NORTH SHORE WATER RESILIENCE TASK FORCE

PRESENTATION – KEY FINDINGS/CONCLUSIONS

Assessment of the Water Security and Resilience Needs and Opportunities in the Ipswich River Watershed

Date: 10/29/24

Dewberry

NORTH SHORE WATER RESILIENCE TASK FORCE

AGENDA

Study Overview

PWS Community Future Water Supply Needs

Regional Water Supply Solutions

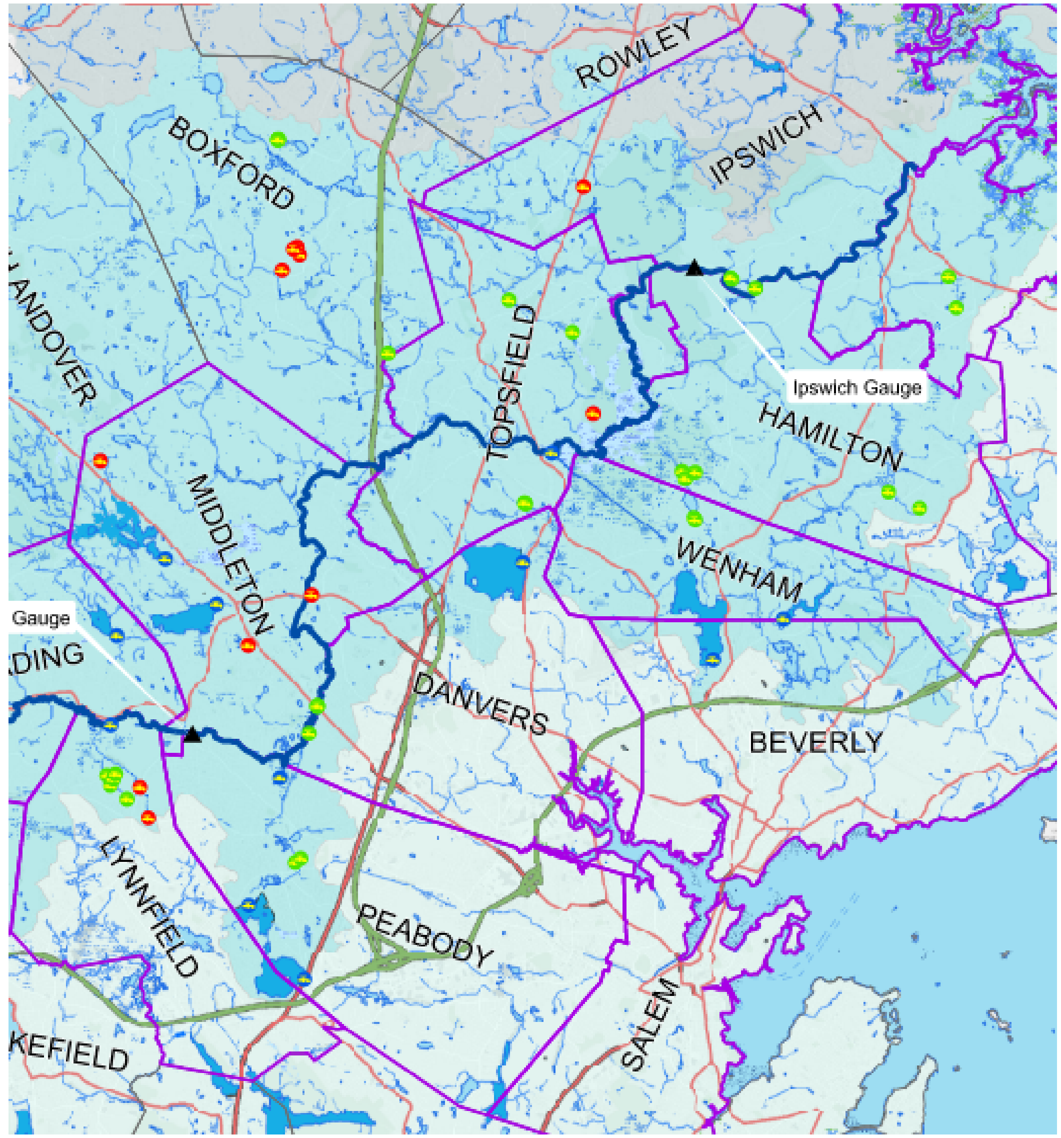
Key Findings/Next Steps

Q&A

Study Overview

- Administered on behalf of Senator Tarr’s North Shore Water Resilience Task Force (NSWRTF)
- Public Water Supply (PWS) communities/agencies included:
  - ❖ Hamilton, Wenham, Ipswich, Topsfield, Salem, Beverly
  - ❖ Danvers, Middleton, Lynnfield Center Water District (LCWD)
  - ❖ Peabody, Salem & Beverly Water Supply Board (SBWSB)

Study Area


ROWLEY
IPSWICH
BOXFORD
ANDOVER
TOPSFIELD
Ipswich Gauge
HAMILTON
MIDDLETON
WENHAM
Gauge
DING
DANVERS
BEVERLY
LYNNFIELD
PEABODY
SALEM
KEFIELD

Study Overview

- Study Goal
  - To evaluate and advance long-term solutions to improve water supply resilience and ecosystem health in the Ipswich River Watershed
- Study Scope
  - Included 7 separate tasks/deliverables
  - Final report to provide executive summary of the task findings with recommendations for future water supply considerations

PWS Community Future Water Supply Needs

- Combined PWS Future Supply Needs:
  - Groundwater Based Systems: 2.48 MGD (ADD) & 4.43 MGD (MDD)
  - Surface Water Systems: 16.62 (ADD) & 27.83 MGD (MDD)
  - Total Future Supply Needs: 19.10 MGD (ADD) & 32.26 MGD (MDD)

Regional Water Supply Solutions

- Having SBWSB supplying study PWS communities on a regional basis;
- Constructing a new reservoir in Topsfield to assist study PWS communities to meet future drinking water needs;
- Extending the MWRA's water system into the region to provide an out-of-basin source for PWS communities to meet the future drinking water needs;
- Sharing available surplus supply among study PWS communities based on WMA allocations to supplement supply deficits and shortages on a mutual aid basis.

SBWSB AS REGIONAL SUPPLIER

- Existing supply system includes one treatment plant & 3 reservoirs w/ diversion from Ipswich River
- Has WMA registered withdrawal of 10.17 MGD w/ permitted withdrawal of 2.27 MGD totaling 12.44 MGD
- Plant operations currently limited to a maximum production capacity of 16 MGD
- SBWSB has no additional capacity to currently supply PWS Communities except for Salem & Beverly

SBWSB AS REGIONAL SUPPLIER

- SBWSB will begin preparing a Master Plan in 2025 which will evaluate the need to upgrade its plant capacity back to its original 24 MGD.
- W/ 24 MGD plant capacity, SBWSB could supply Hamilton, Wenham, Topsfield, Ipswich (partial) along w/ Salem and Beverly (Total MDD of 19.03 MGD)
- SBWSB could possibly supply an additional 2.0 MGD to Danvers-Middleton (Total MDD of 21.03 MGD) but will leave minimal surplus plant capacity

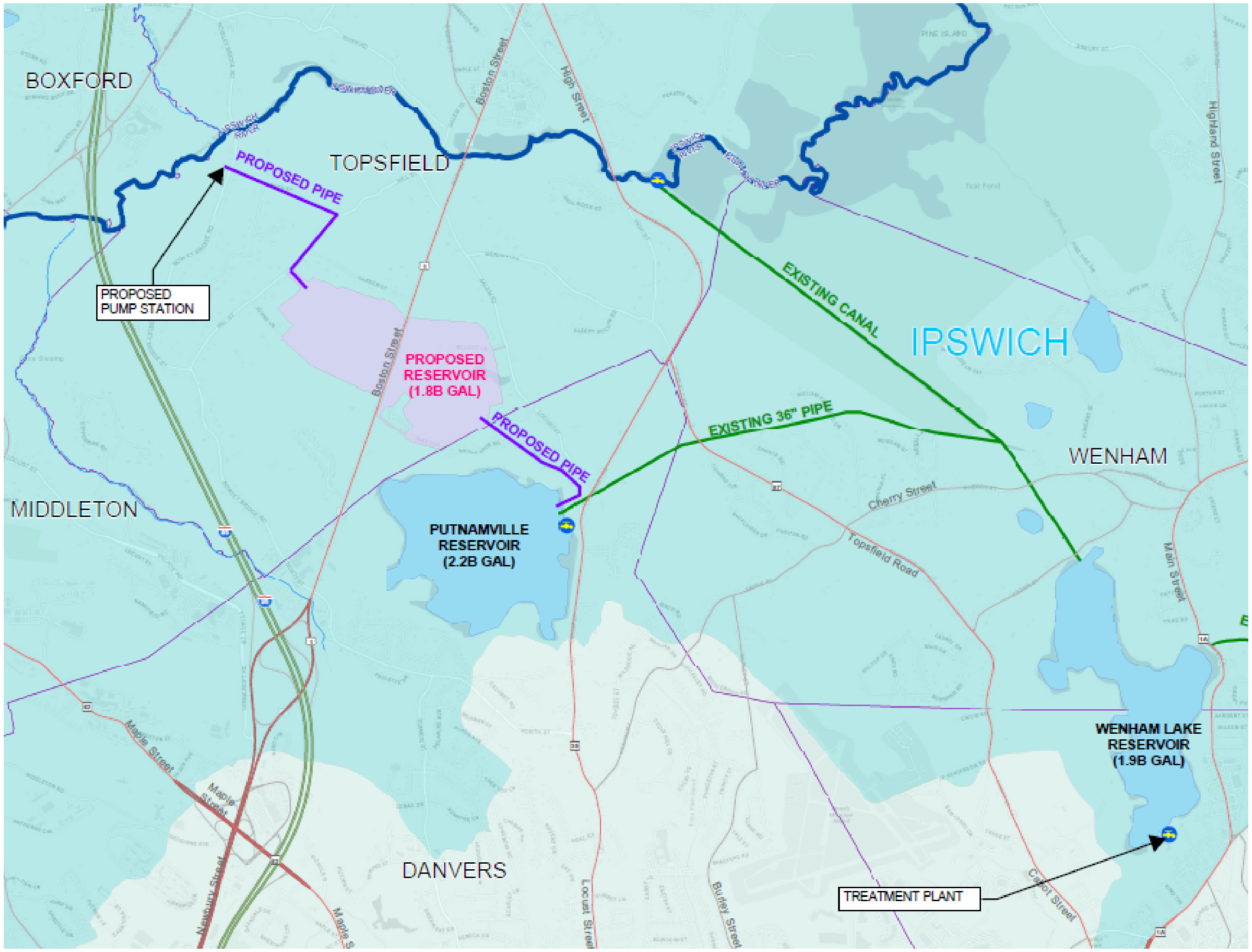
SBWSB AS REGIONAL SUPPLIER

- Supplying Danvers-Middleton will result in SBWSB exceeding its 12.44 MGD WMA authorized withdrawals
- SBWSB's existing Charter allows them to sell water to Wenham, Hamilton & Danvers-Middleton along w/ Salem and Beverly.
- New legislation would be needed to allow SBWSB to supply Ipswich and Topsfield.

NEW RESERVOIR IN TOPSFIELD

- Conceptual design includes:
  - ❖ raw water pump station (PS)
  - ❖ transmission main from PS to reservoir
  - ❖ 1.8 BG reservoir (drainage area of 0.6 square miles)
  - ❖ 2,500' of transmission main from reservoir to SBWSB's Putnamville reservoir
  - ❖ Raising 1,400' of Rte. 1 roadway by 35'
- Updated conceptual cost estimate = $378M

New Reservoir Location



NEW RESERVOIR IN TOPSFIELD

- Initial assessment suggests Ipswich River can sustain new reservoir based on historical streamflow (December to May)
- More comprehensive study needed to confirm other Basin withdrawals not impacted by new reservoir
- Having new reservoir included as part of SBWSB's supply system for treatment & delivery to PWS communities on regional basis is the best approach
- PWS communities would need to construct new pipelines, pump stations & filtration facilities to use new reservoir

SHARING SURPLUS SUPPLY ON MUTUAL AID BASIS

- Evaluated available supply surplus w/in WMA allocations for the following PWS communities:
  - ❖ Hamilton, Wenham, Topsfield, Ipswich, Peabody, Danvers-Middleton & the LCWD
- Summary of Future Supply Surplus/Deficit (shown in Table 1.5)
- Minimal surplus available to share under future system demands
  - ❖ Peabody has some surplus due to MWRA connection
- Possibly share supplemental supply during lower demand periods (October to April)

SHARING SURPLUS SUPPLY ON MUTUAL AID BASIS

- Review of Blending Finish Water Quality:
  - ❖ Hamilton, Ipswich, Topsfield, Wenham, and Danvers-Middleton are compatible w/ respect to disinfection (chlorination), corrosion control (phosphate) & pH
  - ❖ Peabody & the LCWD use pH adjustment only for corrosion control
  - ❖ Peabody uses chloramination for disinfection
  - ❖ Need to further review impacts from blending Peabody & LCWD finish water w/ other PWS communities
  - ❖ Only possible concern with blending/sharing supplies is PFAS
  - ❖ Need to review further w/ MassDEP

SHARING SURPLUS SUPPLY ON MUTUAL AID BASIS

- Permitting Considerations for Sharing Supply:
  - ❖ Hamilton, Wenham, Danvers-Middleton & Topsfield w/in Ipswich; sharing supply governed by WMA requirements
  - ❖ Peabody, LCWD & Ipswich w/in Parker, North Coastal & Ipswich; sharing supply would require IBTA permit
  - ❖ Sharing supply between in-basin systems limited to existing WMA allocations
  - ❖ Systems sharing supply can exceed its WMA withdrawals only if receiving systems reduce WMA withdrawals by the same amount.

SHARING SURPLUS SUPPLY ON MUTUAL AID BASIS

- Needed Infrastructure Upgrades:
  - ❖ Total estimated conceptual cost = $9,450,000 (see Table 1.6)
  - ❖ Additional upgrades may be needed based on future supply rates and localized system hydraulics
  - ❖ The new interconnection between Topsfield & Hamilton may not be needed if SBWSB becomes regional supplier, further analyses to be done

SHARING SURPLUS SUPPLY ON MUTUAL AID BASIS

Table 1.6: Summary of Estimated System Interconnection Upgrade Costs

ITEM	COST
Hamilton Interconnection w/ Wenham including new revenue meter vault and related appurtenances	$480,000
Hamilton Interconnection w/ Ipswich including new revenue meter vault & related appurtenances	$480,000
Peabody Interconnection w/ Danvers including new revenue meter vault, PRV & related appurtenances (2)	$1,300,000
Peabody Interconnection w/ LCWD including new revenue meter vault, PRV & related appurtenances	$480,000
Danvers-Middleton Interconnection w/ Topsfield including new 350 gpm booster station w/ PRV bypass, revenue meter & related appurtenances	$1,425,000
Hamilton Interconnection w/ Topsfield including 6,500 feet of new 8" DI main, 350 gpm booster station w/ PRV bypass, revenue meter & related appurtenances	**$5,285,000**
Total – Estimated System Interconnection Upgrades	**$9,450,000**

MWRA EXPANSION INTO THE BASIN

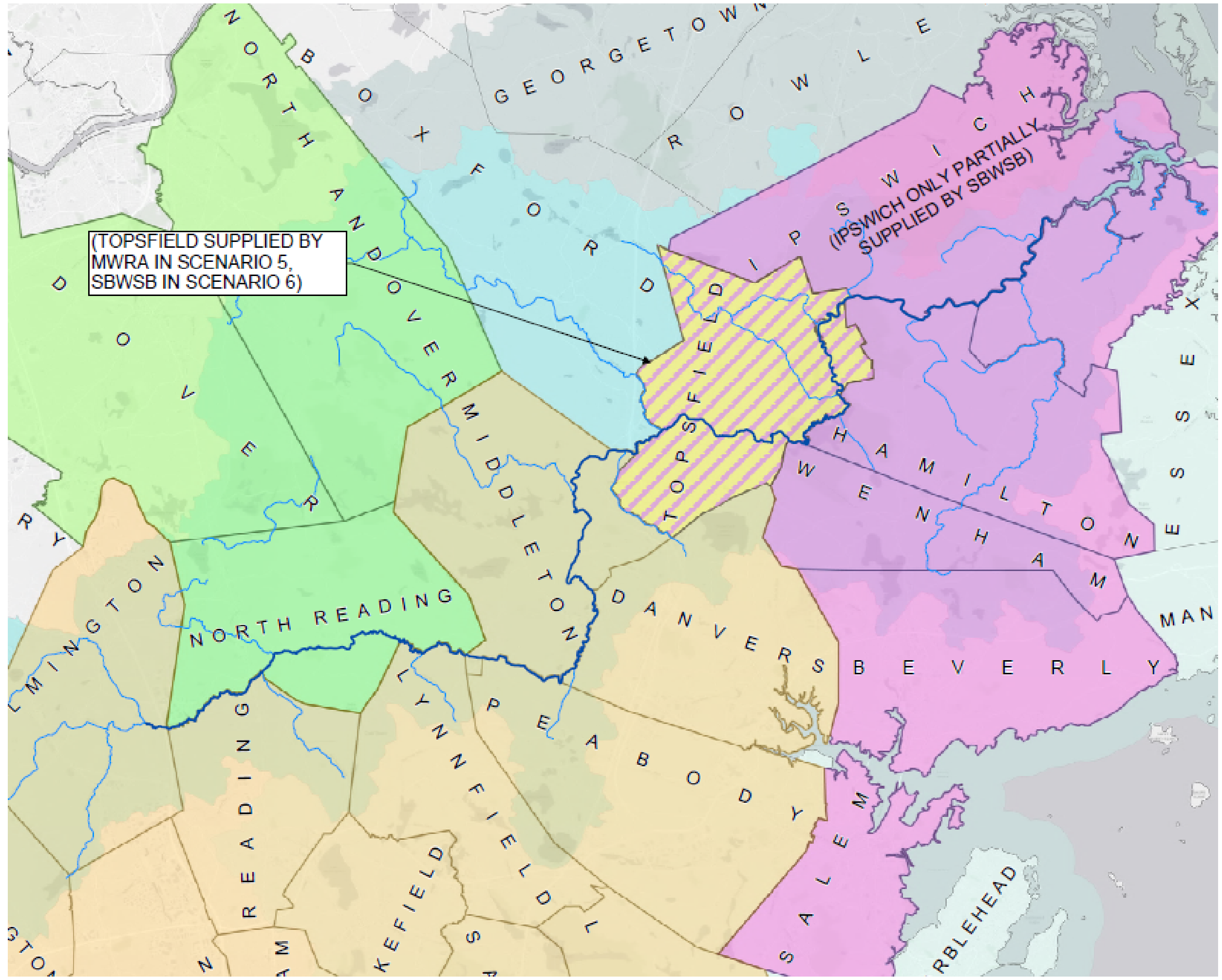
- MWRA study developed 3 conceptual supply alternatives:
  - ❖ No. 1 – supply 42.1 MGD for Beverly, Salem, Peabody, Danvers, Middleton, Hamilton, Ipswich, Topsfield, Wenham, Lynn, the LCWD & Wilmington; $1.210 billion; 20-to-25-years
  - ❖ No. 2 -supply 12.5 MGD for Danvers, Middleton, Hamilton, Ipswich, Topsfield, Wenham, LCWD and Wilmington; $410 million; 10-to-15-years
  - ❖ No. 3 - supply current MDD of 13.5 MGD for Peabody, LCWD and Wilmington with partially supplying Salem (up to 5.3 MGD); $130 million; 5-to-7-years

MWRA EXPANSION INTO THE BASIN

- Dewberry suggested 3 hybrid supply scenarios w/ MWRA & SBWSB as partial regional suppliers including Nos. 4, 5 & 6
- Based on upon further review, the following hybrid supply scenarios were recommended for consideration:
  - ❖ Hybrid 5 – SBWSB supplying Beverly, Salem, Hamilton, Wenham & Ipswich (total of 18.13 MGD) w/ MWRA supplying Wilmington, Peabody, the LCWD, Topsfield, & Danvers-Middleton (total of 14.7 MGD)
  - ❖ Hybrid 6 – SBWSB supplying Beverly, Salem, Hamilton, Wenham, Topsfield & Ipswich (total of 19.03 MGD) w/ MWRA supplying Wilmington, Peabody, the LCWD & Danvers-Middleton (total of 13.9 MGD)

Hybrid Supply Scenarios Nos. 5 & 6

- Have greater reductions in Basin withdrawals
- Takes advantage of ex. interconnections
- Less timely & costly to implement
- See Table 7.1 for estimated cost



- Cost comparable to MWRA Alt. No. 3 OPPC of $410M
- Estimated costs for MWRA portion based on costs presented in MWRA study
- Need to be reviewed w/ MWRA
- Cost for Hybrid Supply Scenario 6 similar

Table 7.1: Estimated Conceptual Cost – Hybrid Supply Scenario Five

ITEM	COST[1]
SBWSB as Partial Regional Supplier w/ Beverly, Salem, Hamilton, Wenham, Ipswich	
Expansion of SBWSB Plant to 24 MGD, new Finish Water Underground Storage & appurtenances	$50,000,000
New Hamilton-SBWSB Pipeline (12,900' DI main, 1.5 MGD booster station, meter & appurtenances)	$8,000,000
New Hamilton Interconnection w/ Wenham incl. meter & appurtenances	$500,000
New Hamilton Interconnection w/ Ipswich incl. meter & appurtenances	$500,000
Miscellaneous Water Main Improvements to existing PWS community systems (20,000' @ $450/ft)	$9,000,000
Subtotal – System Infrastructure Costs w/ SBWSB as Partial Regional Supplier	**$68,000,000**
MWRA as Partial Regional Supplier w/ Peabody, LCWD, Wilmington, Danvers-Middleton, Topsfield	
Expansion of MWRA system into noted PWS Communities	$275,000,000[3]
New Peabody Interconnections w/ Danvers-Middleton (2) incl. meter & appurtenances	$1,300,000
New Peabody Interconnection w/ the LCWD incl. meter & appurtenances	$500,000
New Danvers-Middleton Interconnection w/ Topsfield incl. 350 gpm booster station, meter & appurtenances	$1,500,000
Miscellaneous Water Main Improvements to existing PWS community systems (20,000' @ $450/ft)	$9,000,000
Subtotal – System Infrastructure Costs w/ MWRA as Partial Regional Supplier	**$287,300,000**
Subtotal – Hybrid Supply Scenario Five	**$355,300,000**
Inflation Adjustment (15%)	$53,300,000
Total – Hybrid Supply Scenario Five	**$408,600,000**

MWRA EXPANSION INTO THE BASIN

- Committee suggested a third hybrid supply scenario for further review w/ MWRA & SBWSB as partial regional suppliers as follows:
  - Hybrid 7 – SBWSB supplying Beverly, Hamilton, Wenham, Topsfield, Ipswich and Danvers-Middleton (total of 12.25 MGD) w/ MWRA supplying Salem, Wilmington, Peabody, and the LCWD (total of 15.4 MGD)
- This hybrid scenario has highest reduction in Basin withdrawals and out-of-basin exports
- It will increase surplus production capacity at SBWSB's restored plant and may be less costly overall to implement, needs to be confirmed and reviewed with the MWRA

MWRA EXPANSION INTO THE BASIN

- Review of Blending Finish Water Quality:
  - ❖ MWRA uses chloramination for disinfection w/adding alkalinity & maintaining high pH for corrosion control
  - ❖ MWRA only compatible w/ Peabody, other PWS communities to be supplied by MWRA will have short-term water quality issues
  - ❖ SBWSB is compatible with Hamilton, Topsfield, Wenham, Ipswich and Danvers-Middleton
  - ❖ See Table 5.1

MWRA EXPANSION INTO THE BASIN

- Measures to address blending incompatible finish water:
  - ❖ chemical treatment of incoming MWRA supply to be more compatible;
  - ❖ perform aggressive system flushing & monitoring to minimize blending zones during the transition between the PWS (chlorinated) and MWRA (chloraminated) supplies;
  - ❖ create separate service zones within the distribution system to physically isolate MWRA-supplied (chloraminated) and PWS-supplied (chlorinated) areas;
  - ❖ implement treatment/operational changes to be more compatible with the MWRA supply

KEY FINDINGS/NEXT STEPS

- MWRA Conceptual Alt. Nos. 2 & 3 could be favorable approaches & should be included for further assessment
- Hybrid Supply Scenario Nos. 5, 6 & 7 could also be favorable approaches & should be included for further assessment
- Hybrid scenarios have greater reductions in Basin withdrawals, likely shorter timelines, & fewer water quality impacts
- MWRA & Hybrid Supply Scenarios may likely eliminate need for new Topsfield reservoir; additional analyses needed to confirm
- Short-term water quality issues would be created from having MWRA supply non-compatible PWS communities

KEY FINDINGS/NEXT STEPS

- Both MWRA & hybrid supply scenarios will not be implemented for PWS communities to achieve compliance with new PFAS Rule (5-year timeline)
- NSWRTF to expedite next study phase so a long-term supply solution can be presented to the PWS communities for planning their treatment strategies for compliance w/ the new PFAS Rule appropriately.
- Having SBWSB as a regional supplier under any of the MWRA or hybrid supply scenarios is contingent on having its existing plant restored back to its original 24 MGD capacity
- Additional analyses/modeling needed to determine the benefit of the new Topsfield reservoir to Basin streamflow before eliminating it as a possible solution

KEY FINDINGS/NEXT STEPS

- A comprehensive firm yield analysis of the SBWSB's existing reservoir system should be completed to determine if they have sufficient capacity for SBWSB to be a regional supplier
- Existing interconnections between PWS communities to be upgraded as recommended to wheel MWRA and/or SBWSB supply between PWS communities as needed.
- Additional analyses needed to confirm other infrastructure upgrades to address hydraulic limitations at the interconnections and within the individual distribution systems for those PWS communities to be supplied by the MWRA or the SBWSB

Questions/Answers