



ADVISORY COUNCIL MEETING #2

August 16, 2022



WELCOME!



INTRODUCTIONS

MEETING GOALS

RULES FOR ENGAGEMENT

- The deliberation process will be collaborative
- Everyone's perspective is valued and respected
- Listen to understand, not to debate
- Be concise
- Be hard on the issues – soft on the people
- Avoid right-wrong paradigms

RULES FOR ENGAGEMENT

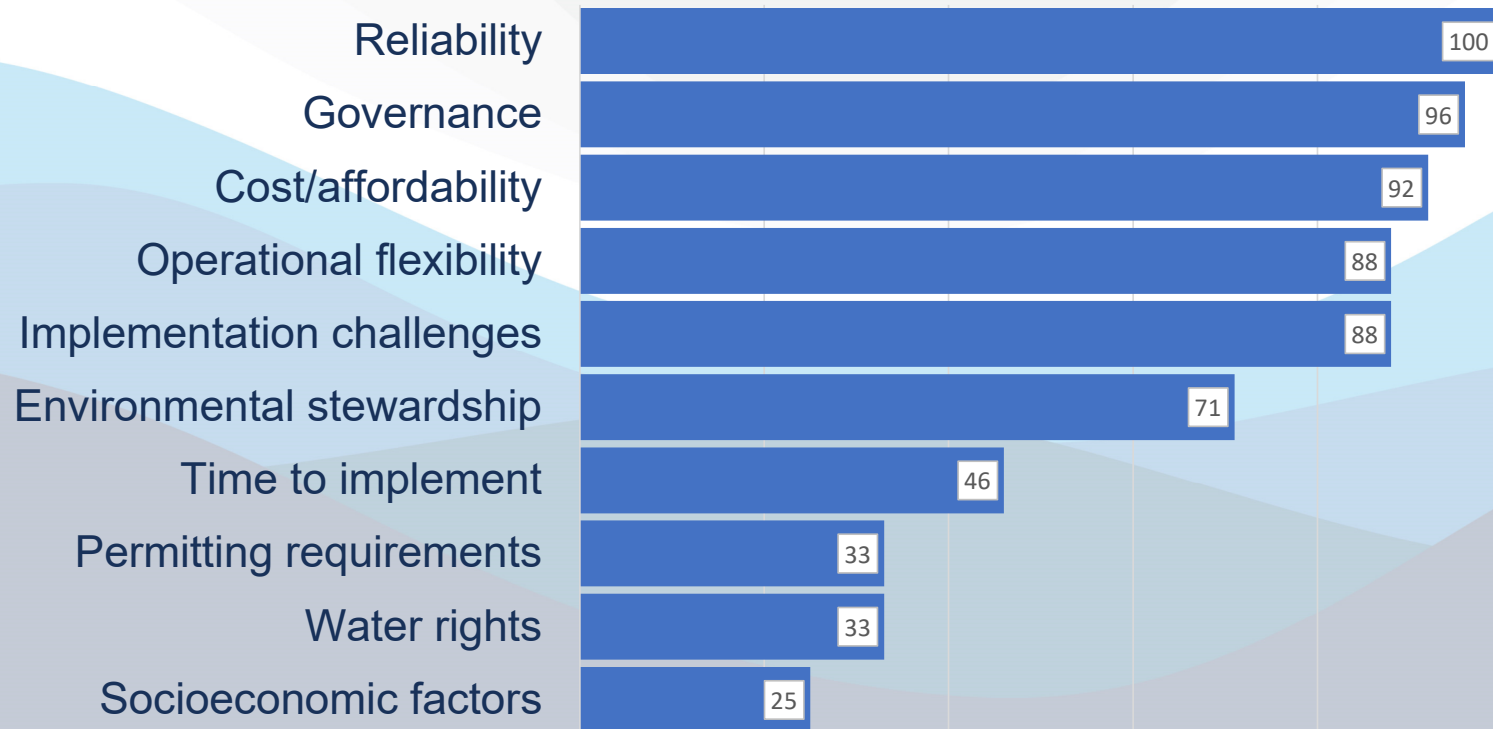
- Everyone should have an equal opportunity to participate
- Respect start and finish times
- Provide your full attention
- Full participation is critical
- Ask questions – don't wait

THE LEVELS OF CONSENSUS ARE:

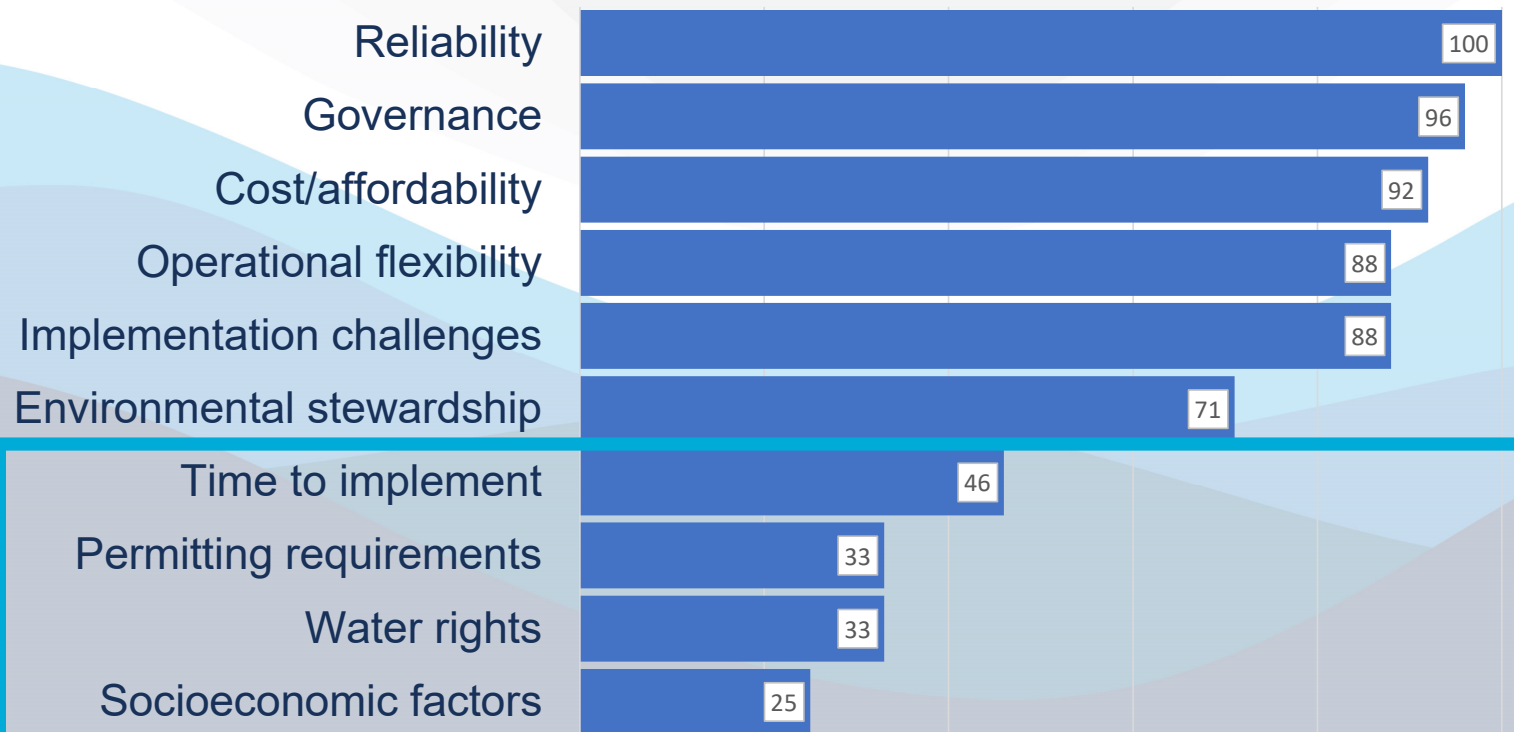
1. I can say an unqualified 'yes' to the decision. I am satisfied that the decision is an expression of the wisdom of the group.
2. I find the decision perfectly acceptable.
3. I can live with the decision; I'm not especially enthusiastic about it.
4. I do not fully agree with the decision and need to register my view about it. However, I do not choose to block the decision. I am willing to support the decision because I trust the wisdom of the group.
5. I do not agree with the decision and feel the need to stand in the way of this decision being accepted.
6. I feel that we have no clear sense of direction of unity in the group. We need to do more work before consensus can be reached.

FINAL CRITERIA DEFINITIONS

CRITERIA VOTING RESULTS

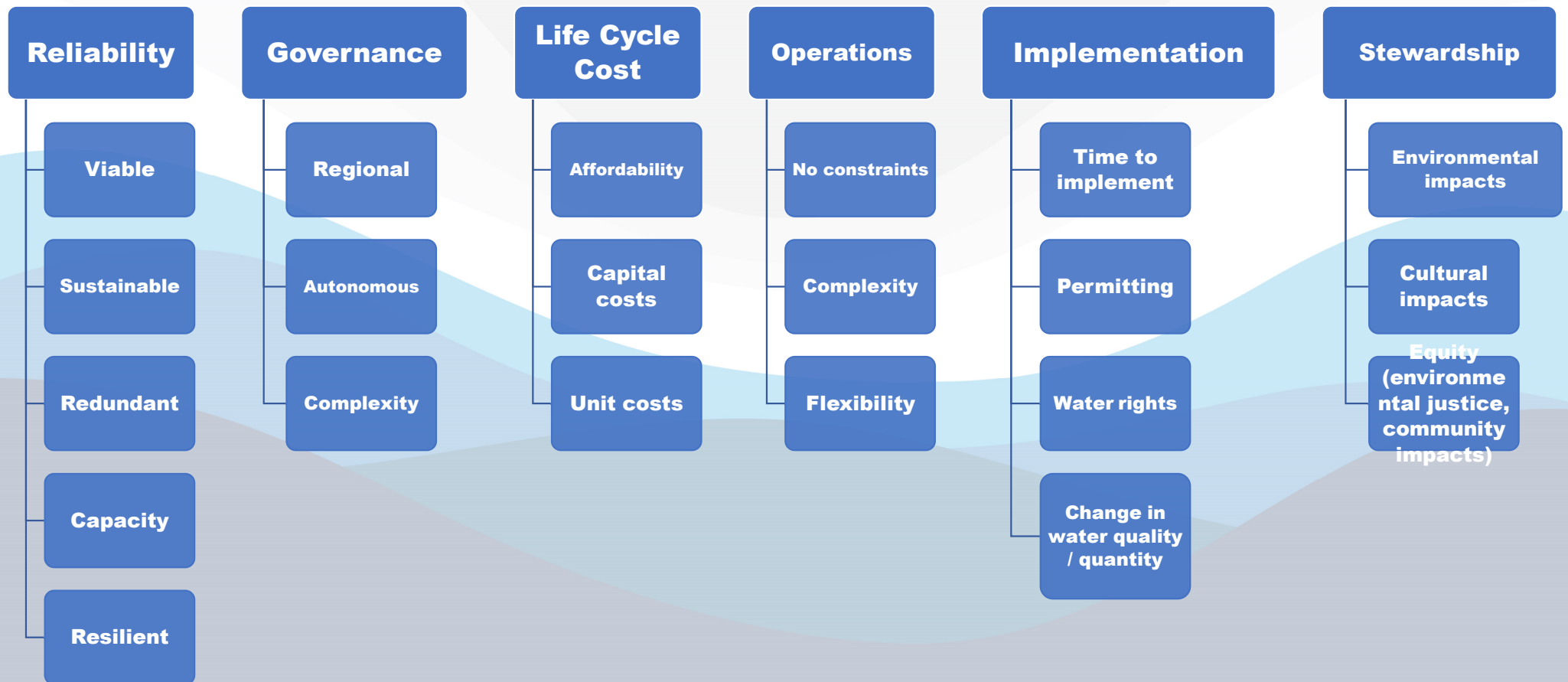


CRITERIA VOTING RESULTS



FINAL CRITERIA

- Reliability
- Governance
- Life Cycle Cost
- Operations
- Implementation
- Stewardship



Reliability

Viable

Sustainable

Redundant

Capacity

Resilient

Regional

Autonomous

Complexity

Affordability

Capital costs

Life cycle costs

Unit costs

No constraints

Complexity

Flexibility

Time to implement

Permitting

Water rights

Change in water quality / quantity

Environmental impacts

Cultural impacts

Equity (environmental justice, community impacts)

Viable

Sustainable

Redundant

Capacity

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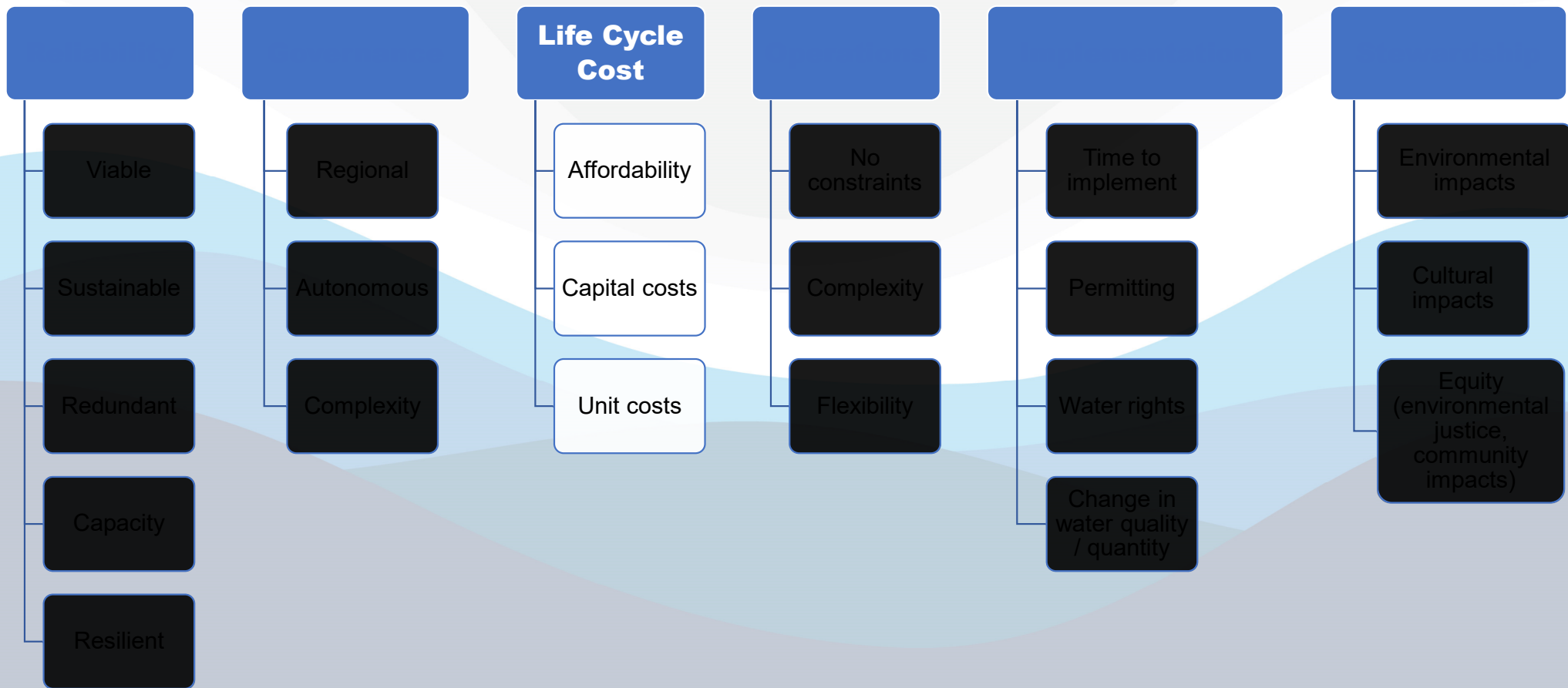
Water rights

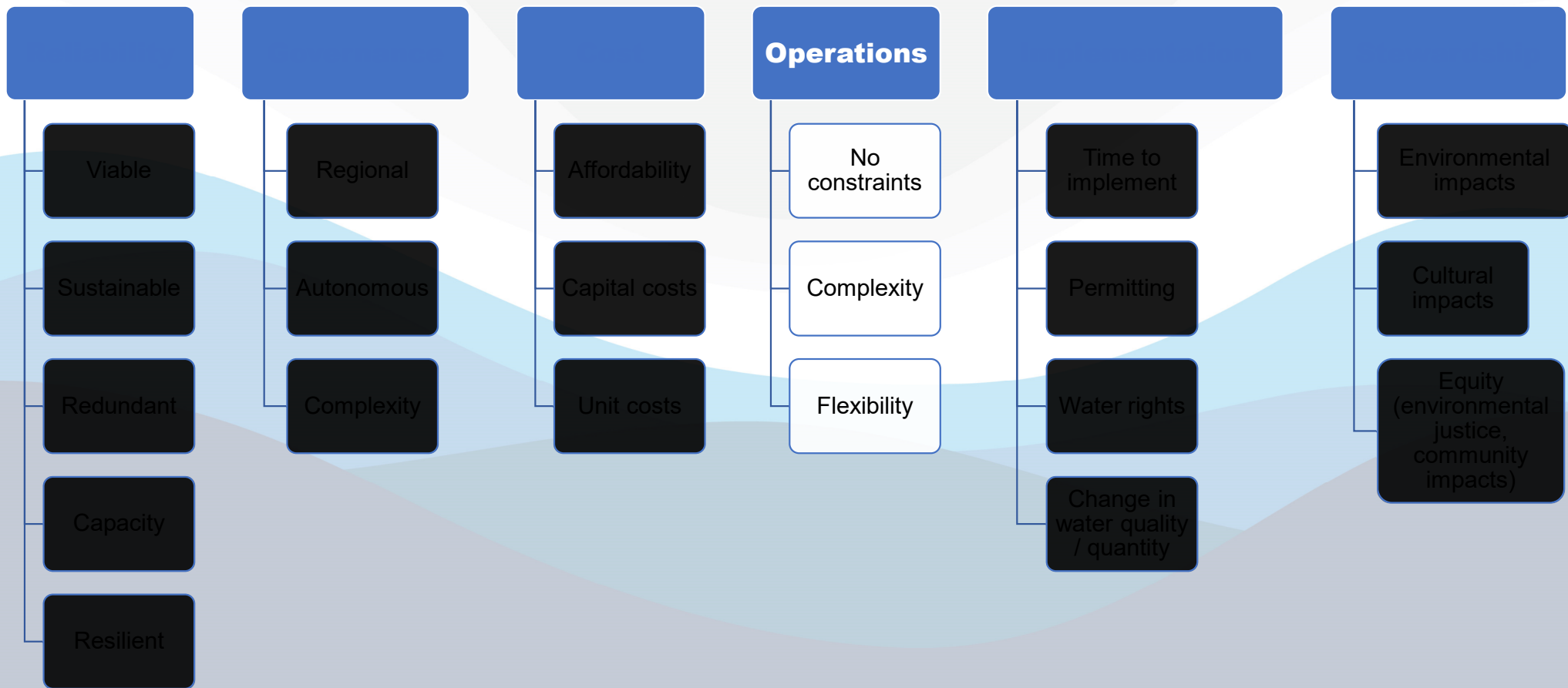
Change in water quality / quantity

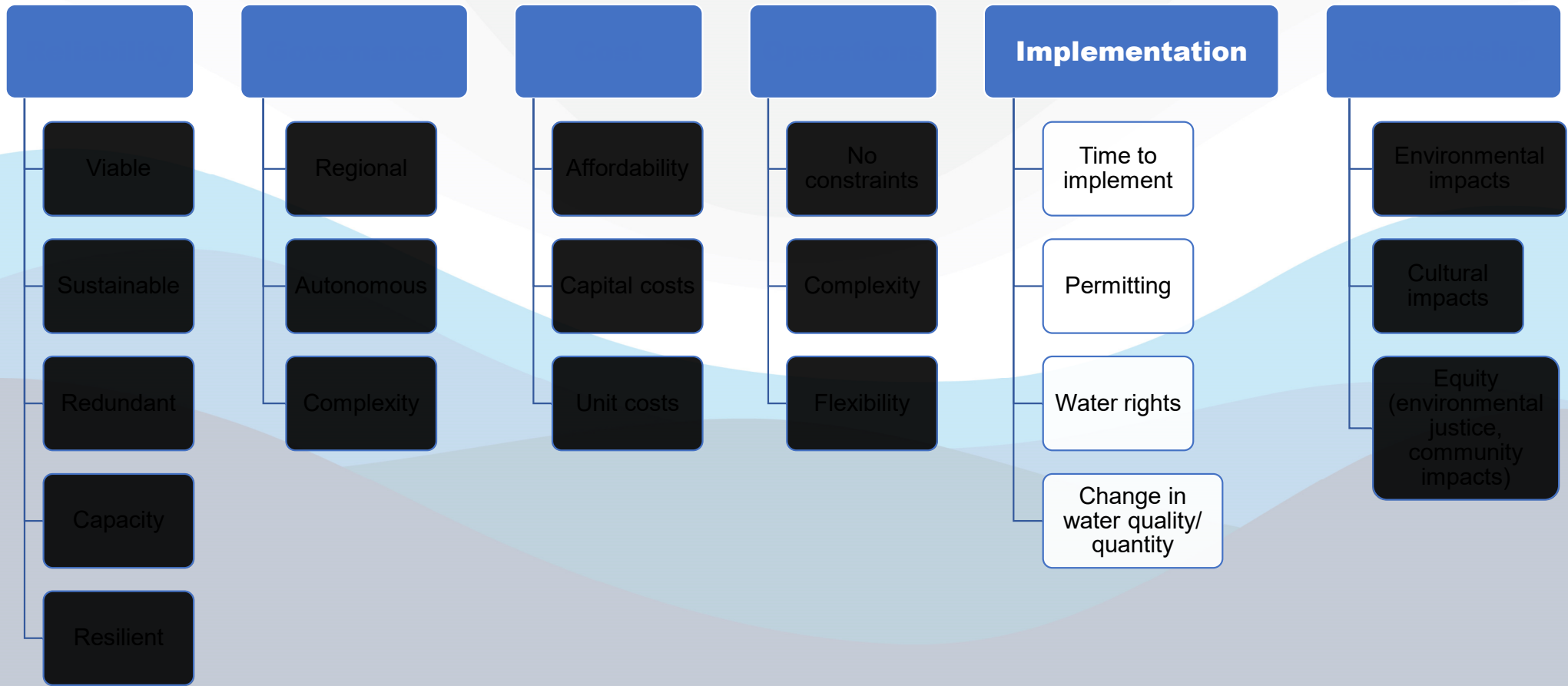
Environmental impacts

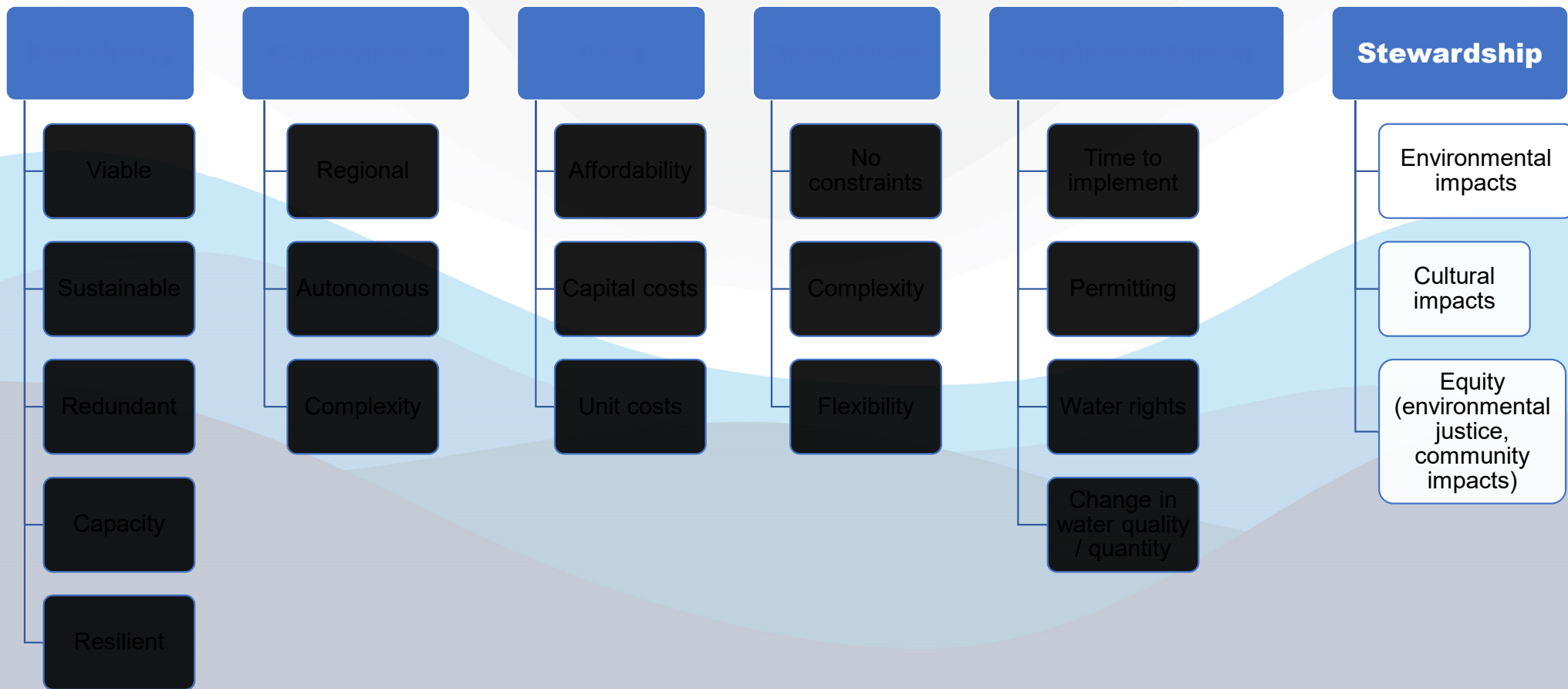
Cultural impacts

Equity (environmental justice, community impacts)









PROPOSED CRITERIA WEIGHTINGS AND CONSENSUS

WEIGHTING OF THE CRITERIA

	Support %	Calculated Weight	Round to Nearest 5	Proposed Weightings
Reliability	100	19%	20	25
Governance	96	18%	20	20
Lifecycle Cost	92	17%	15	15
Operations	88	16%	15	15
Implementation	88	16%	15	15
Stewardship	71	13%	15	10

SCORING DEFINITIONS TO CONSIDER

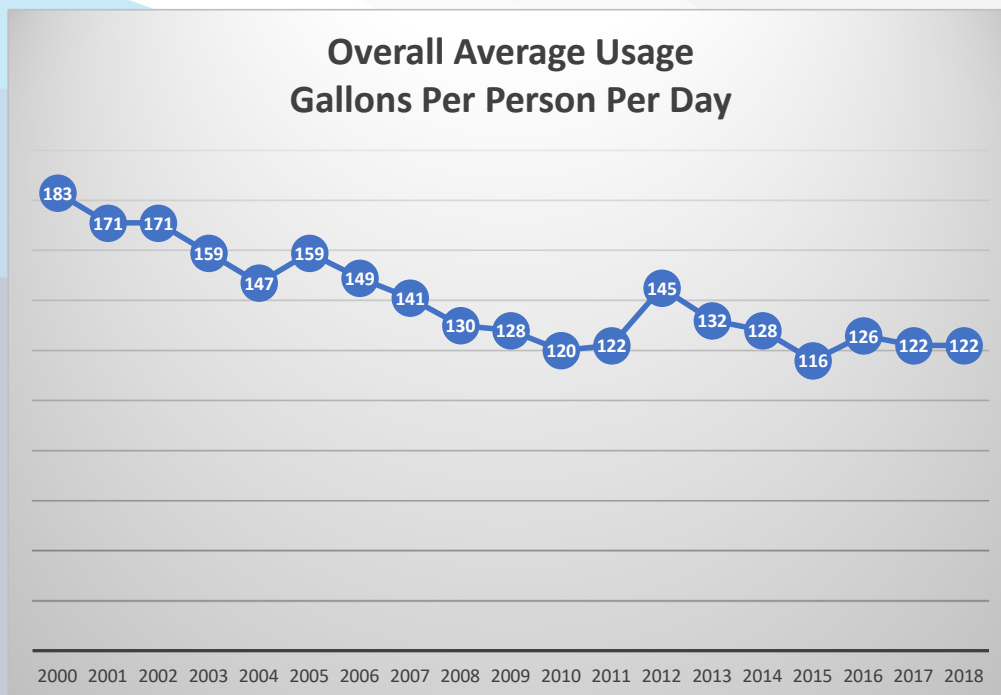
Score	Description
5	<u>Fully</u> meets the criteria definition
4	Meets <u>most</u> of the criteria definition
3	Meets <u>some</u> of the criteria definition
2	Meets <u>little</u> of the criteria definition
1	Meets <u>none</u> of the criteria definition

WATER USAGE AND SUPPLY NEEDS



WATER USAGE AND SUPPLY NEEDS

- Downward Trend in Usage
- Curve Flattening in 2014



Data taken from 2020 Master Plan

How Much Water Do We Use?



Source: Water Research Foundation, Residential End Uses of Water, Version 2, 2016

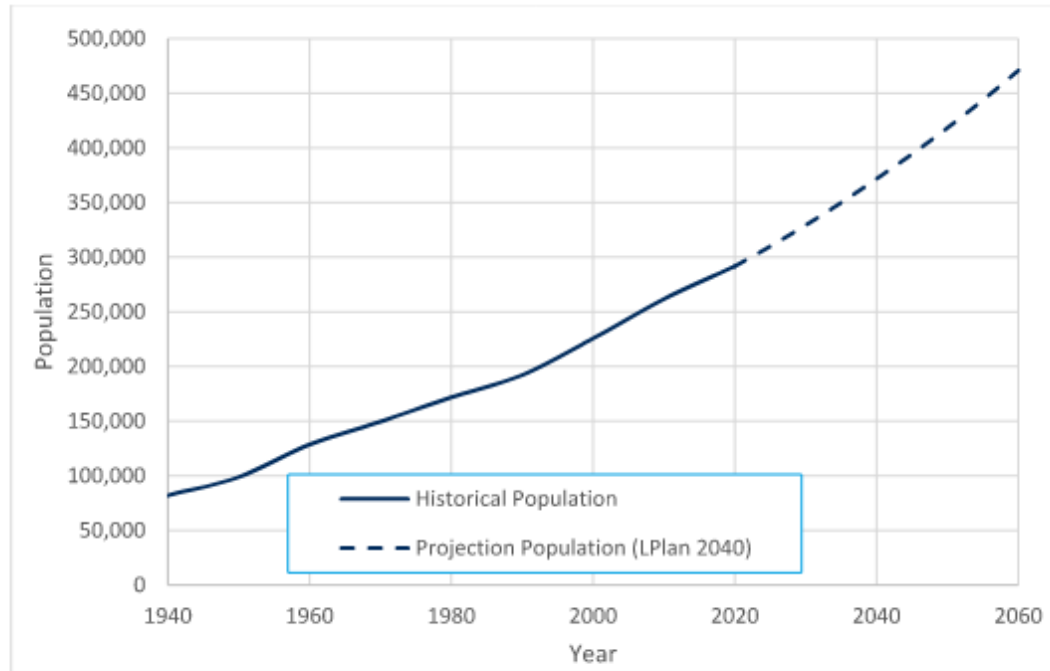


Figure ES-2 City of Lincoln Historical and Projected Population

WATER USAGE AND SUPPLY NEEDS

- Average Use Per Person 124 Gallons Per Day (10 year running average)

PLANNING HORIZON & NEEDED CAPACITIES

PLANNING HORIZON AND CAPACITY NEEDS

- American Water Works Association (AWWA) is industry standard
- Annual benchmarking of utilities nationwide
- Available Supply – Median of 51 years
- City of Lincoln – 26 years

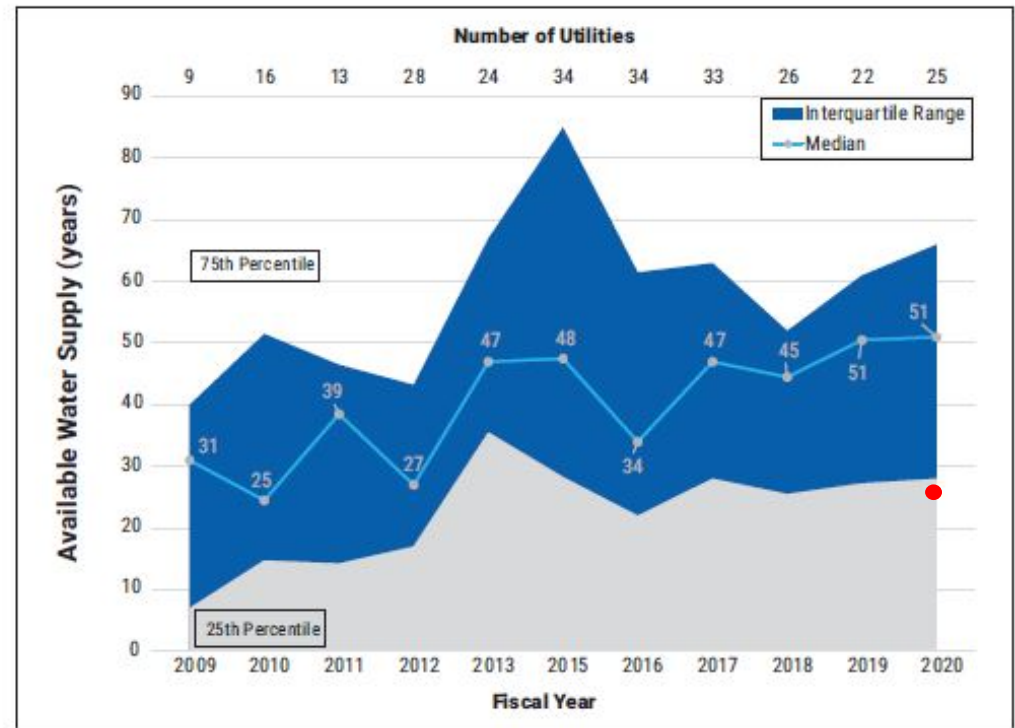
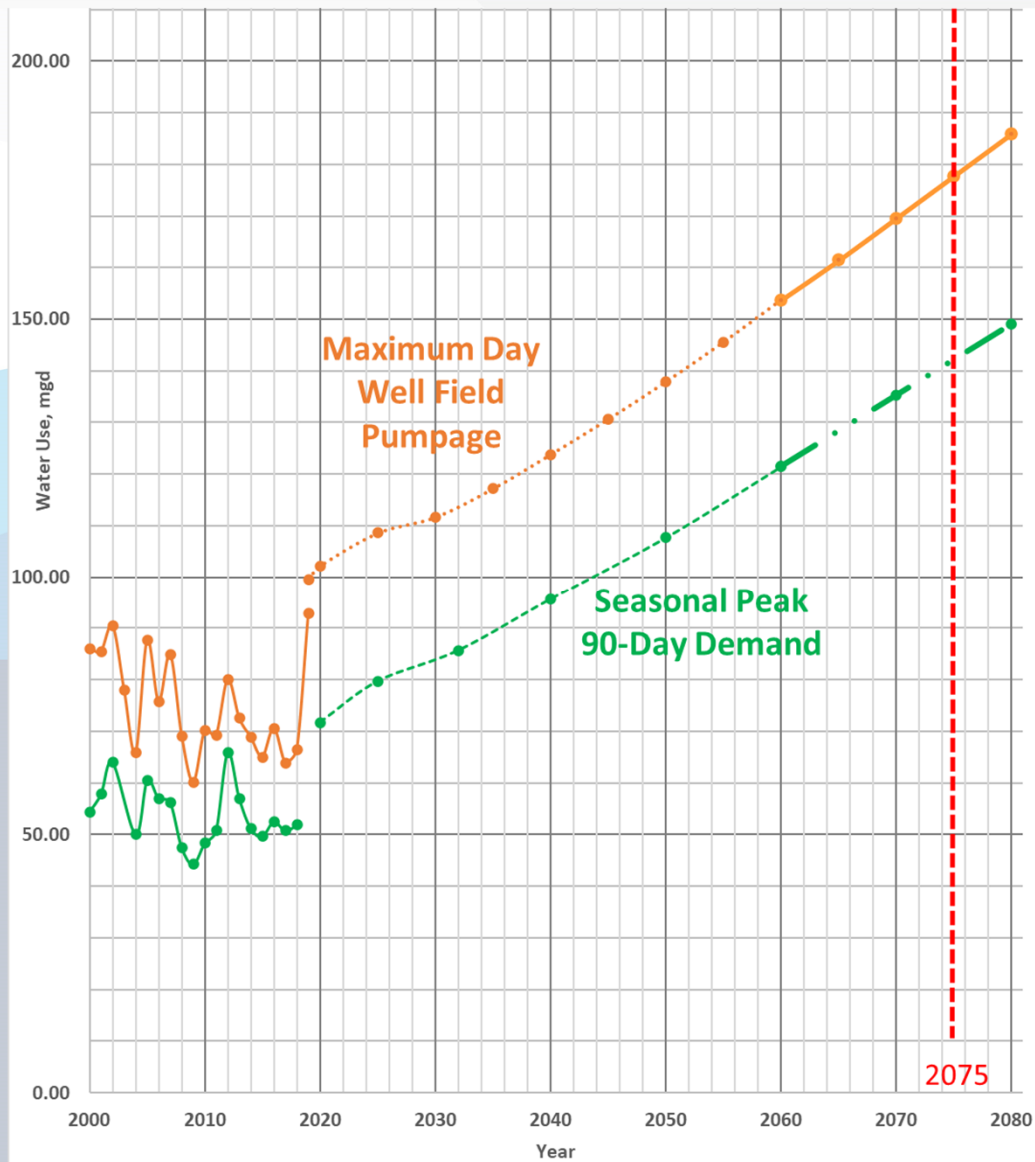


Figure 6-42 Water utility—available water supply (years)



PLANNING HORIZON AND CAPACITY NEEDS

- Recurrence interval
- Climate adjustment
- Design criteria for this study
 - Design Year - 2075
 - Additional 90-day yield of 40 mgd
 - Additional Maximum Day capacity of 60 mgd

FEASIBILITY

THREE CATEGORIES FOR DETERMINING FEASIBILITY

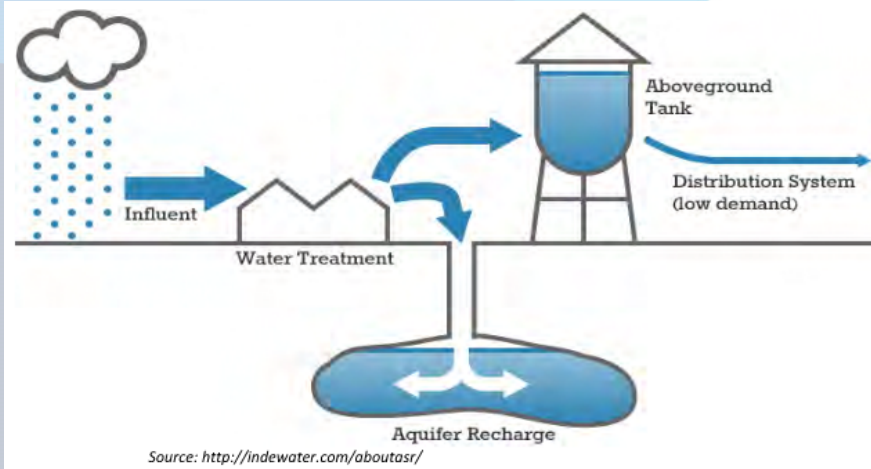
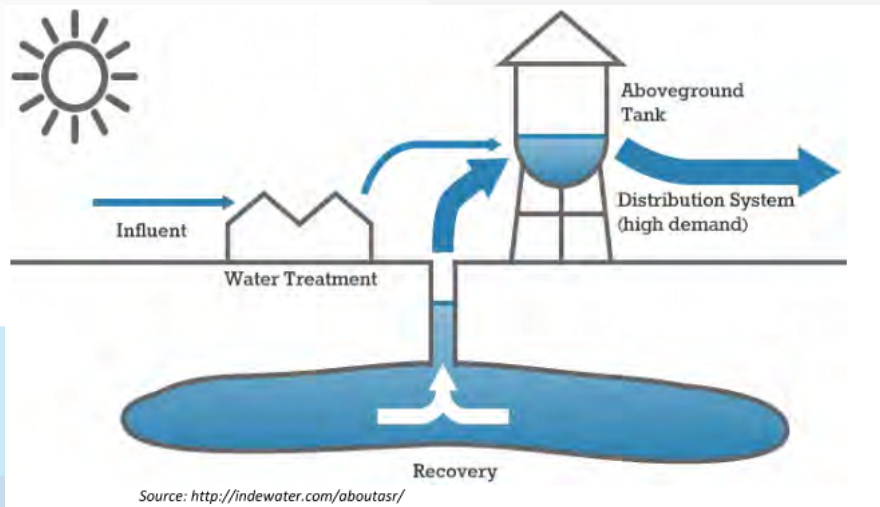
- **SUPPLY ENHANCEMENT**
- **RECOMMEND DISCARDING ALTERNATIVES**
- **ALTERNATIVES WORTHY OF FURTHER EVALUATION**

WATER SUPPLY ENHANCEMENTS

- Conservation

- Columbia, Missouri program estimated to cost \$1 million to implement
- Predicted to reduce average day usage by 1 million gallons per day (mgd) after 10 years

CONSERVATION PROGRAM	CONSERVATION ACTIVITY
Conservation Analysis and Planning	Conservation Coordinator
	Customer Surveys
	Customer Audits
Financial Incentives	Water Conservation Pricing
Supply-Side Conservation & Water Loss Control	AWWA Water Audit and Water Loss Control
Landscaping	Landscape Irrigation Conservation and Incentives
	Residential Landscape Irrigation Evaluation
Education & Public Awareness	Public Information
	School Education
Rebate, Retrofit, and Incentive Programs	Audit Programs for Commercial and Large Commercial Accounts
	Residential Toilet and / or Clothes Washer Incentive Program
	Showerhead, Aerator, Retrofit
Conservation Technology	New Construction Graywater
	Rainwater Harvesting and Condensate Reuse
Regulatory & Enforcement	Prohibition on Wasting Water
	Landscape Irrigation Scheduling Ordinance
	New Construction or Retrofit Ordinance



WATER SUPPLY ENHANCEMENTS

- Water Reuse
- Water Rights
- Aquifer Storage and Recovery (ASR)

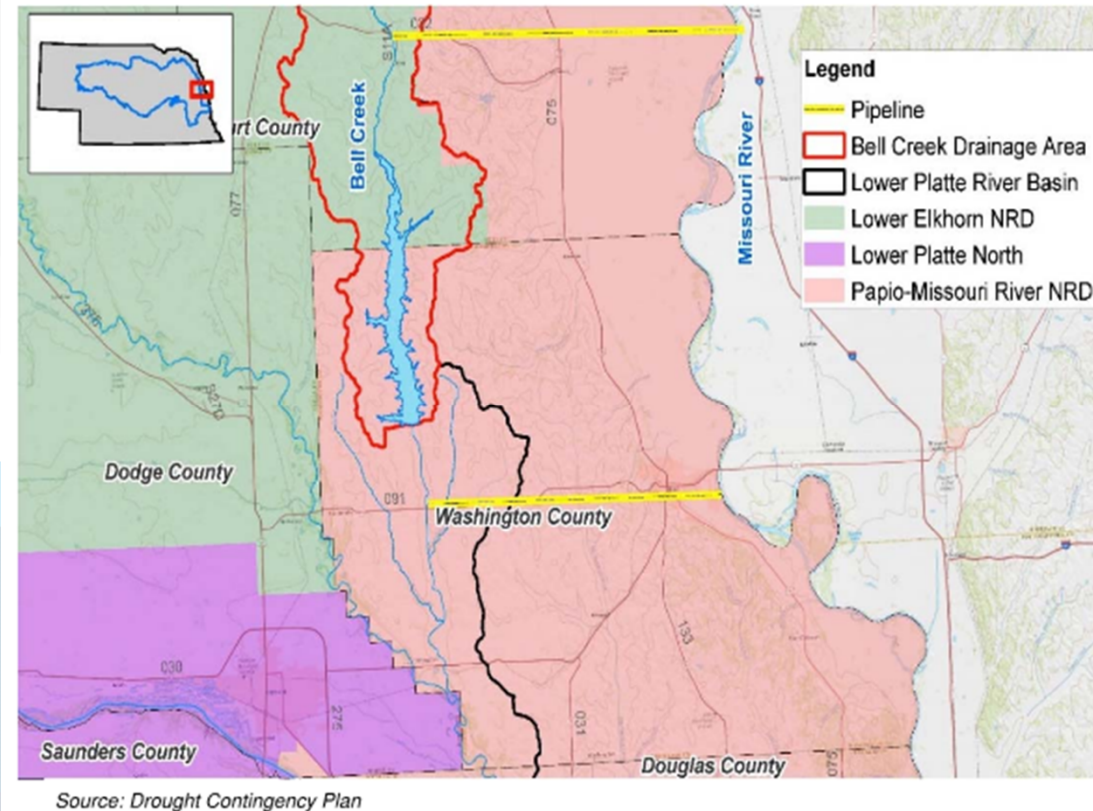
WATER SUPPLY ENHANCEMENTS

Drought Contingency Plan Alternatives		Volume Increase at Ashland (cfs)
1	Import Missouri River Water to Bell Creek (via alluvial well-field; no reservoir)	80
2	Sherman Release (400 cfs at St. Paul)	132
3	Sherman Release (250 cfs at St. Paul)	83
4	Skull Creek Res. Release (100 cfs at Linwood)	80
5	Bell Creek Reservoir Release (100 cfs at Waterloo)	80
6	Pump Missouri River water (via alluvial well-field) and into Bell Creek Reservoir	80
7	Middle Loup Canal Recharge (Historic Loup Canal Operations)	4
8	Middle Loup Canal Recharge (Full Hydropower Right downstream)	1
9	Alluvial sandpit Pumping Leshara	100
10	Augmentation Well-field	100
11	Rapid Response Area / Dry-year Lease	33
12	Interconnection of MUD and LWS Finished Water Supplies	NA

“Fifteen-day operating period, targeting late July/early August critical low-flow period”

WATER SUPPLY ENHANCEMENTS

- Bell Creek Reservoir
 - Anticipated Platte River Flow Increase at Ashland – 80 cfs
 - Second Source – Missouri River
 - Fifteen-day Operating Period

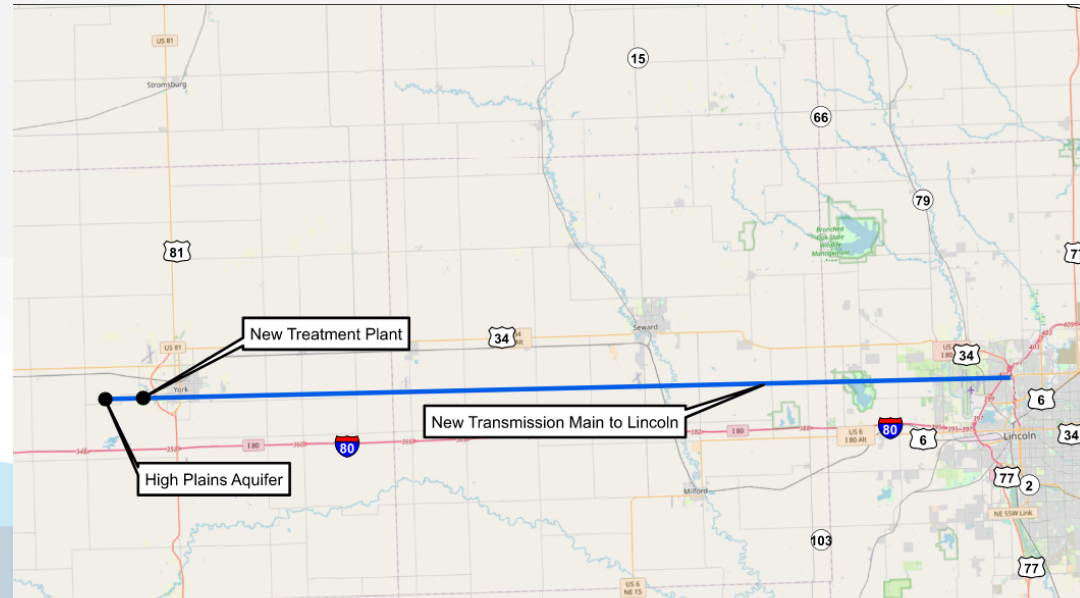


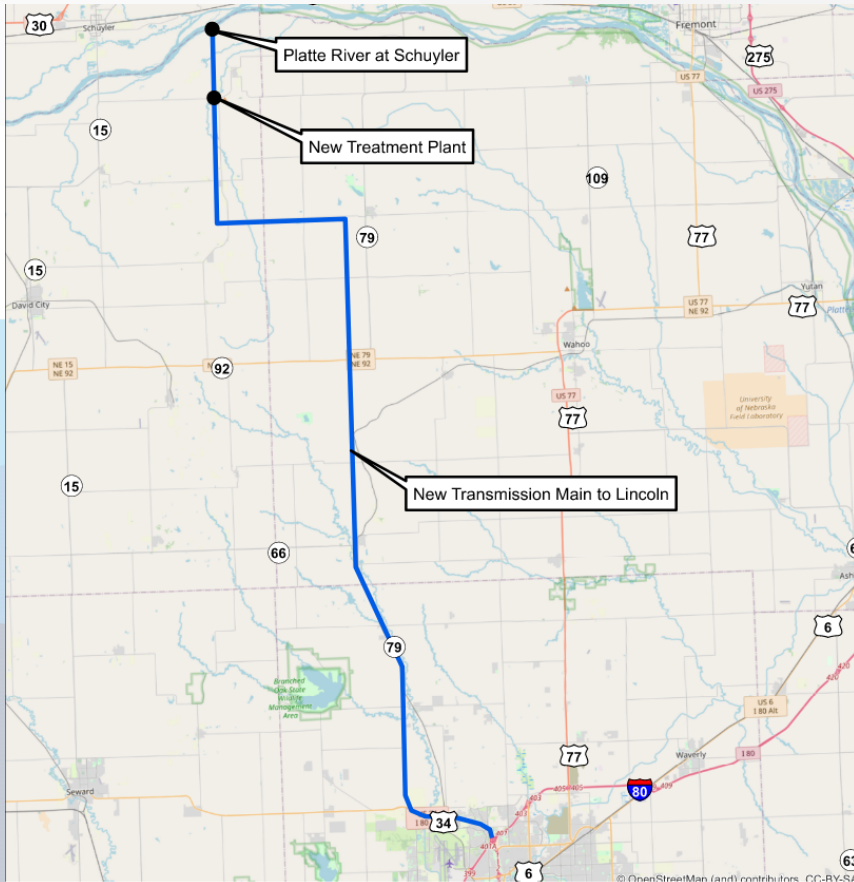
"Fifteen-day operating period, targeting late July/early August critical low-flow period"

WATER SUPPLY ALTERNATIVES RECOMMEND FOR DISCARDING

WATER SUPPLY ALTERNATIVES

- High Plains Aquifer
 - Distance from Lincoln 50+ miles
- Limited aquifer recharge
- Water quality, specifically nitrates
- Permitting challenges





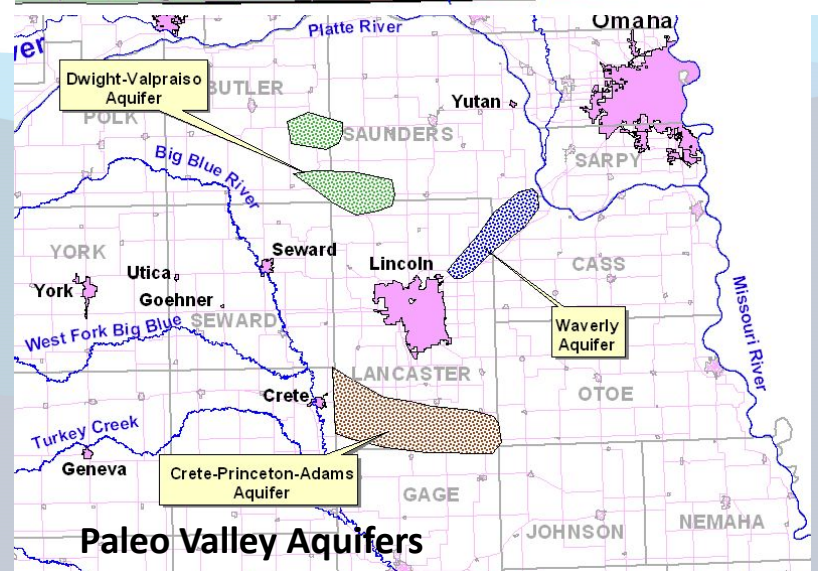
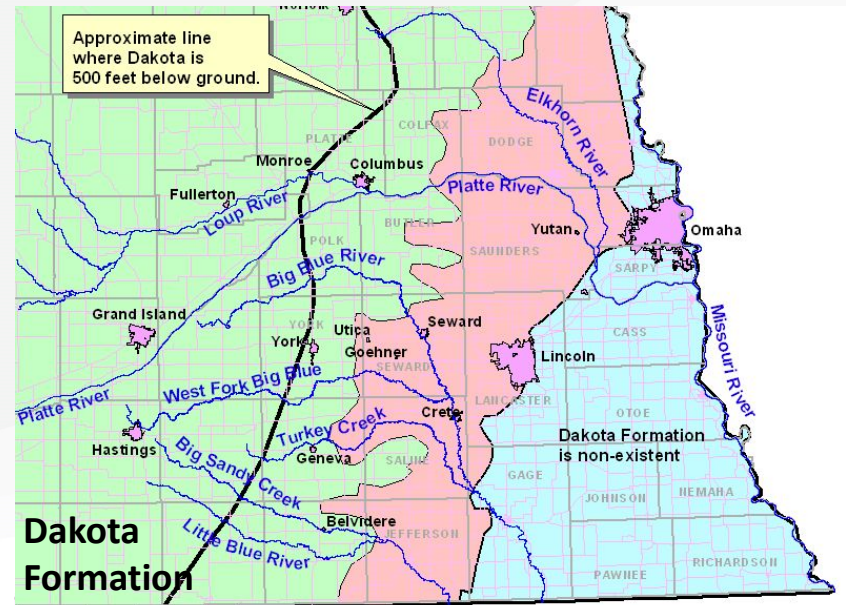
WATER SUPPLY ALTERNATIVES

- Schuyler Wellfield
 - Lower Platte River Basin Collation
 - Impacts to MUD's well field near Yutan
 - Impacts to LWS's Platte River Well Field
 - Conveyance distance of 55 to 60 miles



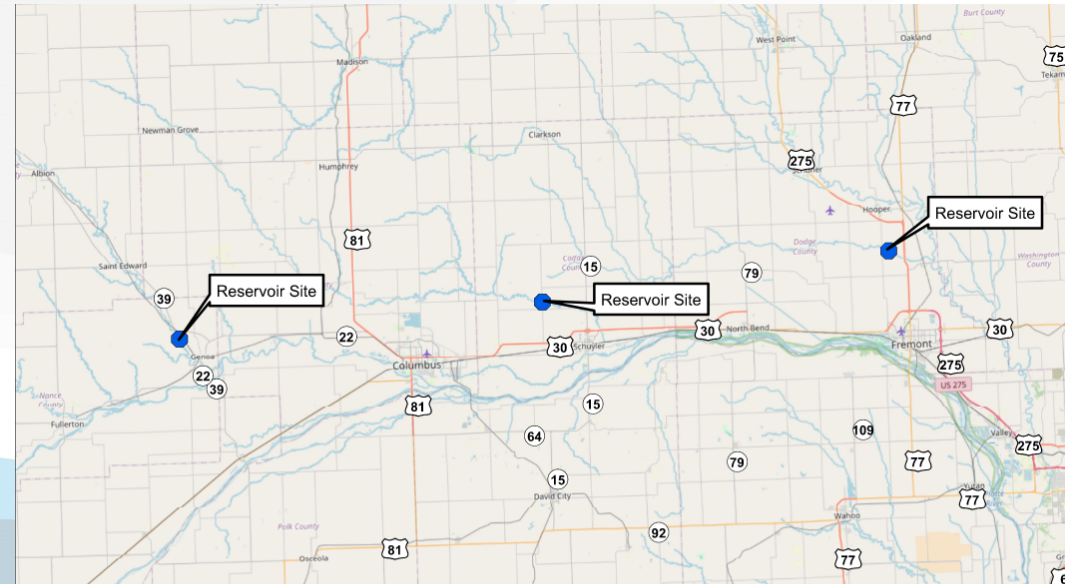
WATER SUPPLY ALTERNATIVES

- **Dakota Formation**
 - Limited / variable capacity
 - Potential for minerals – Antelope Park Wells
 - Could be used for ASR
- **Paleo Valley Aquifer**
 - Slow recharge rate
 - Supply capacity less than City's needs
 - Ability to support continued pumping in question
 - Could be used for ASR



WATER SUPPLY ALTERNATIVES

- Surface Water Reservoirs Along Loup and Elkhorn Rivers
 - Potential water rights issues with downstream users
 - Costs of acquiring land, buying homes, rerouting roads
 - Cost of dam, spillway, permitting, pipeline and treatment
 - Uncertain of amount of additional flow at Ashland





WORTHY OF FURTHER EVALUATION

WORTHY OF FURTHER EVALUATION

- Fully Develop Existing Wellfield
- Expand Existing Wellfield South of I-80
- Off Channel Surface Reservoir
- Omaha MUD Interconnect
- Missouri River Surface Water Intake to Ashland
- Missouri River Wellfield to Ashland
- Missouri River Surface Water Intake to Lincoln
- Missouri River Wellfield to Lincoln
- Combination of Alternatives

FULLY DEVELOP EXISTING WELLFIELD

- Wells, river crossing, pipeline, and plant expansion
- Currently evaluating ultimate 90-day seasonal capacity for existing wellfield property
 - Will be less than 145 million gallons per day
- Likely the lowest cost alternative, but does not change risk profile
- Concern with arsenic levels

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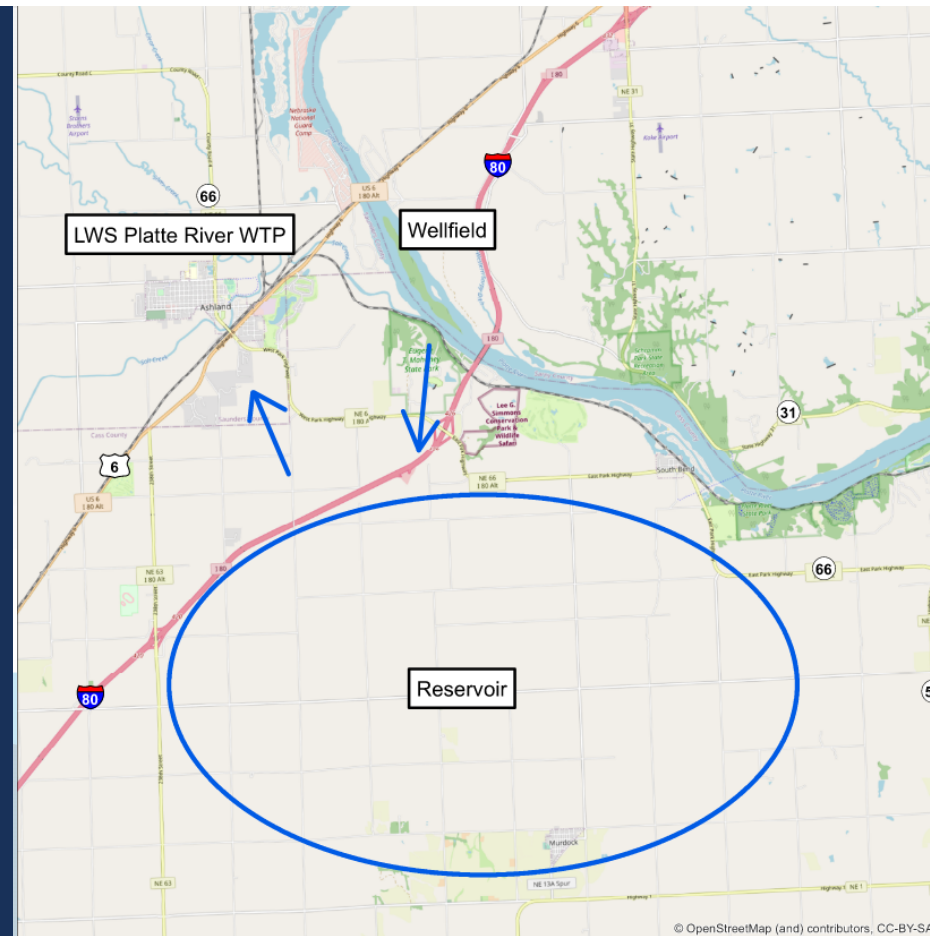
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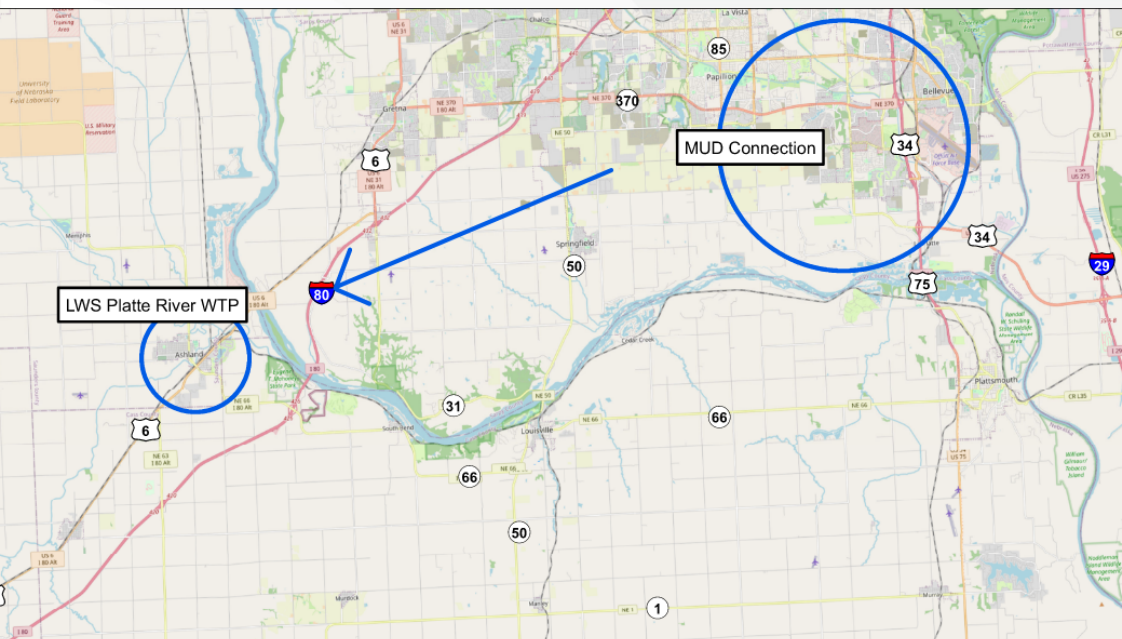
EXPAND EXISTING WELLFIELD SOUTH OF I-80

- Full development of existing wellfield property
 - Plus crossing I-80 crossing and additional wells south of I-80
- Some increase in reliability by expanding the footprint of the wellfield
- Does not improve redundancy
- Economical means to obtain more capacity

OFF CHANNEL SURFACE RESERVOIR

- Maximize existing wellfield, pipelines, reservoir
- Pump excess water during high flows in Platte River and store in reservoir
- Significant public and environmental impacts
- Water rights implications
- Requires plant modifications to treat surface water





OMAHA MUD INTERCONNECT

- Water quality challenges
- Benefits and detriments of a shared utility
- Still working with MUD to understand available capacity
- Need wholesale user rate and impact fees to proceed with life cycle cost analyses
- Lack of control over rate increases



MUD Interconnect



MISSOURI RIVER WATER SUPPLY



MISSOURI RIVER SURFACE WATER INTAKE TO ASHLAND

- Susceptible to chemical spill, algal toxins, PFAS, and taste & odor
- Pre-treatment at the Missouri River, finish treat at Ashland
- LWS less familiar with treating surface water
- Operational concerns – Flooding, Ice, Riverbed degradation



MISSOURI RIVER WELLFIELD TO ASHLAND

- Multiple wellfield locations to be considered
- Wellfield subject to flooding
- Some treatment at wellfield
 - Remove oxidized particulates such as iron, manganese, arsenic
- Filtration and disinfection at Ashland WTP's
- Allows for control and leveraging of operational cost



MISSOURI RIVER SURFACE INTAKE TO LINCOLN

- Complete redundancy with unlimited supply all the way to Lincoln
- New WTP near the Missouri River
- Ability to serve communities between Missouri River and Lincoln
- Most redundant and most expensive of all the alternatives being considered



MISSOURI RIVER WELLFIELD TO LINCOLN

- Identical to previous alternative but supplying well water vs. surface water



Missouri River To Lincoln



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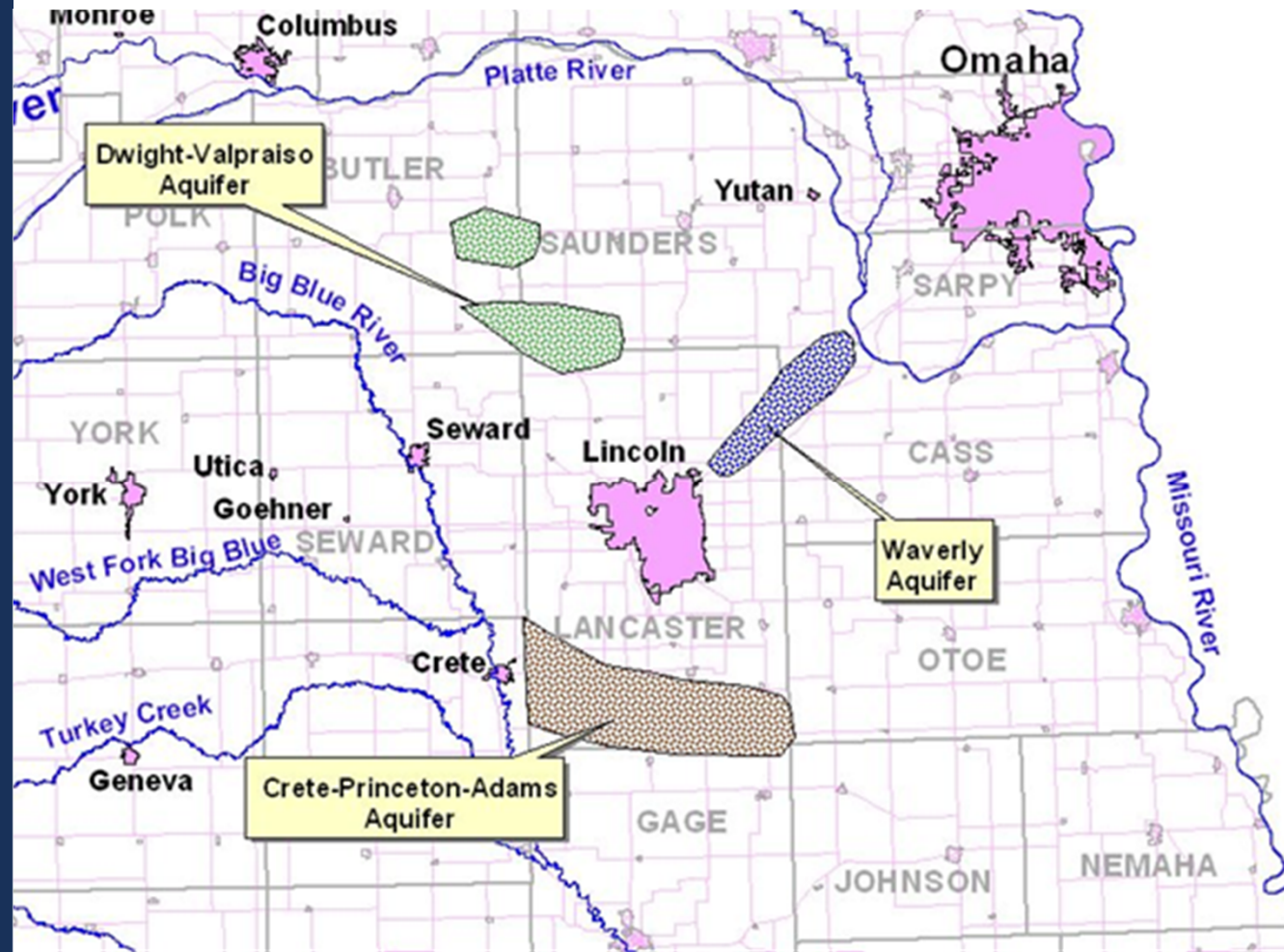


COMBINATION OF ALTERNATIVES

- Expansion of existing wellfield defers major capital expenditure
- Benefits associated with 2nd source sooner rather than later
- Some options
 - Connect to MUD near term and expand existing wellfield long term
 - Expand wellfield near term and connect to MUD or Mo River long term
- Life cycle cost
- Rate impact

EXAMPLE SCORING EXERCISE

EXAMPLE APPLICATION OF THE SCORING CRITERIA FOR PALEO VALLEY AQUIFERS



EXAMPLE SCORING RESULTS FOR PALEO VALLEY ALTERNATIVES

Criteria	Description	Score	Weight	Weighted Score
Reliability	Limited capacity, sustainability, and viability	2	0.25	0.5
Governance	Limited regionality	4	0.2	0.8
Life Cycle Cost	High unit cost	3	0.15	0.45
Operations	Achieves criteria	5	0.15	0.75
Implementation	High competition for water	4	0.15	0.6
Stewardship	Aquifer mining	3	0.10	0.3

Total Weighted Score: 3.4

QUESTIONS

CLOSING THOUGHTS