



INTEGRATED WATER RESOURCE PLAN

City Council Workshop -
DRAFT

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Agenda

1. Purpose of the IWRP
2. Future Supply Gaps
3. Supply Options Considered
4. Supply Evaluation
5. Recommendations



Purpose of the IWRP

Project Objective

Help the City of Waco achieve long-term water supply reliability under future demand growth and uncertain hydrology



Evaluate the volume and timing of additional supply needs



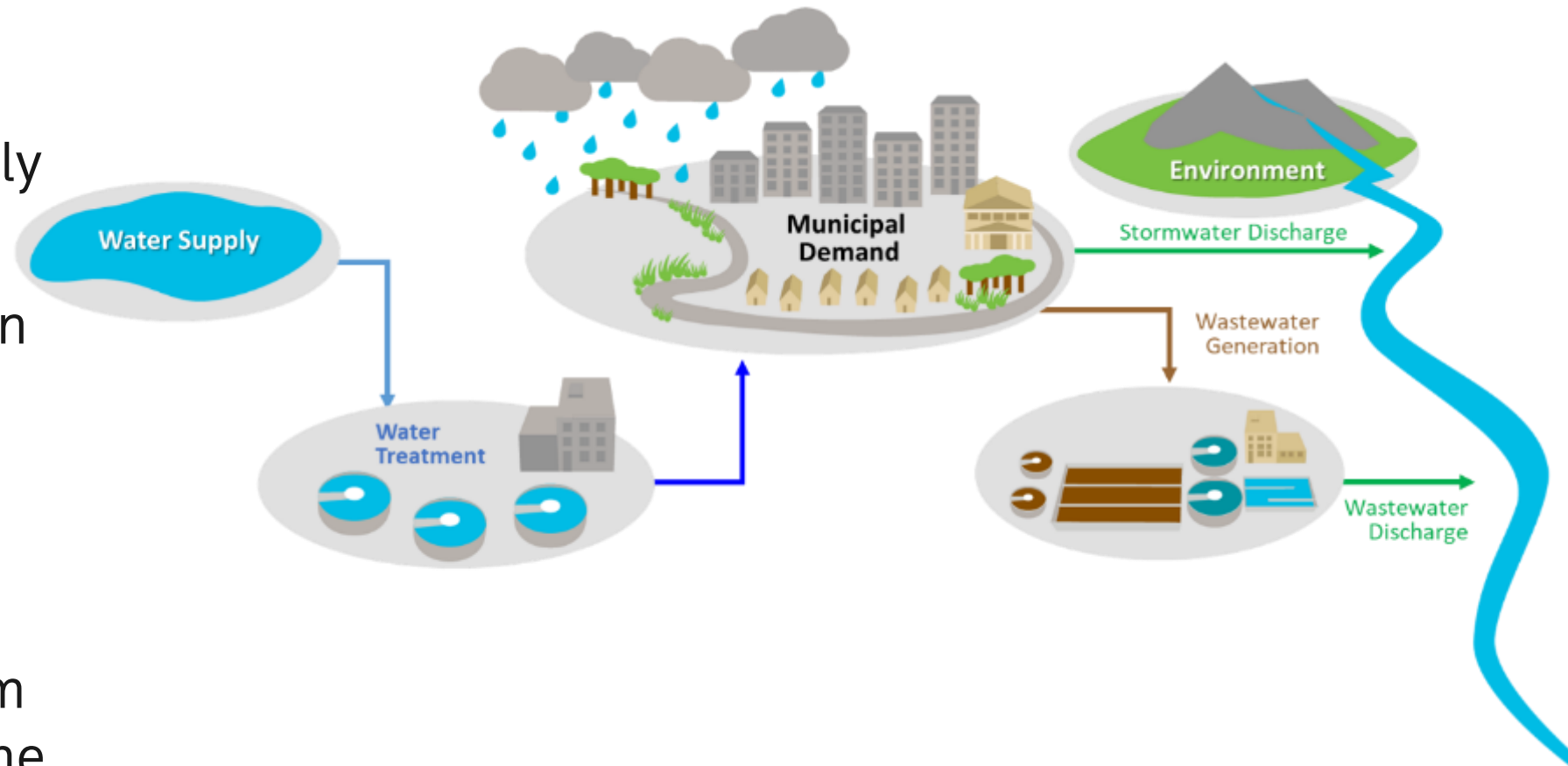
Identify and evaluate available additional supply options



Maintain consistency with ongoing water and wastewater master plans

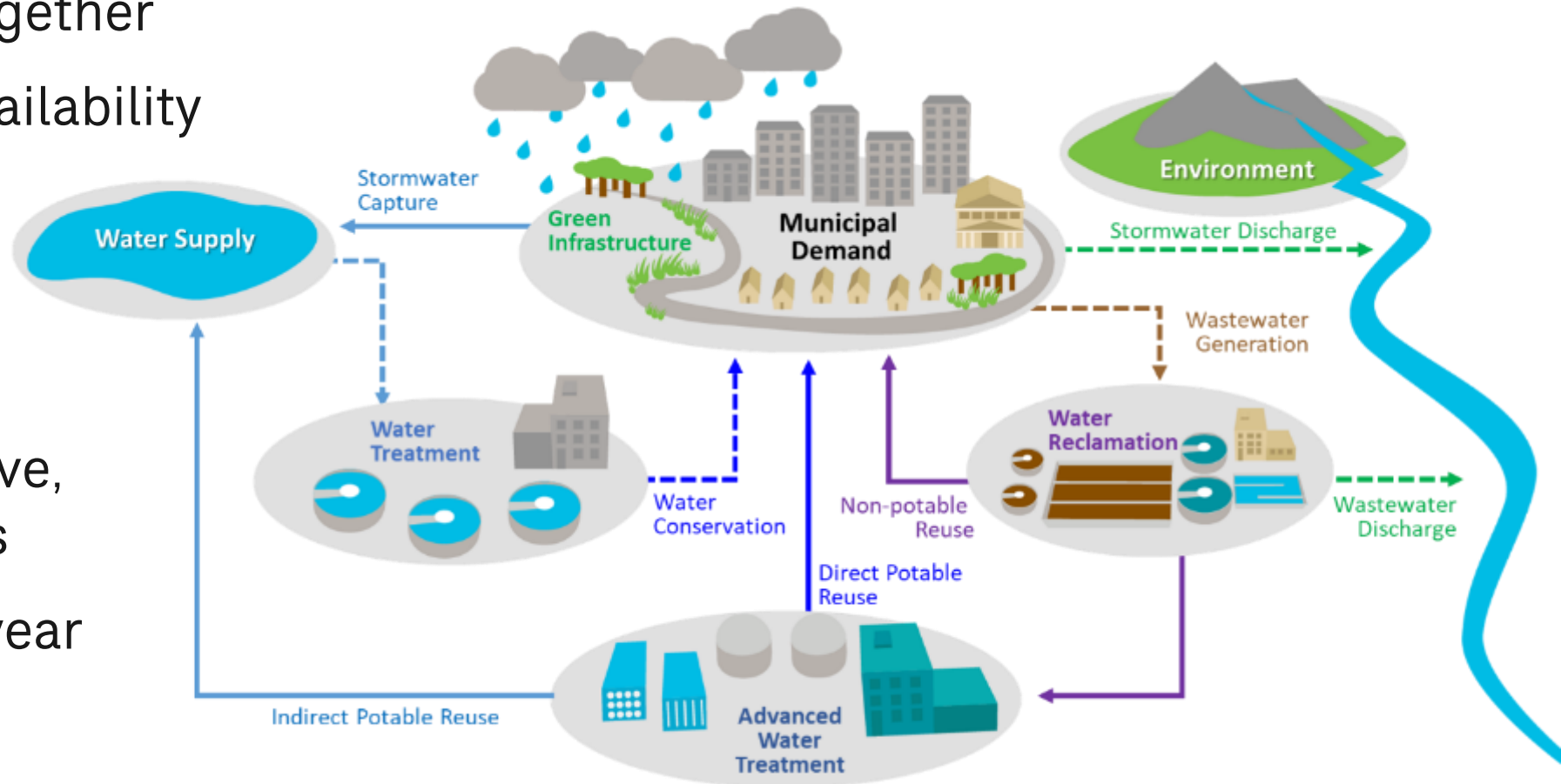
Water and Wastewater Master Planning (in Progress)

- Discrete approach, with each system (water, wastewater, reuse) planned independently
- Focuses mainly on distribution, collection system facility sizing (e.g., pump station capacity)
- Develops capital improvement program over 20-year timeframe



Integrated Water Resource Planning

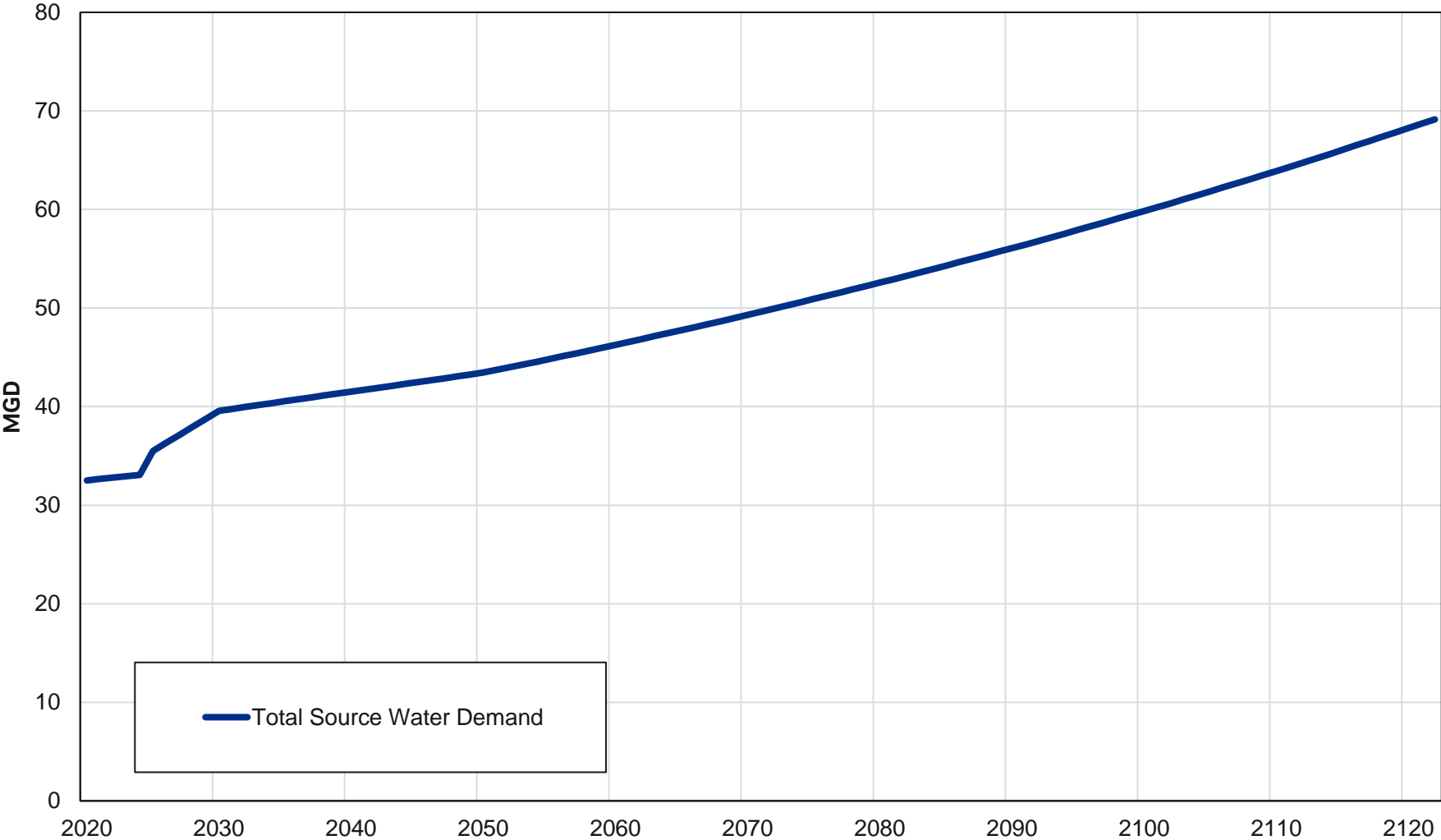
- Integrated approach, with water, wastewater, and reuse planned together
- Focuses on supply availability and risks, future treatment and water supply conveyance needs
- Identifies cost-effective, multi-benefit projects
- Considers up to 100-year timeframe





Future Supply Gaps

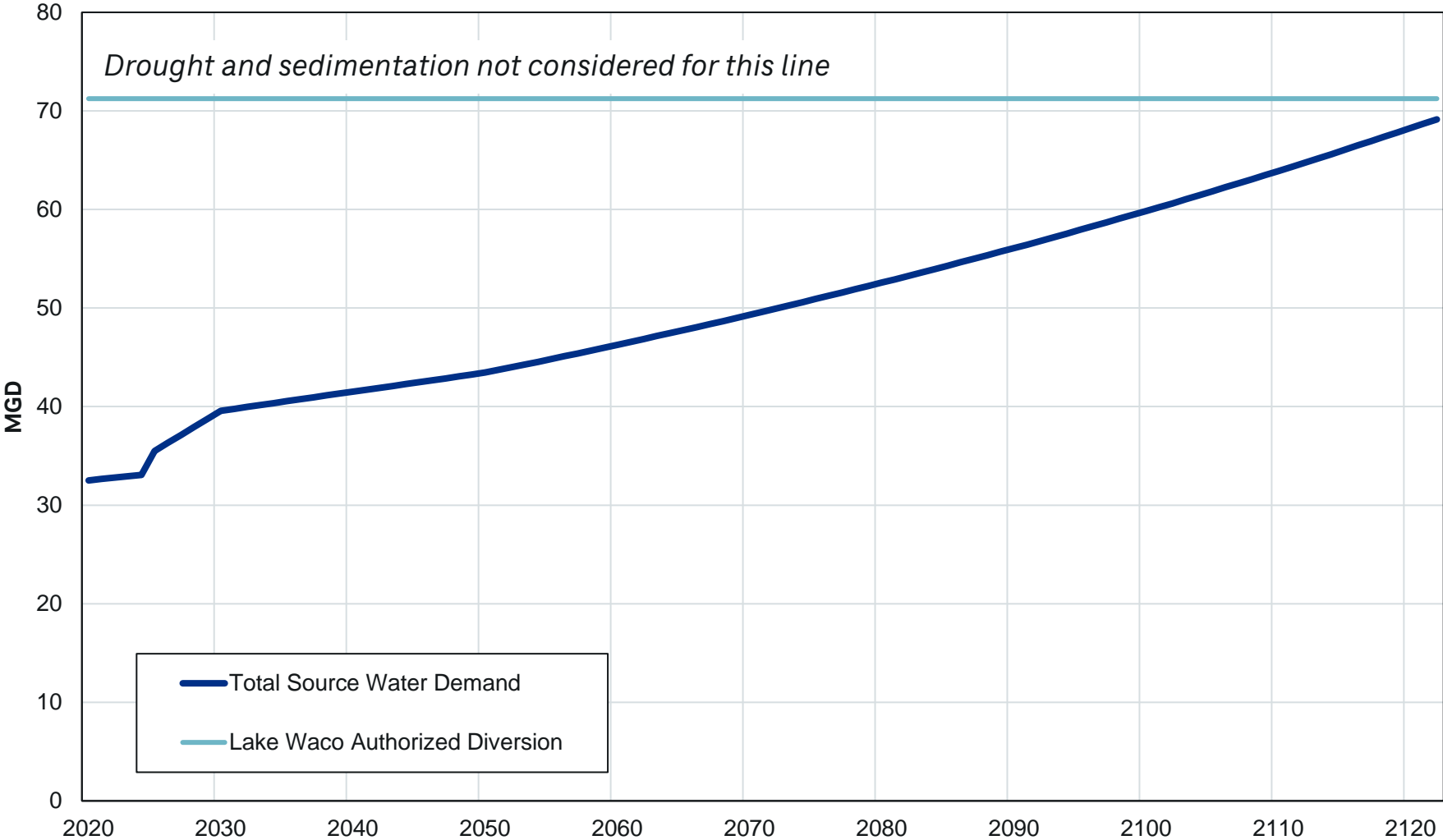
Demand Projection



Water demand projections include:

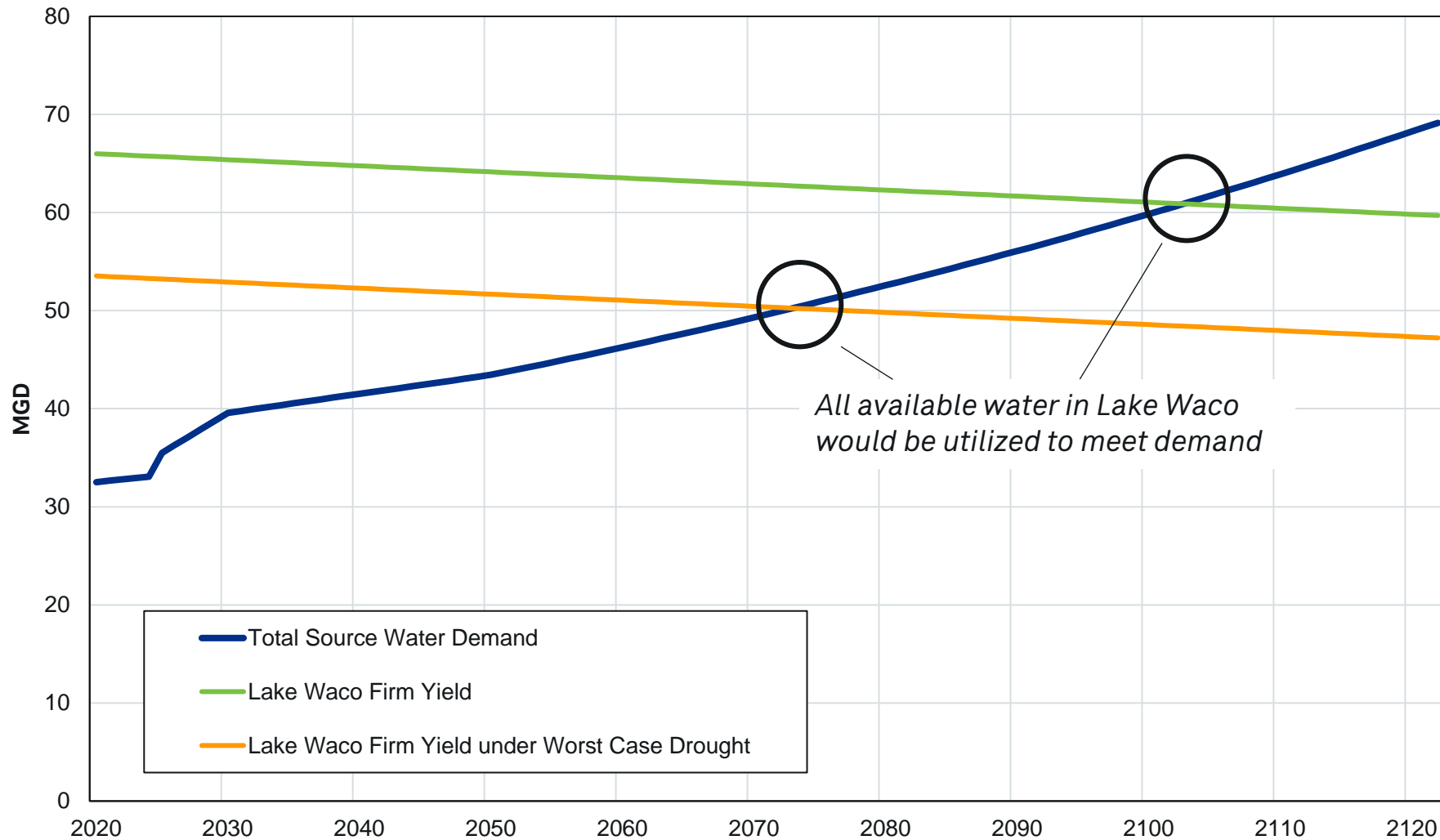
- Residential and commercial
- Industrial
- Wholesale customers (at full contract value)
- Non-revenue water
- Pre-treated and raw water users
- Production losses

Non-Drought authorized Diversion covers 100-year Demand



During non-drought years Lake Waco has enough permitted supply to meet demand over the 100-year planning horizon

Severe Drought utilizes all Lake Waco Supply



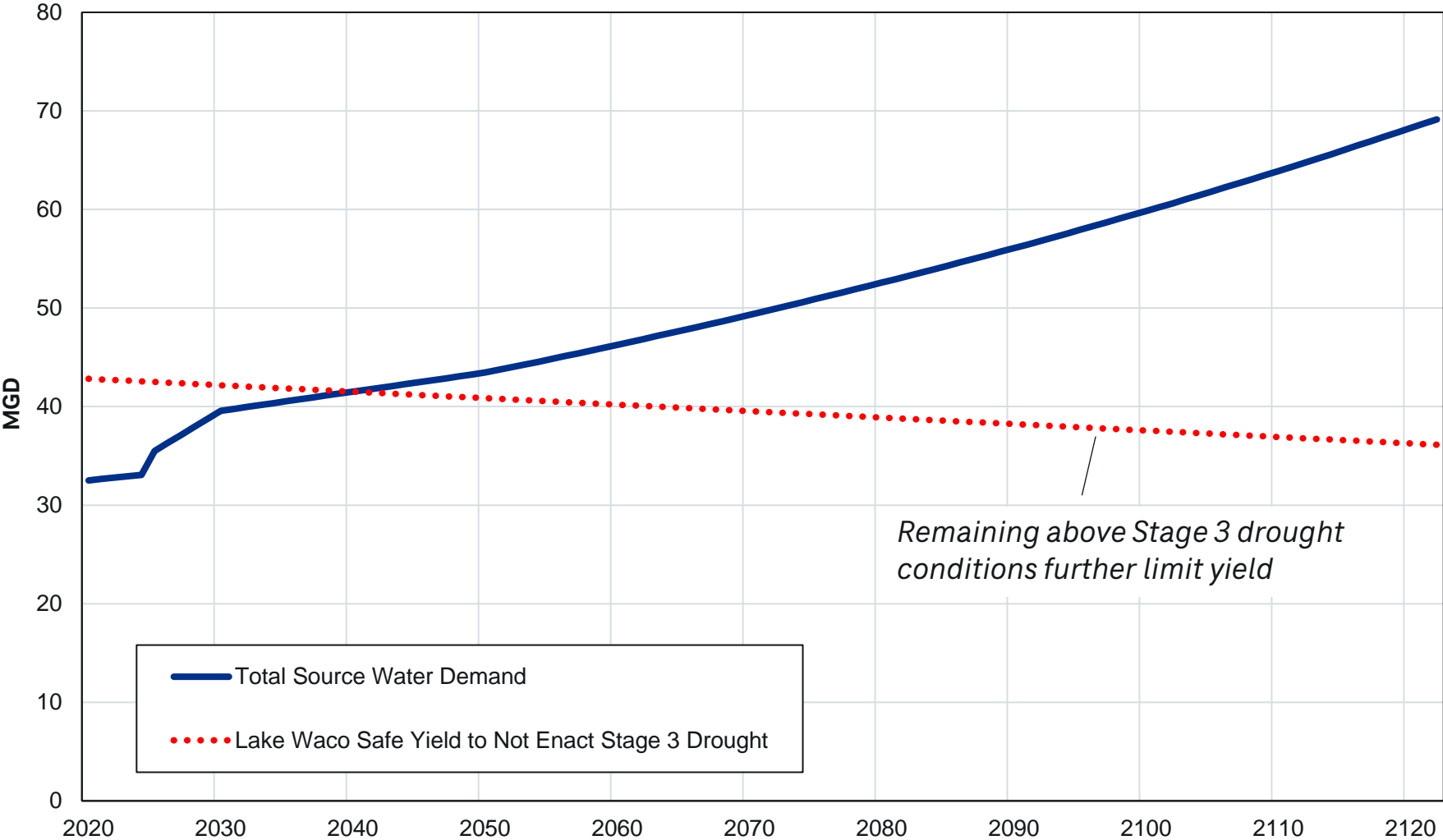
During droughts, the available supply (firm yield) of Lake Waco is reduced.

Sedimentation also decreases available yield into the future

Based on historical droughts (through 2018) there is sufficient supply through 2100 (green line)

Future more severe droughts show sufficient supply through 2070 (orange line)

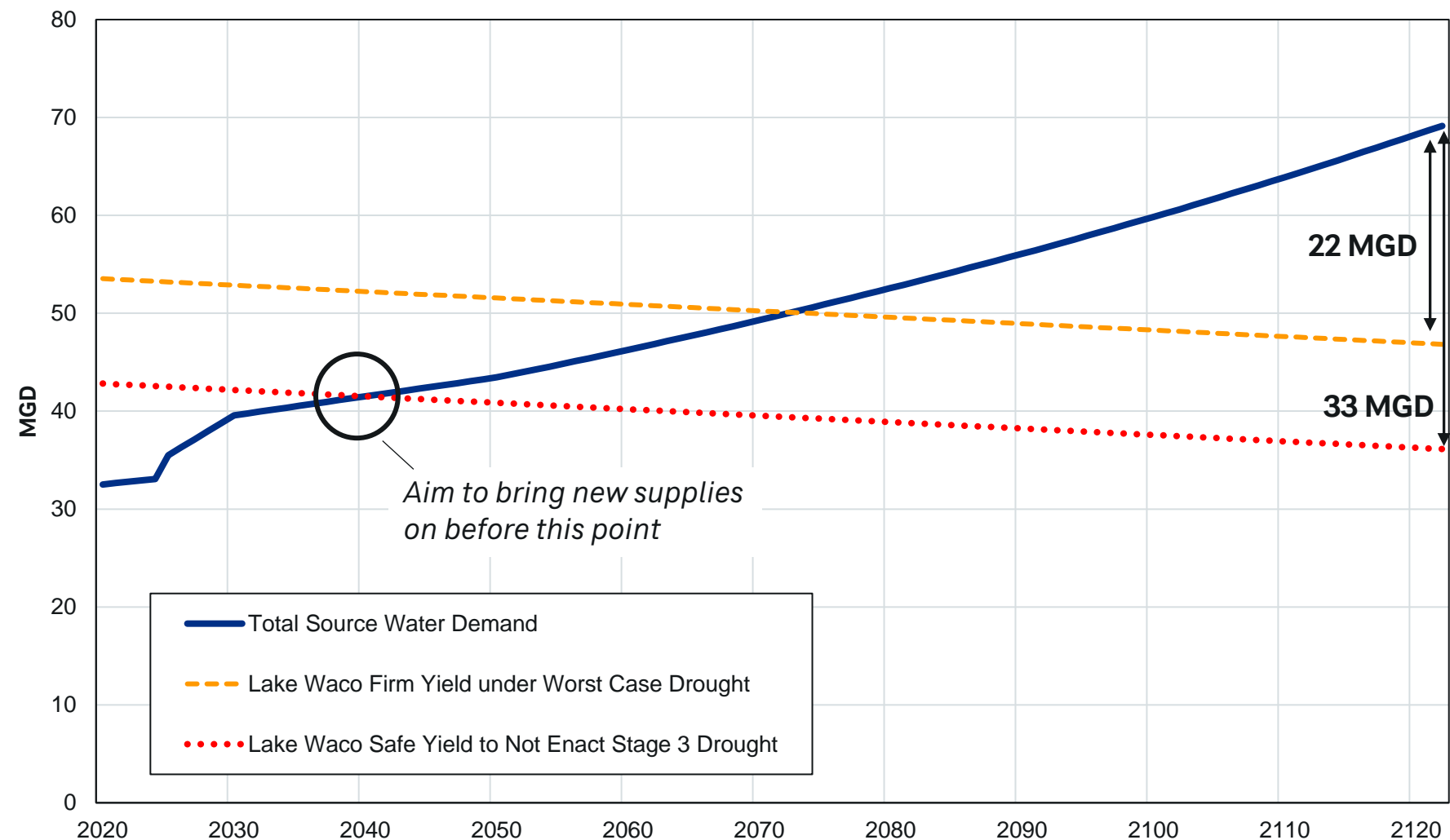
Remaining above Stage 3 Drought further limits Yield



Using less supply from Lake Waco during drought years would allow water levels to remain above Stage 3 drought conditions (elevation 449 feet).

The City has recently approached Stage 3 drought conditions.

Policy Decisions for Supply Planning Considerations



The IWRP uses these two supply lines to determine the size and timing for future water supplies

There is 22-33 MGD of additional supply or demand reduction needed by the end of the planning period.

Additional supplies are needed in 2030 to mitigate reaching Stage 3 drought conditions.

Planning Assumptions

- Assume firm yield of Lake Waco under worst-case drought
 - Over the 100-year planning horizon, droughts worse than experienced over the modeled period (1940-2018) potentially could occur
- In the near-term, move up supply investments to avoid Stage 3 drought conditions
 - Avoid supply insecurity
 - Less impact to customers
 - Less impact to recreational users of the reservoir
- Timing of later supply investments can be reevaluated based on demand growth



Image: Greater Waco Chamber of Commerce



Supply Options



Supply Option Screening

New Supplies Fully Evaluated

- Utilization of existing Brazos River Rights*
- Indirect potable reuse via Lake Brazos*
- Indirect potable reuse via a BRA water swap*
- Purchase of additional BRA Water*
- Conservation
- Non-Potable Reuse

**Options evaluated with and w/o additional treatment*

Supply Options Screened from Consideration

- Raise Lake Waco conservation pool
 - Cost and permitting difficulty
- Lake Brazos Flood Flows
 - Limited yield and water quality impacts
- Aquifer Storage and Recovery
 - Aquifer suitability and control of supply

Additional Options for Future Consideration

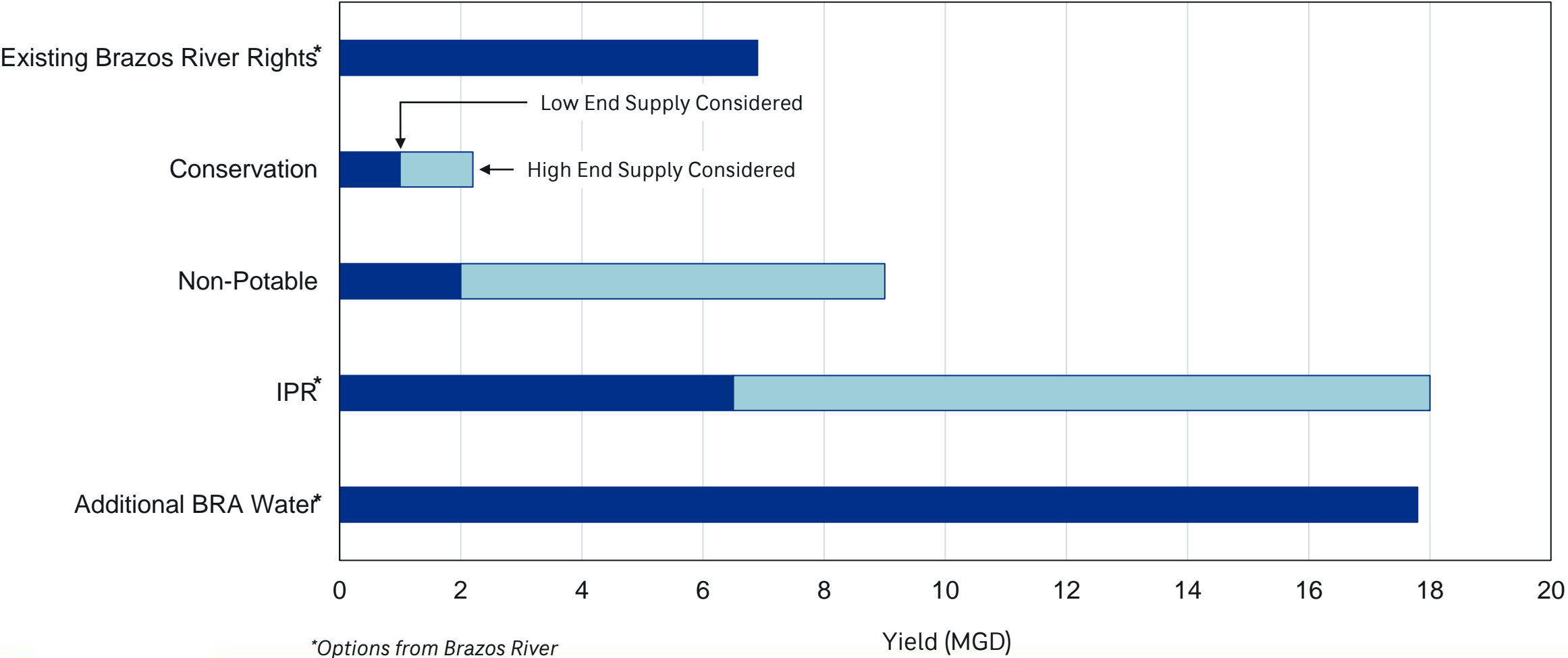
- Direct potable reuse
- Sedimentation control

Raising Lake Waco Considerations

- During the previous reallocation, USACE had the discretionary authority to approve reallocation (flood storage to water supply storage) changes no greater than 15% of the total storage capacity or 50,000 AF whichever is less.
 - Future reallocation would exceed that threshold likely requiring federal authorization through congress
- Additional challenges
 - Raising the conservation pool would require raising the dam to maintain flood control
 - Multiple required studies and unknown dam improvements likely to cost >\$500 million
 - Minimal additional firm yield compared with other available supply options

Supply Option Yields

No single option provides the full 22 MGD of additional needed supply so analyzed in different combinations.



The need for additional treatment

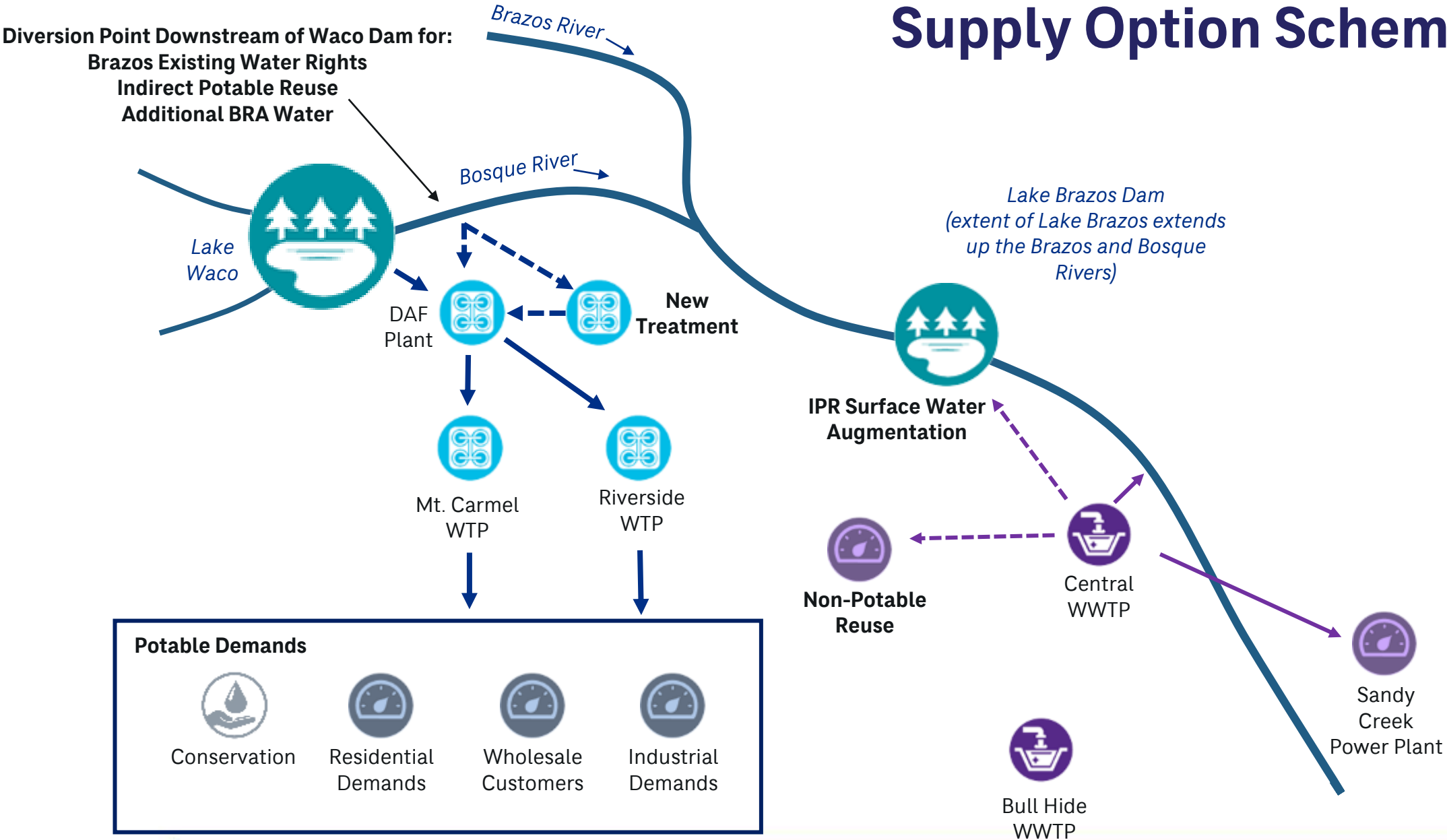
- Lake Brazos water is saltier than Lake Waco which could impact customer experience

	Total Dissolved Solids 5-Year Avg (mg/L)
Lake Brazos	603
Lake Waco	210
EPA Secondary Standard	<500
TCEQ Secondary Standard	<1,000

- Treatment for PFAS is expected to be needed to utilize Lake Brazos water
- Treatment options considered
 - Granular Activated Carbon (GAC)
 - High pressure membranes: nanofiltration and reverse osmosis (NF/RO)

	PFOA (ppt)	PFOS (ppt)
EPA Proposed MCL	<4	<4
Waco Finished Drinking Water	Non-detect (<1.9)	Non-detect (<1.9)
N. Bosque River below Gates	18.4	2.22
Brazos River @ Riverside	34.2	2.85
Central WWTP Effluent	55.8	11.7
Bullhide WWTP Effluent	42.8	2.97

Supply Option Schematic





Supply Evaluation

Five Priorities for Evaluating Future Supply



Increase System Reliability

Avoid supply shortages and remain above projected Stage 3 drought levels

30%



Provide Cost-Effective Solutions

Consider impact to rate payers via total capital cost investment required and unit cost of supplies

30%



Protect Drinking Water Quality

Address emerging contaminants of concern and taste impacts of new supplies

20%



Maximize Implementation

Consider stakeholder acceptance, permitting ease and operational requirements

10%



Use of Sustainable Supplies

Conserve and reuse water where possible before looking to new supplies

10%

Indirect Potable Reuse (IPR)

Advantages

- IPR can be a significant source of new supply and the availability of the supply grows as the City grows
- IPR increases the supply for the entire community (potable and non-potable)
- The potential for a water swap with BRA would make IPR more cost-effective
- The intake and treatment needed for IPR is similar for other supply options coming from Lake Brazos allowing efficiencies of scale.

Disadvantages

- PFAS concerns
- Current supply limited by contract with Sandy Creek Power Plant

Non-Potable Reuse

Advantages

- Builds upon previous investments in purple pipe infrastructure
- Opportunity to use available federal funding
- Regulatory framework clear
- Better matches water quality to use requirements.
- Saves operational costs for drinking water treatment

Disadvantages

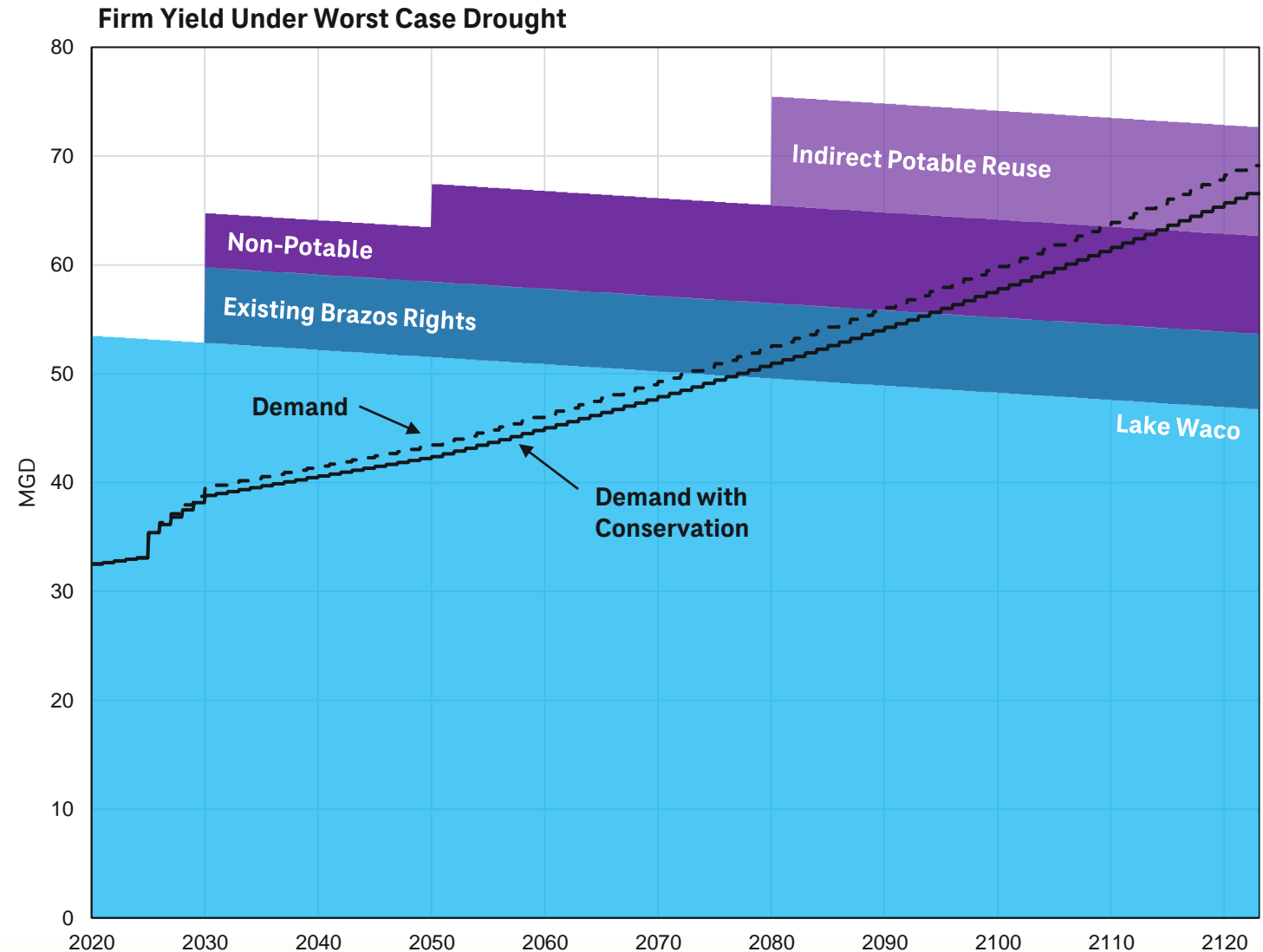
- Non-Potable reuse is an additional system to maintain and operate
- Industry customers are less reliable for long-term use of supply.
 - Consideration for take or pay contracts to lock in commitments.
 - Ensure economic benefits for users to encourage use
- Limited additional water supply



Recommendations

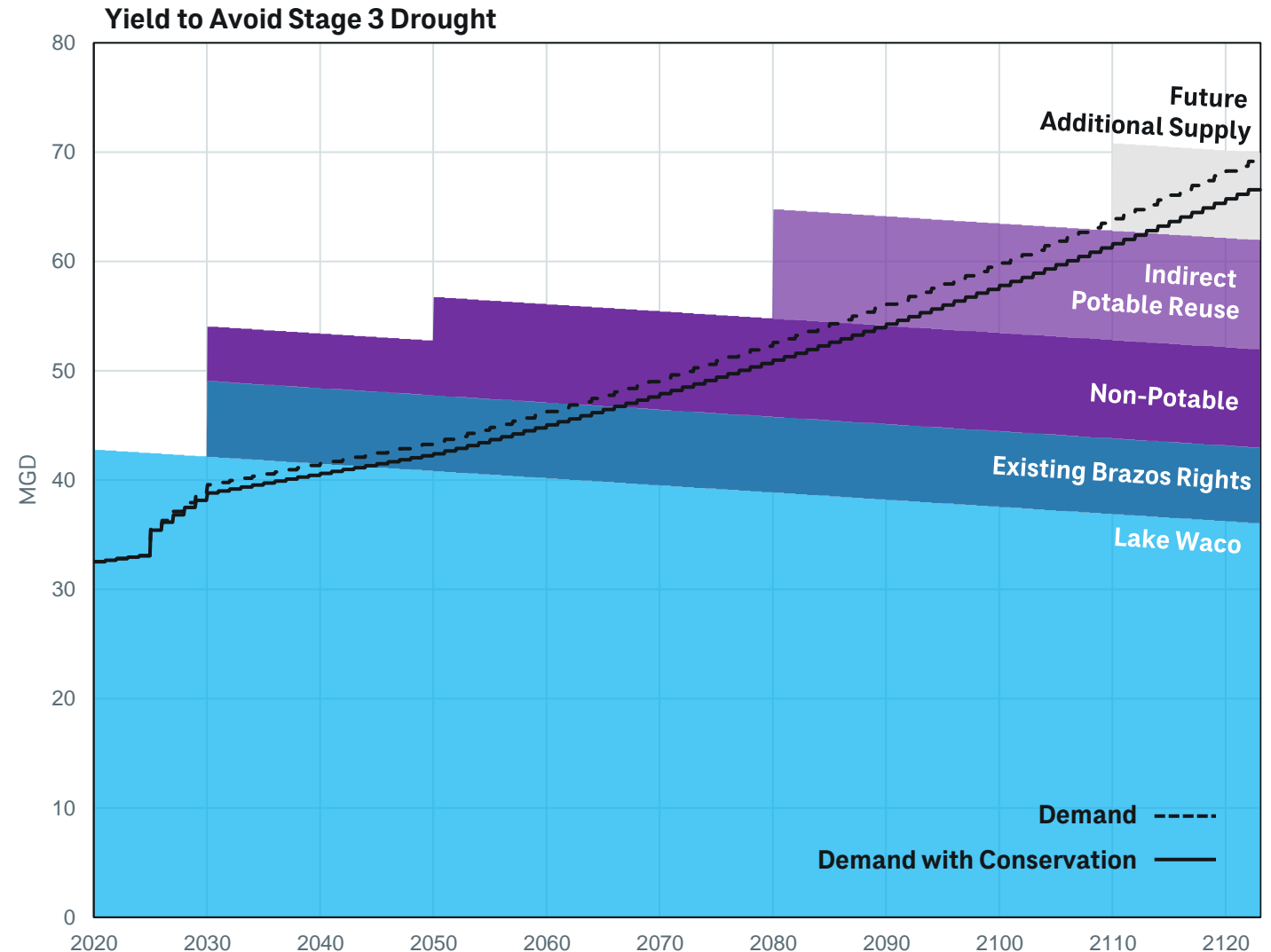
A diversified mix of future supply options is recommended

- Build new intake structure and treatment to utilize Brazos River water rights
- Continue programs to conserve supply and increase water use efficiency
 - Promote customer AMI portal
 - Enforce outdoor irrigation system regulations
 - Process improvements to limit treatment losses
- Indirect potable reuse of Central WWTP supply via water swap with BRA or discharge to Lake Brazos
- Continue to reevaluate planning assumptions



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Cost for Recommended Options

- New intake on Bosque River downstream of the Lake Waco Dam
- Additional treatment at DAF facility to address PFAS concerns in new supply
- Permitting to transfer diversion location of Brazos River right
- Non-potable supply to new industries
- Work with BRA on water swap agreement for Central Plant discharges or permit new discharge location above Lake Brazos dam

Supply Options	Capital Cost (\$M)
<i>Near Term (less than 10 years)</i>	
New intake (sized for the future required capacity of 16.9 MGD)	\$17.4
Phase 1 of GAC treatment – 6.9 MGD	\$8.9
Permitting costs	\$0.5
Non-Potable Reuse: Industrial Service Area	\$39.3
<i>Near-Term Subtotal</i>	\$66.1
<i>Future Investments (10+ Years)</i>	
Non-potable reuse additional investments (20+ years)	\$20.0
Phase 2 of GAC treatment – 16.9 MGD Total	\$7.6
Central WWTP upgrades and new discharge (if needed) for indirect potable reuse	\$23.2
Permitting costs	\$0.5
<i>Future Subtotal</i>	\$51.3
Total	\$117

Implementation Schedule

Near-Term Actions (next 5 years)

- Permitting to transfer location of Brazos River right
- Work with BRA on water swap agreement
- New intake on Bosque River downstream of Lake Waco dam
- Additional treatment to address PFAS
- Invest in non-potable distribution system to industrial customers
- Continued promotion of conservation program

Mid-Term Actions (5-15 years)

Feasible: Pursue water swap related to Central WWTP discharge

Not feasible: Permit new Central WWTP discharge location above Lake Brazos dam

Refine timing and capacity of non-potable reuse and indirect potable reuse needs

Long-Term Actions (continuing actions)

Higher Need:

- Assess need for additional non-potable projects with excess Central WWTP water
- Assess need for and feasibility of purchasing additional BRA contract water
- Evaluate feasibility of Lake Waco sedimentation management

Lower Need: No action

Assess feasibility of water swap

Reassess demand growth and Lake Waco hydrology

Reassess demand growth and Lake Waco hydrology

Summary

- Past City Council decisions have positioned Waco well for future water supply
 - Previous reallocation of Lake Waco supply storage
 - Purchase of Brazos River rights
- Avoiding Stage 3 drought restrictions requires additional investments between 2030 - 2040
 - Continue to promote conservation (delays capital investments) - Ongoing
 - Infrastructure to withdraw from Lake Brazos - 2030
 - Begin serving industries with non-potable reuse - 2030
- Other supply options remain for future consideration
 - Indirect potable reuse
 - Purchase of BRA supplies



listen. think. deliver.

City of Waco Integrated Water
Resource Plan

