COWRA Water Supply Development Plan

Mustang City Council
March 6, 2018

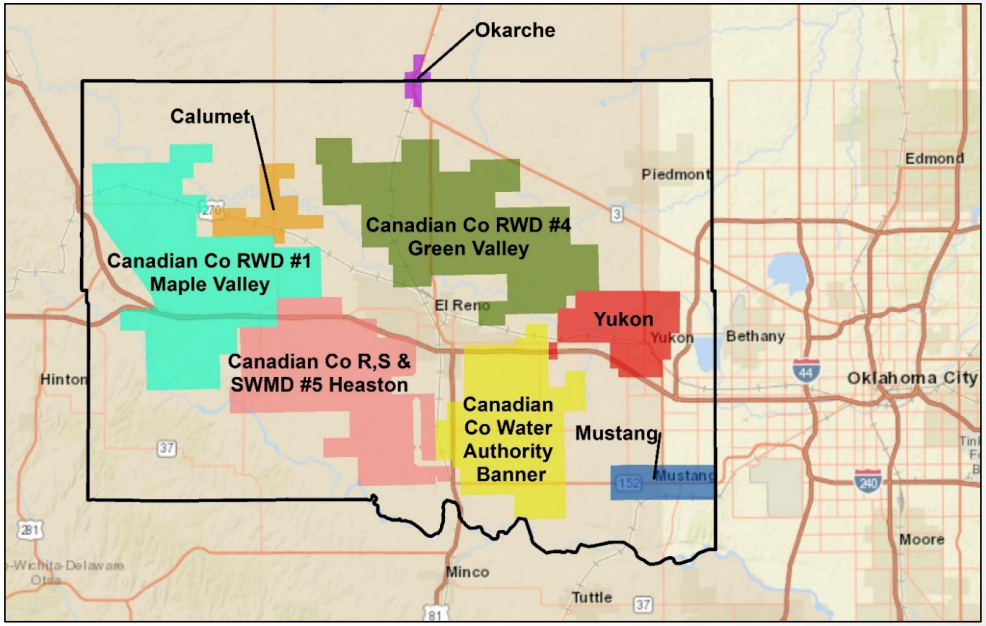
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MARY ELIZABETH MACH, PE

Agenda

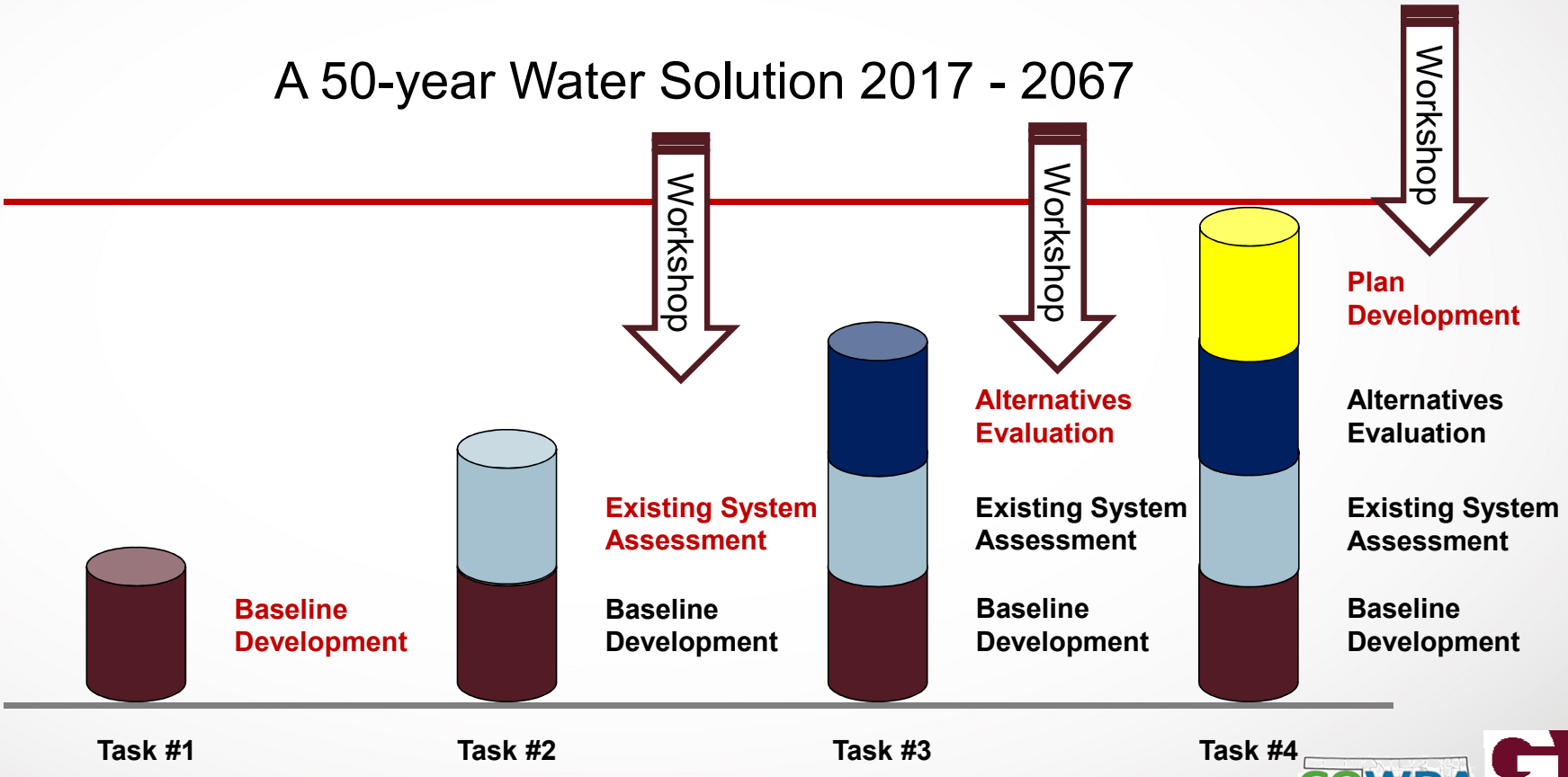
- Project Overview
- Baseline Development and Existing Assessment
- Alternatives
- Capital Improvements Phasing Plan
- Questions



Introduction

Strategic Water Supply Development Plan

A 50-year Water Solution 2017 - 2067

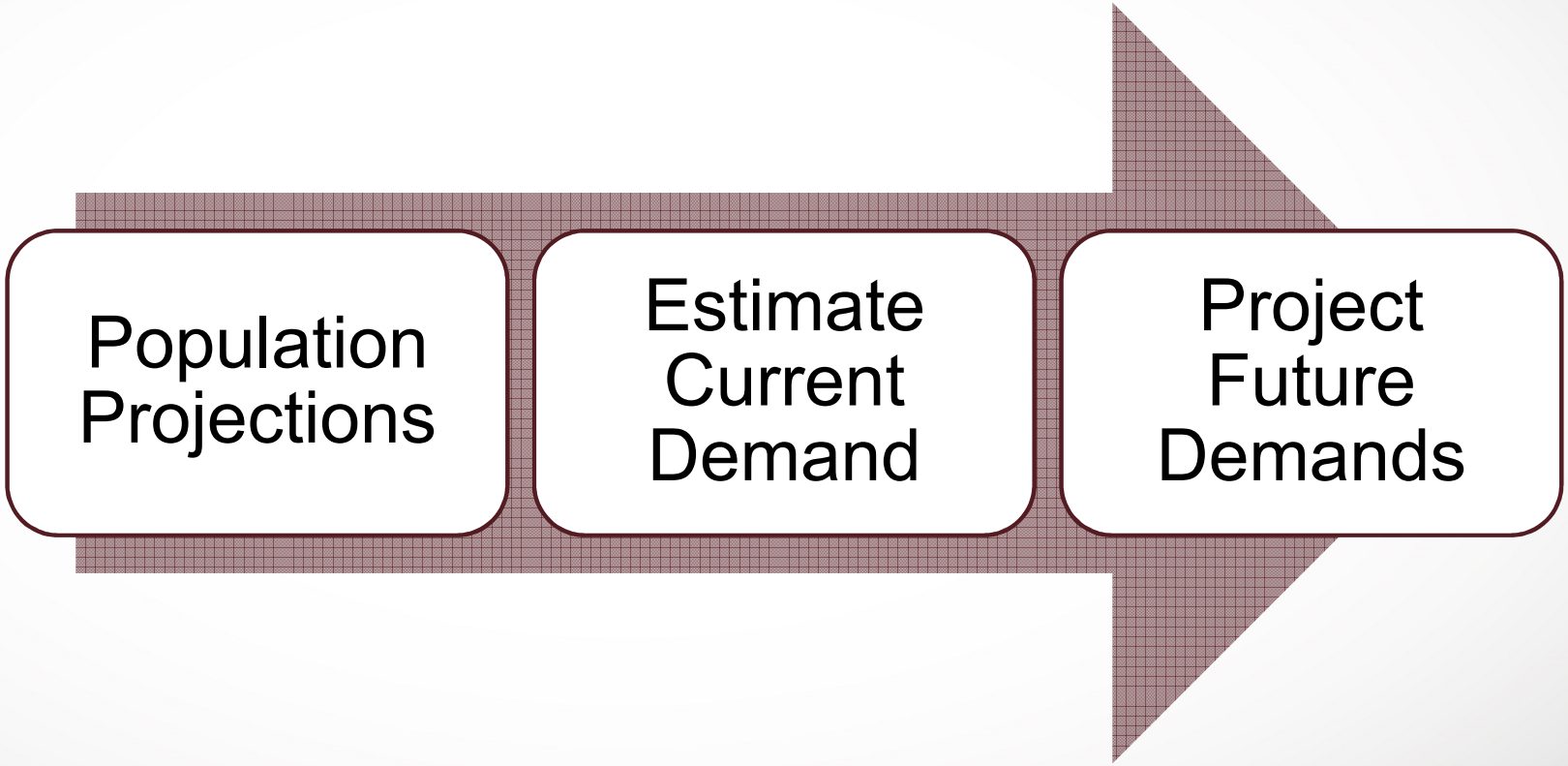


Task #1: Baseline Development

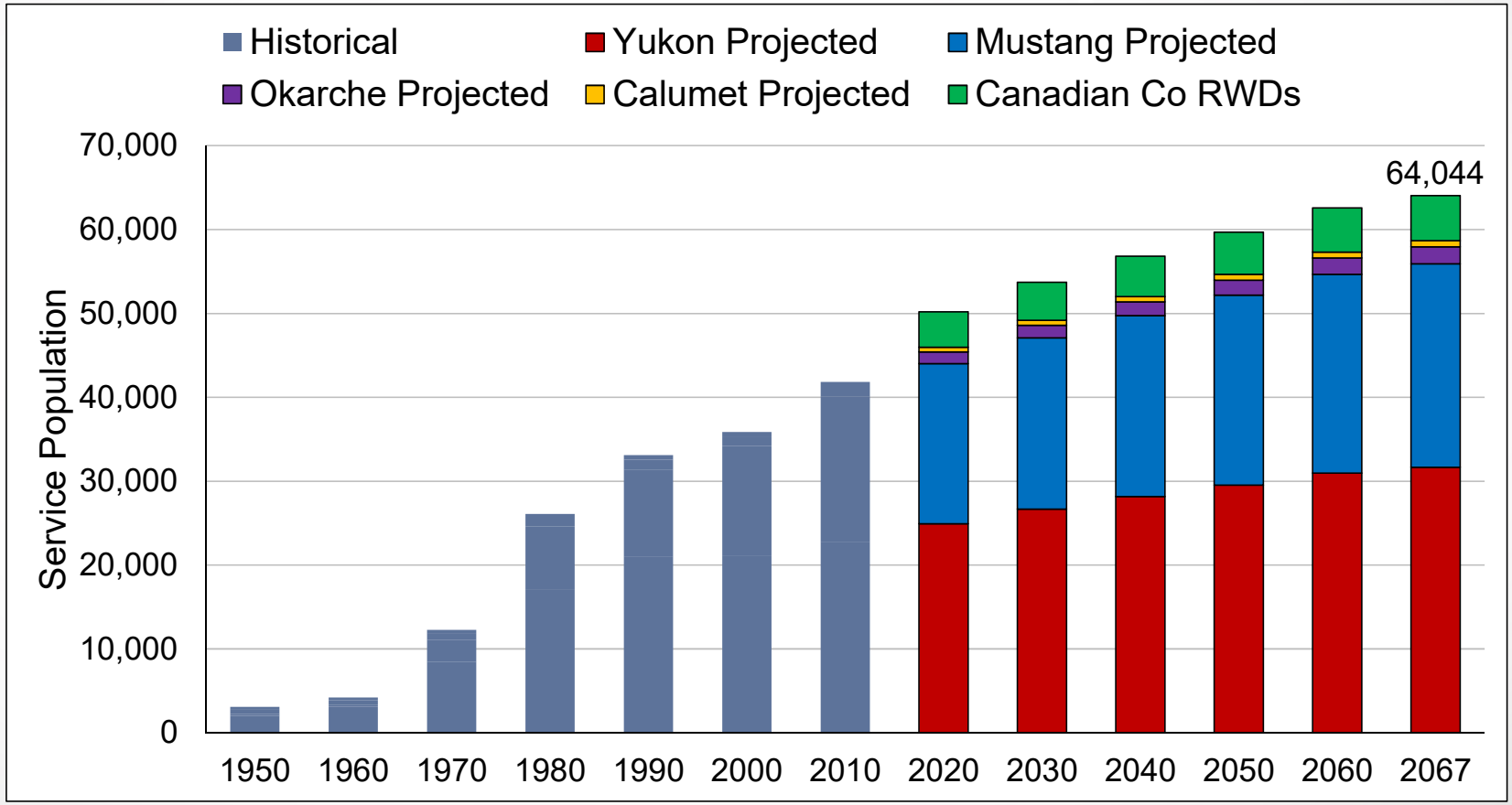
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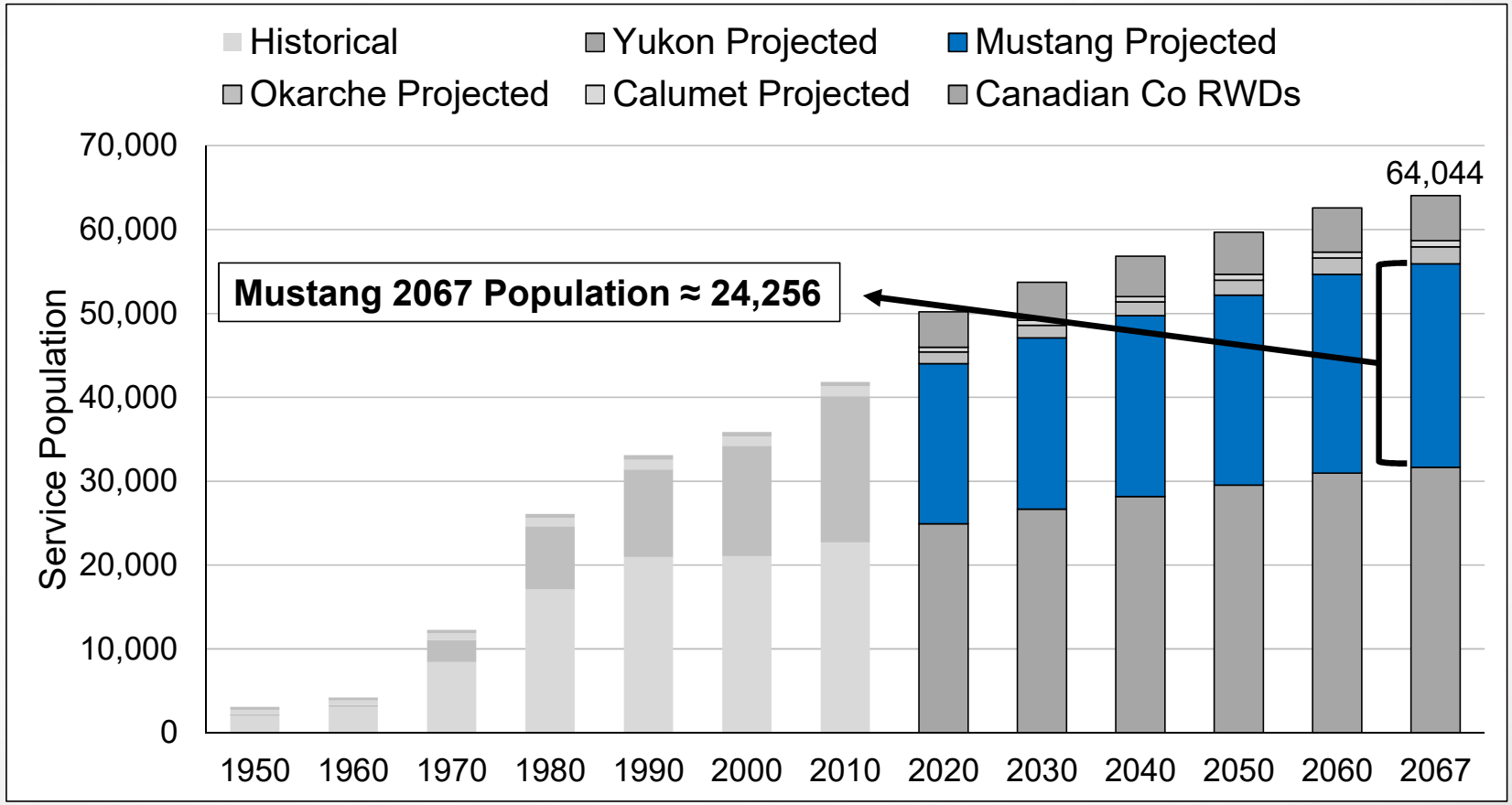
Baseline Development Approach



Population Projections



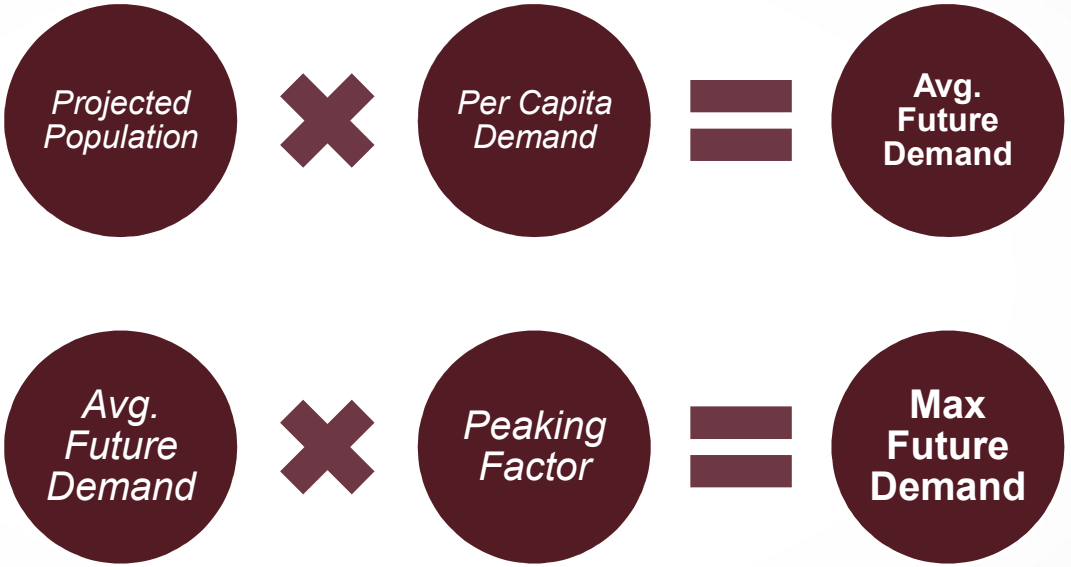
Population Projections



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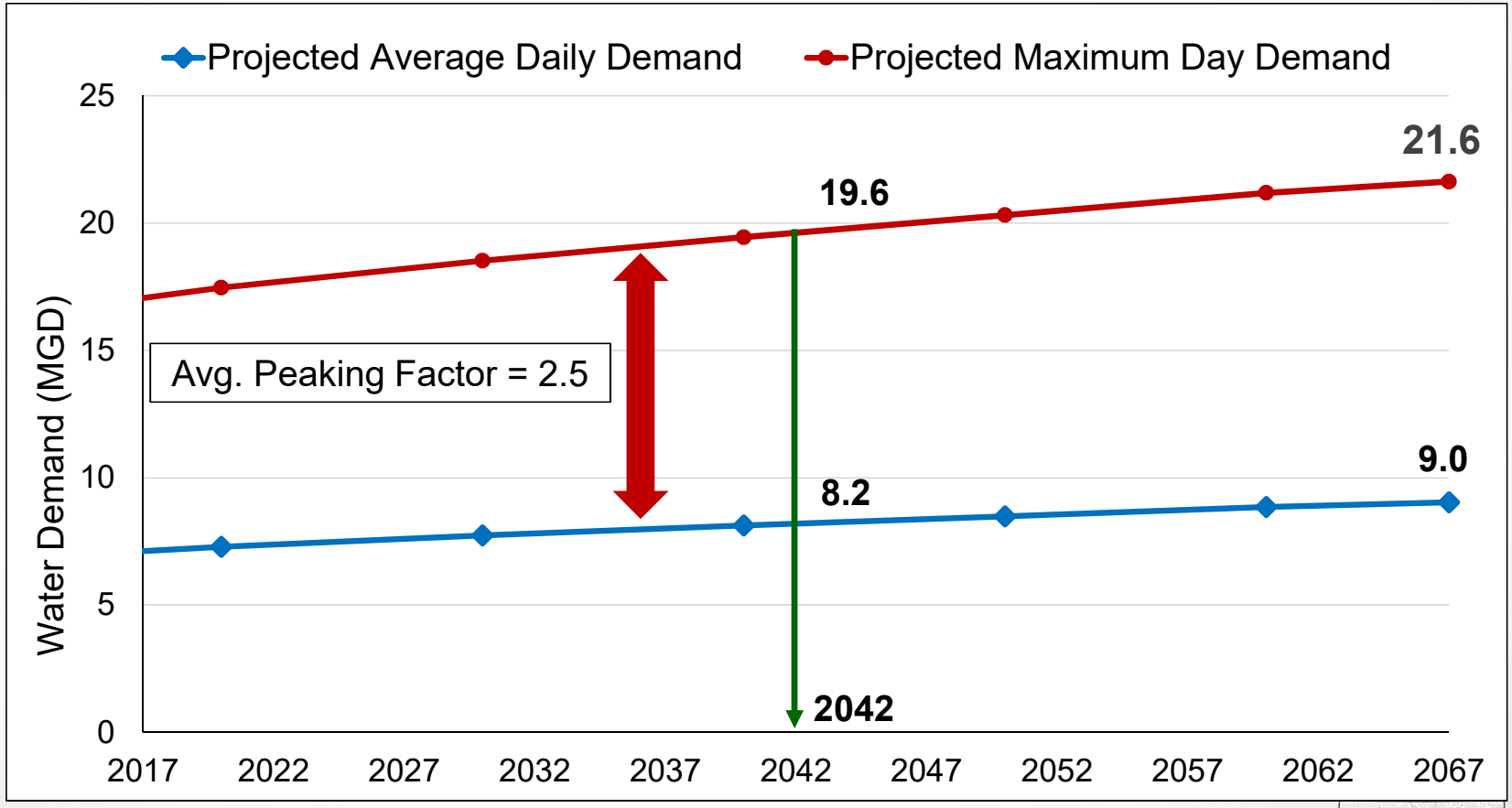
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Water Demand Projection Procedure



Avg. Peaking Factor = 2.5

COWRA Demand Summary



Task #2: Existing System Assessment

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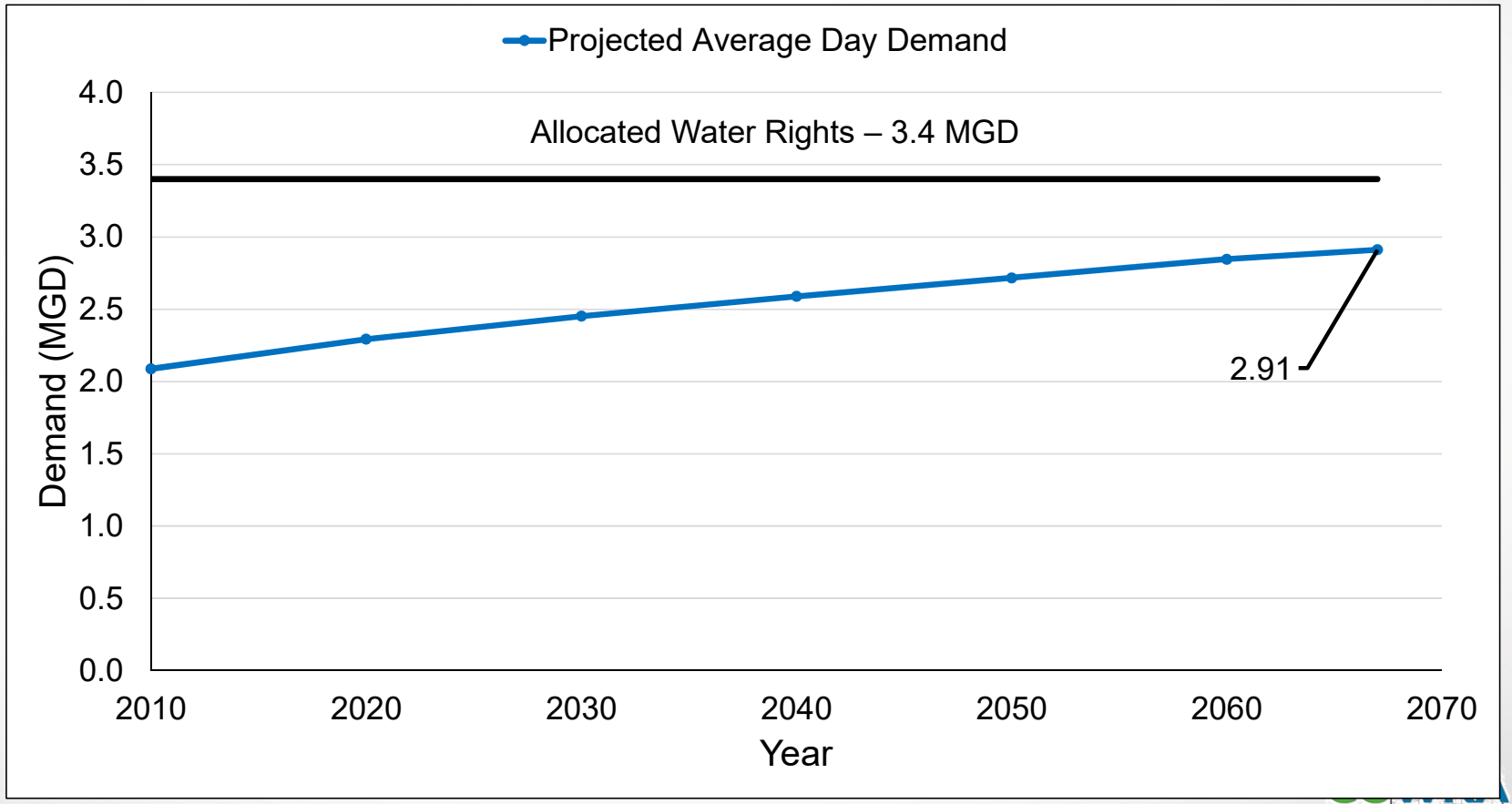
Existing System Assessment

- Source Water Evaluation
- Infrastructure Assessment and Capacity
- Regulatory Compliance

Source Water Evaluation:

Mustang

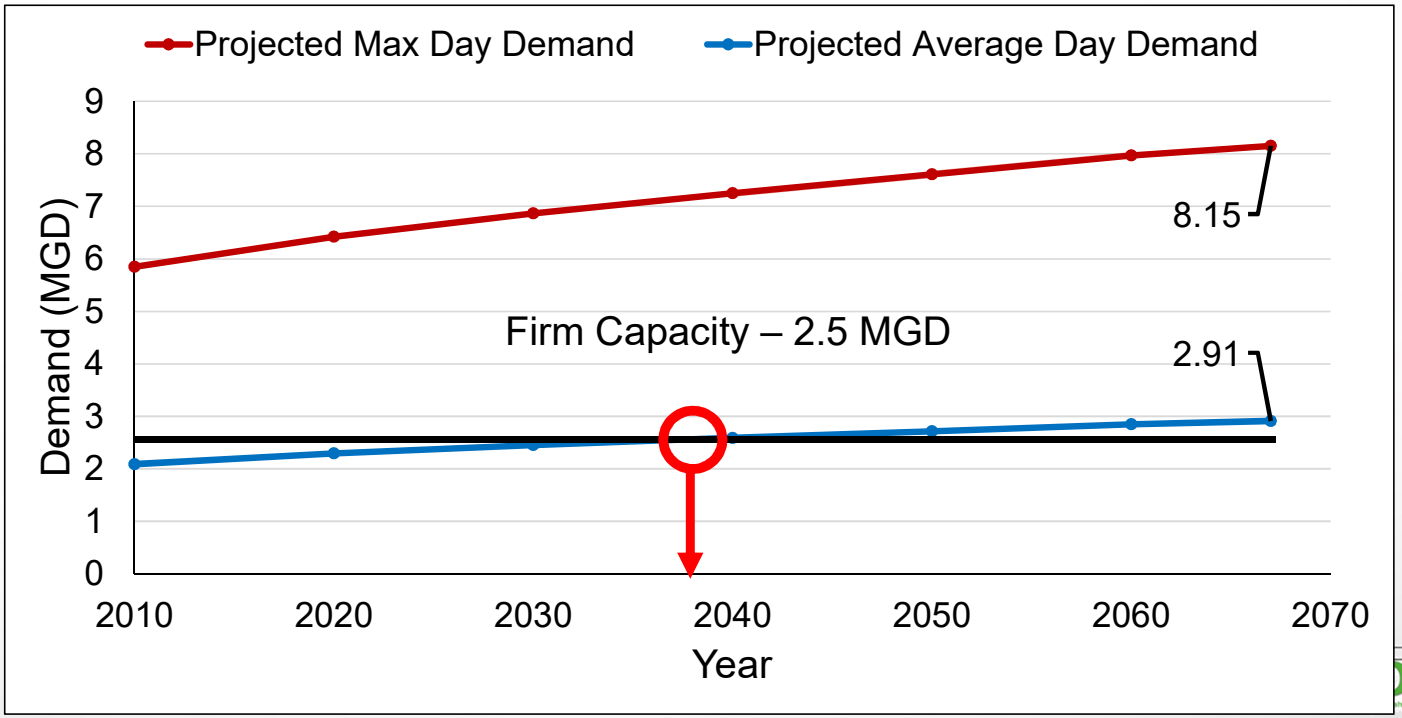
Mustang's Demand vs. Allocation



Well Field Production Capacities

Firm Well Production - Mustang

- Mustang's max day demand is currently greater than the FIRM well production capacity



Raw Water Conveyance Capacity

Raw Water Conveyance Capacities

Provider	Main Length (ft)	Main Diameter (in)	2067 Max Day Demand (MGD)	Velocity (fps)
Calumet	25,000	6	0.29	2.3
Mustang	52,250	16	8.15	9.0
Okarche	70,500	10	0.96	2.7
Yukon	47,750	24	7.60	3.7
Canadian AUTH				
Canadian				
Canadian				
Canadian Co RWD #5	19,600	6	0.28	2.2

Assumes 100% of Max Day flow routed through water main.

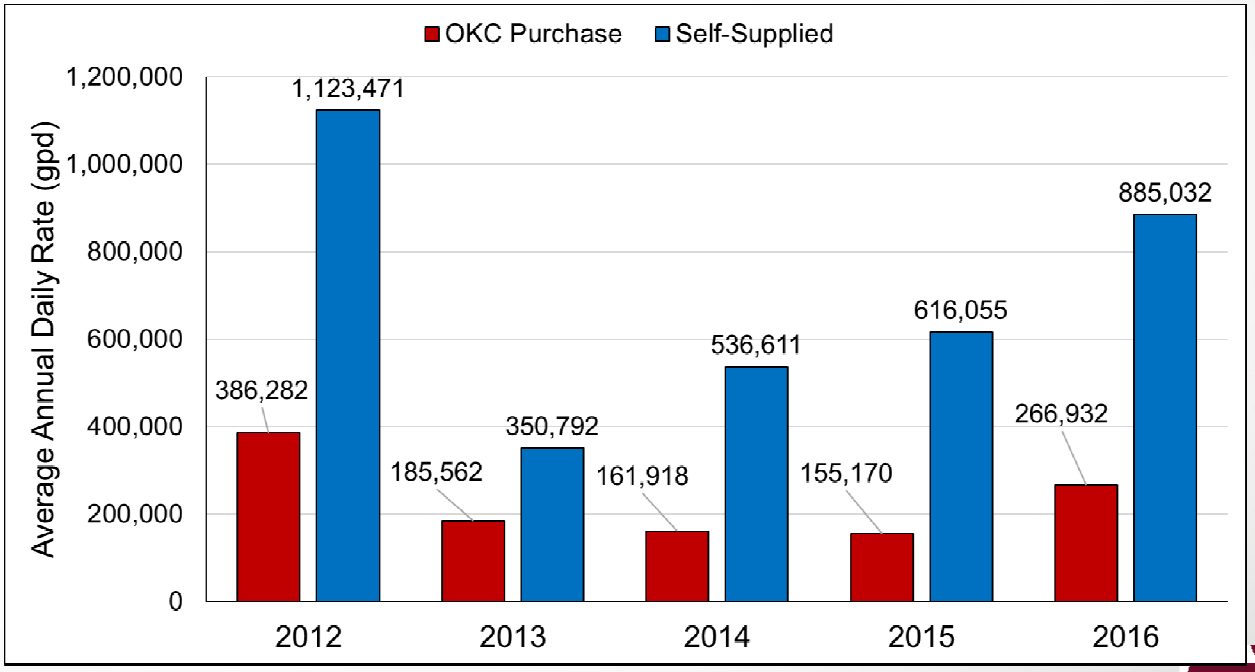
Peak velocity of 9 fps means water main likely needs to be upsized in the future.

Regulatory Compliance Assessment

Mustang – Quality Concerns

Provider	Analyte Group Name
Mustang	Arsenic

Increased OKC purchase to dilute Arsenic concentration



Existing System Assessment Discussion



COWRA Primary Concerns

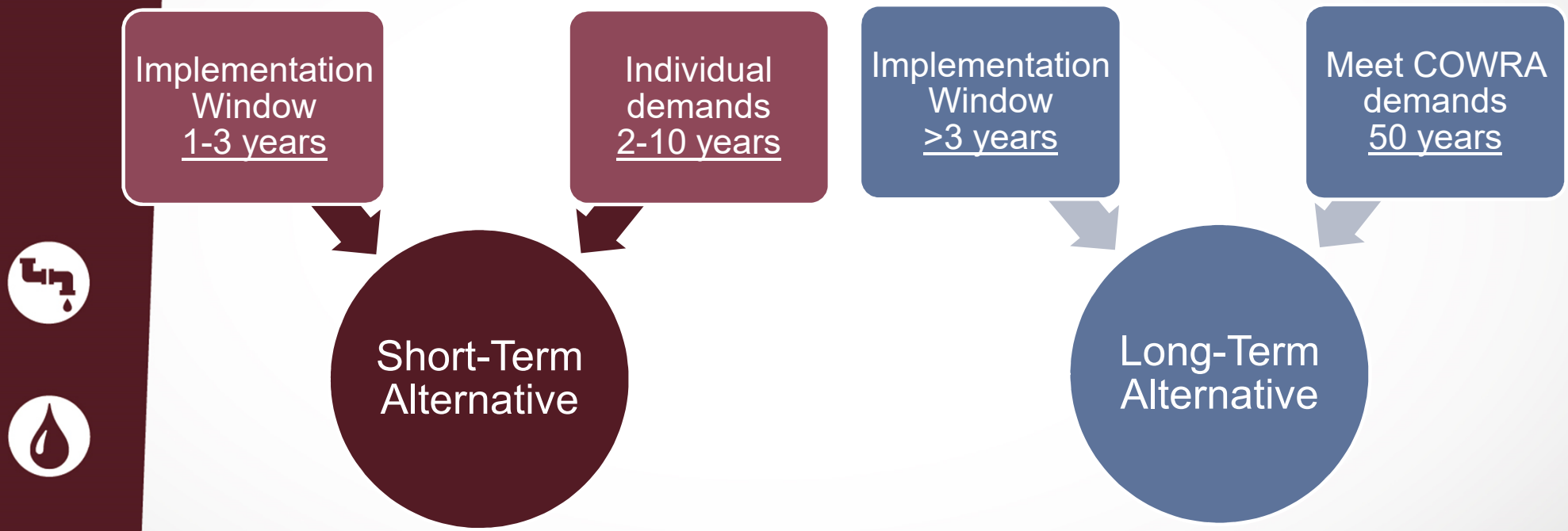
- *Groundwater Allocation*
- *Arsenic and Nitrates*
- *Increased OKC Purchase for Blending*

Task #3: Alternatives Evaluation

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Plan Alternatives



Short Term Alternatives

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Short-Term Alternatives

- ST1 – Mustang Arsenic treatment
- ST2 – Yukon Arsenic Treatment
- ST3 – Combined Arsenic Treatment
- ST4 – Okarche Nitrate Treatment
- ST5 – Mustang Non-pot Reuse
- ST6 – Yukon Non-pot Reuse
- ST7 – Existing groundwater for Non-pot network
- ST8 – New well field for non-pot
- ST9 – Okarche purchase from the City of Piedmont.

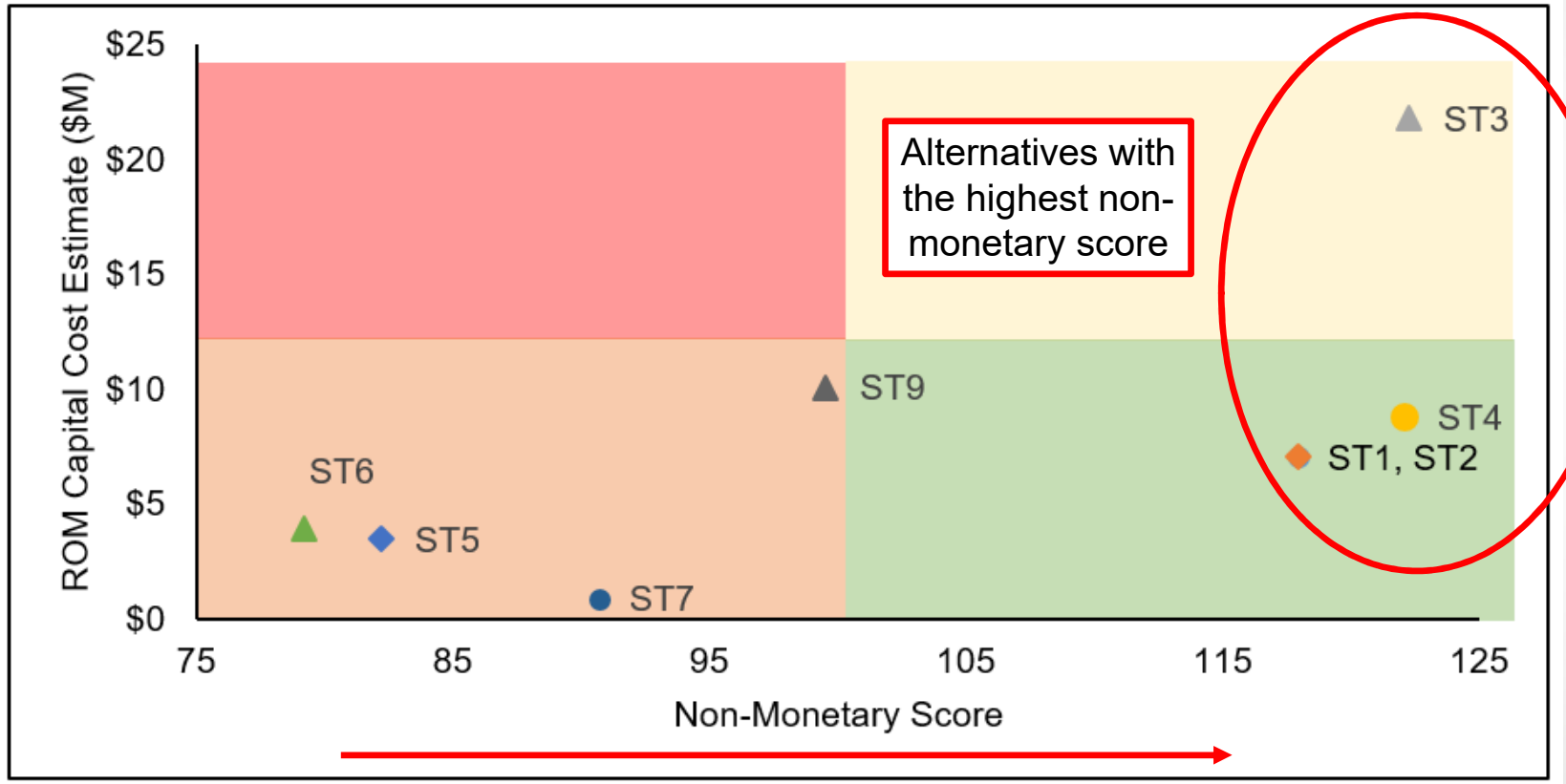
→ ST1 – Mustang Treatment
→ ST2 – Yukon Treatment
→ ST3 – Combined Treatment

→ Recommended Alternative

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Non-Monetary vs. Monetary Eval.



Short-Term Alternatives

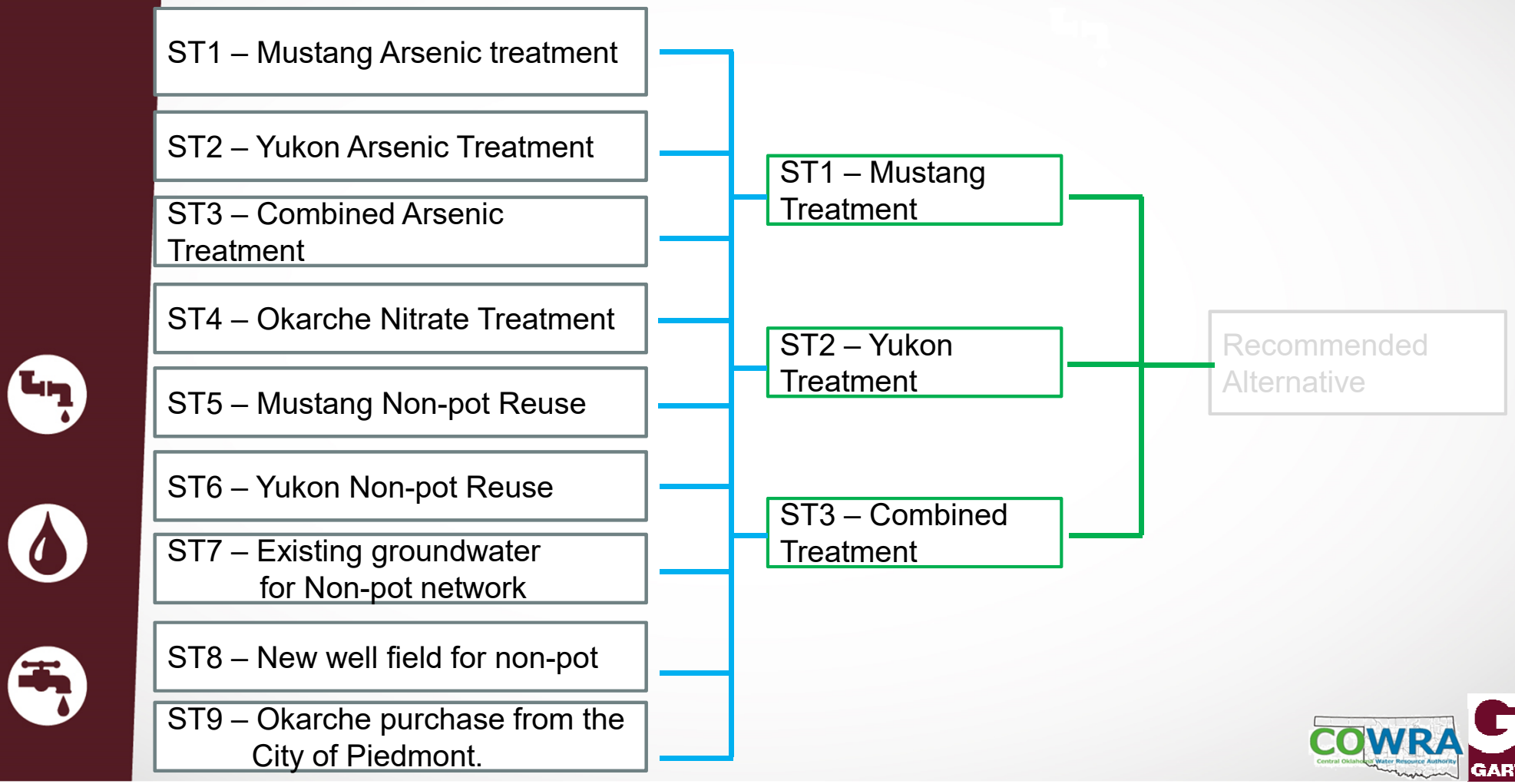
Alt. No.	Description	Flow Contribution (MGD)	ROM Capital Cost Estimate
ST1	Mustang Garber-Wellington Treatment	3.4*	$7,120,000
ST2	Yukon Garber-Wellington Treatment	4.3*	$7,120,000
ST3	Mustang/Yukon Combined Groundwater Treatment	7.7*	$21,830,000
ST4	Nitrate Treatment of Existing North Canadian River Alluvium Groundwater	0.36	$8,820,000
ST5	Non-Potable Reuse (Mustang)	0.37	$3,510,000
ST6	Non-Potable Reuse (Yukon)	0.22	$3,980,000
ST7-A	Existing Groundwater for Non-Potable Applications (Mustang)	0.37	$930,000
ST7-B	Existing Groundwater for Non-Potable Applications (Yukon)	0.22	$840,000
ST8	New Well Field with Non-Potable Distribution Network	-	-
ST9	Purchase Agreement with the City of Piedmont	-	$10,120,000

* Assumes 2.0 EPS of the Garber Wellington Aquifer

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Short-Term Alternatives



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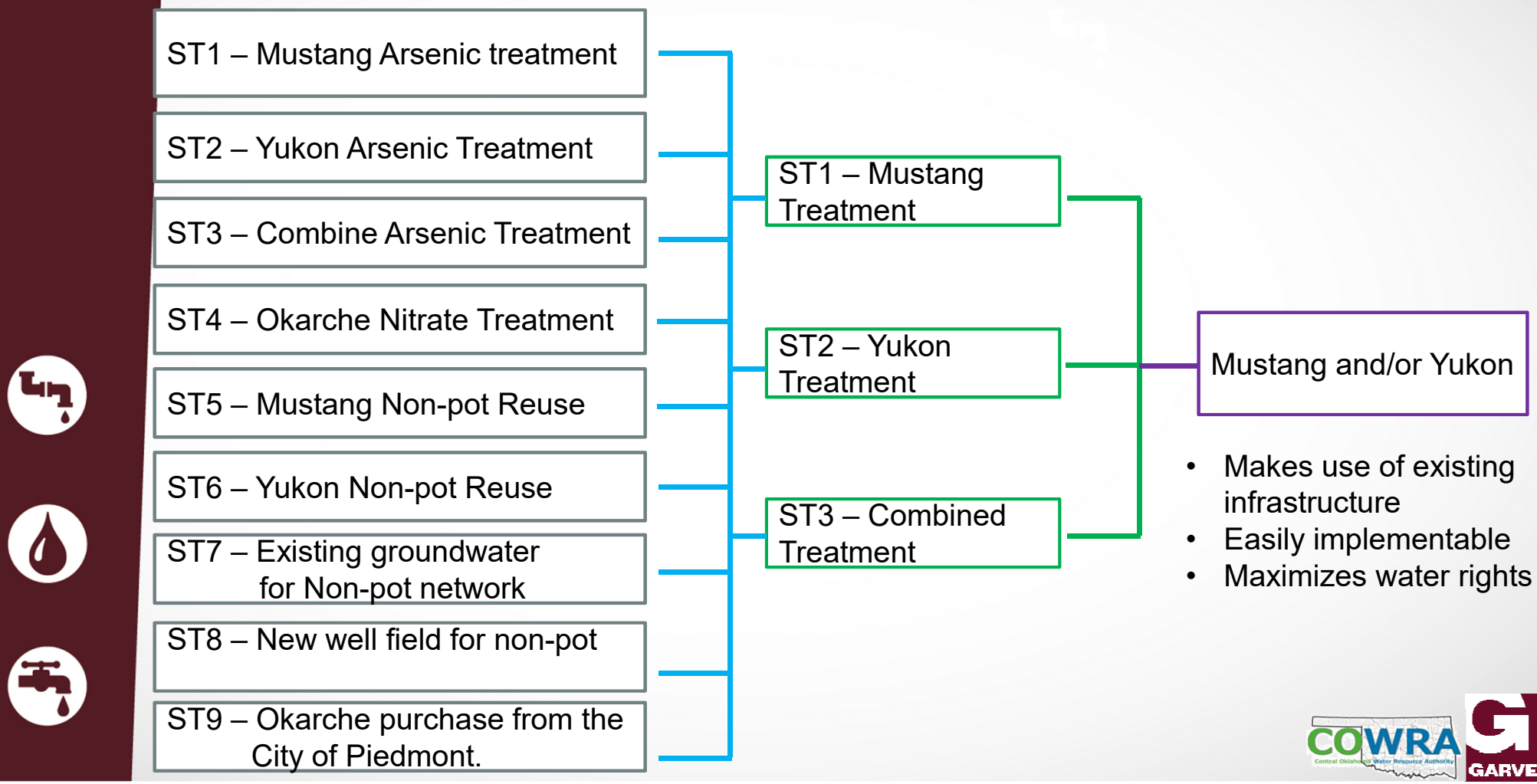
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Short-Term Alternatives

Alternative	Description	Flow (MGD)	Capital Cost ($)	25-Year NPV Cost ($)	O&M Cost ($/kgal)*	25-Year NPV Cost* ($/kgal)
ST1	Mustang GWA Treatment	3.4	$7.1 M	$24.9 M	$0.68	$1.06
ST2	Yukon GWA Treatment	4.3	$7.1 M	$31.9 M	$0.75	$1.04
ST3	Mustang/Yukon Combined Treatment	7.7	$21.8 M	$63.9 M	$0.68	$1.18

*Includes 30% Contingency

Short-Term Alternatives

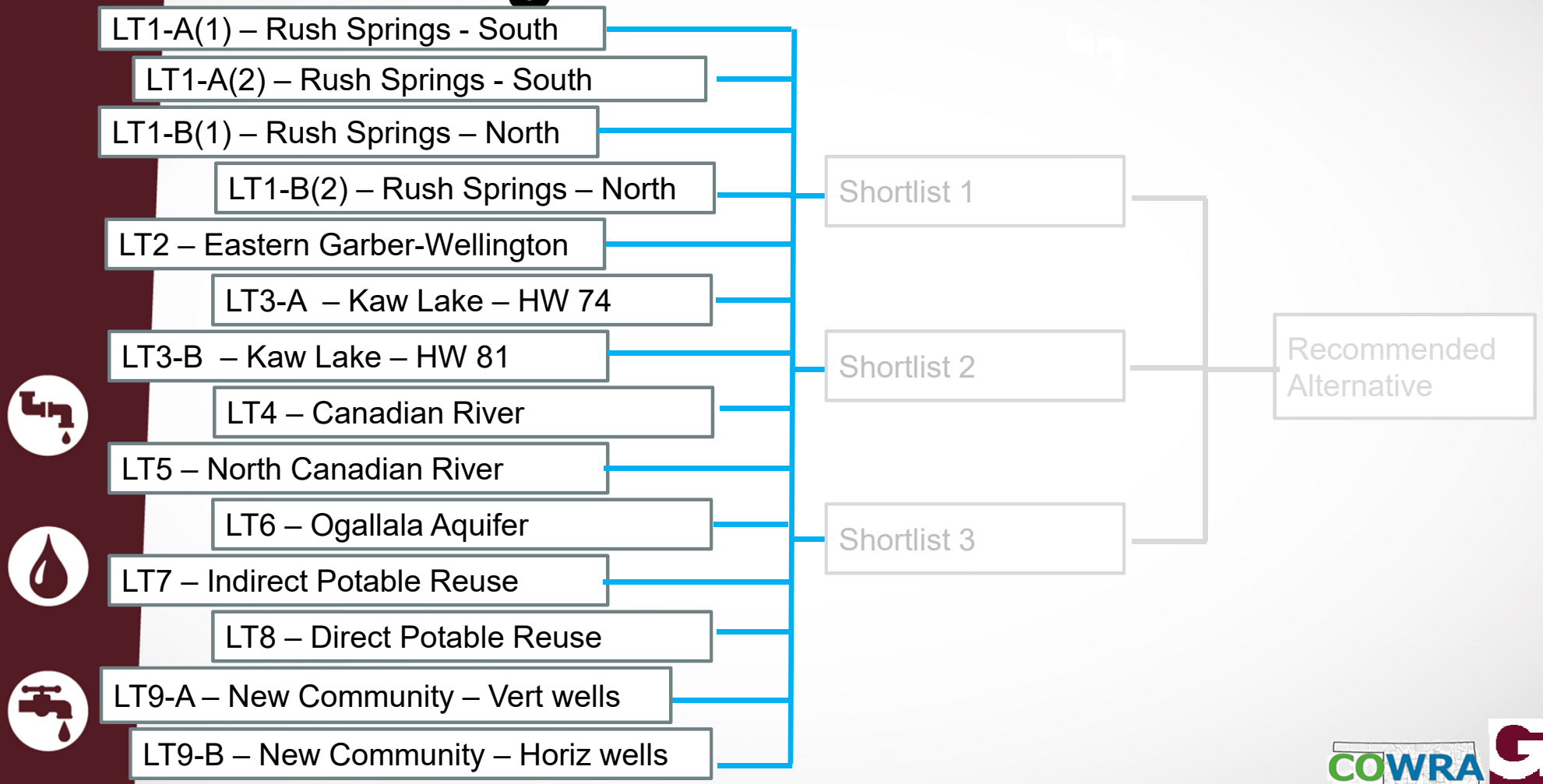


Long Term Alternatives

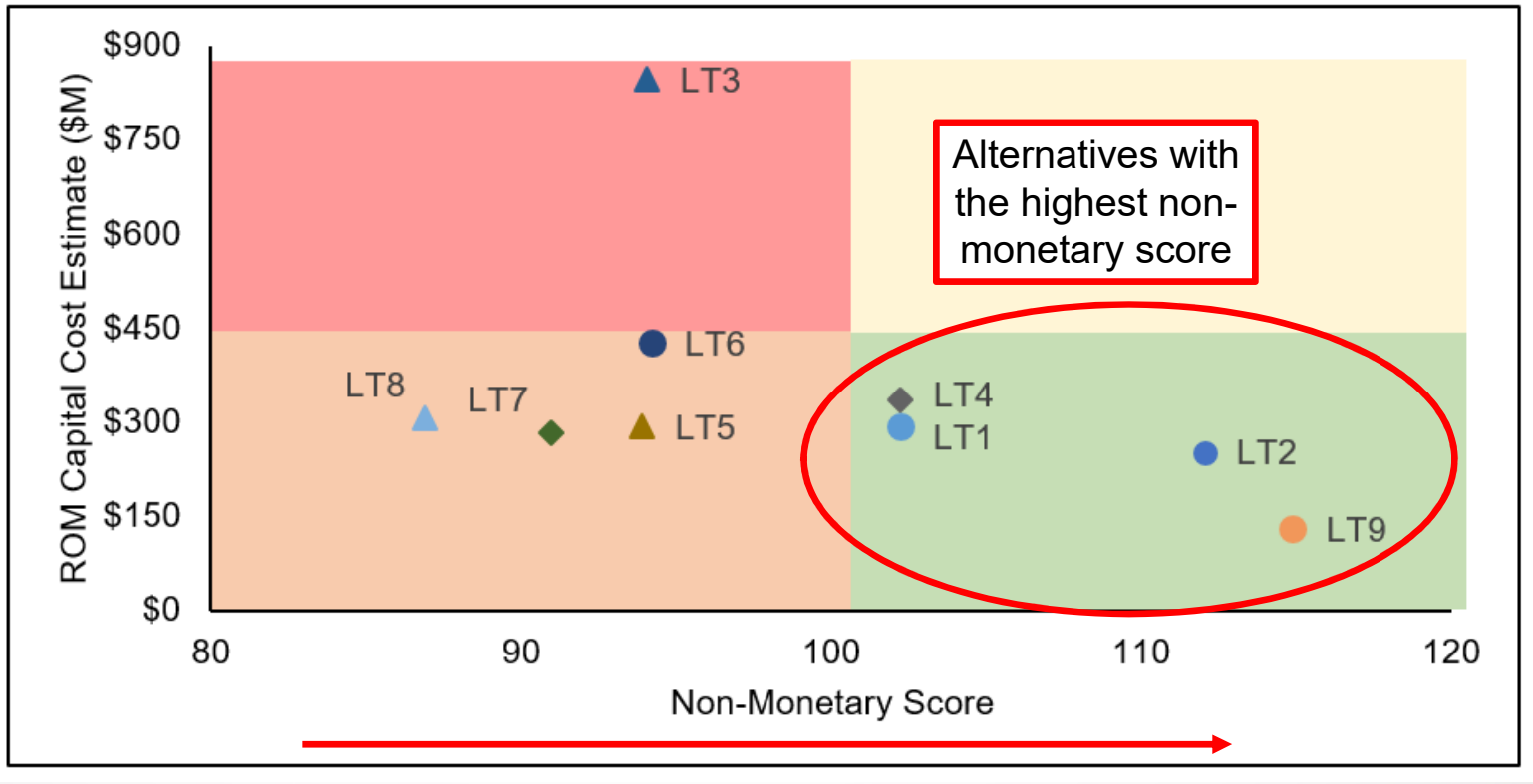
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Long-Term Alternatives



Monetary vs. Non-Monetary Eval.

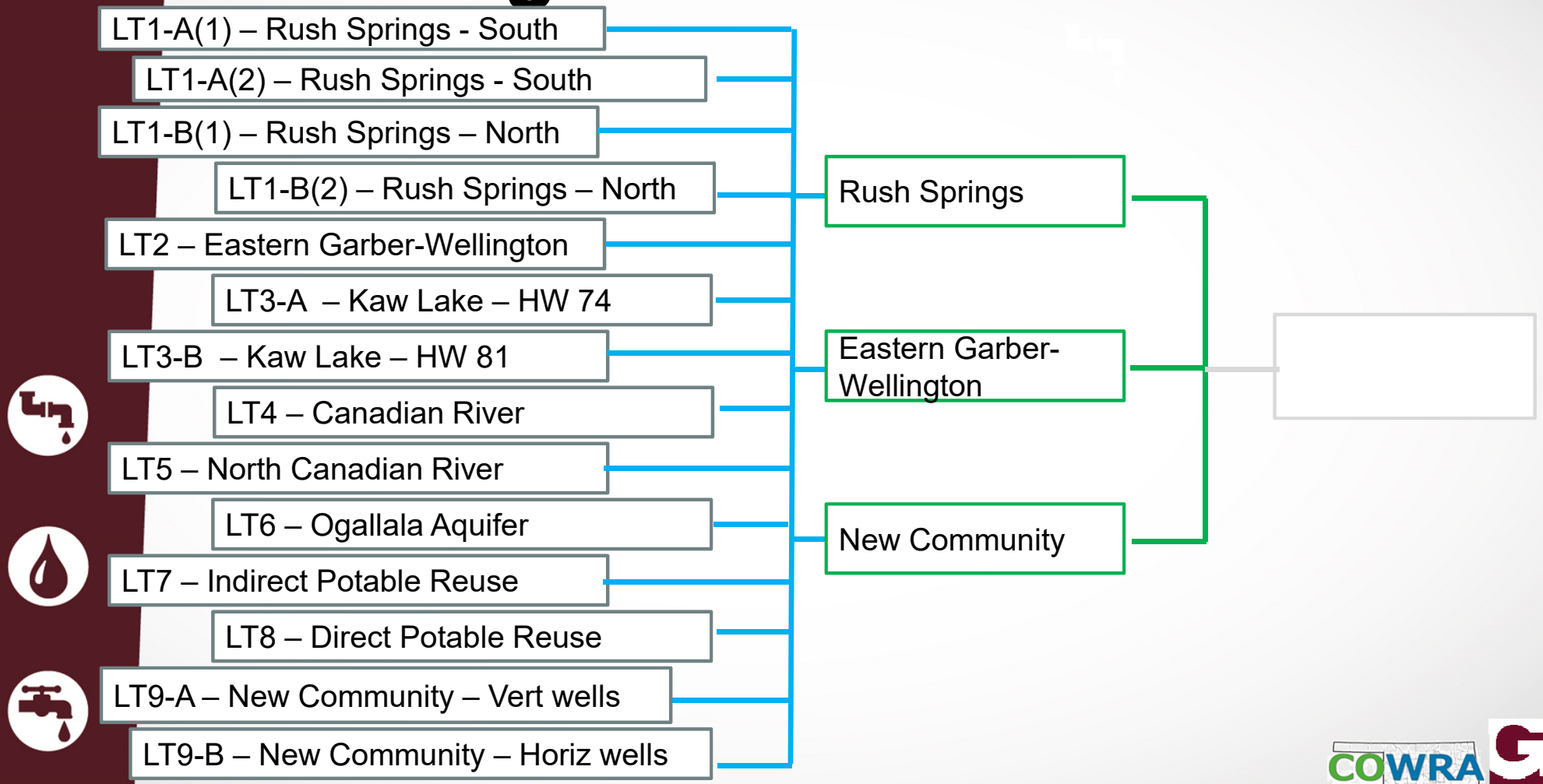


Long-Term Alternatives

Alt. No.	Description	ROM Capital Cost Estimate
LT1-A1	Rush Springs Aquifer – Southern Alignment	$294 M
LT1-A2	Rush Springs Aquifer – Southern Alignment (Horizontal)	$286-$314 M
LT1-B1	Rush Springs Aquifer – Northern Alignment	$219 M
LT1-B2	Rush Springs Aquifer – Northern Alignment (Horizontal)	$211-$239 M
LT2-A	Eastern Garber-Wellington Aquifer	$252 M
LT2-B	Eastern Garber-Wellington Aquifer (Horizontal)	$224-$255 M
LT3-A	Kaw Lake – Highway 74 Alignment	$847 M
LT3-B	Kaw Lake – Highway 81 Alignment	$835 M
LT4	Canadian River Alluvial Aquifer	$335 M
LT5	North Canadian River Alluvial Aquifer	$294 M
LT6	Ogallala Aquifer	$427 M
LT7	Indirect Potable Reuse – Riverbank Filtration	$282 M
LT8	Direct Potable Reuse	$306 M
LT9-A	Utilization of Nearby Community's Groundwater Resources with Vertical Wells	$130 M
LT9-B	Utilization of Nearby Community's Groundwater Resources with Horizontal Wells	$118-$136 M

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Long-Term Alternatives



Long-Term Alternatives

Alternatives		Description	Capital Cost	25-Year NPV Cost	O&M Cost ($/kgal)	25-Year NPV Cost ($/kgal)
Rush Springs	LT1-A1	Southern Alignment with Vertical Wells	$293.8 M	$475.0 M	$1.50	$6.34
	LT1-B1	Northern Alignment with Vertical Wells	$218.7 M	$347.8 M	$1.04	$4.64
Eastern Garber-Wellington	LT2-A	Eastern Garber-Wellington with Vertical Wells	$252.2 M	$414.5 M	$1.37	$5.53
Nearby Community's Water with Treatment	LT9-A	Utilization of Nearby Community's Groundwater with Vertical Wells	$129.9 M	$241.2 M	$1.17	$3.35

*Includes contingency and raw water purchase from nearby community

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Long-Term Alternatives



- LT1-A(1) – Rush Springs - South
- LT1-A(2) – Rush Springs - South
- LT1-B(1) – Rush Springs – North
- LT1-B(2) – Rush Springs – North
- LT2 – Eastern Garber-Wellington
- LT3-A – Kaw Lake – HW 74
- LT3-B – Kaw Lake – HW 81
- LT4 – Canadian River
- LT5 – North Canadian River
- LT6 – Ogallala Aquifer
- LT7 – Indirect Potable Reuse
- LT8 – Direct Potable Reuse
- LT9-A – New Community – Vert wells
- LT9-B – New Community – Horiz wells

→ Rush Springs
→ Eastern Garber-Wellington
→ New Community

→ New Community

- Builds on short term alternative
- Utilizes nearby water source
- Makes use of existing infrastructure
- Easily implementable

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Implementation Plans for Short-term and Long-term Alternatives

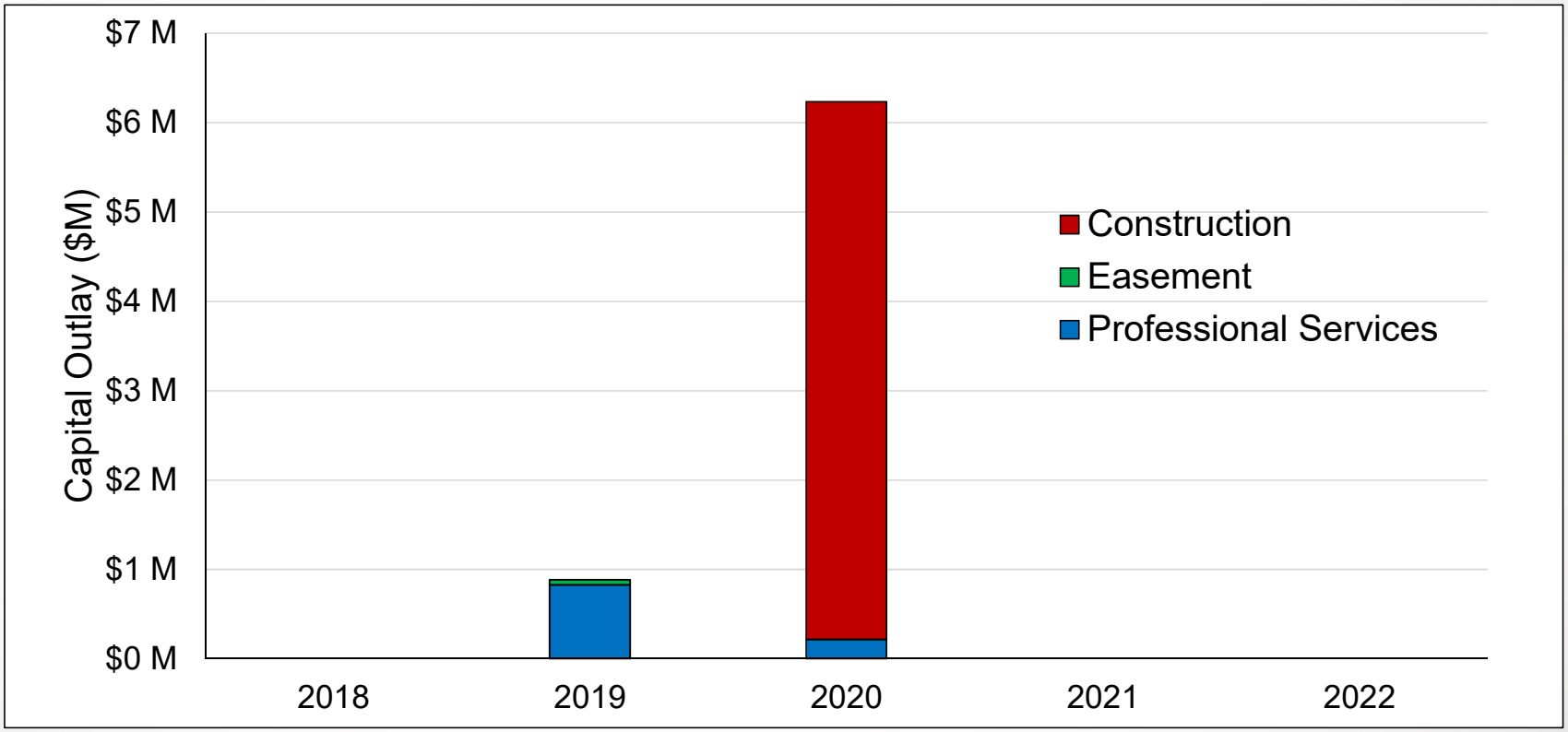
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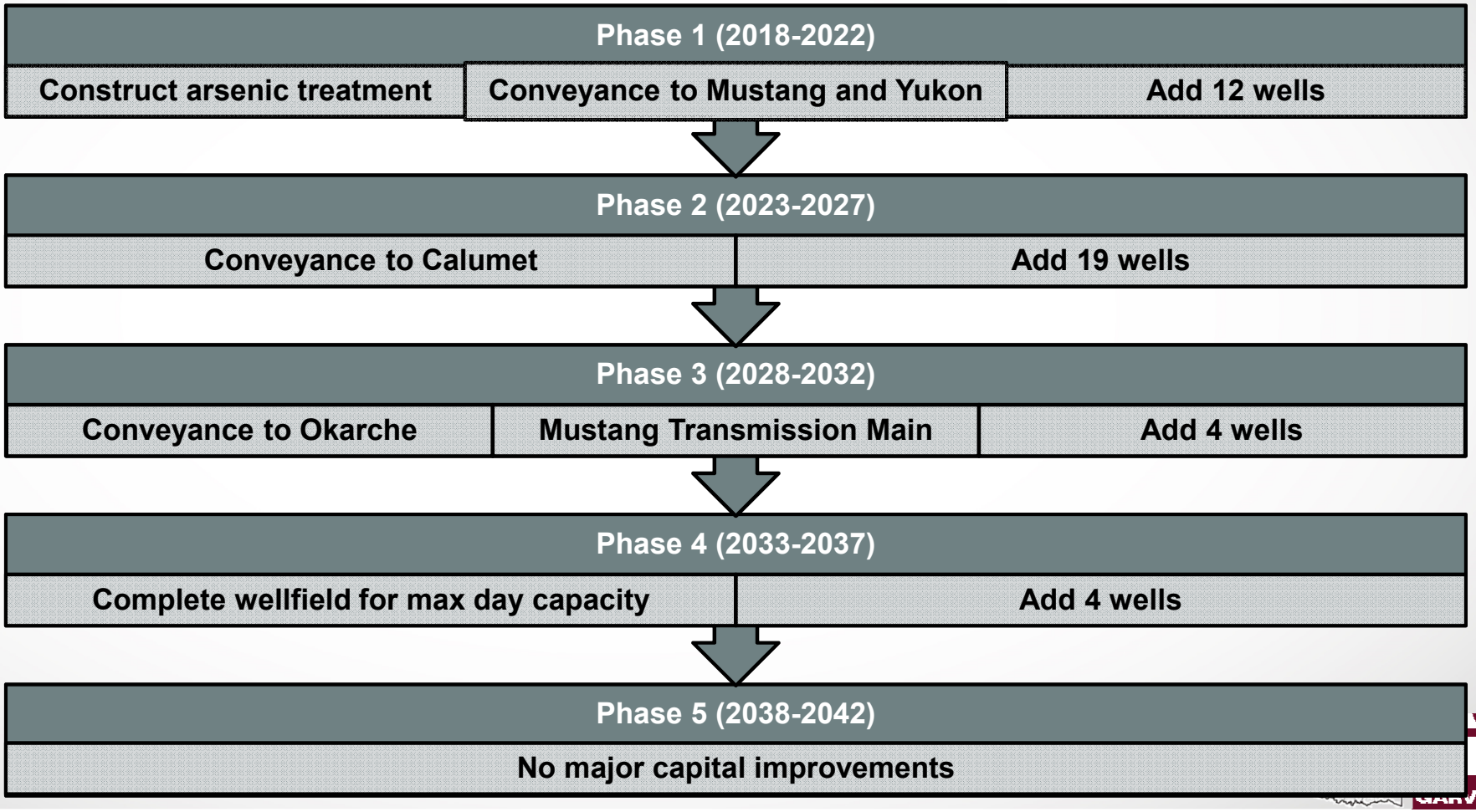
Short-Term Alternatives

Water Supply Development Plan – ST1 or ST2						
Capital Project	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**
Water Treatment						
Design and Professional Services		$828,000	$216,000			$1,044,000
Land/Easement Acquisition		$56,000				$56,000
New Arsenic Treatment Facility			$6,020,000			$6,020,000
Total Capital	**$0**	**$884,000**	**$6,236,000**	**$0**	**$0**	**$7,120,000**

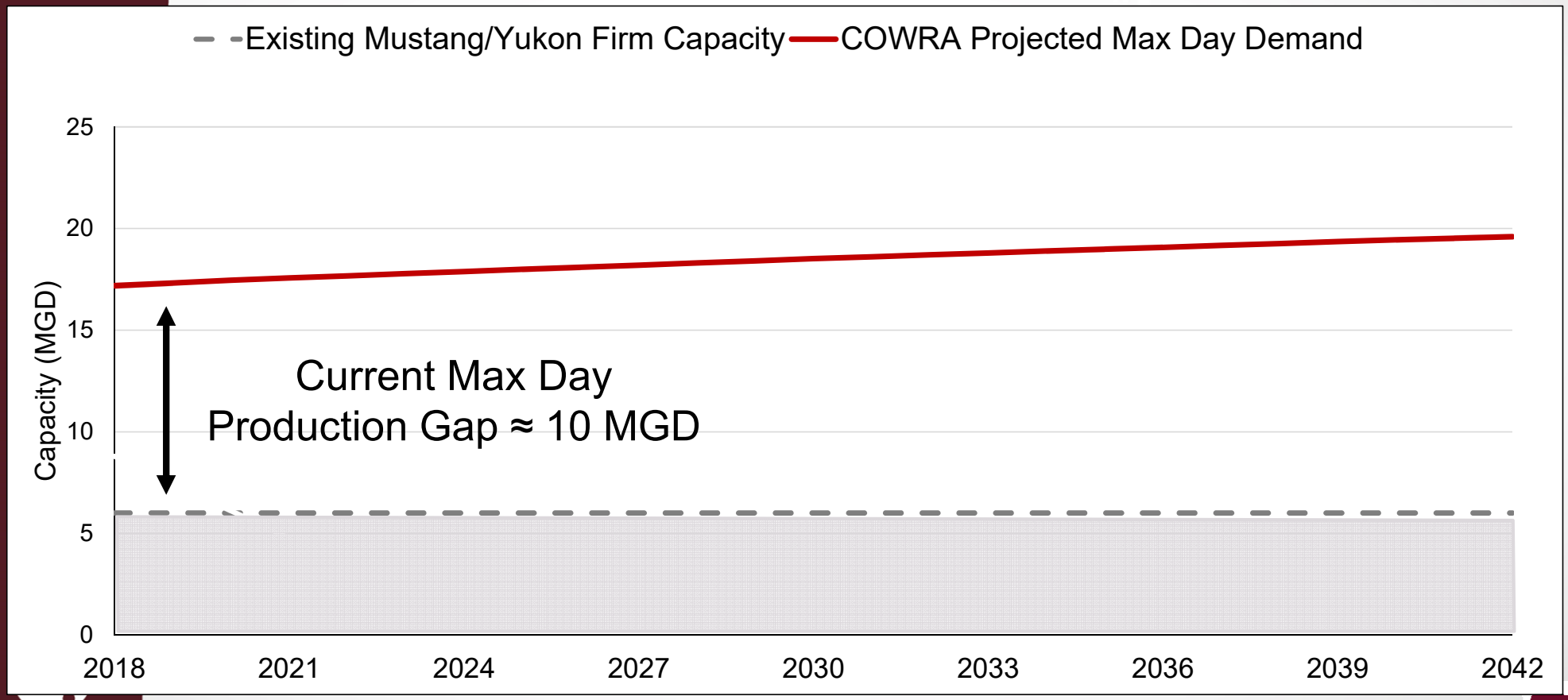
Short-Term Alternative Phasing



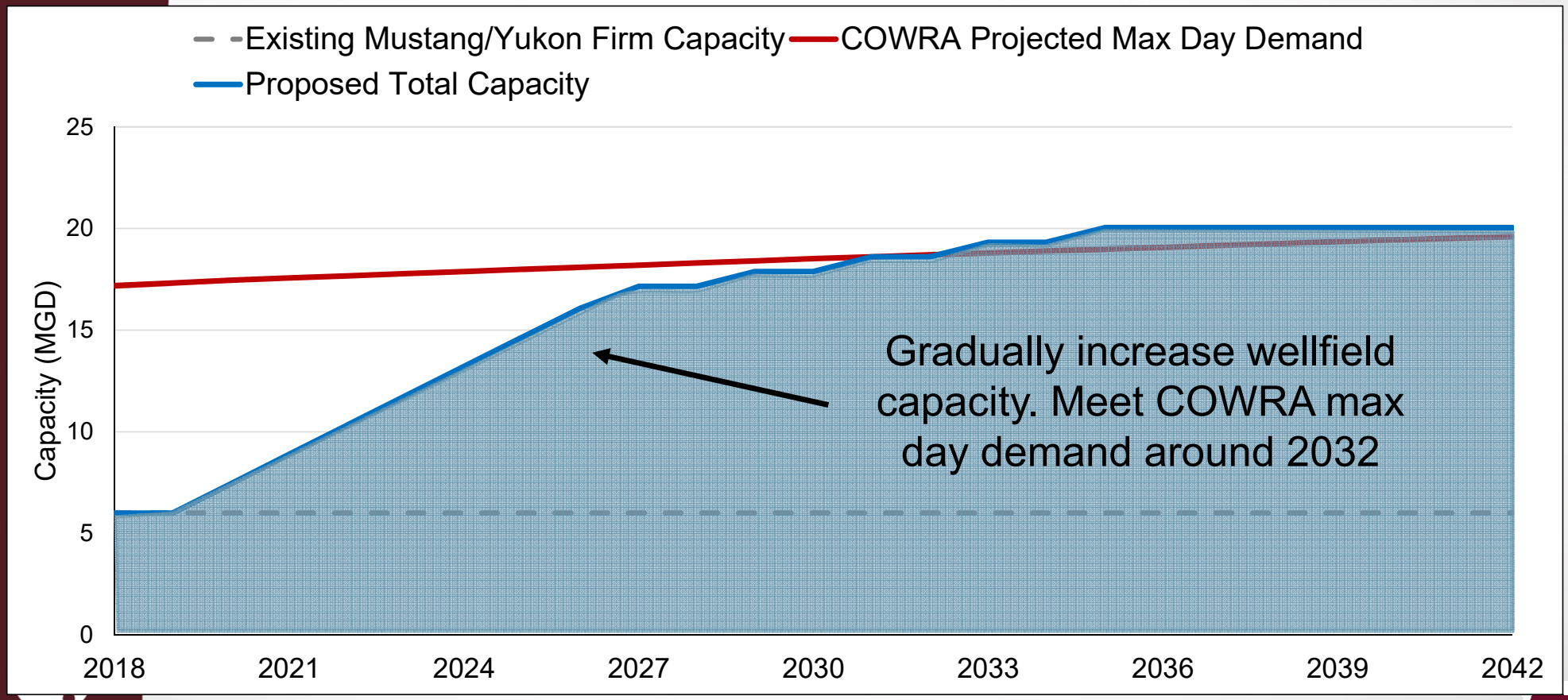
Capital Improvements Plan



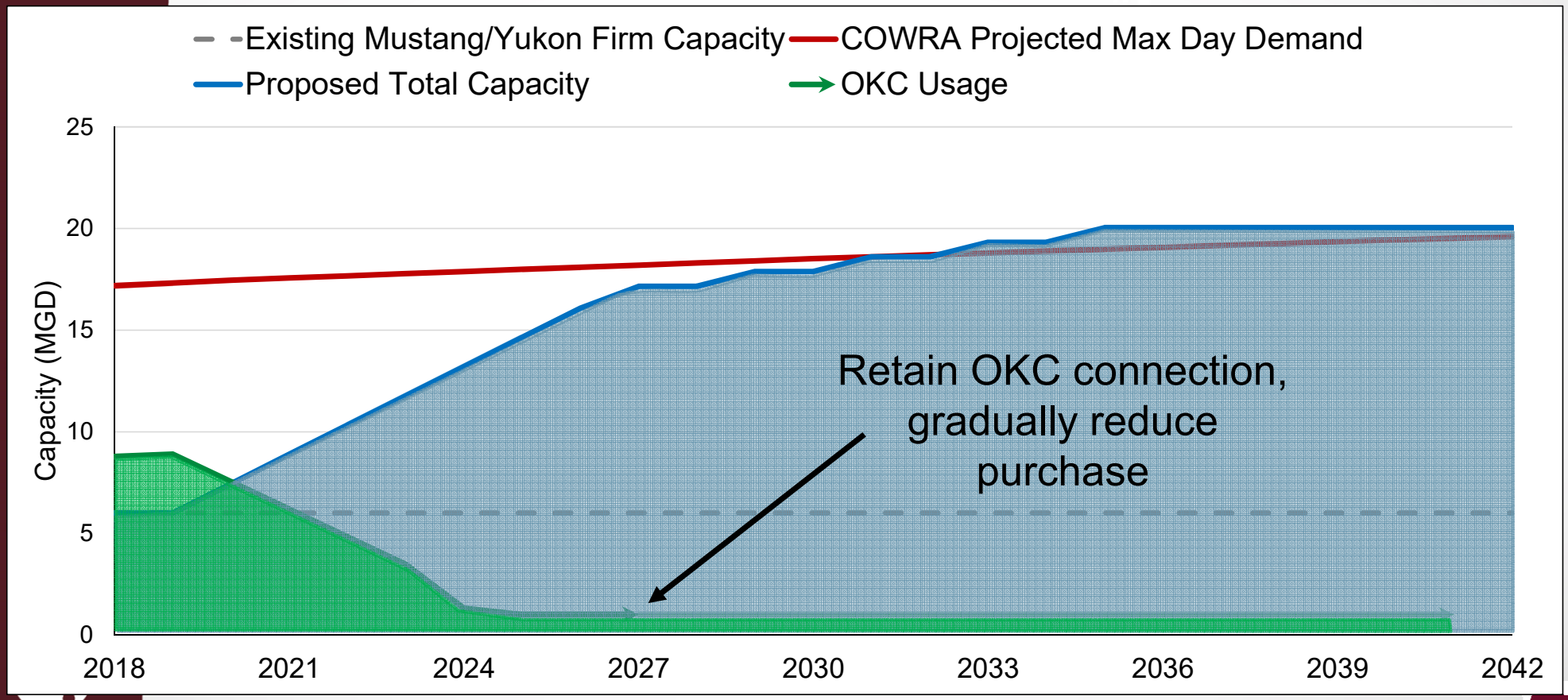
Capital Improvements Plan



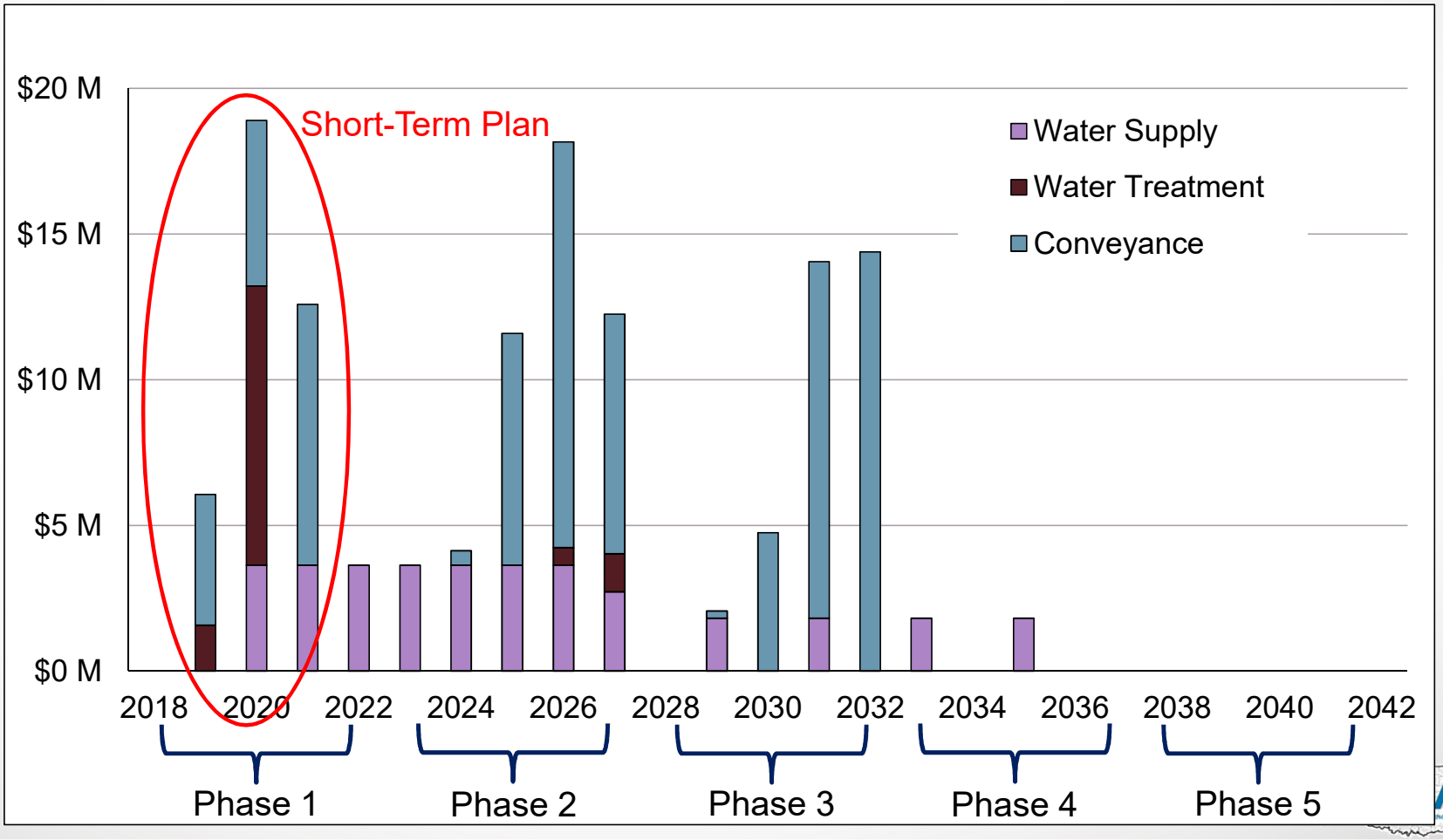
Capital Improvements Plan



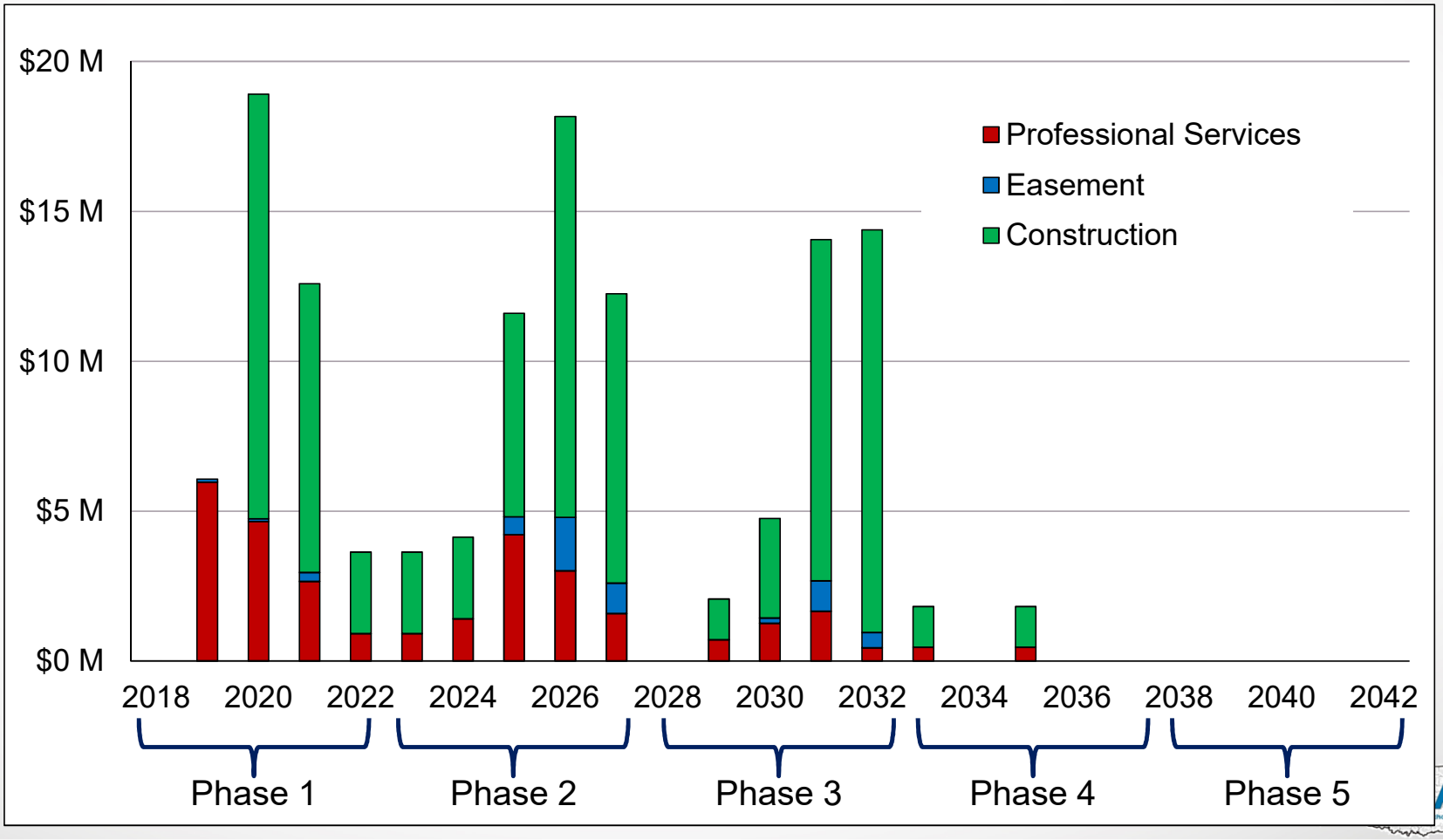
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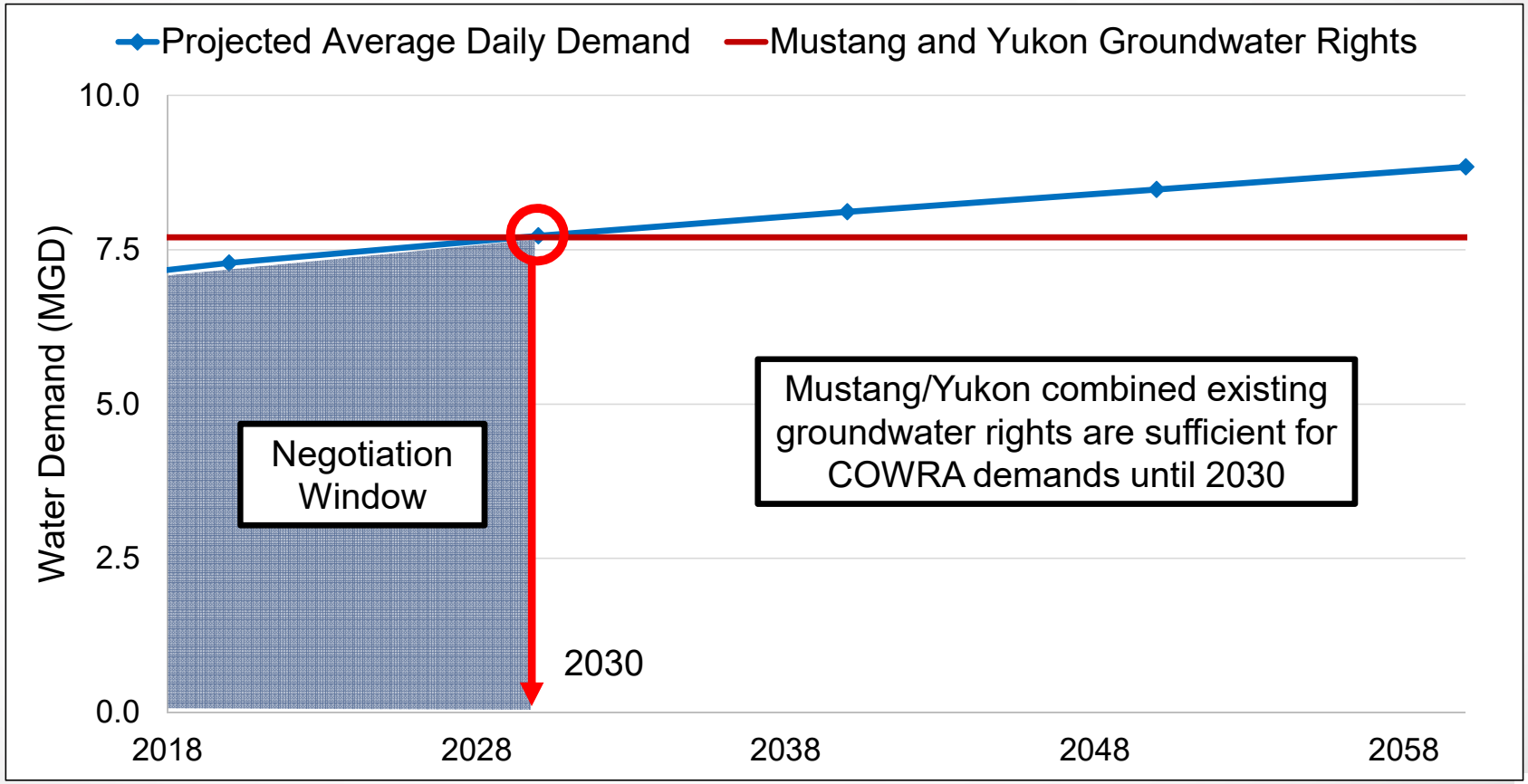
Capital Improvements Plan



Capital Improvements Plan

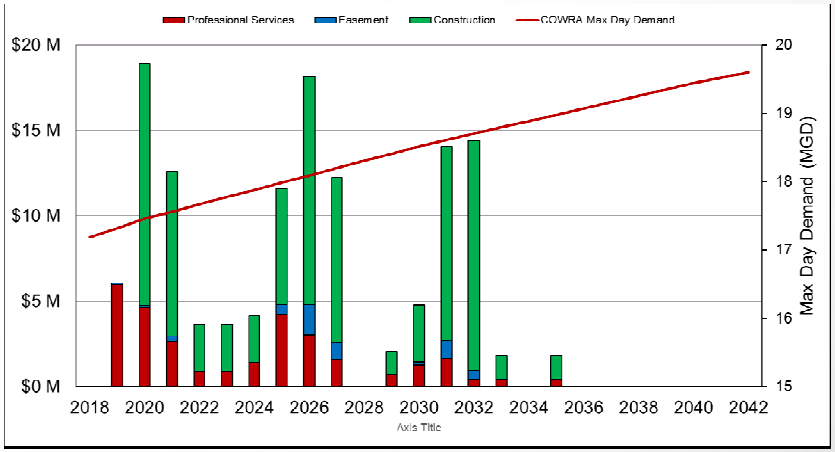


Water Rights



Phasing plan balances capital with actual demands

- As demands increase, add wells
- If demands slow, decrease or delay wellfield expansion
- Maintain OKC Connection
- Begin Water Rights Negotiation



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