

# Feasibility Analysis & Portfolios for the Water Supply Alternatives Plan

City Council  
September 26, 2023

Colin Close  
Senior Water Resources Planner

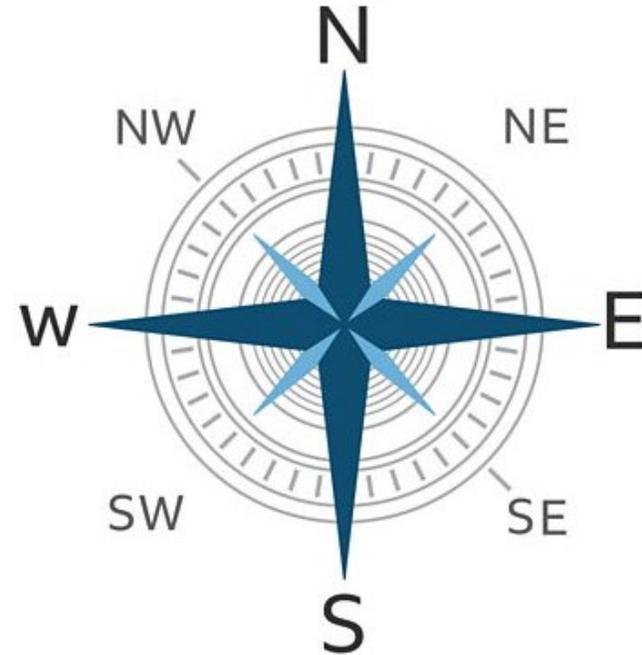
# Purpose for Today

Staff will present

- Final evaluation of supply options
- Draft portfolios (mixes of water supply options to achieve goals)

Seeking Council input on

- Study Results
- Draft Portfolios



# Water Supply Alternatives Plan

## Purpose

Enhance Santa Rosa's water supply resiliency and reliability to mitigate impacts of shortages due to severe droughts and emergencies.

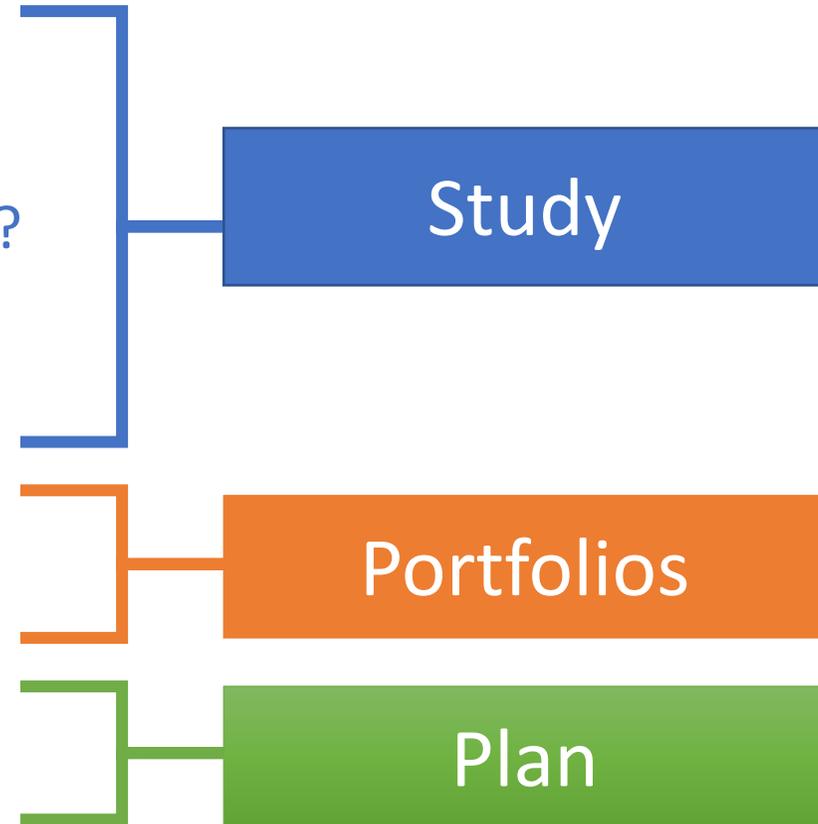
## Approach

Assess the feasibility of new water supply options and develop a plan for increasing resiliency.



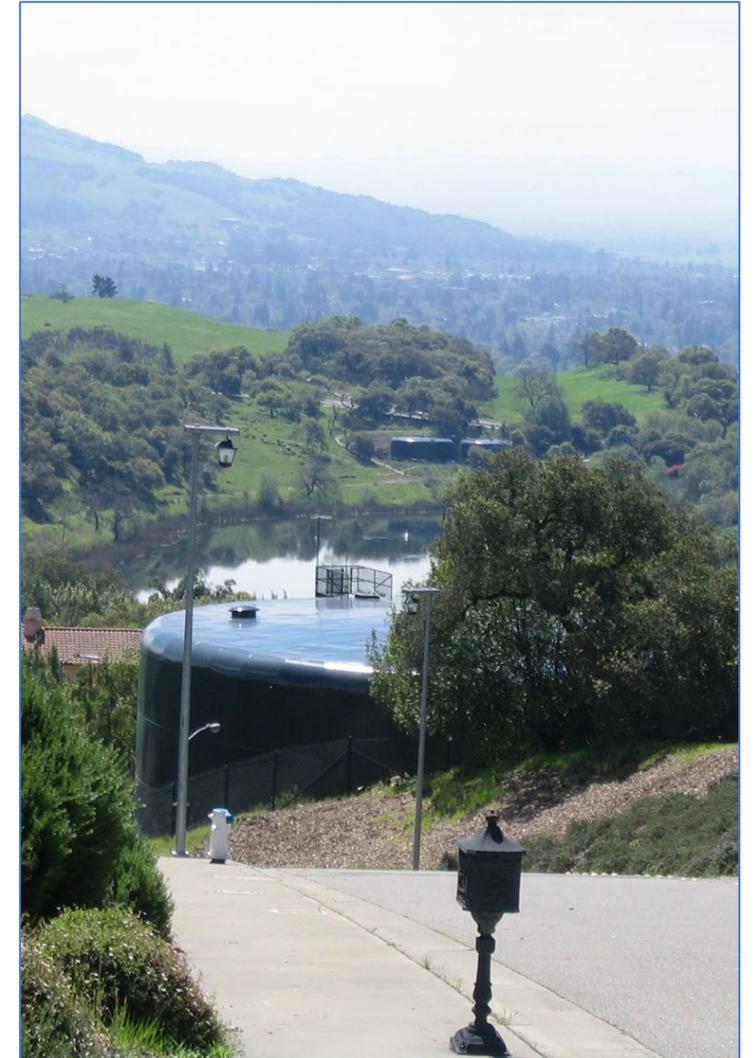
# Key Questions

- How much new water supply is optimal to mitigate the risk of shortages?
- Which supply options should be studied?
- What criteria should be used to assess each supply option?
- Which mix(es) of options will best help us meet our supply resiliency goal?
- What is the most reasonable and adaptive path forward?



# Project Initiation

- April 28, 2022 – City Council / Board of Public Utilities Liaison Subcommittee, by motion, approved staff recommendation to
  - Solicit proposals for assistance,
  - Have the BPU award the contract,
  - Have staff and consultant complete the study and prepare a plan,
  - Have the BPU review the plan, and
  - Have staff implement over time and report progress to the BPU.
- May 19, 2022 – BPU, by motion, approved staff request to issue a Request for Proposals (RFP) to solicit proposals from qualified consultants to assist.
- July 14, 2022 – Review panel selected Woodard & Curran.
- August 10, 2022 – Contract was executed, and work began.



# Project Overview

## ENGAGE STAKEHOLDERS

- ✓ Get input from a wide range of stakeholders on project objectives, supply study, portfolios, & plan.

## SET OBJECTIVES

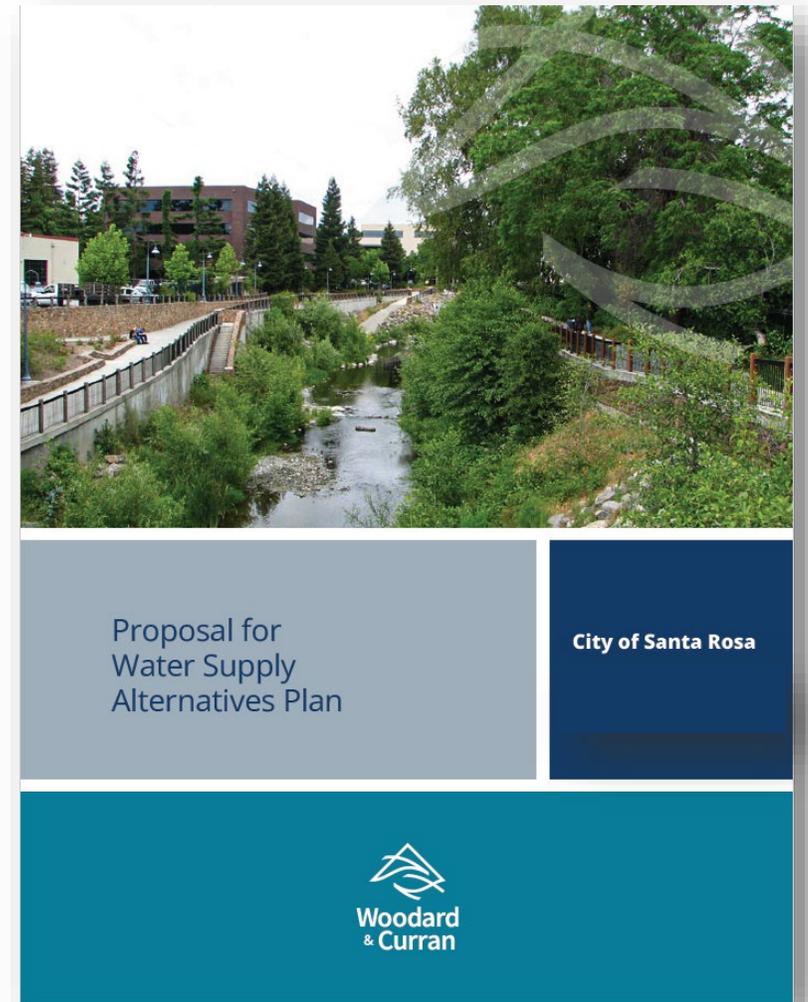
- ✓ Set water supply goals, identify potential supply options, establish criteria and study methods.

## STUDY SUPPLY OPTIONS

- ✓ Study feasibility of potential water supply options.
- Develop and assess portfolios of feasible options.

## DEVELOP A PLAN

- Develop long-term plan for achieving supply goals.



# Water Team

Director Burke

Deputy Directors & Staff

- ✓ Engineering Services
- ✓ Environmental Services
- ✓ Local Operations
- ✓ Regional Operations
- ✓ Water Resources



# Stakeholder Group

Held 4 three-hour working sessions to gather input on:

- Goals, supply options, study methodology
- Study results and draft portfolios
- Early draft of plan

Participants included leaders of organizations in these areas:

- Business & economic interests
- Community & service organizations
- Regional recycled water users
- Environmental & climate interests
- Resources agencies

1. Calpine
2. Community Action Partnership
3. Los Cien Sonoma County
4. NAACP Santa Rosa
5. North Bay Black Chamber of Commerce
6. North Coast Builders Exchange
7. Recycled Water User – Ag
8. Recycled Water User – Urban
9. RED Housing Fund
10. Regional Climate Protection Authority
11. Russian River Watershed Association
12. Russian River Water Protection Committee
13. Santa Rosa Metro Chamber of Commerce
14. Santa Rosa Plain Groundwater Sustainability Agency
15. Santa Rosa Subregional TAC
16. Sonoma Clean Power
17. Sonoma County Alliance
18. Sonoma RCD
19. Sonoma Water

# Our Water Future Community Meetings



OUR FUTURE IN EVERY DROP

- Held 4 two-hour community meetings (Zoom)
  - Oct 26, Jan 25, Jun 26, Aug 28
- Provided background, scope, timeline, & updates
- Solicited community input:
  - ✓ Goal & targets, potential supply options, criteria for assessing options
  - ✓ Study results & portfolios (mixes of supplies)
- Live Spanish interpretation
- Webpage with recordings, slides, meeting schedule
  - [srcity.org/OurWaterFuture](http://srcity.org/OurWaterFuture)



**Exploring  
Opportunities for  
Our Water Future**

# Board of Public Utilities

- Sep. 15, 2022 - BPU received a staff briefing on the project scope, timeline, budget, and team.
- Jan. 19, 2023 - BPU held a study session to receive information and provide input to staff on the water supply goal and targets, list of water supply options for consideration, and criteria and methodology for the feasibility analysis.
- Aug. 17, 2023 - BPU held a study session to receive information and provide input to staff on the supply feasibility analysis and draft portfolios.



# Additional Outreach

- Oct. 2022 – Sep. 2023, staff solicited additional public input through public presentations at
  - General Plan open house events
  - Subregional Technical Advisory Committee
  - Sonoma County Alliance – Water Committee and General Membership
  - Santa Rosa Metro Chamber – Advocacy Committee
  - Santa Rosa Plain Groundwater Sustainability Agency – Advisory Committee



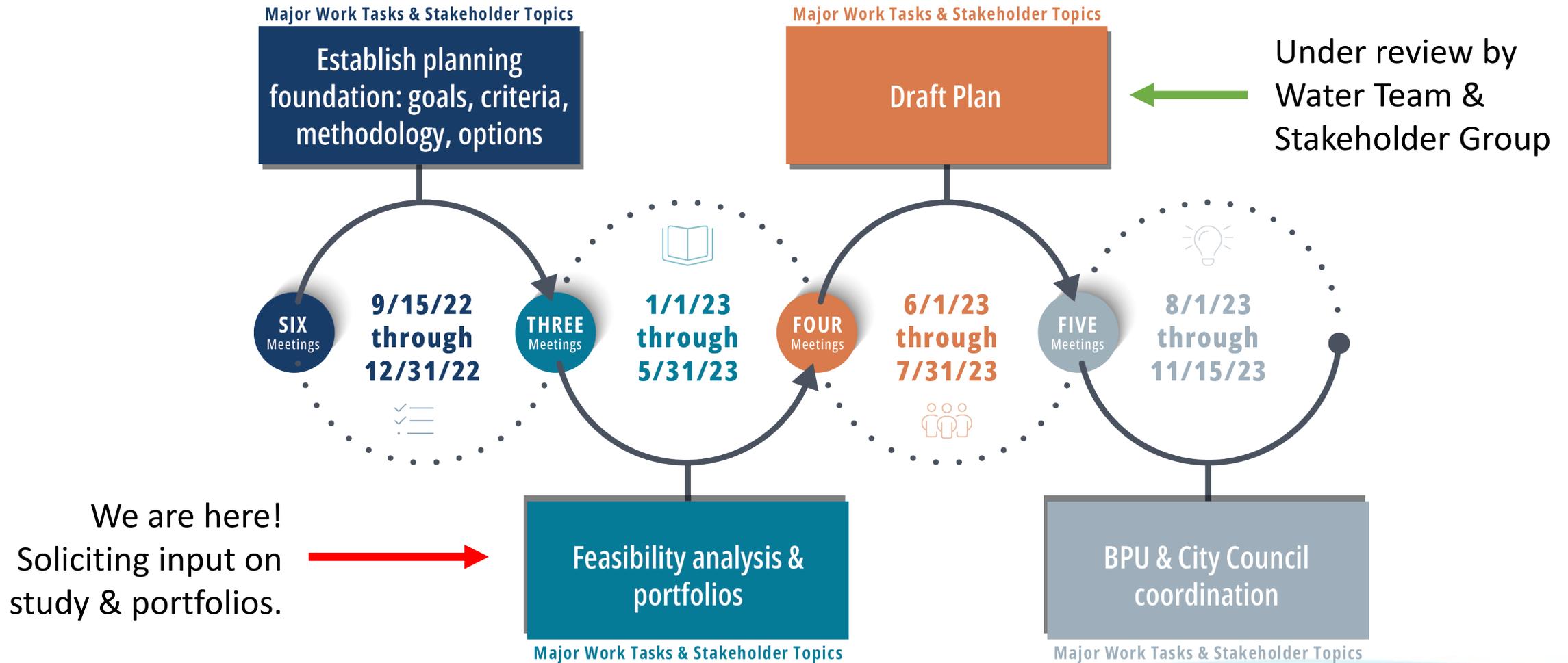
# Work Completed to Date



Understand the foundational work to build the plan

*Katie Cole, Woodard & Curran*

# Project Timeline



# Project Work Update



## Water Team

- 5 working sessions (Oct, Dec, May, Jul, Aug).
- Input on study parameters, study results, portfolios, and early draft of plan.

## Community

- 4 community webinars (Oct, Jan, Jun, Aug).
- Input on study parameters, study results, portfolios, and early draft of plan.

## Stakeholder Group

- 4 working sessions (Nov, Dec, May, July).
- Input on study parameters, study results, portfolios, and early draft of plan.

## Board of Public Utilities

- Contract award, updates, and two study sessions.

## Woodard & Curran

- Stakeholder engagement.
- Preparation of deliverables.

# Feasibility Analysis



Review analysis of water supply options

*Katie Cole, Woodard & Curran*

# Water Supply Resiliency Goals

Diversify and increase city supplies to reduce dependence on Sonoma Water, particularly during Sonoma Water supply shortages or disruption in delivery

## **Mitigate Droughts**

- Produce 30% of city's water demand with city supplies
- About 7,500 acre-feet/year in 2045

## **Mitigate Disasters/Catastrophic Events**

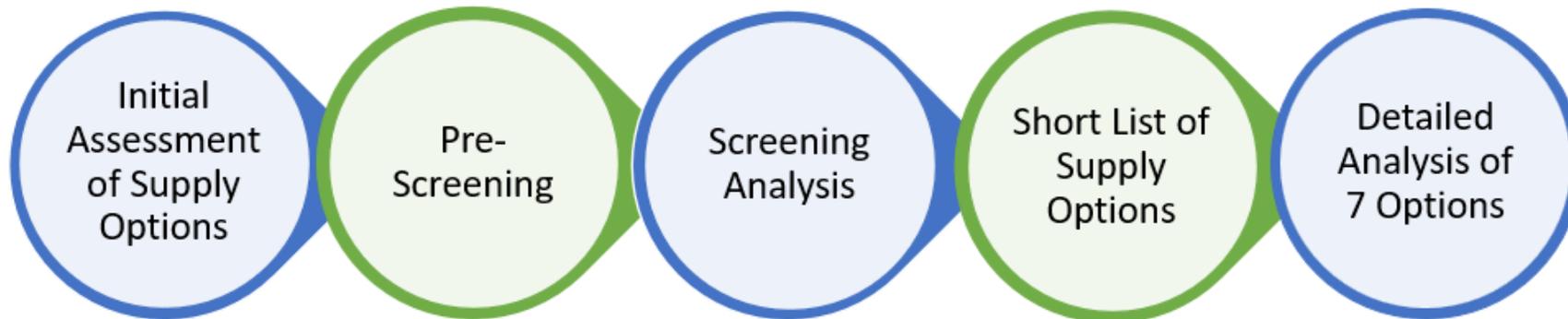
- Produce half of normal domestic/indoor demand with city supplies
- About 9 million gallons per day in 2045

## **Mitigating Peak Day Demand**

- Produce 30% of summer average peak day demand with city supplies
- About 9 million gallons per day in 2045

# Study Methodology

1. Pre-screen all supply options to identify any infeasible or duplicative efforts.
2. Screen remaining supply options.
  - Use 2 key criteria: high-level assessment of cost effectiveness and scalability.
  - Document reasoning for why supply options advance for further consideration (or not)
  - Yield manageable “short list” of options for detailed analysis.
3. Use defined metrics for each criterion for scoring. Assign weight to each criterion to inform scoring process.



# 18 Supply Options for Assessment

## Groundwater

- GW-1** Additional groundwater extraction wells
- GW-2** Conversion of emergency wells to production
- GW-3** Aquifer Storage and Recovery (ASR) wells
- GW-4** Regional groundwater extraction wells
- GW-5** Regional Aquifer Storage and Recovery wells

## Purified Recycled Water

- PR-1** Produce at LTP for direct potable reuse (DPR)
- PR-2** Produce at a satellite location (DPR)
- PR-3a** Produce at LTP and inject into groundwater via ASR wells for indirect potable reuse (IPR)
- PR-3b** Produce at LTP and add to Lake Ralphine before use (IPR)
- PR-3c** Produce at LTP and add to Lake Sonoma (or alternate) before use (IPR)
- PR-4** Regional purified recycled water (DPR)

## Nonpotable Recycled

- RW-1** Expand Nonpotable Recycled Water Service (City)

## Desalination

- DE-1** Brackish desalination (likely Regional)
- DE-2** Ocean desalination (Santa Rosa or Regional)

## Surface/Stormwater

- SW-1** Capture excess winter flows from Santa Rosa Creek/Laguna de Santa Rosa, store in aquifer for later withdrawal
- SW-2** Store excess winter flows from Santa Rosa Creek/Laguna de Santa Rosa, store in enlarged Lake Ralphine, construct water treatment plant to withdraw from Lake Ralphine
- SW-3** Regional Stormwater

## Efficiency Programs

- E-1** Aggressive incentives for toilets & turf replacement

# Rationale for Supply Options

- Retains a broad diversity of options.
- Includes City and Regional projects.
- Includes aggressive efficiency incentives to reduce demand over time.
- Integrates input from Water Team, Community, and Stakeholder Group.

# Five Options Removed During Pre-screening Process

Category	Supply Option	Reason for Removal
Groundwater	GW-4: Regional groundwater wells	Regional efforts planned or underway with significant City involvement.
	GW-5 Regional Aquifer Storage and Recovery	Regional efforts planned or underway with significant City involvement.
Purified Recycled Water	PR-3b: Produce at Laguna Treatment Plant and add to Lake Ralphine before use (indirect use)	Lake Ralphine would not be able to function effectively for storage.
Surface/ stormwater	SW-2 Store excess winter flows from Santa Rosa Creek/Laguna de Santa Rosa in enlarged Lake Ralphine; Construct water treatment plant to withdraw from Lake Ralphine	Lake Ralphine would not be able to function effectively for storage.
	SW-3 Regional Stormwater	Regional efforts planned or underway with significant City involvement.

# Six Options Removed During Screening Process

Category	Supply Option	Reason for Removal
Purified Recycled Water	PR-1: DPR AWWPF at LTP	Not cost-effective based on current and projected water supply needs.
	PR3a: IPR AWWPF at LTP via Delta Pond	Not cost-effective based current and projected water supply needs.
	PR-3c: IPR AWWPF at LTP via Lake Sonoma	Not cost-effective based on current and projected water supply needs. Doesn't reduce Santa Rosa's reliance on Sonoma Water.
Non-potable Recycled Water	RW-1: Expand existing recycled water system	Not cost-effective based on current needs. Doesn't increase potable water supplies to mitigate water shortages or supply interruptions.
Desalination	DE-1: Regional brackish desalination	Not cost-effective based on current needs. Doesn't reduce reliance on Sonoma Water system. Relies on water transfers between agencies (no new supply in City limits). Faces significant permitting obstacles and regulatory challenges.
	DE-2: Ocean desalination	Not cost-effective based on current needs. Faces significant permitting obstacles and regulatory challenges.

# Rationale for Screening

- Retains options that rank higher on cost-effectiveness and scalability.
- Keeps options that further diversify portfolio (stormwater, satellite purified water).
- Includes City and Regional projects.
- Includes aggressive efficiency incentives to reduce demand over time.
- Integrates input from Water Team, Community, and Stakeholder Group.

# A Further Note on Stormwater & Desalination

- Two of 3 stormwater options did not advance to detailed analysis
  - Options would require the construction of a treatment plant
  - Available stormwater should be confirmed before committing costs to a treatment facility
- Neither desalination option advanced to detailed analysis
  - Significant permitting and environmental challenges
  - Turndown capacity is not ideal for Santa Rosa's use case
  - Regional brackish facility does not reduce reliance on Sonoma Water
  - Ocean desalination requires extensive infrastructure (pipeline to Santa Rosa)

# Triggers for Reconsidering Desalination

- Technology that reduces baseline operating costs (improved turndown capacity)
- Less expensive energy prices which reduces operating costs
- Project configuration that yields direct water to Santa Rosa
- Technology that improves water recovery

# 7 Options Underwent Further Analysis

- GW-1: Add Extraction Wells
- GW-2: Convert Emergency Wells to Production Wells
- GW-3: Add Aquifer Storage & Recovery Wells
- PR-2: Satellite Direct Potable Reuse
- PR-4: Regional Direct Potable Reuse at Laguna Treatment Plant
- SW-1: Stormwater Storage in Aquifer
- E-1: Efficiency Programs

# Criteria and Weights Used for Evaluation

Criterion	How assessed	Weight	Score Multiplier
Cost effectiveness	Capital and O&M costs	High	5
Scalability	Can capacity be tailored to need? Can actual production be tailored to need?	High	5
Resiliency	How well does the option perform if future conditions differ from projected?	High	3
Equity	Does option avoid disproportionate impact on vulnerable communities?	High	3
Environmental performance	Does option minimize adverse effects?	High	3
Legal, permitting, and regulatory	Does the option face major implementation challenges? Consider level of mitigation required.	Med	1
City control and interagency coordination	Would the City be able to tailor to meet City priorities?	Med	1
Multi-benefit	Does the project provide multiple benefits?	Med	1

# Results of Qualitative Scoring (Higher Score is Better)

Criterion	Groundwater			Purified Recycled Water		Stormwater	E-1: Efficiency Programs
	GW-1: Add Extraction Wells	GW-2: Convert Emergency Wells	GW-3: City ASR Wells	PR-2: Satellite DPR	PR-4: Regional DPR	SW-1: Stormwater Storage in Aquifer	
Cost effectiveness	2	2	2	0	0	0	1
Scalability	2	0	1	2	2	1	1
Resiliency	1	1	2	2	2	1	1
Equity	1	1	1	1	1	1	2
Environmental performance	1	2	1	0	1	1	2
Legal, permitting, and regulatory	1	2	0	0	0	1	2
City control and interagency coordination	2	2	1	2	0	2	2
Multi-benefit	0	0	1	0	0	2	1
<b>Total Unweighted</b>	<b>10</b>	<b>10</b>	<b>9</b>	<b>7</b>	<b>6</b>	<b>9</b>	<b>12</b>
<b>Total Weighted</b>	<b>32</b>	<b>26</b>	<b>29</b>	<b>21</b>	<b>22</b>	<b>19</b>	<b>30</b>

# Draft Portfolios



Review draft portfolios & analysis

*Katie Cole, Woodard & Curran*

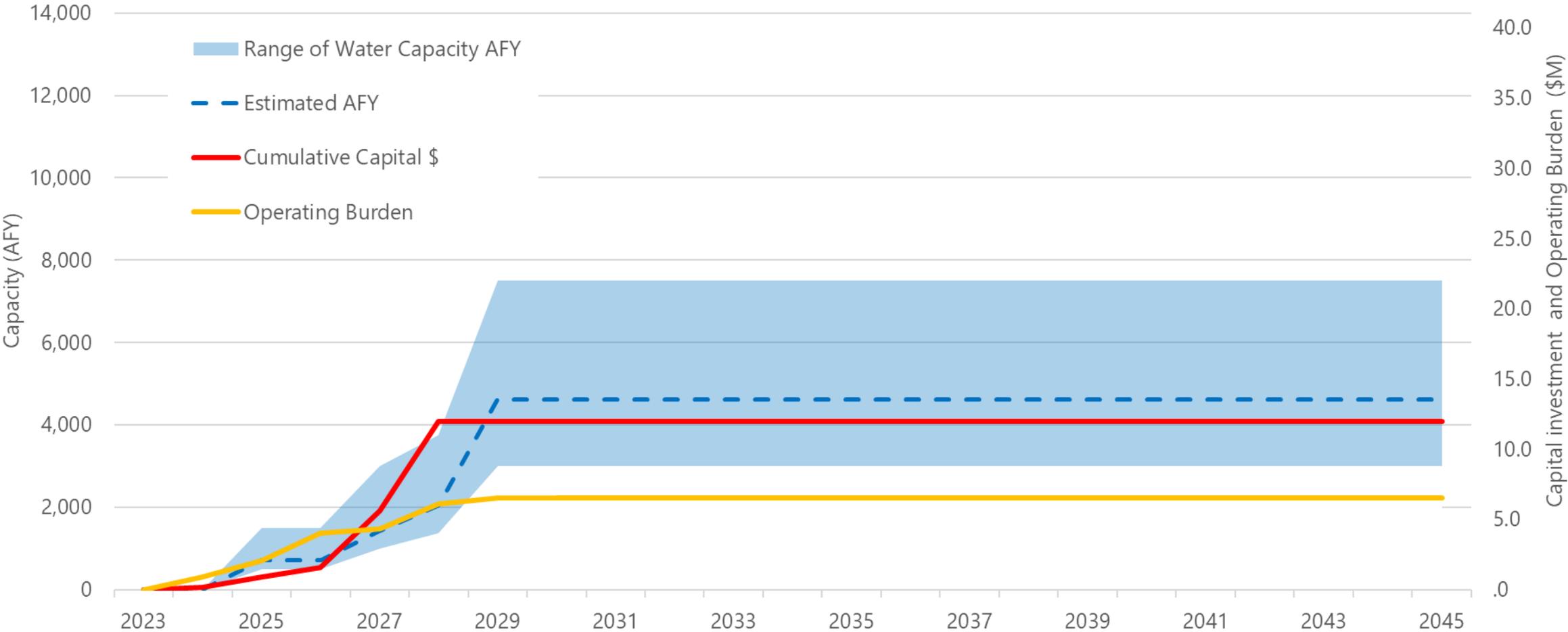
# Rationale for Portfolio Development

- Uses variety of themes to capture different outcomes: least cost, fastest implementation, most water, most flexibility.
- Uses options scoring well in multiple portfolios (efficiency & converting emergency wells).
- Includes options that further diversify portfolio (stormwater, satellite purified water).
- Reflects various implementation logic for portfolio components.
- Integrates input from Water Team, Community, and Stakeholder Group.

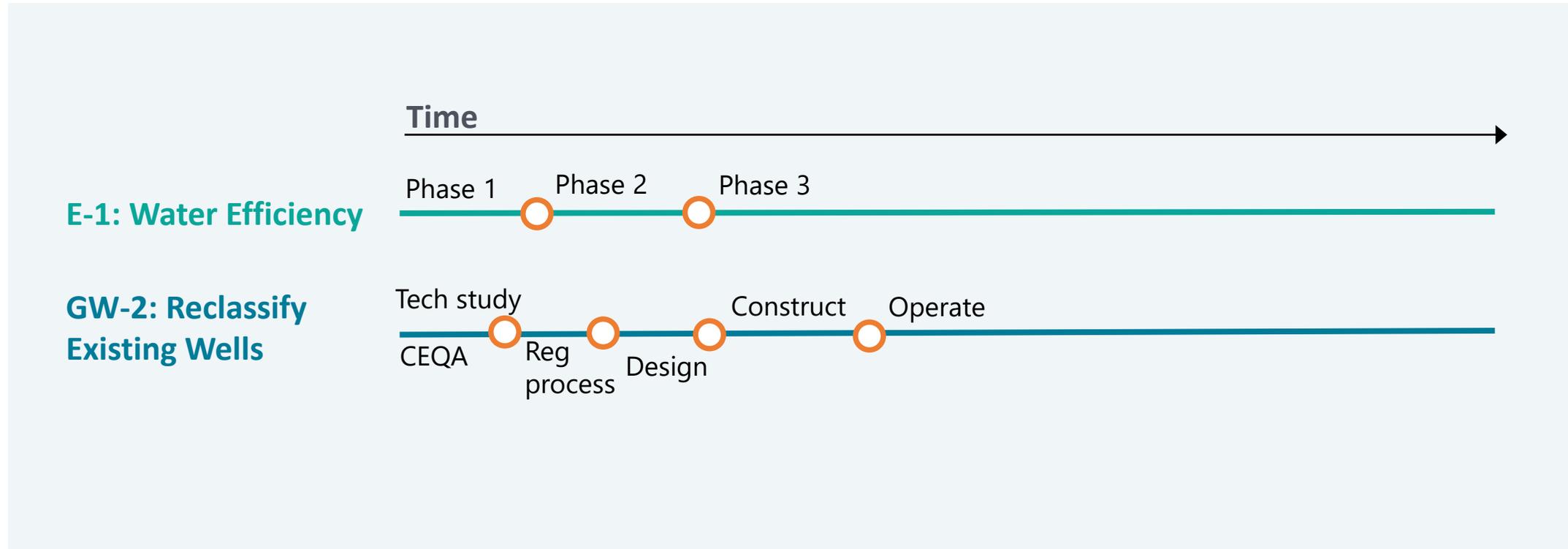
# Portfolios

Option	Description	Portfolio 1 Most Economical	Portfolio 2 Fastest	Portfolio 3 Most Water	Portfolio 4 Most Adaptive
GW-1	Add Extraction Wells (Up to 12)		✓	✓	✓
GW-2	Convert Emergency Wells to Production Wells	✓	✓	✓	✓
GW-3	Aquifer Storage & Recovery Wells				Consider
PR-2	Satellite Direct Potable Reuse			✓	Consider
PR-4	Regional Direct Potable Reuse at Laguna Treatment Plant				Consider
SW-1	Stormwater Storage in Aquifer			Consider	Consider
E-1	Efficiency Programs	✓	✓	✓	✓

# Portfolio 1: Cost and Yield Performance



# Portfolio 1: Implementation Concept

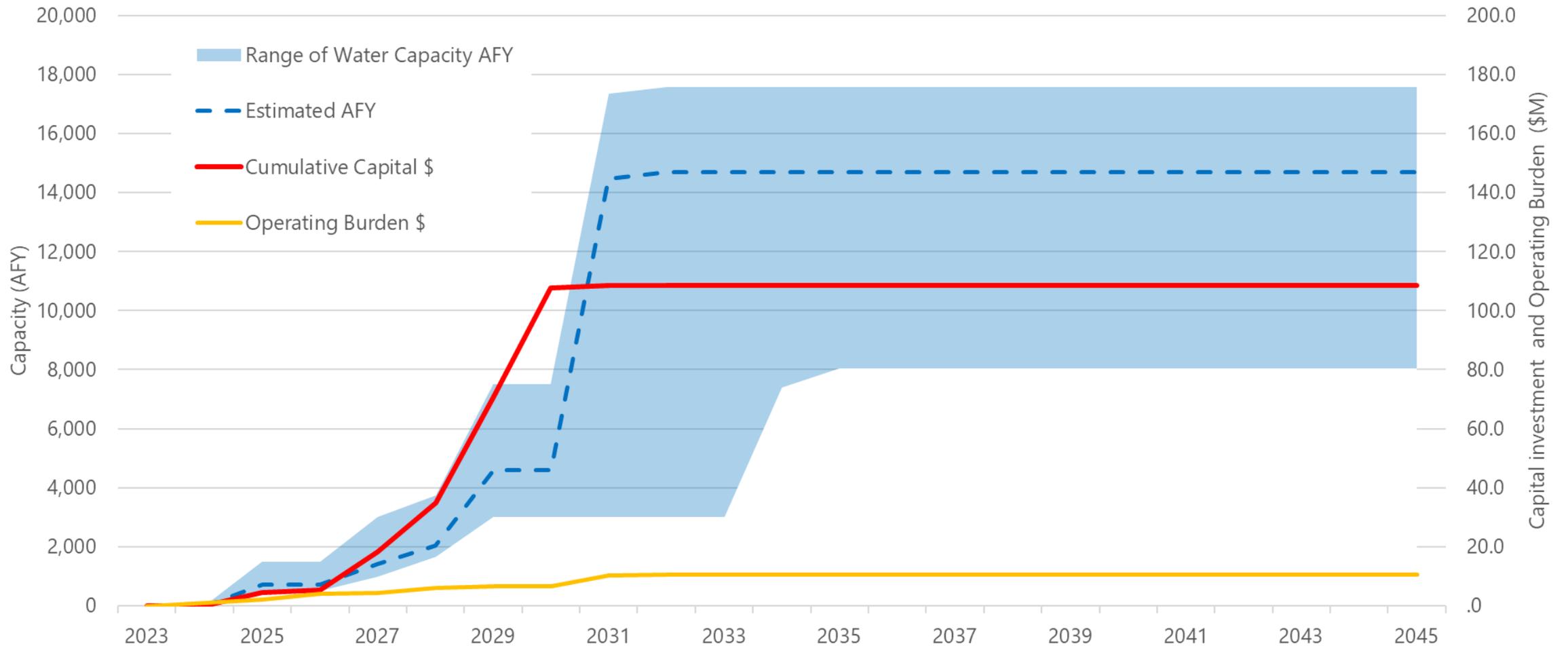


○ Decision point

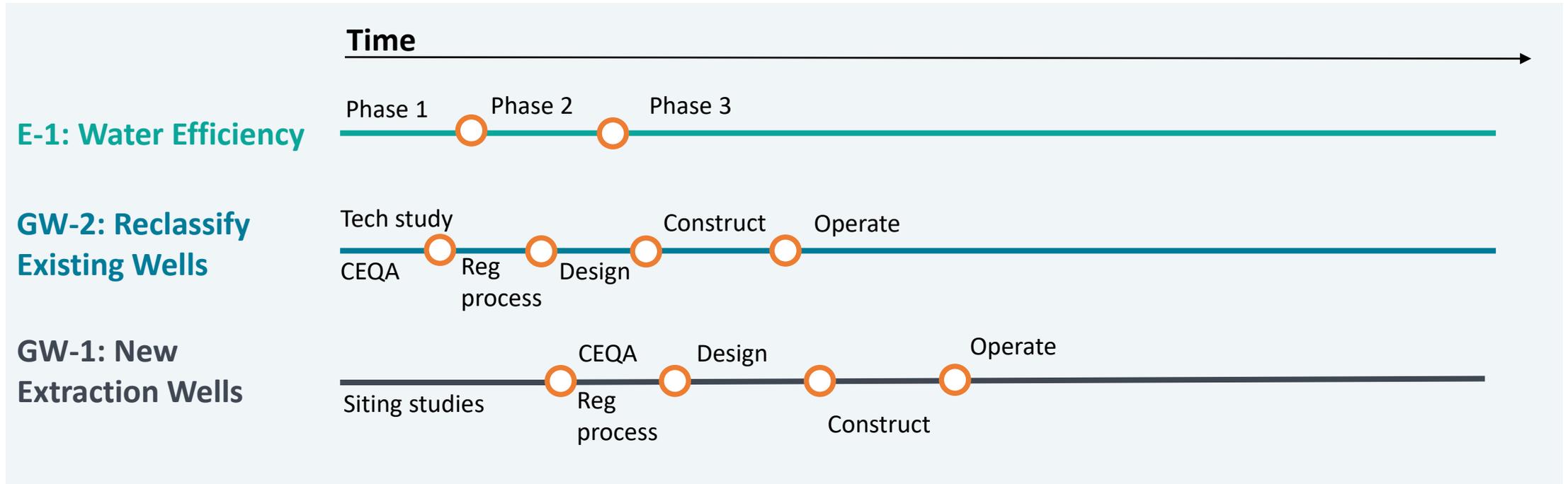
# Portfolios

Option	Description	Portfolio 1 Most Economical	Portfolio 2 Fastest	Portfolio 3 Most Water	Portfolio 4 Most Adaptive
GW-1	Add Extraction Wells (Up to 12)		✓	✓	✓
GW-2	Convert Emergency Wells to Production Wells	✓	✓	✓	✓
GW-3	Aquifer Storage & Recovery Wells				Consider
PR-2	Satellite Direct Potable Reuse			✓	Consider
PR-4	Regional Direct Potable Reuse at Laguna Treatment Plant				Consider
SW-1	Stormwater Storage in Aquifer			Consider	Consider
E-1	Efficiency Programs	✓	✓	✓	✓

# Portfolio 2: Cost and Yield Performance



# Portfolio 2: Implementation Concept

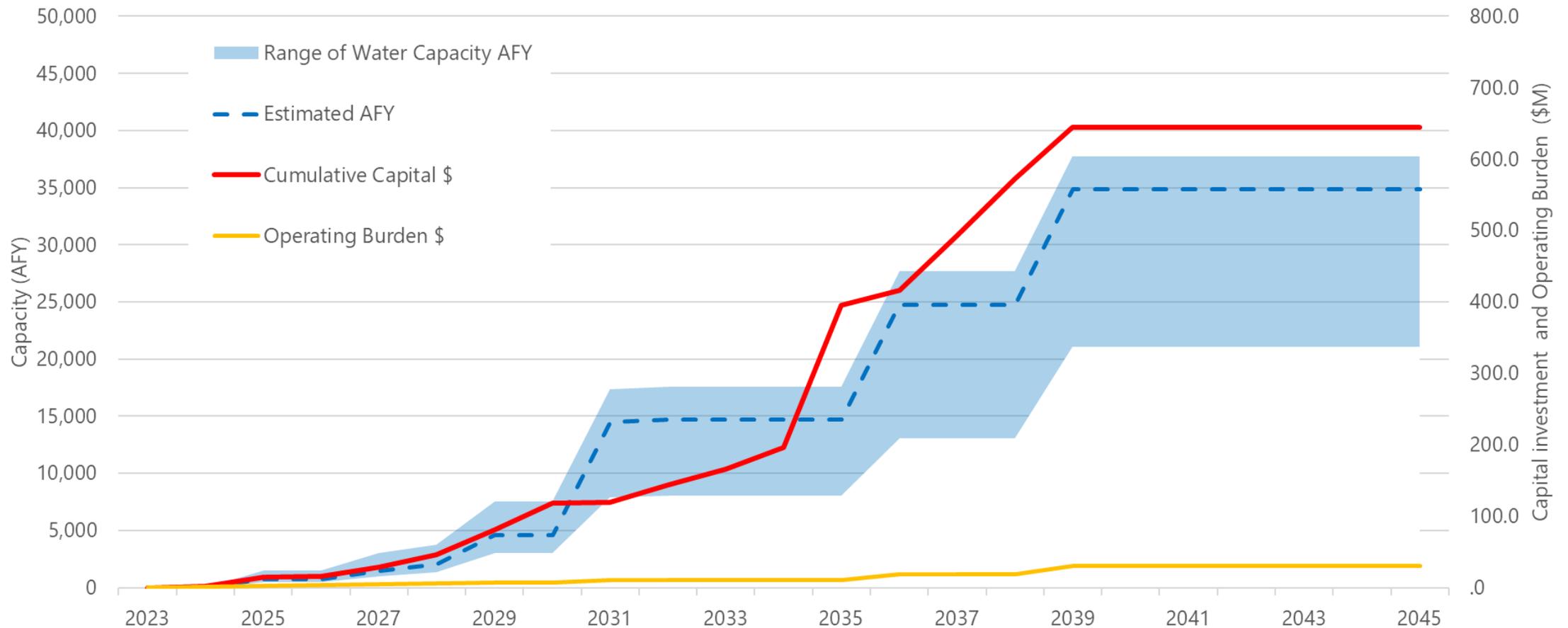


○ Decision point

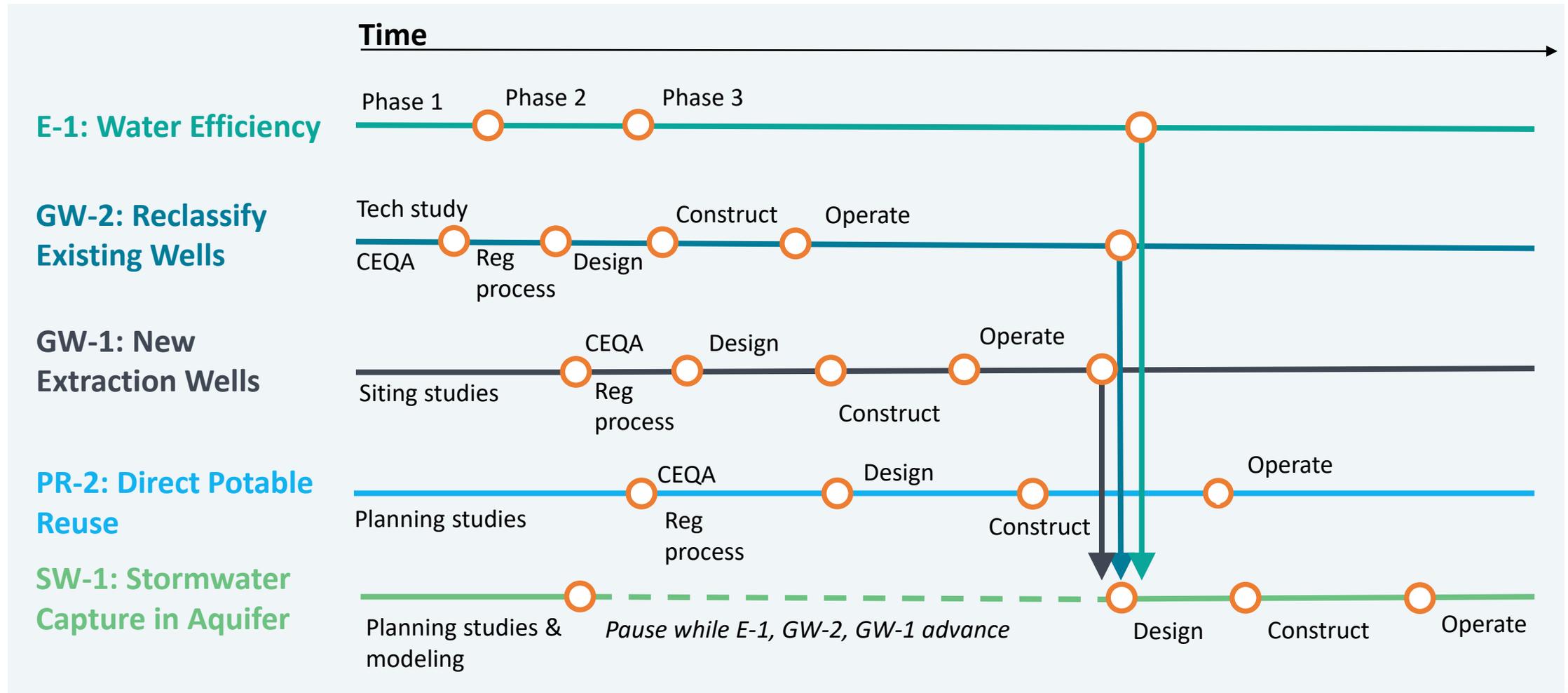
# Portfolios

Option	Description	Portfolio 1 Most Economical	Portfolio 2 Fastest	Portfolio 3 Most Water	Portfolio 4 Most Adaptive
GW-1	Add Extraction Wells (Up to 12)		✓	✓	✓
GW-2	Convert Emergency Wells to Production Wells	✓	✓	✓	✓
GW-3	Aquifer Storage & Recovery Wells				Consider
PR-2	Satellite Direct Potable Reuse			✓	Consider
PR-4	Regional Direct Potable Reuse at Laguna Treatment Plant				Consider
SW-1	Stormwater Storage in Aquifer			Consider	Consider
E-1	Efficiency Programs	✓	✓	✓	✓

# Portfolio 3: Cost and Yield Performance



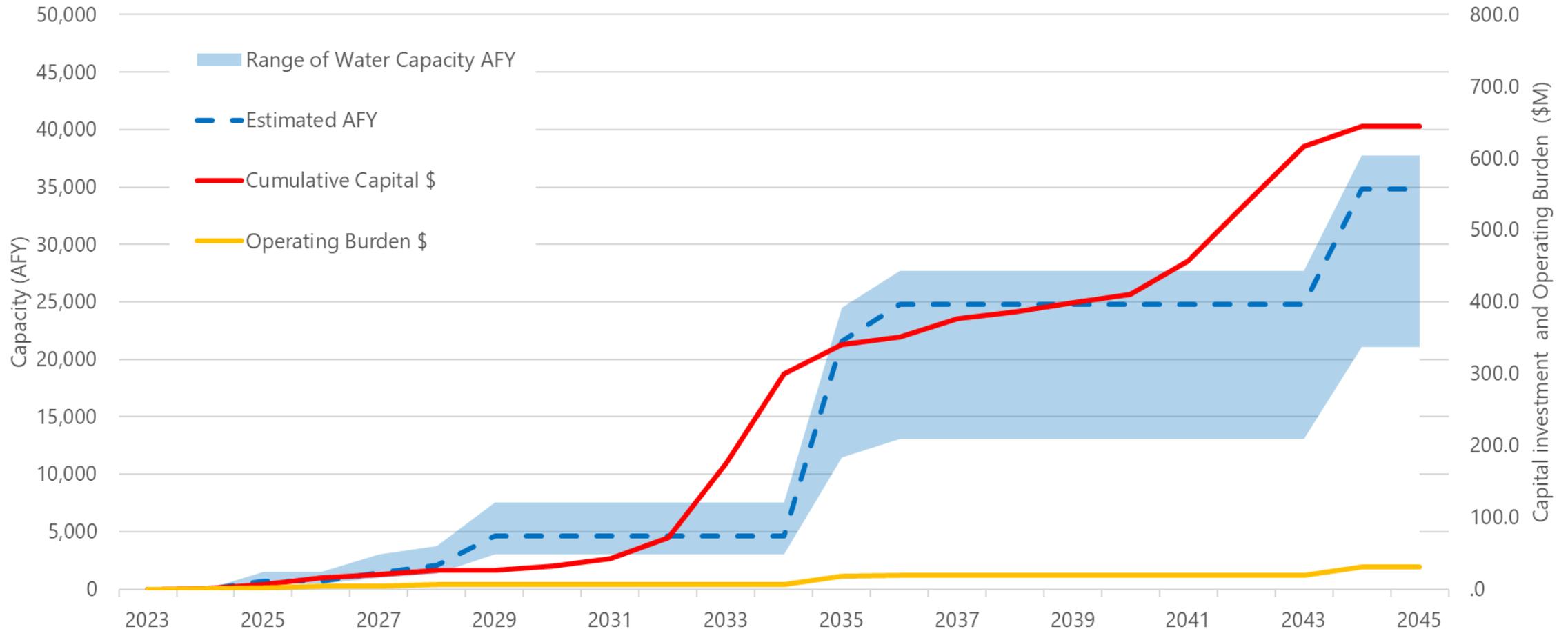
# Portfolio 3: Implementation Concept



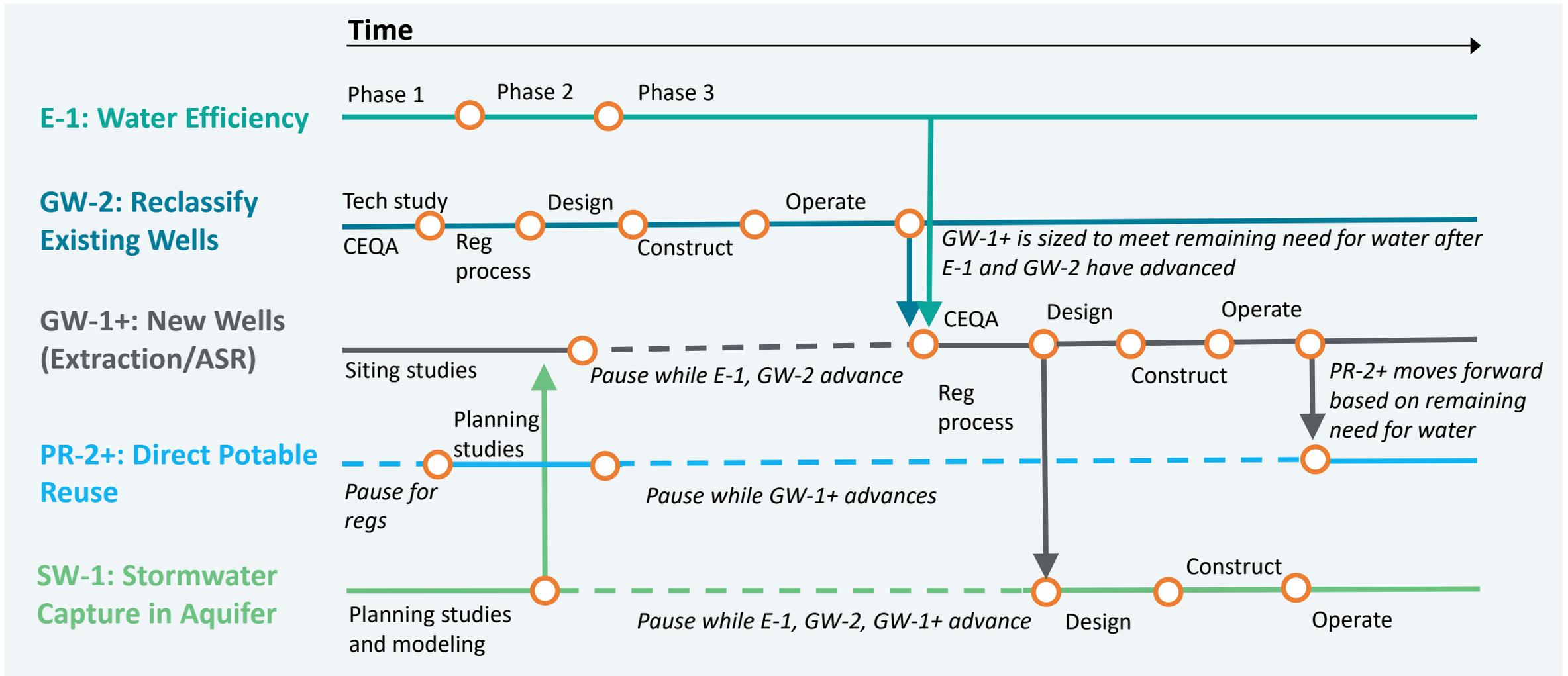
# Portfolios

Option	Description	Portfolio 1 Most Economical	Portfolio 2 Fastest	Portfolio 3 Most Water	Portfolio 4 Most Adaptive
GW-1	Add Extraction Wells (Up to 12)		✓	✓	✓
GW-2	Convert Emergency Wells to Production Wells	✓	✓	✓	✓
GW-3	Aquifer Storage & Recovery Wells				Consider
PR-2	Satellite Direct Potable Reuse			✓	Consider
PR-4	Regional Direct Potable Reuse at Laguna Treatment Plant				Consider
SW-1	Stormwater Storage in Aquifer			Consider	Consider
E-1	Efficiency Programs	✓	✓	✓	✓

# Portfolio 4: Cost and Yield Performance (Baseline Scenario)

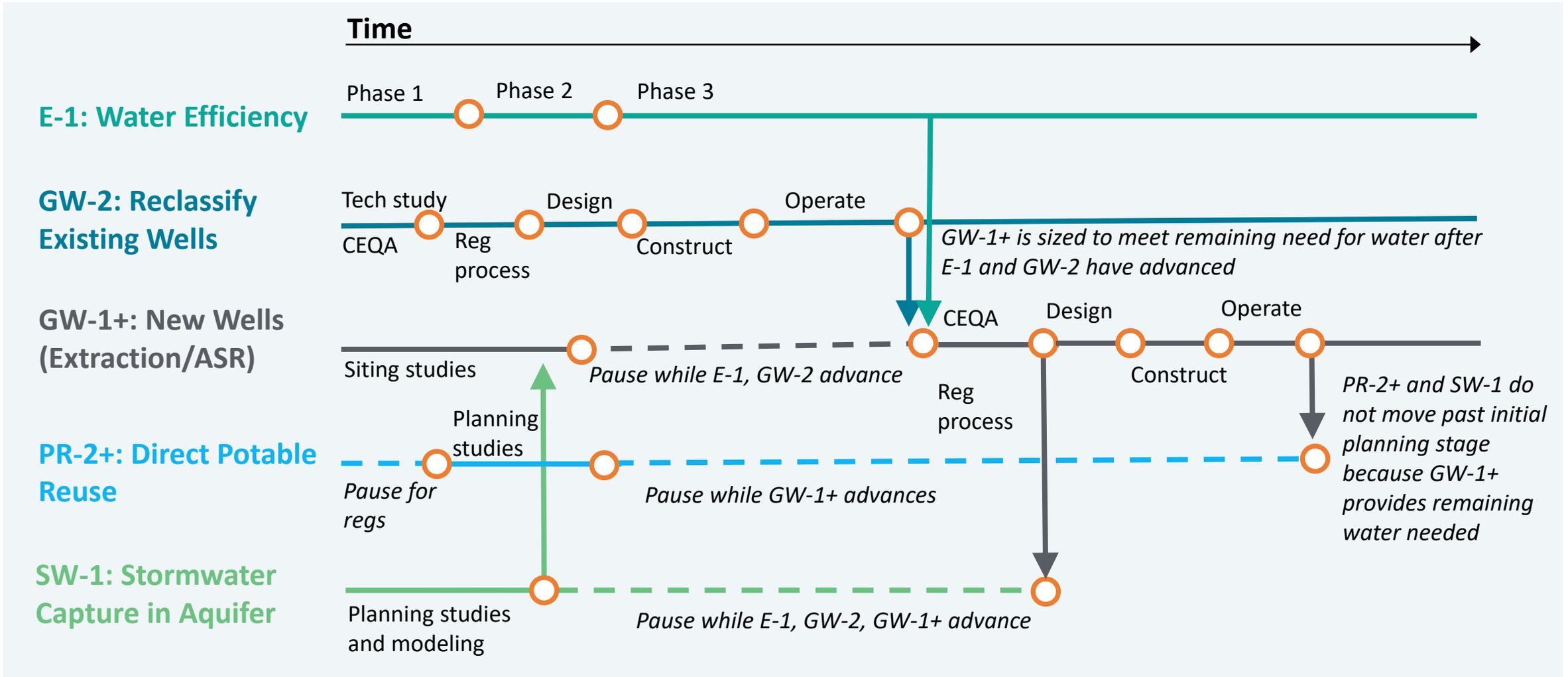


# Portfolio 4: Implementation Concept (Baseline Scenario)



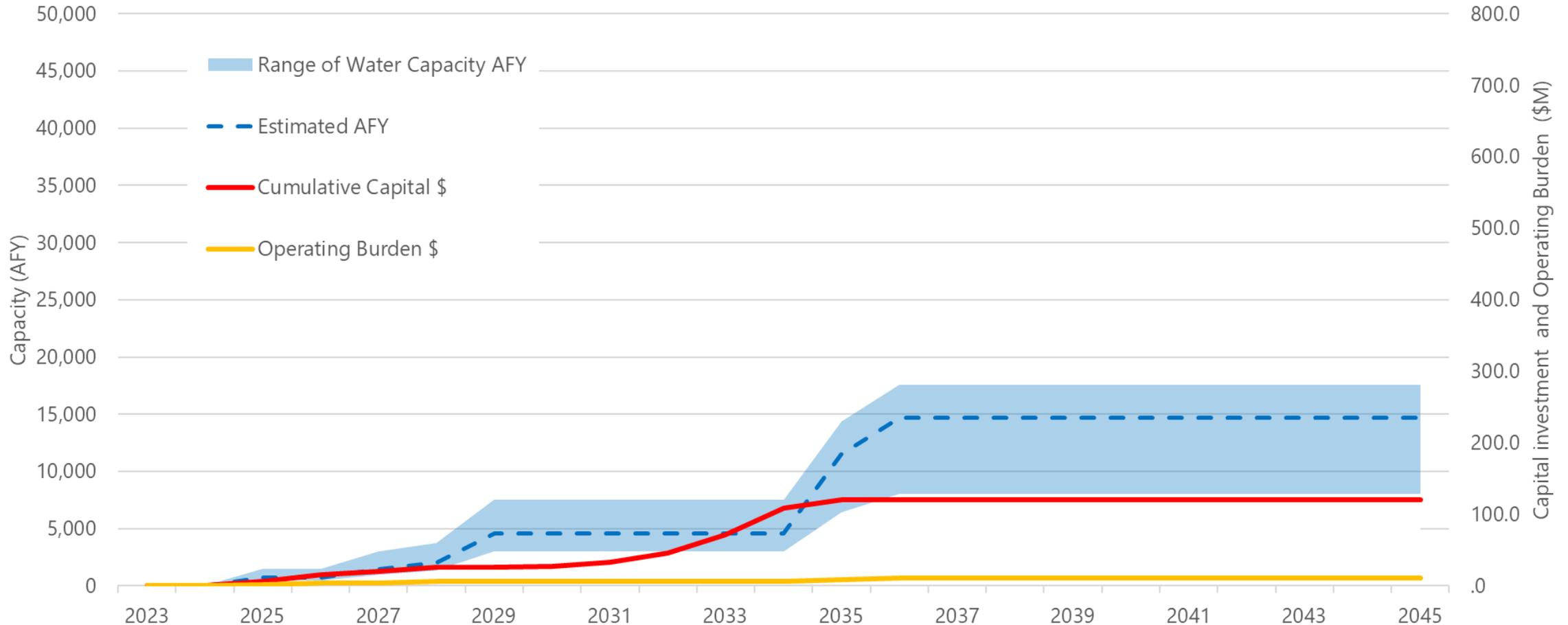
○ Decision point

# Portfolio 4: Implementation Concept (Alternative Scenario)



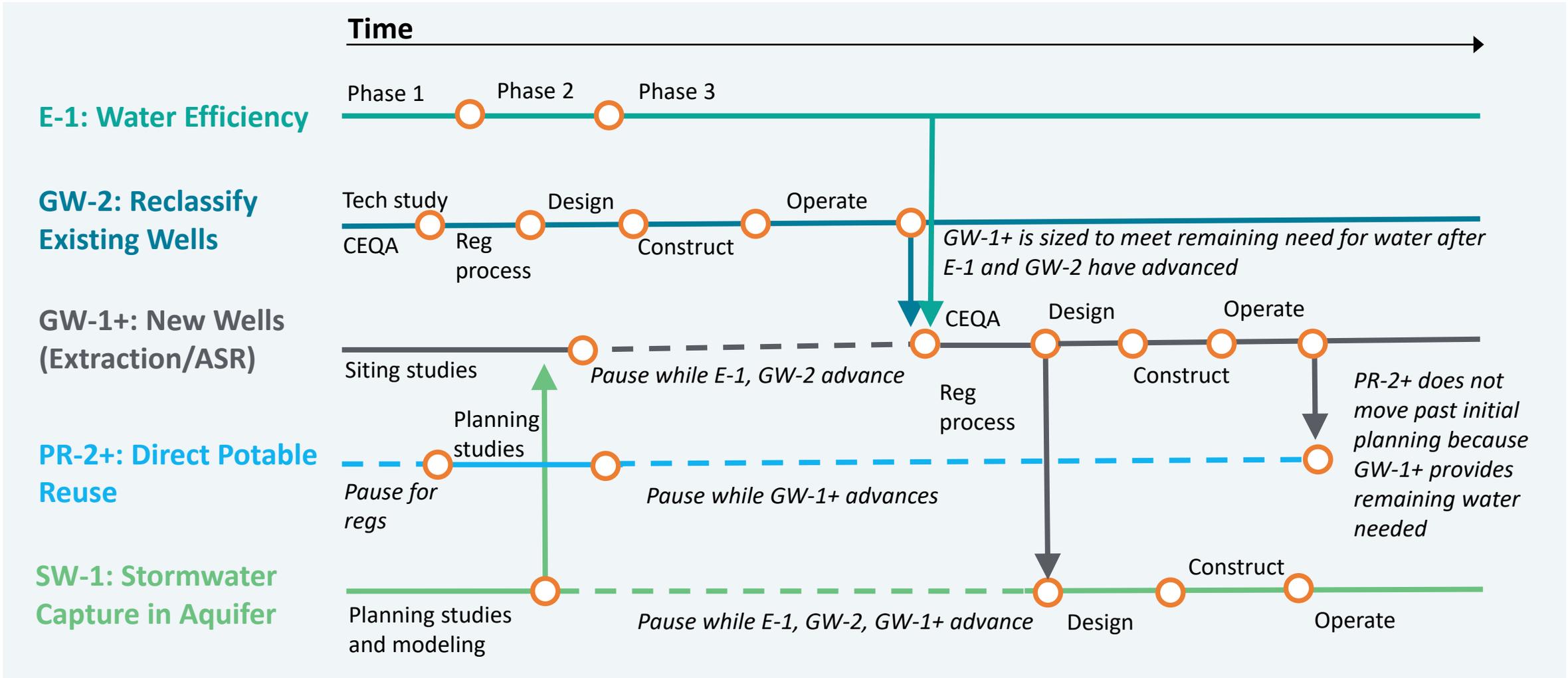
○ Decision point

# Portfolio 4: Cost and Yield Performance (Alternative Scenario)



# Portfolio 4: Implementation Concept (Alternative Scenario, Variant 1)

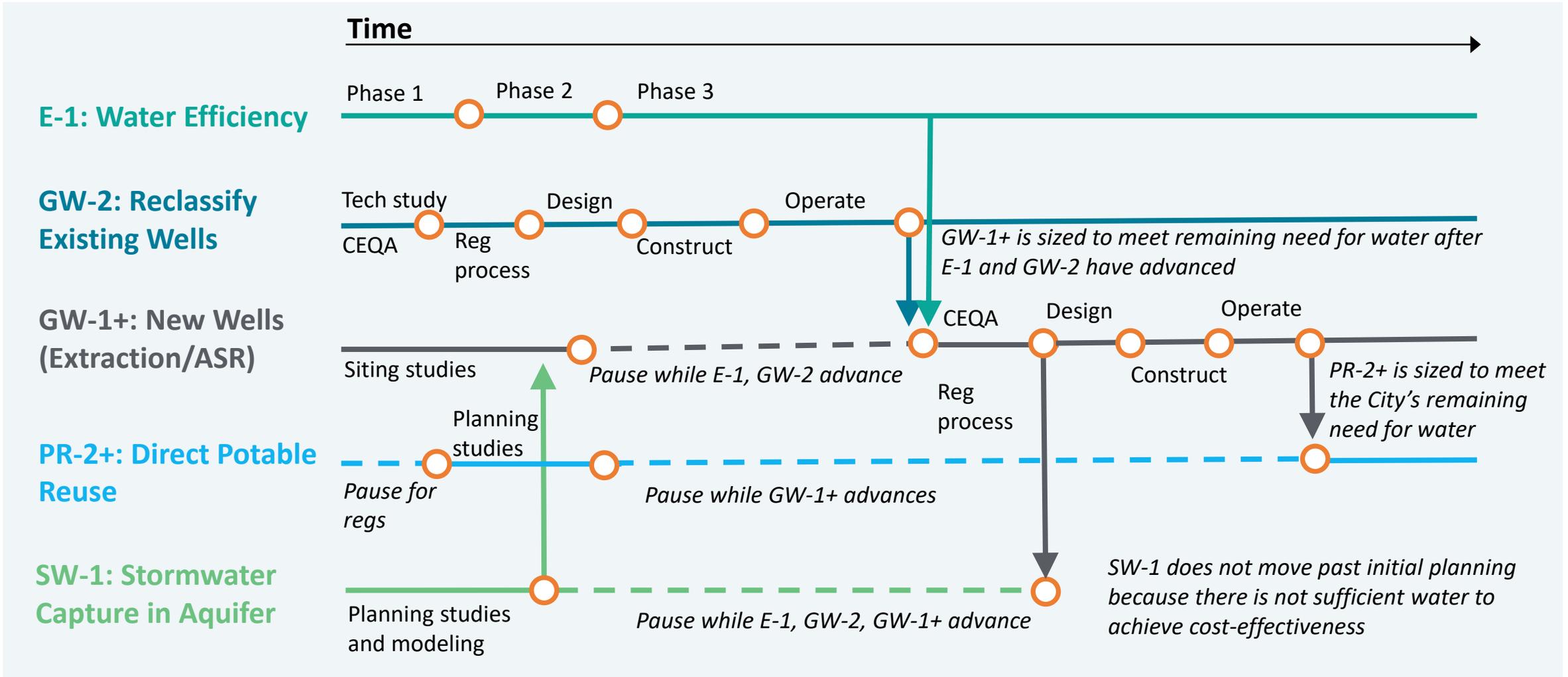
## What if SW-1 can provide water to GW-1+?



○ Decision point

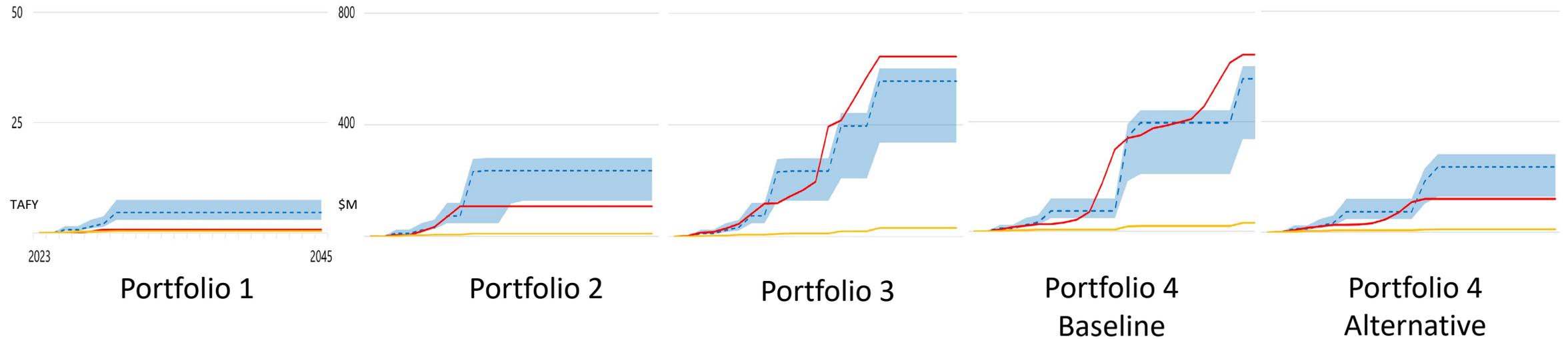
# Portfolio 4: Implementation Concept (Alternative Scenario, Variant 2)

## *What if GW-1+ is not able to provide the needed water?*



○ Decision point

# Comparison of Portfolio Cost and Yield Performances



# Summary of BPU Discussion

- Supportive of study and portfolio approach.
- Several Board Members requested more information about why desalination options did not advance past the screening step, and what changes in future would trigger reassessing the viability of desalination for City water supply.
- Study report now includes additional information and an appendix discussing desalination.
  - Provides more information about its suitability for the City and triggers that may cause the City to reconsider it in the future.
  - Portfolio 4 will be updated in the Plan, to identify when and why the City may reconsider desalination as a potential supply source in the future.
  - Memo appended to the Study Technical Memorandum and the Plan.

# Next Steps



Review of next steps

*Colin Close, Santa Rosa Water*

# Project Timeline and Milestones

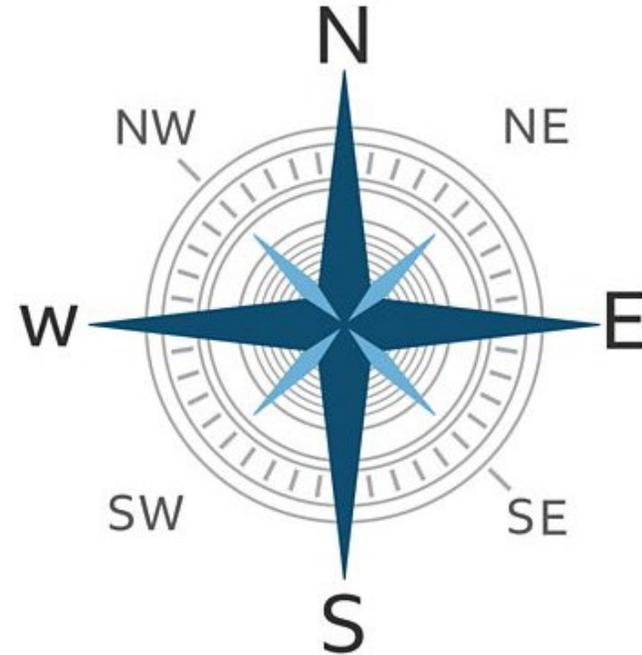
WORKING SESSIONS	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	
<b>Water Team</b>	<i>WT</i>		<i>WT</i>					<i>WT</i>		<i>WT</i>	<i>WT</i>			
<b>Stakeholder Group</b>		<i>SG</i>	<i>SG</i>					<i>SG</i>		<i>SG</i>				
<b>BPU</b>				<i>BPU</i>							<i>BPU</i>		<i>BPU</i>	
<b>Council</b>												<i>CC</i>	<i>CC</i>	
<b>Community</b>	<i>Com</i>			<i>Com</i>					<i>Com</i>		<i>Com</i>			
<b>KEY DELIVERABLES</b>	<ol style="list-style-type: none"> <li><i>Supply goals</i></li> <li><i>Supply options</i></li> <li><i>Criteria &amp; methods</i></li> </ol>			<ol style="list-style-type: none"> <li><i>Feasibility study report</i></li> <li><i>Synopsis of portfolios</i></li> </ol>						<ol style="list-style-type: none"> <li>Working draft Plan</li> <li>Admin draft Plan</li> <li>Final Plan</li> </ol>				

# Discussion/Direction

Seeking Council questions on information presented.

Seeking Council input on study and portfolios:

- Is the Council supportive of the evaluation?
- Is the Council supportive of the portfolio approach, which provides an adaptive pathway for decision making and implementation?



# QUESTIONS and COMMENTS