



Grand River Water Supply Study

Broken Arrow Municipal Authority



November 7, 2023





AGENDA

- 1 Introduction & Scope of Project
- 2 Water Rights & Demand Projections
- 3 Agency Coordination
- 4 Source Water Comparison
- 5 Raw Water Pipeline Condition Assessment
- 6 Alternatives Evaluation & Recommended Path Forward

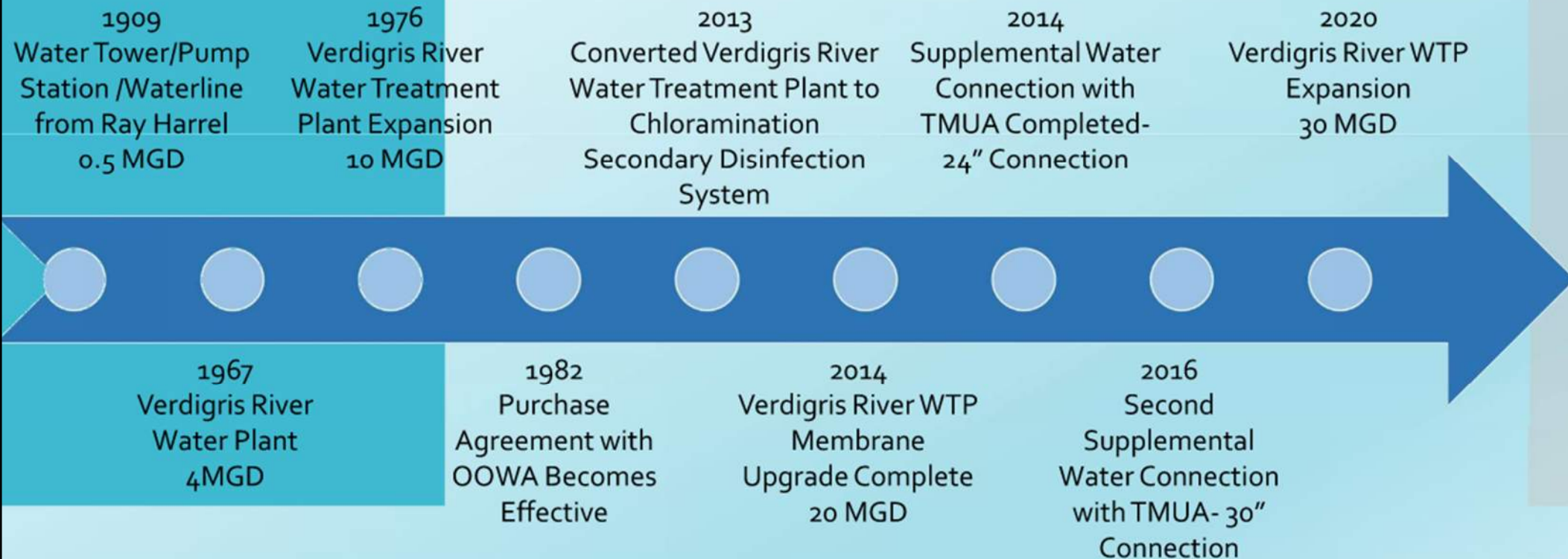


1 Introduction & Scope of Project

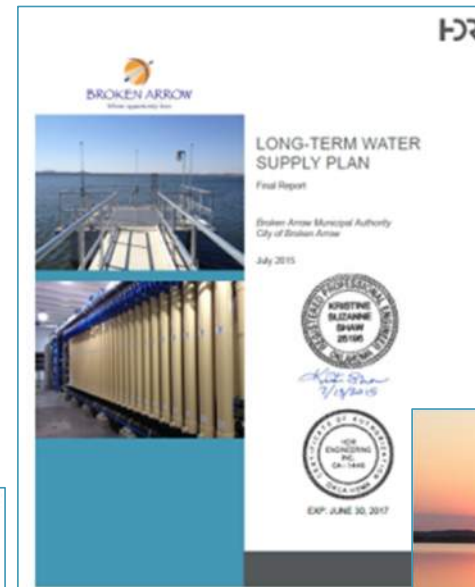
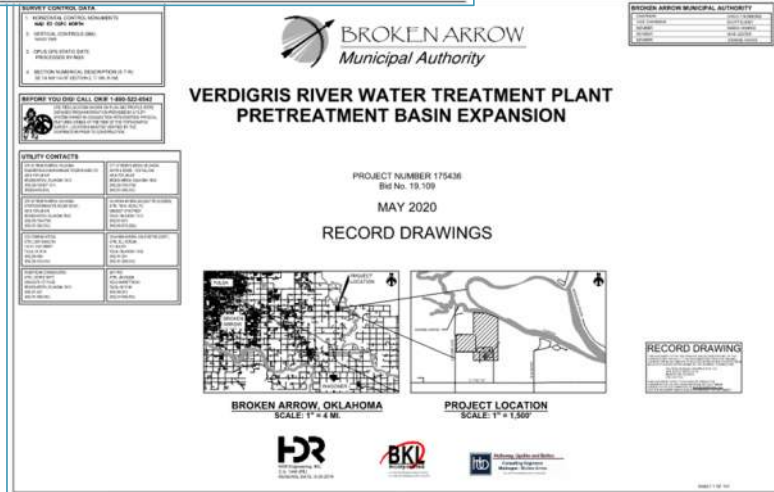
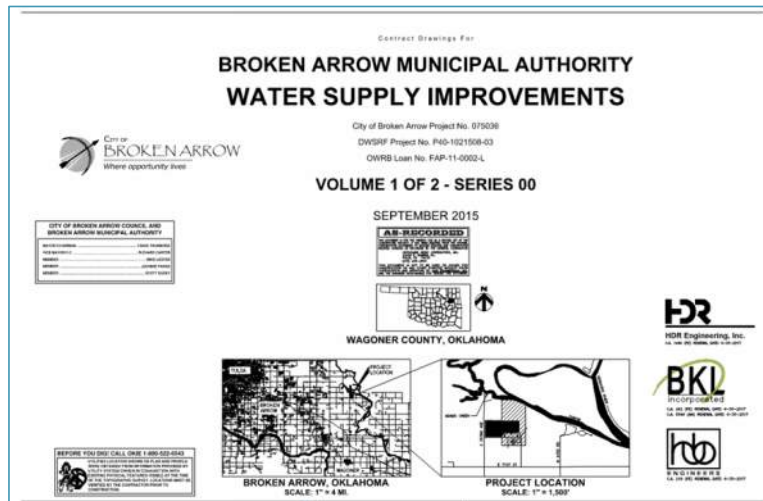
Historical Overview



In the last 100+ years The City of Broken Arrow's population has grown, and the water supply plan has grown and changed with it



HDR has assisted BAMA on water supply since 2007

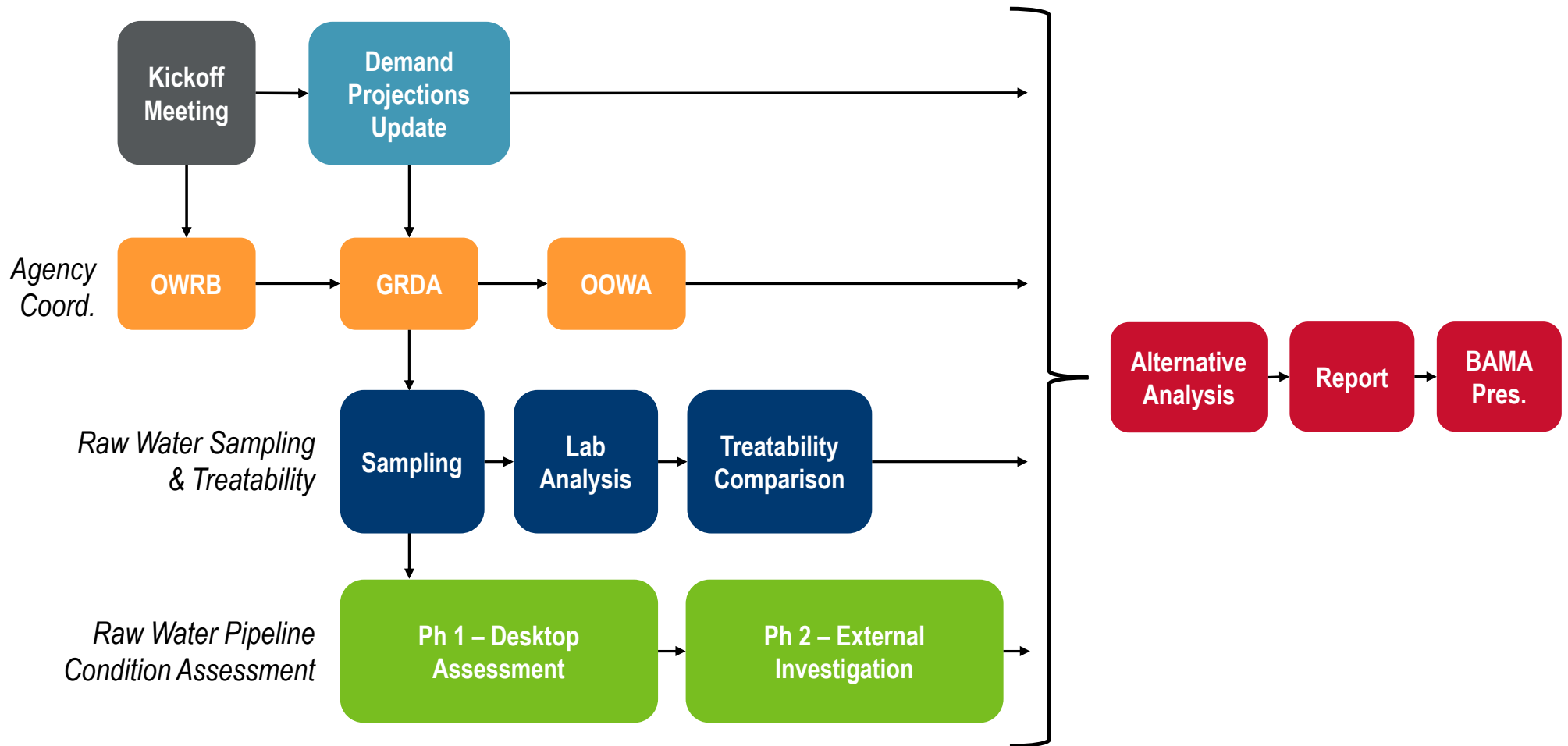


Drivers for this Grand River Water Supply Study

- City relies on only one water source
 - Navigable channel (subject to accidents such as spills, etc.)
 - Upstream users (is there enough water in extreme drought?)
 - Periodic algae outbreaks in recent history
 - Potential OWRB curtailment of existing water rights
- Need for increased reliability and resiliency
 - Redundant supply during future drought conditions or water quality events
 - Flexibility for water quality fluctuations



Grand River Water Supply Study - scope of work summary





2 Water Rights & Demand Projections

Existing water rights

Verdigris River:

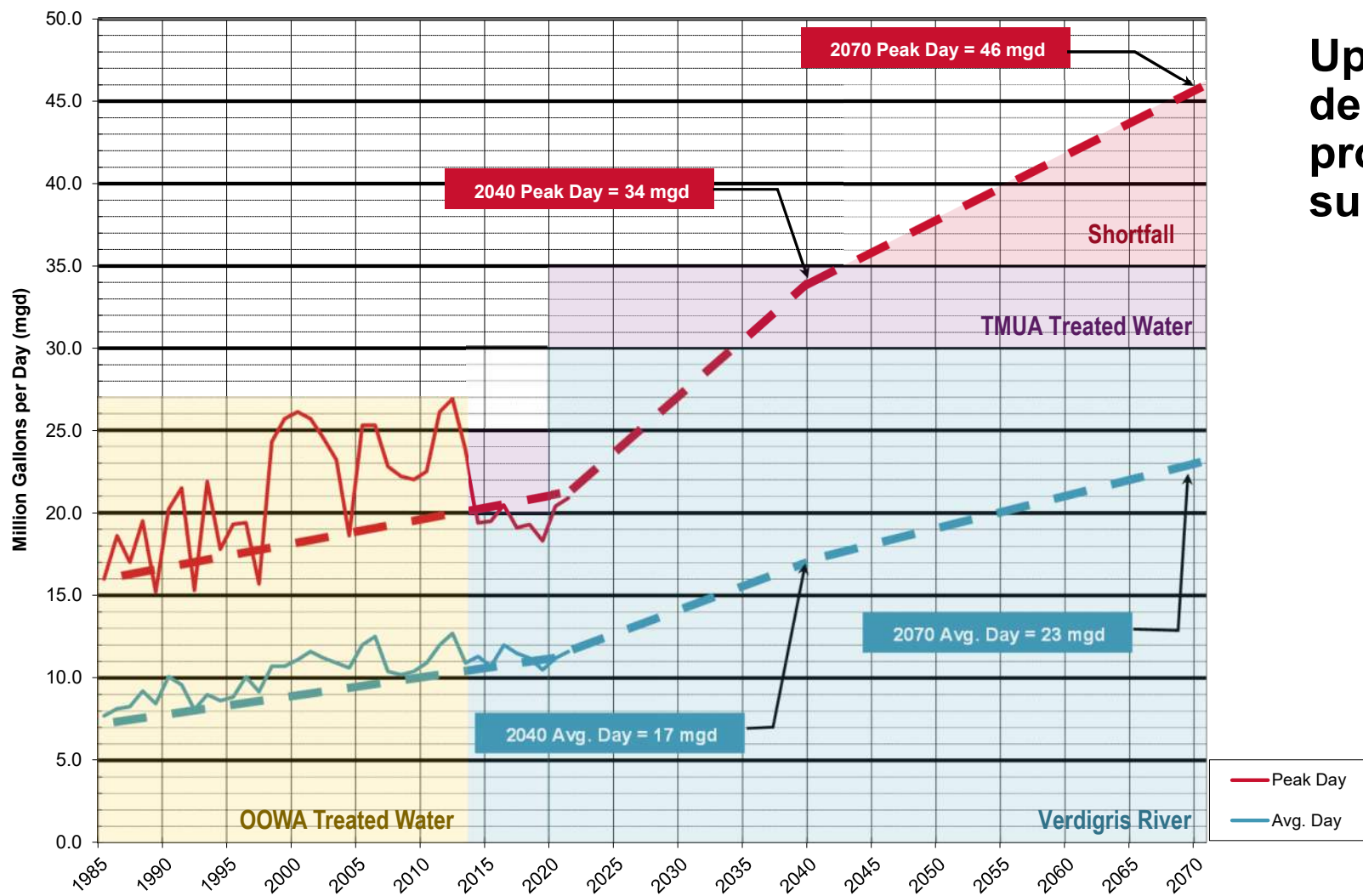
- Permit #1963-131
15,185 ac-ft/year (13.6 mgd)
Max. diversion = 15 mgd
- Permit #1978-063 (pending)
12,042 ac-ft/year (10.7 mgd)
Max. diversion = 15 mgd

Total Verdigris:

- 27,227 ac-ft/year (24.3 mgd)
- Max. diversion = 30 mgd

Tenkiller Ferry Lake:

- Permit #1979-060
56,000 ac-ft/year (50 mgd)
- No storage available in lake from USACE
- Released these rights in 2023



Updated water demand projections and supplies



3 Agency Coordination



OKLAHOMA Water Resources Board

Attention: Kenneth Schwab

Date: January 25, 2023

The attached material is sent to you:

_____ In response to your request

_____ For your information

XXX Additional Information Needed

By: Jason Tutkowski
Water Rights Administration Division



OKLAHOMA WATER RESOURCES BOARD
3800 NORTH CLASSEN BLVD
OKLAHOMA CITY, OKLAHOMA 73118
DESK PHONE (405) 530-8848
CELL PHONE (405) 421-3262
TELEFAX (405) 530-8900
jason.tutkowski@owrb.ok.gov

Re: City of Broken Arrow, Wagoner County Stream Water Application #20150008

On February 10, 2015, we received your application for surface water rights and have assigned it application #20150008 along with check #212277 in the amount of \$3,000.00. The application currently requests an additional 17,729 acre-feet per year. Annual water use estimates as described in "City of Broken Arrow, Water Supply Improvements, Plan Development Report, January 24, 2008" appear to project a peak demand of 52.8 million gallons per day (mgd) of need by 2060 (29.8 mgd self-supplied by the City plus 23 mgd of water purchases from the Oklahoma Ordinance Works Authority (OOWA)). When converted to units more commonly used in the water rights application process, the peak need appears to be 59,143.6 acre-feet per year (1 acre-foot = 325,851 gallons).

The City of Broken Arrow ("City") currently has three active stream water permits that authorize stream water to be used for municipal/public water supply purposes:

- Permit #19630131: 15,185 acre-feet per year from the Verdigris River,
- Permit #19780063: 12,042 acre-feet per year from the Verdigris River, and
- Permit #19790060: 56,000 acre-feet per year from Lake Tenkiller;

which have a combined peak authorization of 83,227 acre-feet per year (or approximately 74.3 mgd). The City also has an active stream water permit #20110036, however it was not included above as it specifically authorizes water to be used for irrigation of a golf course and not municipal/public water supply purposes.

If you would like to continue pursuing application #20150008, you will need to submit information to revise the application and show that the additional 17,729 acre-feet per year requested is an estimated water use customer need that is in addition to (beyond) the existing 83,227 acre-feet of existing municipal/public water supply appropriation. This is a standard requirement for all surface water applicants in the State, where additional water cannot be appropriated when that particular water use on an application would be for the same use already appropriated in an active water right(s).

If you have any questions or concerns regarding the requested revised information for your pending application, please contact me at 405-530-8848 or jason.tutkowski@owrb.ok.gov.

Note: Any incomplete or unresponsive answers may cause a delay in the processing of your application. In addition, 82 O.S. § 105.10(A)(2) and Title 785, Section 20-3-9 of the Oklahoma Administrative Code (OAC) states that if any application is defective as to form, or if the plans submitted appear unfeasible, unsafe, or unlikely to be constructed to completion, the Board must advise the applicant of the correction, amendments, or changes required. Once notified, the applicant has sixty (60) days in which to refile or correct the application as required. If not received by the Board within sixty (60) days of notification, the application shall be treated as an original application received on the date of its refile or correction. If an applicant does not correct an application or publish notice as instructed by the Board, and no further proceedings are initiated by the applicant for six months or more after last contact with the Board, the application shall be deemed withdrawn. OAC 785:20-3-9(d). The Board shall provide notice to the applicant that the application has been deemed withdrawn.

Best Regards,

JT

Jason Tutkowski - Permitting Specialist

EMAILED TO:

Kenneth Schwab, Assistant City Manager – kschwab@brokenarrowok.gov
Ethan Edwards, Engineer Manager – EEdwards@brokenarrowok.gov
Kristi Shaw, Consultant – Kristi.Shaw@hdrinc.com





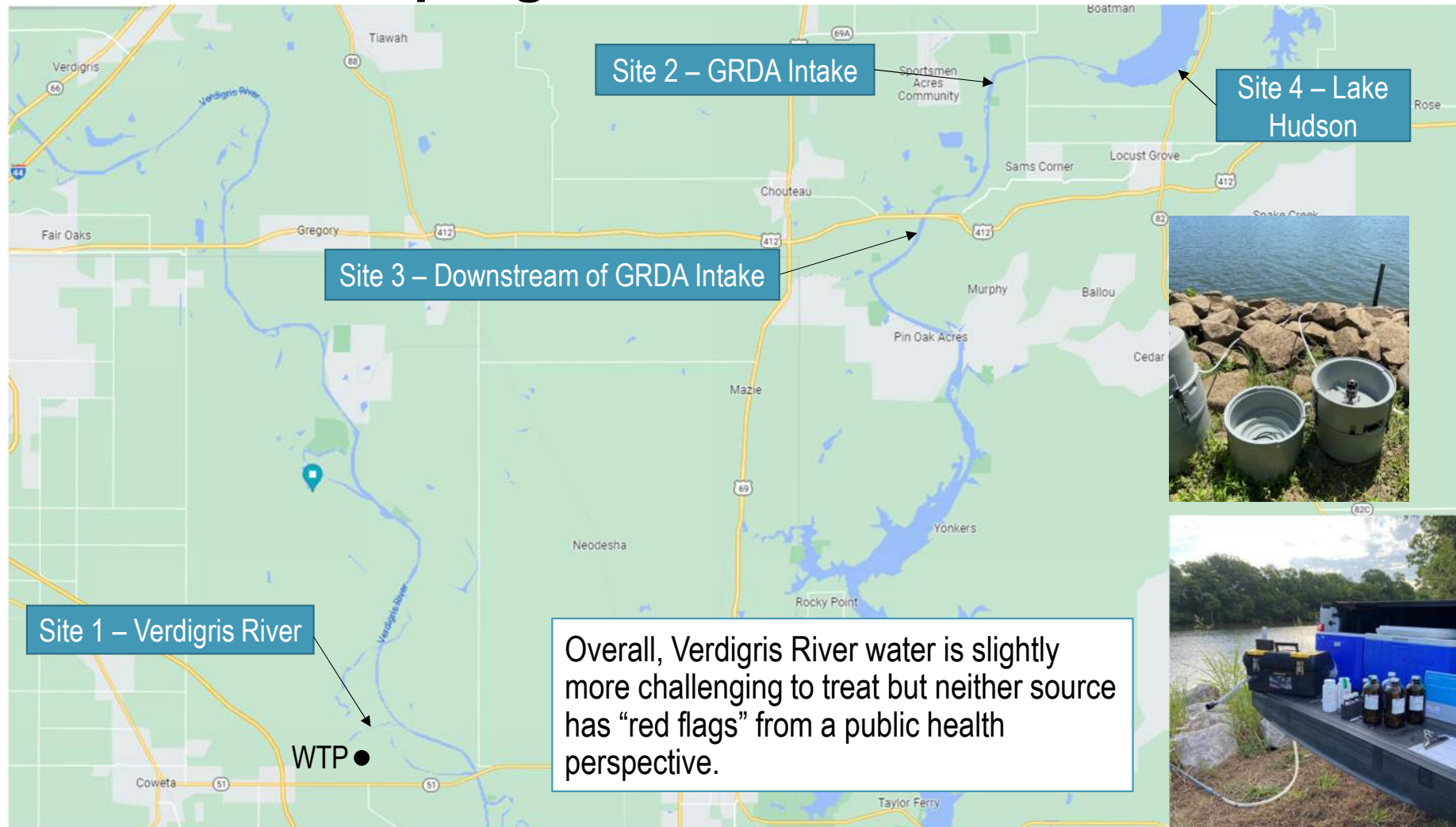
Oklahoma Ordnance Works Authority





4 Source Water Comparison

Raw water sampling locations





5

Raw Water Pipeline Condition Assessment

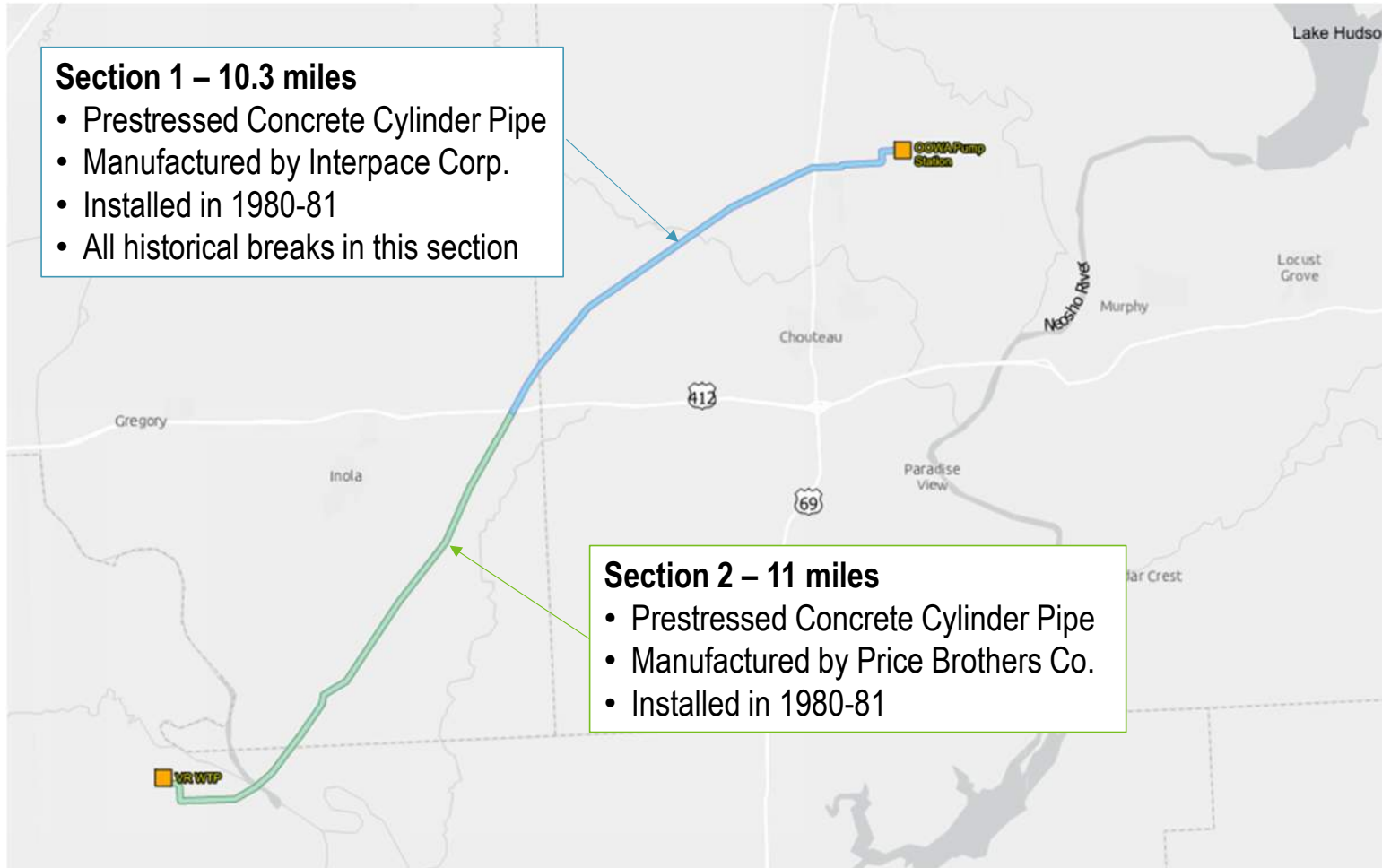
Existing 36-inch OOWA Pipeline

Section 1 – 10.3 miles

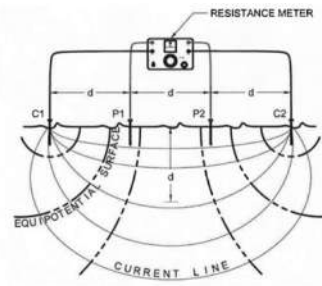
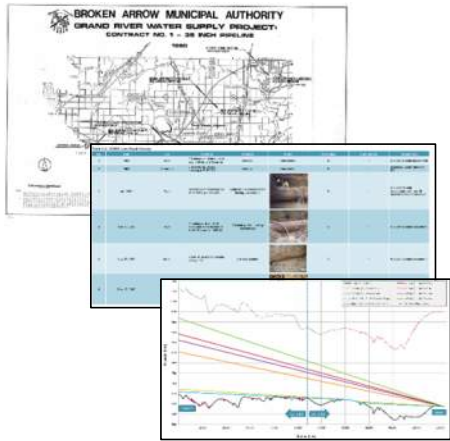
- Prestressed Concrete Cylinder Pipe
- Manufactured by Interpace Corp.
- Installed in 1980-81
- All historical breaks in this section

Section 2 – 11 miles

- Prestressed Concrete Cylinder Pipe
- Manufactured by Price Brothers Co.
- Installed in 1980-81



Systematic condition assessment was conducted on the pipeline



Desktop Assessment

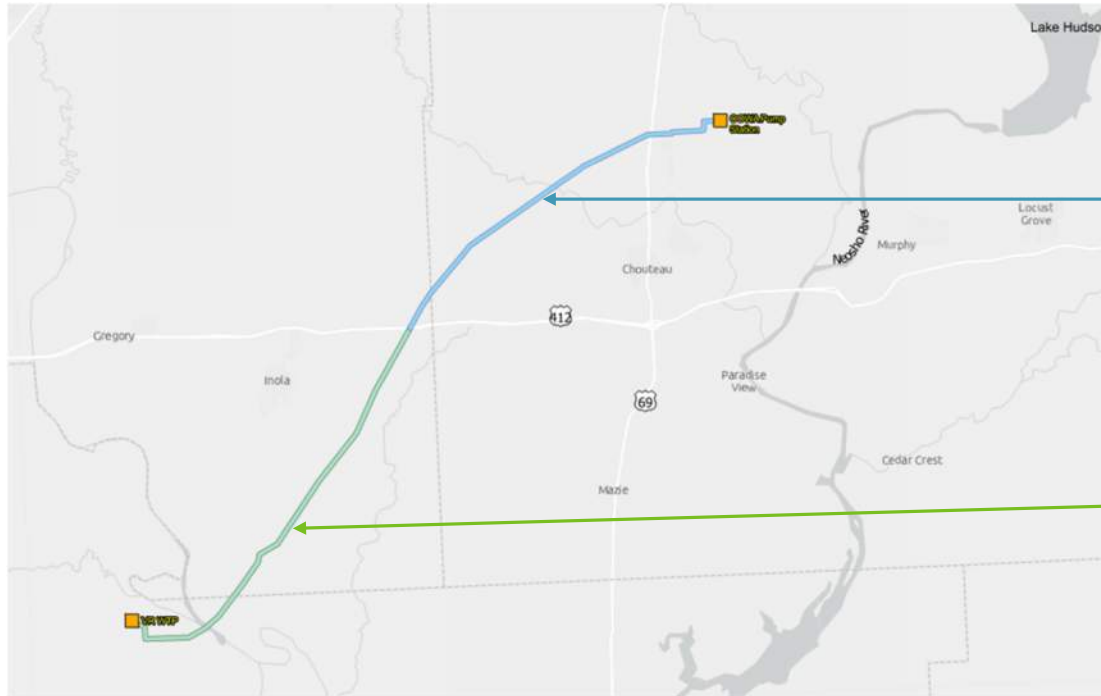
Electromagnetic
Conductivity
Survey

Soil Resistivity
Testing

Soil Sampling &
Analysis

Excavations

Condition assessment conclusions and recommendations



Section 1 – 10.3 miles

- Gravity service: Approx. \$18M to rehabilitate
- Pressure service: More cost-effective to replace (approx. \$23M)

Section 2 – 10.8 miles

- Gravity service: Approx. \$13M to rehabilitate
- Pressure service: Similar cost to rehabilitate or replace (approx. \$25M)

- If decision made to move forward with Grand River supply, recommend internal condition assessment to obtain detailed rehab/replace information for design





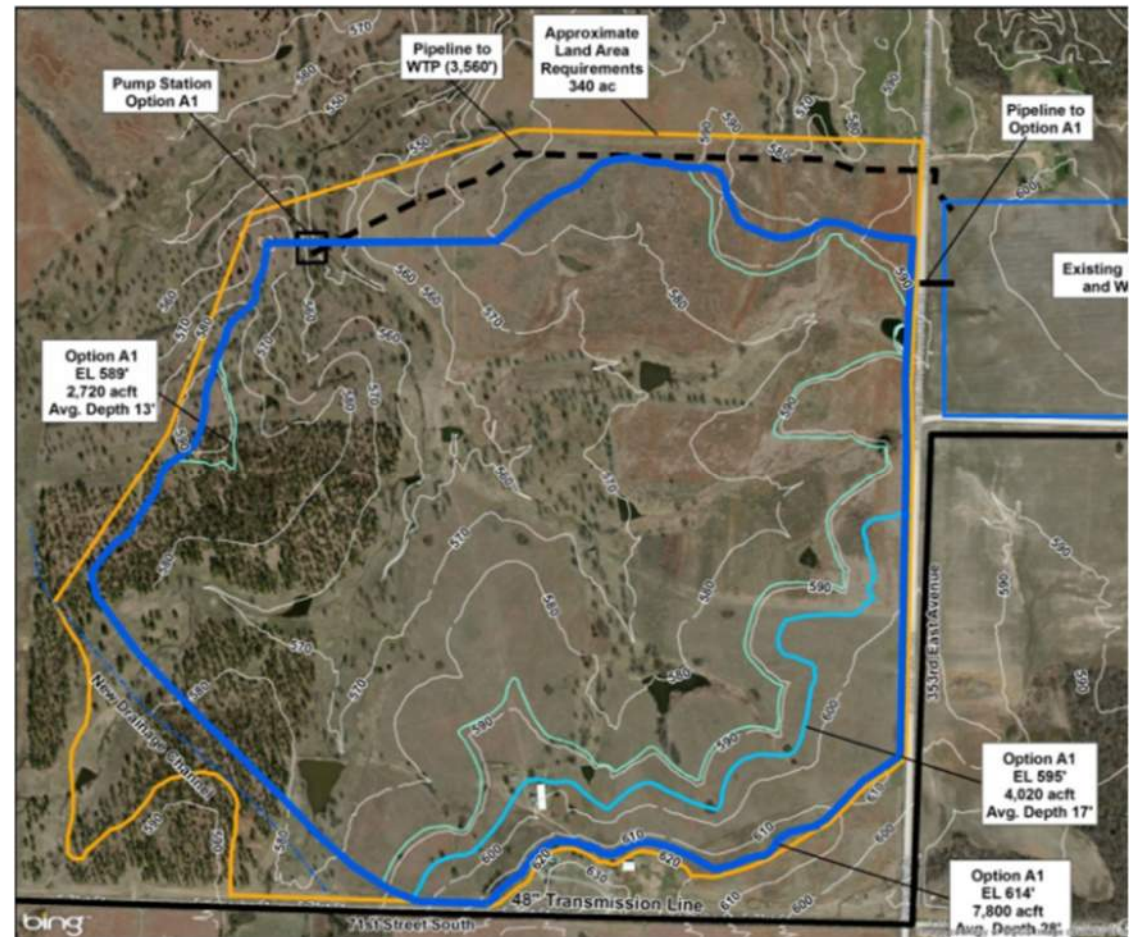
6 Alternatives Evaluation & Recommended Path Forward

Alternatives summary

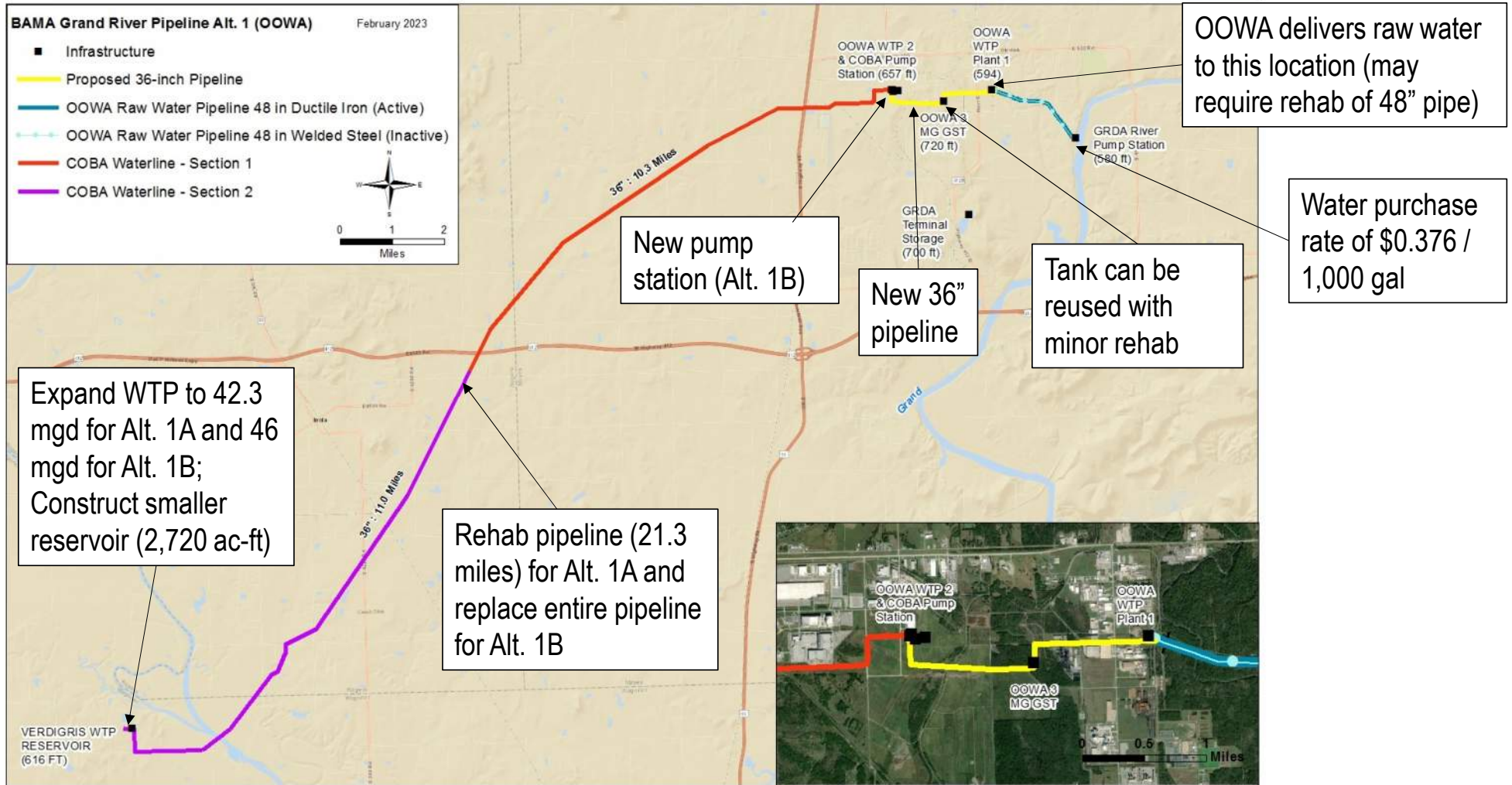
No.	Description	Raw Water Supply (46 mgd Future Demand)
0	Verdigris River Supply Only	46 mgd Verdigris (30 mgd current permits) (16 mgd new permit)
1A	Grand River Supply with OOWA Partnership, Gravity Supply	12.3 mgd Grand 30.0 mgd Verdigris 3.7 mgd TMUA
1B	Grand River Supply with OOWA Partnership, Pumped Supply	25 mgd Grand 21 mgd Verdigris
2	Grand River Supply with GRDA Partnership, Pumped Supply	25 mgd Grand 21 mgd Verdigris

Alt. 0 – Verdigris River Supply Only

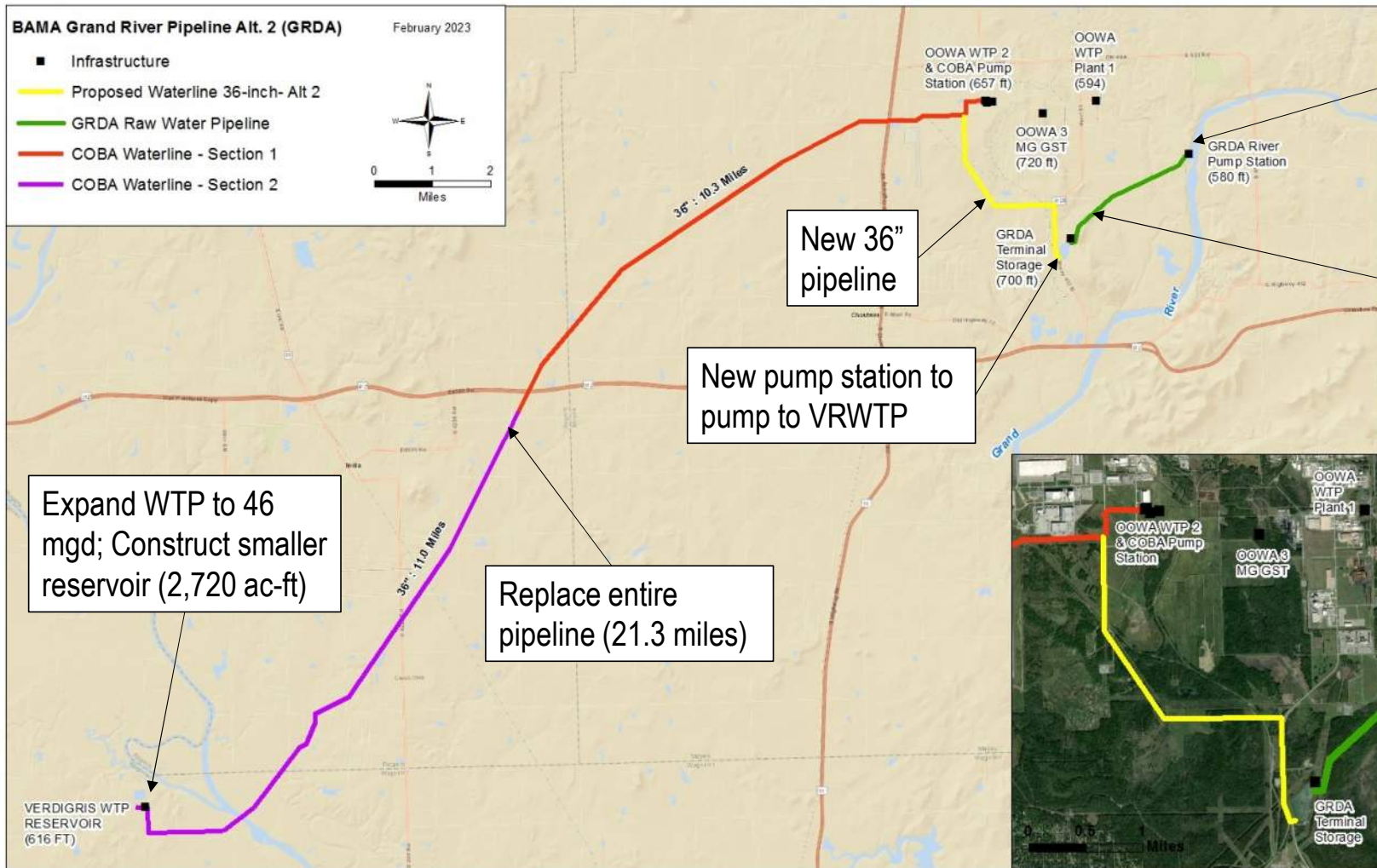
- Expand intake pump station on the Verdigris River to 46 mgd
- Construct off-channel reservoir west of WTP site (4,020 ac-ft)
- Expand WTP to 46 mgd (16-mgd expansion)



Alt. 1 – Grand River Supply from OOWA



Alt. 2 – Grand River Supply from GRDA



Water purchase rate of \$0.40 / 1,000 gal

GRDA will deliver flow reservoir using existing 36" pipeline

Cost comparison of alternatives

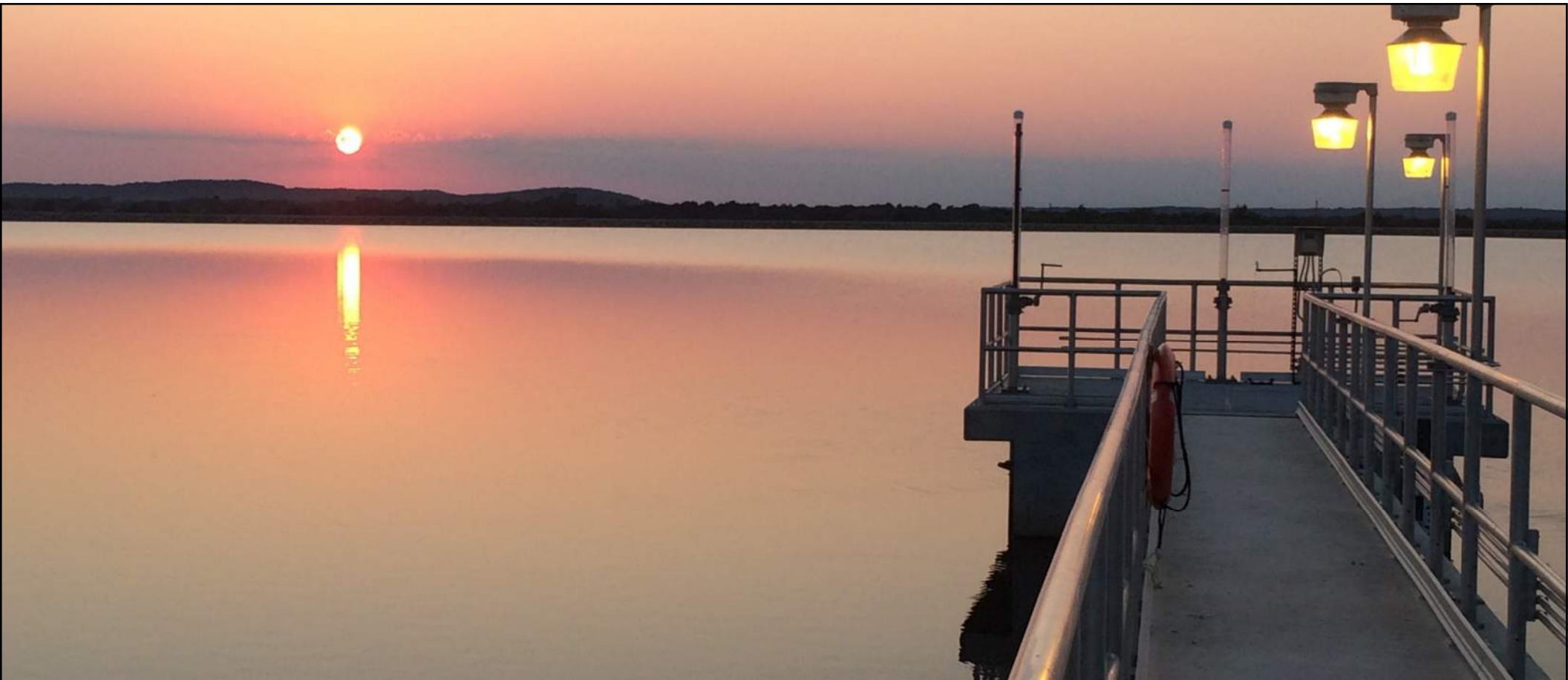
Item	Alt 0 - Verdigris River Supply Only	OOWA		GRDA
		Alt 1A – Gravity Supply	Alt 1B – Pumped Supply	Alt 2 – Pumped Supply
Capital Cost				
Off-channel Reservoir	\$15,256,000	\$12,534,000	\$12,534,000	\$12,534,000
Intake Pump Station	\$11,882,000	\$0	\$0	\$0
Transmission Pipelines	\$0	\$42,196,000	\$59,226,000	\$61,492,000
Transmission Pump Stations & Storage Tanks	\$0	\$1,649,000	\$18,806,000	\$19,041,000
Water Treatment Plant Expansion	\$48,964,000	\$40,466,000	\$48,964,000	\$48,964,000
TOTAL COST OF FACILITIES	\$76,102,000	\$96,845,000	\$139,530,000	\$142,031,000
Contingency / Unforeseen Costs	\$28,857,000	\$33,795,000	\$47,883,000	\$48,645,000
TOTAL COST OF PROJECT	\$104,959,000	\$130,640,000	\$187,413,000	\$190,676,000
COST DIFFERENCE FROM ALT 0	\$0	\$25,681,000	\$82,454,000	\$85,717,000

Recommended phasing for 1A/1B implementation

	<u>Estimated Cost</u>
Phase 1 (immediate)	
- Secure MOU with OOWA on water purchase (25 mgd), purchase rate, and use of infrastructure - Begin land acquisition on OOWA property (if necessary)	\$0.1M
Phase 2	\$33M
Replace Section 1 of existing 36" pipeline	
Phase 3	\$12M
- Construct facilities to connect with OOWA Place system into service to deliver 12.3 mgd to VRWTP by gravity	
Phase 4	\$13M to \$35M
- Conduct internal condition assessment of Section 2 of existing 36" pipeline - Rehabilitate/replace portions of Section 2 based on findings	
Phase 5	\$22M
- Construct pump station (or rehabilitate existing) at WTP2 Place system into service to pump 25 mgd to VRWTP	
Phase 6 (goal to be in service by 2035)	\$85M
Construct WTP expansion to 46 mgd and presedimentation basin at Site 1A	
	\$165M to \$188M

Recommended implementation timeline

[illegible]



Questions?



Staff Recommendation:

Approve and authorize plan to begin process of obtaining a secondary water source as recommended in the Grand River Water Supply Study.