/Jenks. It is desired to have a review of the information presented in these memoranda to provide an independent confirmation of the reasonableness of the project definitions and associated cost data.

This assessment will be based on the data provided in the memoranda or provided separately at the Consultant's request. No new design information or cost information will be created as part of the evaluation. The assessment will be based on the information provided and the Consultant's experience with similar facilities.

The following tasks will be performed as part of the independent review.

Task 1 – Review Memoranda for SqCWD's Back Up Options

- Consultant to review Kennedy/Jenks' Technical Memoranda on the six back up options that were presented to the Board at their July 15, 2014 meeting. These include TM's 1-3 for two recycled water projects, two desalination projects, and two surface water transfer projects. Where insufficient information exists in the memoranda to make an assessment of the reasonableness of the data provided, a request will be prepared for additional background information.
 - *Deliverable – Additional background information request.*
- Consultant to review any additional data provided and participate in two calls with Kennedy/Jenks to ask clarifying questions.
 - *Deliverable – None. Information will be used in subsequent tasks*

Task 2 – Prepare Back-up Options Review Memo

- Consultant will prepare a Draft Memo that describes the results of the review and evaluation tasks above. The Draft Memo will address the following:
 - An assessment of each project definition and appropriateness of the defined project components.
 - An assessment of the reasonableness of the presented capital and O&M costs for each option.
 - A list of any fatal flaws or areas of significant concern identified for any of the options.
 - A list of areas where insufficient information was presented that could have a material effect on the evaluation of the options.
- Consultant will participate in a conference call with SqCWD staff to review the Draft Memo. Review comments from SqCWD staff will be documented and incorporated into the Final Memo.
- Consultant will provide one electronic copy of the Draft Memo. Once final, Consultant will provide two hard copies and one electronic copy of the Final Memo.

10/13/2014

- *Optional Task -Consultant will attend a board meeting and present the Peer Review Memo (not included in fee).*
 - *Deliverable – One electronic (PDF copy) of the draft memo and two hard copies and one electronic copy (PDF) of the final memo, review meeting agenda and minutes.*

Task 3 – Project Management

- Project management activities will include monthly invoice and progress report, monitoring of project budget and schedule, and project setup and filing. Regular correspondence with the District will be conducted via emails and phone. The following meetings are included in the Scope of Work
 - Project Kickoff Meeting –B&V Project Director and Project Manager will participate in a conference call to kick-off the project
 - Progress Meeting – Meeting to discuss progress with respect to evaluation. This meeting will be conducted by telephone.
 - Report Review Meeting – Meeting to review the draft report (covered under Task 2)
- Deliverable: Progress report and monthly invoicing, meeting agenda and minutes

Proposed Schedule

It is assumed that the scope of work will be performed on the following schedule:

Project Kickoff Meeting – 2 weeks from NTP

Task 1 Review Memoranda for SqCWD's Back Up Options – 4 weeks from NTP

Task 2 – Prepare Back-up Options Costs Review Memo –

Draft Memo 4 weeks from end of Task 1

Final Memo 2 weeks from review meeting

BLACK & VEATCH CORPORATION

Owner: Sequoy Creek Water District

Project: Peer Review Assessment of Backup Options

Phase/Task	Project Director	Project Manager	Design Engineer	Project Admin / Accountant	QC	Estimator	SUBTOTAL hours	SUBTOTAL Billings \$	EXPENSES		SUBTOTAL EXPENSES	TOTAL COST
									Misc	Auto / Travel		
(\$1000 Net, \$5,000)	\$285.00	\$225.00	\$150.00	\$50.00	\$250.00	\$160.00			\$ 5.00			
Task 1 Review Memoranda in SECTION 2000 Back Up Options												
Review of Memoranda and Data Request	1	4	4				9	\$ 1,705	\$ 81		\$ 81	\$ 1,886
Review additional information		1	4				5	\$ 825	\$ 45		\$ 45	\$ 870
Discussion with KJ		2	2				4	\$ 700	\$ 36		\$ 36	\$ 736
Task 2 Prepare Back-Up Options Cost Review Memo												
Prepare Draft Memo	1	4	24	4	2	4	39	\$ 6,325	\$ 351		\$ 351	\$ 6,676
Review Meeting	2	2					4	\$ 1,020	\$ 36		\$ 36	\$ 1,056
Final Memo	1	2	5				11	\$ 1,825	\$ 99		\$ 99	\$ 1,924
Task 3 Project Management												
Project Setup, Plan, Budget and Schedule Tracking and Invoicing		2					2	\$ 480	\$ 18		\$ 18	\$ 498
Project Meetings (2)	2	4					6	\$ 1,470	\$ 54		\$ 54	\$ 1,524
TOTAL HOURS	7	21	42	4	2	4	58					
TOTAL FEE	\$ 2,895	\$ 4,725	\$ 6,300	\$ 240	\$ 480	\$ 720		\$ 14,883	\$ 720	\$ -	\$ 720	\$ 15,603

November 4, 2014

MEMO TO THE BOARD OF DIRECTORS

Subject: Agenda Item No. 6.2

Update on Back-Up Water Supply
Efforts related to Surface Water
Transfers, Loch Lomond Water
Banking, and Groundwater
Replenishment

Background

Soquel Creek Water District conducted a yearlong process (September 2013-August 2014) of evaluating back-up water supply options that included fourteen public board meetings focusing on topics or projects related to demand management and/or supplemental water supply. These meetings were primarily held at Capitola City Council Chambers, were well attended by the public, and filmed by Community Television of Santa Cruz County. For more information on these informational meetings, visit: <http://www.soquelcreekwater.org/planning-our-water-future/back-supplemental-supply-options>.

On August 26, 2014, Kennedy/Jenks Consultants and staff conducted a dedicated workshop with the Board to evaluate the six alternatives using a criteria-based approach. Upon completion of the evaluation exercise, the Board directed staff to bring back a plan for further detailed studies for 1) San Lorenzo Surface Water Transfers – Existing Infrastructure, 2) Mid-County Groundwater Replenishment, and 3) Santa Cruz Regional Groundwater Replenishment. The Board also requested that more information be brought forth regarding the Loch Lomond Water Banking, locally referred to as “Lochquifer Alternatives”.

San Lorenzo Surface Water Transfers

The evaluation of surface water transfers is being conducted as part of the County of Santa Cruz’s Water Exchange Study. This study, part of the Integrated Resources Water Management (IRWM) grant bundle, has been evolving since 2011 and the County of Santa Cruz is nearing completion of its final report. The Board’s decision in August 2014 to continue support and evaluation reaffirmed the Board’s earlier decision in the 2012 Integrated Resources Plan (IRP) to prioritize surface water transfer as a potential supply option.

Staff will continue to monitor the status of the report and schedule a presentation by John Ricker, SC County Water Resources Division Director, when the report is complete to facilitate discussion on next steps for the District related to surface water transfers.

Loch Lomond Groundwater Banking “Lochquifer Plan”

Jerry Paul, a local Santa Cruz resident and co-founder of Engineers for Water Alternatives, presented to the Board at the November 2013 meeting focused on exploring surface water exchange and transfers with neighboring water agencies. The Lochquifer Plan is one of his several initiatives and strategies for water resource management in the County.

At the Santa Cruz Water Convention, Mr. Paul presented several of his proposals which are available on the Civinomics website that includes more than 60 other different projects/proposals proposed by community members, vendors, and the City of Santa Cruz. To access Mr. Paul’s most recent strategies that include the Lochquifer plan, visit: <https://civinomics.com/profile/4Wt1/jerry-paul>

Currently, the City is collecting community input on Mr. Paul’s Lochquifer Plan and all of the other proposed projects using the Civinomics website and asking that the initiatives be rated in terms of effectiveness, practicability, environment, and local economy. This public input process is scheduled to continue collecting community feedback through November 2, 2014.

In the next couple of months the Santa Cruz Water Supply Advisory Committee (WSAC) will be finishing up the ‘recon’-phase of their work which includes developing the tools and criteria needed to make good decisions with regards to water supply and demand issues. In the “real deal” phase starting in 2015 they will be using a multi-criteria decision tool to better understand the technical information needed to evaluate the various alternatives, create portfolios of various alternatives, and make their recommendations to the City Council.

Staff will continue to monitor the efforts of the WSAC and propose that, if the Board is interested, we schedule Rosemary Menard, SC Water Director and a representative of the WSAC to present to the Board about their efforts as they have to local community groups in the last few months.

Mid-County Groundwater Replenishment and Santa Cruz Regional Groundwater Replenishment

Advanced-treatment of wastewater for recycled water is growing in California to provide water for irrigation as well as indirect potable reuse for groundwater replenishment and seawater barriers. Two options came out of the Board’s August 26 workshop to further consider:

The Mid-County Groundwater Replenishment and Santa Cruz Regional Groundwater Replenishment. The District is currently working with the City of

Santa Cruz and Kennedy/Jenks consultants to apply for state grant funding to evaluate these two options.

Santa Cruz Regional Groundwater Replenishment

The City is including in their grant proposal a planning study on recycled water opportunities that will focus on potential recycled water alternatives that include, but aren't limited to, using the Santa Cruz Wastewater Treatment Facility (WWTF) as source water for landscape irrigation, seawater barrier, groundwater replenishment, reservoir augmentation, and direct potable reuse. As part of this study, they will be evaluating recycled water options that would involve a project as a sole entity and with other agencies (such as the District) to provide more regional benefits (Santa Cruz Regional Groundwater Replenishment Project).

Recognizing that the City's WSAC efforts are currently evaluating projects whereby Santa Cruz Regional Groundwater Replenishment Project may or may not be carried through their winnowing process, this makes it challenging for the District to determine if this project is viable as a stand-alone option for the District since the WWTF is solely owned and operated by the City of Santa Cruz.

The City plans to submit their grant application by the end of the year and District Staff will continue to work closely with them on this effort.

Mid-County Groundwater Replenishment

The District proposes to conduct feasibility level analyses for the Mid-County Groundwater Replenishment Project (MCGRP) of capturing sewer water from the Santa Cruz County Sanitation District's conveyance system for advanced treatment. This project will be evaluated as a District-only project with the possibility of being expanded to include other agencies (such as the City) to provide more regional benefits. As several Board members commented at the August 26 back-up options board workshop, the MCGRP looks somewhat more favorable as a potential project (at this point) since the SC County Sanitation District has shown initial interest in supplying source water for recycled water use.

Currently, the District workload pertaining to this option includes (1) submitting the grant application by the end of the year and, if approved, applying this grant funding (up to \$75K) to our feasibility analyses and (2) working on developing a scope of work for a technical advisor who will be assisting us with more fully evaluating recycled water for groundwater replenishment.

Black and Veatch Corporation (B&V) is currently one of the District's on-call consultants for engineering services. Additionally, B&V is conducting the peer

review of the six alternatives and selection criteria evaluated on August 26. B&V has extensive experience related to recycled water projects, and Staff proposes to work with them to develop a phased scope of work to serve as the lead technical advisor for the District's supplemental water supply efforts related to recycled water. These services will be provided on an on-call, as-needed basis.

The outline below is intended to serve as a framework of potential and proposed scope of services that would be conducted over the course of evaluation (upwards of multiple years) depending on the District's actions of further pursuit of recycled water as a groundwater replenishment project.

PHASE 1: Feasibility

1. Assist the District in defining the steps necessary to evaluate the two recycled water options and take any selected project through permitting and design engineering efforts.
2. Identify the necessary feasibility analysis to assist with evaluation. The preliminary list, thus far, includes a wastewater treatment feasibility study, hydrogeological assessment of the proposed groundwater recharge basin (in collaboration with HydroMetrics, WRI), wastewater source control study, pipeline alignment and right-of-way acquisition studies, treatment facility siting analysis and facility requirements, funding study, and advanced water purification technology study.
3. Develop a schedule for the identified steps and update the schedule as required through program evaluation and development.
4. Assist the District in the retention of qualified consultant(s) to perform the necessary technical work associated with the evaluations. This assistance may include, but not be limited to, preparing the technical criteria to be used by the consultants, drafting scopes of work, drafting requests for qualifications/proposals, assisting with a technical evaluation of the proposals, assisting with the interviews and selection of the consultants, contract negotiations, participating in project meetings with the District staff and consultant(s), and providing review and oversight of the technical content of the consultants work efforts and deliverables.
5. Provide quality assurance and quality control (QA/QC) for work under the recycled water evaluation including detailed reviews of work by in-house staff and sub-consultants and review of all deliverables. QA/QC shall include reviews for clarity, code compliance, technical approach and feasibility, costs, and constructability.

6. Provide the District with general technical expertise to address issues that may arise internally, from the Board, or from the public. Potential white paper topics may include, but are not limited to, wastewater source control strategies (with emphasis on constituents of emerging concern [CEC], endocrine disrupting compounds [EDCs], and pharmaceutical and personal care products [PPCPs]), current uses and applications of indirect potable reuse in California, current and regulations for potable reuse projects, and waste management strategies (e.g. reverse osmosis concentrate) at advanced water purification facilities.
7. Attend Board and public meetings, as needed, to assist staff in discussing the technical aspects of the options.
8. Conduct a technical peer review of feasibility studies prepared by design consultants. Review will ensure comprehensive and relevant data is presented to meet overall project objectives.
9. Assist with the public outreach and communications strategy and assistance, as-needed, toward addressing potential challenges to the project.
10. Provide recommendations for implementation of a pilot study for public outreach purposes along with options for other means of public education in the absence of a physical pilot plant. If the District moves forward with a pilot project for outreach or permitting reasons, consultant will provide technical guidance and review of data, analysis, evaluation and preliminary design criteria for the pilot plant operations.

PHASE 2: Select Project and Conduct Environmental and Permitting Analysis and Funding Options


1. Assist with the environmental review process including generation of additional technical analyses that was not performed in Phase 1 of the feasibility work.
2. Assist in providing permitting and regulatory support such as developing a preliminary list of permits, being the liaison between the District and agencies with respect to project concerns, and provide updates on regulatory developments related to recycled water.
3. Assist in preparing the necessary applications for grant funding or low-interest loans for the project from Federal, State, and other sources as identified.


PHASE 3: Design, Build, and Operate

1. Provide technical support and value engineering for the project design phase.
2. Act as Resident Engineer on behalf of the District during construction, start-up, and commissioning.
3. Provide technical support and oversight of permitting requirements (such as Basin Tracer Study).

POSSIBLE BOARD ACTION

1. BY MOTION; approve proposed scope of work (listed above) for recycled water technical advisor and direct staff to obtain formal proposal from Black and Veatch through the existing Engineering On-Call Agreement.
2. BY MOTION; modify proposed scope of work (listed above) for recycled water technical advisor and direct staff to obtain formal proposal from Black and Veatch through the existing Engineering On-Call Agreement.
3. BY MOTION: provide staff alternate direction for technical support of recycled water studies.
4. No action taken.

By 
Melanie Mow Schumacher
Special Projects Engineer

By 
Kim Adamson
General Manager

**Water Supply Advisory Committee Meeting
First session: Wednesday November 19
5:00 p.m. – 9:30 p.m.**

**Fellowship Hall, Peace United Church of Christ (formerly the First
Congregational Church)**

900 High Street, Santa Cruz

**Second session: Friday November 21
2:00 p.m. – 6:00 p.m.**

Police Department Community Room 155 Center Street, Santa Cruz

Flow Agenda¹

First Session:

Roll Call

1. Welcome to the public and public comment (5:00-5:10)

We encourage members of the public to attend this Committee's meetings and invite public comment about items on the agenda at the beginning of each session. We will invite additional comment during the session before making major decisions. We invite public comments about items relevant to this Committee's work but not on the meeting's agenda during the Oral Communication section at the end of Friday's session.

¹ This is the Flow Agenda prepared for use by the co-facilitators. It includes information that is excluded from the official agenda about the timing of the meeting and the content of agenda items. We expect that, as much as we hope to stick to this flow agenda, we will have to make adjustments during the meeting to the schedule and the contents described here. The Committee is required to do pretty much exactly what the official agenda says, so we get the "wiggle room" we need in the official agenda by making the official version less specific about schedule and content. You will easily recognize the official agenda by the lighthouse logo on its first page.

2. Committee member updates (5:10-5:20)

Members provide news of significant communication between them and organizations with significant interest in the development of water policy in Santa Cruz.

3. Agenda Review (5:20-5:30)

The Committee reviews the agenda for both sessions of this meeting.

Desired outcomes:

- Understanding of the relevance of this meeting's tasks to the Committee's work as a whole
- Agreement on the agenda for this meeting

4. Results from the Civinomics website rating of Alternatives from the Water Supply Convention (5:30-5:50)

Manu Koenig and Robert Singleton from Civinomics will present the results of community ratings of alternatives presented at the October 16 Water Supply Convention and will answer questions.

Desired outcome:

- Understanding of the results of the community ratings of alternatives.

NOTE: The following four agenda items form a series of topics relating to the further development of the MCDS model for Recon and identification of next steps.

5. MCDS – Selection of the Alternatives for Recon (5:50-6:20)

Bob will summarize the results of the Committee's "5-dot" exercise selecting 12+ alternatives to be used in MCDS for Recon so that the Committee can reach agreement on the small group of alternatives to be used for this Recon exercise.

Desired outcomes:

- Understanding of the results of the "5-dot" exercise
- Agreement on the approximately 12 alternatives selected for use in the Recon MCDS exercise so that the Committee can explore the decision space

6. MCDS – Running "what if's" through the model (6:20-6:50)

Bob will demonstrate the way that the MCDS Recon model responds to two using "what if" changes to the assumptions underlying two different alternatives

Desired outcome:

- Understanding of the way the MCDS model can be used to consider changes in assumptions about alternatives

7. Break (6:50-7:00)

8. MCDS – the Two Futures scenarios (7:00-7:30)

Rick presents the two scenarios developed by Rick at the Committee's request. These will be used with the MCDS tool to evaluate and compare the selected alternatives for the Recon MCDS exercise.

Desired outcome:

- Agreement on the “two futures” scenarios to be used with MCDS for evaluating and comparing alternatives for the Recon MCDS exercise

9. MCDS – Criteria and Scales for Recon (7:30-8:15)

Carie updates the Committee on the criteria and the scales to be used to rate the alternatives against those criteria in Recon.

Desired outcomes:

- Agreement on the criteria and the scales to be used to rate the alternatives against those criteria in Recon

10. Presentation on Local Hydrogeology (8:15-9:15)

WSAC IRP member and registered professional geologist, Mike Cloud will give a presentation on local hydrogeology with a focus on local aquifers, aquifer characteristics, and their current condition. (includes time for Committee Q/A and discussion)

Desired Outcome:

- Increased understanding of local groundwater resources, aquifers, aquifer characteristics, and potential for local aquifers to play a role in producing or providing storage for potential available winter flows or water produced through reclamation of wastewater.

11. Wrap up, plan for second session and evaluation of this session (9:15-9:30)

Desired Outcomes:

- Continuity between sessions
- Understanding of the quality of the session's process

Second Session

12. Public comment (2:00-2:10)

We encourage members of the public to attend this Committee's meetings and invite public comment about items on the agenda at the beginning of each session. We will invite additional comment during the session before making major decisions. We invite public comments about items relevant to this Committee's work but that are not on the meeting's agenda during the Oral Communication section at the end of this session.

13. Correspondence received from the community (2:10-2:15)

Mike Rotkin reports on correspondence received from the community.

Desired outcomes:

- Understanding of the correspondence received
- Agreement on any direction to be given to the Corresponding Secretary

14. Reflections on the previous session (2:15-2:25)

The Committee considers the salient points from the previous session and reviews the agenda for today's session.

Desired outcomes:

- Acknowledgement of the major achievements of the previous session
- Agreement on any changes to today's agenda

15. Water Rights 101 (2:25-3:25)

Water rights attorney, Martha Lennihan will present a briefing on water rights law, policy and procedures, and provide preliminary discussions of possible water rights issues related to selected alternatives, as examples only. (includes time for Committee Q/A and discussion)

Desired Outcome:

- Increased understanding of water rights laws, policies and procedures that may be relevant to various alternatives the Committee will be considering.

16. Example of Triple Bottom Line analysis of a couple of different alternatives (3:25-4:00)

Bob Raucher will share some preliminary analysis of what kind of information about alternatives could be developed using the Triple Bottom Line (TBL) framework.

Desired Outcome:

- Increased understanding of how the TBL framework might be used to characterize and communicate information about alternatives or portfolios of alternatives.

17. Break (4:00-4:10)

18. Planning Horizon (4:10-4:25)

Technical team and Committee members discuss issues related to specifying a planning horizon for the Committee's work.

Desired Outcomes:

- Understanding of the options for and issues associated with specifying a planning horizon for the Committee's work.
- Agreement on how to approach the planning horizon issue.

19. Technical Work Plan (4:25-4:55)

Bob Raucher and Bill Faisst will present and discuss progress on the technical work plan, including laying out new work resulting from ongoing efforts by the technical team and City staff to develop a technical work plan that will support the Committee's decision-making effort.

Desired Outcomes:

- Agreement on work plan activities, priorities.
- Direction on any additional items to be included in the work plan.

20. Subcommittee Reports (4:55-5:30)

- **Recon Outreach Subcommittee Update**

Recon Outreach Subcommittee members will report on outreach activities, including a discussion of website issues.

Desired Outcome:

- Agreement on any direction to the Recon Outreach Subcommittee

- **Real Deal Planning Subcommittee Update**

Real Deal Planning Subcommittee members will report on their discussion at their 11/14 meeting and engage the whole Committee in determining future topics and tasks for the Real Deal Planning Subcommittee to work on.

Desired Outcome:

- Agreement on any direction to the Real Deal Planning Subcommittee

21. Agendas for the December meeting meetings (5:30-5:40)

The Committee discusses the agenda outlines for the Committee's next two meetings.

Desired outcomes:

- Understanding of the tasks anticipated for the December meeting
- Agreement on direction to the co-facilitators regarding the plans for Committee meetings during the next two months

22. Materials resulting from the previous meeting (5:40-5:45)

Desired outcome:

- Agreement on final versions of the Action Agenda for the previous meeting

23. Oral communication (5:45-5:55)

We invite public comments about items relevant to the Committee's work but not on the meeting's agenda

24. Evaluation and wrap up (5:55-6:00)

Review the session and consider items to be carried forward to the next meeting.

25. Adjourn (6:00)

Peace United Church of Christ
Fellowship Hall
900 High St.
Santa Cruz, California 95060

Santa Cruz Police Department
Police Community Room
155 Center St.
Santa Cruz, CA 95060



WATER SUPPLY ADVISORY COMMITTEE (WSAC) AGENDA

Regular Meeting

November 19 - 21, 2014

5:00 P.M. REGULAR MEETING - SESSION ONE (NOVEMBER 19): FELLOWSHIP HALL

2:00 P.M. REGULAR MEETING - SESSION TWO (NOVEMBER 21): POLICE

COMMUNITY ROOM

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.

General Business: Any document related to an agenda item for the General Business of this meeting distributed to the WSAC 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 WSAC meeting with the display copy at the rear of the Council Chambers.

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, the basis upon which the action is considered to be in error, and addressed to the City Council in care of the City Clerk Administrator.

Other - Appeals must be received by the City Clerk Administrator 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.

City Councilmember Attendance: Four or more members of the City Council may be in attendance at this meeting.

The City of Santa Cruz does not discriminate against persons with disabilities. Out of consideration for people with chemical sensitivities we ask that you attend 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 the City Clerk's Department at 420-5030 at least five days in advance so that we can arrange for such special assistance, or email CityClerk@cityofsantacruz.com. The Cal-Relay system number: 1-800-735-2922.

Water Supply Advisory Committee Agenda

November 19, 2014 5:00 PM - 9:30 PM

SESSION ONE

Call to Order - Meeting Convenes

Roll Call

Welcome to Public and Public Comment

A hand out will be provided to attendees. An opportunity for public comment on agenda items is provided at the beginning of each session of the meeting. An opportunity for oral communication by members of the public about issues relevant to the work of the Committee is provided at the end of the final session of the meeting. Additionally the Committee will provide an opportunity for public comment before major decisions are made.

Committee Member Updates

Committee Members will update the Committee on significant communications between them and other Santa Cruz entities with significant interest in the development of water policy in Santa Cruz.

Agenda Review

Committee Members will review the agenda for the WSAC's eighth meeting.

Results from the Civinomics website rating of Alternatives from the Water Supply Convention

Manu Koenig and Robert Singleton from Civinomics will present the results of community ratings of alternatives presented at the October 16 Water Supply Convention and will answer questions.

MCDS - Selection of the Alternatives for Recon

Bob Raucher will summarize the results of the Committee's "5-dot" exercise selecting 12+ alternatives to be used in MCDS for Recon so that the Committee can reach agreement on the small group of alternatives to be used for this Recon exercise.

MCDS - Running “what if’s” through the model

Bob Raucher will demonstrate the way that the MCDS Recon model responds to “what if” changes to the assumptions underlying two different alternatives

MCDS - the Two Futures scenarios

Rick Longinotti will present the two scenarios he developed at the Committee’s request. These scenarios are intended to be used with the MCDS tool to evaluate and compare the selected alternatives for the Recon MCDS exercise.

MCDS - Criteria and Scales for Recon

Carie Fox updates the Committee on the criteria and the scales to be used to rate the alternatives against those criteria in Recon.

Presentation on Local Hydrogeology

WSAC IRP member and registered professional geologist, Mike Cloud will give a presentation on local hydrogeology with a focus on local aquifers, aquifer characteristics, and their current condition. (includes time for Committee Q/A and discussion)

Written Review and Wrap Up - Identification of any incomplete issues to be carried forward to tomorrow’s session and meeting evaluations.

Adjournment - The Water Supply Advisory Committee will adjourn from its first session on November 19 of the regular meeting of November 19 - 21, 2014 to its second and final session on November 21 for an open session after the hour of 2:00 p.m. in the Police Community Room at the Santa Cruz Police Department.

Water Supply Advisory Committee Agenda

November 21, 2014 - 2:00 PM - 6:00 PM

SESSION TWO

Call to Order - Meeting Reconvenes

Roll Call

Public Comment

Presentation - Correspondence Received from the Community

Committee Corresponding Secretary Mike Rotkin will lead the Committee Members in a discussion on correspondence received from the community.

Review of Previous Session

Committee Members will review the previous session and the agenda for the current session.

Water Rights 101

Water rights attorney, Martha Lennihan will present a briefing on water rights law, policy and procedures, and provide preliminary discussions of possible water rights issues related to selected alternatives, as examples only. (includes time for Committee Q/A and discussion)

Example of Triple Bottom Line analysis of a couple of different alternatives

Bob Raucher will share some preliminary analysis of what kind of information about alternatives could be developed using the Triple Bottom Line (TBL) framework.

Planning Horizon

Technical team and Committee members discuss issues related to specifying a planning horizon for the Committee's work.

Technical Work Plan

Bob Raucher and Bill Faisst will present and discuss progress on the technical work plan, including laying out new work resulting from ongoing efforts by the technical team and City staff to develop a technical work plan that will support the Committee's decision-making effort.

Recon Outreach Subcommittee Update

Recon Outreach Subcommittee members will report on outreach activities, including a discussion of website issues.

Real Deal Planning Subcommittee Update

Real Deal Planning Subcommittee members will report on their discussion at their 11/14 meeting and engage the whole Committee in determining future topics and tasks for the Real Deal Planning Subcommittee to work on.

Agendas for future meetings

The Committee discusses the agenda outlines for the Committee's next two meetings.

Materials Resulting from the Previous Meeting

The Committee Members will review the Action Agenda prepared for the previous meeting.

Oral Communication

Written Review and Wrap Up - Identification of any incomplete issues to be carried forward to next meeting and meeting evaluations.

Adjournment - The Water Supply Advisory Committee will adjourn from the second session on November 21 of the regular meeting of November 19 - 21, 2014 to its next meeting on December 17, 2014 at 5:00 PM and December 19, 2014 at 2:00 PM in the Fellowship Hall at Peace United Church of Christ, 900 High St. Santa Cruz, CA..

CIVINOMICS PUBLIC ENGAGEMENT SUMMARY - 11.14.14

Agenda Item 4a



Proposal by Jerry Paul, Systems Engineer



The Lochquifer Alternative - Storage

This proposal would use the Santa Margarita and Purisma Aquifers as water storage by diverting up to 6,000 acre feet (1.9 billion gallons) per year of San Lorenzo River and Zayante Creek winter flows. The treated water would first be pumped to Loch Lomond before being dispensed to the aquifers for longterm storage. The vast recharged aquifers would provide robust long-term drought protection to all mid-County, enhance fish habitat, and stay immune to saline incursion.

Estimated Cost: \$52M

[Rate and comment](#)



Proposal by JoeBen Bevirt, Local Entrepreneur, Founder of Joby Energy and four other successful startups in the last 10 years



Build Reservoirs in North Coast Quarries – Storage

Reusing the Liddell and San Vicente limestone quarries as water reservoirs could be a cost effective, environmentally responsible, and aesthetically attractive way to store 3.6 billion gallons and double the water storage capacity of the City of Santa Cruz.

Estimated Cost: \$44M



CONTENTS



1. Results of Exit Interviews
2. Takeaways from Convention
3. Review of Online Ratings
4. Key Takeaways,
Recommended Next Steps

EXIT INTERVIEWS - OVERVIEW

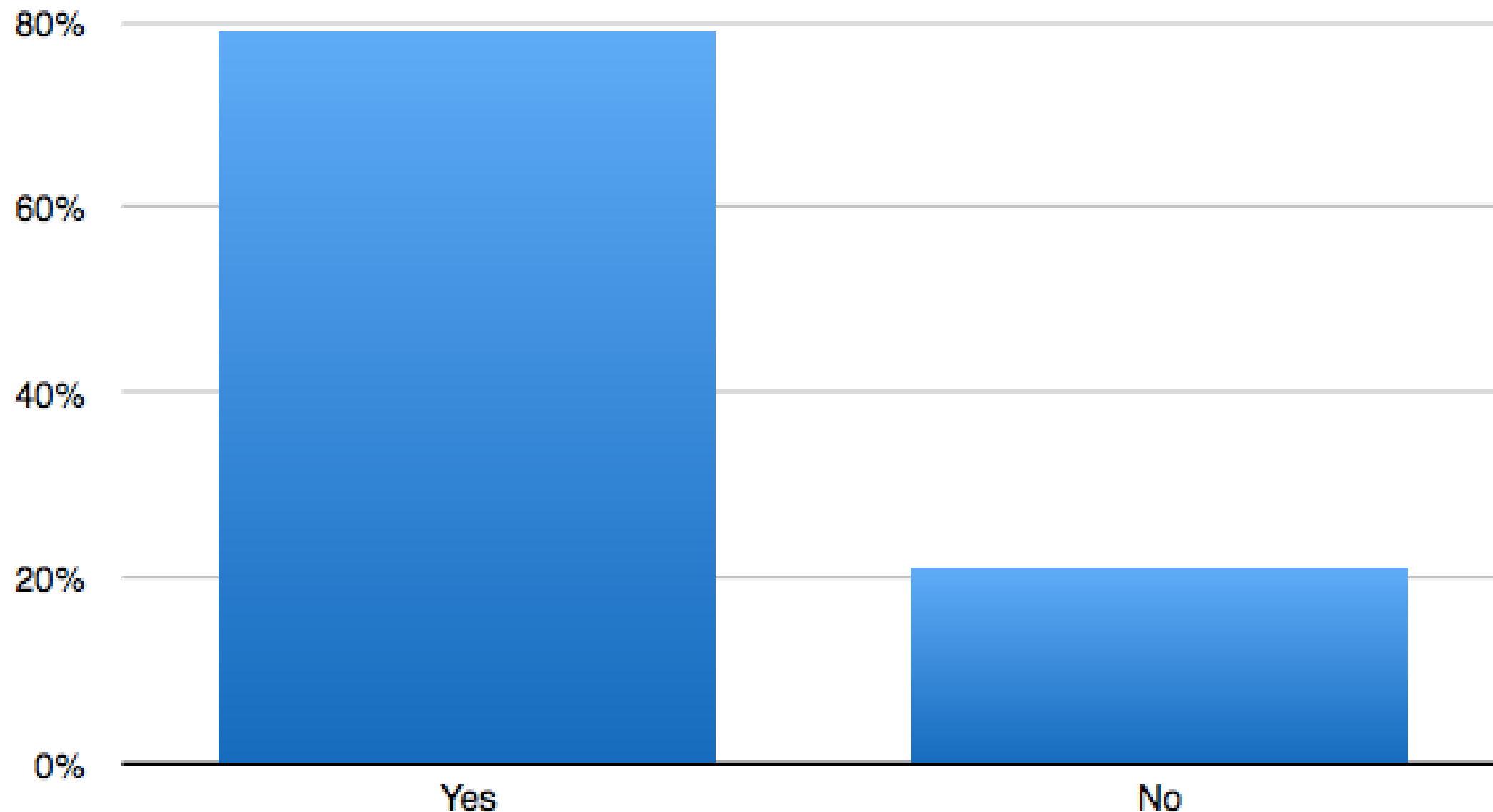


- 117 Exit Interviews Conducted (~ 1 in 4 attendees)
- Event format was 'helpful'
- Most attendees were already engaged in the process
- Event attendees took the event very seriously
- Effectiveness was seen as most important criteria, local economic benefits the least important
- No one proposal was favored significantly over all of the others, but some were clearly more popular
- Desalination seen as most divisive proposal

WHO ATTENDED?

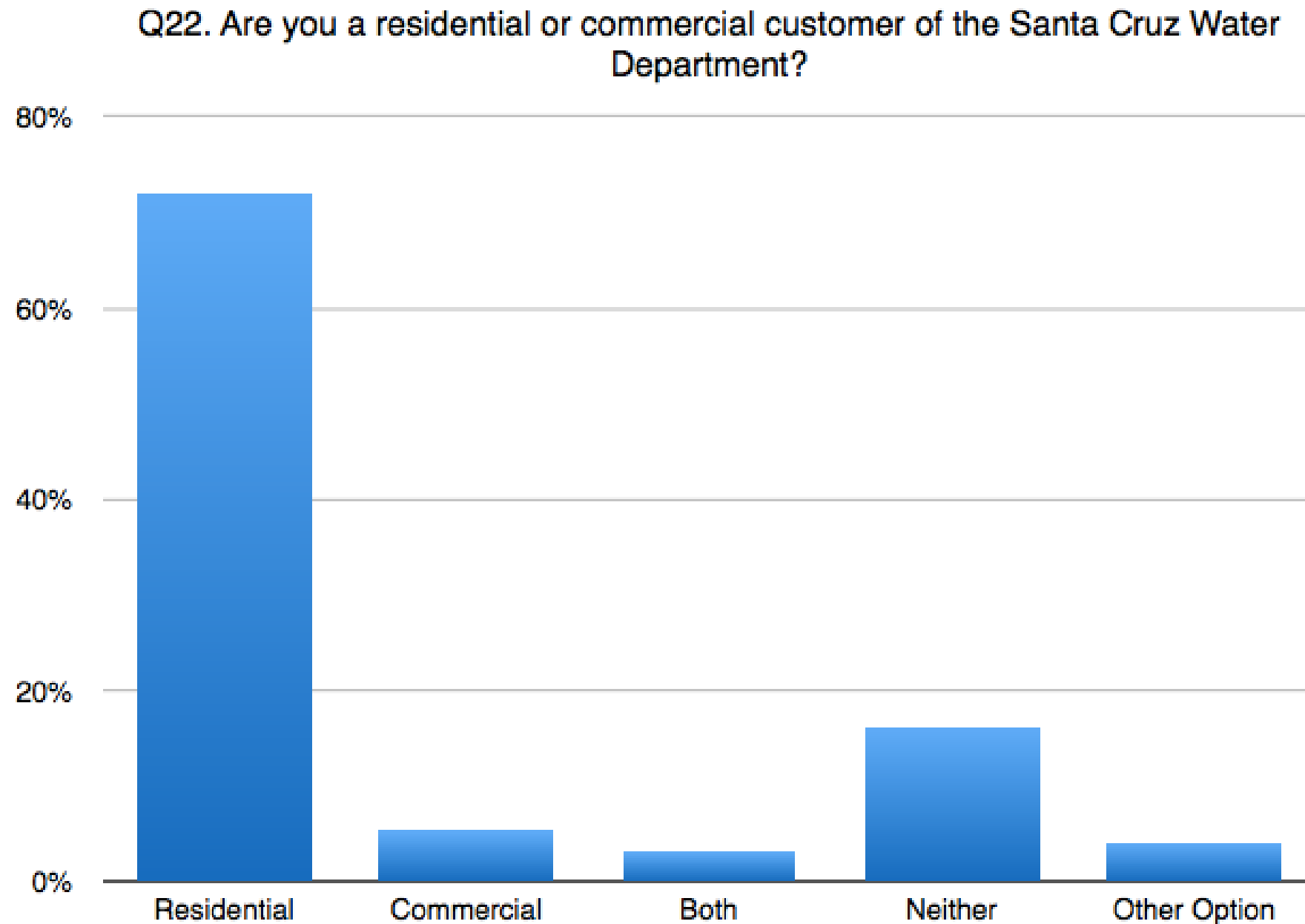


Q1. Do you live in the Santa Cruz Water Department Service Area? (City Limits, Live Oak, Pasatiempo included)



The majority of attendees were Santa Cruz Water Department customers (approx. 80%).

WHO ATTENDED?

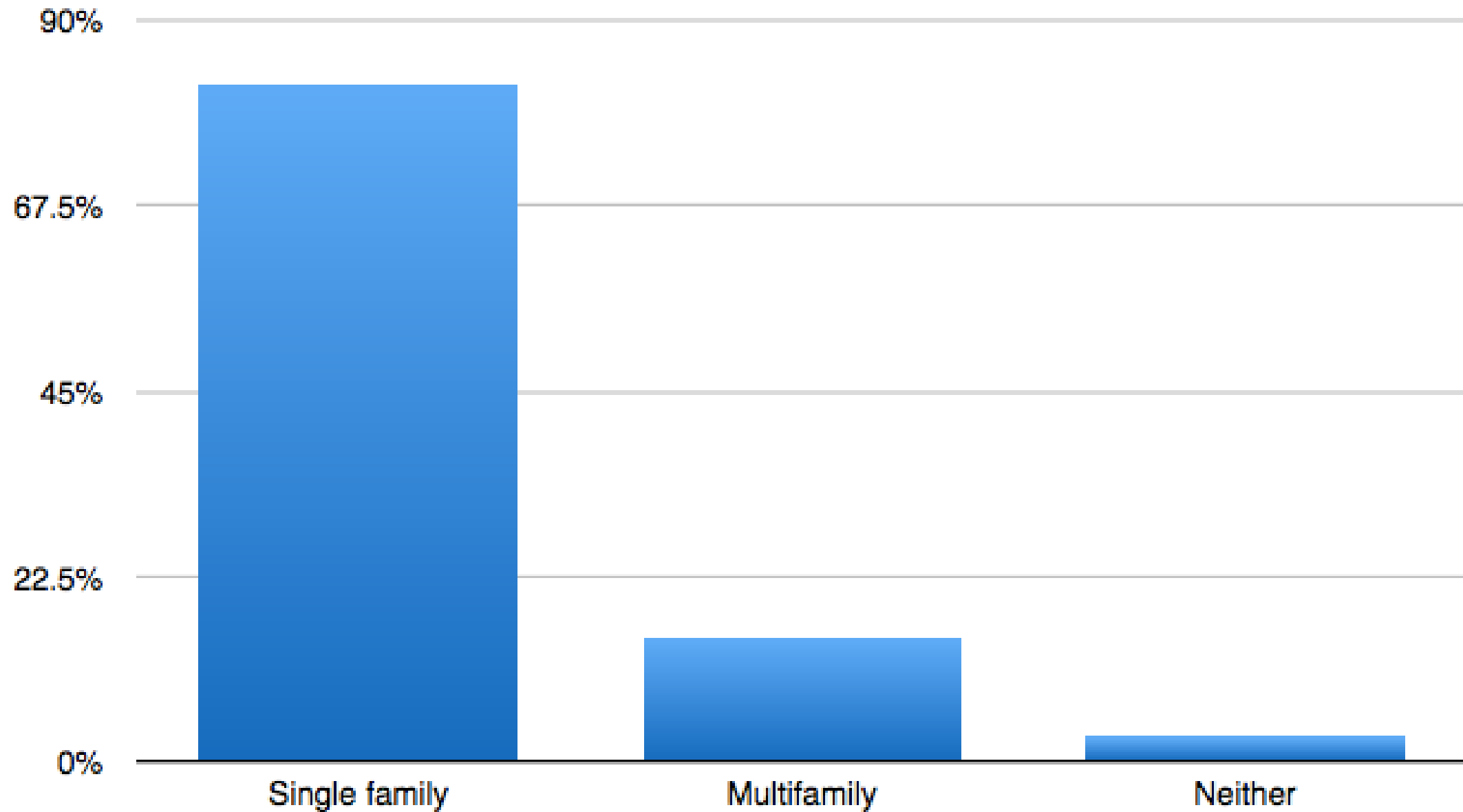


Residential customers matched actual percentage of customers. (88% compared to 88.6% total hookups). 9% of attendees were Commercial or “Both” (compared to 7.6% actual).

WHO ATTENDED?



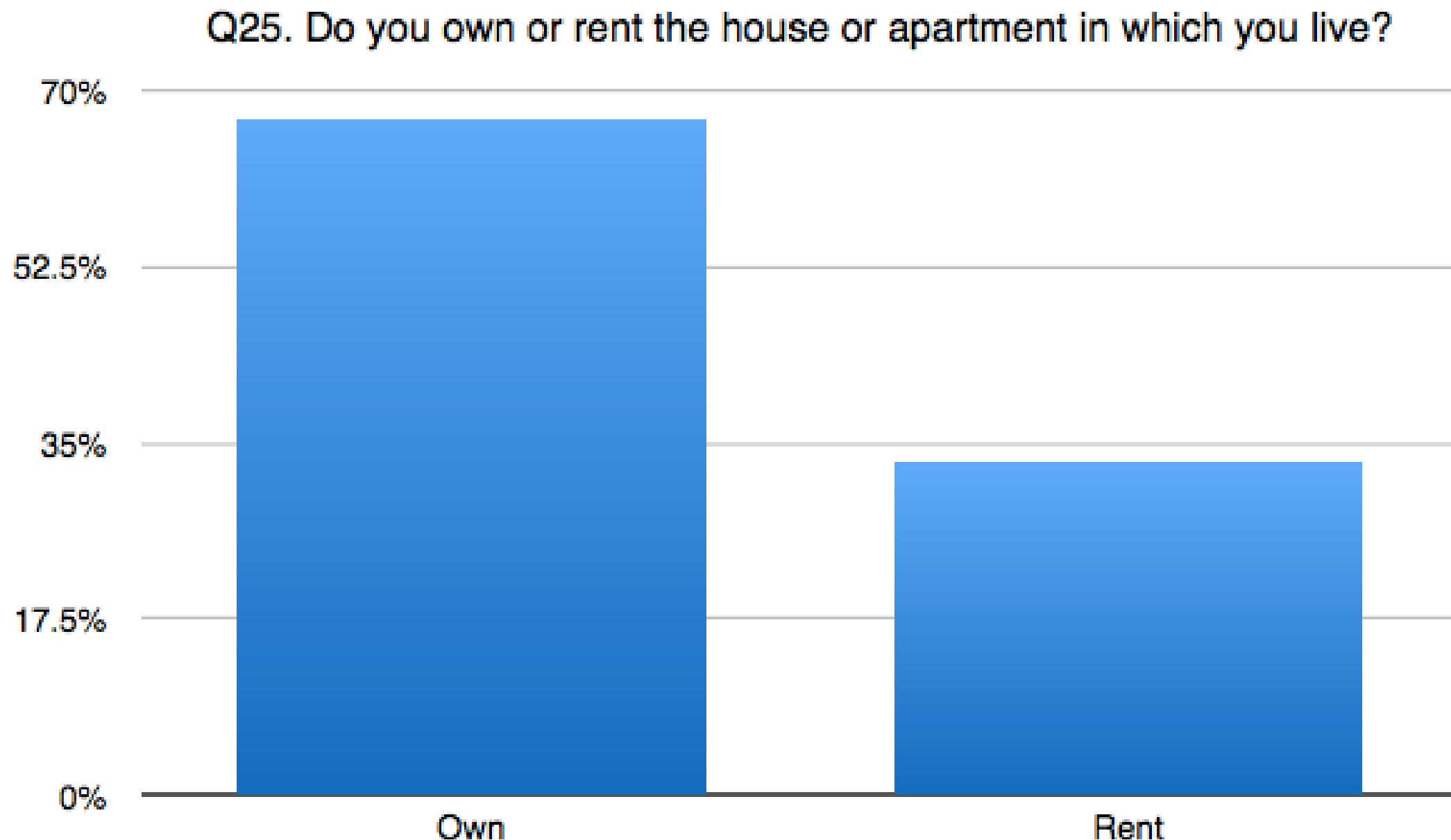
Q23. Do you live in a single family or multifamily home?



Single family residents are currently over-represented in the process. (80% single family compared to 51.4% actual) *

possible discrepancy between respondent definition and zoning definition - e.g. Townhome

WHO ATTENDED?

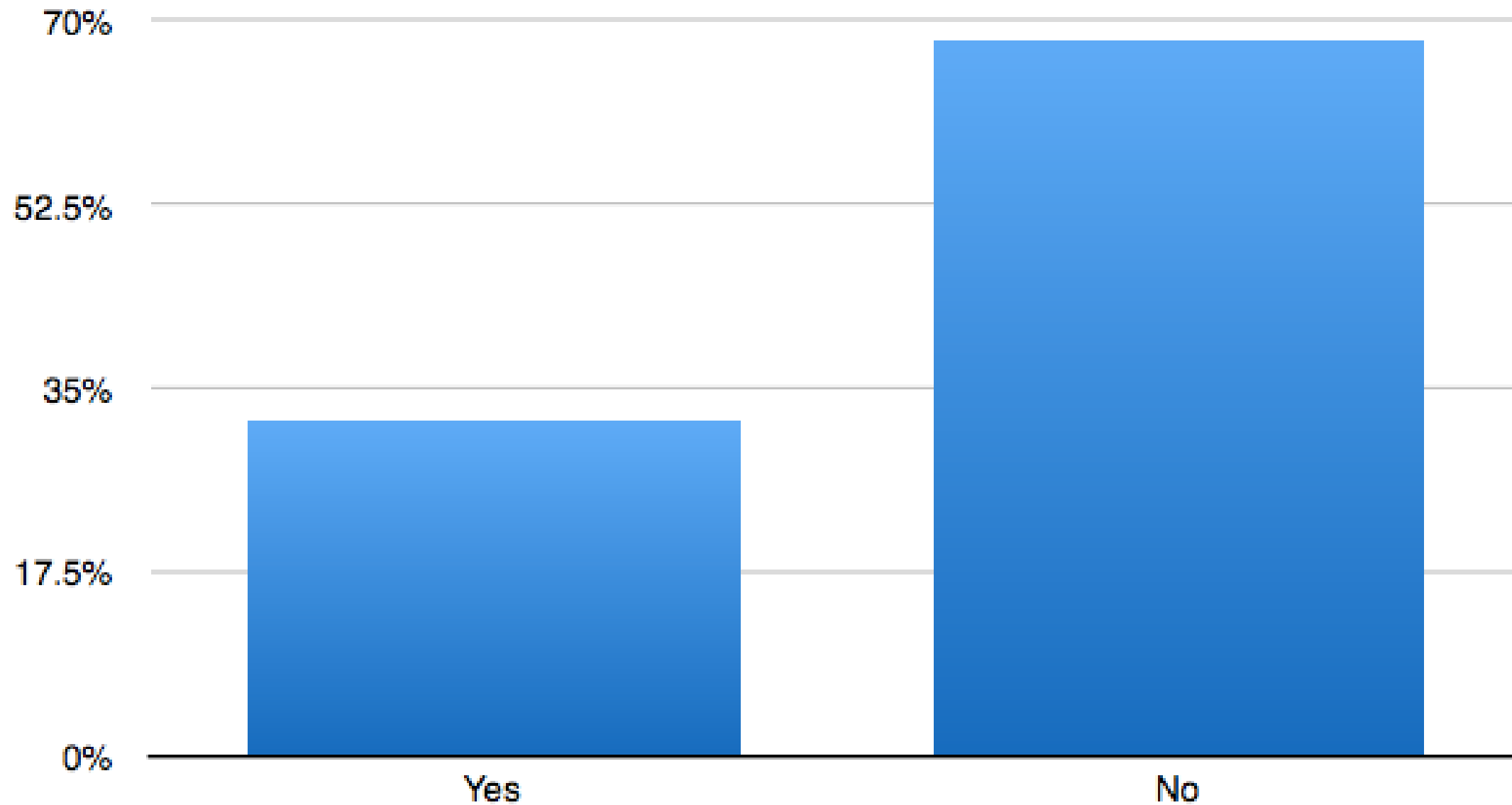


Homeowners are currently over-represented in the process.
(67% homeowners compared to 43.9% actual).

WHO ATTENDED?



Q26. As a renter, do you personally pay your water bill?

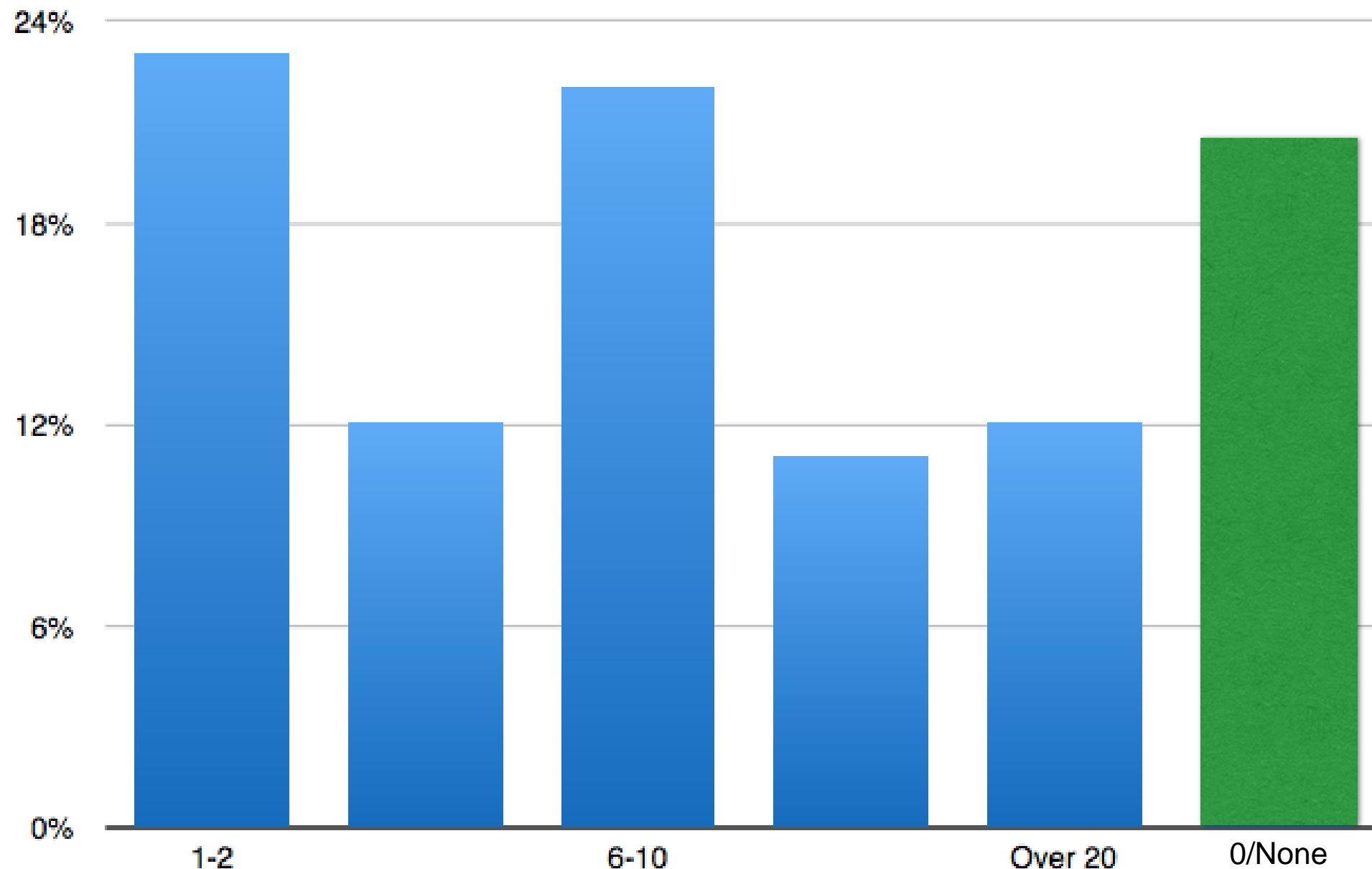


68% of renters don't pay their own water bill.

HOW ENGAGED ARE THEY?



Q20. Estimate how many public meetings you have attended in the past 2 years. This includes City Council meetings, community workshops and public commission meetings.

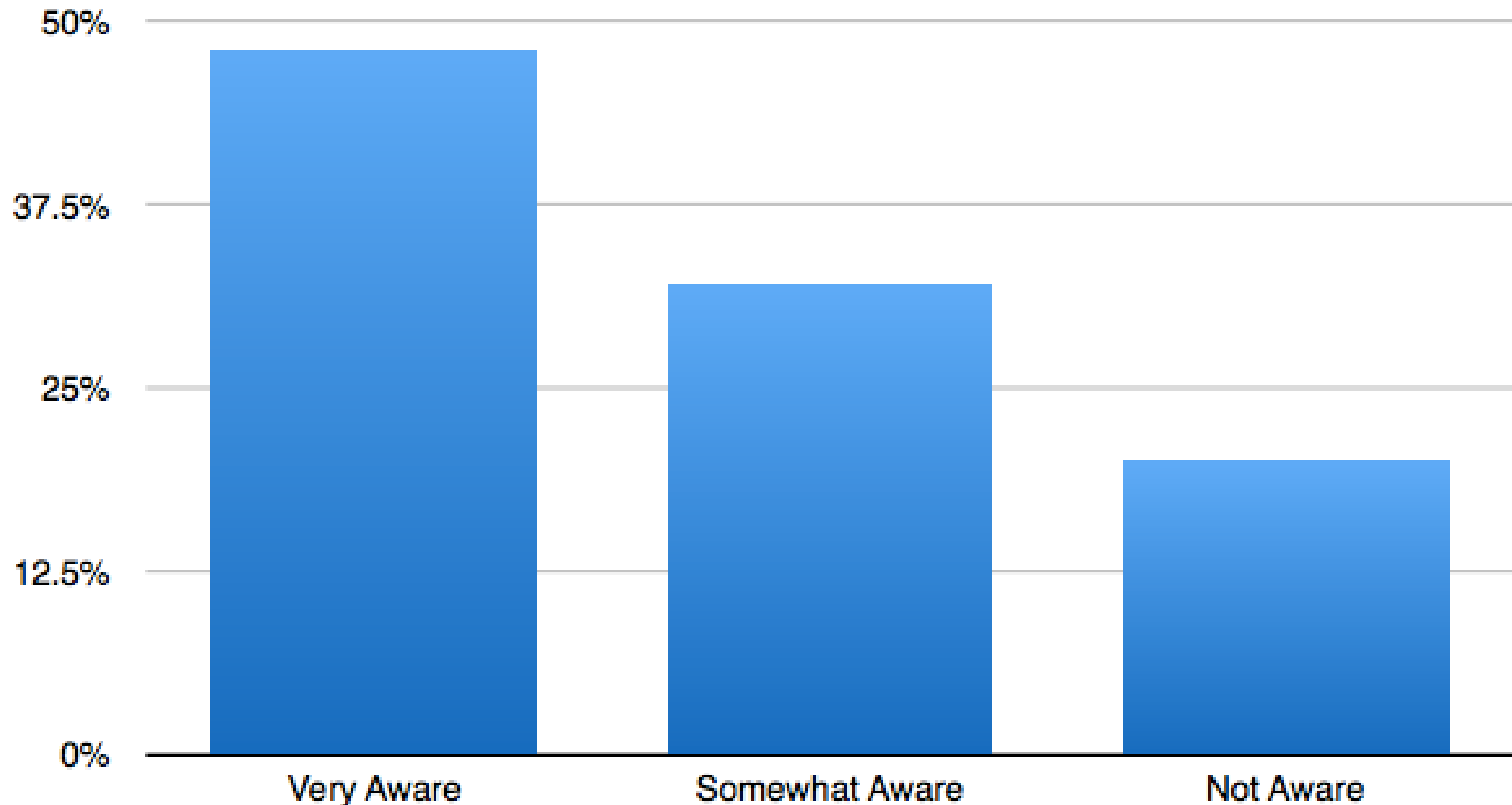


So far, participation has not broadly expanded beyond those who were already engaged. 80% attended a public meeting in the last 2 years.

HOW ENGAGED ARE THEY?



Q18. How aware are you of the Water Supply Committee?

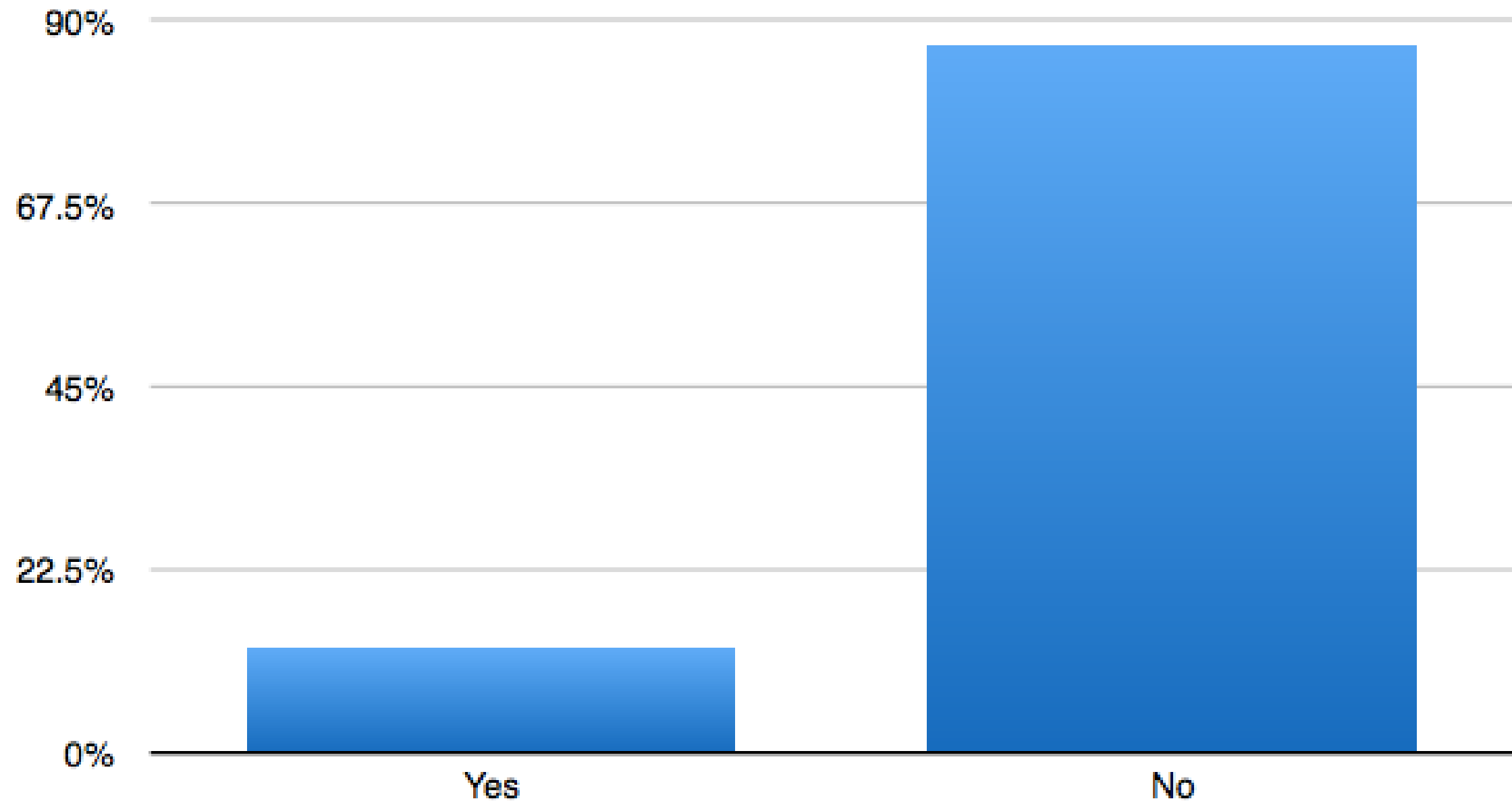


Nearly half (48%) of attendees were already, “Very Aware” of the WSAC.

HOW ENGAGED ARE THEY?

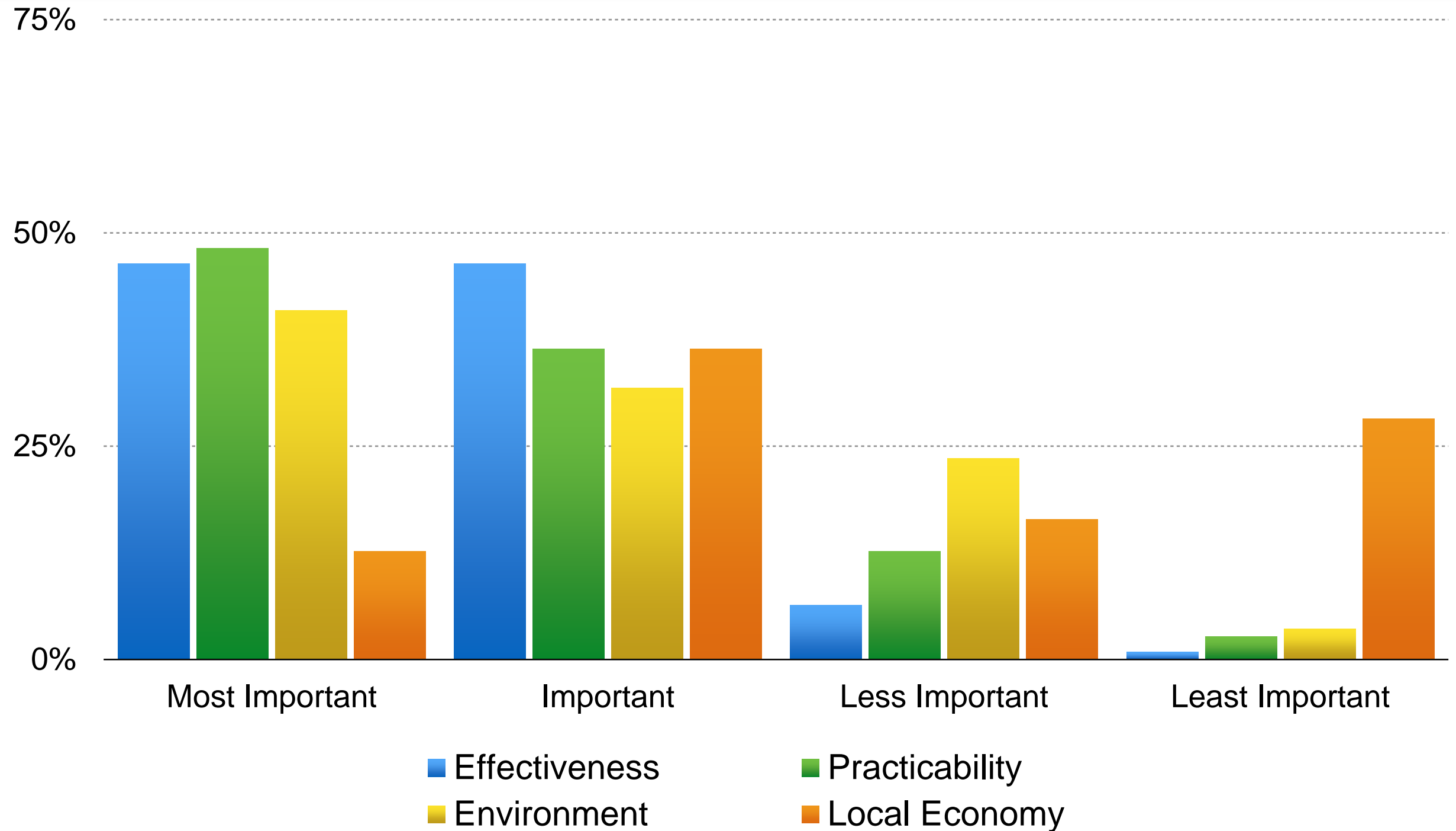


Q19. Have you attended any of the WSAC meetings?



Yet, for approx. 87% of attendees, it was the first time they had attended a WSAC event.

WHAT IS IMPORTANT TO ATTENDEES?



Attendees ranked Effectiveness and Practicability most important and Environment and Local Economy less so.

WHAT IS IMPORTANT TO ATTENDEES?

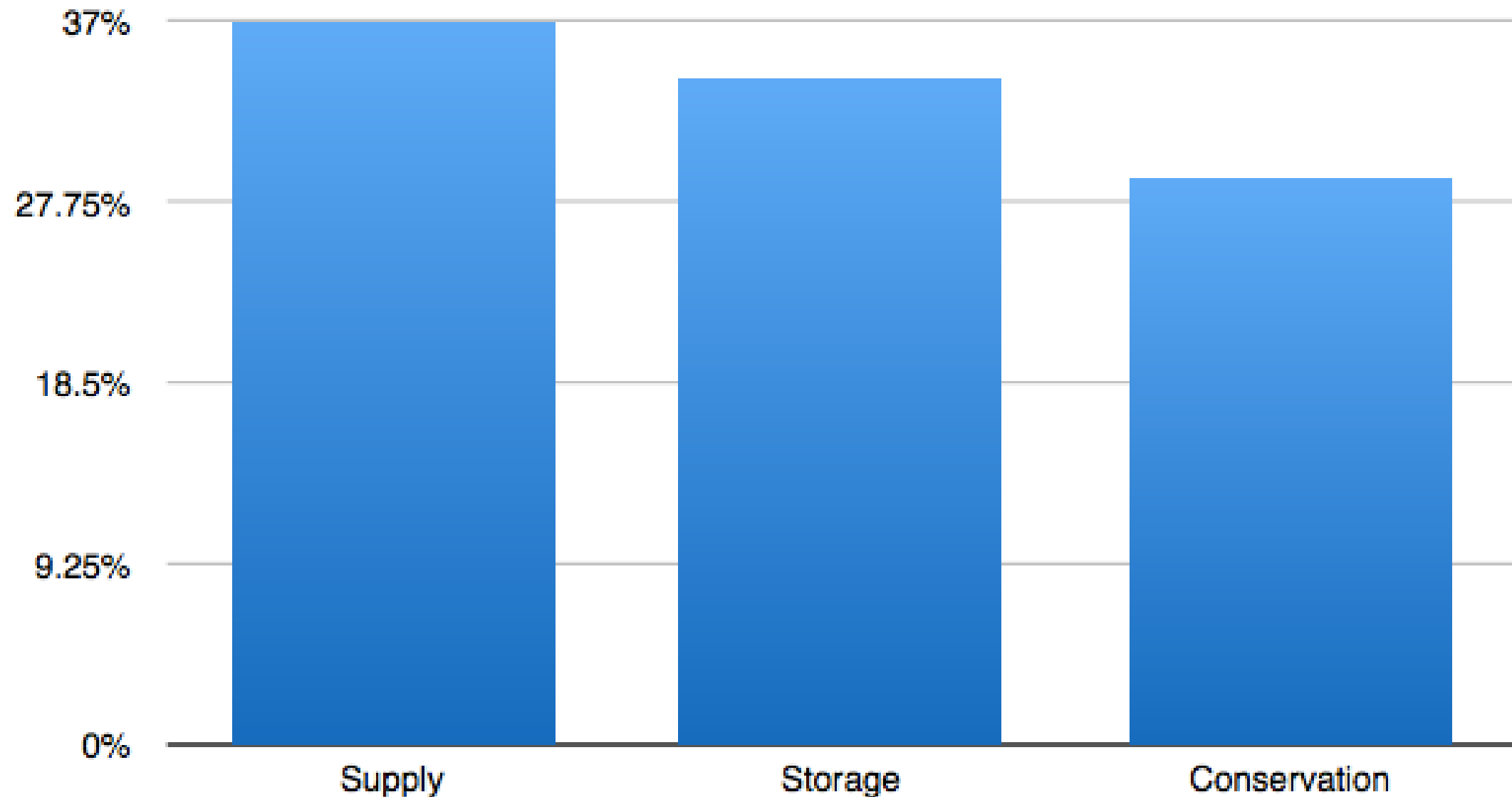


Criteria	Weighted Average
Effectiveness	3.38
Practicability	3.3
Environment	3.1
Local Economy	2.39

WHAT IS IMPORTANT TO ATTENDEES?

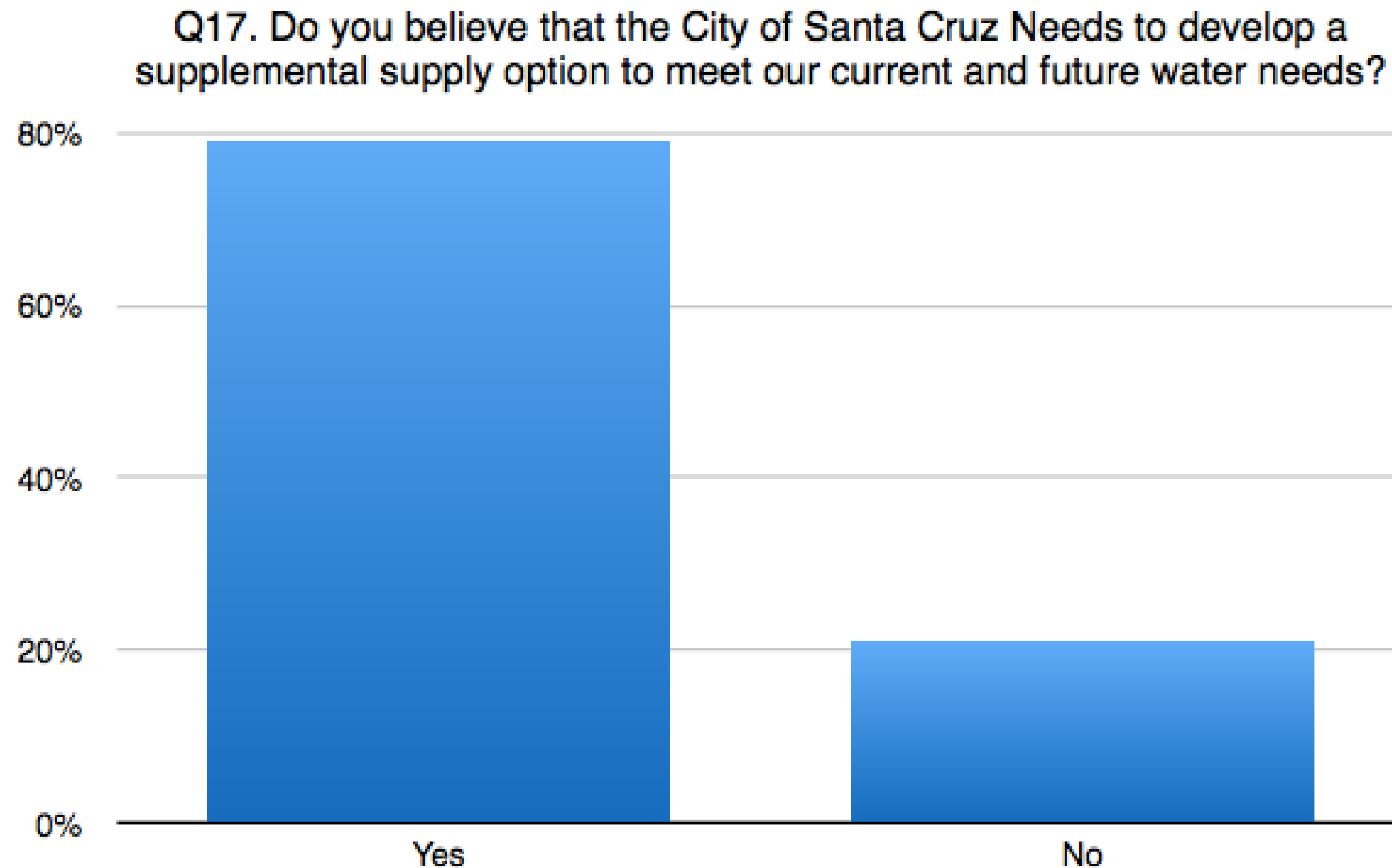


Q11. For the purposes of evaluation, each proposal was categorized based upon the following project type: supply, storage and conservation. In general, which types of projects most appealed to you?



Although there was only 10% variance, Supply projects were seen as most appealing by attendees.

WHAT IS IMPORTANT TO ATTENDEES?

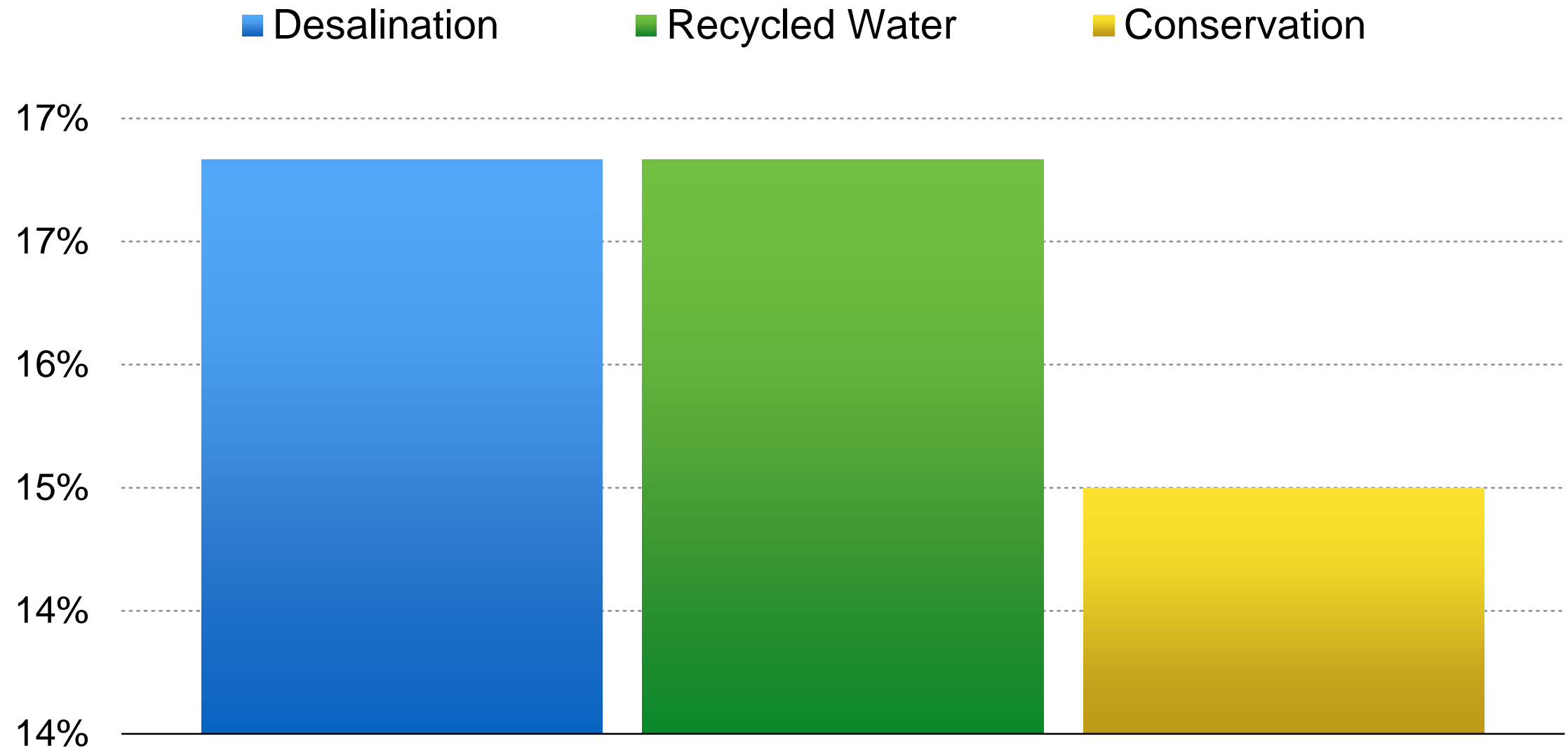


The vast majority of respondents (79%) believe that Santa Cruz needs a new supplemental supply source.

COMMENTARY ON PROPOSALS



Q13. If you had to select a project or multiple projects together, to meet the water supply needs of the city, which project(s) would you choose and why?



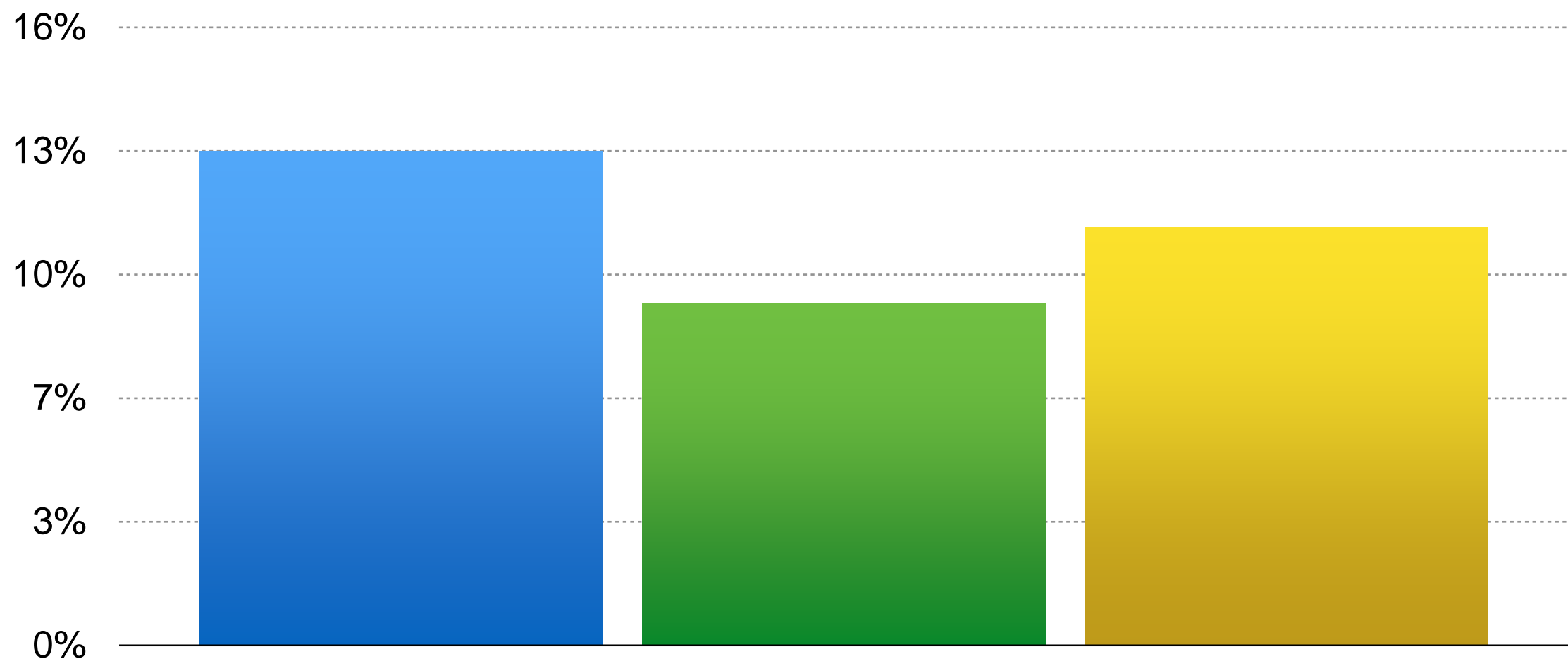
Recycled Water and Desalination were mentioned with equal frequency.

COMMENTARY ON PROPOSALS



Q14. When accounting for all 4 criteria, which proposal would you rate as being the best overall and why?

■ Desalination ■ Recycled Water ■ Desal Alternatives Group of Conservation Options



Conservation was mentioned more frequently when respondents were asked which they liked best overall.

CONVENTION TAKEAWAYS



- Needed to be promoted more
 - More outreach through organizations
- Standardized presentation format
 - Uniformity of metrics
 - Work more closely with authors
 - Combine similar ideas



ONLINE RATINGS

EVOLUTION OF THE SITE

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Santa Cruz Water Supply Convention [READ BACKGROUND](#)

[RESEARCH
56](#)[IDEAS
104](#)[INITIATIVES
46](#)[FINAL RATING
0](#)[WINNERS ANNOUNCED
0](#)[IMPACT
0](#)

Background

Initiatives

Collection of Residential Shower and Bathtub Gray Water for Reuse to Flush Toilets and for Irrigation

The Storm Aquarries Plan (Booth 5)

The Reservoir Plan (Booth 5)

The Recycle Plan (Booth 5)

Water Skate Parks (Booth 5)

Watershed Restoration (Booths 19-22)

Aquifer Restoration via Inter-District Collaboration (Booths 19-22)

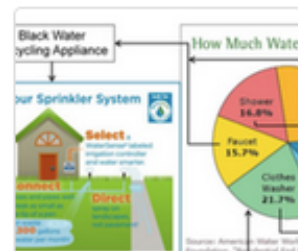
INITIATIVES

The following initiatives are submitted to the Water Supply Advisory Committee by members of the public. Please rate them in terms of the following criteria:

- **Effectiveness:** The expected decrease in demand OR increase in storage or supply related to this proposal.
- **Practicability:** Cost, community and political support, regulatory considerations.
- **Environment:** Environmental consequences, considering energy intensity, and riverine, marine, and terrestrial benefits or impacts.
- **Local Economy:** Potential to create sustainable local jobs in the planning, implementation, and support of the proposal.

[zNano in](#)[Santa Cruz /](#)[Water](#)

6d, 9h ago






Rebates to Unlock Water Efficient Technologies and Retrofits (WET&R) (Booth 24)

Water efficient technologies and retrofits (WET&R) projects could reduce water consumption by >50% and sewer outflows by >90%. Water treatment and distribution systems (WTDS), including desalination and advanced water

EVOLUTION OF THE SITE





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Diversion Alternatives

Upgrade Existing SCWD-SqCWD Intertie

The Lochquifer Alternative

Beyond Curtailment (Booths 19-22)

Encourage Climate-Appropriate Landscaping (Booths 19-22)

Suggested Water Supply Sources (Booth 15)

Timely & Adequate Demand Management in Dry Years (Booths 19-22)


Regional Cross-District Groundwater Management, Restructuring and Consolidation (Booth 12)

Collection of Residential Shower and Bathtub Gray Water for Reuse to Flush Toilets and for Irrigation

Ranney Collectors

zNano Water Filtration Systems (Booth 24)


Subcategory ▾






Cowell Railroad Pipeline

Many thanks to Terry McKinney for his outstanding Ranney col ...more

Infrastructure

 Jerry Paul


 Rated  Commented | Total Ratings (26) Total Comments (8)






Loch-Down Alternatives - Sec. 23 of 27

The Loch-Down Alternatives achieve robust drought protection ...more

Supply

 Jerry Paul


 Rated  Comment | Total Ratings (26) Total Comments (6)






Private Pumps

Legislative changes are revolutionizing this arena. Promote ...more

Policy

 Jerry Paul


 Rated  Comment | Total Ratings (18) Total Comments (6)





SLR Alluvial Plain Wells

The desal dEIR says that Carollo Engineers in about 2001 rep ...more

Supply

 Jerry Paul

 Rated  Comment | Total Ratings (10) Total Comments (1)

EVOLUTION OF THE SITE

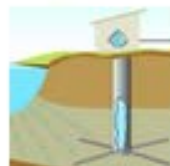


Basics mentioned in the film:

- Santa Cruz needs an additional 900M gallons/ year
- 95,000 acre feet(30,951M gallons) flow through the San Lorenzo Watershed each year. Current total water usage is 16/17% of this total.
- The proposed Desal Plant has an estimated cost of \$115M



Proposals by Terry McKinney, Production Superintendent, Santa Cruz Water Department













Ranney Collectors - Supply

Ranney collectors are essentially shallow wells built in a creek or river bed. Capturing water with a Ranney collector would add another tool for managing the lagoon and create a new water supply. Possible sites to target











MOST POINTS OVERALL *20 ratings (avg #) required



	Name	Ratings	Total Pts
	Water - Energy Nexus	29	15
	Build Reservoirs in North Coast Quarries	36	14
	Use Available Water to Irrigate Golf Courses	31	14
	Santa Cruz Water Department - 4 Reuse Scenarios	28	14
	Loch-Down Alternatives	25	14
	Aquifer Restoration via Inter-District Collaboration	25	14
	Price Water to Encourage Conservation	24	14
	Timely & Adequate Demand Management in Dry Years	21	14
	Encourage Climate-Appropriate Landscaping	21	14
	Ranney Collectors	34	13

LEAST POINTS/RATINGS OVERALL



	Name	Ratings	Total Pts
	Water Conservation Accounts	16	9
	Aqueous Freshwater Recovery Systems	8	9
	A Low GHG Desalination/ Water Re-use Process	33	8
	The Storm Aquarries Plan	21	8
	The Recycle Plan	20	8
	Regional Water Authority Plan	12	8
	zNano Filtration Systems	8	8
	Water Skate Parks	16	7
	Desalination	39	6
	The Reservoir Plan	13	6



- Process tedious to engage with, even for dedicated participants
- Rating scale challenging to interpret/misused among public: (e.g. Desalination, Effectiveness: 2)
- Need consistent MGD/Cost numbers and summaries

OUTREACH RECOMMENDATIONS



- Work to publicize the results of this round of outreach (info graphics etc.)
- Option, continue promotion of primary proposals: newspaper, 1 a week for a couple months
- Have a Round 2, simplify engagement requirements
 - Remove duplicate proposals, group small proposals
 - Clarify summary language, cost and MGD/ supply
 - Use cost constrained YES/NO ratings in next iteration of public input - e.g. you have \$120M to spend on water projects, which would you choose?

Agenda Item 4b

Number	Proposal Title	Author	Sub Category	Comments	Ratings	Effectiveness (avg)	Practicability (avg)	Environmental Benefits (avg)	Local Economy Benefits (avg)
1	Cowell Railroad Pipeline	Jerry Paul	Infrastructure	8	27	3	3	3	3
2	Loch-Down Alternatives - Sec. 23 of 27	Jerry Paul	Storage	6	25	4	3	4	3
3	Private Pumpers	Jerry Paul	Policy	6	17	3	3	4	2
4	SLR Alluvial Plain Wells	Jerry Paul	Supply	1	9	3	3	4	3
5	Clean Off-Stream Reservoirs - Sec. 19 of 27	Jerry Paul	Storage	4	14	4	3	4	3
6	Weir Systems	Jerry Paul	Habitat Restoration	1	14	3	3	4	3
7	Detention Tub String	Jerry Paul	Recycled Water	4	8	3	3	3	3
8	Water Looping	Jerry Paul	Habitat Restoration, Storage	3	11	3	3	4	2
9	Cross-County Pipeline - Sec.15 of 27	Jerry Paul	Infrastructure	1	13	3	3	3	3
10	Upgrade Existing SCWD-SqCWD Intertie	Jerry Paul	Infrastructure	1	10	4	4	4	3
11	The Lochquifer Alternative	Jerry Paul	Storage	13	26	3	3	3	3

Number	Proposal Title	Author	Sub Category	Comments	Ratings	Effectiveness (avg)	Practicability (avg)	Environmental Benefits (avg)	Local Economy Benefits (avg)
12	Diversion Alternatives	Jerry Paul	Supply	3	14	4	3	3	3
13	Multipurpose Settling Pond	Jerry Paul	Supply	2	7	4	4	5	4
14	Strategies, Approaches, Guidance Questions - many of the 27 sections	Jerry Paul	Policy	2	8	4	4	4	4
15	Potable Supply Diversification	Terry McKinney	Infrastructure	6	14	4	4	4	4
16	Rebates to Unlock Water Efficient Technologies and Retrofits (WET&R) (Booth 24)	zNano	Conservation	22	34	3	3	3	3
17	A Low GHG Desalination/Water re-use Process (Booth 4)	Analiese Ramsay	Recycled Water, Desalination	13	33	2	2	2	2
18	Composting Toilets in Public Venues: Costs and Benefits (Booth 13)	Peter Scott	Conservation	11	46	3	3	2	2
19	WaterSmart Software (Booth 9)	David Sheridan	Conservation	15	24	2	3	3	2
20	Tertiary Recycle Treated Water	Russell Weisz	Supply, Recycled Water	20	27	3	3	3	3
21	Santa Cruz Water Department - 4 Reuse Scenarios: Potable Reuse, Groundwater Replenishment, Irrigation/Industrial, San Lorenzo River Augmentation (Booth 16)	Catherine Borrowman	Recycled Water	10	28	4	3	4	3
22	Zayante Dam and Reservoir (Booth 16)	Catherine Borrowman	Storage	15	32	3	2	2	2

Number	Proposal Title	Author	Sub Category	Comments	Ratings	Effectiveness (avg)	Practicability (avg)	Environmental Benefits (avg)	Local Economy Benefits (avg)
23	The Regional Water Authority Plan (Booth 5)	Bill Smallman	Policy	9	12	2	2	2	2
24	The Recycle Plan (Booth 5)	Bill Smallman	Recycled Water	3	20	2	2	2	2
25	The Storm Aquarries Plan (Booth 5)	Bill Smallman	Supply	14	21	2	2	2	2
26	Water Conservation Accounts Plan (Booth 5)	Bill Smallman	Conservation	1	16	2	3	2	2
27	The Reservoir Plan (Booth 5)	Bill Smallman	Storage	1	13	2	1	1	2
28	Water Skate Parks (Booth 5)	Bill Smallman	Storage	5	16	2	2	1	2
29	Desalination: the best strategy for a truly reliable water supply for Santa Cruz (Booth 11)	Sustainable Water Coalition	Supply	18	39	2	1	1	2
30	Fund Watershed Restoration	Bruce Van Allen	Habitat Restoration	10	31	3	3	4	3
31	Water Supply Infrastructure (Booths 19-22)	Bruce Van Allen	Infrastructure	9	24	3	3	3	3
32	Aquifer Restoration via Inter-District Collaboration (Booths 19-22)	Bruce Van Allen	Policy	6	25	4	3	4	3
33	Timely & Adequate Demand Management in Dry Years (Booths 19-22)	Bruce Van Allen	Policy	5	21	3	4	4	3

Number	Proposal Title	Author	Sub Category	Comments	Ratings	Effectiveness (avg)	Practicability (avg)	Environmental Benefits (avg)	Local Economy Benefits (avg)
34	Suggested Water Supply Sources (Booth 15)	Scott McGilvray	Supply	3	11	3	3	3	3
35	Beyond Curtailment (Booths 19-22)	Desal Alternatives	Conservation	4	17	4	4	4	3
36	Encourage Climate-Appropriate Landscaping (Booths 19-22)	Bruce Van Allen	Conservation	3	21	3	4	4	3
37	Building Code Revisions & Onsite Water Systems (Booths 19-22)	Rick Longinotti	Conservation, Policy	6	23	3	3	4	3
38	Reclaimed Water - The Perfect Compliment To Water Conservation (Booth 2)	Terry McKinney	Recycled Water	6	22	3	3	3	3
39	Ranney Collectors	Terry McKinney	Supply	15	34	3	3	4	3
40	Water - Energy Nexus and Sustainable Water Source through Ocean Energy (Booth 7)	Candace Brown	Recycled Water, Desalination	18	29	4	4	4	4
41	zNano Water Filtration Systems (Booth 24)	zNano	Conservation	4	8	2	2	2	2
42	Off-Stream Storage Reservoir (Booth 18)	Wilson Fieberling	Storage	6	20	3	3	3	3
43	Water-Neutral Development to Address Growth (Booths 19-22)	Bruce Van Allen	Policy	5	26	3	3	3	2
44	Price Water to Encourage Conservation (Booths 19-22)	Sue Holt	Conservation	7	24	4	3	4	3

Number	Proposal Title	Author	Sub Category	Comments	Ratings	Effectiveness (avg)	Practicability (avg)	Environmental Benefits (avg)	Local Economy Benefits (avg)
45	Collection of Residential Shower and Bathtub Gray Water for Reuse to Flush Toilets and for Irrigation	Kenneth Garges	Conservation	8	18	3	3	4	3
46	Recycled Water/ North Coast Groundwater Exchange (RCGE)	Dana Ripley	Supply, Recycled Water	19	26	3	2	3	3
47	Atmospheric Water Generators (Booth 3)	Dewpoint	Supply	12	23	2	2	3	2
48	Aqueous Freshwater Recovery Systems (Booth 14)	Aqueous Systems	Recycled Water, Desalination	2	8	3	2	2	2
49	Membrane Filtration Plant for San Lorenzo River Water	Terry McKinney	Supply	12	22	3	3	3	3
50	How to save water in your landscape and house: (Booth 6)	Bobby Markowitz	Conservation	9	18	3	3	4	3
51	Three Year Reserve of Water for Fish, Drought Relief and Aquifer Recharge (Booth 25)	Bill Malone	Policy	2	15	3	3	3	3
52	Rate Increases Strengthen Water Savings (Booth 17)	Sue Holt	Conservation	2	16	3	3	3	2
53	Maximum Application of the WaterSmart Conservation and Customer Engagement Program (Booth 12)	Pual Gratz	Conservation	3	14	3	4	3	2
54	Use Available Water to Irrigate Santa Cruz Golf Courses	Paul Gratz	Supply, Recycled Water	20	31	4	3	4	3
55	Regional Cross-District Groundwater Management, Restructuring and Consolidation (Booth 12)	Paul Gratz	Policy	2	12	3	3	3	2

Number	Proposal Title	Author	Sub Category	Comments	Ratings	Effectiveness (avg)	Practicability (avg)	Environmental Benefits (avg)	Local Economy Benefits (avg)
56	Building Reservoirs in North Coast Quarries	JoBen Bevirt	Storage	23	36	4	4	3	3

WSAC Exit Interview Comments Overview

Question 9: For the criteria you selected as being most important, why was this criteria the most significant in your rating process?

Key Quotes:

“This is about water, nothing else. effectiveness is the most important criteria.”

“A lot of the issues we face today are due to the lack of consideration for our environment; and having the knowledge we do now about the impact we make with our actions today for future generations it's a moral obligation to not repeat mistakes.”

“We need a realistic solution that can be implemented FAST”

Effectiveness, or one of the defining characteristics of effectiveness, was mentioned or alluded to in roughly 16 of the 62 comments, or roughly 26 percent of the time.

Practicability, or one of the defining characteristics of practicability, was mentioned or alluded to in 11 comments, or roughly 17 percent of the time. Environmental Benefits/Impacts, or the one of the defining characteristics thereof, was mentioned 17 times, or roughly 27 percent of the time. Local economic benefits were mentioned indirectly, but were not listed as the most important criteria by any respondent directly.

It is clear from comments received that environmental impacts/benefits are extremely important to those who attended the convention, and are seen as the most important factor by a significant portion of those who participated in the exit interview. However, effectiveness and practicability are also listed as being the most important by a significant number of those participated. While respondents were generally conscience of the need to balance all of these criteria, the ability to provide water in way that does not significantly impact the environment is the prevailing sentiment of aggregate comments for this question.

Question 10: Can you elaborate more on how you balanced the competing needs of multiple criteria?

Key Quotes:

“Practicability was important because if an idea is not practicable, it doesn't matter how good an idea is if it will never happen.”

“The more environmentally sound options often also provide clean, green local jobs. I took a long term view of costs and effects. I am concerned that some approaches are not proven safe for long term use(toilet to tap, and even tertiary recycled water on annual food crops).”

“All four are certainly important, but for me I believe we have to prioritize "the greater good." That "good" means ensuring we have a safe, reliable supply to maintain/enhance our quality of life. Sacrifices will have to be made by all interested parties.

When questioned about balancing the sometimes competing needs of each criteria, respondents showed a greater willingness to compromise on what they felt was the most important criteria. In answering this question many commented on how practicability and effectiveness are paramount considerations. The overarching sentiment of the aggregate comments is that projects will of course need to be effective and practical to be considered, but that this balance does not mean environmental considerations should be left to the wayside. Local economic and community benefits are not a major priority when being considered alongside the other 3 criteria.

Question 12: Why do these types of projects appeal to you more than others? (In regards to the three “types”: supply, storage and conservation.

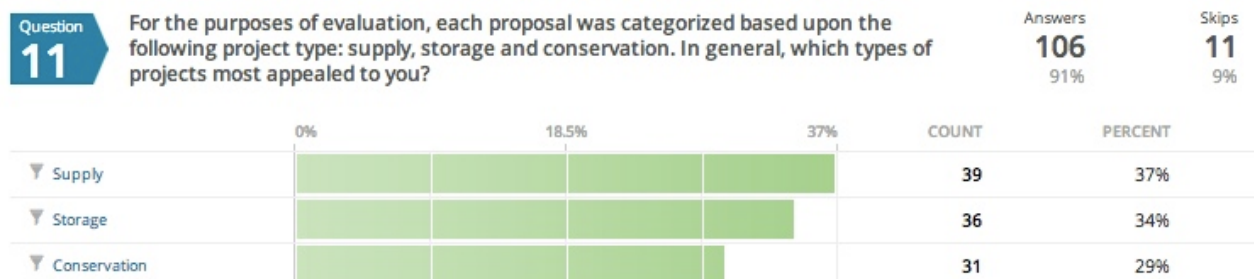
Key Quotes:

“There is plenty excess water in San Lorenzo every winter. A cost effective storage solution is only trumped by a breakthrough energy solution.”

“I consider these demand-side projects. there are still a lot of low hanging fruit (ways to improve efficiency). these are smart & necessary regardless of supply-side additions.”

“Because we are totally dependent on rainfall for our water, securing a supplemental supply of water is the most important consideration.”

This was a follow up question to Question 11 which asked respondents to identify their preferred project type from supply, storage and conservation. The results of question 11 are shown below:



Of those that picked supply and left a comment, most acknowledged the limits of being dependent on rainfall. From a closer review of those who chose supply and left a comment, it seems as though this group believes that conservation alone will not adequately address the current problem and that storage solutions are unreliable because of their dependence on rainfall. Of those who picked storage and chose to leave a comment, many believed that we are receiving enough water naturally and that management and capacity are our main problems. To them conservation falls short, but storage is seen a less costly alternative to developing a new supply. For those who chose conservation and leave a comment they see the problem as being closely related to personal choices, that is people are still using too much water, and that supply/storage options are associated with growth.

Question 13: If you had to select a project, or multiple projects together, to meet the water supply needs of the city, which project(s) would you choose and why?

Key Quotes:

"The whole Conservation panoply, conservation pricing, water neutral development ordinance, the best quarry for more storage, and Locquifer /water transfers to treat our watershed as a whole.

I am concerned about the Soquel aquifer leaking and having private wells, so Scotts Valley looks safer, but it would be great to help out Soquel's saltwater intrusion, if it is truly viable and we could get water back."

"Ground water recharge, off stream storage and water recycling."

"Regional water sharing, managing excess water to support those who need it in bad times. Though we need a diverse portfolio that includes surface water, reclaimed water, groundwater and storm water."

Question 13 resulted in a wide variety of answers, not just in terms of different project groups, but also in regards to individual projects. Out of the 71 comments collected, 12 directly referenced desalination, 12 directly referenced water recycling and 11 directly referenced conservation. These 3 options were the most frequently mentioned, with the rest of the comments discussing a diversity of other solutions, including quarry storage, grey water, aquifer recharge, and off stream storage. among others. No one project or group of projects was significantly more preferable than any other, beyond the 3 previously mentioned.

Question 14: When accounting for all four criteria, which proposal would you rate as being the best overall, and why?

Key Quotes:

“Desalination...because it provides a new source of water. potable reuse is a close second, but ultimately, it is dependent on existing water...provided by rainfall.”

“Desal Alt. Their options are the only ones that address the root problem. they are the only truly sustainable options with long term security.”

“Watershed restoration and early action in dry years, booth 19. Great examples of projects that were successful in 2009 and strategies for convincing the public to conserve water all of the time.”

Only 53 respondents chose to leave a comment clarifying what they felt was the strongest singular project overall. The most frequently mentioned projects were desalination (7), Desal Alternatives group of solutions (6) and recycled water (5). Others mentioned the use of the Liddel Quarry, or an off-stream storage option. Again, no one proposal carried a significant proportion of respondents to warrant an “overall” preferable option amongst those who chose to leave a comment.

Question 15: Out of the proposals you rated today, were there any you do not want to see implemented. If so why?

Key Quotes:

“Desalination

Why not:

- 1. Capital intensive.... Can't build one smaller than 2.5 Mgd*
- 2. Expensive capital cost/ volume of water*
- 3. Expensive operating cost/volume of water*
- 4. Energy intensive.”*

“Recycling water for potable or row crops because our country's chemical laws and use leave us with so many synthetic chemicals we cannot test for them and understand their effects adequately. Rising rates of autism, cancer, and endocrine disruption are critical and we had better pay attention to climate and non-renewable energy use.”

“Most of the apparent independent contractors that are here advertising their services or products. They would not be motivated to conduct adequate research regarding environment impacts and other fields that would not accrue capital for their business.”

Of the 48 respondents who chose to leave a comment for this question, 27 (56%) directly mentioned desalination as a project they do not want to see implemented. While this is a majority of those who chose to leave comments for this question, it is only 23 percent of the total respondent pool.

Question 16: Were there any proposals you wanted to see but didn't?

Key Quotes:

“I would like to see a proposal for allowing each water customer to see, in real time, the amount of water being consumed. somewhat like a smart meter... the city,s water meters are electronic, but they are underground and out of sight, i am not able to lift the heavy water meter lid, but would appreciate having an interface that would let me read the meter from my computer.”

“Limits to population growth, living in watershed sustainably.”

“No, the one I wanted was being proactive before a drought happens and these proposals completely covered that idea.”

Of the 40 respondents who chose to leave a comment for this question, 25 (63%) stated that there were no proposals absent from the convention that they would have liked to see.

Memorandum

To: Water Supply Advisory Committee (WSAC)
From: Bob Raucher and Colleen Donovan, Stratus Consulting Inc.
Date: 11/12/2014
Subject: A closer look at some of the Santa Cruz Water Management alternatives and summary of the “dots” exercise

In this memorandum we present a brief description of each of the Santa Cruz water management alternatives that Stratus Consulting and several of its subcontractors will look at more closely as part of its reconnaissance (Recon) (see Table 1). This is not intended to favor or eliminate any alternatives. Instead, it is an effort to cover a broad range during the Recon phase. We also provide the results of the “dots” exercise in Table 2.

Table 1. An overview of the Santa Cruz water management alternatives that Stratus Consulting and its subcontractors will look at in depth

Focus area	Alternative name from Master List	Solution(s)	Description
Demand	Markowitz: Landscaping, Capture, Reuse	Appropriate landscaping	Grey water for your landscape; minimize irrigation requirements; minimize lawns/design in patios. Rainwater to go into the house/building for domestic, non-potable use.
Demand	Santa Cruz Desal Alternatives (SCDA): Conservation Building Codes	#3 – Building Code Adoption	Forming a working group to consider building code revisions that include onsite water systems. These would go beyond the California Building Code, so that new buildings are highly water-efficient and can capture and reuse water onsite. The city can pass an ordinance requiring efficient fixtures in existing buildings.
Demand	SCDA: Water-Neutral Development	#2 – Water-Neutral Development	Implementing a water demand offset program, in which developers fund conservation retrofits elsewhere in the system to offset the new demand for water created by the development. The city needs to prevent growth from eroding our drought security by adopting a water-neutral growth policy in which developers fund conservation programs that are not already funded by ratepayers.
Demand	Smallman: Conservation Savings Accounts	Conservation Savings Accounts	Conservation accounts: Each water agency will show a special account with a line on each invoice. This account will accrue money from a percentage of the billing. The water agency shall also apply for grants for this program to help build these accounts. How to charge for water: Slowly increase base charge enough to run the agency, and start putting more and more of the high water use fee income toward conservation improvements. Part of the money could go toward capital improvement for the water agency and part could go into these conservation accounts. Eventually, there will be widespread conservation improvements furnished and installed from the money of high water users.
Storage	Bevirt: North Coast Water	Quarry Reservoirs	This project would convert the Liddell and San Vicente quarries into two reservoirs. This would provide a combined 11,000 acre-feet of storage capacity.

Table 1. An overview of the Santa Cruz water management alternatives that Stratus Consulting and its subcontractors will look at in depth

Focus area	Alternative name from Master List	Solution(s)	Description
Supply	McKinney: Expanded Treatment Capacity	Membrane Filtration Plant (MFP)	Implement a new MFP to treat high-turbidity (+ NTU) water from the San Lorenzo River (SLR) or from North Coast streams (Laguna Creek, Majors Creek, and Liddell Creek). Alt 1 (SLR-9): MFP with a treatment capacity of 9 million gallons per day (MGD) located near the SLR, close to the Tait Street Diversion, saving 9 MGD of raw water from the Loch Lomond Reservoir (LLR). Alt 2 (SLR-13): MFP with a treatment capacity of 13 MGD located near the SLR, close to the Tait Street Diversion, saving 13 MGD of raw water from LLR. Alt 3 (BSR-5): MFP with a treatment capacity of 5 MGD located near the Bay Street Reservoir, saving 5 MGD of raw water from LLR.
Supply	McKinney: Ranney Collectors on SLR	Ranney collectors on SLR	An alternative to using the LLR is installing ranney collector wells along the SLR. Installing ranney collector wells along the SLR is an ideal alternative to extracting from Loch Lomond because ranney collectors can filter extremely turbid water.
Supply	Paul: (13) The Lochquifer Alternatives	Lochquifer	Divert up to 6,000 more acre-feet per year (AFY) of SLR/Zayante Creek winter water to Loch Lomond and dispense it from the Lochquifer throughout each year to water districts dependent upon wells, allowing wells to rest and aquifers to recharge quickly. This will involve (1) increasing the Lochquifer pipeline capacity to about 28 MGD by upgrading an existing, aging 14 MGD pipeline and adding a second one; (2) building an 8 MGD conventional water treatment plant to treat Lochquifer water all year; (3) use Ranney collectors for water diversions to filter out turbidity; and (4) build a low-cost settling pond for Felton diversions using large drain pipes.
Supply	Ripley: Reuse for agriculture	Indirect potable reuse (IDPR)/Irrigation	This is the Reclamation/Coast Groundwater Exchange (RCGE) water-supply strategy. The RCGE includes two construction projects: (1) a 4–5 MGD tertiary wastewater treatment plant and associated facilities to deliver water to North Coast farmers for irrigation, and (2) wells and associated facilities needed to extract the groundwater. In all years, the farmers would use reclaimed water rather than groundwater to irrigate their fields. In return, the city would get access to the groundwater supplies that the farmers currently use.
Supply	SCDA: Regional Aquifer Restoration	#7 – Aquifer Restoration	Sending river water to Scotts Valley and Soquel Creek during winter months, allowing these districts to reduce their well pumping and allow the aquifer to recharge.

Table 1. An overview of the Santa Cruz water management alternatives that Stratus Consulting and its subcontractors will look at in depth

Focus area	Alternative name from Master List	Solution(s)	Description
Supply	Santa Cruz Water Department (SCWD): Water Reuse	Recycling (comprehensive)	<p>Option 1: Potable reuse and groundwater replenishment for Tait Well Field</p> <p>Option 1a: Potable reuse and North Coast agricultural irrigation</p> <p>Option 1b: Potable reuse and SLR augmentation</p> <p>Option 2: Joint irrigation and groundwater replenishment for Tait Well Field</p> <p>Option 3: Santa Cruz regional groundwater replenishment project</p> <p>Option 4: Mid-county regional groundwater replenishment project</p> <p>Option 5: Large landscape irrigation with grey water</p>
Supply	Sustainable Water Coalition: Desalination	Desalination as an option	Seawater is pumped to Desalination Plant through filtered intakes at such a low-flow velocity that the effect on marine life would be insignificant. Freshwater distributed to customers through existing water system. Brine waste from the desalination process is transferred to the city's existing wastewater treatment facility. Brine is mixed with treated wastewater and returned to the Pacific Ocean at close to the salinity and temperature of seawater.
Supply	Trevi: Forward Osmosis Desalination	Desalination	Trevi Systems, Inc., of Petaluma, California, has developed a forward osmosis (FO) process that relies on a source of low-grade heat at 80°C to supply a large percentage of the system's energy requirements. Waste heat, rather than electricity, is used to desalinate or remove impurities from the water. This FO process is at least four times more energy efficient than reverse osmosis (RO) in electricity use.

Table 2. A summary of the “dot” exercise

Category	Alternative name from Carie’s list	Alternative name from Master List	Vote tally	In-depth
Storage (on-stream, off-stream, underground, and groundwater development)	North Coast Water Storage (10)	Bevirt: North Coast Water	9.8	Yes
Recycled water	SCWD– 4 Reuse Scenarios – Potable Reuse, Groundwater Replenishment, Industrial Reuse, SLR augmentation (16)	SCWD: Water Reuse	7	Yes
Desalination	Desalination: The Best Strategy for a Truly Reliable Water Supply for Santa Cruz (11)	Sustainable Water Coalition: Desalination	6.8	Yes
Operational performance improvement (incremental supply improvements from current sources included)	WSAC Ranney Collectors (2)	McKinney: Ranney Collectors on SLR	5.5	Yes
Operational performance improvement (incremental supply improvements from current sources included)	Second 10–12 MGD WTP at the SLR Pump Station or Other Proposed Site (2)	McKinney: Expanded Treatment Capacity	3.5	Yes
Demand management	Building Code Revisions and On-Site Water Systems (19–22)	SCDA: Conservation Building Codes	2.6	Yes
Operational performance improvement (incremental supply improvements from current sources included)	Aquifer Restoration via Inter-District Collaboration (19–22)	SCDA: Regional Aquifer Restoration	2.5	Yes
Demand management	Water Neutral Development to Address Growth (19–22)	SCDA: Water-Neutral Development	2.3	Yes
Storage (on-stream, off-stream, underground, and groundwater development)	The Storm Aquarries Plan (16)	Smallman: Storm Aquarries	2.1	No
Regional water management	The Regional Water Authority Plan (5)	Smallman: Regional Water Authority	2	No
Operational performance improvement (incremental supply improvements from current sources included)	Water Supply Infrastructure – Water Loss Control Elements, Relocating the San Lorenzo Intake, and Additional Treatment Facility Elements (19–22)	SCDA: Enhance Existing Infrastructure	1.5	No

Table 2. A summary of the “dot” exercise

Category	Alternative name from Carie’s list	Alternative name from Master List	Vote tally	In-depth
Recycled water	Reclaimed Water, the Perfect Complement to Water Conservation (2)	McKinney: Water Reuse	1.3	No
Recycled water	Reclamation/Coast Groundwater Exchange (8)	Ripley: Reuse for agriculture	1.3	Yes
Recycled water	Trevi Systems: A Low GHG Desalination/Water Re-Use Process (4)	Trevi: Forward Osmosis Desalination	1.3	Yes
Desalination	Aqueous Freshwater Recovery Systems (14)	Aqueous: Desalination (non-membrane)	1.3	No
Storage (on-stream, off-stream, underground, and groundwater development)	Zayante Dam and Reservoir (16)	SCWD: Zayante Dam and Reservoir	1.3	No
Storage (on-stream, off-stream, underground, and groundwater development)	Off-Stream Storage Reservoir (18)	Fieberling: Expand Storage	1.3	No
Storage (on-stream, off-stream, underground, and groundwater development)	Three-Year Reserve of Water for Fish, Drought Relief, and Aquifer Recharge (25)	Malone: Enhanced Storage and Recharge	1.1	No
Demand management	Encourage Climate-Appropriate Landscaping (19–22)	SCDA: Climate Appropriate Landscape	1.1	No
Demand management	Rate Increase Strengthen Water Savings (17)	Holt: Rate-Driven Conservation Behavior	1.1	No
Demand management	Water Conservation Accounts Plan (5)	Smallman: Conservation Savings Accounts	1.1	Yes
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (14) Upgrade Water Intertie	1	No
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (15) Cross-County Pipeline	1	No

Table 2. A summary of the “dot” exercise

Category	Alternative name from Carrie’s list	Alternative name from Master List	Vote tally	In-depth
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (16) Water Looping	1	No
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (13) The Lochquifer Alternatives	1	Yes
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (11) Multi-purpose Settling Ponds	1	No
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (1–10, 22) Foundation Strategies	1	No
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (12) Diversion Alternatives	1	No
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (17) Detention Tub String	1	No
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (18) Weir Systems	1	No
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (19) Stream Relocation	1	No
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (20) SLR Alluvial Plain Wells	1	No

Table 2. A summary of the “dot” exercise

Category	Alternative name from Carie’s list	Alternative name from Master List	Vote tally	In-depth
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (21) Groundwater Rights Management	1	No
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (23) Loch-Down Alternatives	1	No
Operational performance improvement (incremental supply improvements from current sources included)	Recommendations Series: Upgrading Existing Interties, Cross-County Raw-Water Pipeline, Water Looping, and More (1)	Paul: (24) Cowell Railroad Pipeline	1	No
Regional water management	Regional Cross-District Groundwater Management, Restructuring and Consolidation (12)	McGilvray: (10) Regional Collaboration	1	No
Grey water	zNano-Water Filtration System (24)	zNano: On-site Water Reuse	1	No
Other	Beyond Curtailment (Watershed Restoration) (19–22)	SCDA: Conservation Education	1	No
Other	Water-Energy Nexus and Sustainable Water Sources through Ocean Energy (7)	Brown: Zero-emission Wave Energy	1	No
Grey water	Collection of Residential Shower and Bathtub Grey Water to Flush Toilets and Provide Irrigation Water	Garges: Residential grey water	0.5	No
Storage (on-stream, off-stream, underground, and groundwater development)	The Reservoir Plan (16)	Smallman: Reservoirs	0.3	No
Storage (on-stream, off-stream, underground, and groundwater development)	Water Skate Parks (5)	Smallman: Water Skate Parks	0.1	No
Storage (on-stream, off-stream, underground, and groundwater development)	Water Supply Infrastructure – Additional Groundwater Development, and Aquifer Storage and Recovery Elements (19–22)	SCDA: Watershed Restoration	0.1	No

Table 2. A summary of the “dot” exercise

Category	Alternative name from Carie’s list	Alternative name from Master List	Vote tally	In-depth
Demand management	Price Water to Encourage Conservation (19–22)	SCDA: Conservation Pricing	0.1	No
Demand management	Maximum Application of the WaterSmart Conservation and Customer Engagement Program (12)	McGilvray: (9) Implement Conservation	0.1	No
Demand management	How to Save Water in your Landscape and House (6)	Markowitz: Landscaping, Capture, Reuse	0.1	Yes
Demand management	Timely and Adequate Demand Management in Dry Years (19–22)	SCDA: Demand Management During Droughts	0.1	No
Demand management	Composting Toilets in Public Venues (13)	Scott: Composting Toilets	0.1	No
Demand management	WaterSmart Software (9)	WaterSmart: Home Water Reports	0.1	No
Demand management	Rebates to Unlock Water-Efficient Technologies and Retrofits (24)	zNano: Conservation rebate program	0.1	No
Recycled water	Using Available Recycled Water to Irrigate Santa Cruz Golf Courses (12)	McGilvray: (1) Recycled Water for Irrigation	0	No
Recycled water	Tertiary Recycled Treated Water	McGilvray: (8) Tertiary Treatment, Reuse	0	No
Recycled water	The Recycle Plan (5)	Smallman: Recycled Water	0	No
Other	Atmospheric Water Generators	DewPoint: Atmospheric Water Generation	0	No

Draft

Santa Cruz Water Supply Advisory Committee

Technical Summary for Alts Selected for Recon Evaluation and MCDS Exercise

The attached form presents a draft approach to a concise summary presentation for characteristics and initial evaluation for the City of Santa Cruz water supply alternatives. Key features include:

- Estimated alternative annual yield
- Assessment of reliability
- Estimated costs at an order-of-magnitude accuracy level. Costs include both the initial estimates and an error bound around the estimate, typically minus 50 percent to plus 100 percent at this accuracy level.

The summary also will present abbreviated notes on implementation and permitting requirements together with environmental considerations, any legal requirements, and overall issues to resolve if the City proceeds with further planning and implementation. Implementation will address construction activities and constraints. Permitting will list known permits such as might be required from California Fish and Wildlife (e.g., stream bed alteration permit), National Marine Fisheries Service, and Caltrans (e.g., easement for a pipeline along state highways). Environmental issues could include known sensitive habitats, fish bypass flows, energy and carbon footprint needed per unit of water delivered, and construction or operational concerns. Legal issues might include water rights and cross-jurisdiction water transfers. Overall issues might address the need for interagency agreements over water transfers and water storage.

City of Santa Cruz Water Supply Advisory Committee		
Recon Phase -- Technical Summary		
Convention Number	Title:	
Description:		
Estimated Annual Yield (million gallons [MG])		
Reliability Over Time (seasonal and inter-annual variability)		
Costs	Best Estimate	Likely Range
Capital		
Annual		
Present Value		
Capital cost/MG		
PV Cost/MG		
Energy (KWh/MG)		
Key Components		
1	6	
2	7	
3	8	
4	9	
5	10	
Implementation Requirements Summary		
Required Land Area (acres)		
Permitting Summary		
Legal Requirements/Issues		
Environmental Considerations		
Issues to Resolve		
Initial Evaluation		
Effectiveness		
Practicality		
Environmental Impacts		
Weighted		

“What If” Conditions to Consider with MCDS Exercise

As part of the intent to help “explore the decision space” and the associated application within the MCDS model, we have constructed the following “What If” contexts for the Committee’s consideration:

Forward Osmosis (Trevi Systems). The technical feasibility and reliability of Forward Osmosis (FO) is an important unresolved issue. For membrane treatment systems (such as deployed for most desal, water reuse and other advanced water treatment applications), FO potentially is an attractive alternative to the Reverse Osmosis (RO) membrane systems that currently are prevalent in municipal-scale treatment systems. FO is much potentially less energy intensive than RO-based processes, alleviating one of the large concerns about some water supply alternatives that rely on membrane processes. If FO systems are found to be reliable and effective over the long term at large-scale applications, then several supply options would require a lot less energy and have a far smaller carbon footprint than would be the case with RO. However, FO is in the field test stage, and so we assume here that its practical ability to provide reliable long-term service is unknown. In contrast, RO is widely used and has a long, proven track record.

1. How does this affect your thinking about this Alt? Compared to other Alts?
2. How would this situation affect how you think about portfolios? Adaptive management?
3. How would this play out in applying the MCDS model?

Potable Reuse. The State of California is poised to issue regulations (by 2016) enabling and governing Direct Potable Reuse (DPR), such that it will be safe and reasonably cost-effective. However, until the regulations are finalized and in place, it is uncertain whether this alternative will be a viable or cost-effective option for Santa Cruz. There also is the real potential for significant public acceptance barriers to DPR, or even indirect potable reuse (IPR) in Santa Cruz.

1. How does this affect your thinking about this Alt? Compared to other Alts?
2. How would this situation affect how you think about portfolios? Adaptive management?
3. How would this play out in applying the MCDS model?

To: WSAC
From: Rick Longinotti
Re: Shortfall numbers for simplified Scenarios

At its October meeting, the WSAC charged me with coming up with some worst-case drought shortfall amounts for future scenarios. I chose two scenarios that are significantly different in the amount of supply shortfall during a worst-case drought.

The shortfall amounts that I am submitting for the scenarios are the following:

1. 1977 stream flows; significant reduction in demand = 0 shortfall
2. 3rd drought year; minimal reduction in demand = 1 billion gallons shortfall

Both scenarios assume DFG-5 fish flows.

Note about Scenario #1: If demand in 2035 is significantly lower than current demand (2012-2013 average), there would be ample water in the reservoir to meet demand in the second drought year (1977-type year). There are a number of ways that this lower demand could be achieved. See the appendix to this memo if you would like to see one example.

Note about Scenario #2: Assume that a drought equivalent to 1976 and 1977 is followed by a third critically dry year in which yield from river and streams is 20% below that of 1977. Assume that demand in 2035 is slightly lower than current demand (2012-13 average).

Suggestions for Research

The exercise in future scenarios has brought to light some areas of needed research.

1. How can the Confluence Model be modified to account for City action to reduce demand during drought years? Currently the Model assumes that normal demand will be completely met without any sort of curtailment --- even in a record dry year. The result of this assumption is that the Model is limited in its ability to depict real-life shortfalls during multiple drought years.
2. Will the Model be updated in time for WSAC consideration? As the DFG-5 spreadsheet from Gary Fiske states, the DFG spreadsheet was developed for the Draft EIR for the desal project in 2013. Calif Dept. of Fish and Wildlife had some suggestions for updating the Model in their comment on the DEIR. City staff are now working on updating stream flow data that will be entered into the DFG-model.
3. Does the Model include any assumptions regarding the current practice of recharge of the reservoir via Felton Diversion?

Accompanying this memo are the following documents

- The Excel document that Rosemary sent me that depicts Confluence Model results, *DFG-5 DEIR Mod Assump Prod & Lake Levels*, depicting the worst-case year under the DFG-5 flow regime.

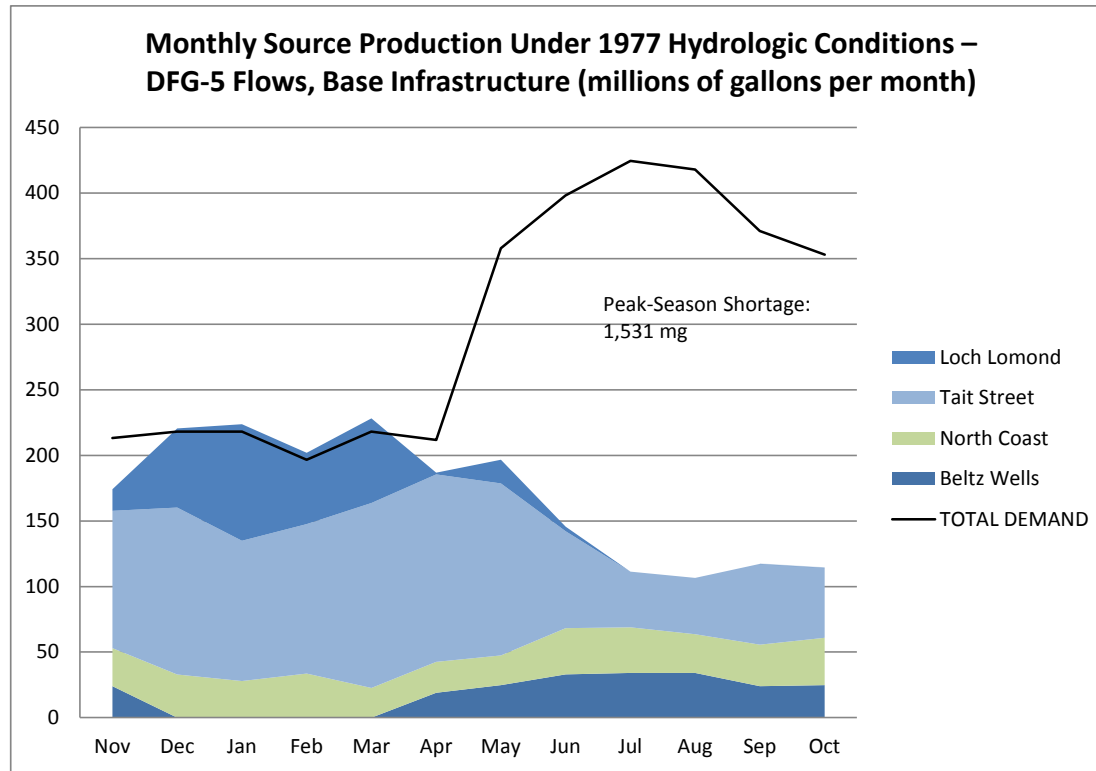
- Sue Holt's submission to the WSAC, "Rate Increases Strengthen Water Savings"

Appendix: Example of how demand in 2035 could be significantly lower than current demand:

Demand in 2035 can be derived as follows:

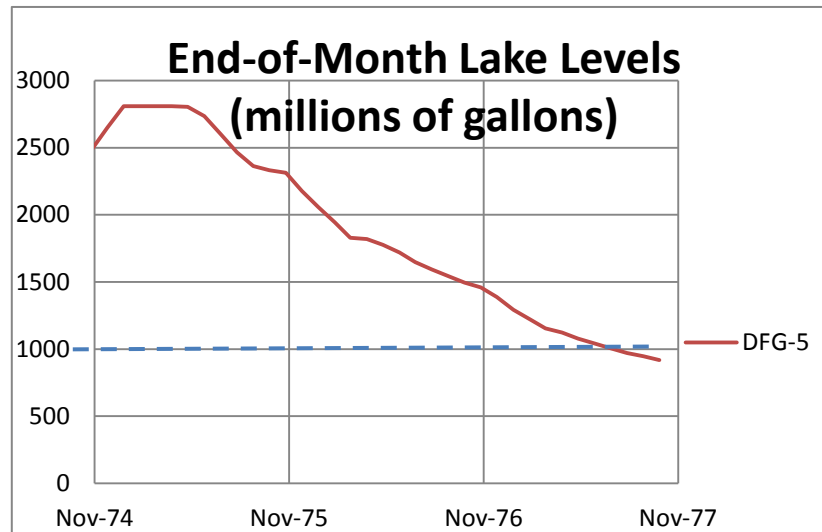
- Update the baseline (For existing demand use the average of 2012/2013 rather than previous estimates of what demand would currently be.)
- Add the growth in demand by 2030 projected by the City's *Water Supply Assessment* (2011) for the General Plan
- Subtract the amount of water saved through adoption of the Master Conservation Plan & Ca. Building Code; the LAFCO water-neutral requirement for UCSC growth; and the water saved as a result of the current price increase of 61% over 5 years.

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Beltz Wells	24	0	0	0	0	19	25	33	34	34	24	25	218
North Coast	29	33	28	34	23	24	23	35	35	30	32	36	360
Tait Street	105	127	107	114	141	143	131	74	42	43	62	53	1,142
Loch Lomond	16	60	89	54	65	1	18	3	0	0	0	0	307
TOTAL DEMAND	213	218	218	197	218	212	358	398	425	418	371	353	3,598



End-of-Month Lake Levels 1975-1977 Water Years
DFG-5 Flows, DEIR Modeling Assumptions

Nov-74	2483.323
Dec-74	2649.91
Jan-75	2808.322
Feb-75	2810
Mar-75	2810
Apr-75	2810
May-75	2803.982
Jun-75	2736.507
Jul-75	2603.698
Aug-75	2465.067
Sep-75	2364.548
Oct-75	2332.927
Nov-75	2312.415
Dec-75	2178.531
Jan-76	2058.157
Feb-76	1943.753
Mar-76	1829.361
Apr-76	1820.609
May-76	1777.577
Jun-76	1719.115
Jul-76	1648.363
Aug-76	1592.954
Sep-76	1543.259
Oct-76	1495.669
Nov-76	1460.844
Dec-76	1388.317
Jan-77	1292.293
Feb-77	1221.595
Mar-77	1153.677
Apr-77	1123.605
May-77	1078.955
Jun-77	1042.575
Jul-77	1005.809
Aug-77	969.947
Sep-77	945.907
Oct-77	917.986



RATE INCREASES STRENGTHEN WATER SAVINGS

Sue Holt

October 6, 2014

suholt@cabrillo.edu

DROUGHT AND RATIONING

Our three-year drought and water rationing imposed May 1st have encouraged most of us to find ways to save on water use. Our motives are many – to “do the right thing” to help our community live with less supply, to live within our household ration limits and avoid penalty fees, and to curtail spending while we recover from the recession.

Total water use by Santa Cruz customers is now down to around 7 million gallons a day (mgd), from a normal summer level of about 10 million gallons a day in a healthy economy. That amounts to 30% water savings across all users – residential, commercial, and others. An astonishing 93% of households have lived within their ration limits this summer. This is the “new normal” for us – if the drought continues and no new supplies occur, and population doesn’t grow.

WILL WE CONTINUE OUR LOWER WATER USE? REBOUND OR NOT?

Some city officials and consultants expect that water use will rebound when the drought and rationing end and the economy is healthy again.

But the drought and recession have lasted an unusually long time by recent standards, long enough that our community has changed its water use habits. Social norms have changed too. Our 93% compliance with ration limits is strong evidence of changed habits and norms.

What will the new normals for water use and rainfall be? Will our conservation norms persist if the rains return to normal and when the local economy recovers? Will we keep some or all of these new water habits or will a wet winter erase them? What conditions can help us maintain lower water use levels?

The City Council recently approved drought surcharges (temporary) and rate increases (permanent). Rates rose 15% on October 1. Over the next five years they will rise 61%. (That’s 10% a year compounded over 5 years, necessary to finance capital improvements and stabilize revenue.)

So the question is will these higher prices for water sustain, maybe even increase the water savings we have achieved in the last few years? If there is a rebound in water demand – from 7 mgd to some higher level, will it be small or large?

Surprises are in store for those who expect a sizeable rebound in water use if it doesn't occur. Or surprises for those who expect that new habits and higher rates will curtail more use than subsequently might occur.

Will demand return to 10 mgd or stay below that level? We don't know, but we have tools to make educated guesses. And the City may eventually fund a study to learn the answer. In the meanwhile, what does previous research show?

WHY WATER DEMAND WILL STAY BELOW 10 MGD

When rates rise, customers tend to cut back on water use to some degree, and a smaller supply of water is required to meet their demand. Table 1 gives estimates of the extent of water that will no longer be needed from the city system as customers curtail their use in response to the rate increases. (The calculations are explained in footnotes and Table 2.)

Table 1. Estimated Water Savings Due to Santa Cruz's Recent Rate Increases

		2015	2020 +
Rate change		15% more	61% more
Demand change		4.5% less ¹	42.7% less ²
Projected Water Savings ³	Single Family Residences only	65 MGY ⁴ at \$0 additional cost 178,000 gd ⁵	630 MGY at \$0 additional cost 1,726,000 gd
	All Users	160 MGY at \$0 additional cost 438,000 gd	1500 MGY at \$0 additional cost 4.1 mgd ⁶
	Very conservative – cut all savings to 40%	175,000 gd	1.6 mgd

¹ Estimates that demand initially falls by 3% for any 10% increase in rates, based on research in Table 2.

² Estimates that demand eventually falls by 7% for any 10% increase in rates, based on research in Table 2.

³ Assumes no drought, a healthy economy, and normal demand of 3500 million gallons a year.

⁴ MGY = millions of gallons a year.

⁵ gd = gallons a day.

⁶ mgd = millions of gallons a day.

Economists use the term “elasticity” for the size of customer response to higher water prices. They have estimated its impact on water use across many communities and several decades. The careful estimation process must separate the effects of rate changes from simultaneous changes in weather and conservation programs, and variation in household size, income, landscaping and irrigation.

This large body of peer-reviewed research, described in Table 2, shows that the typical single family household will reduce water use 3-4% when rates rise 10%. People can be flexible about their water “wants” as long as they can satisfy their water “needs.”

Realistically, as we experience rate increases, some households that are already strongly conserving may not be able to reduce their use much further. But wherever there is greater discretion in how water is used, the responsiveness is larger. Research shows there is greater discretion among larger users in higher-rate tiers, for higher-income households than lower-income, during dry seasons than wet ones, for larger lots than smaller ones and for outdoor uses vs. indoor.

INITIAL BEHAVIOR

People are motivated by rate increases to become water-wiser and more efficient – just as they are motivated by drought, water rationing, and a weak economy. They change some habits and some fixtures. These behaviors include learning more about their own water use, replacing or repairing equipment (e.g., dripping faucets), and practicing more cautious use patterns. Each household makes its own choices about what to learn, what to fix or change, and what to be more cautious about (e.g., shorter showers vs. irrigation timing). Different households make different choices, depending on the characteristics of their household, their habits, knowledge, and the savings and livability they expect from any method of reduced water use.

EVENTUAL BEHAVIOR

Given more time, studies show that customers become more conserving – because they get more opportunity to learn, to change habits, to replace less efficient equipment, and to choose new technologies that were previously unavailable or expensive (e.g., a meter monitor on a kitchen counter). Over time, social norms also shift more toward conservation and away from outward signs of heavy water use (e.g., lush lawns, water running down the sidewalk). Therefore, the total effect of any rate increase becomes larger over time, across the five years our rates will increase and beyond. Studies show that this long-run effect in households is around 7% for a 10% increase in rates.

THE WELL-INFORMED CUSTOMER

People don’t tend to closely monitor their purchases of low-cost items. And when rates are low, being uninformed about water-savings opportunities makes sense. The effort to become better informed may not generate much savings on the water bill. So they’ll tend to ignore water conservation programs and rebate offers.

But new information about water use, information that is household-specific, has been shown to cause reductions in water use by itself. For example, when multi-family units are sub-metered, water use in California cities tends to fall 15% (item 6, Table 2). And when irrigation accounts in Santa Cruz were billed more frequently (monthly vs. bi-monthly), water use fell 11% (item 16, Table 2). When East Bay Municipal Utility District and Soquel Creek Water District used WaterSmart software to show its customers how their use compared to their neighborhood, water use fell 5%.

Higher rates plus feedback about household-specific water use, more feedback and more frequent feedback, energizes all customers to pursue their cheapest options for water savings. Officials cannot know which conservation methods or water use restrictions work best for which customers. But customers know and when rates rise, they achieve much more conservation and at a lower cost, than any conservation master plan can achieve. As a result, the entire community cooperates to conserve water in the cheapest and most reliable ways.

SANTA CRUZ CAN PLAN FOR DEMAND CHANGES – AVOID WASTEFUL PROGRAMS

Our new rates will do a lot to encourage water efficiency, beyond what the drought and City conservation programs have accomplished. For example, the research in Table 2 shows that household water use is twice as sensitive to rate changes as weather conditions (items 1 and 4). Officials may complain that there are few takers for conservation rebates when rates are low, but they find many more takers when rates rise. The primary reason is that higher prices strengthen the motive for water conservation and encourage customers to become better informed in order to capitalize on water-saving opportunities.

In its conservation master plan, the Water Department has focused on education and replacement and rebate programs. The plan does not address rate responsiveness. Yet it is reasonable and useful to do so. There is reason to be concerned that the conservation master plan will prove unnecessarily expensive – not because people won't conserve but rather because rate increases are motive enough and the master plan might generate little additional savings.

Over the next several years officials may be surprised by the extent of conservation that water customers will choose. And if conservation is not properly anticipated, new supply projects may prove too large and too costly.

EFFECTIVENESS

1. **Water savings estimated at 438,000 gallons a day in the first year and 4.1 million gallons a day after several years. See Table 1.**

Using peer-reviewed, careful elasticity estimates, we estimate that single-family residences will respond to rate increases by reducing their demand about 65 MGY initially (2015) and by 630 MGY eventually (2020 and later). If other users can be characterized by the same elasticity values as single-family residences, then total water demand will drop by 160 MGY initially and 1500 MGY eventually. To the extent that these estimates are valid, the rate increase alone will eventually **reduce demand, and therefore desired supplies, by 43% (1500 MGY, or 4.1 mgd).**

2. Most customers won't experience substantially higher rates until they move into higher tiers during dry months, when most outdoor use occurs. That means the estimated

water **savings will occur primarily during the peak dry months, when we most need it.**

3. Now let's be **especially conservative**. Suppose Santa Cruz isn't typical of the communities where these elasticity values were calculated. Suppose that those elasticities are too high for Santa Cruz, say 2.5 times too high. Even then we can expect total demand to drop by 65 MGY initially and 600 MGY eventually, mostly during the peak season. This amounts to a 17% reduction in demand without any drought or recession effects. This effectively spreads existing supplies 17% further **by saving 600 MGY or 1.6 million gallons a day; it closes 17% of the gap between demand and supply.**
4. The elasticity effect will interact with any other programs the City uses – conservation outreach and rebates, and any feedback such as WaterSmart billing information. **Synergies among these programs will make all of them more effective.**

PRACTICABILITY

1. **Estimated Costs = \$ ZERO.** This is not a major new capital project. It involves no new facilities, programs, land acquisition, or staff. This is an existing program, simply one whose consequences have not been fully anticipated and incorporated in the conservation plan.
2. **\$0 per million gallons saved.** This proposal is the least-cost, most cost-effective method among all those proposed. It will not create huge new supplies but it is the cheapest route to any additional water savings.
3. **Proven implementability.** It is a normal, common and widespread practice for water agencies to raise their rates as their costs increase. The effects on water users have been documented extensively in the water resources literature (see Table 2). Rate increases reliably dampen demand, regardless of whether that is the intent.
4. **Proven acceptability.** These rate increases have gone through public hearings and been adopted by the City Council. They went into effect October 1.
5. **Avoid some costly new supply projects** that end up being idled once the full rate increases are in effect and customers have exploited the widest variety of conservation opportunities.

ENVIRONMENTAL AND COMMUNITY IMPACT

1. Promotes **sustainability**, and living within the limits of our natural water supplies. Demonstrates that Santa Cruz can **"walk the talk."**
2. Promotes our community **adaptation** to a warmer, potentially drier climate. Increases our ability to make less water go further.
3. Contributes to **fairness and equity** – The heaviest water users will face the highest costs. Tiered rates will still offer the lowest rates to those who consume the least water.

4. Rewards customers who become **better informed** about their water use and their options to conserve.
5. Encourages **innovation** in water waste reduction methods and in water-conserving equipment and services.
6. Increases demand for **water-saving programs and technologies**. More customers and sales for businesses and workers who offer water-conserving equipment and services.
7. Reduces **greenhouse gas emissions** as less water is collected, pumped, stored, treated, and delivered.
8. Protects **fish** flows by reducing water use, especially in peak-demand dry months.
9. Protects **native habitats** by promoting native landscapes. Supports native birds, bees, and butterflies.
10. Reduces demand for **water-intensive landscapes** and the businesses and employment that support them.
11. Reduces demand for **spas and hot tubs** and the businesses and employment that support them.
12. Encourages **collaboration among** neighbors interested in sharing water-conserving ideas.
13. Builds stronger **social norms** for water conservation.

UNKNOWNNS

1. **How “typical” are City water customers compared to those in the research literature?**
Will the City experience the same reduction in water use as is characterized in the research or more or less?
2. What **margin of error** should the City use in estimating the demand reduction?
3. Can **customers who are not single-family residents** be characterized by the typical values in the literature? Will they reduce their water use by the same percentage, or more or less?
4. In the past, when droughts ended and the local economy had recovered from recession, water demand rebounded. But now, **have rates and norms and conservation technologies changed enough to permanently dampen water demand compared to past recoveries?** If so, will the rate responsiveness make water demand even lower than it currently is?
5. The City has a number of education, rebate, and replacement programs in its draft Water Conservation Master Plan. Some of the use of these programs will be due to rate responsiveness

and some to other reasons. What portion of these opportunities will customers use because of the rate increases?

6. **What risk does the City take** if and when it assumes a certain level of rate responsiveness among its customers? If future demand turns out to be larger than expected, will curtailment programs be necessary? If future demand is smaller than expected, will new supply facilities need to be idled?
7. If rates don't keep pace with income growth and inflation, will water demand rebound? How much? How soon?
8. How responsive will water demand be to population increases?
9. How much higher can rates go before customers exhaust all reasonable water-saving methods? At what level of rates will demand harden?

I'd like to hear from you. Please contact me with questions and ideas. You can reach me at suholt@cabrillo.edu

Table 2. Elasticity Estimates for Water Demand, peer-reviewed publications

	Elasticity Value	Context	Citation
1	average is -0.51; short-run median is -0.38; long-run median is -0.64; tiered rates have strong effects compared to weather & household size	meta-analysis of 124 estimates, 1963-93	M. Espey, J. Espey, W.D. Shaw, Price elasticity of residential demand for water: a meta-analysis, <i>Water Resources Res.</i> 33 (1997), 1369–1374. http://ron-griffin.tamu.edu/x677/readings/espey.pdf
2	-1.6 at top tier rates in summer, so 10% increase in summer price leads to 16% drop in water use	summer residential use, average lawn 9000 sqft, 1981-85, Texas	Julie A. Hewitt and W. Michael Hanemann, A Discrete/Continuous Choice Approach to Residential Water Demand under Block Rate Pricing, <i>Land Economics</i> , Vol. 71, No. 2 (May, 1995), pp. 173-192 http://www.jstor.org/discover/10.2307/3146499?uid=3739560&uid=2&uid=4&uid=3739256&sid=21102471684651
3	-0.46 year-round average; -0.36 in winter; -0.70 in summer	review of 18 studies	Hanemann, W. M., 1997, Determinants of urban water use, in <i>Urban Water Demand Management and Planning</i> , Baumann, D. et al, eds., McGraw Hill, New York , pp. 1-75. http://are.berkeley.edu/courses/EEP162/spring2007/documents/hanemannDeterminantsUrbanWater.pdf
4	twice as strong in summer or in drought (-0.23 to -0.30) as in winter or in plenty (-0.14); but price may get credit for drought effects	aggregated across 3 Bay Area districts before (1982-86) and during (1987-92) drought; restrictions	Corral, L., A.C., Fisher, N.W. Hatch. (1999). "Price and Non-Price Influences on Water Conservation: An Econometric Model Aggregate Demand under Nonlinear Budget Constraint." Dept. of Agriculture and Resource Economics, UCB, UC Berkeley. http://escholarship.org/uc/item/3gx868tg
5	mean of -0.41, median of -0.35	meta-analysis of 314 estimates	Price and Income Elasticities of Residential Water Demand: A Meta-Analysis, <i>Jasper M. Dalhuisen, Raymond J. G. M. Florax, Henri L. F. de Groot, and Peter Nijkamp, Land Economics</i> , May 2003, 79(2): 292-308. http://ron-griffin.tamu.edu/x677/readings/dalhuisen.pdf
6	-0.27 in short run for indoor multi-family use; indoor water use dropped 15% with submetering	460,000 units in 13 mostly western US cities, 1999-2002	Peter W. Mayer, et al, National Multiple Family Submetering And Allocation Billing Program Study, 2004, Aquacraft, Inc. and the East Bay Municipal Utility District. http://li215-232.members.linode.com/sites/default/files/pub/Mayer-(2004)-National-Submetering-and-Allocation-Billing-Study.pdf
7	long-run ranged from -0.39 to -0.84	16 south Florida water districts, single family use, 2002	Whitcomb, J.B., Florida Water Rates Evaluation of Single-Family Homes, Southwest Florida Water Management District, 2005. http://www.swfwmd.state.fl.us/documents/reports/water_rate_report.pdf
8	-0.38 average; -0.26 for high income; 40% larger when price posted next to quantity used	1995, 383 utilities	Gaudin, S., Effect of price information on residential water demand, <i>Applied Economics</i> , 2006, 38:383-393. http://ron-griffin.tamu.edu/x677/readings/gaudin2006.pdf
9	short-run values of -0.3 to -0.4; larger values at higher rates	hundreds of studies reviewed	Olmstead, SM, and RN Stavins, "Managing Water Demand: Price vs. Non-Price Conservation Programs," Pioneer Institute White Paper No. 39, 2006. http://www.hks.harvard.edu/fs/rstavins/Monographs_&Reports/Pioneer_Olmstead_Stavins_Water.pdf

	Elasticity Value	Context	Citation
10	-0.33 on average; -0.61 with tiered rates	1028 households, 16 urban agencies, 1990s	S.M. Olmstead et al., Water demand under alternative price structures, <i>Journal of Environmental Economics and Management</i> 54 (2007) 181–198 http://www.hks.harvard.edu/fs/rstavins/Papers/Water_Demand_JEEM.pdf
11	short-run values of -0.263 to -0.522 for those consuming twice the average (40 CCF/bill)	City of Santa Cruz households, 1994-98	Nataraj, Shanthi. "Do Residential Water Consumers React to Price Increases? Evidence from a Natural Experiment in Santa Cruz." <i>Agricultural and Resource Economics Update</i> 10(3) (2007):9-11. http://giannini.ucop.edu/media/are-update/files/articles/v10n3_3.pdf
12	indoor water use not responsive; -0.48 for large-lot outdoor use by above- avg income; -0.87 for small-lot outdoor use OR below- avg income	1028 households, 16 urban agencies, 1990s	The Value Of Scarce Water: Measuring The Inefficiency Of Municipal Regulations, Erin T. Mansur and Sheila M. Olmstead, NBER Working Paper 13513, 2007. http://www.nber.org/papers/w13513
13	from -0.34 for low users to -0.75 for high users; restrictions only gave 6- 14% reductions	10,000 households, 1997-2005, big rate increases, major drought, restrictions	Kenney, D.S. et al, Residential Water Demand Management: Lessons From Aurora, Colorado, <i>JAWRA</i> , 44:1, 2008. http://www.kysq.org/docs/Kenney.pdf
14	if shortage is 20% & elasticity is -0.40, then shortage will be avoided by temporary 50% price increase	overview – no data	Comparing price and nonprice approaches to urban water conservation, Sheila M. Olmstead and Robert N. Stavins, <i>Water Resources Research</i> , Vol. 45, W04301, doi:10.1029/2008WR007227, 2009. http://www.hks.harvard.edu/fs/rstavins/Papers/Olmstead_Stavins_Water_Resources_Research.pdf
15	elasticities at least twice as big in winter as summer, and larger for lower water users: -1.93(-0.99) for smallest users, -1.53 (-0.45) for largest users, in winter (summer); drought cuts summer elasticity by close to 2/3	metro Phoenix data aggregated across 11 census blocks, 5 percentile ranks, 2000-03, new rates each season	H. Allen Klaiber, V. Kerry Smith, Michael Kaminsky, and Aaron Strong, Measuring Price Elasticities for Residential Water Demand with Limited Information, 2012 paper. http://aede.osu.edu/sites/aede/files/publication_files/Klaiber%20-%20Price%20Elasticities.pdf
16	11% less use due to switch from bimonthly to monthly billing	55 residential irrigation accounts served by City of Santa Cruz, 2006- 2011	Pourzand, Roxanna Neda, The Response Of Large Irrigation Accounts In Santa Cruz County To A Change In Billing Cycle: Implications For Conservation, UCSC senior thesis, 2012. http://ciwr.ucsc.edu/document_links/pourzand_senior_thesis_2012.pdf

Esteemed Ctte Members—

In this packet you will find information that brings you closer to the end of Recon:

- A schedule of the final MCDS progression (separate attachment)
- The third draft of the MCDS Recon model, with changes from the 2nd draft highlighted (separate attachment)
- A discussion of roles and commitments for this final stretch (below)

At the end of this screed there is a series of questions for you. If you are skimming, please skim that far. Let me know your answers by e-mail.

First, the highlights of the schedule:

- ‘Finalize’ the model for purposes of Recon in the November meeting (quotation marks because you may want to fiddle with it at the December meeting) and agree on simplified scenarios and a decision-space-exploring sample of proposals to apply the model to
- Within days of your November meeting the City provides preliminary, highly guesstimated technical ratings
- Starting on the 29th of November, you engage in a series of small meetings to test and discuss the model with Nicholas or me. (Remember when Mark talked about how his ratings assumptions changed as he worked through the proposals? The idea here is to take the kind of internal dialog Mark found himself in but do it in small groups.)
- Question for below: how you engage with your constituents in this time...
- After your group meetings you’ll have until December 5th to channel your constituents, complete your inputs to the MCDS model and press the ‘I’m done for this round’ button that Philip is coding for you. (Why so little time? Because we need to give Philip a few good days for making the interim report, upon which so much in the December meeting hinges-- and I want the report to be timely in the packet.)
- Because you haven’t done enough work yet I would like to ask you to fill out a survey focusing on “to what extent have we met our Recon goals?”
- Philip prepares an interim report for your December packet. (See draft outline below.)
- Meanwhile the consultant team prepares slightly more thorough ratings for some of the criteria and some of the proposals, which we can toss into the MCDS Recon model at the December meeting (it will be interesting to see how much these will improve the power of the model).
- At the December meeting make sure we have met the Recon goals (greater collaborative capacity, keener understanding of the overall problem, greater understanding of processes/time constraints/tools and uncertainty, deep understanding of proposals and how they might fit in portfolios... in short, readiness for the Real Deal).

- At or shortly after the Dec meeting (or after the final report?) you fill out the same “have we met our Recon goals” survey.
- Philip prepares a final report.

So now in the final stretch, these are your roles and commitments—do you agree?

- Committee
 - Appreciate the courage and transparency the city staff is showing in providing preliminary ratings for the model. When they do this they will be giving you a rare insight into their perspectives and rationales. This is a gift. Be kind. On the same note, they are making estimates, as required for Recon. This requires a great deal of trust. Please never quote these ratings except in the context of Recon.
 - You will be doing the non-technical ratings; eventually it is your job to evaluate and weigh these factors—please be willing to take the same leap of faith as the city is in rating the following subcriteria (or let me know if you think these are really technical ratings that you ought not to originate):
 - Political Feasibility
 - Legal Feasibility (or ask lawyer?)
 - Traditional Landscapes
 - Climate-Adapted Landscapes
 - Preserves Future Choices
 - Look over City ratings with a keen eye and, if you change them in the MCDS model, *use the comment button to explain your rationale*
 - Weigh the criteria and subcriteria, check the ‘see why’ page, fiddle around with the weights and gut check them, seriously now...
 - Coordinate with your constituents
 - Answer the two “did we get the job done in Recon” surveys
- City-- do initial ratings
- Consultants—provide some refined ratings and participate in the spirit of Recon adventure in ‘what ifs’ at the December meeting.

And now the questions—please e-mail Nicholas or me with your thoughts.

- Yes to the Committee items above?
- How do you want to involve your constituents in the Recon MCDS exploration?
- Are you available for MCDS model get-togethers late Nov/early December? (We’ll be scheduling those at the November meeting.)

Thank you.

Carie

Preliminary report draft outline

Most useful insights gleaned from Philip's direct analysis of MCDA data

Gleaned from Philip's analysis but lower priority;

City collates and does basic analysis

Things to be gleaned directly from Ctte about their experience

Focus on what is needed to set up for December meeting!

- Looking for strengths and weaknesses in the model
 - too much lumping or too much splitting
 - correlation and double dipping
 - “natural weights” meaning that people have an easy time getting their weights to shine through
 - catches the tensions
 - are people using the full breadth of the scales?
- Report on comments (city or consultant does with input from Carie and Philip)
 - comments already organized by criterion
 - types (e.g., website, model structure, alternatives ratings, alternatives uncertainty)
 - formats and sends out
 - look at rationales for ratings changes
 - comments about uncertainty
- Committee Involvement:
 - activity level for ratings changes (from City origin) at gross level
 - activity level for ctte-originated ratings
 - activity level for putting in the rationale
 - degree of contrasts in weights and ratings and where they occur for different futures
 - did they look at the ‘see why’ screen? Did it resonate?
- What pops out just at the single future level:
 - weights portraits
 - simple stuff about areas of tension and agreement
 - city-originated ratings changed and comments about ratings—which criteria?
 - analysis of ctte-initiated ratings
 - thoughts (graphics) about uncertainty related to ctte-initiated ratings
 - simple stuff about sensitivity to ratings
- Comparisons of futures: what pops up
 - Which weights and criteria were most affected by the different simplified scenarios?
 - Which alternatives shift (in terms of both ratings and decision scores) most across simplified futures
 - Look at how uncertainty changes across futures, as indicated by variation in decision scores
- What's Next—meeting focus based on these results

3rd Draft Recon Model

I took comments from Oct meeting, touched base with Dana, David B, Sarah, Doug, Bob and Rosemary and made some changes (which are noted below). -CF

Yellow highlights are changes since last meeting

Implementability

Note: The likelihood of getting this approach done.

Question: How much does each subcriterion matter to you in meeting the requirements for implementability?

Technically Feasibility

Note: Technical feasibility is an estimate of whether this approach would work as envisioned.

Question: How feasible is this approach technically?

Scale: *Proven in cities, Demonstrated in field, Promising in 3-5 years, Promising in 6-10 years, Not promising*

Note: If the planning horizon is 50 years and the “speculative technology” horizon is 10 years, that may be a bit of a disconnect. On agenda for November meeting and a very good topic for first stage of Real Deal.

Legal Feasibility

Note: This addresses siting, water rights or other legal rights relevant to implementing this approach as envisioned. If you feel that changes to the law are required and should be pursued, please make a comment to that effect (we don't want the need for new laws to be a 'fatal flaw' but nor do we want to make a whole separate subcriterion “needs change in law.”)

Question: Are the necessary rights currently held?

Scale: *Rights are secured and unambiguous, Rights are secured but ambiguous, Rights to be acquired, Rights controversial, Rights not obtainable*

Regulator Feasibility

Note: This addresses environmental and regulatory review.

Question: Is the approach likely to receive easy and quick regulatory approval? If you feel this is unlikely or highly unlikely, please comment on why (environmental, earthquake hazard, human health etc.)

Scale: *Easy and quick, Some complexity, Uncertain, Unlikely, Highly Unlikely*

Note: I split legal and regulatory feasibility and adjusted the scales per conversation with David..

Political Feasibility

Note: Extent to which an approach will claim and retain the support of formal political entities as well as informal social and political groups. This applies to demand reduction (e.g. volunteerism, finances for incentives or enforcement of regulations) and to supply (e.g. majority public vote requirement for desalination, willingness to make large capital investments or concerns about oversupply and water immigration.)

Question: What level of political reaction is this approach likely to have?

Broad Enthusiastic, Solid, Moderate, Indifference, Active Resistance

Cost-Effectiveness

Cost to the City: Upfront costs

Note: This addresses siting, planning, designing, obtaining rights and permits and other upfront costs.

Question: What are the upfront costs for this approach?

Scale: *Numeric scale in \$/MG*

Cost to the City: Operation and Management

Note:

Question: What are the operation and management costs for this approach?

Scale: *Numeric scale in \$/MG*

Cost to the Customer (may be more than one subcriterion)

Note: This cost is based on a (simplified) lifecycle cost (capital cost divided life of project plus annual O&M converted to cost per gallon) and compared to the estimated cost of a gallon of water to an average single family residential customer in 2018 which is about 1 penny per gallon. An average single family residential customer uses 8 ccf (hundred cubic feet) per month.

Question: How does the cost of this option compare to the cost an average single family residential customer's cost for a gallon of water in 2018?

Scale: Numeric scale in pennies per gallon

Community Well-being

Encompasses a range of social and community values.

The next two subcriteria are meant to surface differences about traditional and climate-adapted approaches as manifested in the “look and feel” of outdoor SC. Rick is right, this is very much about water availability, especially in the peak season. If people do in fact weigh these two differently, the scale will probably be useful in Recon. The issue, ‘landscape’ is really a proxy for bigger things. Nicholas pointed out that according to the survey, people actually cared more about toilet flushing than gardens, so maybe this is a misleading proxy? (But if so, please could someone else write the toilet criterion?)

Traditional Landscape

Note: This addresses the desire to have a future Santa Cruz whose gardens and landscapes look and feel much as they do now, preserving generational continuity and a traditional sense of place. It also hints at ease: the avoidance of regulation and not having to make difficult tradeoffs between indoor or outdoor use. It avoids social shaming/regulation/harsh rate structures or other provisions where policy might be seen to trump personal choice.

In setting the scale, we imagined what the top and bottom would be for someone who gives a great deal of weight to this criterion.

Question: Would this proposal tend to protect individual users’ ‘breathing room’ to preserve, create and enjoy traditional landscapes?

Scale: *Tradition stable/ Mostly stable/ Some risk/ Under siege/ SC wasteland*

Climate-Adapted Landscape

Note: The look and feel of the community as it relates to a climate-adapted paradigm. Santa Cruz’s appearance could change, but the change could be as beautiful or pleasing as the present landscape or character, while being more sustainable. The point is that the community creates a less water-intensive landscape. This change would be embraced by the community rather than imposed through regulation or aggressive rate structures.

The term ‘native’ in the scale does not imply that the exact suite of plants that existed in Santa Cruz hundreds of years ago would be reproduced. Some would have been native to a slightly dryer climate. Also, in ‘natives abundant,’ roses would still be part of the mix, but irrigated less often.

Again, the bottom of the scale is the bottom for people who want this subcriterion.

Question: How well does this approach foster a shift towards a community character that differs from the present: to what extent do water customers embrace climate-adapted landscape strategies?

Scale: *Enthusiastic, Natives Abundant/ Voluntary, Natives Abundant/ Compliant some Natives / Grudging fewer natives / Natives Irrelevant*

Regional Water Stability

Note: This gets at approaches that would not only redound to the benefit of SC water customers, but to the region.

Question: To what extent does this approach improve regional water stability?

Across County, Across 2 or more, Not at all

Local Economy

Note: This refers to the health of Santa Cruz's economy.

Question: How might this proposal affect Santa Cruz's economy?

Water isn't an issue, Water a mild concern, Water concerns drag, Key worry in BUSI plans, Major disincentive [BUSI is the official abbreviation for 'business.' Doug, could I please use 'biz?']

Environmental Well-being

Note: This criterion relates to the degree to which a water supply or demand management strategy contributes to or impacts the quality and sustainability of the natural environment.

Question: How important are the subcriteria to you in evaluating the criterion "Environmental Well-being?"

Energy Intensity

Note: The degree to which a proposal will demand energy from cradle to grave: the making of component parts, the building or installation of materials or facilities including delivery systems, operation and maintenance as well as disposal.

Question: Taking the entire cycle into account, from producing parts to disposal, how much energy will this approach require per MG of water?

Numeric scale in tonnes/MG

Marine Ecosystem Health

Note: I'd like to have a better scale--how does it harm? Then the bottom of the scale would be "creates severe turbidity" or "confuses fish" or whatever the feared impact is....

Question: How would this approach affect marine ecosystem health?

Note:

Negligible effect, May harm, Will harm

Need better scale

Freshwater and Riparian Ecosystem Health

Note: This rating encompasses the positive (e.g. when restoring watersheds or by making it easier to leave more water in the river) as well as potential harm.

Question: If this approach were implemented, how would it affect freshwater ecosystems?

Plentiful water, About as it is now, Degraded ecosystem health

Moved Riparian from Terrestrial to Freshwater

Terrestrial Health

Note: This would apply, for instance, with offstream storage

Question: How does this approach affect terrestrial or riparian health?

Actively restores, Allows restoration, Does not affect, Depletes Resource, Greatly Depletes Resource

Groundwater Resources

Note:

Question: How would this approach affect groundwater resources?

Actively restores large amount, Allows restoration, Does not affect, Depletes Resource, Greatly Depletes Resource

Adaptability

Note: Characteristic of a supply project that relates to how well the approach can be modified over time to respond to changing conditions.

Question: How important are the subcriteria to you in evaluating the criterion 'Adaptability?'

Infrastructure Resilience

Note: 'Infrastructure resilience' has to do with how well the water supply system would withstand natural disasters such as fire or flooding or other disturbances. When evaluating an approach for 'infrastructure resilience' consider the existing system and ask whether this approach would make the system more resilient than it now is. For instance, does it diversify or make management more flexible?

Question: How much would this approach improve the existing system's ability to withstand natural disasters and other disturbances?

Greatly improves, Moderately, Somewhat, Hardly improves, Not at all

Reliable Supply

Note: Reliability of water supply relates to how much water can be produced under various climate conditions such as drought or extreme precipitation.

Question: How much would this approach improve the existing system's reliability?

Greatly improves, Moderately, Somewhat, Hardly improves, Not at all

Scalability

Note: Scalability measures the extent to which an approach can be scaled up or down as needs change.

Question: How easily can this approach be scaled up or down while still working as envisioned?

Easy, broad range / Less easy, small range / Not scalable

Preserves Future Choices

Note: One factor in choosing among approaches is the benefit of leaving future options open. Losing siting opportunities or making large capital investments are examples of steps that could reduce future planning options.

Question: How well does this approach preserve future choices?

Many options kept open, Some kept open, Few closed off, Some closed off, City locked in

Effectiveness

Note:

The ability for a particular alternative to align supply and demand.

Question: How well will this alternative align supply and demand?

Yield

Note: Reduction in demand or increase in supply.

Question: How much water will this approach save or produce?

Numeric scale

Flexibility

Note: The degree to which this approach increases management flexibility that in turn helps the system "get by with less" while still meeting resilience, reliability and other goals. (This is particularly designed for approaches that don't actually increase supply or reduce demand, but might nevertheless be useful.)

Question: To what extent does this approach increase flexibility?

Maximizes, Greatly increases, Moderately increases, Somewhat increases, Does not increase

Addresses Peak Demand

Question: Does this approach address peak demand?

Yes, Maybe, No

Agenda Item 9c

Agenda Item 9c	Primary Resp	11/6	11/7	11/8	11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	
Plan	Carie	Make and send plan**															
Splash and Help Page	Carie																
Criteria, Subc, scales	Ctte/C&N	Sched	Work on scales with experts				Conf with ctte				Write up and push out				discuss		
Tech ratings, unc	City then Cons/C&N																
Soc-Pol ratings, unc	Ctte/C&N	Q: can we create a by-criterion uncertainty approach/capability?															
Weights	Ctte																
Futures, Prob Stmnts	RM/Rick	Rick and Rosemary maybe late packet										discuss					
Learning, collaborating																	
Tool capabilities	Philip/Carie																
Uncertainty		Uncertainty										Numeric scales		Scales F			
Juxtaposition		Design										Sample futures for testing					
Constituency Involv't	Discuss																
Reports	Philip/ NC&R	Get out the Convention Report															

** I think the plan should include this spreadsheet, something partnering-agreement-like about what the ctte is going to be doing with the model--including the Kaffeeklatsch, a description of the fun and frolic in December and a description of Philip's upcoming two reports and what they will accomplish.

Carie in SC

Meeting Days

Packet Day

11/21 11/22 11/23 11/24 11/25 11/26 11/27 11/28 11/29 11/30 12/1 12/2 12/3 12/4 12/5 12/6 12/7 12/8 12/9 12/10 12/11

Revise and send plan

Revise and send if necessary*

gins raw, technical End Write up and push out*

Each ctte member provides
Each ctte member provides

Consultants proc

Revise and send if necessary*

schedule Kaffeeklatsch

Online Kaffeeklatsch work model Ind submit Deadline!

Prelim Report

loat

Juxtapose Futu I am done!

*The asterisk means that all these elements are necessary for pushing out the fully functioning model; some may need a quick turn-around to the ctte, others will be settled well enough that they can be returned to the ctte in the form of the 'pushed out' model revision. I.e., in the online model they will be using all month.

12/12 12/13 12/14 12/15 12/16 12/17 12/18 12/19

Dry run with city and consultants

Provide some refined consultant city Consultants discuss assumptions and ratings on the fly as Philip makes model adjustments in 'what if' style

Yes!

Final MCDS Recon Report deadline tbd

**Triple Bottom Line Illustration
(Water Reuse Options)**

Bob Raucher, Stratus Consulting

November 12, 2014

The Committee has asked for an illustration of what a Triple Bottom Line (TBL) assessment would look like for an example of a water supply alternative(s) for Santa Cruz. As part of the WSAC meeting on Friday, November 21, we will provide such an illustration, with a focus on a couple of potential water reuse alternatives. This document provides background information in support of the forthcoming illustration, including a brief discussion on the range of water reuse options and the associated issues that underlie their respective financial, societal, and environmental impacts (i.e., their TBL costs and benefits).

Why are we Focusing on Water Reuse for this Illustration of TBL?

The WSAC “red dot” exercise resulted in the greatest number of votes going to Water Department’s water reuse submittal. Several other Alt submissions (and votes) also entail water recycling in one form or another. Thus, there is considerable interest evident in water reuse within WSAC and across the broader community.

In addition, there is a considerable volume of reclaimed water potentially available for various water reuse applications -- perhaps 4 to 5 MGD might be consistently available from the wastewater effluent currently discharged to the ocean. In addition, there are numerous variations possible on how and where reclaimed water might be used in Santa Cruz, and each alternative carries its unique set of costs and benefits, spanning the financial, societal, and environmental “bottom lines.” Thus, there are a lot of factors and tradeoffs to consider when weighing water reuse alternatives.

How is Water Reuse Defined for this Illustration?

For the purposes of this exercise, we define water recycling (also referred to as water reuse or water reclamation) as making safe, productive use of highly purified effluent from the municipal wastewater treatment plant (WWTP). That is, we are focusing on options that entail tapping into wastewater that is captured within the City (or County) sewer system and associated wastewater treatment system. It may also include extracting wastewater effluent from points along the sewer system and purifying it at “scalping” treatment plants for more localized applications.

Excluded from this illustration are smaller-scale on-site water recycling options, such as may occur when a household taps its graywater for landscape irrigation. Likewise, on-site recycling of water at a car wash facility, or other such water-using entity, is not included in this illustration. These forms of on-site recycling are important in their own right, but for simplicity are excluded from this discussion. These on-site recycling practices also may be considered as conservation (water use efficiency) measures.

What is the Range of Water Reuse Options?

Recycling of highly purified municipal wastewater typically is characterized in three general forms:

1. **Nonpotable Reuse (NPR)**, in which highly purified (tertiary treated) municipal wastewater is applied to specific non-drinking water uses (typically including crop or landscape irrigation, streamflow augmentation or habitat restoration, industrial processes, and/or cooling system applications). There are several proposed Alts that include some form of NPR, including conveyance to North Coast farmers for irrigation uses, or to other locations for purposes such as golf course and other turf/park irrigation.

NPR is governed by water quality regulations (Title 22 requirements) for tertiary treatment before application. There are many successful applications of NPR in place across California and elsewhere. NPR requires dedicated pipelines and pump systems to deliver reclaimed water to users (often referred to as “purple pipe” systems), which tends to add considerable cost, energy requirements, and carbon footprint. And many users/applications only use reuse water on a seasonal basis, limiting the volume of reuse water that is applied and, hence, limiting the potential value of NPR.

2. **Indirect Potable Reuse (IPR)**, in which very highly purified municipal wastewater—derived from what is referred to as “Complete Advanced Treatment (CAT)” -- is introduced into an *environmental buffer* for a specified period of time before being withdrawn for potable purposes. The environmental buffer may be a groundwater aquifer or a surface water reservoir. The purpose of the environmental buffer is to provide an additional barrier for the protection of public health. For example, the Division of Drinking Water (DDW) of California’s State Water Resources Control Board (SWRCB) allows one-log of virus removal credit for each month the purified water remains in the aquifer. IPR is safely practiced in many locations in California and elsewhere, including the Orange County Water District’s Groundwater Replenishment System.

3. **Direct Potable Reuse (DPR)**, in which very highly purified wastewater from a CAT facility is introduced with or without the use of an *engineered buffer* into the raw water supply feeding a water treatment plant (or directly into a potable water supply distribution system, “downstream” of a water treatment plant). The purpose of the engineered buffer is to provide sufficient volumetric capacity to retain purified water for a specified period of time to allow for the measurement and reporting of specific water quality parameters, to be assured that the water provided meets all applicable water quality standards prior to being introduced into the potable water system. In most situations, the storage capacity of the transmission line used to transport the purified recycled water to a water treatment plant will provide sufficient retention time to make any needed interventions.

DPR is not yet permitted in California, although the SWRCB is actively working with an expert panel to develop pragmatic regulations that will permit DPR in the state by 2016 (in accordance to directives from the State Legislature and Governor). DPR has been used safely and reliably in Windhoek, Namibia for more than 40 years, and is now being implemented at the municipal scale in

Singapore, Texas, and elsewhere. These existing potable reuse projects are important because the treatment technologies employed have been accepted by various regulatory authorities as being able to reliably produce safe potable drinking water, and the implementation of these projects has been accepted by the public.

How Might Water Reuse Options be Implemented in Santa Cruz?

Each of the three main forms of water reuse may be implemented in various possible forms and configurations in Santa Cruz. These variations are evident across several of the Alternatives put forward for the Convention.

These variations may include off-stream surface water *storage* (e.g., a quarry configured into a reservoir), or groundwater storage (e.g., some form of aquifer storage and retrieval, ASR; or seawater intrusion barrier injection wells). Several variations include *exchanges* with neighboring communities or other parties, in which City-provided reclaimed water to neighboring water systems might be “returned” to the City system in kind, under various possible arrangements.

For example, NPR might include constructing a purple pipe conveyance system to deliver irrigation quality water to North Coast farmers. In exchange, the City might receive raw water that the farmers would otherwise tap for irrigation (e.g., freeing up more high quality North Coast stream water for the City, or providing local groundwater to the Water Department).

Likewise, IPR alternatives might include providing potable quality reclaimed water to neighboring water systems to help replenish their depleted aquifers. Exchanges may then be considered to “repay” the City system, especially in drought years. Or, if local aquifer systems tapped by the City’s Water Department are physically suitable for recharge, storage, and extraction, then IPR could be confined to Water Department resources as a way to reliably and sustainably supplement its own groundwater yields. Or, potable-quality reclaimed water could conceivably be delivered to Loch Lomond (or other surface water storage facilities, if developed) for use as part of the potable supply and/or fish flow support.

DPR might be accomplished by delivering CAT-purified waters to the City’s Graham Hill Water Treatment Plant (WTP), where it could supplement the other source waters the City treats and taps for its potable supply. Other possible DPR configurations and permutations are also possible.

Issues, Tradeoffs, and Other TBL Considerations

Each of the myriad possible water reuse approaches and configurations has its own suite of costs, energy requirements, public acceptance, regulatory, and yield considerations. The TBL framework provides one way to consider the array of tradeoffs across these alternatives. It also provides a useful construct for comparing water reuse alternatives to other options (such as desal, winter flow capture and storage, conservation, the do nothing status quo, etc.).

For the TBL illustration that we plan to convey at the Nov 21 WSAC meeting, we intend to compare and contrast a NPR alternative (probably the Reclamation/North Coast Irrigation Exchange approach per

Dana Ripley’s “RCGE” submittal) to a potable reuse alternative (possibly a DPR approach, akin to a component of SCDW’s Water Reuse submittal for “Option 1”, but assuming the State facilitates DPR by issuing suitable governing regulations in the coming 2 years).

Disclaimer

The TBL illustration will – by design and intent -- include many assumptions and simplifications. This is because we do not yet have all the relevant technical information available to provide a more realistic and case-specific analysis. The intent is to illustrate the types of information the TBL assessment *could* provide, once a lot more analysis is completed, and once more time is available to more carefully compile and interpret the relevant technical information. We simply will be filling in the blanks with some very rough guesstimates as illustrative placeholders – as a means to help reveal what and how a TBL approach can communicate impacts and tradeoffs between alternative options.

Some Key Questions:

Evaluating water reuse alternatives requires that a long list of questions be investigated (regardless of the approach used to evaluate the options – TBL or otherwise). Some of the core questions include:

1. ***How much water is available for recycling?*** There may be up to 4 to 5 MGD available as potential reuse production, based on the WWTP flows. Half of the effluent that serves as potential reuse source water originates from beyond the City and might be used at Scotts Valley for reuse, so the available volume could be reduced. Indoor water conservation also may reduce volumes.
2. ***How much water would irrigators demand and use?*** And, would the demand be seasonal (leaving the treatment and pipeline system unused for large portions of the year)?
3. ***How much would it cost to build and operate the irrigation pipeline and associated pumping facilities?*** What would be the carbon footprint embedded in such facilities and operations?
4. ***How much water would be available in the NPR exchange from the North Coast, and when?*** What would be the potential water quality and yield issues? Are there infrastructure needs associated with facilitating an exchange (e.g., pipeline capacity, possible treatment challenges)?
5. ***What public acceptance (and regulatory) issues might arise with potable reuse?*** How might these concerns be effectively addressed?
6. ***What would it cost to develop CAT for potable water quality?*** And, how much would it cost to develop conveyance (pipeline and pumping) to the Graham Hill WTP facility?
7. ***Is storage required for either NPR or DPR alternatives?*** If so, what are the options and respective costs?

Update on the Technical Workplan

Bob Raucher

13 November 2014

The technical workplan remains as discussed and described in the October 24 WSAC meeting and associated written materials circulated then and previously, and as summarized below. At the November 21 WSAC meeting, we will review this workplan and provide an update of works in progress.

The workplan from this point forward is primarily directed at addressing key technical issues associated with the “Real Deal” phase of the WSAC process. It also builds on several work elements that have been developed through the “Recon” phase.

At this time, specific timelines and some areas of focus are not yet finalized. This is because there are several key elements of the WSAC process that are in flux – namely the overall schedule and the form and level of specificity of the final recommendations WSAC anticipates developing for City Council at the conclusion of the Real Deal. However, it is highly likely that there are some alternatives that the committee will want to know more about no matter what and it would make sense to establish workplans and begin to develop technical data as soon as possible. These may include Ranney Collector use at Felton Diversion, feasibility of Purisima for groundwater recharge projects, updating the water transfer study. In order to make the most productive and efficient use of the technical consultant team and the available contract resources, we want to properly deploy and focus our efforts to best meet the anticipated WSAC product.

Past documents and discussions of the work plan have focused on topical areas (e.g., estimating future demand, examining the hydro-geologic conditions of regional aquifer systems with regard to the potential feasibility of storage and retrieval). Below, we offer a slightly different perspective on how the anticipated pieces of technical work fit together.

1. Defining the Problem

How large of a water supply shortfall is Santa Cruz facing, from now through future decades (e.g., to mid-century or beyond)? To address this question, the following work plan elements are in process or anticipated:

- Estimating water demands – via both the traditional demand projection approach used by the City’s Water Department (with price elasticity included in one variation), as well as development of a more sophisticated and useful econometric demand forecasting model.
- Forecasting supply yields -- from the City’s existing water supply resources and infrastructure, taking into consideration the uncertain but likely considerable impacts of climate change, fish flow requirements associated with the terms of a future Habitat Conservation Plan (HCP) agreement, and possibly other factors. This includes considerable technical work including streamflow hydrologic modeling and system yield modeling, coupled with scenarios that embody a range of plausible climate change projections and HCP requirements.

- Developing estimates of the “gap” between supply and demand – combining the two sets of above efforts to convey the ranges and frequencies of different potential gaps between projected supply and demand. Given the vast uncertainties (e.g., regarding the frequency and severity of future droughts), this entails developing a range of gap-related scenarios.

2. Identifying Possible Solution Options (Alternatives)

The Alts convention has provided a venue through which a large number of possible solutions have been suggested by a wide range of engaged citizens as well as water sector professionals. The technical team has recently initiated an expedited review of these “Alts” and an initial group of a dozen Alts have been selected for preliminary technical evaluation to support the application of the MCDS model for Recon. We anticipate that additional Alts may emerge as the Committee’s work proceeds, and as we collectively sort through and refine the suite of Alts already submitted for consideration.

The Alts to be considered may be categorized according to those that are designed to decrease demand (conservation, water use efficiencies), increase supplies (e.g., tapping winter flows, implementing water recycling, desal), add storage to address intra- and inter-annual variability in demands and yields (e.g., converting quarries to surface reservoirs, or using local groundwater formations for aquifer storage), and a variety of other approaches. Numerous permutations and combinations are possible.

3. Evaluating the Possible Solution Options (Developing a Portfolio)

This is the core of what the technical team anticipates addressing through the Real Deal. For the Alts of potential interest, we need to understand and communicate the costs, yields, reliability, technical feasibility, environmental impacts, water rights implications, societal/community impacts (including quality of life and regional economic vitality), and so forth. This will entail a range of technical analyses drawing on the specific areas of expertise distributed through the technical team that we are assembling.

The various technical analyses may be used within a number of possible analytic frameworks in order to facilitate WSAC evaluation of the Alts. This may include MCDS and/or TBL and/or other analytic approaches to help WSAC sort through the options.

4. Selecting a Portfolio of Preferred Options

The extent to which WSAC engages in specific portfolio recommendations – as contrasted to more general conclusions and recommendations – is not yet fully resolved by the Committee. We will assist in this stage in the manner that corresponds to WSAC’s intended type of recommendation package for City Council.

5. Implementing, Monitoring, and Evaluating (and Refining) the Preferred Portfolio

This step extends beyond the anticipated role and duration of the technical team’s involvement, although some strategies and issues may be offered in the context of the Committee’s overall recommendations (e.g., examining the role of and strategies for effective “adaptive management” as the City moves forward).

DRAFT DECEMBER MEETING AGENDA ITEMS

Time	Draft December Agenda Item	Lead	Pckt
	Session 1		
5:00	Opening Remarks, Agenda Review, Updates	ND	
5:30	Summary of Results and Discussion of Committee Ratings: (not necessarily in this order)_ <ul style="list-style-type: none"> • Committee debrief on rating process • Overview of MCDS interim Report* • Discussion Ctte's weights: distribution of weights, decision's sensitivity to weights • Discussions of Ratings: Initial ratings, changes to ratings, comments on alternatives and/or ratings; sensitivity to ratings • Discussion of Uncertainty: Overall uncertainty; uncertainty of the alternatives • Discussion of shifts in weights and ratings depending on Two Futures scenarios 	CF/PM	Report
8:00	Break		
8:10	Discussion on what the ratings and sensitivity analysis tell us about what the Research Agenda needs to focus on	CF/PM	
9:00	Identification of 'What Ifs' to run and talk about in session 2 Wrap Up and pro	CF/PM	
9:20	Wrap Up		
9:30	Adjourn	ND	
	Session 2		
2:00	Opening, Correspondence, Reflection		
2:25	Additional Modeling Runs and Results: <ul style="list-style-type: none"> • Results of "What If?" • Possible model runs based on updated technical information, if any is available 	CF/PM/BF	
3:25	Break		
3:35	Additional discussion and agreement on the Research Agenda	CF/PM/BF	
4:35	Recon Report to Council		
5:00	Subcommittee Reports <ul style="list-style-type: none"> • The Planning Subctte • The Outreach Subctte 		
5:30	Possible January/February Enrichment Activities		
5:55	The Usual Wrap Up		
6:00	Adjourn		

**WATER SUPPLY ADVISORY COMMITTEE
ACTION AGENDA FOR OCTOBER 23 & 24, 2014**

Santa Cruz Police Department
Police Community Room
155 Center St.
Santa Cruz, CA 95060

Peace United Church of Christ
Fellowship Hall
900 High St.
Santa Cruz, California 95060



WATER SUPPLY ADVISORY COMMITTEE (WSAC) AGENDA

Special Meeting

October 23 & October 24, 2014

ACTION Agenda prepared November 6, 2014 with action taken in bold type.

5:00 P.M. **SPECIAL MEETING - SESSION ONE (OCTOBER 23): FELLOWSHIP HALL**

2:00 P.M. **SPECIAL MEETING - SESSION TWO (OCTOBER 24): COMMUNITY ROOM**

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.

General Business: Any document related to an agenda item for the General Business of this meeting distributed to the WSAC 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 WSAC meeting with the display copy at the rear of the Council Chambers.

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, the basis upon which the action is considered to be in error, and addressed to the City Council in care of the City Clerk Administrator.

Other - Appeals must be received by the City Clerk Administrator 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.

City Councilmember Attendance: Four or more members of the City Council may be in attendance at this meeting.

October 23, 2014 - 5:00 PM

SESSION ONE

Call to Order - Co-Facilitator Nicholas Dewar called the meeting to order at 5:00pm

Roll Call: Charlie Keutmann, Rick Longinotti, Dana Jacobson, Doug Engfer, Erica Stanojevic, Greg Prepping, Mark Mesiti-Miller, Peter Beckmann, Sarah Mansergh, Sid Slatter, Sue Holt, and Rosemary Menard.

Public Comment

Welcome to Public and Public Comment

Co-facilitators Fox and Dewar welcomed the public. One member of the public spoke on matters relating to the availability of meeting materials.

Committee Member Updates

Committee Members updated the Committee on significant communications between them and other Santa Cruz entities with significant interest in the development of water policy in Santa Cruz.

Agenda Review

Committee Members reviewed the agenda for the WSAC's seventh meeting. Members agreed by consensus on the following changes to the agenda:

- The item "Demonstration of Sensitivity Analysis using Convention MCDS Results" was replaced by two items: "Ratings" and "Probing the Decision Space - Dots exercise"
- The item "General Plan growth targets" was removed from the agenda and the substance of that item was included in the item "Forecasting Water Demand."

Results of the Attitudinal Survey

Principal of Gene Bregman & Associates, Gene Bregman, led Committee Members in a discussion on the findings of the Attitudinal Survey.

Action: None.

Review Outcomes of the Convention

Members of the Convention Subcommittee led Committee Members in a discussion on the outcomes of the Convention.

Action: None.

Weights in the Convention Decision Model

Co-Facilitator Carie Fox led Committee Members in a discussion on Members' experiences weighing the importance of criteria and the best ways to use this feature. Committee Members also discussed what standards they use when deciding on the relative importance of criteria.

Action: None.

Demonstration of Sensitivity Analysis Using Convention MCDS Results

The substance of this item was discussed during the preceding and succeeding items and not dealt with as a separate item..

Action: None.

Simplified Scenarios and Problem Statements

WSAC Consultants Karen and Bob Raucher led Committee Members in a presentation on Simplified Scenarios.

Action: None.

Recon Outreach Subcommittee Update

Members of the Recon Outreach Subcommittee reported on outreach activities.

Action: None.

Written Review and Wrap Up - Identification of any incomplete issues to be carried over to Friday's session.

Adjournment - At 9:30 p.m. the Water Supply Advisory Committee adjourned from its first session on October 23 of the regular meeting of October 23 - 24, 2014 to its second and final session on October 24 for an open session after the hour of 2:00 p.m. in the Police Community Room at the Santa Cruz Police Department.

Water Supply Advisory Committee Agenda

October 24, 2014 - 2:00 PM - 6:00 PM

SESSION TWO

Call to Order - Meeting Reconvenes

Roll Call: Charlie Keutmann, Rick Longinotti, Dana Jacobson, Doug Engfer, Erica Stanojevic, Greg Prepping, Mark Mesiti-Miller, Peter Beckmann, Sarah Mansergh, Sid Slatter, Sue Holt, and Rosemary Menard

Public Comment

Presentation - Correspondence Received from the Community

Committee Corresponding Secretary Mike Rotkin led the Committee Members in a discussion on correspondence received from the community.

Action: None.

Review of Previous Session

Committee Members reviewed the previous session and the agenda for the current session.

Action: None.

Clarification of All the Components of the Recon Decision Model

Co-Facilitator Carie Fox worked with Committee Members building on their experience with the Convention model and clarifying all the component parts of the Recon Decision Model.

Action:

- Consensus was to use MCDS thru recon and to use it with two scenarios.
- To define these two scenarios Rick will pick two amounts to describe extremes of the potential supply/demand gap, expressed as MGY. These amounts will be based on Karen's Matrix.
- To help identify about 12 alternatives to be used in the MCDS exercise at the conclusion of Recon, each Committee member will send their selection of five alternatives to Bob

and Karen by 10/31/14.

- Consultant experts will use these alternatives selected by Committee members to sort and organize about twelve alternatives for use in the MCDS exercise in Recon. Consultants will include explanations of why these selected alternatives are appropriate for the purposes of the MCDS exercise, and will in no sense be selecting a “best” alternative.
- Stratus will provide illustrative examples of the use of Triple Bottom Line analysis.
- An updated word version of the criteria, subcriteria and scales will be included in the next packet.
- In early December facilitators will conduct online meetings with Committee Members to familiarize them with the use of the MCDS model.
- The Cost criterion needs further development.

Forecasting Water Demand

Water Department Staff Toby Goddard presented information describing how the demand forecast used in the 2010 Urban Water Management Plan and the Water Supply Assessment for the City’s 2030 General Plan was developed. Toby also described current trends in new water accounts compared to the historical information on this topic.

Action: None.

Stratus Work Plan Report

WSAC Consultant Bob Raucher provided an update on the progress of current assignments to Committee Members.

Action: None.

Agenda for November and December

Committee Members discussed the agenda outlines for the Committee’s November and December meetings.

Action: None.

Real Deal Planning Subcommittee

The Committee discussed how the Real Deal Planning Subcommittee's role fits in the time-table of the Committee's work

Action: None.

Materials Resulting from the Previous Meeting

The Committee Members reviewed the Action Agenda and Meeting Summary prepared for the previous meeting.

Action: None.

Oral Communication

Written Review and Wrap Up - Identification of any incomplete issues to be carried forward to next meeting.

Adjournment - The Water Supply Advisory Committee meeting adjourned at 6 p.m. from the second session on October 24 of the regular meeting of October 23 - 24, 2014 to its next meeting on November 19, 2014 at 5:00 PM and November 21, 2014 at 2:00 PM in the Fellowship Hall at Peace United Church of Christ, 900 High St. Santa Cruz, CA 95060 and the Police Community Room at the Santa Cruz Police Department, 155 Center St. Santa Cruz, CA 95060.

Session Number	Session Title	Date/Time (All Wednesdays)	Location
1	Overview of Work Plan and Modeling and Forecasting Tools Presenter: Rosemary Menard	November 12 4 pm to 6 pm	Planning Conference Room 107, 809 Center Street
2	Modeling and Forecasting Flowing Source Supply and Groundwater Resources Presenters: Shawn Chartrand, Jeff Hagar, Isidro Rivera	December 3 4 pm to 8pm	Library Conference Room, Santa Cruz Public Library, Downtown, 224 Church Street
3	Current and Proposed Future Approaches to Forecasting Water Demand Presenters: David Mitchell, Toby Goddard	December 10 4 pm to 7 pm	Council Chambers, 809 Center Street
4	Demand Management Decision Support System Model Presenters: Bill Maddaus, Lisa Maddaus	January 7 4 pm to 7 pm	Library Conference Room, Santa Cruz Public Library, Downtown, 224 Church Street
5	Shortage Contingency Planning Presenter: Toby Goddard	January 14 4 pm to 8 pm	Planning Conference Room 107, 809 Center Street
6	Confluence Modeling and Supply Forecasting Presenter: Gary Fiske	January 21 4 pm to 7 pm	Library Conference Room, Santa Cruz Public Library, Downtown, 224 Church Street
7	Parking Lot Issues Presenter: Members of the WSAC Technical Team and City Staff to be determined	January 28 4pm to 7pm	Library Conference Room, Santa Cruz Public Library, Downtown, 224 Church Street
8	Modeling and Forecasting Products to be used in Phase 2 of the WSAC work Presenter: Members of the WSAC Technical Team and City Staff to be determined	February 4 4 pm to 7 pm	Library Conference Room, Santa Cruz Public Library, Downtown, 224 Church Street