

A Scenario Approach to Supply System Planning Positions Portland Water Bureau for a Sustainable Future

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Overview

1. Setting the stage
2. Seeing into the future
3. Planning for Uncertainty
4. Adapting as the Future unfolds

Setting The Stage

Portland's Unique Water Supply

The Portland Water Bureau serves drinking water to ~1 million people in and around Portland, Oregon.

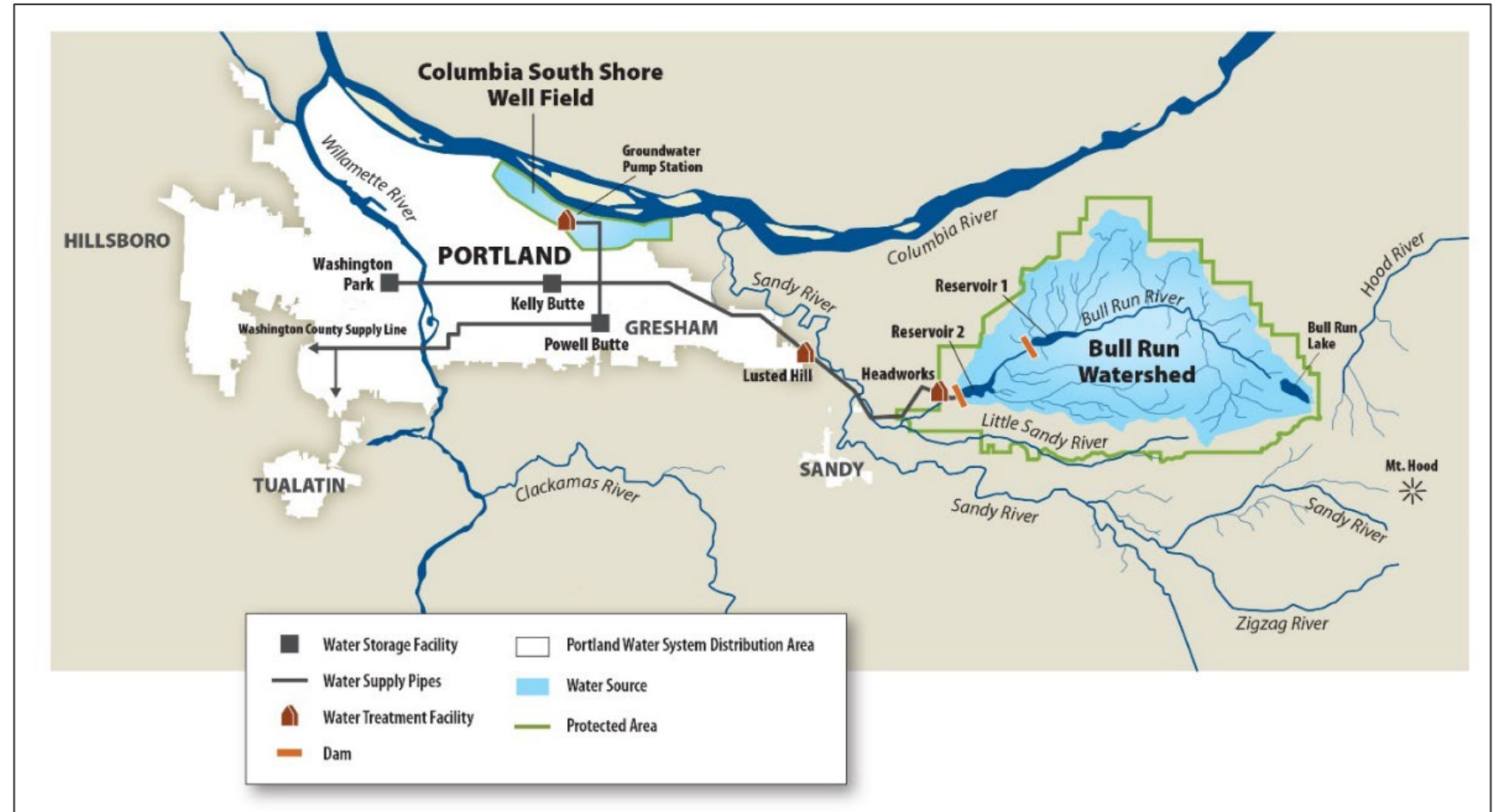
Municipal (local government) utility.

Serving water since 1895

Two water supplies (1) Bull Run Watershed (2) Columbia South Shore Well Field

100 mgd average production (+/- 20%)

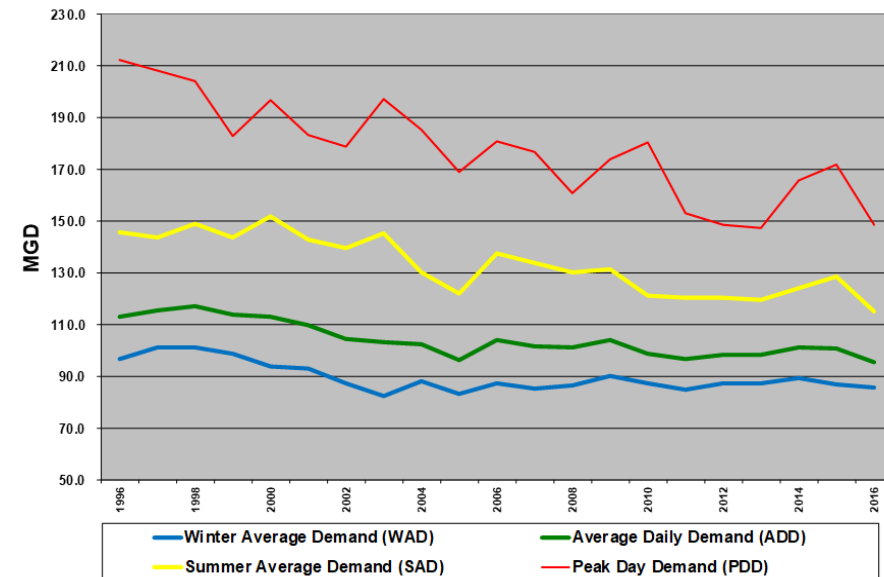
\$1.2 billion 5-year CapEx
\$117 million annual OpEx



New Master Plan for Next 20 Years

- Master plans for water systems required by State
- 2001 Master Plan out of date
 - At the end of its 20-year planning period
 - Many projects have already been completed
 - Demand forecasts no longer relevant

Year	Peak Season	Peak Event
2000	174	258
2010	198	292
2020	219	321
2030	225	333
2040	230	339
2050	234	347



Need for New Approach



- Experience shows the future does not play out according to a static plan (e.g. demand, pandemics, drought, wildfires, heat domes).
- We cannot always see the road ahead. Need to be nimble and flexible, adapt to changing conditions.
- A range of plausible future conditions needs to be considered to better deal with the inherent uncertainty associated with long-term planning.
- Better prepare for complex and rapidly changing environments. The goal is to make better decisions, and *make the right supply investments at the right time*.

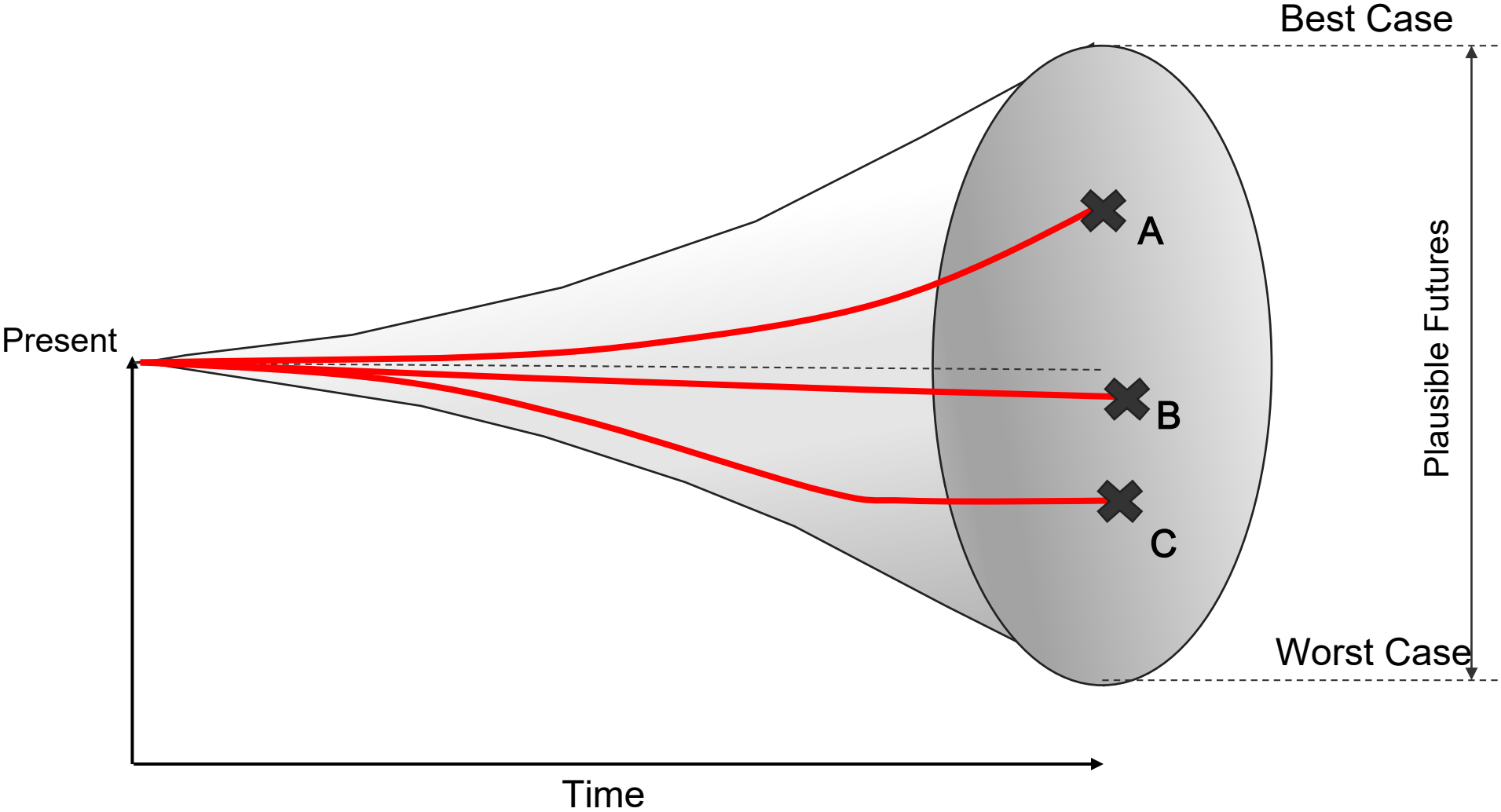
Using a Focal Question To Plan For A Community's Needs

How can we best prepare our supply system to meet our customers' water needs as future challenges and opportunities arise?

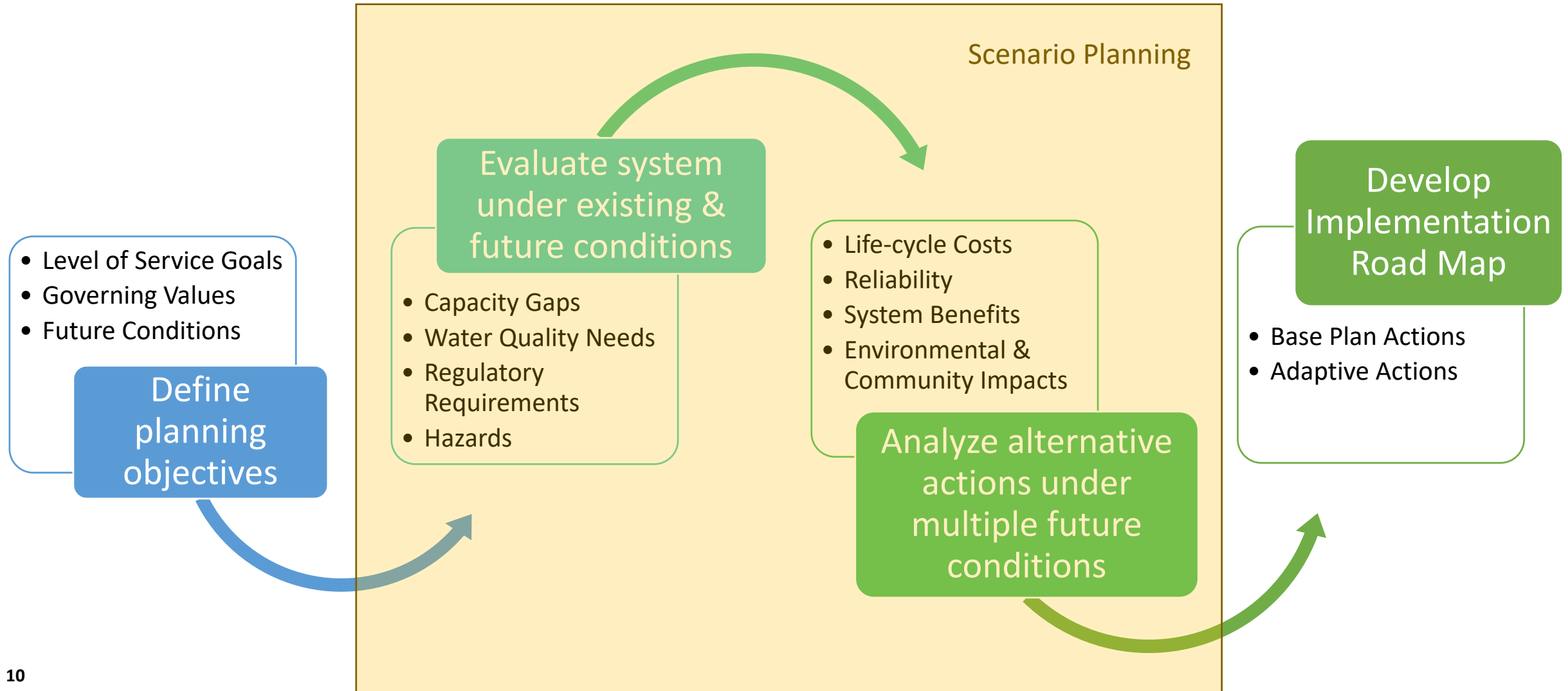


Seeing Into The Future

Planning for Multiple Future Scenarios Reduces Risk of Failure

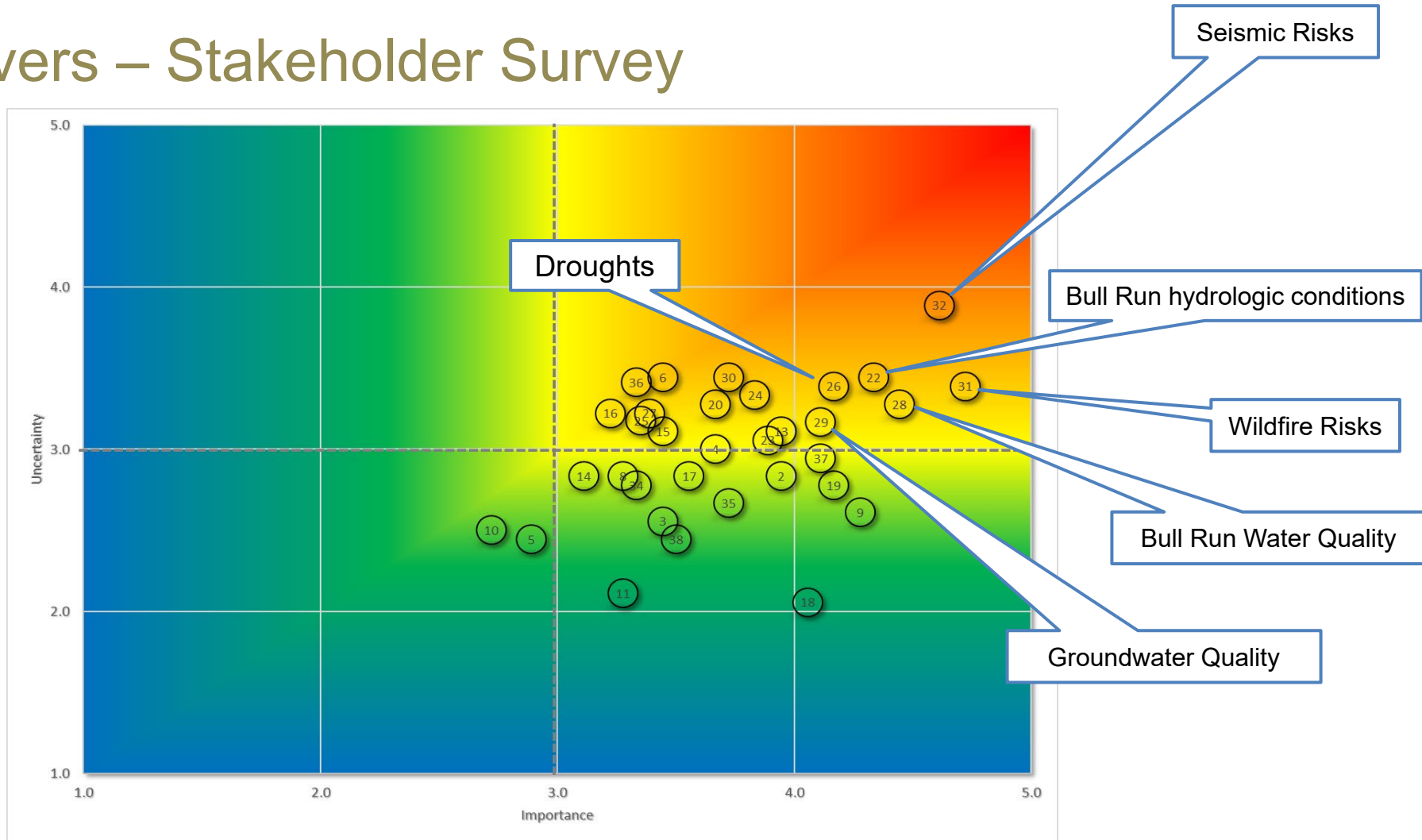


Overview of PWB's Adaptive Process





Key Drivers – Stakeholder Survey



Narratives Communicate Concepts to Decision-Makers

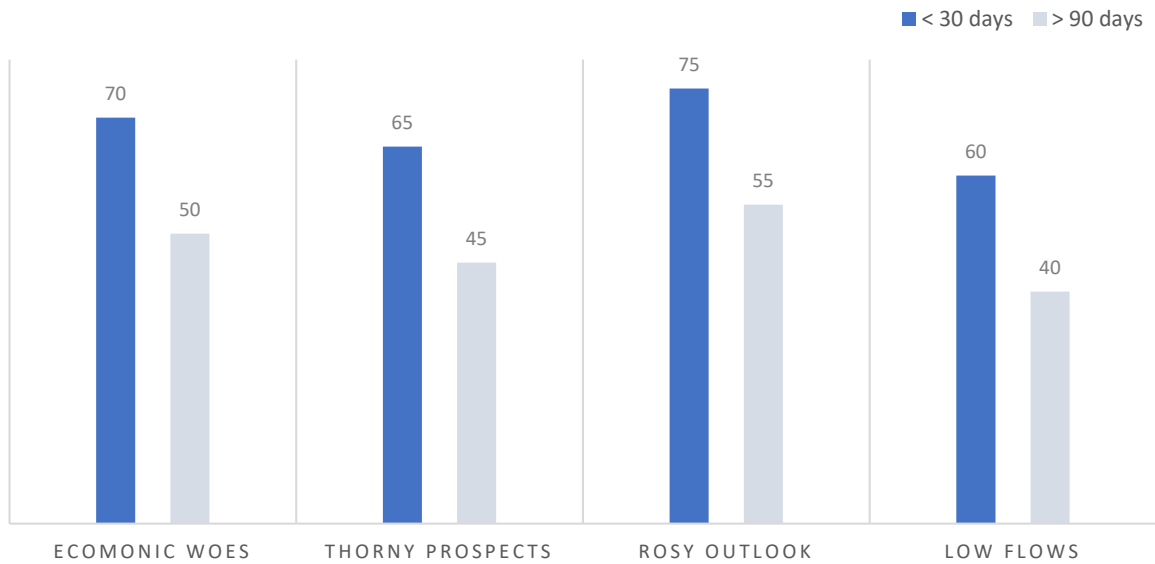
Key Drivers of Change

- Supply Stress
 - Wholesale customer base
 - Demands
 - Climate change impacts
 - Groundwater water quality
- Available Funding
 - Revenue
 - Bond Rates
 - Competing priorities
 - Public/political support

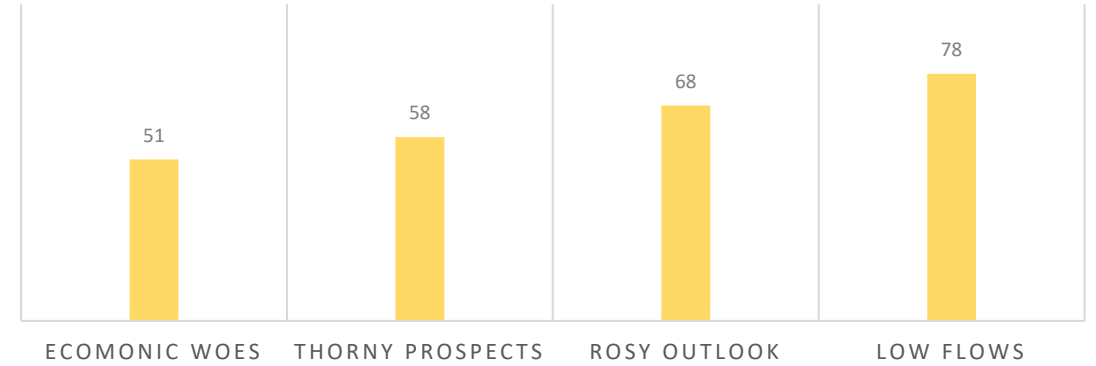


How do scenarios impact supply & demand forecasts?

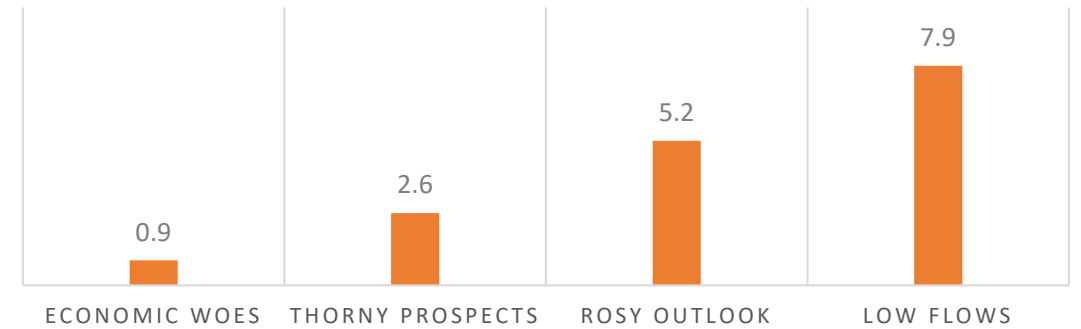
Reliable Groundwater Capacity (mgd)



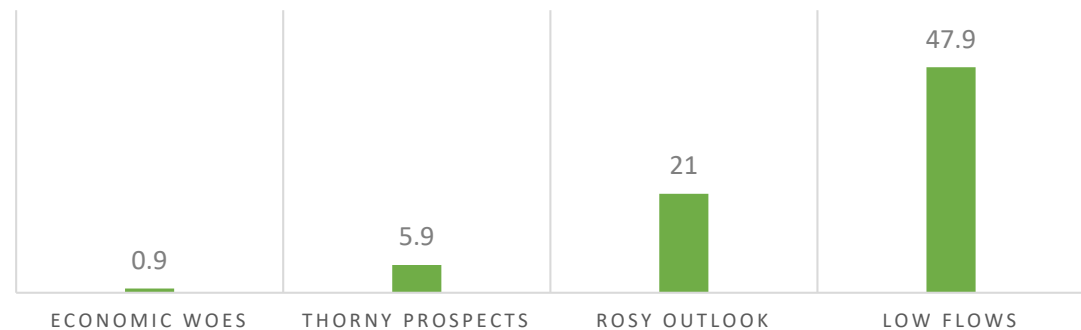
Average Daily Demand (mgd)



Summer Augmentation Need (BG)



Percent of Summers Requiring Augmentation



Planning For Uncertainty

How Can the 20-Year CIP Adapt to Changing Conditions?

Category	Description	Evaluation Methodology
Scenario-Independent Actions (12 Actions)	Actions that need to be implemented in the next 20 years regardless of future conditions (low uncertainty). These actions are typically related to regulatory requirements, asset condition needs, or hazard mitigation.	Standard Cost-Benefit Analysis
Scenario-Dependent Actions (17 Actions)	Actions that may (or may not) be needed in the next 20 years depending on future conditions (high uncertainty). These actions are primarily related to expanding or replacing supply capacity (e.g., new groundwater wells)	Scenario-based evaluation with cost model
Long-term Actions (8 Actions)	Actions that will eventually be needed but are unlikely to be implemented until after 2040. These actions are either very low priorities for PWB or have no driver for the foreseeable future.	Actions not evaluated in 2020 SSMP

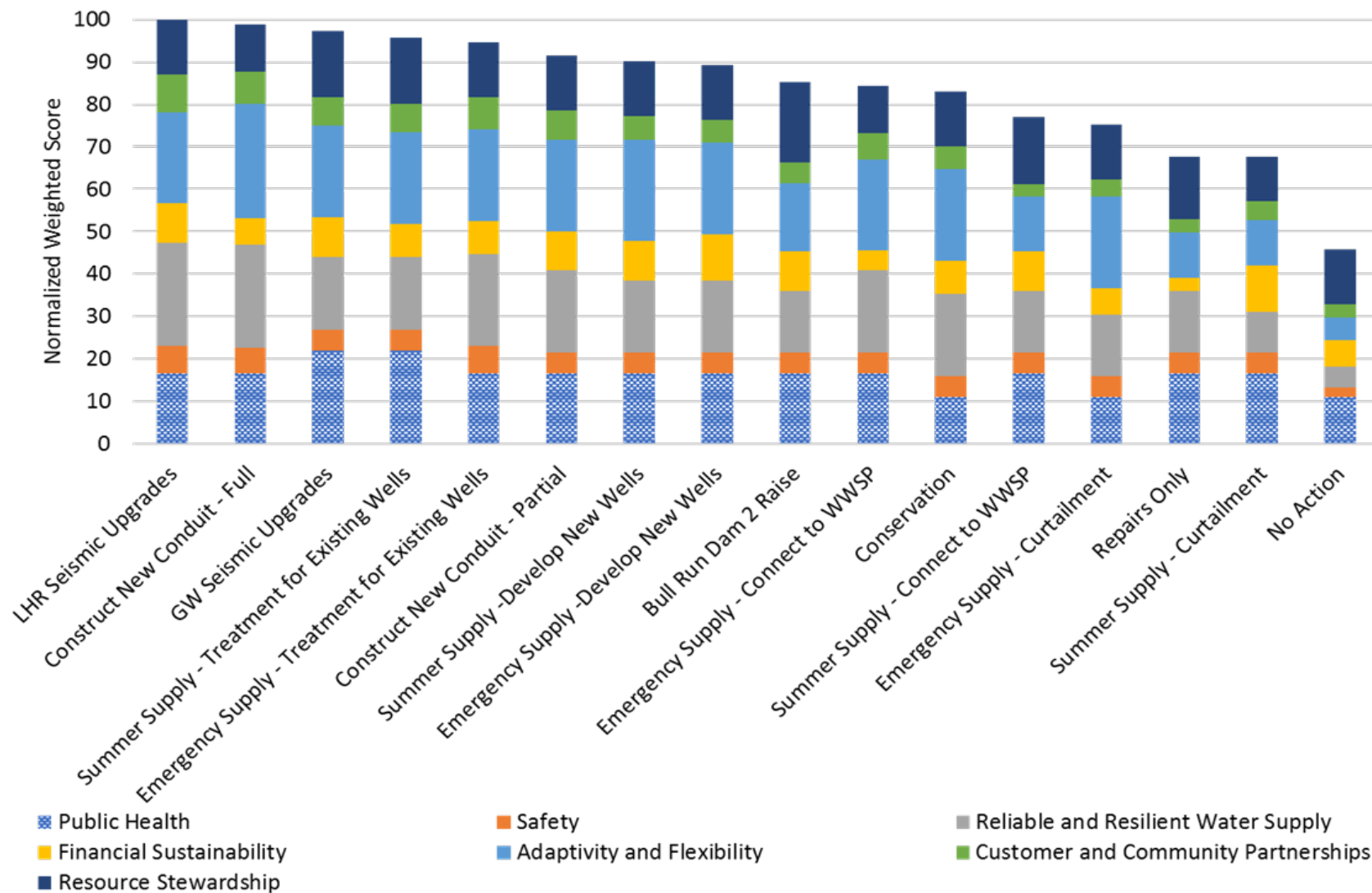
Resilient Planning Requires A Full Portfolio of Solutions

Conduits	Seismic	Supply
Repairs Only	No Action	Curtailement
Upgrade Least Hazardous Route (LHR)	Groundwater Seismic Upgrades	Conservation
Construct New Conduit- Full (Headworks to Powell Butte)		Bull Run Dam 2 Raise
Construct New Conduit- Partial (Headworks to Hudson Intertie)		Connect to WWSP
		Develop new wells
		Treatment for existing wells

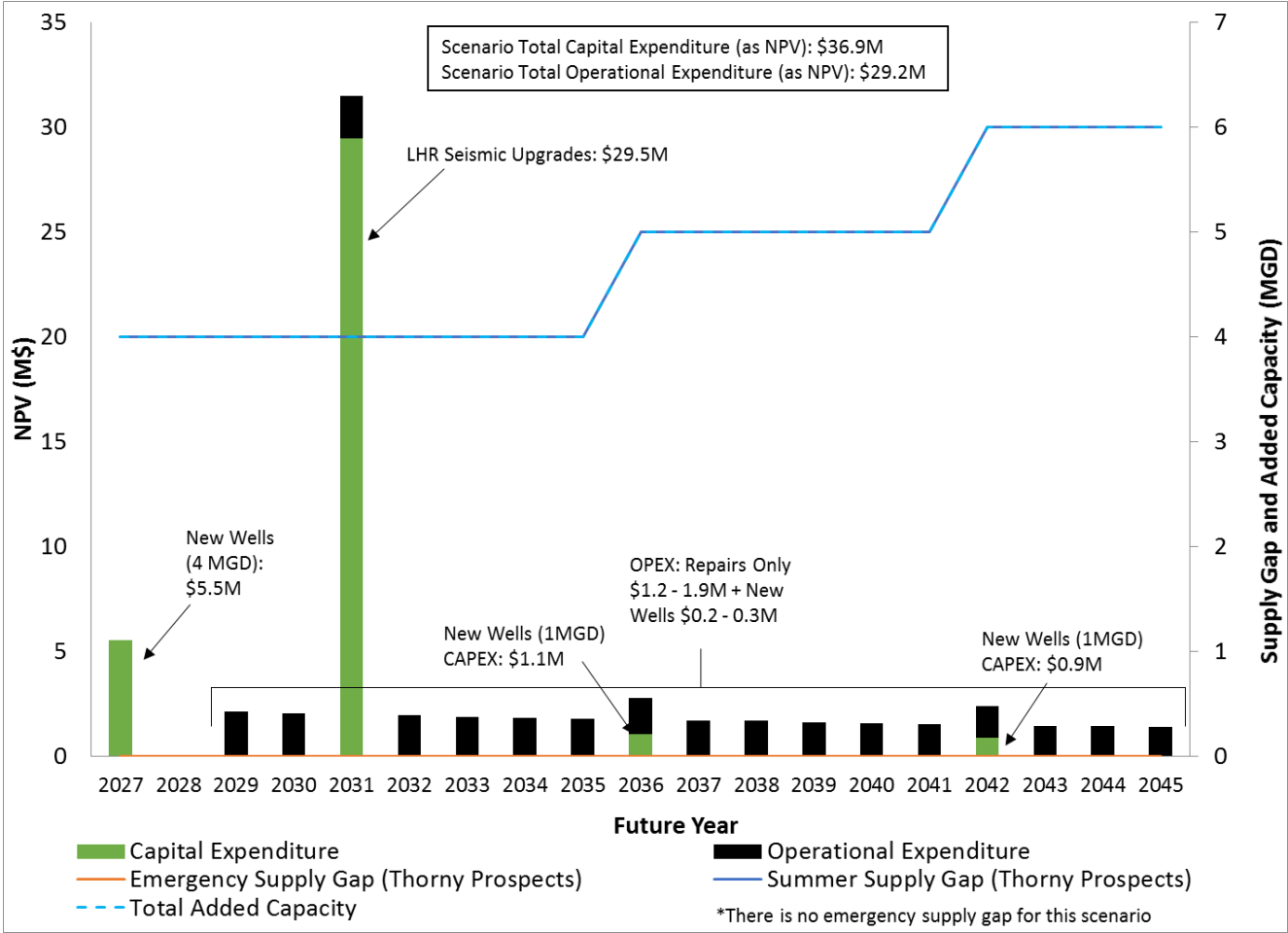
Portfolio construction example

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Multi-Objective Analysis Integrates Values and Analysis



Cost Model Example



An Efficient Frontier Across All Scenarios Shows Best Value



Primary Components of Implementation Framework

Base Supply Plan

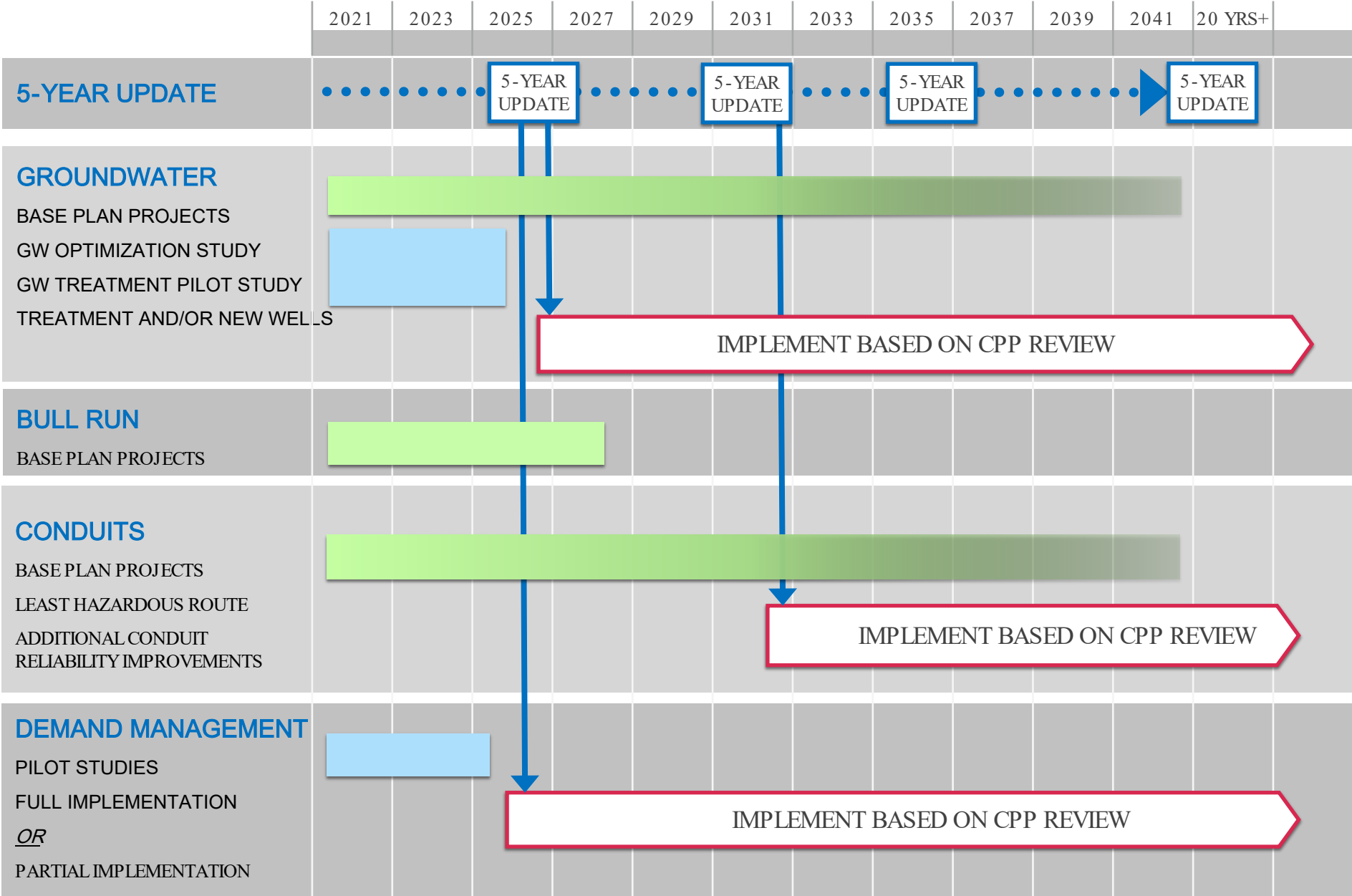
- Includes projects that address the following elements:
 - Regulatory Requirements
 - Asset Management
 - Hazard Mitigation
 - Operational Improvements
- These “low-regret” actions will be needed regardless of how future conditions may change.

Adaptive Actions

- Additional Adaptive Supply Actions may (*or may not*) be needed to supplement the Base Supply Plan.
- The need for any adaptive action will depend on future conditions.
- Requires an ongoing adaptive planning process to know if/ when to implement.

Supply System Road Map

- Planning
- Implementation
- Adaptive



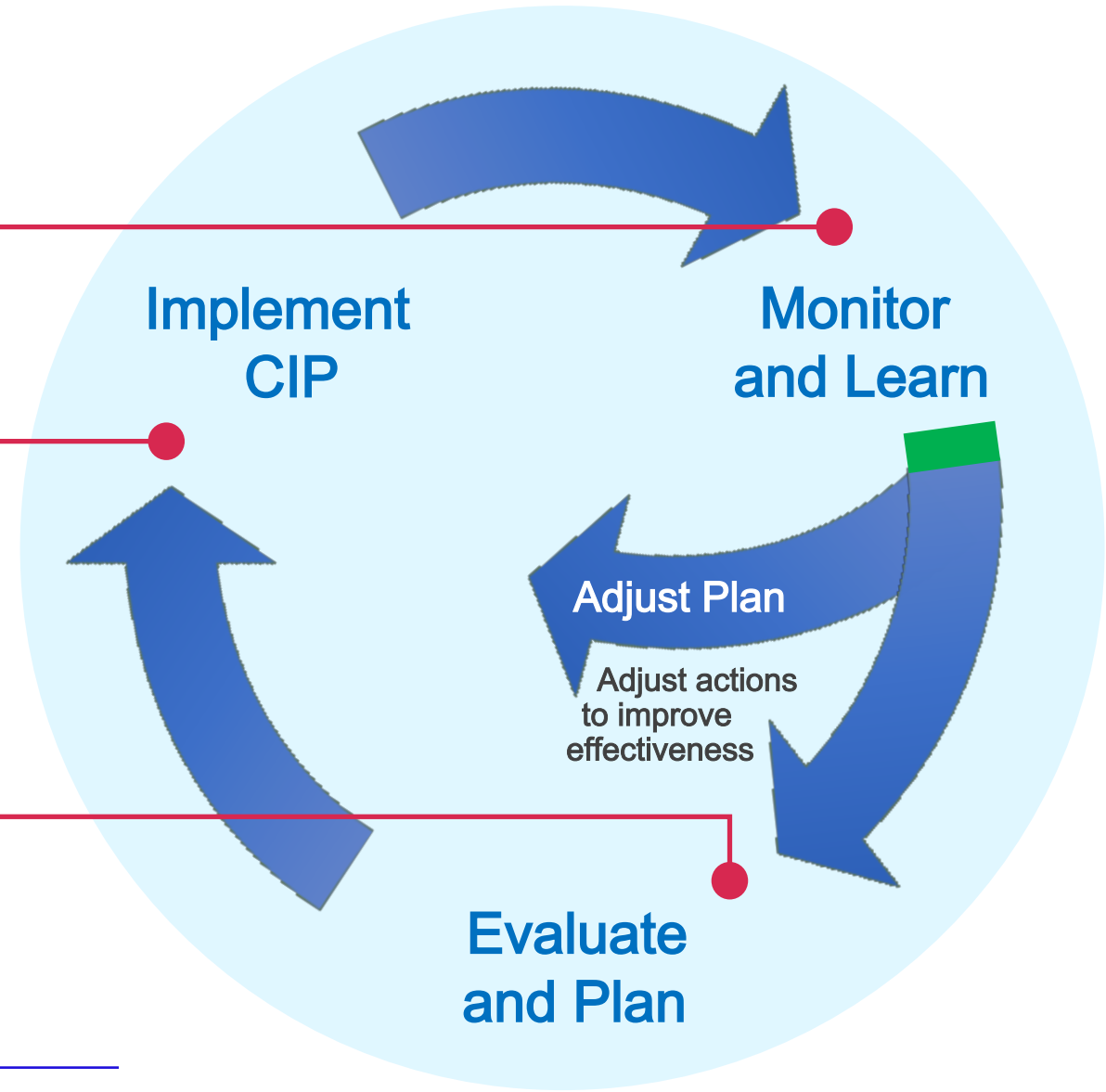
Adapting As The Future Unfolds

Overview of adaptive management cycle

Have supply, demand and economic conditions changed?
What metrics need to be considered?
Do indicators point towards a need to adjust the base plan?

Implement projects included in CIP.
Conduct studies identified during planning phase.

Develop the Base Supply Plan and longrange “options” to preserve.
Prioritize projects that provide the most benefit to the greatest needs identified by indicators.
Identify studies that need to be conducted in order to implement projects.



PWB's Ongoing Adaptive Planning



Annual Process

Quarterly Stakeholder Meetings

1. Track and monitor
2. Identify trends and key takeaways/stressors
3. Synthesize information

Annual Adaptive Planning Workshop

1. Convene stakeholders
2. Status updates on key trends
3. Evaluate project priorities and budget recommendations

Capital Budgeting Integration

1. Recommendations to CIP and Program Budgets (as needed)

5-year Process

In-depth Base Plan Review

Risks and Planning Scenarios Review and Update

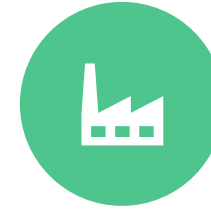
Update Long-Range Supply and Demand Forecasts



Key Questions



ARE THERE
SIGNIFICANT
TRENDS OR
CHANGES IN
THE SUPPLY
SYSTEM,
CUSTOMER
DEMAND, OR
OUR FINANCIAL
RESOURCES?



AS A RESULT,
SHOULD WE
**RETHINK HOW WE
ARE INVESTING IN
THE SUPPLY
SYSTEM?**



DO WE NEED
TO
RECOMMEND
ADAPTIVE
**ACTIONS OR
CHANGES TO
THE CIP OR
PROGRAM
BUDGETS?**

Business & Organizational Benefits



Scenarios have already been useful!

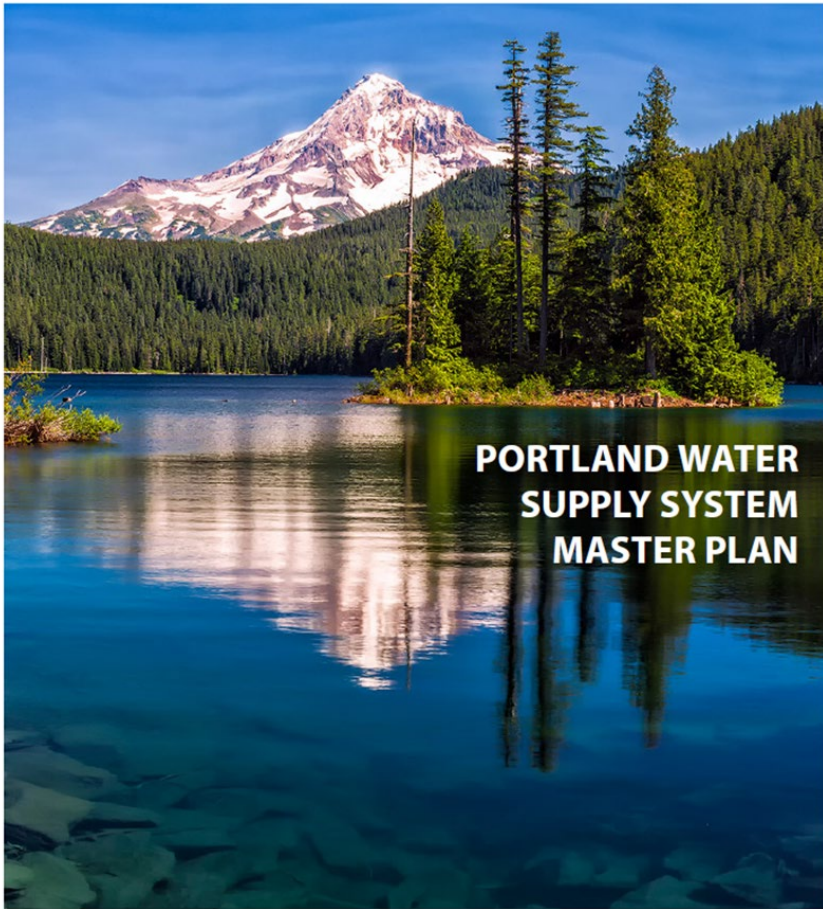
Recent Trends 2021-2023

Demands	Decreasing demands Future loss of 3 wholesalers Uneven economic growth/recovery in Portland
Financial & CIP	Declining demand is affecting revenue Limited CIP flexibility, funding trade-offs
Bull Run Supply	Multiple project needs, some unfunded Aging infrastructure Supply stress: lower flows and lower reservoir storage
Groundwater Supply	High levels of pumping for augmentation Reduced reliable capacity Multiple project needs, some unfunded

Planning Scenarios



Lessons learned



- Adaptive planning is a non-linear process that can require a cultural shift within organization.
- Important to get stakeholder buy-in early and have a clear understanding of what outcomes are needed.
- Be prepared to explain (and re-explain) the process.
- More time is required for the initial planning stages, but overall adaptive planning saves time and energy.
- Meaningful collaboration results in a more holistic understanding of system risks and needs.
- It's a journey, not a destination.

Thank you

