



Overview of Pure Water Silicon Valley

Presented by: Hossein Ashktorab, Valley Water and Brian Pecson, Trussell Technologies



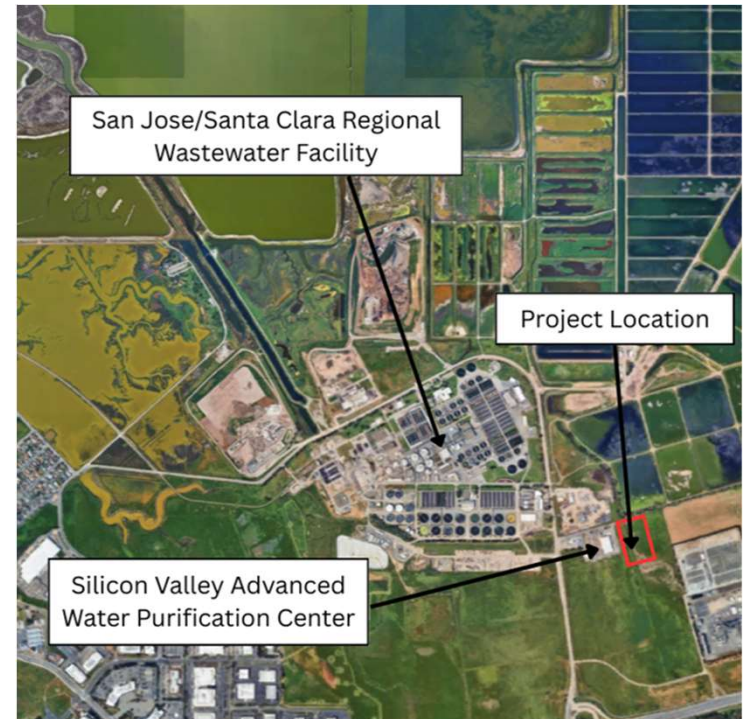
Silicon Valley Advanced Water Purification Center (SVAWPC)

- Partnership between the Cities of San José and Santa Clara
- Largest advanced water purification plant in Northern California
- Treats up to 8 MGD of secondary effluent
- Improves water quality for 1,000 recycled water users



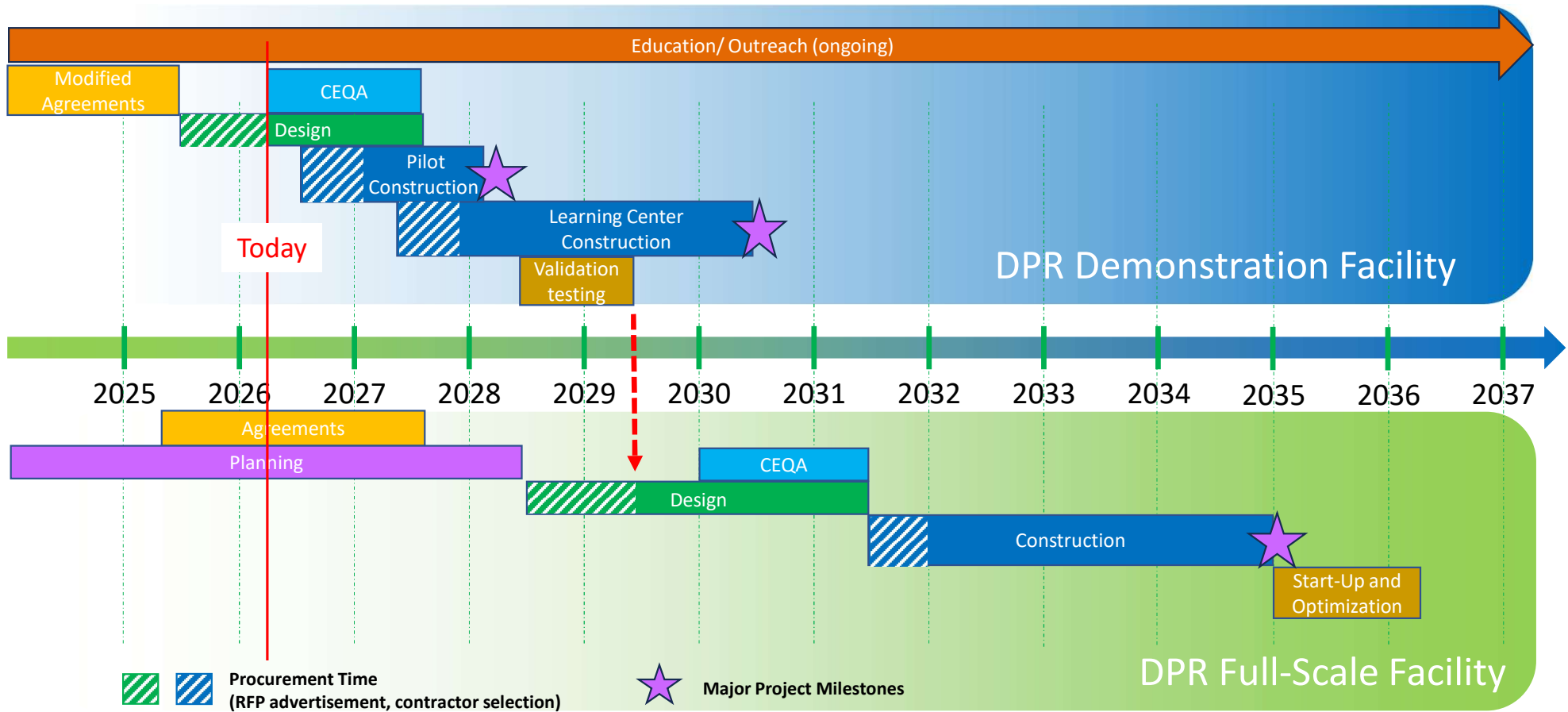
Pure Water Silicon Valley (PWSV) Project Overview

- Collaboration with the Cities of San José and Santa Clara by receiving treated wastewater
- Adjacent to the existing SVAWPC
- Full Scale Facility - Capable of producing up to 24,000 AFY by 2035
- Implemented in two Projects:
 - Demonstration Facility Project
 - Pilot Facility (2025-2028)
 - Learning Center (2025-2030)
 - Full Scale Facility Project (2028-2035)

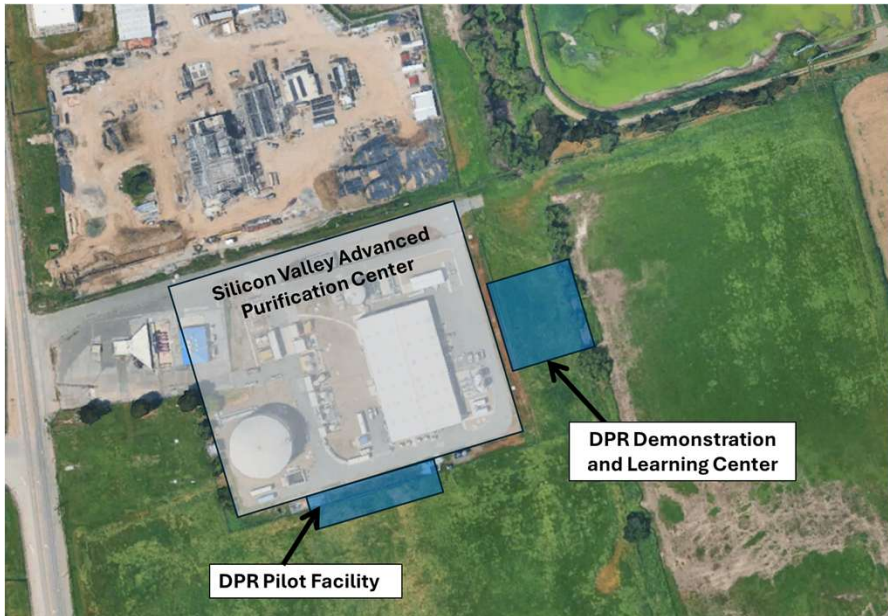


DPR Facility Location

Pure Water Silicon Valley Project Timeline



Demonstration Facility Project – Pilot Facility



DPR Pilot/Demo. Facility Location

- Valley Water Board has emphasized on expedited project delivery
- Temporary installation at the SVAWPC
- Operating at ~200 gpm with full-scale RO elements
- After testing, relocate treatment processes to the Learning Center
- Long-term Demonstration Facility

Pilot (or demo) Testing is Essential

Y -3

Y -2

Y -1

Year 0

Y +1

Y +2

Time (years)



Full-scale facility

With Piloting



Validation
Protocol



Pilot facility

Pilot (or demo) Testing is Essential



With Piloting


Validation Protocol


Pilot facility


Engineering Report and Validation Protocols

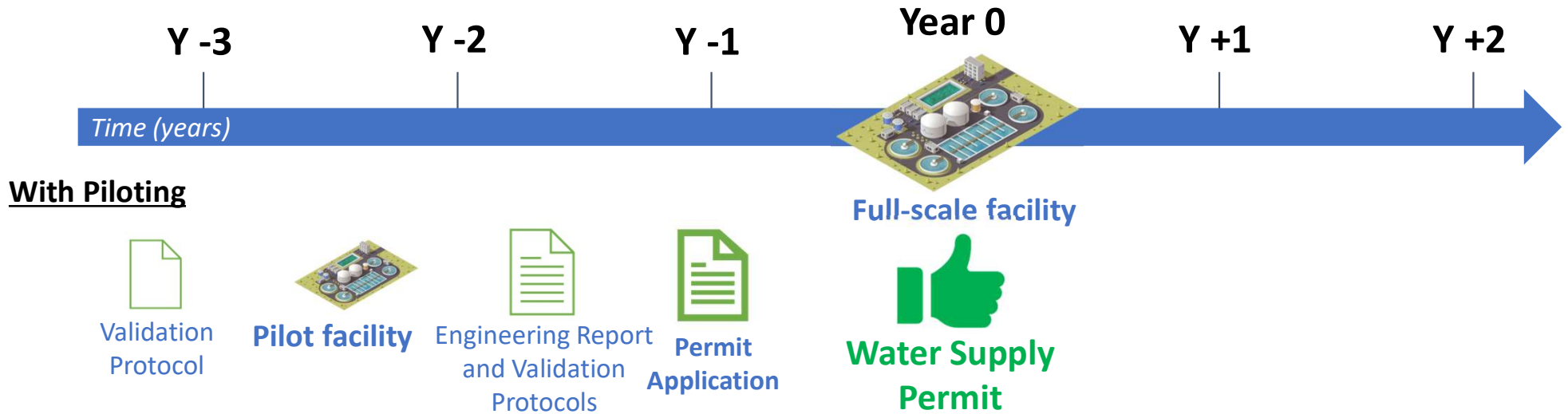

Permit Application

Full-scale facility

Water Supply Permit

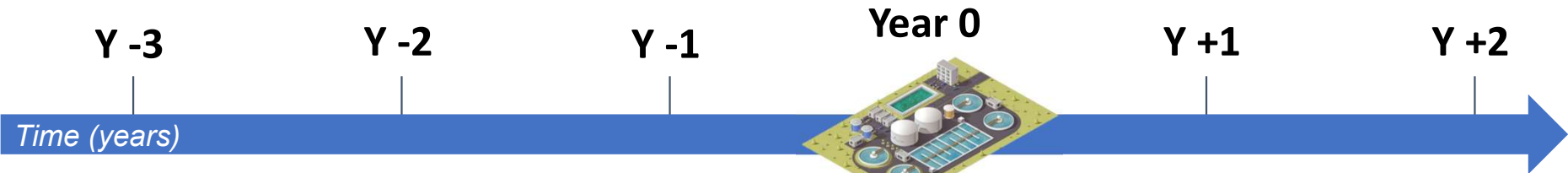


Pilot (or demo) Testing is Essential



- DDW confirmed their interest in pilot testing for DPR
- Piloting allows project to receive permit around startup
- Purified water can immediately be distributed

Permitting with full-scale data is not viable



With Piloting


Validation Protocol


Pilot facility


Engineering Report and Validation Protocols


Permit Application

Full-scale facility

Water Supply Permit

With Full-Scale Data

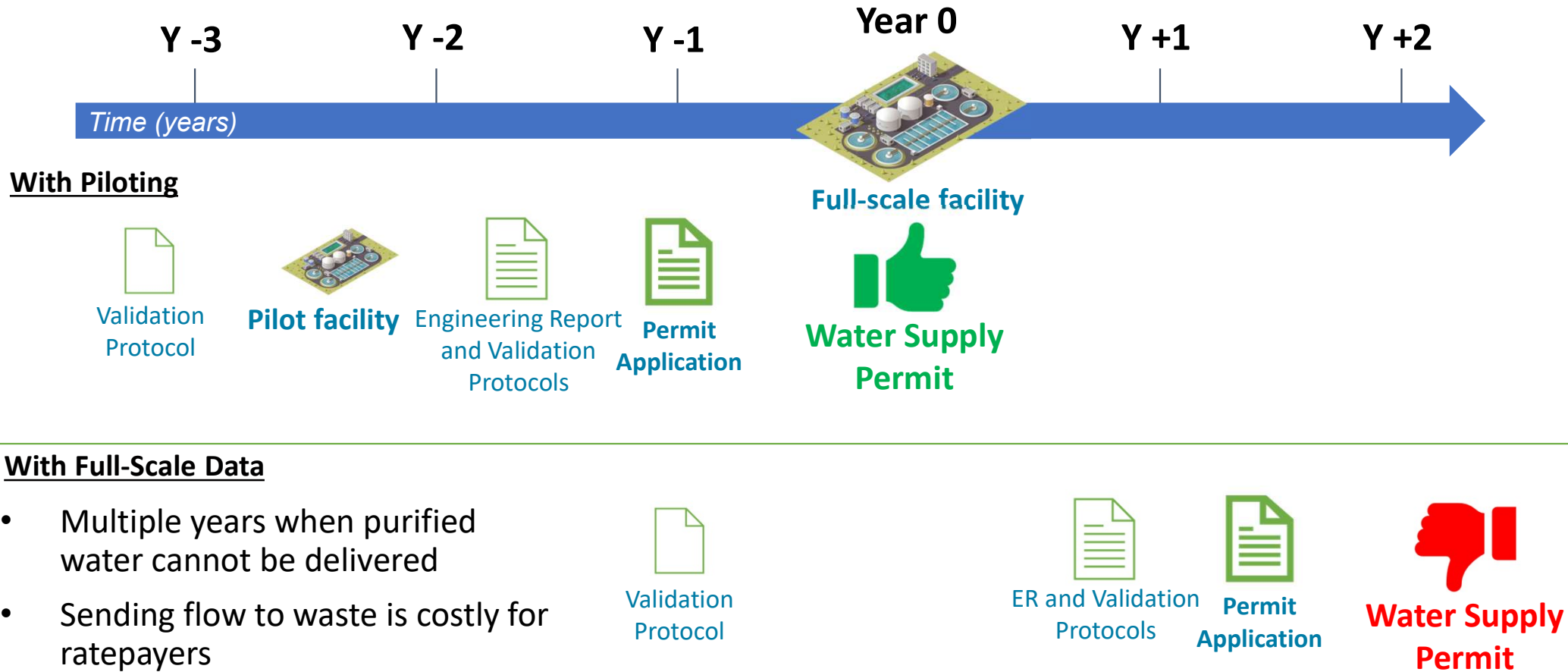

Validation Protocol


ER and Validation Protocols

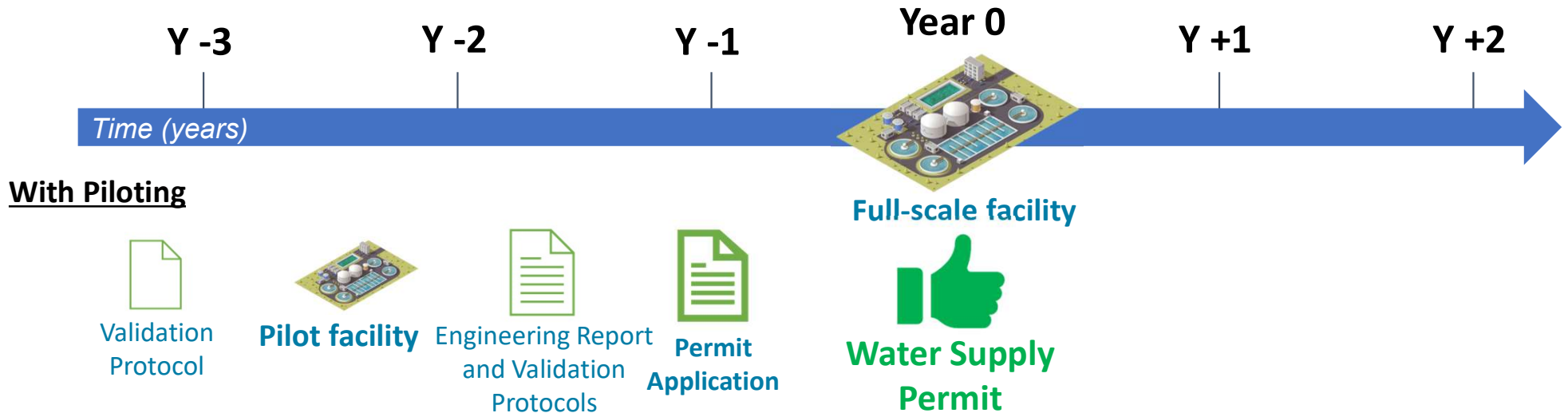

Permit Application



Permitting with full-scale data is not viable



Piloting supports multiple regulatory deliverables



*Pilot testing also allows project to develop information for **Operations Plan, Joint Plan, Monitoring Plan, and others***

Role of DPR Demonstration Facility



Collecting real-time data on a smaller scale



Adjustments and optimizations before full-scale implementation



Cost-effective design



Operator training

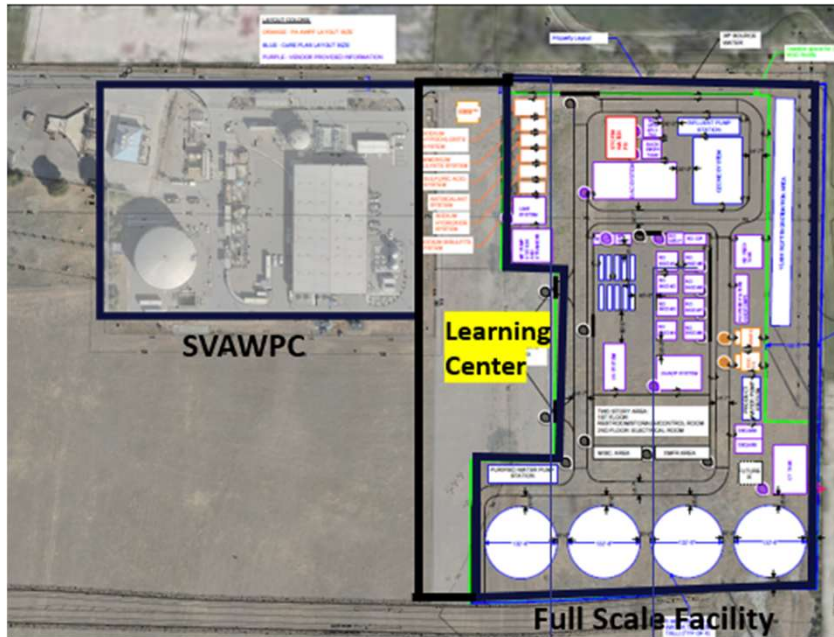


Compliance with all the permitting and regulatory requirements



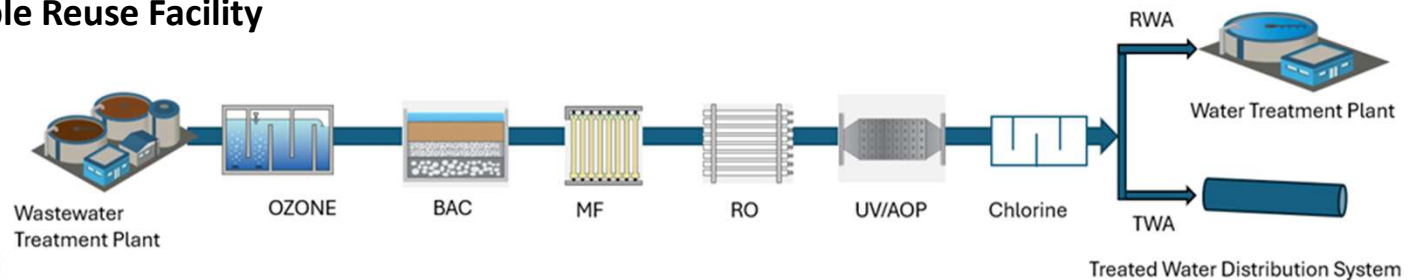
Robust public outreach

Full-Scale Facility



- Design, construction, and permitting of a DPR Full-Scale Facility
- Adjacent to the existing SVAWPC
- Capable of producing up to 24,000 AFY
- Infrastructure for water delivery to the distribution system (RWA or TWA)

Direct Potable Reuse Facility



Technical and Other Key Challenges



Wastewater availability



Water utilization



Project timeline acceleration



Meeting stringent nutrient discharge standards



ROC management strategies

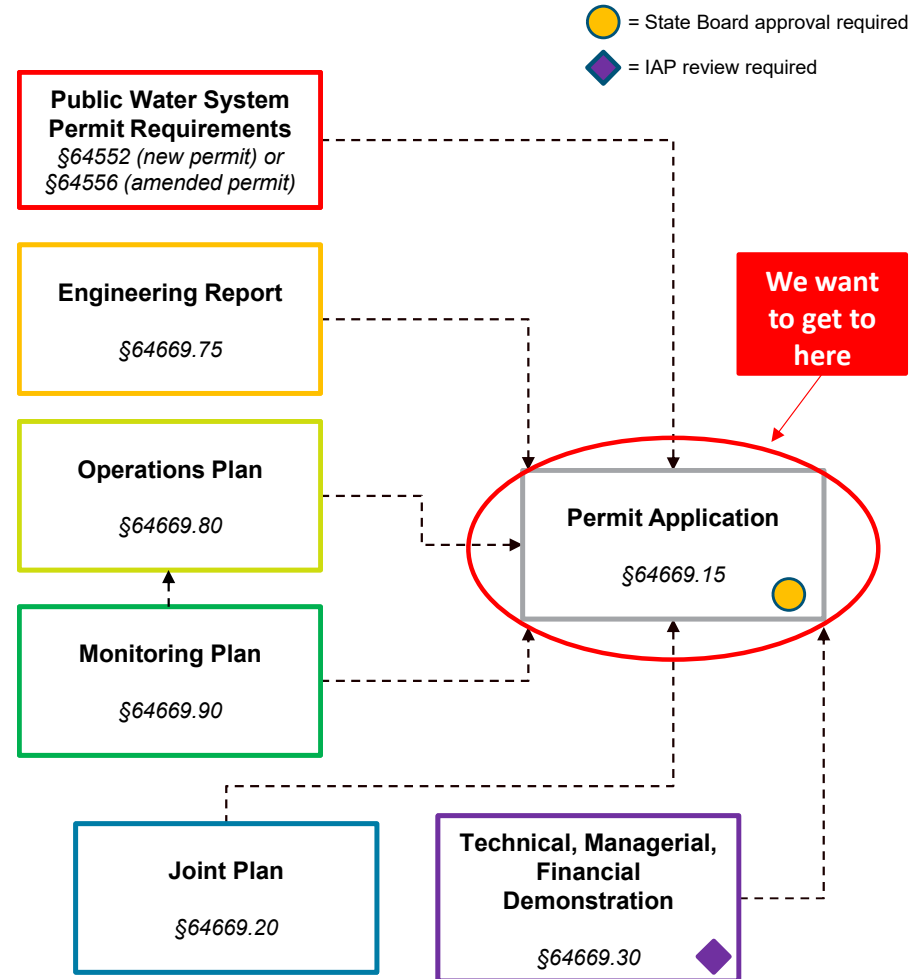
Plotting a Path to DPR: Valley Water's DPR Permitting Approach

May 1, 2026

Brian Pecson, Trussell Technologies

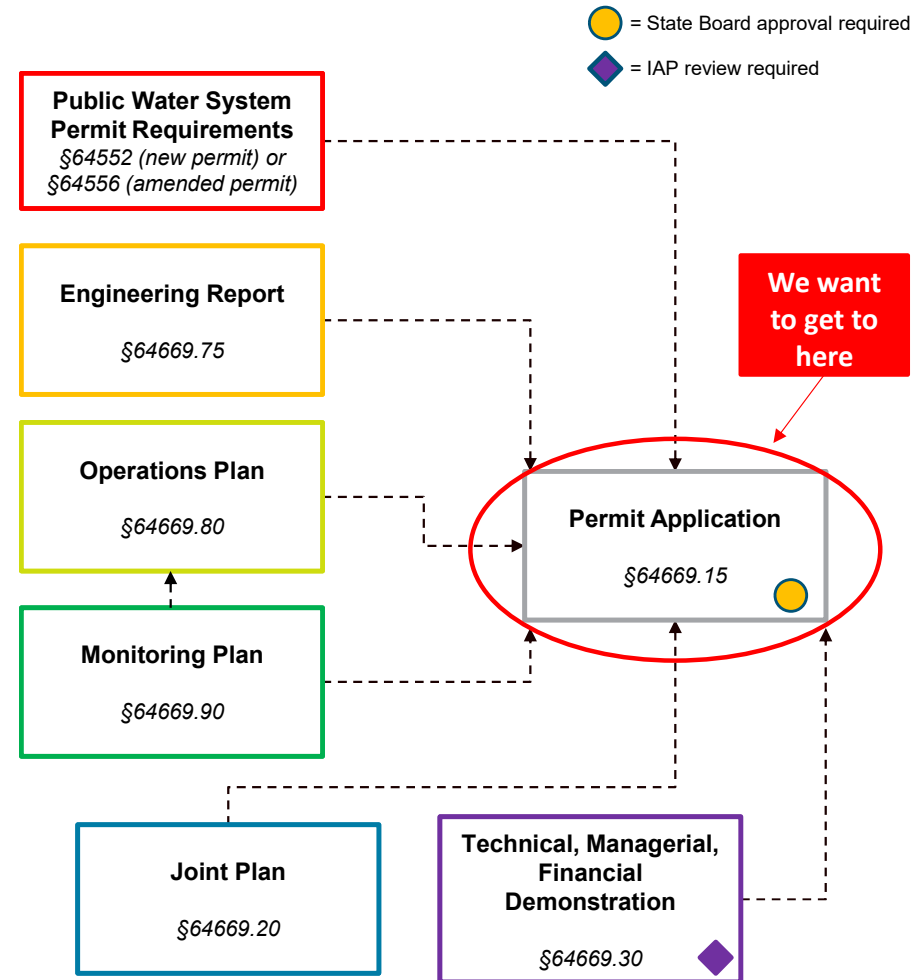


Permit Application Requirements





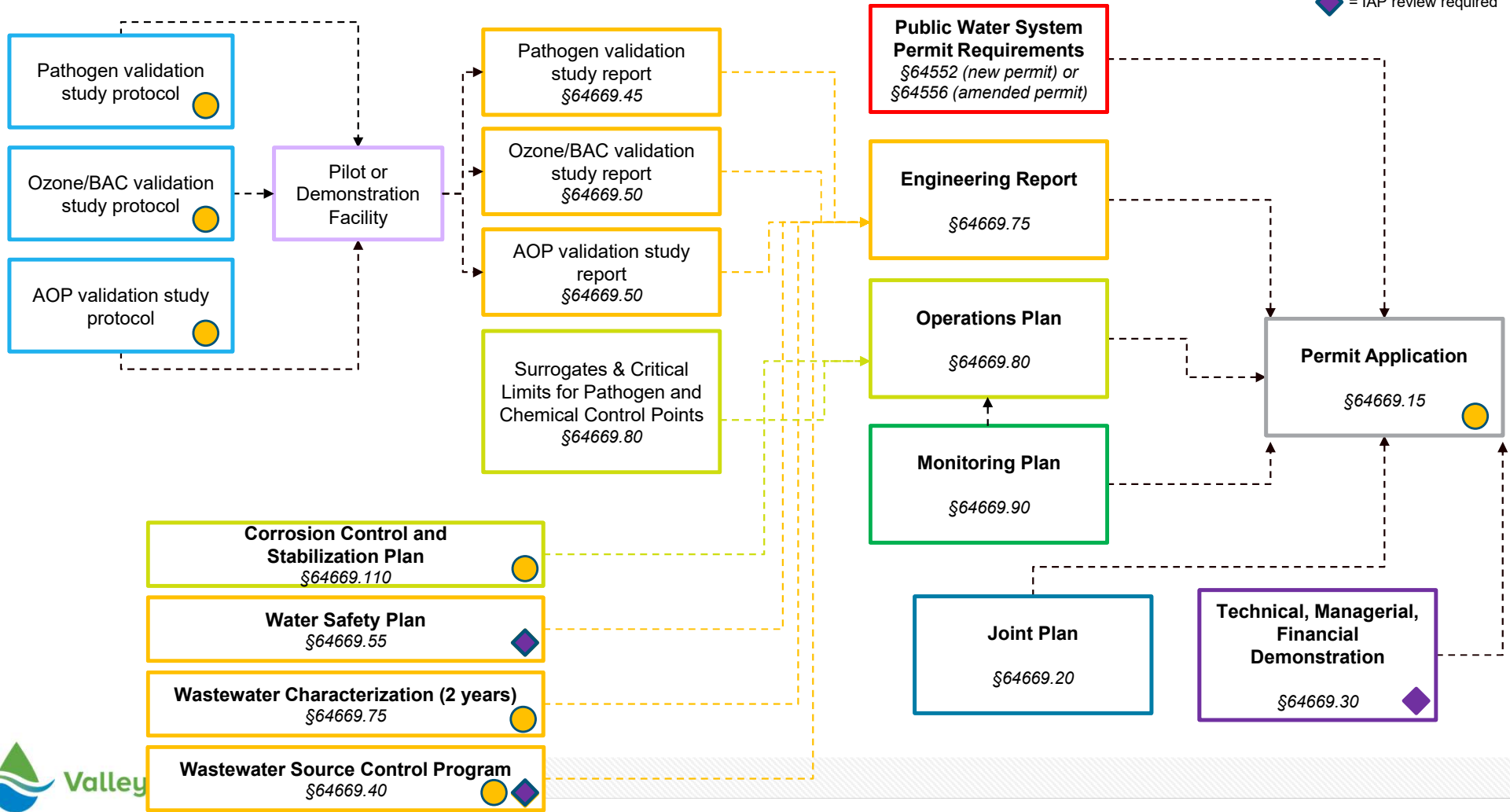
Differences with IPR Permitting

- Requires a **public water system permit** (vs. WDR/WRR or NPDES)
- Operations Plan, Monitoring Plan, and Joint Plan are submitted *with* the permit application (not after)





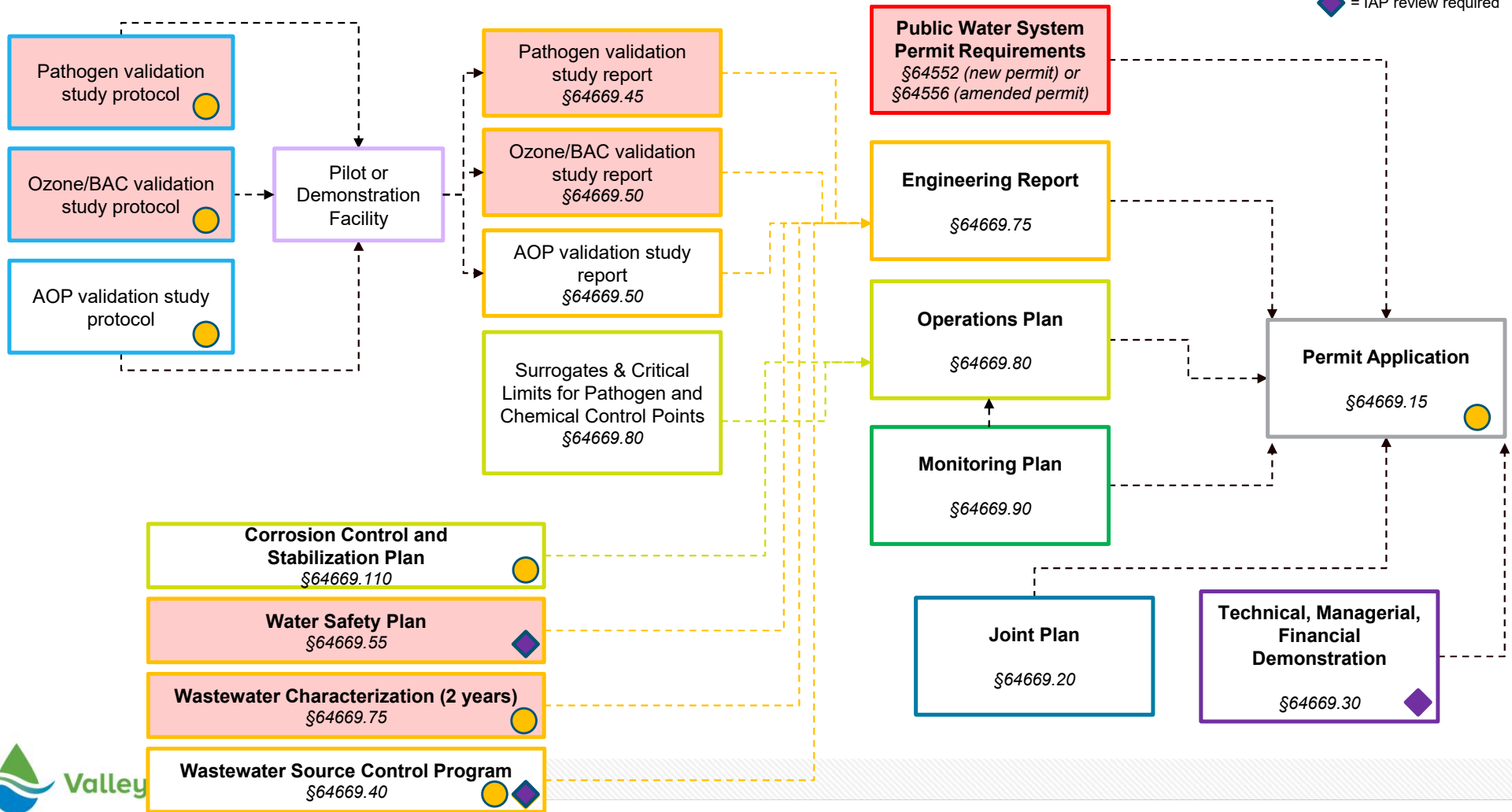
Permit Application Requirements

 = State Board approval required
 = IAP review required





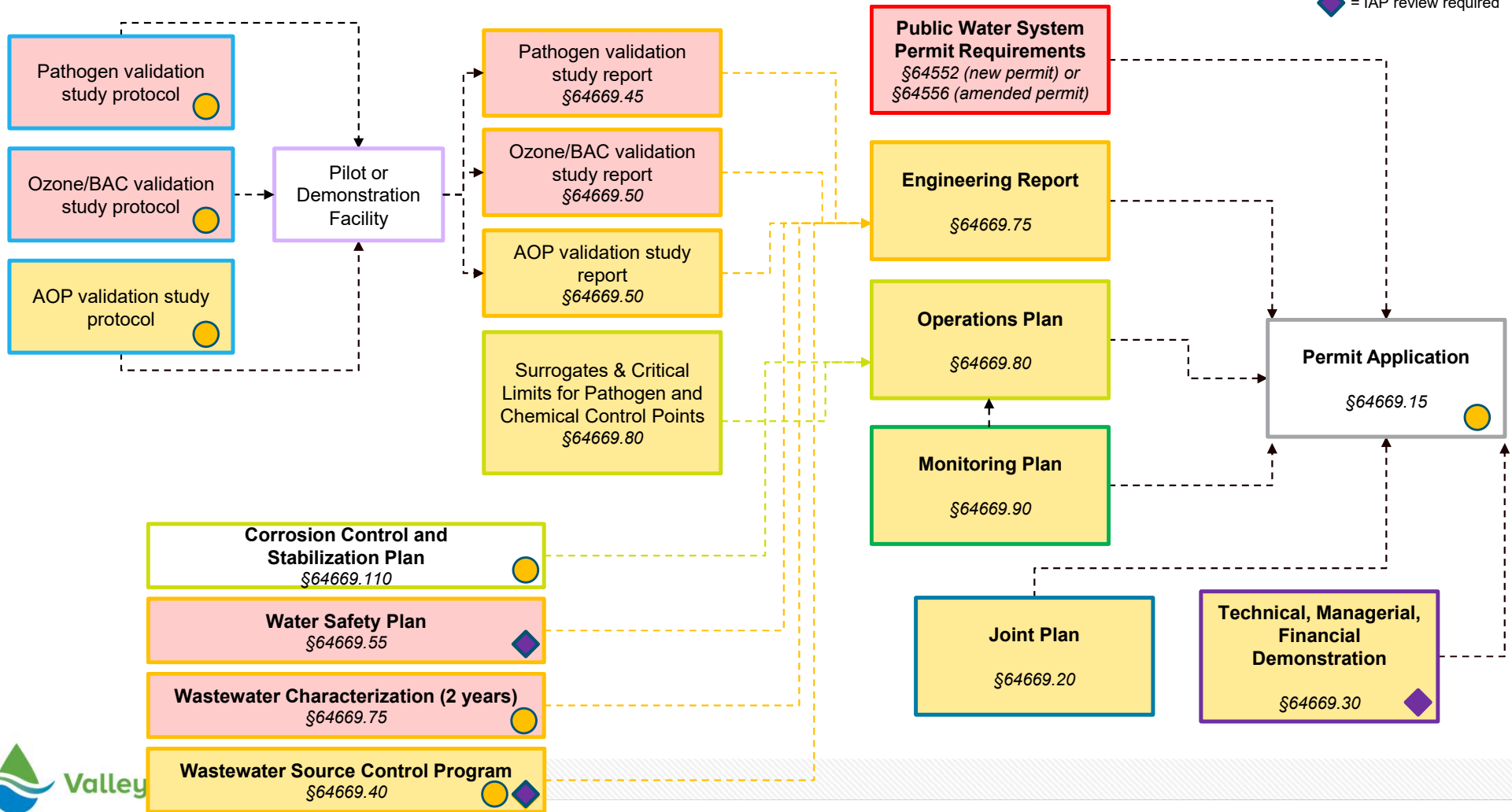
What are **new requirements** for DPR?

 = State Board approval required
 = IAP review required



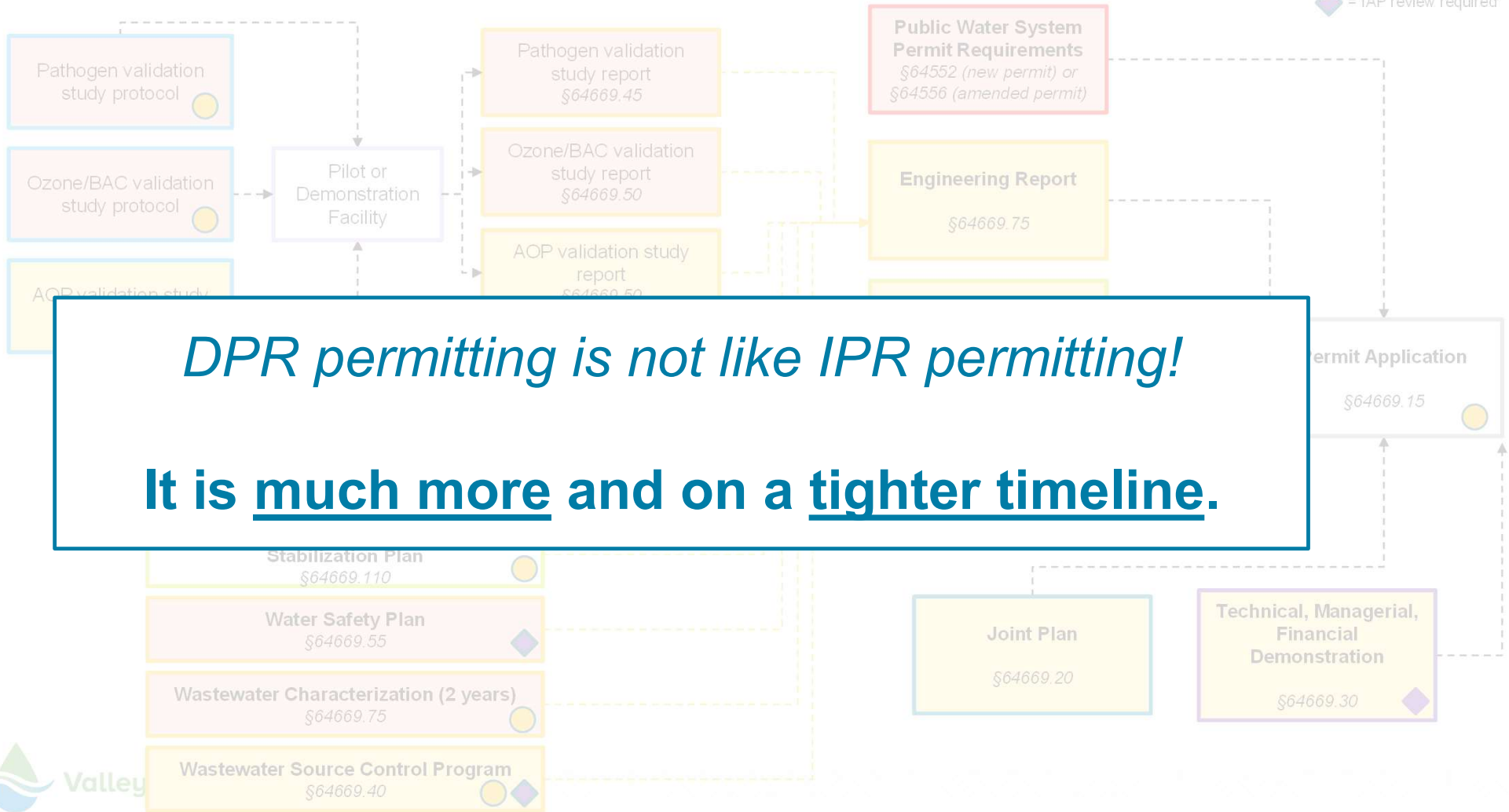
What are enhanced requirements for DPR?

 = State Board approval required
 = IAP review required



What are enhanced requirements for DPR?

● = State Board approval required
◆ = IAP review required



DPR permitting is not like IPR permitting!
It is much more and on a tighter timeline.



Pathway to Pure Water Silicon Valley

Universe of potential DPR projects

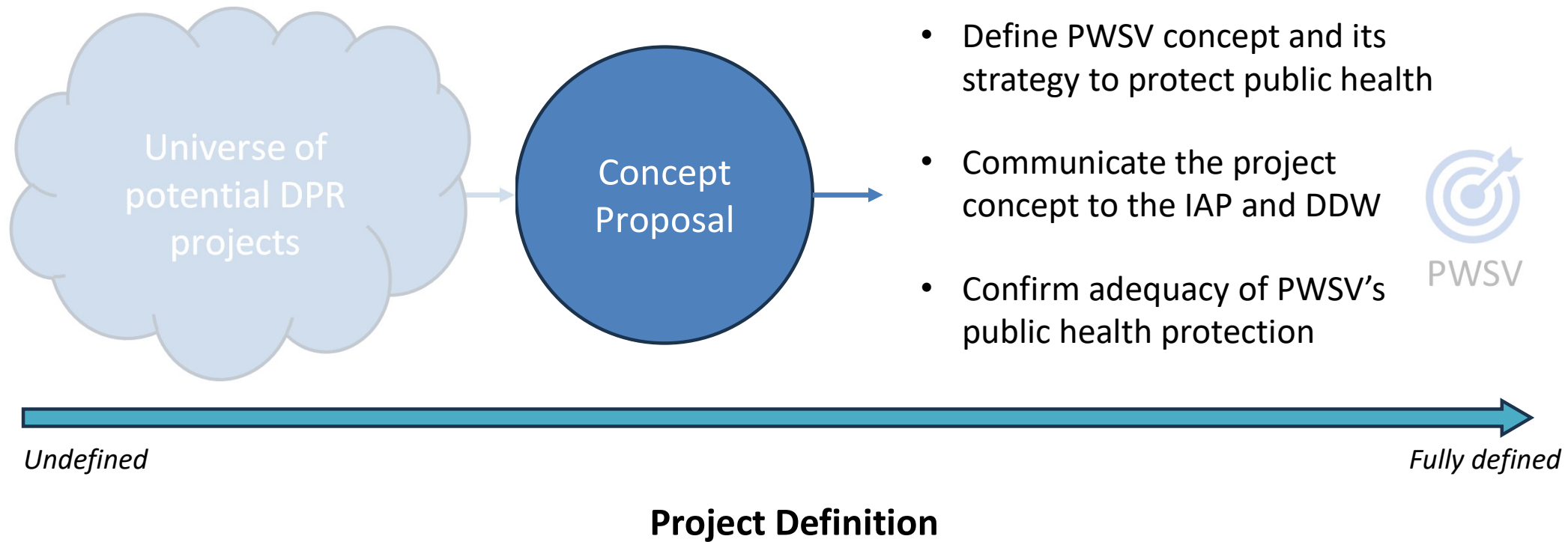


PWSV

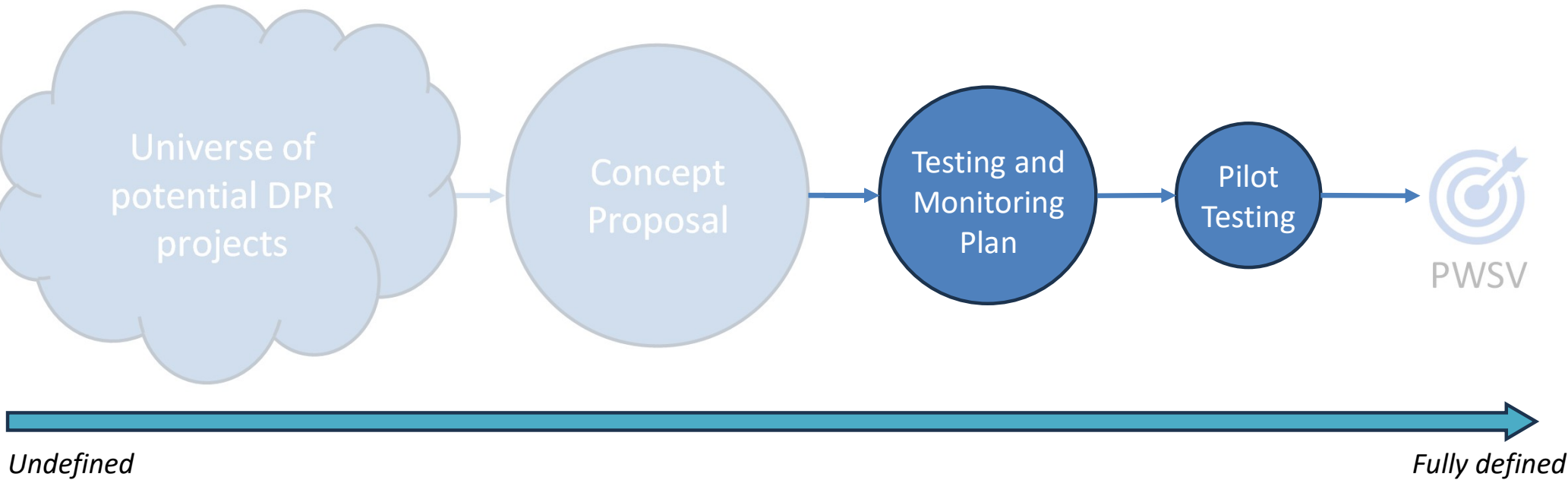


Project Definition

Purpose of the Concept Proposal



Concept Proposal informs pilot testing



IAP Engagement



NWRI IAP Meeting at Valley Water on 9/12/25

Regulatory Requirements

- Wastewater characterization
- Wastewater source control
- Water safety plan
- Source water quality
- TMF capacity

Additional Topics

- Pilot design and operations
- Chemical validation testing
- Pathogen LRV crediting
- Corrosion control
- RO concentrate management

DDW Engagement is Critical

- Monthly meetings since February 2025
- Key topics of discussion:
 - *Permitting approach for DPR*
 - *PWSV approach for pathogen and chemical control*
 - *Differences between permitting RWA and TWA*
 - *Pilot testing approach*
 - *Corrosion control and stabilization*
 - *Pathogen validation*
 - *Interagency coordination*



DDW Engagement is Critical

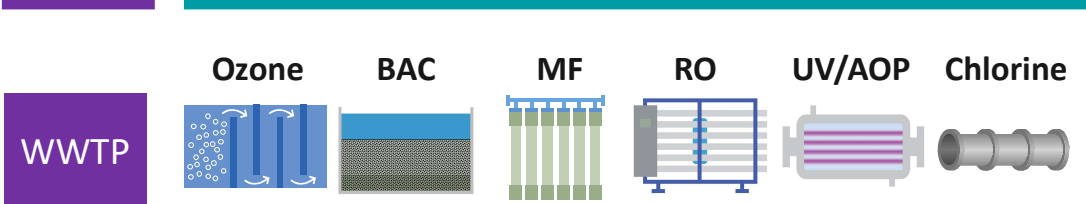
- Monthly meetings since February 2025
- Key topics of discussion:
 - *Permitting approach for DPR*
 - ***PWSV approach for pathogen and chemical control***
 - *Differences between permitting RWA and TWA*
 - *Pilot testing approach*
 - *Corrosion control and stabilization*
 - *Pathogen validation*
 - *Interagency coordination*



Pathogen Control in the DPR Treatment Train

WWTP

AWPF



Pathogen	WWTP	Ozone	BAC	MF	RO	UV/AOP	Cl ₂	Total	Required
Virus	0	6	0	--	2	6	6	20	20
<i>Giardia</i>	0	6	0	4	2	6	1	19	14
<i>Crypto</i>	0	1	0	4	2	6	--	13	15

Pathogen Control for PWSV

Pathogen	WWTP	AWPF							Total	Required
	WWTP	Ozone	BAC	MF	RO	UV/AOP	Low-dose UV	Chlorine		
Virus	0	6	0	--	2	6	2	6	22	20
<i>Giardia</i>	0	6	0	4	2	6	6	1	25	14
<i>Crypto</i>	0	1	0	4	2	6	6	--	19	15

Why were we feeling good about this?

Pathogen	WWTP	AWPF							Total	Required
	WWTP	Ozone	BAC	MF	RO	UV/AOP	Low-dose UV	Chlorine		
Virus	0	6	0	--	2	6	2	6	22	20
<i>Giardia</i>	0	6	0	4	2	6	6	1	25	14
<i>Crypto</i>	0	1	0	4	2	6	6	--	19	15

DDW-approved credits for San Diego's North City Project

DDW-approved credits for all IPR projects using UV/AOP

DDW-approved credits for both SWA projects (ECAWP and San Diego)

But DDW said, "Not so fast..."

Pathogen	WWTP	O ₃
Virus	0	
<i>Giardia</i>	0	
<i>Crypto</i>	0	

DDW-approved credits
for Diego's N
Pro



Cl ₂	Total	Required
6	22	20
1	25	14
--	19	15

DDW-approved credits for both projects (San WP and San Diego)

DPR pathogen crediting is different than IPR

§ 64669.45. Pathogen Control.

(4) Each treatment process...shall have the pathogen log reduction validated. The DiPRRA may use:

- (A) Validation study report previously approved by State Board using an approved protocol (i.e., the “10-step protocol”)
- (B) A pathogen log inactivation table pursuant to Chapter 17
- (C) Validation study that follows the 10-step protocol

DPR pathogen crediting is different than IPR

§ 64669.45. Pathogen Control.

(4) Each treatment process...shall have the pathogen log reduction validated. The DiPRRA may use:

- (A) Validation study report previously approved by State Board using an approved protocol (i.e., the “10-step protocol”)
- (B) A pathogen log inactivation table pursuant to Chapter 17
- (C) Validation study that follows the 10-step protocol

**Surface Water
Treatment Rule
credits are limited to
4-log maximum**

DPR pathogen crediting is different than IPR

§ 64669.45. Pathogen Control.

(4) Each treatment process...shall have the pathogen log reduction validated. The DiPRRA may use:

Consequence: DDW only willing to provide maximum credit identified in SWTR, which is less than the anticipated 6-logs

(C) Validation study that follows the 10-step protocol

credits are limited to 4-log maximum

DPR offers pathways for alternative crediting

§ 64669.45. Pathogen Control.

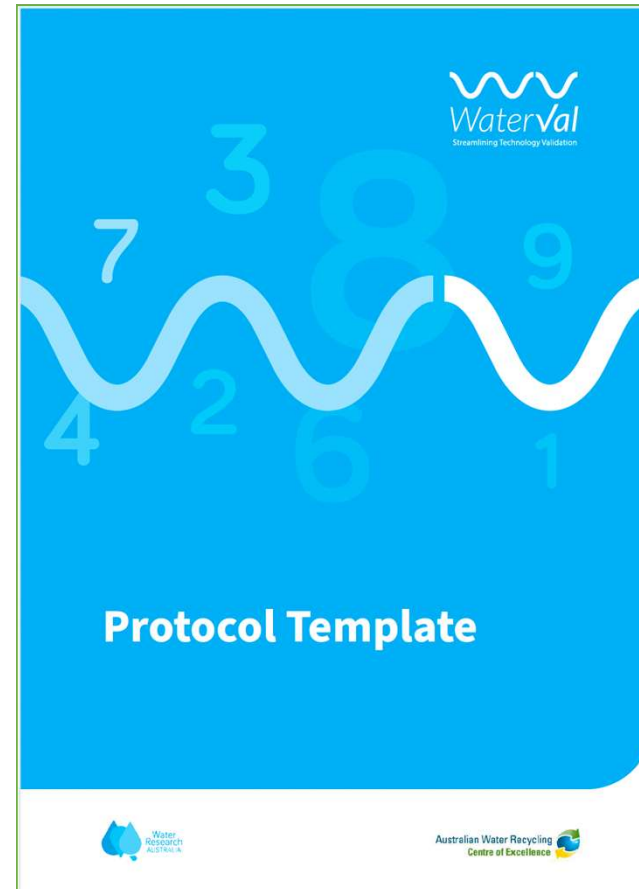
(4) Each treatment process...shall have the pathogen log reduction validated. The DiPRRA may use:

- (A) Validation study report previously approved by State Board using an approved protocol (i.e., the “10-step protocol”)
- (B) A pathogen log inactivation table pursuant to Chapter 17
- (C) Validation study that follows the 10-step protocol

What is the 10-step protocol?

Ten-Step Validation Method

1. Mechanisms of pathogen removal
2. Target pathogens and surrogates
3. Presence of target pathogens in sources
4. Influencing factors
5. Operational monitoring parameters
6. Validation methodology
7. Method to collect and analyze data
8. Determining critical limits
9. Determining LRVs
10. Means for re-validation



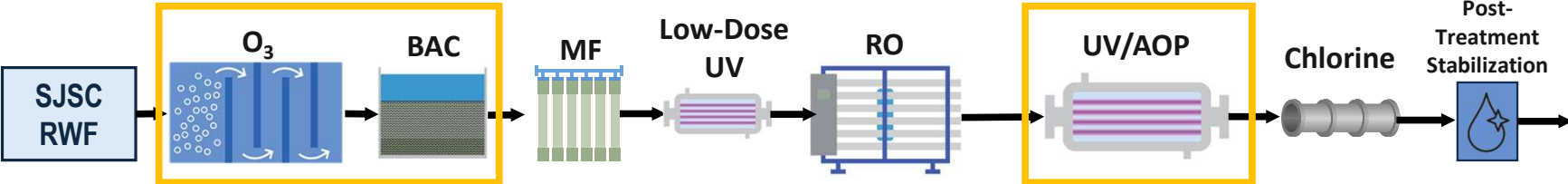
Valley Water developing justifications for 6-log credits

Pathogen	WWTP	AWPF						Total	Required	
	WWTP	Ozone	BAC	MF	RO	UV/AOP	Low Dose UV			Cl ₂
Virus	0	6	0	--	2	6	2	6	22	20
<i>Giardia</i>	0	6	0	4	2	6	6	1	25	14
<i>Crypto</i>	0	1	0	4	2	6	6	--	19	15

DDW is allowing VW to use of existing information to justify 6-log crediting for **free chlorine, ozone, and UV**

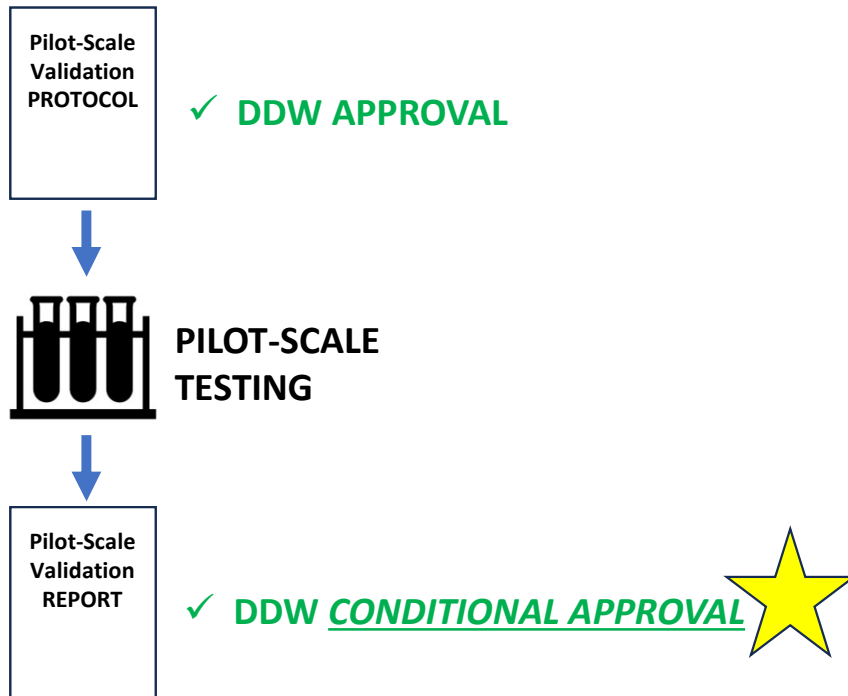
Chemical Control Validation

Chemical Validation Testing



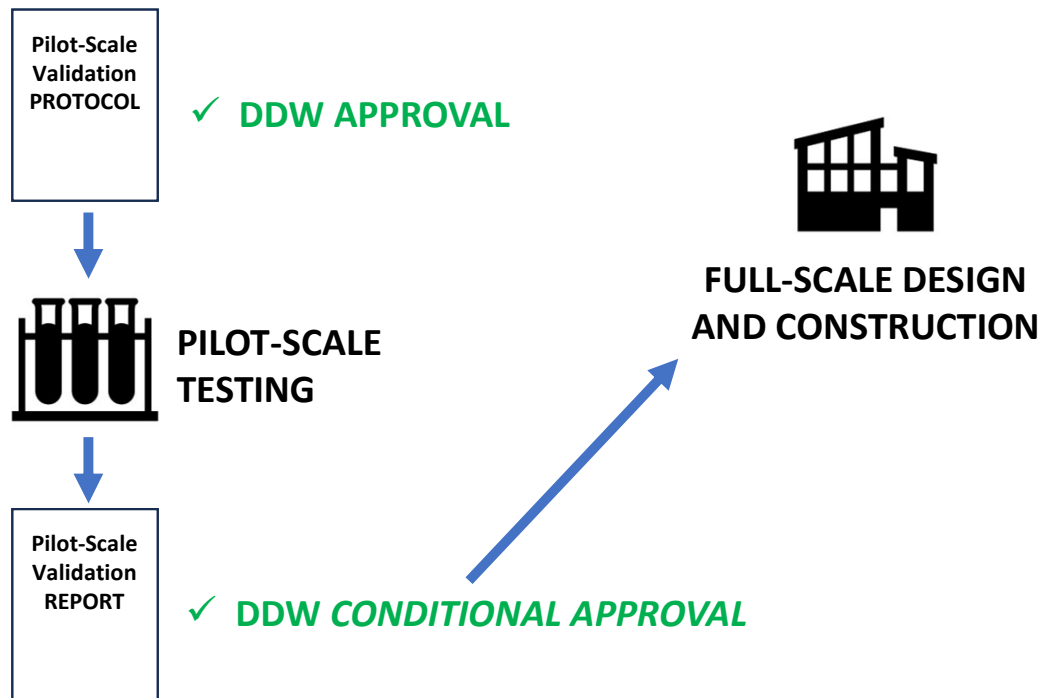
VW's Chemical Validation Approach

Pilot-Scale Validation (at variable design conditions)



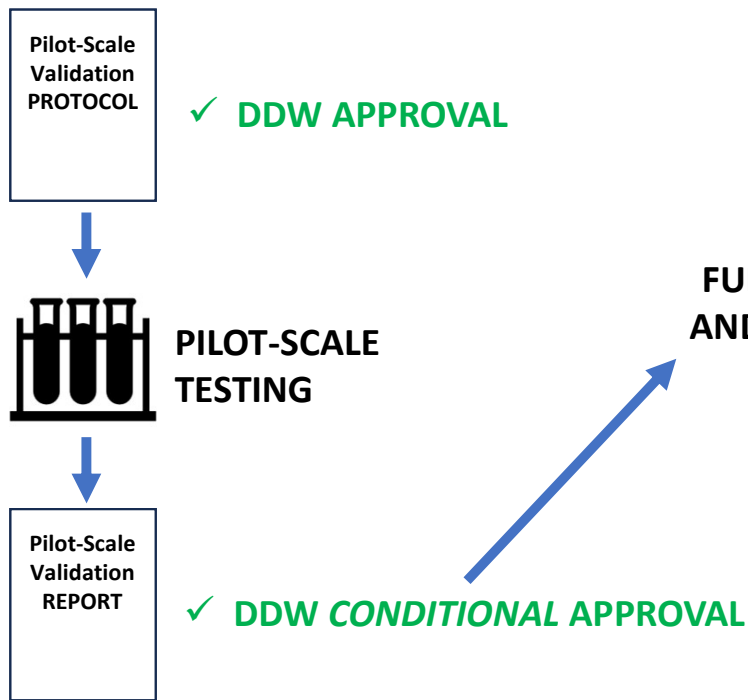
VW's Chemical Validation Approach

Pilot-Scale Validation (at variable design conditions)

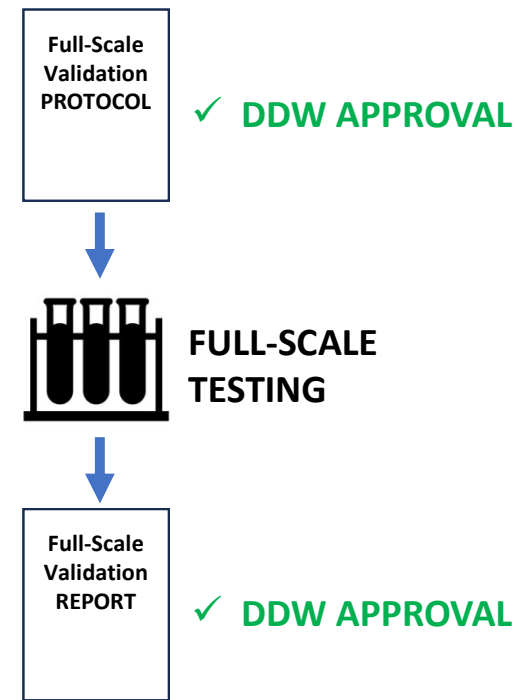


VW's Chemical Validation Approach

Pilot-Scale Validation (at variable design conditions)



Full-Scale Validation (at design condition)



FULL-SCALE DESIGN AND CONSTRUCTION

Key Takeaways

- DPR permitting is like IPR permitting...on steroids
- The permitting pathway requires parallel efforts over multiple years
- Develop an engagement plan for DDW from the get-go
- Be prepared...pathogen & chemical requirements are higher than IPR!

QUESTIONS





Thank you

Presented by: Hossein Ashktorab, Valley Water and Brian Pecson, Trussell Technologies