Old Colony Planning Council Regional Water Plan

Workshop 2

Economic Resilience and Sustainable Water Supply

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April 23, 2024

Agenda

1. Call to Order
2. Public Comment
3. Guest Speaker Al LeBlanc: A Technical Overview of PFAS
4. Review of Our Process, Objectives, and Examples of Metrics from Other Regions
5. Break-Out Groups: Proposed Metrics and Rubrics
   Coffee Break
6. Full Group Finalization of Metrics
7. Annotated Bibliography
8. Regional Schematic
9. Demand Projections
10. Next Workshop
11. Feedback Survey

Public Comment

Guest Speaker: PFAS

Final PFAS National Primary Drinking Water Regulation

EPA United States Environmental Protection Agency

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Safe Drinking Water Act

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Per- and Polyfluoroalkyl Substances (PFAS)

Final PFAS National Primary Drinking Water Regulation

- Summary
- Supporting Materials
  - General Information
  - Communications Toolkit
  - Technical Information for States, Tribes and Water Systems
  - Español
- Regulatory Information and Supporting Documents
- Webinar Registration
- Background

Summary

On April 10, 2024, EPA announced the final National Primary Drinking Water Regulation (NPDWR) for six PFAS. To inform the final rule, EPA evaluated over 120,000 comments submitted by the public on the rule proposal, as well as considered input received during multiple stakeholder engagement activities held both prior to and following the proposed rule. EPA expects that over many years the final rule will prevent PFAS exposure in drinking water for 100 million people, prevent thousands of deaths, and reduce tens of thousands of serious PFAS-attributable illnesses.

EPA is also making unprecedented funding available to help ensure that all people have clean and safe water. In addition to today's final rule, $1 billion in newly available Infrastructure Law to help states and territories implement PFAS testing and treatment at public water systems and to help owners of private wells address PFAS contamination.

EPA finalized a National Primary Drinking Water Regulation (NPDWR) establishing legally enforceable levels, called Maximum Contaminant Levels (MCLs), for six PFAS individually: PFOA, PFOS, PFHxS, PFNA, and HFPO-DA as contaminants with individual MCLs, and PFAS mixtures containing at least two or more of PFHxS, PFNA, HFPO-DA, and PFBS using a Hazard Index MCL to reduce the combined and co-occurring levels of these PFAS in drinking water. EPA also finalized health-based, non-enforceable Maximum Contaminant Level Goals (MCLGs) for each of these PFAS.

EPA announces first-ever national regulations for "forever chemicals" in drinking water

PUBLIC HEALTH

EPA puts limits on 'forever chemicals' in drinking water

APRIL 10, 2024 · 5:01 AM ET

HEARD ON MORNING EDITION

Pien Huang

AP

Biden-Fitz 2024 | Israel-Hamas war | Arizona abortion ban | M

EVEN WHEN THE NEWS IS FREE, JOURNALISM IS NOT. SUPPORT INDEPENDENT, FACT-BASED JOURNALISM.

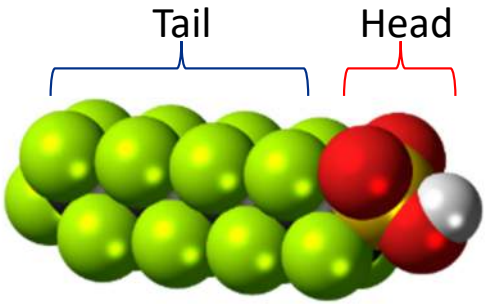
CLIMATE

Biden administration sets first-ever limits on 'forever chemicals' in drinking water

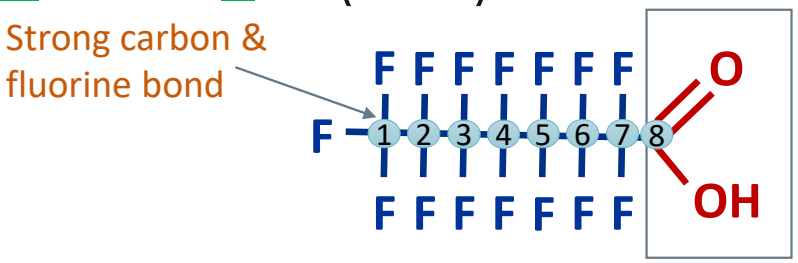
UCMR5 data suggests 10,000 treatment facilities will need to be built potentially costing more than $40B in capital investment. The 5 year window is going to help, but this will still be a sprint to overcome workforce, supply chain, and other issues.

Emerging Contaminant – PFAS Overview

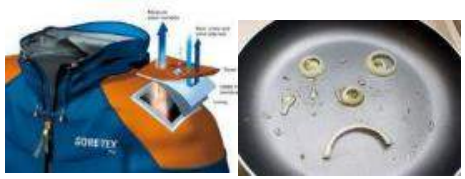
- ***P****er-* and *Poly-****F****luoro****A****lkyl* ***S****ubstances* (PFAS)



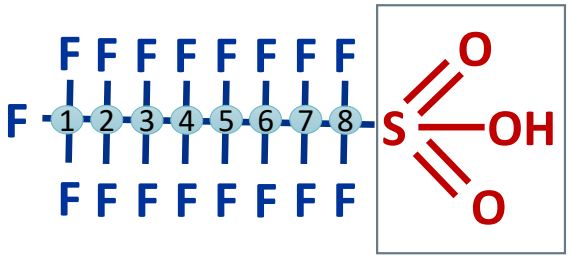
- ***P****er****F****luoro****O****ctanoic* ***A****cid* (PFOA)



Carboxylate



- ***P****er****F****luoro****O****ctane****S****ulfonic Acid* (PFOS)



Sulfonate

PFAS Vocabulary

- Long-chain and short-chain
- Carboxylates and sulfonates

PFAAs	C4	C5	C6	C7	C8	C9	C10	C11	C12
Carboxylates	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDoA
Sulfonates	PFBS	PFPeS	PFHxS	PFHpS	PFOS	PFNS	PFDS	PFUnS	PFDoS

Short-Chain PFAS

Long-Chain PFAS

7

PFAS Sources and Exposures

- Facilities using or storing aqueous film forming foams (AFFF), such as DoD installations, airports, oil refineries, fire training facilities, fire stations, etc.
- Manufacturing air emissions
- Chrome plating (PFOS as mist suppressant)
- Other areas where PFAS has been detected:
  - Landfill leachates, Wastewater, Stormwater

- PFAS in daily life

Regulatory Environment and Consumer Expectations

- 2009 Health Advisories:
  - PFOA at 400 ppt; PFOS at 200 ppt
- 2016 Revised Heath Advisories:
  - PFOA at 70 ppt; PFOS at 70 ppt
- June 2022 Health Advisories
- March 14, 2023 Draft MCLs
- April 10, 2024 Final MCLs
- Public push for more stringent levels in drinking water

Final EPA National Primary Drinking Water Regulations

Parameter	Maximum Contaminant Level Goal (MCLG)	Maximum Contaminant Level (MCL)
PFOA	0	**4.0 ppt**
PFOS	0	**4.0 ppt**
PFNA	10 ppt	10 ppt
PFHxS	10 ppt	10 ppt
GenX (HFPO-DA)	10 ppt	10 ppt
Mixture of 2 or more: PFNA, PFHxS, GenX, PFBS	Hazard Index (HI) of 1	HI of 1

- PFOA and PFOS levels did not change from draft MCL
- Remains the most challenging part of the rule for many water systems to comply with
- EPA Quote: *"lowest levels that are feasible for effective implementation"*

Final EPA National Primary Drinking Water Regulations

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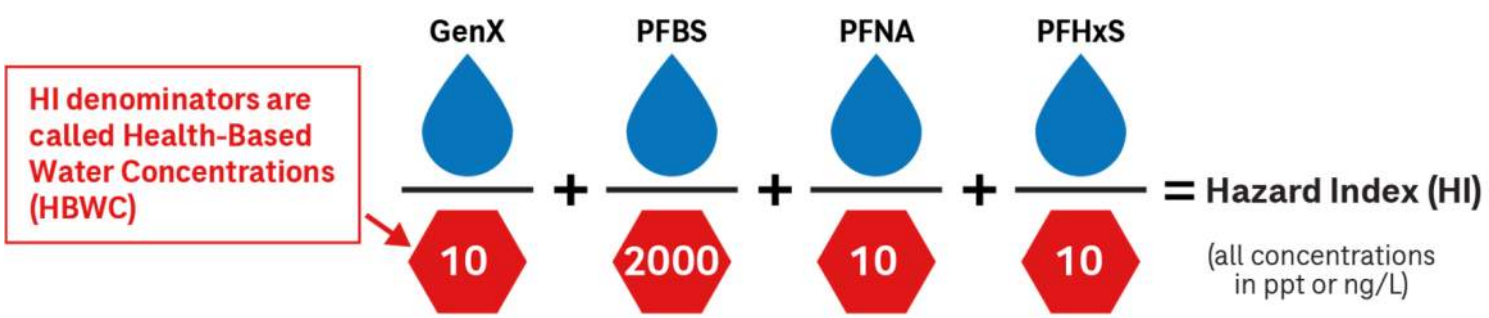
PFOA	0	4.0 ppt
PFOS	0	4.0 ppt
PFNA	10 ppt	**10 ppt**
PFHxS	10 ppt	**10 ppt**
GenX (HFPO-DA)	10 ppt	**10 ppt**
Mixture of 2 or more: PFNA, PFHxS, GenX, PFBS	Hazard Index (HI) of 1	HI of 1

- New MCLs (previously only included in the HI)
- Compliance for these three MCLs is to <u>one significant figure</u>

Examples: Measured value of 14.9 ppt rounds to 10 ppt (one significant figure) = **Compliance**
Measured value of 15.0 ppt rounds to 20 ppt (one significant figure) = **Violation**

Final EPA National Primary Drinking Water Regulations

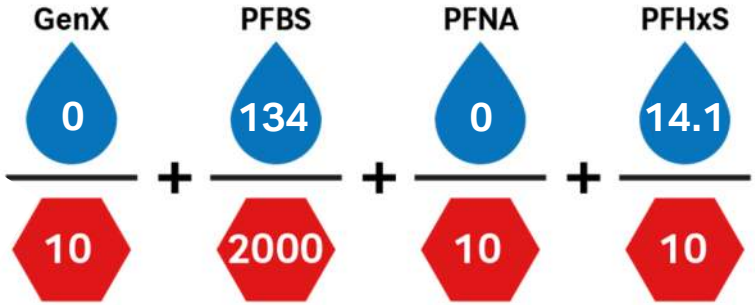
Hazard Index (HI) is used when two or more of these PFAS are present



- Compliance changed from “1.0” (draft rule) to “1” (final rule)
  - Is the change significant?

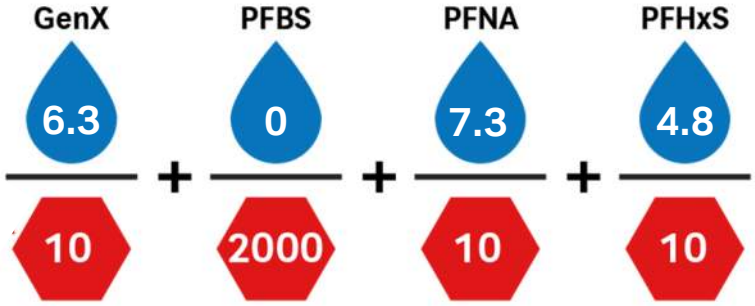
Final EPA National Primary Drinking Water Regulations

Example 1 – Water A: 134 ppt of PFBS,14.1 ppt of PFHxS, & non detect (ND) for GenX and PFNA



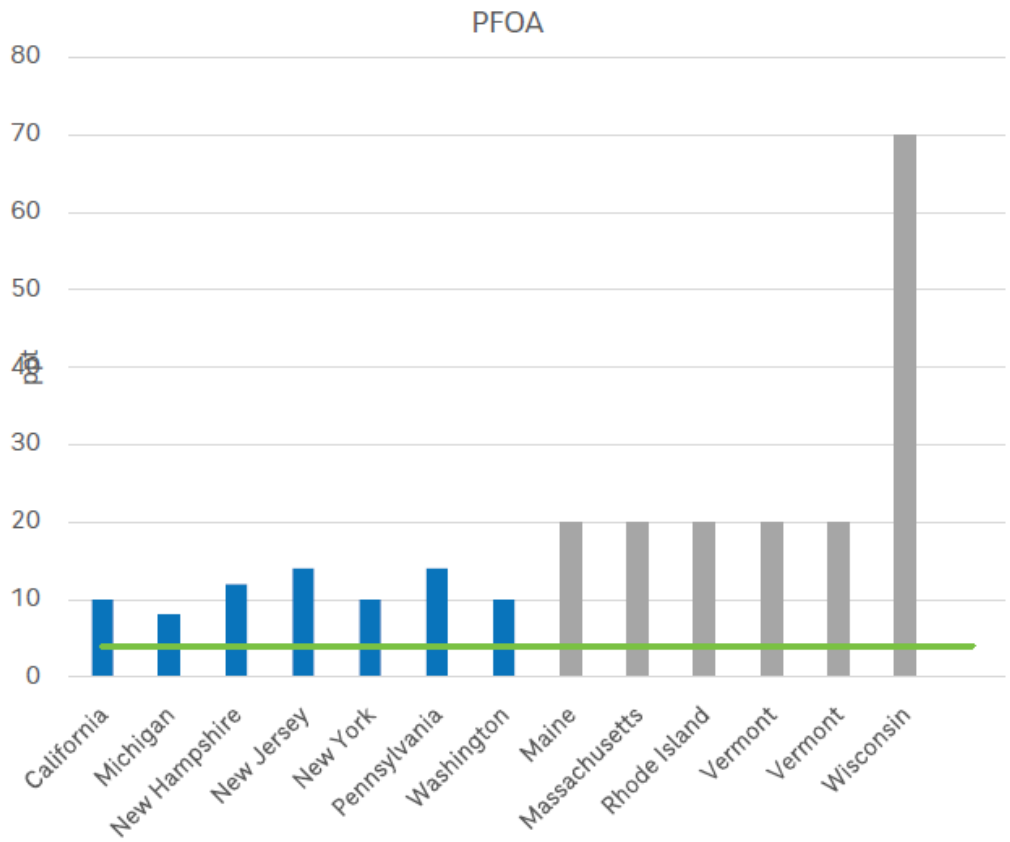
1.477 **Rounds to 1 = Compliance**

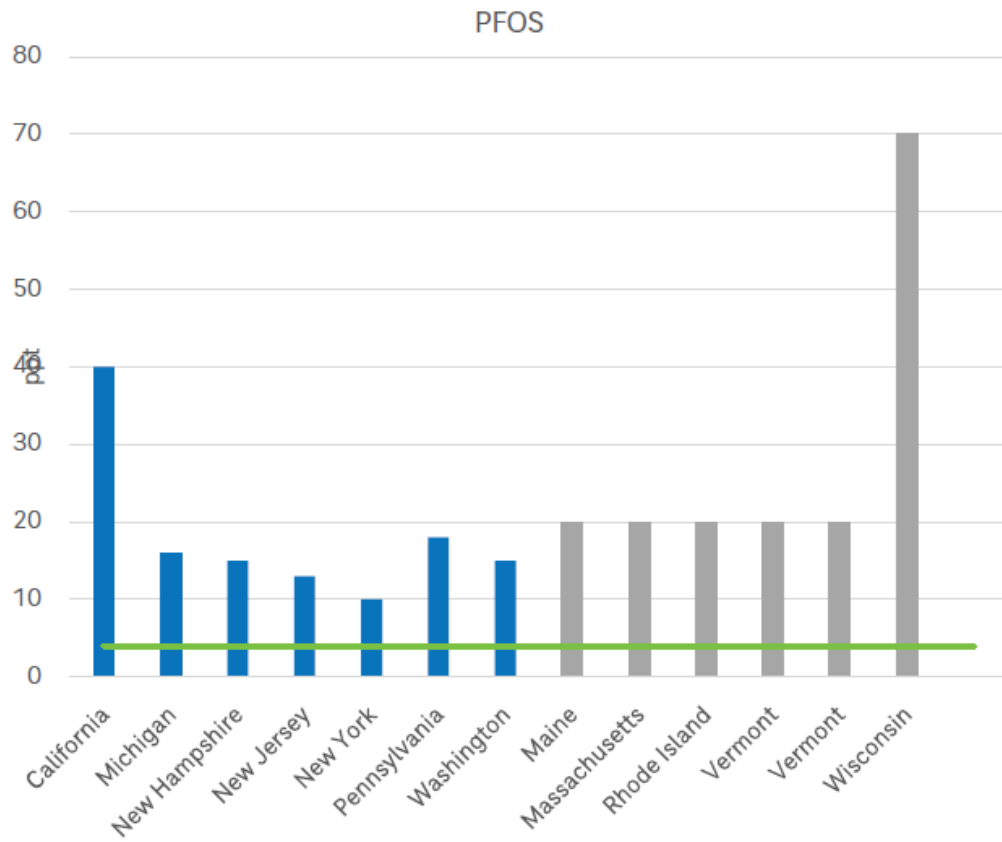
Example 2 – Water B: 6.3 ppt of GenX, 7.3 ppt of PFNA,4.8 ppt of PFHxS & ND for PFBS



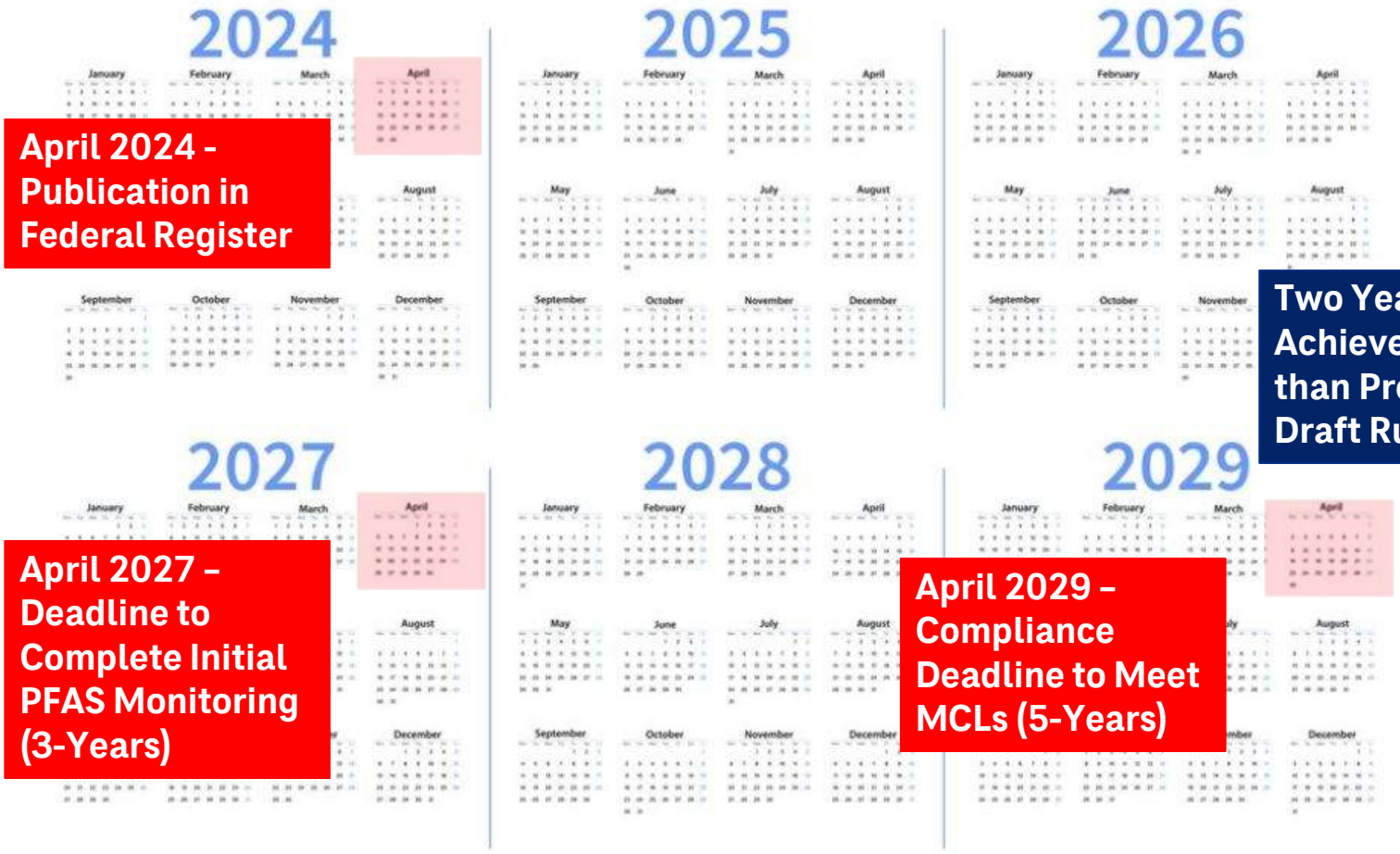
1.84 **Rounds to 2 = Violation**

Comparison to Promulgated State Regulations





Compliance Schedule

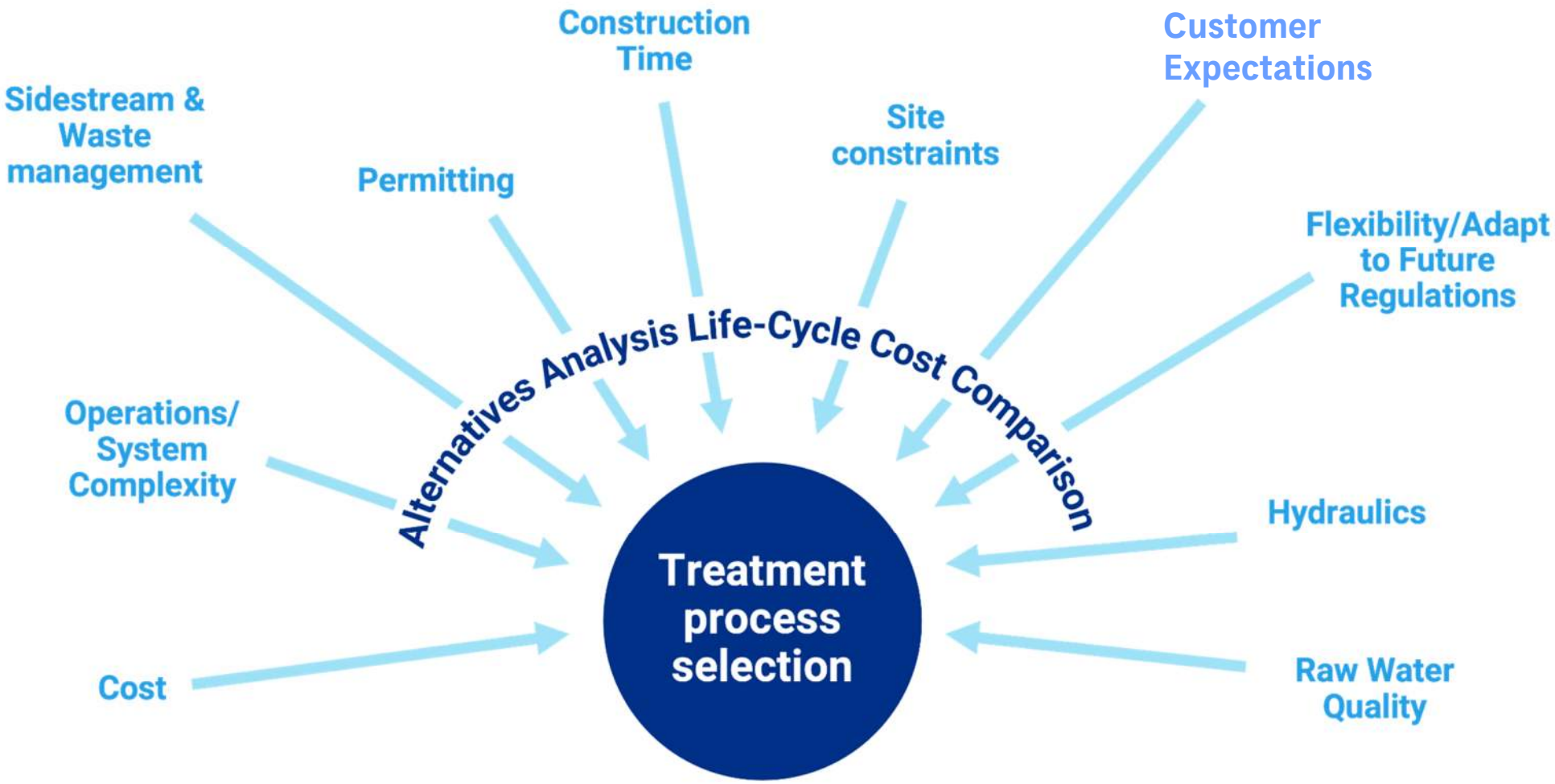


Typical PFAS Project Implementation Steps

Traditional Delivery

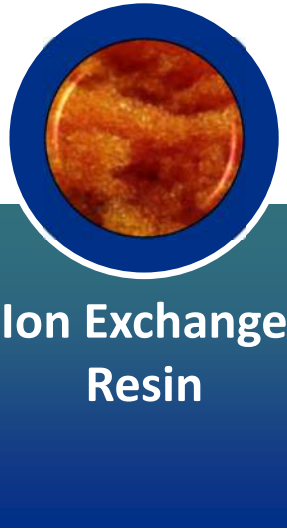
	Activity	Common Duration
1	Gather/Review Data and Prepare Concept Memo	3 months
2	Bench Scale Testing	>=4 months
3	Pilot testing (if needed)	3-12 months
4	Design and Permitting	4-12 months
5	Bidding and Contract Award	2 months
6	Construction and Commissioning	15-36 months

- Project complexity and state regulatory requirements will affect timeline
- Concurrent performance of testing and design activities is possible
- Alternative project delivery methods can accelerate project schedule!
  - Design-build
  - Equipment/vessel pre-purchase


Construction Time
Customer Expectations
Sidestream & Waste management
Permitting
Site constraints
Flexibility/Adapt to Future Regulations
Alternatives Analysis Life-Cycle Cost Comparison
Operations/ System Complexity
Hydraulics
Treatment process selection
Cost
Raw Water Quality

Three Mainstream PFAS Treatment Technologies

Granular Activated Carbon (GAC)



Ion Exchange Resin

Reverse Osmosis Membranes

PFAS are NOT removed appreciably by conventional drinking water treatment. High doses of Powder Activated Carbon (PAC) can assist removal.

PFAS Removal for a Typical Groundwater Supply

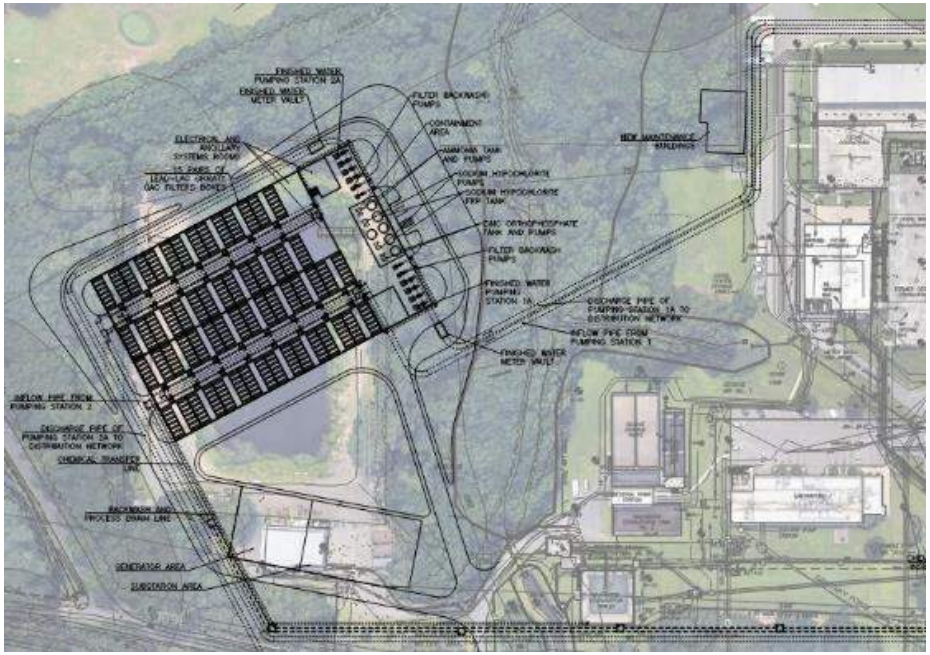
Owen District Road Water Treatment Plant
Westfield, Massachusetts

Key Points:

- Successful bench-scale test
- Three years (450 MG) of removing over 200 ppt to non-detect
- Rapid execution & schedule efficiency

PFAS Removal at Typical Surface Water Supply

Confidential Client
Eastern United States



Key Points:

- >100-mgd surface water supply with low level PFAS
- Filter retrofit vs. post filter treatment alternatives
- Rigorous technology evaluation & alternative analysis

PFAS Removal with Anion Exchange

Key Points:

- Less contact time required = Less Media = Lower Vessel Height
- Finer media requires upstream protection for resin

In this Photograph:

- Two 12-ft diameter AIX vessels
- Two bag filters
- Two chemical systems (calcium thiosulfate & zinc orthophosphate)

PFAS Removal with Reverse Osmosis (RO)

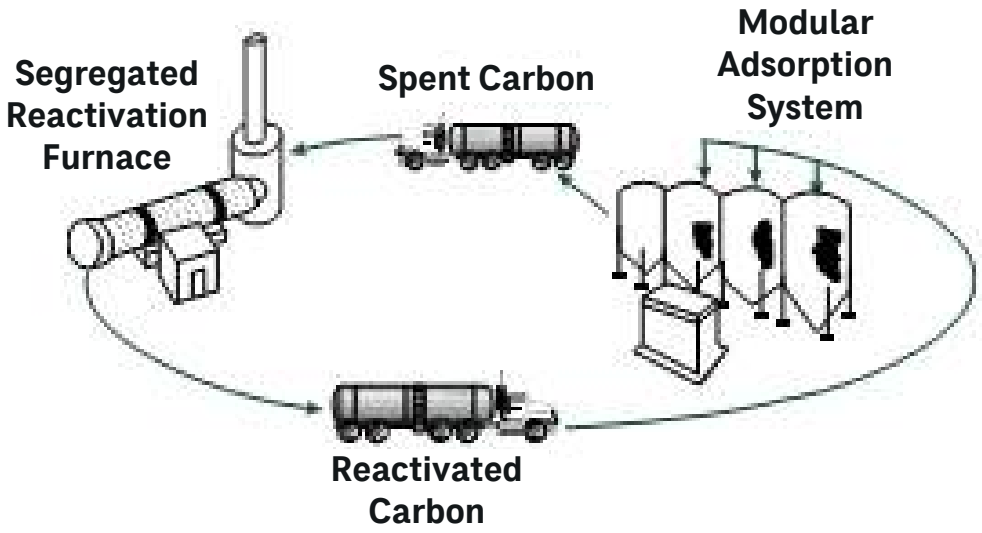
- Advantage:
  - Removal of co-contaminants
- Disadvantage:
  - Discharge of concentrated PFAS waste
  - High energy usage

Brunswick County	LPRO	Ozone/ O3 BAF – GAC	GAC/IX/UV -AOP
Total Capital Costs	$ 99 M	$ 99 M	$ 84 M
25-yr Present Worth Annual Costs	$ 59 M	$ 95 M	$ 93 M
Total 25-yr Capital + Annual O&M	**$ 158 M**	$ 194 M	$ 177 M

Brunswick County, NC Surface Water Treatment RO Facility (41-mgd capacity)

The Source and Fate of Spent Media

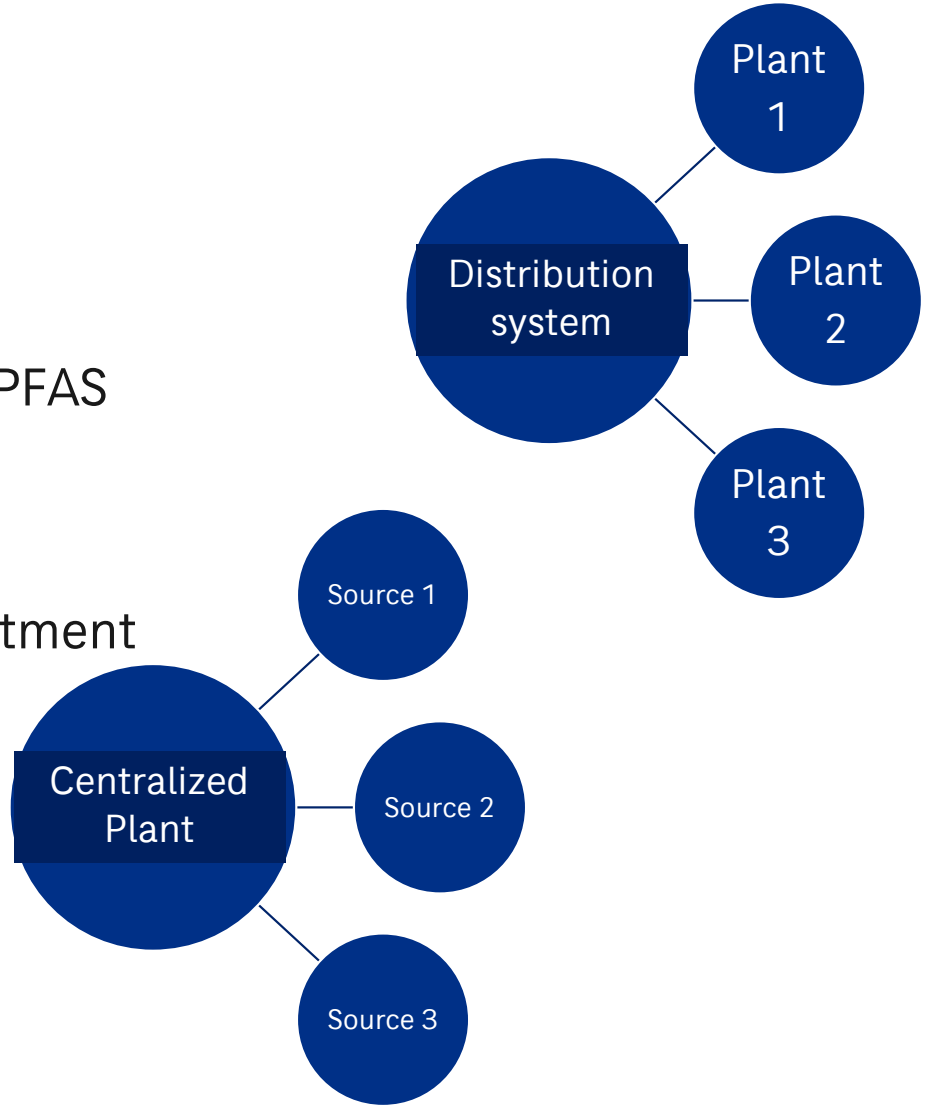
- Granular Activated Carbon
  - Mined then "activated"
  - Landfill
  - Incineration
  - Reactivation / Reuse of Carbon
- Single Use Anion Exchange Resin
  - Manufactured
  - Landfill
  - Incineration
  - No re-use of Anion Exchange Resin



Graphic courtesy of Evoqua

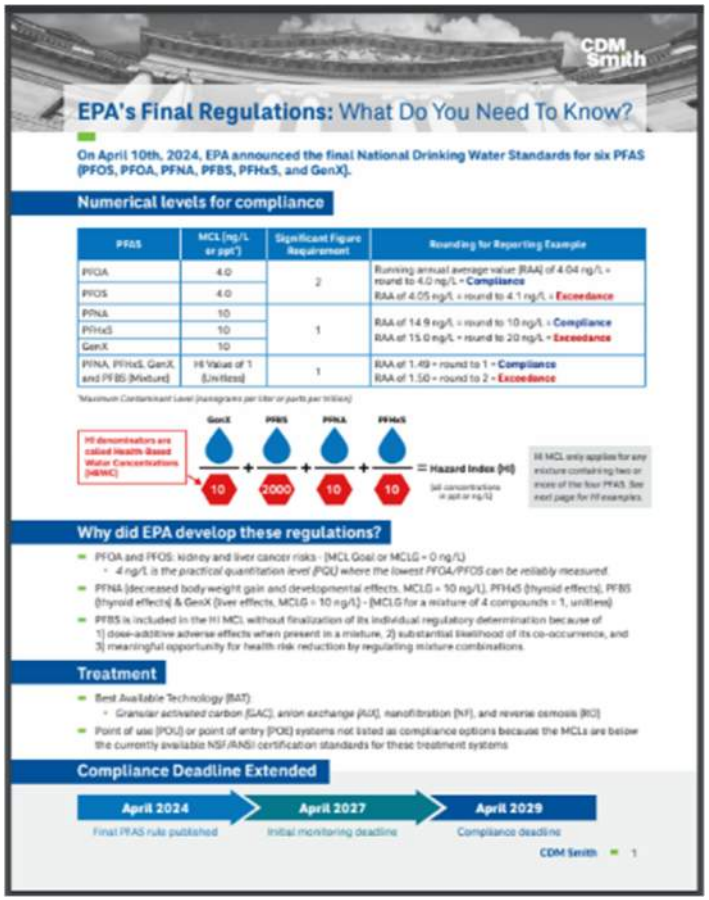
PFAS Removal Strategies

- Abandon Supply Source
- Find New Supply Source
- Blend with Source to Achieve Lower PFAS Concentration
- Treat PFAS at the Supply Source
- Combine Facilities to Centralize Treatment



Additional Resources

- Factsheet summary



- AMWA webinar

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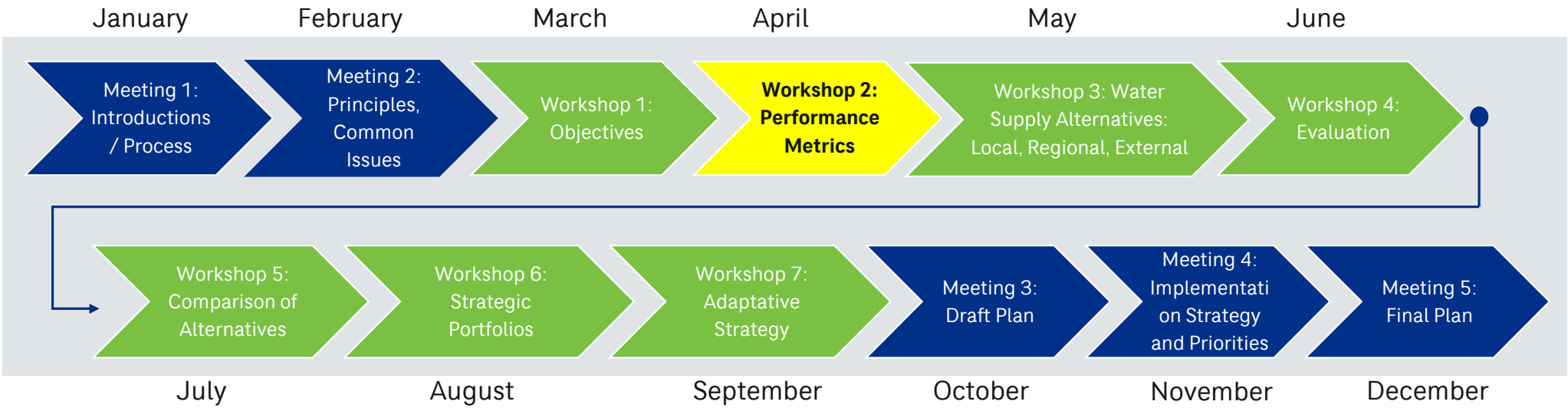
Connect with us!

Review and Status of our Process

Overview of Regional Water Plan Process



Workshop Process

Workshop 1: Objectives → Workshop 2: Metrics → Workshop 3: Alternatives → Workshop 4: Evaluation → Workshop 5: Comparison → Workshop 6: Portfolios → Workshop 7: Adaptive Plan

Social, Environmental, Economic, Reliability, Other Goals

Quantitative and Qualitative Measurements of Progress toward Objectives (with Rubrics)

Local, Regional, and External Options for Water Supply and Resource Management

Review quantitative scores, collaborate on qualitative scoring, Individual weights for objectives

Distinguish most broadly beneficial, least beneficial, and discuss less clear alternatives

Group alternatives into strategic portfolios

Decision Tree: Short-Term Plan and Long-Term Options

Definitions of Terms for Strategic Planning

- **Guiding Principles**
  - Represent a set of core values that stakeholders use to guide the development of the plan, usually 3-5 statements that convey the following
- **Objectives**
  - Represent specific, measurable goals for the plan that are usually aligned to each guiding principle. There may be more than one objective for each guiding principle.
- **Criteria or Metrics**
  - The specific measurements of success in meeting the objectives.
- **Alternatives / Strategies**
  - The proposed actions or combinations of actions that will be evaluated against criteria/metrics.
- **Portfolios**
  - The groupings of alternatives that are considered for the final plan.

Our Objectives from Workshop 1 (March)

- Meet all current and future peak water demands **with climate resilient supply side and demand side strategies.**
- Meet safe drinking water quality regulations, current and future.
- Improve ecosystem health.
- Prioritize alternatives with high cost-benefit value.
- Promote equity by incorporating affordability, accessibility, and distribution of infrastructure impacts.
- Consider innovative and alternative solutions such as stormwater **capture**, wastewater **reuse** and water use efficiency.
- Encourage sustainable **potential for housing, economic development and prosperity.**

Our Objectives from Workshop 1 (March)

Original	Updates
• Meet all current and future peak water demands reflecting existing sources of water supply.	• Meet all current and future peak water demands **with climate resilient supply side and demand side strategies.**
• Meet safe drinking water quality regulations, current and future.	• Meet safe drinking water quality regulations, current and future.
• Improve ecosystem health.	• Improve ecosystem health.
• Prioritize alternatives with high cost-benefit value.	• Prioritize alternatives with high cost-benefit value.
• Promote equity by incorporating affordability, accessibility, and distribution of infrastructure impacts.	• Promote equity by incorporating affordability, accessibility, and distribution of infrastructure impacts.
• Consider innovative and alternative solutions such as stormwater, wastewater and water use efficiency.	• Consider innovative and alternative solutions such as stormwater **capture**, wastewater **reuse** and water use efficiency.
• Encourage sustainable economic prosperity .	• **Encourage sustainable potential for housing, economic development and prosperity.**

Metrics Example #1- Regional Plan in Florida

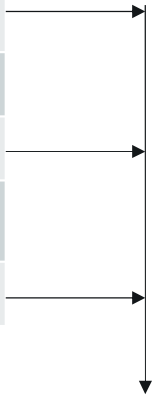
Objectives	Objective Weight	Metric
Deliver Utility System Reliability	30%	Supply shortages
Provide Cost-Effective Solutions	25%	Total levelized unit cost and total capital costs
Protect the Natural Environment	25%	Net aquifer withdrawal over planning period and total sustainable sources
Maximize Implementation	15%	Stakeholder acceptance, permitting ease and operational ease
Offer Community Benefits	5%	Leading edge solutions and co-benefits

Metrics Example #2 - Regional Plans in Austin, TX

Objective	Objective Weight	Criteria	Criteria Weight
Water Supply Benefits	25%	Maximize Resiliency	15%
		Increase Diversity of Sources	10%
Economic Benefits	25%	Provide Cost-Effective Services	15%
		Support Local/Regional Economy	10%
Environmental Benefits	20%	Reduce Impacts to Ecosystems	12%
		Meet GHG Emission Reductions	8%
Social Benefits	20%	Maximize Social Justice	10%
		Preserve Colorado River for All	10%
Implementation Ease	10%	Reflect Permitting/Legal Issues	10%

Examples Considering Units and Rubrics

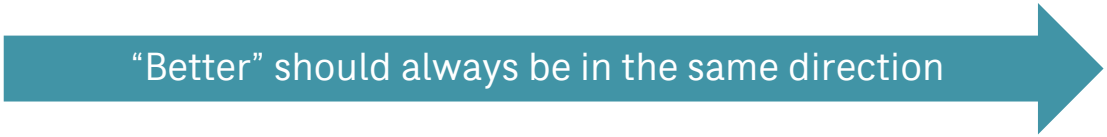
Metric	Quantitative/Qualitative	Units
Maximize resiliency	Quantitative	% Reliability During Drought
Increase diversity of sources	Quantitative	# of Significant Sources
Provide cost-effective services	Quantitative	$/MG Delivered
Support local/regional economy	**Qualitative**	**Qualitative Rubric**
Meet GHG emission reductions	Quantitative	Carbon Loading in Pounds
Maximize social justice	**Qualitative**	**Qualitative Rubric**
Preserve Colorado River for all	Quantitative	% of documented needs met
Reflect permitting/legal issues	**Qualitative**	**Qualitative Rubric**



Example of a qualitative rubric on next slide

Examples of Qualitative Rubrics

Metric	1	2	3	4	5
Environmental Impacts	High Detrimental Impacts	Moderate Detrimental Impacts	Low Detrimental Impacts	No Detrimental Impacts	Environmental Benefits
Potential for Job Creation	May actually lose jobs	No clear opportunity	Potential for moderate job growth	Will definitely create some jobs	Will create many jobs
Supply Redundancy	No Redundancy	Potential for Future Redundancy	Isolated/ Partial Redundancy	Full Redundancy	--



Guidelines for Qualitative Rubrics

- Be precise (try to avoid “poor-fair-good-better-best” if possible)
- Be confident that “bins” can be used to distinguish alternatives
- Only use as many as needed
- Carefully think about what is certain vs. what is only plausible

Break-Out Groups: Proposed Metrics and Rubrics

A

Objectives
Meet all current and future peak water demands with climate resilient supply side and demand side strategies.
Improve ecosystem health.

People
Pine DuBois
John Haines
Bob Kostka
Kendra Martin
Val Massard
Liz Shea
Dan Sullivan
Kirk

B

Objectives
Promote equity by incorporating affordability, accessibility, and distribution of infrastructure impacts.
Meet current and future safe drinking water quality.

People
Jason Duff
Kimberly Groff
Shane O'Brien
Noreen O'Toole
Wayne Parks
Greg Swan
Brian Vasa
Amara

C

Objectives
Consider innovative and alternative solutions such as stormwater capture, wastewater reuse, and water use efficiency.
Prioritize alternatives with high cost-benefit value.

People
Jonathan Beder
Peter Gordon
Duane LaVangie
Phil McNulty
Greg Tansey
Bill and Grace

D (hybrid)

Objectives
Encourage sustainable water use to meet the needs for housing and economic prosperity.

People
Peter Forman
Jon Hobill
Gavin Murphy
Jimmy Powell
Brian Vasa
Art Edgerton
Martin Pillsbury
Margherita Prior
Joanne and Kara

Coffee Break

Refinement of Metrics

Refinement of Metrics

- Group D:
  - Objective: Encourage sustainable water use to meet the needs for housing and economic prosperity
  - One metric for private well households: permitting for well re-digging. Track this on a regional scale to understand if there is no longer sustainable water supply
  - Another metric: additional water supply potential for economic development
    - May have limited data availability for this, would require measuring groundwater levels and surface water levels.
    - Ideas came up about how to incorporate recommendations for final water plan
    - Look at per capita water use- good indicator for if there is additional water
    - Unaccounted for water (UAW)- trends for this
    - Housing density efficiencies for water use – no specific metric mentioned
    - Conserved land that is left for water recharge
    - Public private partnerships
    - Peak demand may not be a good metric to understand “cushion” for economic development
    - High cost of water as a consideration for reclaimed water
    - Drought restrictions could be an indicator for some communities while others go under drought restrictions every year so would not be a useful

Refinement of Metrics

- Group C:
  - Consider innovative and alternative solutions such as stormwater capture, wastewater reuse and water use efficiency
    - Consensus that water use efficiency is the most useful
    - RGPCD is a measure of efficiencies
    - UAW is a measure of efficiency
    - Seasonal water use- to understand how much is being used for landscaping and nonessential uses
    - Cost of solutions
    - Ranking efficiency (efficiency = 4/5, traditional source (e.g. MWRA) = 2/3, wastewater reuse = 1)
    - Stormwater was considered as the least likely alternative- lowest on priorities

Refinement of Metrics

- Group C
  - High cost benefit value
    - Efficiency would be considered highest cost benefit value
    - Potential benefits from regional alternatives for high cost benefit value
    - Wastewater reuse isn't cost effective
    - Potential metric $/ gallon in efficiency or $/gallon in water sourced, applied to different uses

Refinement of Metrics

- Group B
  - Promote equity by incorporating affordability, accessibility and distribution of infrastructure impacts
    - Equal access to goods= clean drinking water
    - Impacts of infrastructure don't impact more communities than others
    - Affordability- making sure that one community isn't paying significantly more than another community. But each community is it's own separate system
    - Potentially use something like Household Burden Index – evaluate the cost of water compared to income
    - Difference between regional and local equity- equity between communities versus within the same community
    - If there are going to be groups of projects that are going to benefit the region as a whole, where are those projects going to take place? Where

Refinement of Metrics

- Group B
  - Promote equity by incorporating affordability, accessibility and distribution of infrastructure impacts
    - Potential to assess comparing gaps between supply and demand- but difficult due to interconnections
    - Potentially look at RGPCD
    - Try to ensure federal and state government funding can be spread throughout the region
    - Consider the equity issue between private well owners and public water supply users

- Objective 2: Meet current and future drinking water quality
  - Scale (low) = not meeting required water quality standards, medium = meeting required drinking water quality standards, high = exceeding required water quality standards

Refinement of metrics

- Group A
  - Meet all current and future peak water demands with climate resilient supply side and demand side strategies
    - Only focusing on the end user of the water supply: delivering water as a percent of demand for the region
    - Resiliency within that supply on a regional scale- built in capacity – based on a specific goal to be determined- example of 20% buffer for climate resiliency
    - Objective 2: Improve ecosystem health
      - Groundwater levels
      - Streamflows
      - Connectivity of different water bodies
      - Fish migration patterns
      - We are probably below what we should be for a healthy ecosystem. Should use different parameters to have an ecosystem index. Track over time, and have metrics based off of positive trend on ecosystem index. May be able to use MA state data related to this, or set for our own region

Annotated Bibliography

Annotated Bibliography

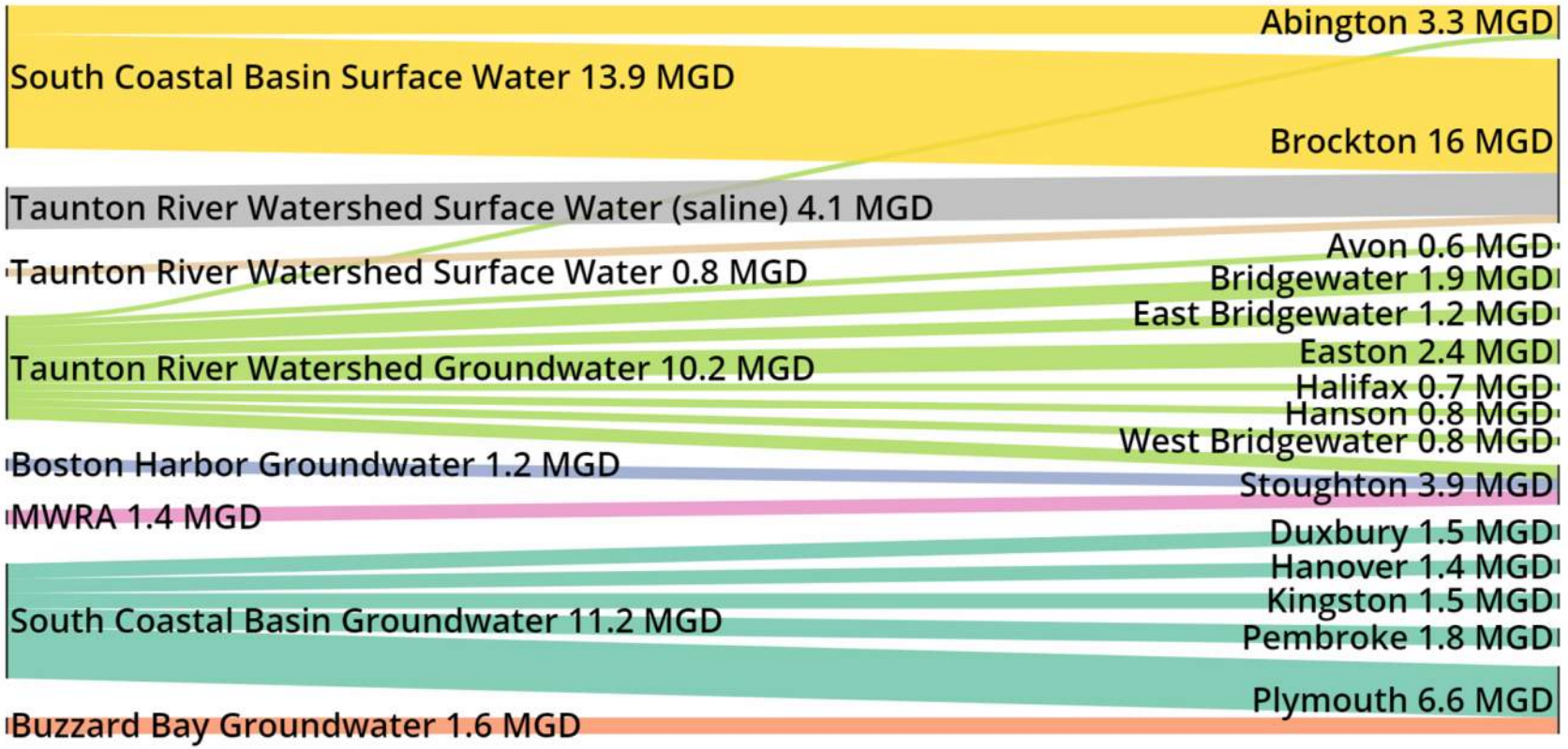
- Each community had a question section, which we are hoping to hear back about

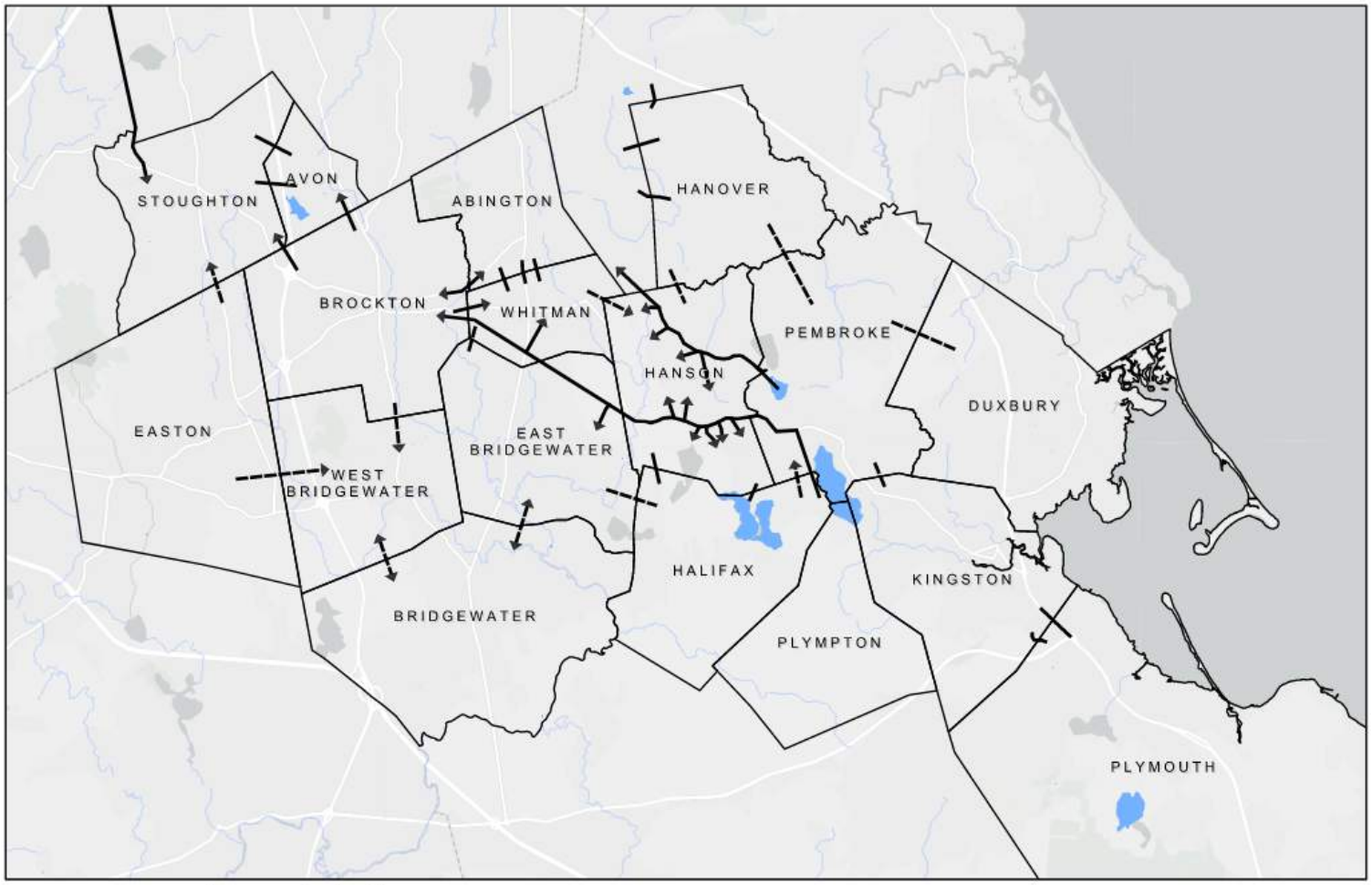
- By May 1st:
  - Review the relevant section
  - Send us any edits or updated documents
  - Answer our questions in the last subsection

Regional Schematic

Sankey Diagram- Water Management Act Permitted Amounts

Water Source – Total Amount Allotted to the Region





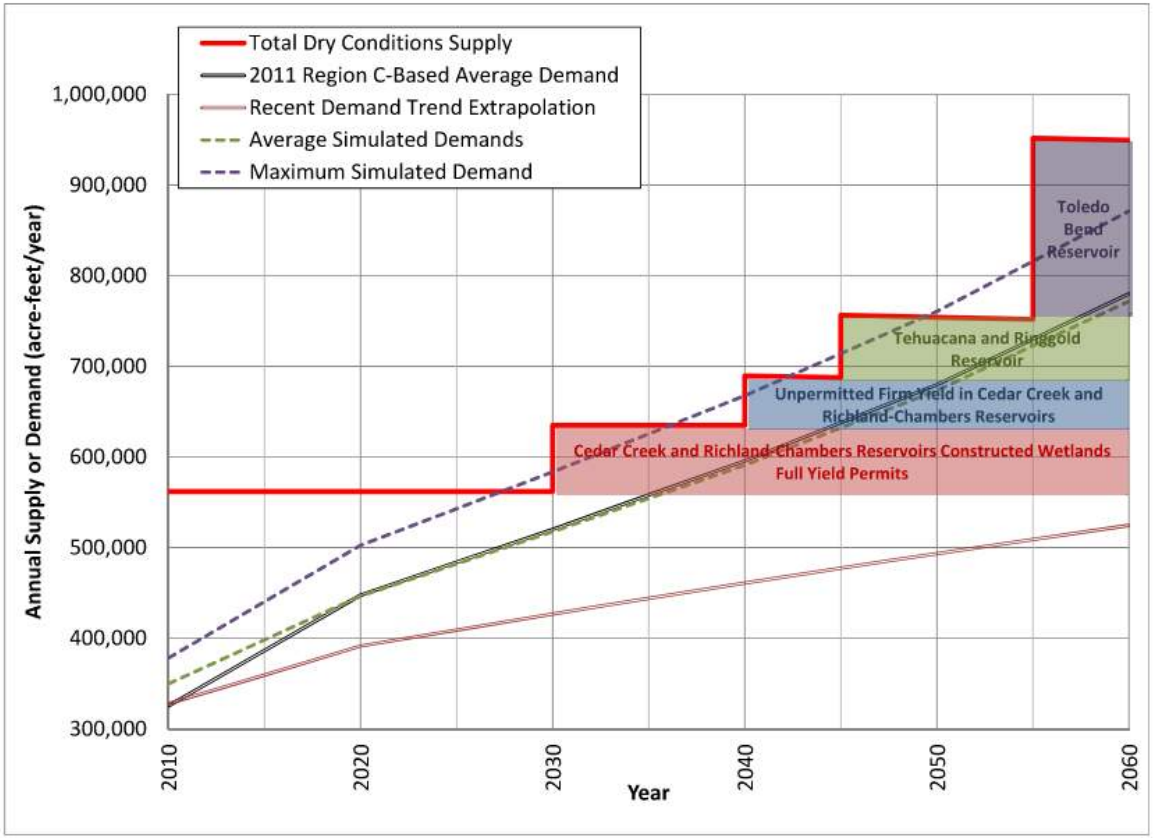
Old Colony Planning Council Region Interconnections

Pipe

CDM Smith

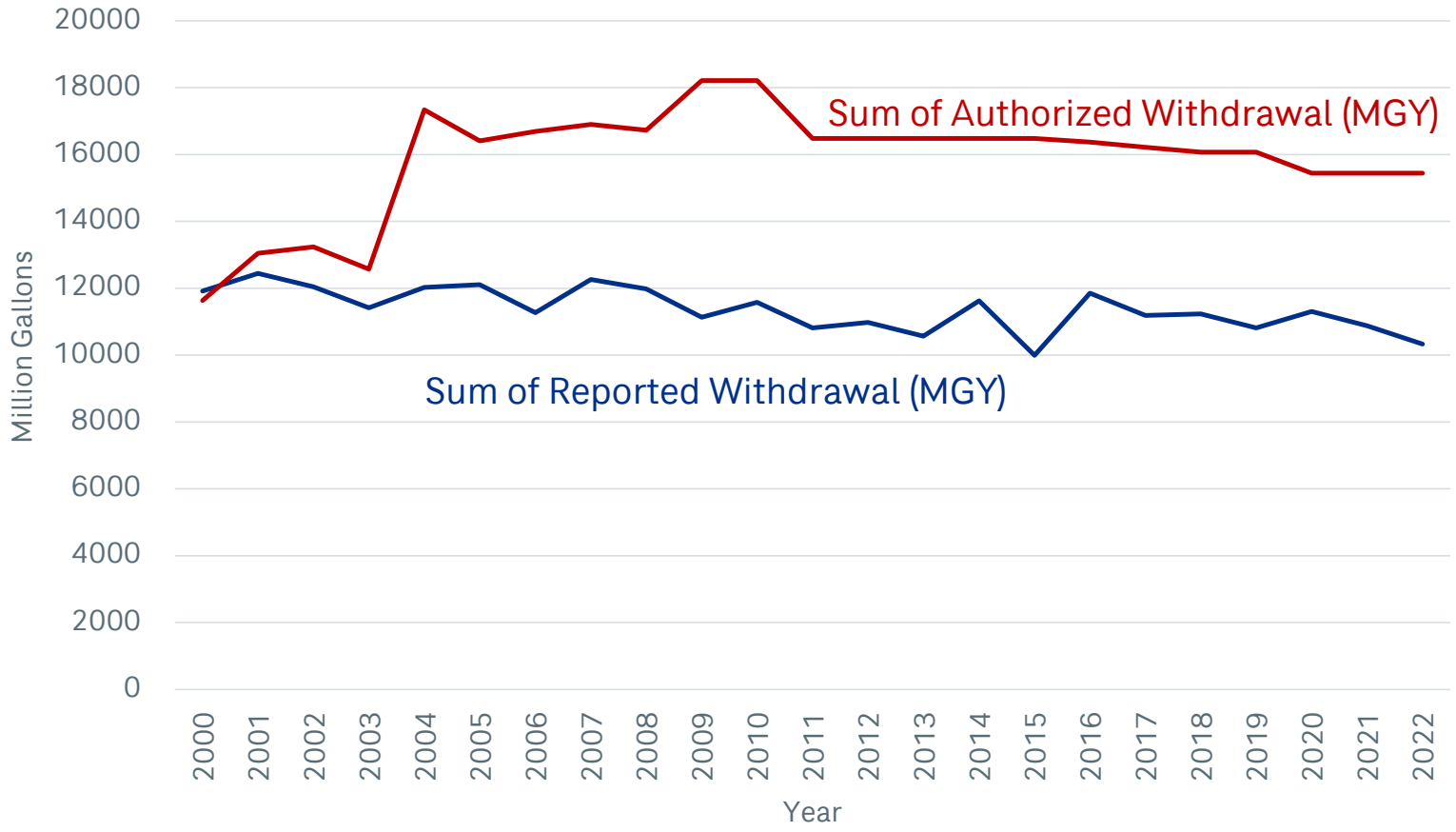
Demand Projections

Texas Demand Gap Analysis Example



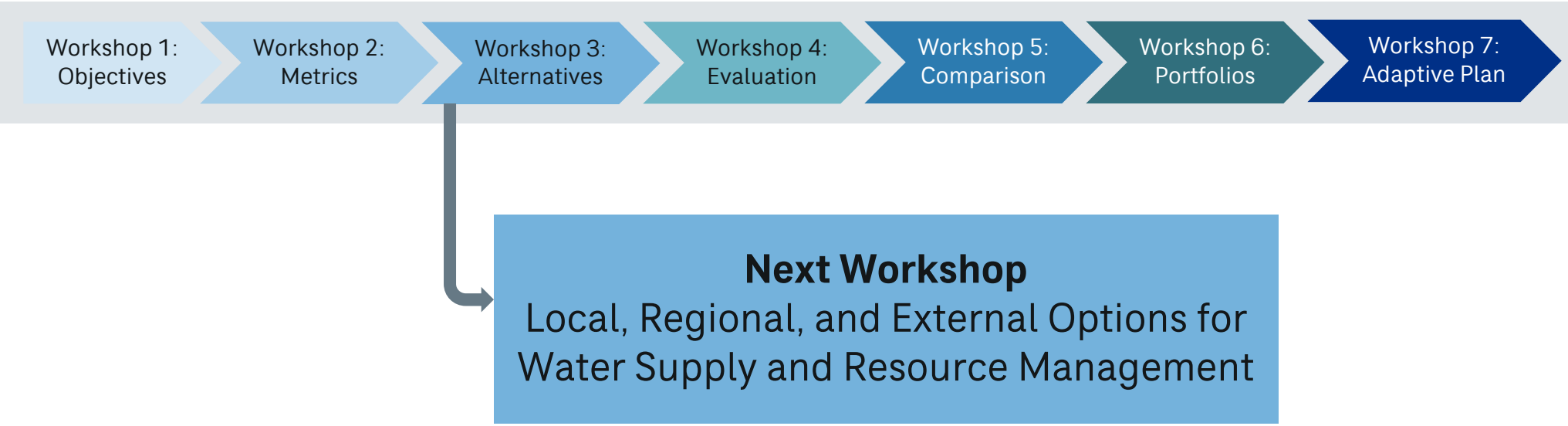
Tarrant Regional Water District, 2013 Integrated Water Supply Plan, Figure 4.28.

Historic Withdrawals for the Region Shown with WMA Authorized Withdrawals



Next Workshop

Workshop Process



Upcoming Schedule

WHEN	DETAILS
Monday, May 20th 9:00 am – 12:00 pm	Workshop 3
Tuesday, June 25th 9:00 am – 12:00 pm	Workshop 4
Wednesday July 31st 9:00 am – 12:00 pm	Workshop 5
Tuesday, August 27th 9:00 am – 12:00 pm	Workshop 6
Tuesday, September 24th 9:00 am – 12:00 pm	Workshop 7
Tuesday, October 29th 9:00 am – 12:00 pm	Meeting 3
Monday, November 18th 8:00 am – 12:00 pm	Meeting 4
Tuesday, December 10th 8:00 am – 12:00 pm	Meeting 5

Feedback Survey

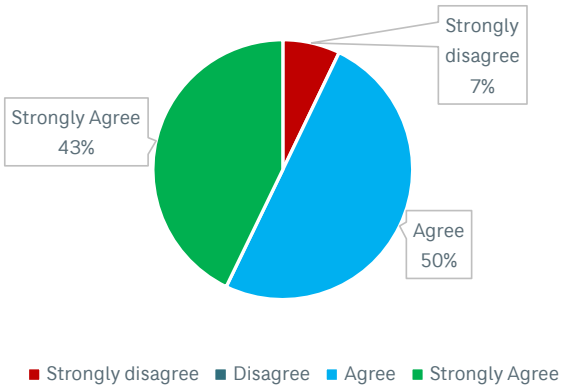
Last Meeting: Feedback Survey Results

1. Please tick one box per row.
The meeting had a clear agenda.
Facilitation of today's meeting was effective.
I had plenty of opportunity to participate in the discussion today.
Interactions were positive and respectful.
I understand where we are in the process and where we are going.

Strongly disagree	Disagree	Agree	Strongly agree

Last Meeting: Feedback Survey Results

The meeting had a clear agenda.



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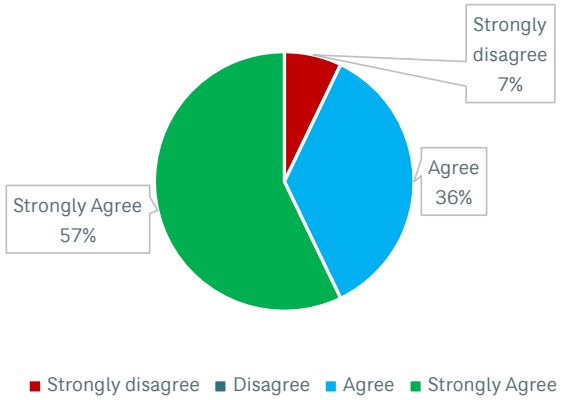

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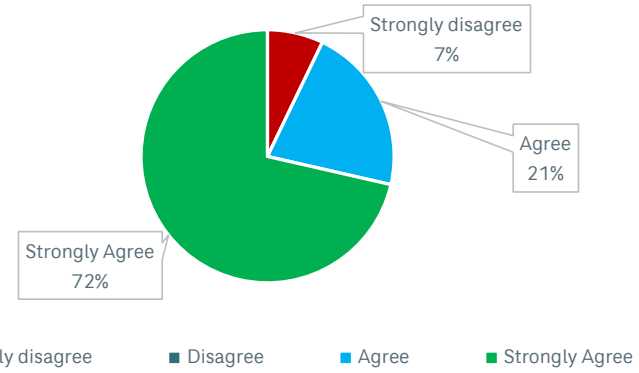

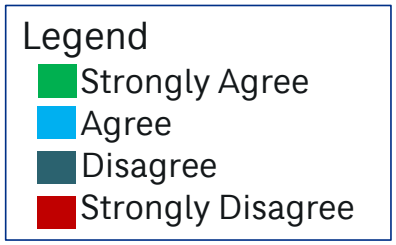

Last Meeting: Feedback Survey Results