Build-A-Portfolio

Proposal Number: 20

Submitted by: Rick Longinotti, Mark Mesiti-Miller, Sid Slatter, Greg Pepping

Name of Proposal: Dual Track ASR-DPR

Brief Description: Parallel development of CRec, In-Lieu, ASR & DPR.

Long Description: Group 20 adopted two portfolios for further consideration, *Aquifer Storage Using Surface Water*, and *Optimized Direct Potable ReUse.* Essentially these are a combination of building blocks 1, 2 & 3, with little or no changes to each block; the original block descriptions can therefore be used to explain the components of our portfolio (rather than our providing new versions of them).

In the limited time for the group's discussion, there was no consensus reached on how to implement either strategy. Mark Mesiti-Miller outlines his suggestion for a decision-making process in the last paragraph of the DPR description. Rick is submitting a separate write-up with his suggestions for an adaptive management strategy.

Timeline (attach/optional)

Map (attach/optional)

Unresolved questions (attach/optional)

1. We need confirmation of the number of years to achieve reliable water from each of these building blocks.
2. Some people think ASR is proven while others are hopeful/skeptical and need verification that it can be relied upon with the confidence we need. Specifically, what are the data and measurements that people need to see in order to be convinced ASR will work or is working?
3. Does the ASR energy calculation consider that neighboring districts will save energy by reducing their normal operations (pumping and otherwise)?

Additional unanswered questions, asked by members of this group of the technical team:

4. In the recent Building Block Summary Table Update, the "average annual production" for BB1 is 90mg and the "average year yield" is 290mg. Could you explain what the difference is?

5. Could you explain how the energy intensity of *DPR small* is lower than that of DPR?
6. I'm confused about the distinction between the quantities of available wastewater of DPR versus DPR small. The former is "based on the volume of City-owned wastewater" and the latter is based on " the wastewater effluent it [the City] produced on its own". Can you explain the difference?
7. In evaluating the energy use of a particular strategy, it would be helpful to see the total annual energy use of that strategy. For example, the total annual energy use of any strategy would be the energy per million gallons times the annual production of that strategy. Could you add a column that does that?

If your proposal includes an **adaptation strategy**, please use the following language for the sake of consistency:[1]

- *Contingencies* include both *performance measures* and *changes in external conditions*, each of which might result in a shift to your plan; and
- *Decision structures* describe how you decide to adapt to contingencies.

[1] Or let Carie know why it doesn't work for you!

Proposal-wide Ratings

Adaptive Flexibility (Scalability)

Adaptive Flexibility measures the capacity of a set of blocks to respond to changing conditions, for example to higher or lower demands, to more or less impact of climate change. Adaptive flexibility enhances the ability to meet the requirements of changing circumstances in a timely and cost effective manner. When you rate your proposal, for now just consider the adaptability of the blocks together—this isn't meant to be a rating of your process (contingencies/decision structure etc). We will get to those later.)

Question: How adaptable or flexible is this proposal likely to be in the face of changing climate conditions, demand levels or streamflow requirements?

- Proposal provides significant adaptive flexibility benefits;
- Proposal provides moderate adaptive flexibility benefits;
- Proposal provides minimal additional adaptive flexibility benefits;
- Proposal does not increase or decrease adaptive flexibility;
- Proposal reduces or eliminates existing adaptive flexibility in the system.

Optional: provide a rationale for your rating.
Lots of redundancy. It works.

Supply Reliability

Reliability of water supply relates to how much water can be produced under various climate conditions such as drought or extreme precipitation and includes the system's ability to perform well in a variety of conditions, for example, high flow conditions that may increase turbidities in source waters. The focus of this criterion is on the likelihood that your proposal will improve the reliability of the Santa Cruz water system.

Question: How adaptable or flexible is this proposal likely to be in the face of changing climate conditions, demand levels or streamflow requirements?

- Proposal provides significant adaptive flexibility benefits;
- Proposal provides moderate adaptive flexibility benefits;
- Proposal provides minimal additional adaptive flexibility benefits;
- Proposal does not increase or decrease adaptive flexibility;
- Proposal reduces or eliminates existing adaptive flexibility in the system.

Optional: provide a rationale for your rating.
Solution closes the supply-demand gap, including peak season issues.

Supply Diversity

This criterion measures the how well prepared or positioned the system will be to respond to future uncertainties based on the diversity of its supply portfolio. The premise is that supplies coming from different sources are less likely to be as vulnerable to the same kinds of uncertainties.

Questions How does this Approach affect the diversity of Santa Cruz water sources?

- Proposal significantly increases the diversity of Santa Cruz's supply portfolio.
- Proposal somewhat increases the diversity of Santa Cruz's supply portfolio.
- Proposal does not increase the diversity of Santa Cruz's supply portfolio.

Optional: provide a rationale for the rating.
May change our balance of groundwater-surface water usage and may provide for new rainfall independent source of water.

Environmental Profile:

The environmental profile of a proposal takes into account all the potential environmental impacts and benefits associated with that proposal.

Question: What is the environmental profile of this proposal?

- The Environmental profile of this proposal provides significant environmental benefits
- This proposal has some environmental benefits
- The environmental profile of this proposal is acceptable without mitigation
- The environmental profile of this proposal is acceptable with appropriate and effective mitigation
- The environmental profile of this proposal is not acceptable and/or cannot be made acceptable even with effective mitigation

Optional: provide a rationale for this rating.

Political Feasibility

The extent to which a proposal will claim and retain the support of the community, both formal political entities as well as informal social and political groups and the community at large.

Question: What level of political support is the proposal likely to have?

- Widely acceptable
- With timely and appropriate informational and educational outreach to the community may be acceptable in the near future; some comment that DPR pushes it to 5 years
- Not acceptable now but highly likely to be acceptable in the future – 5 or more years out;
- Not acceptable now and highly uncertain about acceptability in the future;
- Likely never acceptable.

Optional: provide a rationale for your rating.

Block-by-Block Proposal Ratings

Regulatory Feasibility: Rate each block

Regulatory Feasibility addresses the certainty, ease and likely timeframe of receiving necessary regulatory approvals for the block. If you are worried about a lawsuit regarding a regulatory permit, that concern should be addressed here (not in *Legal Feasibility).*

Question: How easy or difficult would the regulatory approval process be for this Block? (Indicate one; cut and paste if you need more scales)

Block 1&2 Rating: (bold, circle or otherwise indicate your rating)

- Highly certain for regulatory reviews and approvals to be easy and quick; regulatory issues are limited, routine, and/or non-controversial;
- Regulatory review process likely to be slow but relatively sure; regulatory issues include some challenges but approvals and completed processes likely achievable within 6 to 12 months;
- Regulatory review process likely to be slow but with some questions due to number or complexity of regulatory issues needing to be resolved; Can probably acquire; achievable within 12 to 36 months;
- Regulatory approvals likely to be difficult to acquire; new regulations may need to be developed, the scope or number of regulatory process or approvals involves complex, contentious issues, timeframe for completion likely more than 3 years;
- Significant regulatory challenges make approvals or completion of the regulatory review process in a reasonable, predictable time highly uncertain, likely would be expensive and require more than 5 years, if ever, to complete.

Block DPR Rating:

- Highly certain for regulatory reviews and approvals to be easy and quick; regulatory issues are limited, routine, and/or non-controversial;
- Regulatory review process likely to be slow but relatively sure; regulatory issues include some challenges but approvals and completed processes likely achievable within 6 to 12 months;
- Regulatory review process likely to be slow but with some questions due to number or complexity of regulatory issues needing to be resolved; Can probably acquire; achievable within 12 to 36 months;
- Regulatory approvals likely to be difficult to acquire; new regulations may need to be developed, the scope or number of regulatory process or approvals involves complex, contentious issues, timeframe for completion likely more than 3 years;
- Significant regulatory challenges make approvals or completion of the regulatory review process in a reasonable, predictable time highly uncertain, likely would be expensive and require more than 5 years, if ever, to complete.

Optional: provide a rationale for your rating(s)

Energy – Rate by Block

This criterion focuses on the acceptability of the energy use of the block.

- How much energy will this block require per million gallons of water produced?

In the meantime, please use this rating scale:

Block 1&2 Rating:

- The energy profile of this block is acceptable without mitigation
- The energy profile of this block is acceptable with appropriate mitigation
- The energy profile of this block is not acceptable and/or cannot be made acceptable with mitigation

Block 3 Rating:

- The energy profile of this block is acceptable without mitigation
- The energy profile of this block is acceptable with appropriate mitigation
- The energy profile of this block is not acceptable and/or cannot be made acceptable with mitigation

Note that our team wants to mitigate the energy use of this and all proposals.

Optional: provide a rationale for your rating(s)

Regulatory Feasibility: Rate each block

(This was already rated above; we assumed this was a typo in the template)

Legal Feasibility: Rate each block

Legal Feasibility addresses siting including acquisition of land, easements or rights or way, water rights, or other legal rights relevant to implementing the alternative as envisioned. This criterion is distinct from Regulatory Feasibility, which relates to specific regulatory approvals that would be required, separate from the legal requirements addressed here. Lawsuits about regs are still part of 'regulatory feasibility.'

Question: Does this Proposal have the necessary rights in the form needed?

Block 1&2 Rating:

- Unambiguous "yes;" legal issues are routine, non-controversial;
- Yes, but with some ambiguities; achievable within 6 to 12 months from the start point;
- Can probably acquire; achievable within 12 to 24 months from the start point;
- Difficult to acquire; complex, contentious issues involved, likely requiring more than 2 years to resolve from the start point;
- Very unlikely; significant and contentious legal issues involved, likely requiring more than 5 years from the start point, if ever, to resolve.

Block 3 Rating:

- Unambiguous "yes;" legal issues are routine, non-controversial;
- Yes, but with some ambiguities; achievable within 6 to 12 months from the start point;
- Can probably acquire; achievable within 12 to 24 months from the start point;
- Difficult to acquire; complex, contentious issues involved, likely requiring more than 2 years to resolve from the start point;
- Very unlikely; significant and contentious legal issues involved, likely requiring more than 5 years from the start point, if ever, to resolve.

Optional: provide a rationale for your rating(s)

Administrative Feasibility: Rate each block

Extent to which success of the proposal is dependent on the actions, cooperation, collaboration, financial participation or willingness to enter into intergovernmental agreements of other partners or players.

Question: To what degree does this proposal require the cooperation, collaboration, financial participation, and/or intergovernmental agreements to succeed, and how likely is it that these can be obtained?

Block 1&2 Rating:

- Agreement with other parties is not essential
- Agreement is essential and highly likely
- Agreement is essential and likely
- Agreement is essential and not likely
- Agreement is essential but almost impossible

Block ____ Rating:

- Agreement with other parties is not essential
- Agreement is essential and highly likely
- Agreement is essential and likely
- Agreement is essential and not likely
- Agreement is essential but almost impossible

Optional: provide a rationale for your rating(s)

Cost Metrics: rate each block

Question: What is the unit cost for the water produced by this block, when compared across blocks? ($/mg)

Block 1&2 Rating:

- Unit cost is comparably low
- Unit cost is in the middle range
- Unit cost is high

Block 3 Rating:

- Unit cost is comparably low
- Unit cost is in the middle range
- Unit cost is high

Optional: provide a rationale for your rating(s)
Using the rationale field is especially important if you want to make the case "that's not important here" (as you might for Block 5) or if your cost deviates from the costs in technical reports (for instance if you think your 'flexed' block is more cost-effective).
External revenue does not appear to have mitigated the listed unit cost for 1&2.

Aquifer Storage Using Surface Water (Longinotti)

This portfolio relies on in lieu recharge, supplemented by injection wells as needed, to close the City's supply-demand gap through creating a minimum of 3 billion gallons in additional aquifer storage. The portfolio envisions an adaptive management strategy that implements the program in stages, allowing performance feedback to inform whether to implement the next stage and what to implement in that stage. This strategy is meant to optimize existing infrastructure and cost savings. Constraints that might be addressed in successive stages of implementation include treatment capacity, diversion capacity, injection well capacity, interconnect capacity, and water rights.

Additional advantages of this strategy include:

- The option to continue recharge beyond the 3 billion storage goal, if more storage is desired to cope with climate changes and/or the community decides that the fish habitat benefit of higher base-flow in the streams is worth the expense.
- The co-incident benefit in water reliability for neighboring districts, and the resulting economic security for our community.
- In the Purisima portion of the portfolio, the option to secure an agreement with Soquel Creek District wherein District wells that are rested are in the vicinity of Santa Cruz wells. The goal of this strategy would be to recover the ability to safely pump Santa Cruz wells at historic levels during drought years.

Note: This portfolio assumes that the City will adopt the Master Conservation Plan, including additional measures to be recommended by the WSAC. It also assumes that the City will construct a new pipeline from Felton to Loch Lomond.

Building Block 3-optimum Direct Potable Reuse (Mesiti-Miller)

For the purposes of this build-a-portfolio exercise, our team accepted the basic description of a DPR solution as provided but developed a new set of figures for use in comparing this BB to others. The new figures shown below were derived by interpolating between the figures given for DPR and DPR-small and setting the worst year peak season shortage percentage to 15%.

Building Block #	**3**	**3-optimum**	**3-small**
Building Block Approach	**DPR**	**DPR-opt**	**DPR small**
Capital Cost ($ M)	116	99	90
Annual O&M cost ($ M)	5.2	4.4	3.4
Total Annualized Cost ($ M)	15	13	11
Present Value Costs ($M)	328	296	279
Energy Use (MWH/MG)	8.6	9.0	9.3
Annual Production Cost ($/MG)	8,200	9,100	10,000
Average Annual Production (MG/year)	1715	1,300	1100
Worst Year Yield (MG)	1110	826	710
Average Year Yield (MG)	340	333	330
Worst year yield unit cost (Total Ann Cost/Wst Yr Yield)	12,600	14,659	15,500
Average year yield unit cost (Total Ann Cost/Ave Yr Yield)	41,200	35,591	33,300
Worst Year Peak Season Shortage (MG)	0	284	400
Worst Year Peak Season Shortage (%)	0%	15%	21%
Average Year Peak Season Shortage (MG)	0	7	10
Average Year Peak Season Shortage (%)	0%	<1%	<1%
Approximate Timeline (Years)	9 to 13	9 to 13	9 to 13

Given the figures derived above, we compared DPR-optimum to our hybrid of BB's 1 and 2. What we found was the cost impact to rate payers was about the same (DPR was about $30/year less than the hybrid) and while the predicted energy use of DPR-optimum is about 40% than the predicted energy use of our hybrid BB1&2 DPR provides the following benefits:

a) DPR is a rainfall independent solution and diversifies our overall water supply portfolio
b) DPR does not require agreements with neighboring water districts
c) DPR does not require any changes to existing water rights nor application for a new water right
d) the availability of purified recycled water for direct potable reuse may enable higher instream flows to remain in the SLR and other coastal streams that otherwise may be

more actively tapped for water supply. This would provide benefits for salmonid fisheries and other aquatic/riparian species.

e) should it prove technically feasible, purified recycled water could be used in an IPR application to recharge our own Beltz well field aquifer
f) purified recycled water could be used in an IPR application to recharge neighboring aquifers should neighboring water districts be successful in negotiating with SCWD for that use
g) the City would probably be able to obtain grant funding for DPR resulting in lower cost to ratepayers

We recognize that DPR also has some drawbacks including:

a) Permitting: Regulations do not yet exist to permit construction of a DPR solution. However, the technical team has advised that CA is currently working on this and they anticipate regulations will be issued in the next few years.
b) Political acceptability: There may be some political resistance to DPR but given the benefits, we opine this resistance can be addressed with an education outreach to our community.