

**Proposal Number:** 40

**Submitted by:** Erica Stanojevic

J. Paul 2015-08-06

**Name of Proposal:** **The Lochquifer Portfolio**

### **Brief Description**

Lochquifer prioritizes yield, reliability and cost efficiency. It expedites diverting abundant winter river water and banking water in aquifers from Aptos through SV, primarily using small, cost-effective upgrades to existing infrastructure. In ~3 years\*, Lochquifer could reach true security: 3Bg banked. In ~4 more years\* it could recharge the ~9Bg remaining aquifer space. Lochquifer is a low risk solution with fast results, with a low price tag of about \$31M. SCWD pays ~60%.

\* Not counting critically-dry years.

### **Description**

Note: Lochquifer is intended to work in conjunction with WSAC's Deep Conservation plan, and will use supply-demand gap projections which will have been narrowed by the plan.

The Lochquifer Portfolio will use Loch Lomond Reservoir and local aquifers to quickly provide robust protection against drought for the entire mid-county region for many decades, by means of diverting abundant surplus winter river water and storing it. Some of the diverted water will be pumped into the Loch so as to be usable in other seasons and years. The City (SCWD) would treat the Loch and river water and would send much of the treated water to be stored in the aquifers of the region, by the use of injection wells and production-well reversals, and by "in-lieu" use, where regional customer demand would be satisfied by treated City water in lieu of well water. The Lochquifer plan consists of a systematic elimination of constraints, including increasing water treatment capacity, enabling the City to quickly charge regional aquifers year-around using water stored in Loch Lomond. During extended droughts, the City would reduce water transfers to the aquifers, and on rare occasions, the City would need some aquifer water to be returned to the City.

### **Operation**

The main goal of adding the Lochquifer infrastructure is to recharge the region's aquifers and to quickly top them off after droughts. Once the aquifers have been charged, however, SCWD would be at liberty to use much more of the Lochquifer expanded diversion and treatment capacity for its *own* consumptive benefit. This is because the City will no longer have to export so much water to the neighbors. In other words, the Loch is likely to stay relatively full and be refilled quickly, even in dry years. (Consider that after 4 straight years of drought, the Loch is presently about 80% full, and the Lochquifer capacity improvements have not yet begun.) Since on average, the City diverts only about 2.5 Bg of the River's 30 Bg, there is a lot of surplus winter water, even in dry years.

The Loch traditionally has had six roles:

1. be a recreational site;

2. regulate the hourly and daily peaks and valleys of demand;
3. be a water repository to enable larger winter diversions from the river;
4. hold winter water a few months to serve summer dryness, peak demand, and fall fish migration;
5. carry the year's surplus water into the following year;
6. be the City's "insurance policy" against long-term drought and climate change.

In regard to operating policy, these roles have severely conflicted with each other. In particular, role 3 conflicts with roles 5 and 6 when it comes to the question of how much water should be left in the Loch just before the rainy season begins. Roles 5 and 6 would leave the Loch pretty *full*, whereas role 3 (taking a big drink of winter river water) requires that the Loch be relatively *empty* just beforehand.

The Lochquifer Portfolio ends the conflict by assigning roles 5 and 6 to the much larger and substantially recharged aquifers, by and large. This is the key which allows the City to robustly fulfill role 3 and take an extra 2.3 Bg annually out of the river (almost an entire Loch-full). This is a particularly important capability to have just after a multi-year megadrought, as it is the essence of fast aquifer recharge.

This reassignment of roles gives the City the ability to give the Loch the heretofore unprecedented ability to divert a *lot* of water even during dry and critically dry years, because the City will have a sufficiently vacant place to put it. This in turn means that the City will not be as likely to need to get water back from the neighbors as often as many people suppose. During extended droughts, the City would not suddenly import water; rather, the City would merely reduce water transfers to the aquifers. Only on rare occasions would the City need neighbors to return aquifer water to the City, and even that is likely to be for no more than a few months, primarily to top off the City's capacity to handle summer peak demand.

## Project Levels

Lochquifer is an integrated progression through 5 project Levels, numbered 0 through 4.

- Each Level increases production capacity and supply reliability as compared to the previous Level.
  - Each Level brings the succeeding Level to within about one year of its first water production.
  - Commitment to proceeding to Level 3 quickly will insure that the initial-phase work gets done post haste so as not to delay the final phase and its reward. A year's further delay means *wasting a year's worth of water*, potentially 2.3Bg, just when City Council is asking citizens to do their utmost to conserve.
- **Level 0** patches and removes rocks from existing Felton-Loch pipeline, implements SC-SqC water transfers at 1.48 mgd throughout this winter (2015-16), performs most studies & tests (hydrogeology, environmental, Ranney collector, well reversibility, injection sites, etc.) settles HCP, obtains Felton-GHWTP direct transfer right, applies for new water rights, gets contracts among stakeholders signed.
  - **Level 1** builds Felton-Loch pipeline #2 (April-Oct. 2016), builds SV intertie and pump station, upgrades SC-SqC intertie pipe diameter, makes a production well reversible for injection drills an injection well
  - **Level 2** installs a Ranney collector at Felton (filters water, boosts treatment capacity at low cost) refurbishes Felton-Loch pipeline #1

makes more production wells reversible for injection  
 drills more injection wells  
 obtains water rights for Level 3

- **Level 3** (yields 2.3 Bg annually in most years; enables year-around in-lieu & quick drought recovery)
  - builds pumpstation for SC-SqC intertie (needed mostly for westbound flow, future)
  - builds 2.5mgd of new treatment capacity\* at SV or if competitive, at GHWTP.
  - makes more production wells reversible for injection
  - drills more injection wells
  - builds recovery well treatment capacity in SV
- **Level 4** conducts a new comprehensive review and analysis including new climate change projections, thereupon allowing other approaches (e.g., desal, DPR, IPR, DWDesal, etc.) to be added.

Capacities, costs and other details of many of these operations can be found in Rick Longinotti's portfolio, similar to this one.

#### \* **Water Treatment at Scotts Valley**

The costs of a SV 2.5 mgd treatment plant in Level 3 are questionable. However, conventionally treating the relatively clean water coming from the Felton Ranney collector might incur a capital cost in the general neighborhood of \$12M to \$20M. Note that:

(a) the plant would only be required for duty mainly during the initial years of aquifer recharge and during drought recoveries.

(b) such temporary, intermittent duty might tolerate using a cheap, prefab plant.

(c) since the Ranney collector output would be so clean, conventional non-membrane treatment may do.

(d) the small amount of sludge generated probably could go to the nearby SV waste treatment plant.

(e) such a plant might be able to do alternate duty, recycling SV's waste treatment plant output.

In contrast, GHWTP upgrades have been quoted at from \$40M to \$92M. This may be because the GHWTP upgrades would pertain to *all* the water going through GHWTP, not just the 2.5 mgd needed in SV—i.e., about 5 times more capability than we need for *this* job.

#### **Felton Ranney collector**

The Felton Ranney collector has many benefits, worth the ~\$7M installed cost:

1. It saves ~tens of millions of dollars from what must be spent to upgrade GHWTP.
2. It filters water going to Scotts Valley, making treatment costs cheaper there, too.
3. It filters water going to the Loch, increasing water quality over rubber-dam diverted water.
4. It increases diversion capacity at Felton, essential for instant drought recovery during rainy seasons shortened by climate change.
5. It is immune to being hit and damaged by logs and debris, which climate change may make increasingly likely in future deluges.
6. Unlike Felton Diversion's rubber dam, a Ranney collector would have considerable ability to divert during and prior to the "first flush" of each season, (which sometimes doesn't even happen, and so prevents rubber-dam diversions entirely).
7. Ranney collectors are more "fish-friendly" than conventional rubber-dam diversions; fish suffer virtually no impactment (crashing into) or entrainment (getting sucked up a pipe).

8. It is possible that CEQA *et al* would rather see these high-volume diversions done with a Ranney collector than with a rubber-dam divertor, i.e., approvals may come faster and easier.
9. A Felton Ranney collector would be at some 200 feet higher elevation than Tait St. Diversion, thus saving energy when serving the Loch or Scotts Valley destinations.

## Cost Estimates

Level	Item	Cap (\$M)	Op.Cos t (\$/HCF) 1	Comments
				<b>** = already in CIP</b>
<b>0</b>	Patch & de-rock existing Felton-Loch pipeline	0.2		
	SC-SqC water xfer at 1.48 mgd this winter '15-'16		0.40	but profit = ~\$6/HCF?
	Perform studies, tests--env., hydro, Ranney, wells...	0.5		
	Settle HCP			**
	Obtain Felton-GHWTP direct transfer right			**
	Apply for new water rights	0.1		
	Get contracts among stakeholders signed	0.1		
	<b>Level 0 Totals:</b>	<b>0.9</b>	<b>0.40</b>	Big net profit also
<b>1</b>	Build Felton-Loch pipeline #2 (April-Oct. 2016)			**at \$22M cap. cost
	Build SV intertie and pump station	2.4		
	Upgrade SC-SqC intertie pipe diameter	8.0		
	Make a production well reversible for injection	0.1	0.01	
	Drill an injection well	0.9	0.01	
	<b>Level 1 Totals:</b>	<b>11.4</b>	<b>0.02</b>	<b>L0 + L1 = 12.3, 0.42</b>
<b>2</b>	Install Felton Ranney collector (well & ~filter)		0.1	~\$7M but saves even more at GHWTP**
	Refurbish Felton-Loch pipeline #1	2.0		
	Make more production wells reversible for injection	0.2	0.01	
	Drill 3 more injection wells @ \$0.9M each	2.7	0.01	
	Obtain water rights for Level 3	0.3		
	<b>Level 2 Totals:</b>	<b>5.2</b>	<b>0.03</b>	<b>L0...L2 = 17.5, 0.45</b>
<b>3</b>	Build pumpstation for SC-SqC intertie (westbound)	5.0	0.01	part-time use
	Build new 2.5mgd WTP at SV or upgrade GHWTP		0.40	**? ~\$17.5M if at SV
	Make more production wells reversible for injection	0.3	0.01	
	Drill 6 more injection wells	5.4	0.02	
	Build recovery well & treatment capacity in SV	2.0	0.01	part-time use
	<b>Level 3 Totals:</b>	<b>12.7</b>	<b>0.45</b>	<b>L0...L3 = 30.2, 0.90</b>
<b>4</b>	Conduct a new comprehensive review and analysis	0.3		
	<b>Level 4 Totals:</b>	<b>0.3</b>	<b>0.00</b>	
	<b>Lochquifer Total<sup>2</sup>:</b>	<b>30.5</b>	<b>0.90</b>	see NOTE 3
	<b>NOTE 2:</b> A SIGNIFICANT SHARE OF THIS FUNDING IS EXPECTED TO BE BORNE BY AGENCIES TO WHICH THE CITY SENDS WATER, INCLUDING SqCWD, SVWD, THE COUNTY, AND THE GROUNDWATER MANAGEMENT AGENCY.			<b>NOTE 1:</b> The above operating costs are marginal, i.e., they are only the extra costs incurred by

	<p><b>DETAILS NEED TO BE WORKED OUT AS TO WHETHER PAYMENTS WOULD BE FOR WATER SALES, AND/OR BY SHARING CAPITAL COSTS MORE DIRECTLY. NOTE THAT MANY OF THE WELLS WILL BE OUTSIDE OF SCWD AND THUS MIGHT BE PAID FOR BY AGENCIES OTHER THAN SCWD. THUS SCWD NET SHARE MAY BE CLOSER TO \$19M.</b></p>			<p>adding the respective Level of capacity.</p> <p><b>NOTE 3:</b> <b>Op costs are likely to go down after recharge is done.</b></p>
--	---	--	--	---

## Unresolved Questions

1. Results of well-reversal tests, e.g., Beltz 12 test now in progress.
2. Injection well sitings.  
Shall injection wells be sited to constitute a shoreline anti-saline fence?
3. Ranney collector test results
4. What does it take to settle the HCP by December?
5. What does it take to get rights for direct Felton-GHWTP transfer for use *this December*?
6. If the City's lawyer, John Ricker, SqCWD et al began work NOW on water rights applications, when would the first usable temporary or emergency rights arrive?  
Note that we may only need such rights until Water Security Day (i.e., 3 Bg stored in the aquifers), or until the aquifers are full, whereupon regular water rights possibly could take over.
7. Do the City's pre-1914 North Coast water rights allow water transfer to SqCWD to be *delayed*? I.e., in order to enable the City to charge SqCWD aquifers *year-around* and not just during the rainy half of the year, could the City designate the place of use as being *routed through the Loch*? This theory could involve using a "**double in-lieu**" concept: first the City consumes NC water in lieu of Loch water, and a few months later, the City sends to SqCWD Loch water in lieu of NC water. This theory could increase annual transfers without upgrading the existing intertie.
8. Cost and siting of 2.5 mgd pre-fab treatment plant at Scotts Valley
  - a. Split the cost with SVWD, the new groundwater management district and/or the county?
  - b. Double-duty? i.e., mix in recycled wastewater, or take turns processing the two types?
9. What are reasonable terms for the contracts among stakeholders including the new groundwater management agencies?
10. At Hansen Quarry, surface spreading and percolation ponds were seen as attractive on the grounds that such water may not need to be potably treated first if it came by gravity feed from the Loch and especially if it came from a Ranney collector at Felton. However, these ideas were discouraged by the Tech team on the grounds that the water would lubricate a nearby hill-slide threat. Yet the slide has not given way in spite of annual winter rains. What percolation/surface spreading rate might be safe during the *dry* half of each year?
11. Is Level 4 a reasonably acceptable compromise to enable WSAC consensus to happen?

## ● 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.**



## 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.**

## 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.**

### 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;
- 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 0 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 1 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 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 3 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 4 Rating: NA**

**(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.

**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 0 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 1 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 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

### Block 4 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

**Optional: provide a rationale for your rating(s)**

### 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 proposal?

#### Block 0 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 1 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 2 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 3 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 4 Rating: NA**

- 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)**

### Legal Feasibility: Rate each block

Legal Feasibility addresses siting including acquisition of land, easements or rights of 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 0 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 1 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 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.

**Block 4 Rating: NA**

- 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 0 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 1 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 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 3 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 4 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 0 Rating:**

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

**Block 1 Rating:**

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

**Block 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

**Block 4 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).*