Mary Rhodes Pipeline Condition Assessment

DRAFT

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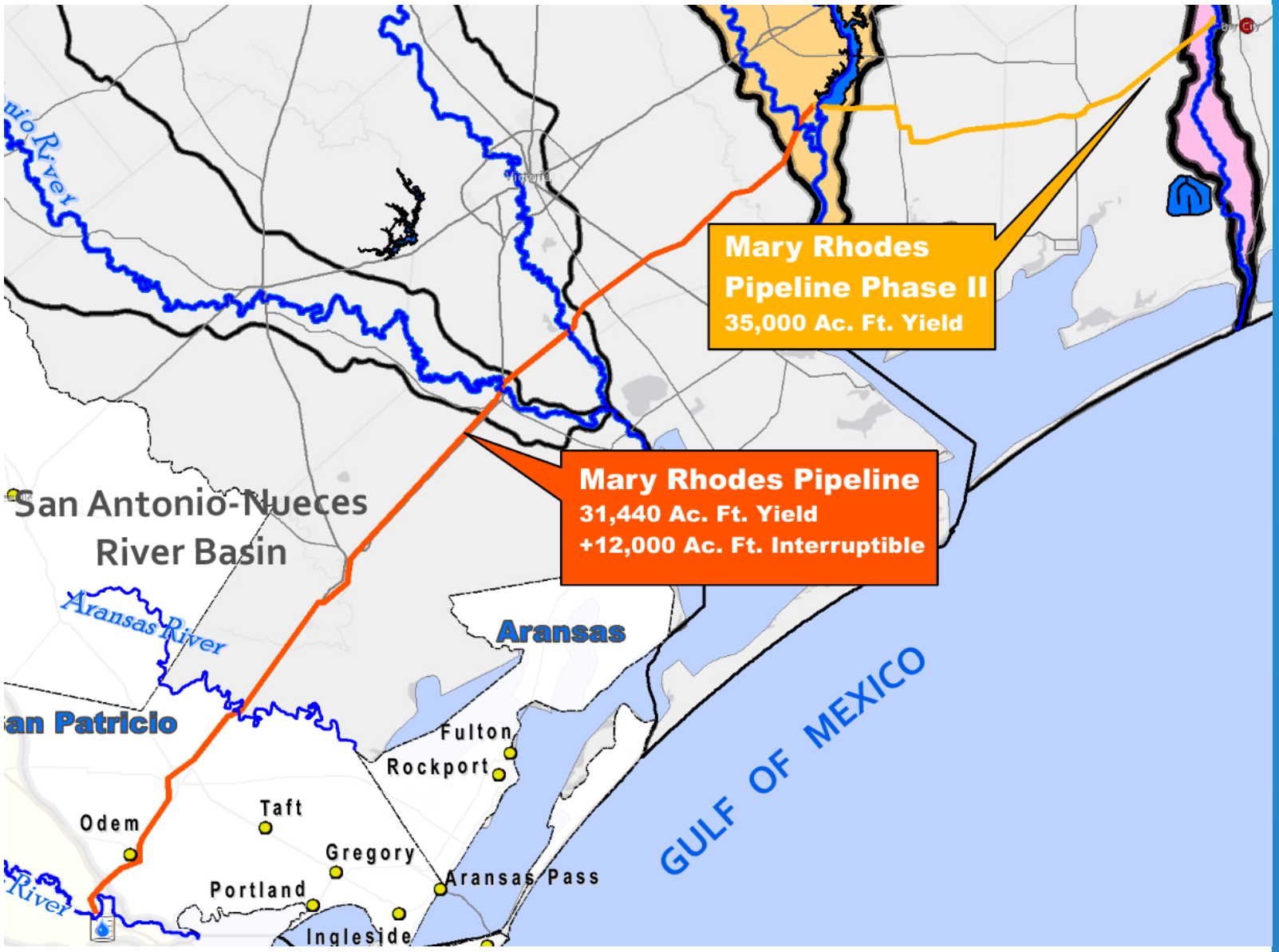
Corpus Christi Water℠
Serving the Coastal Bend

- Mary Rhodes Pipeline (MRP) I
  - 101-mile-long pipeline running from Lake Texana near Edna, Texas to the O.N. Stevens Water Treatment Plant
  - Construction started in 1997, completed in 1998
- Mary Rhodes Pipeline (MRP) II
  - 42-mile-long pipeline that ties into MRP Phase I at the West Delivery Pump Station
  - Construction started in 2014, completed in 2016



MRP I and II Water Sources

Lake Texana

MRP I

Contract Minimum Amount Take or Pay: 31,440 acre-ft.
- Interruptible A (if available): 4,500 acre-ft.
- Interruptible B (if available): 7,500 acre-ft.

Colorado River

MRP II

Run of the River Water Rights: 35,000 acre-ft.

Eastern Basin (LNRA and Colorado River) Water Availability vs. Water Taken

Source	Qty	2021	2022	2023
Contract Water Amount (MRP I - Lake Texana/LNRA)	31,440 acre-ft.	28,563 (91%)	32,147 (102%)	30,423 (97%)
Interruptible A Diversions 4,500 (I.A)	4,500 acre-ft.	4,500 (100%)	4,500 (100%)	4,500 (100%)
Interruptible B Diversions 7,500 (I.B)	7,500 acre-ft.	7,500 (100%)	Not offered	Only 4,500 offered (100%)
Water Rights Amount (MRP II - Colorado River)	35,000 acre-ft.	9,326 (27%)	10,900 (31%)	7,866 (22%)

MRP I and II Operational and Contractual Expenses

Source	FY	Operational Expense	Contractual Expense
MRP I (Lake Texana)/LNRA	2021	$ 1,039,100	$ 8,508,183
	2022	$ 895,995	$ 9,393,594
	2023	$ 1,098,004	$ 9,136,880

Source	FY	Amount
MRP II (Colorado River)	2021	$ 530,415
	2022	$ 652,299
	2023	$ 545,338

Pipeline Components

- Pipe:
  - 99 miles of 64” diameter bar-wrapped pipe
  - Approximately 1 mile of 48” diameter bar-wrapped pipe
  - Approximately 1 mile of 72” diameter pre-stressed concrete cylinder pipe
  - 41 miles of 54” diameter bar-wrapped pipe
- Key components:
  - Colorado River Intake Pump Station
  - Colorado River Booster Pump Station
  - LNRA Intake Pump Station
  - Booster pump stations located at Bloomington and Woodsboro
  - Isolation valves, air relief valves (ARVs), blowoff valves:
    - 294 ARVs (270: 2-inch, 24: 12-inch)
    - 7 in-line valves
    - 28 blowoff valves
    - 27 water crossings (7 River/Barge, 20 Creek)
    - 300 pipeline crossings
    - 7 railroad crossings
  - 24” SDI connection
  - 36” San Patricio (Dressen) connection

Pump Stations

LNRA Intake Station

Bloomington Pump Station

Woodsboro Pump Station

Colorado River Pump Station

Pumping Schedules

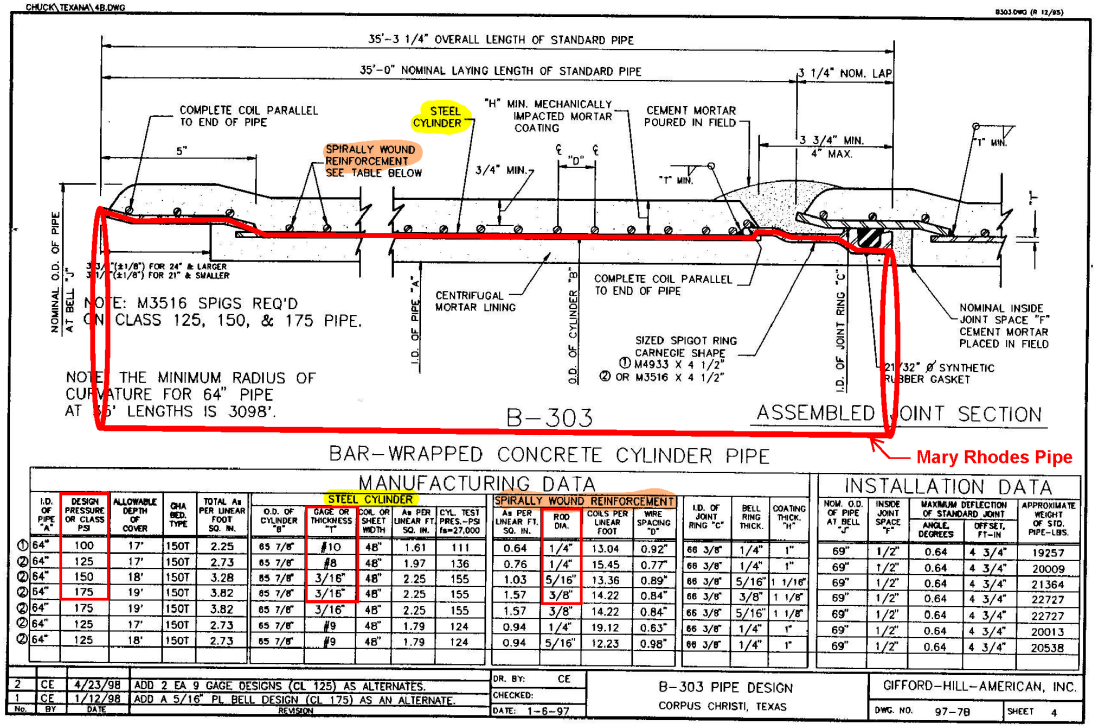
Pumping Schedule	MGD
Schedule 1A	11.5 MGD to 24.4 MGD
Schedule 1B	25 MGD to 32.4 MGD
Schedule 2A	34 MGD to 40 MGD
Schedule 2B	40 MGD to 46 MGD
Schedule 3	55 MGD to 58 MGD
Schedule 4	72 MGD to 79 MGD

MRP Repair Parts Inventory

- Woodsboro Pump Station
  - Repair parts are kept in the pump station and in a storage container unit
    - 2- Barrel clamps (steel)
    - 3- 5/16 Closure straps (steel)
    - 2- ½ Saddle (steel)
    - 2- 3/8 6' Pipe Pups cut up (steel)
    - 4- 80-pound Zinc anodes
    - 15- Diapers
- Bloomington Pump Station
  - Repair parts are kept in the pump station
    - 1- Barrel clamp
    - 3- ½ Closure straps (steel)
    - 1- ½ Closure strap (steel)
    - 2- ½ Saddle (steel)
    - 3- 35' B303 joint (Located outside)
    - 16- Diapers
    - CCW in the process of ordering 1- 24" saddle manway and have ordered 3/8 mild steel rods

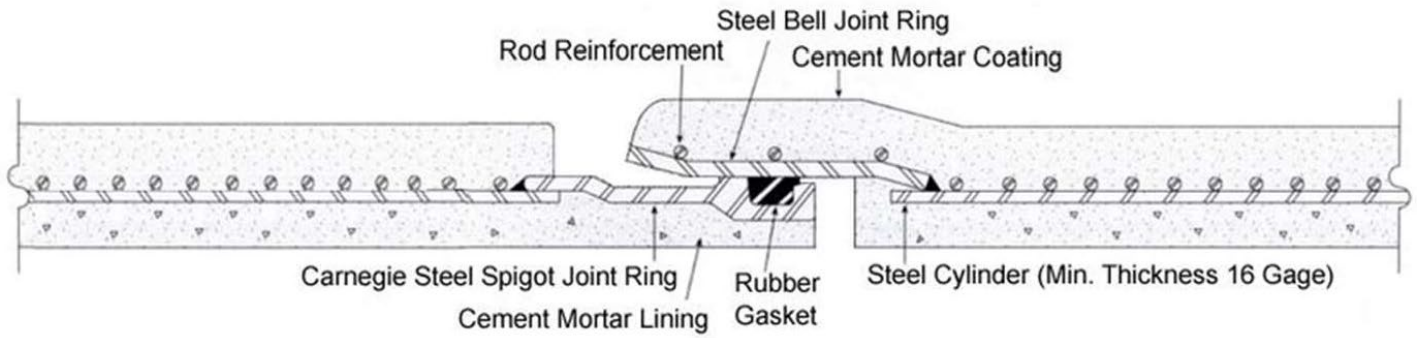
Pipe Design and Pressure Class/Rating

Pressure	Steel cylinder thickness	Spirally Wound Reinforcement
100 psi	1/10"	¼"
125 psi	4/25"	¼"
150 psi	3/16"	5/16"
175 psi	3/16"	3/8""



AWWA C303

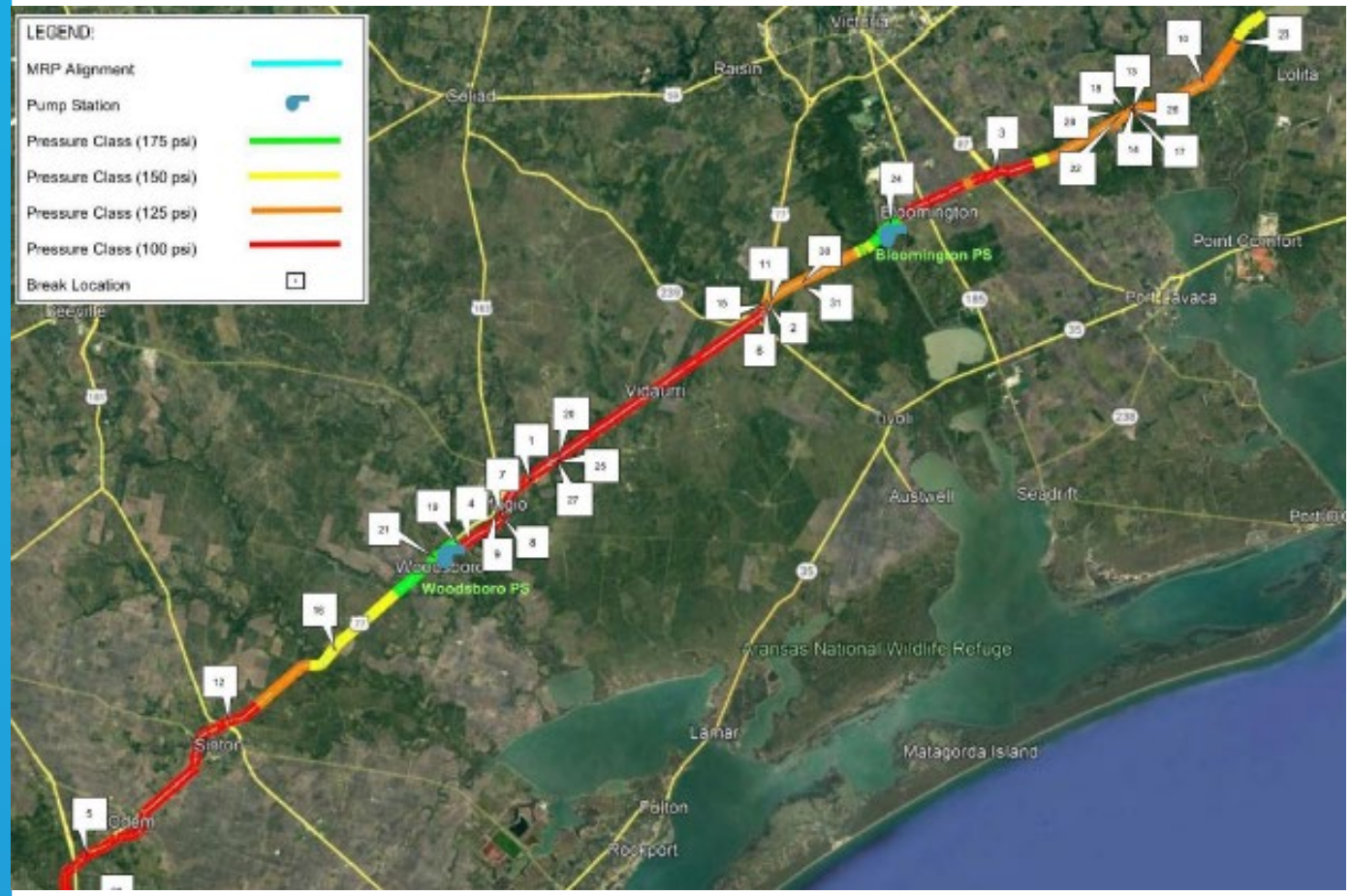
(Bar wrapped pipe)



Project Goals

- Determine the current condition of the pipeline
- Understand and determine causes of past failures
- Identify and implement proactive measures to ensure the useful life of the pipeline
- Investigate the feasibility of operating at increased flows without increased risk of failure
- Develop a near and long-term plan to manage and protect the asset

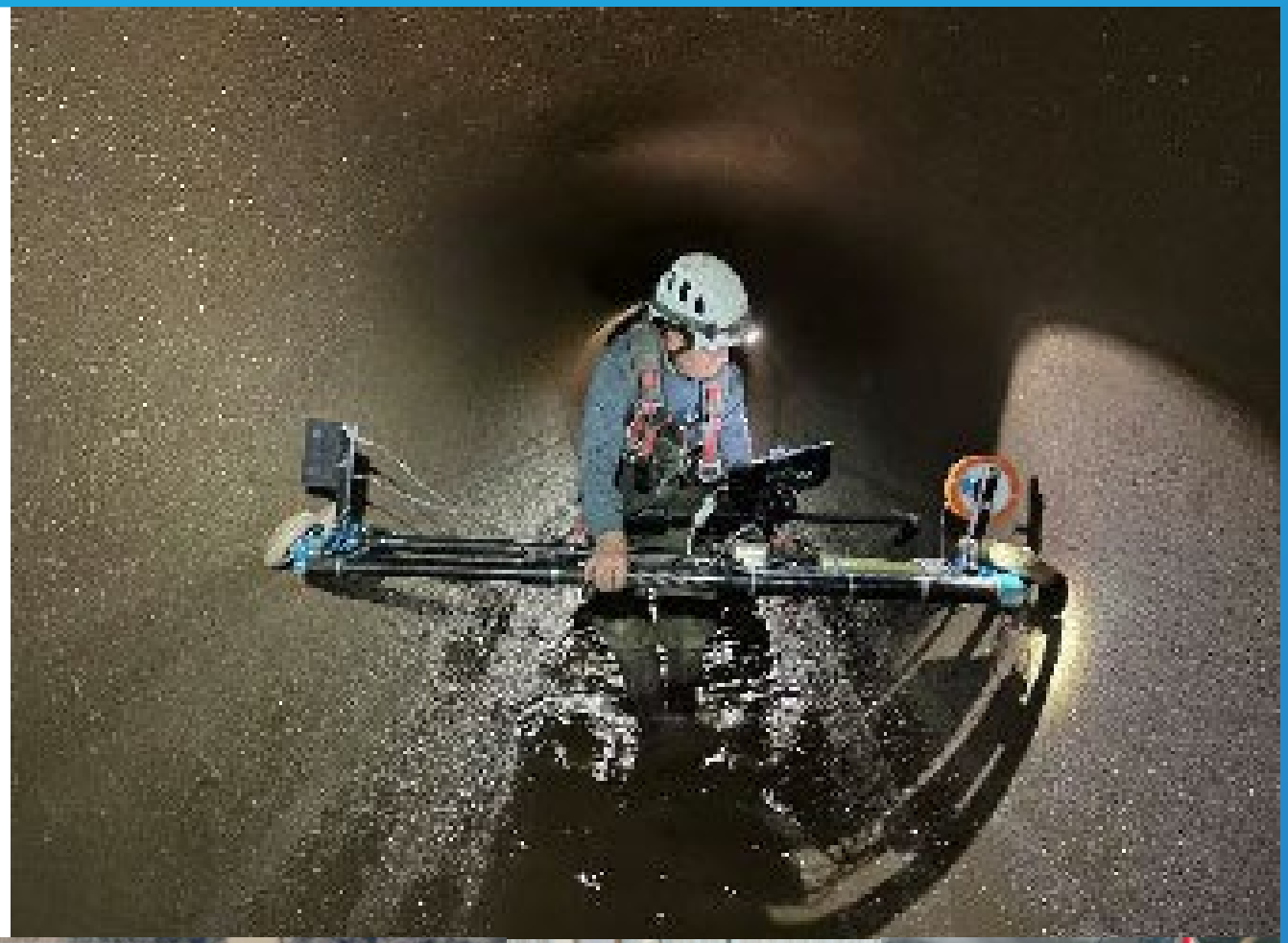
Project Timeline

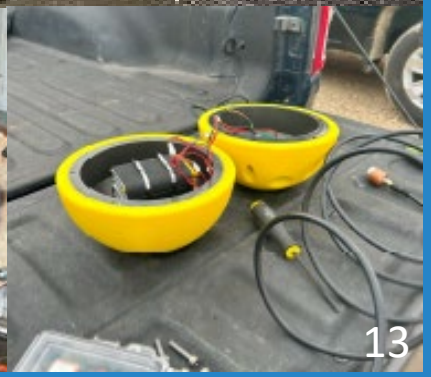


- June 13, 2023: CCW proactively initiates condition assessment of the MRP I with council approval
- April 29, 2024: Draft condition assessment report submitted
- May 2024: Condition assessment project complete (2 months ahead of schedule)

Assessment Methods

- Internal condition assessment
  - Acoustic leak detection
  - Electromagnetic evaluation
  - Mortar and wire analysis
  - Visual
- Drone survey (aerial & water)
- Hydraulic analysis
- Soil corrosivity analysis
- External condition assessment





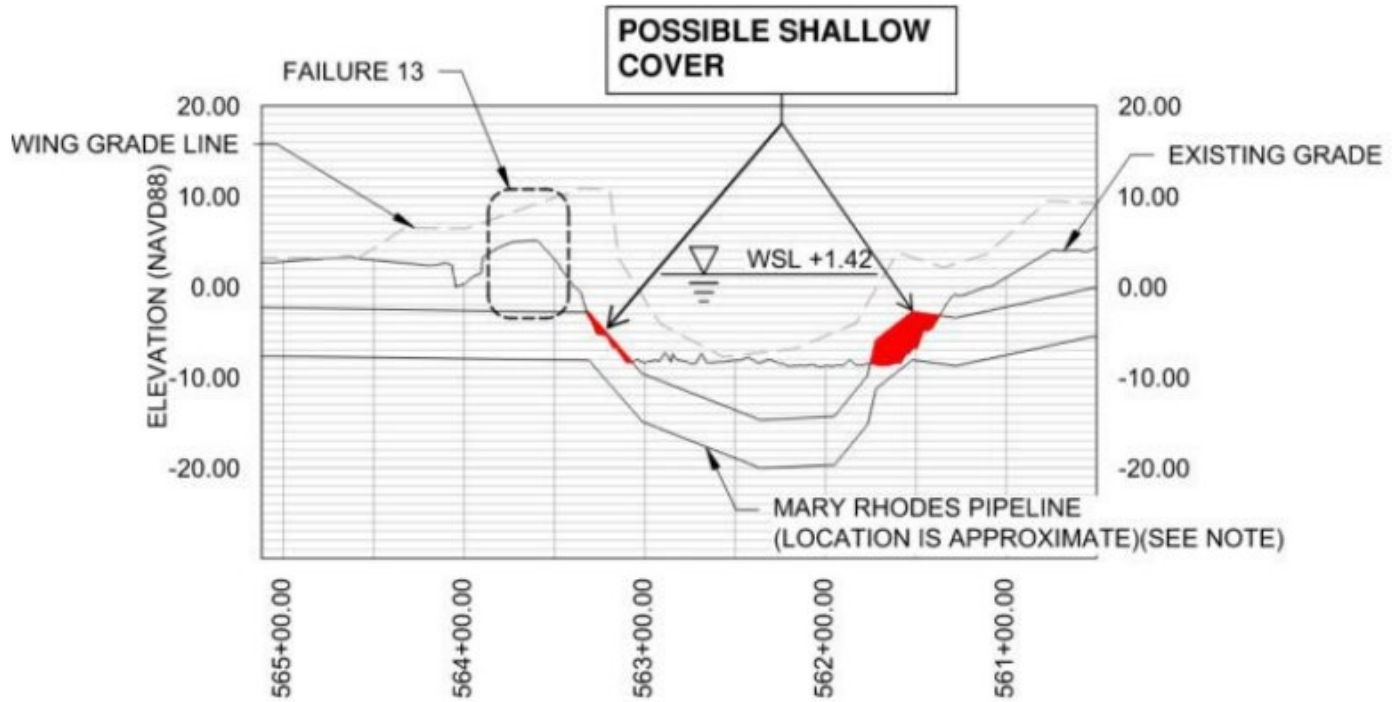
Findings and Observations

- MRP is performing satisfactorily at the current pumping rate
  - The overall integrity of the pipe is good
  - Acoustic ball inspections identified three small leaks which have been repaired
- Past failures are typically associated with access points, air relief valves, joints
- Erosion areas reducing the cover over the pipeline have been identified at various water crossings

Findings and Observations

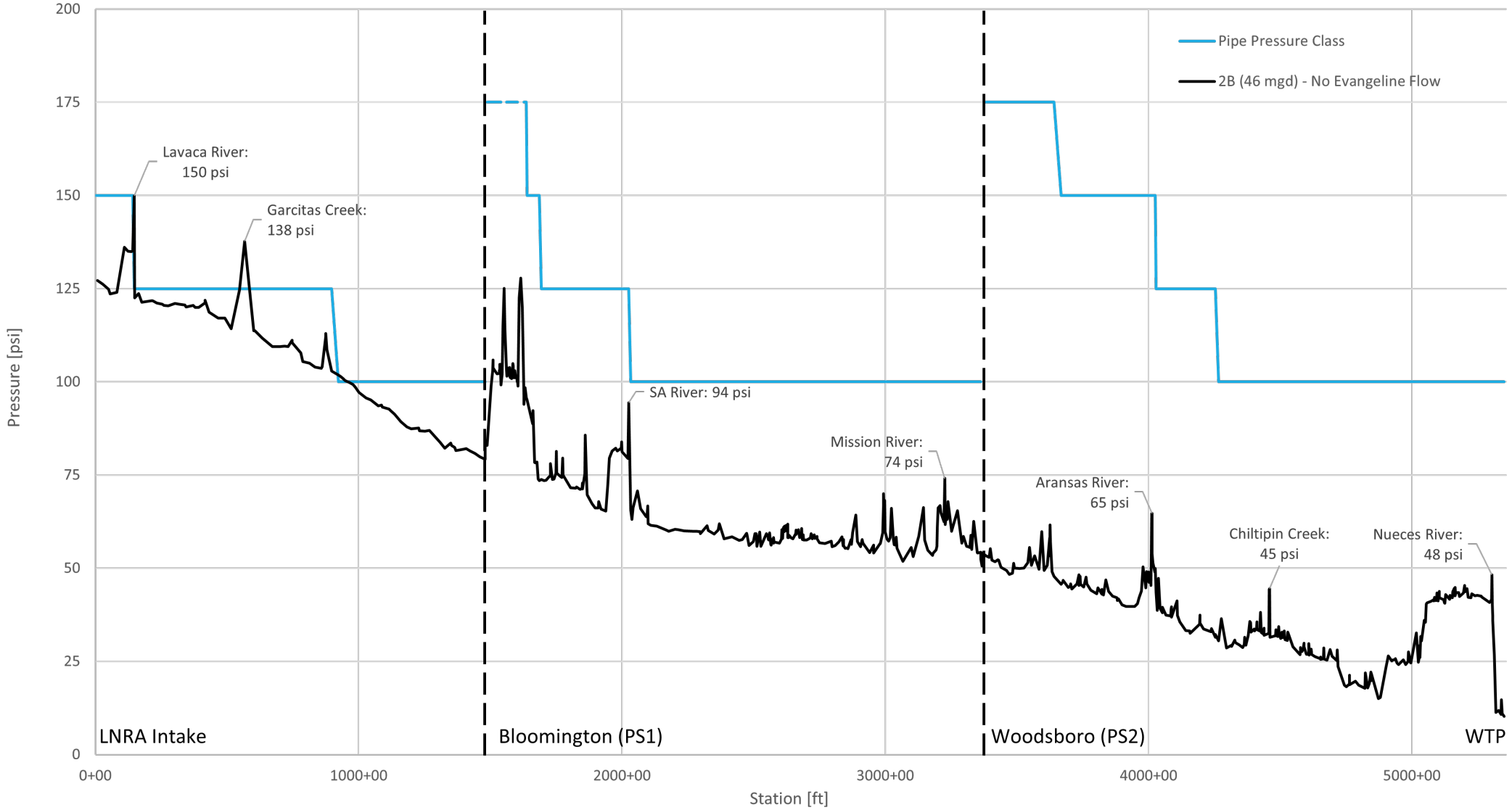
- Varying soil corrosivity conditions exist throughout the length of the pipeline and current cathodic upgrades should continue as planned
- Pump station upgrades are needed and should continue as planned
- Pipe pressure exceedance areas have been identified

Erosion and Shallow Cover Areas

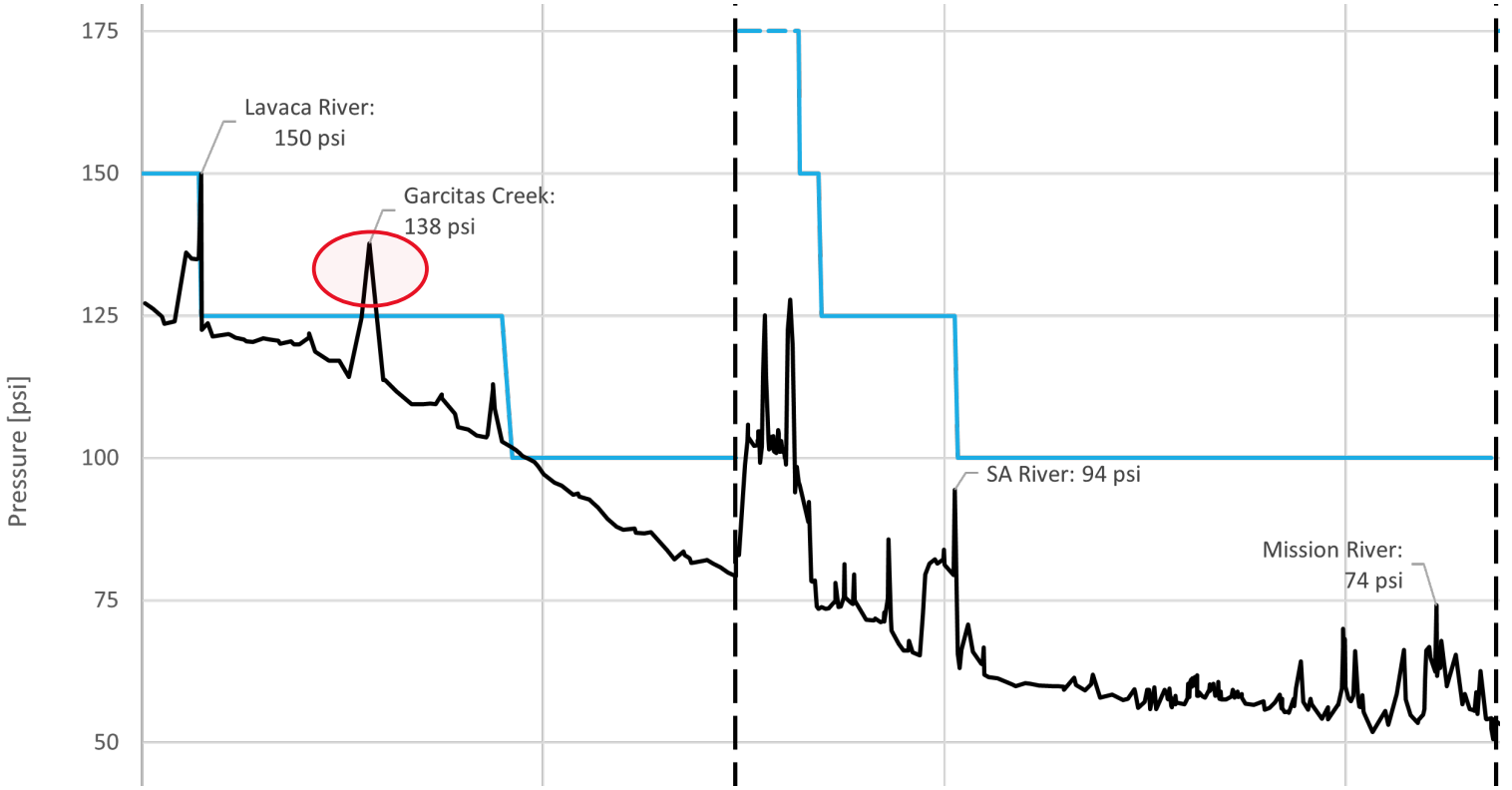


- The crossings that were surveyed and findings:
  - Lavaca River – possible shallow cover on west bank
  - Garcitas Creek – possible shallow cover on east and west banks
  - Victoria Barge Canal – possible shallow cover on west bank
  - San Antonio River – possible shallow cover on east bank
  - Mission River – possible shallow cover on east bank

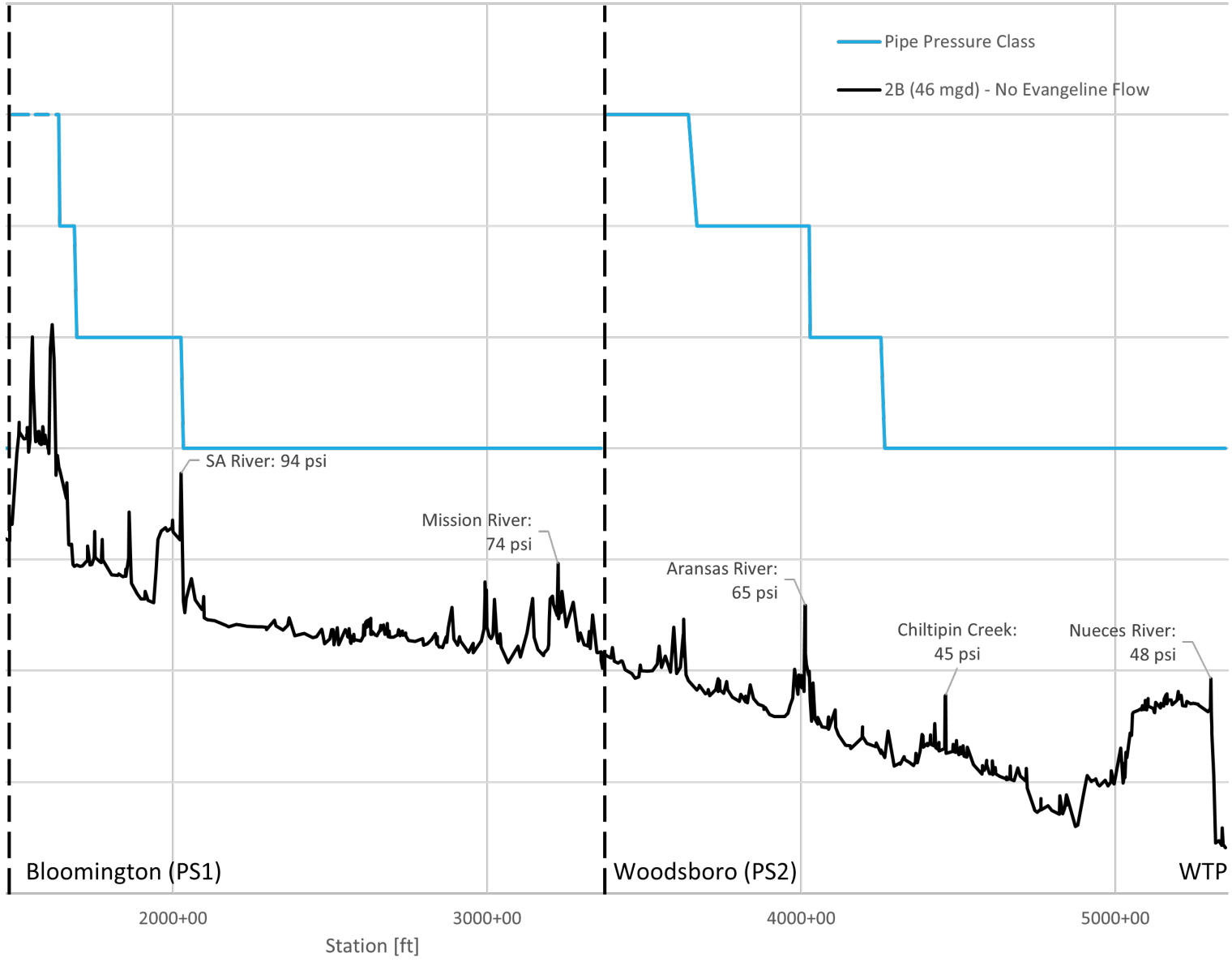
Pressure Exceedance: 46 MGD (Sch. 2B)



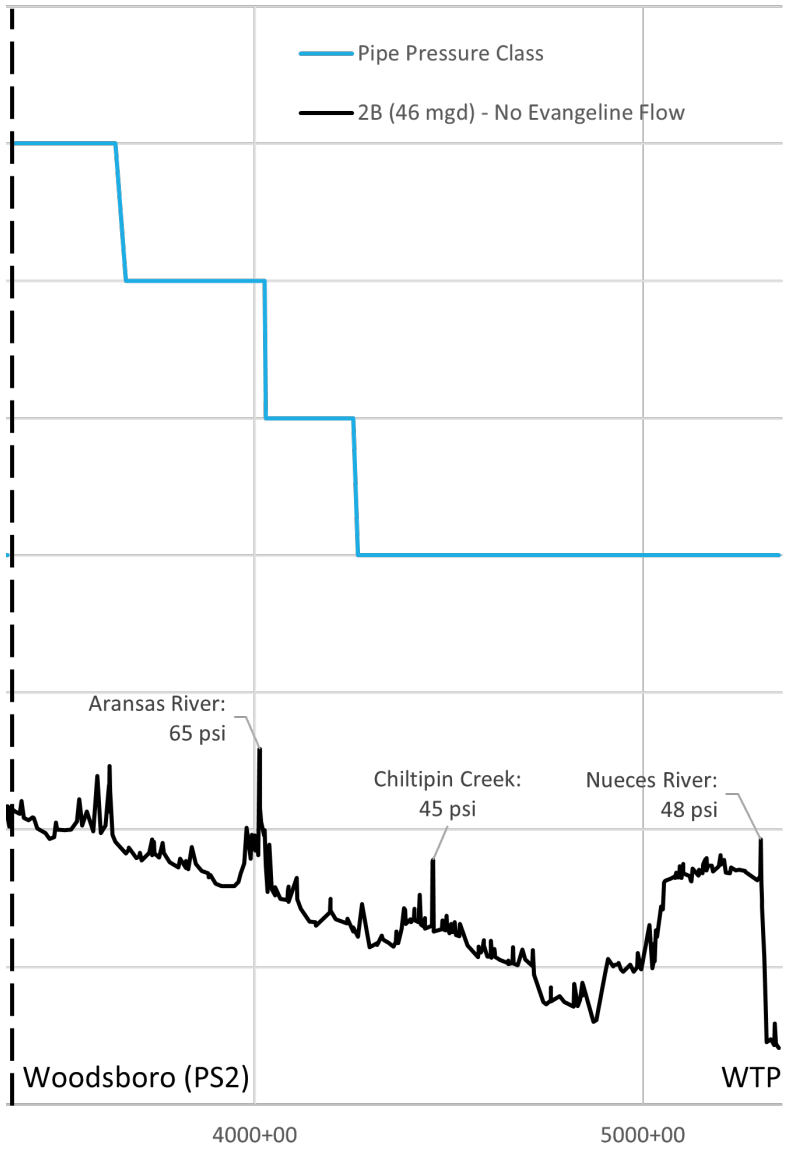
Pressure Exceedance: 46 MGD (Sch. 2B) – LNRA to Bloomington



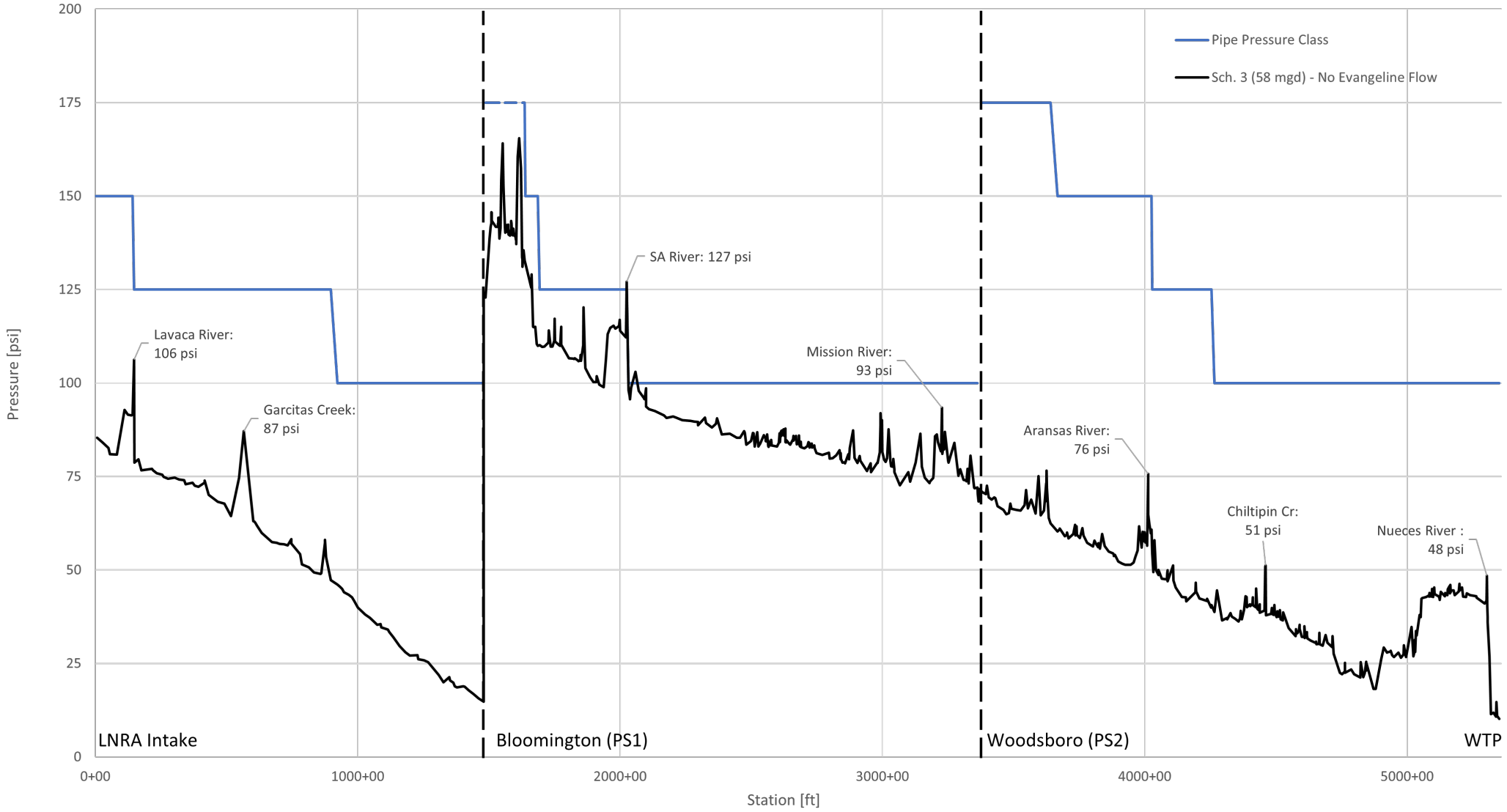
Pressure Exceedance: 46 MGD (Sch. 2B) – Bloomington to Woodsboro



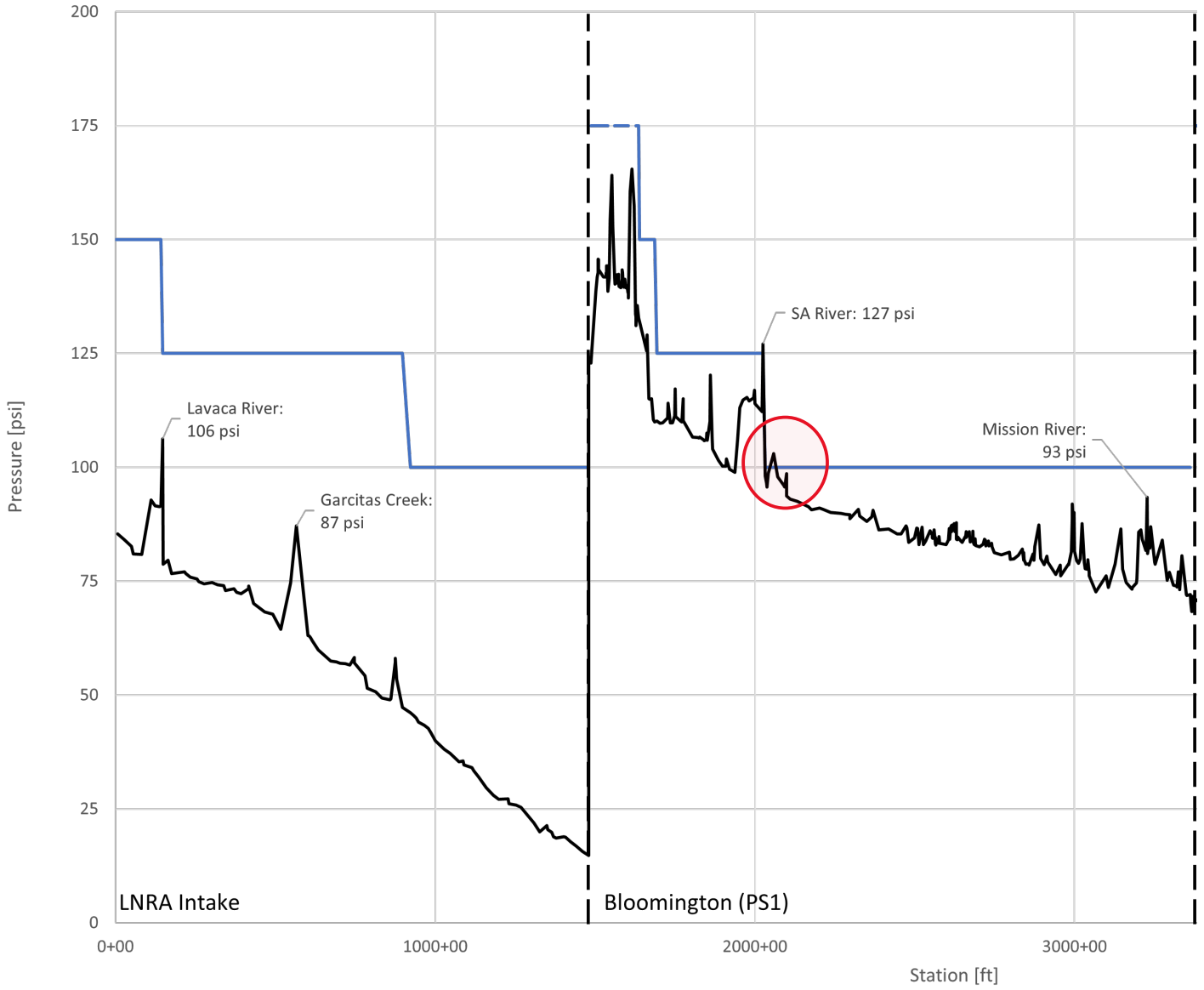
Pressure Exceedance: 46 MGD (Sch. 2B) – Woodsboro to ONSWTP



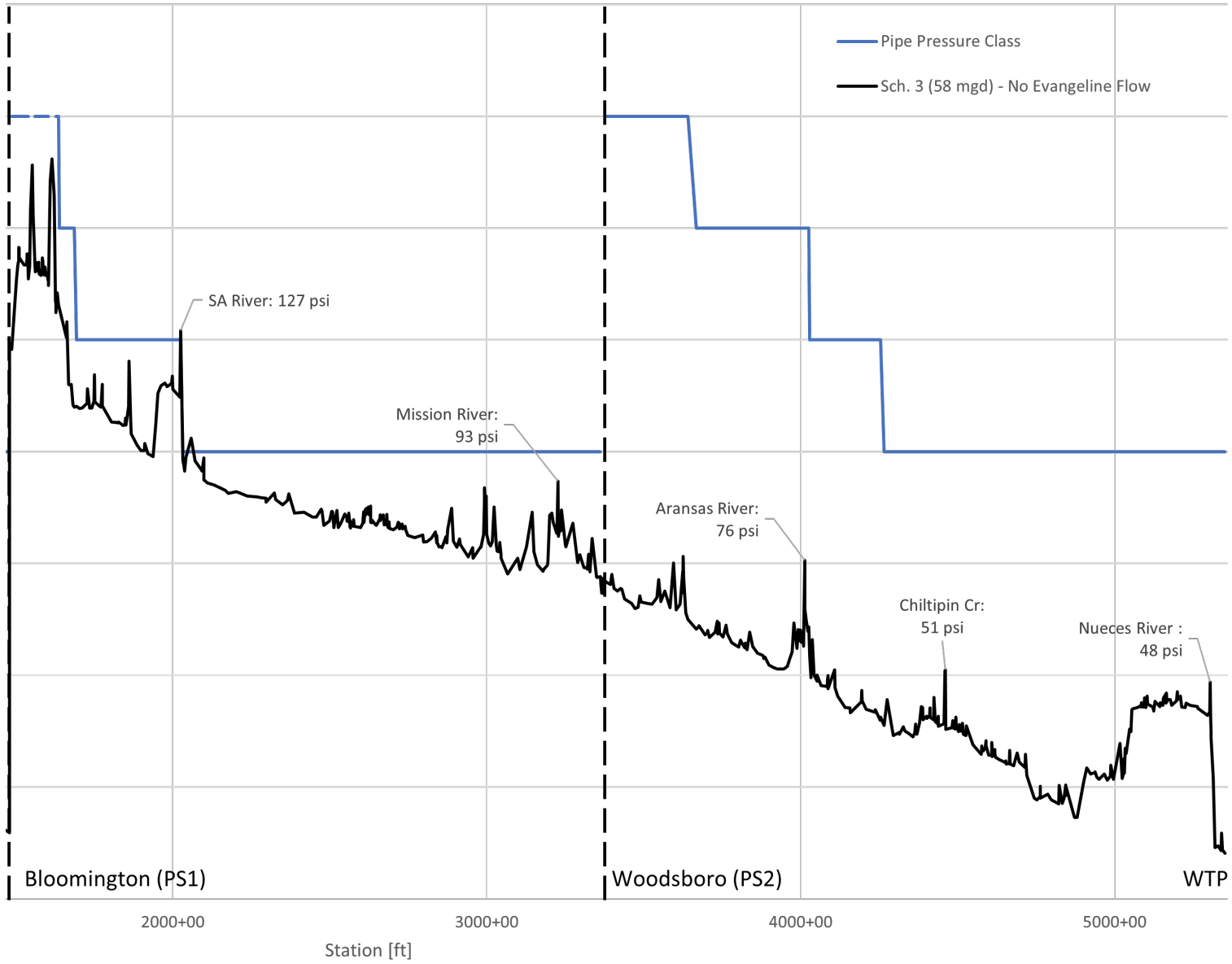
Pressure Exceedance: 55-58 MGD (Sch. 3)



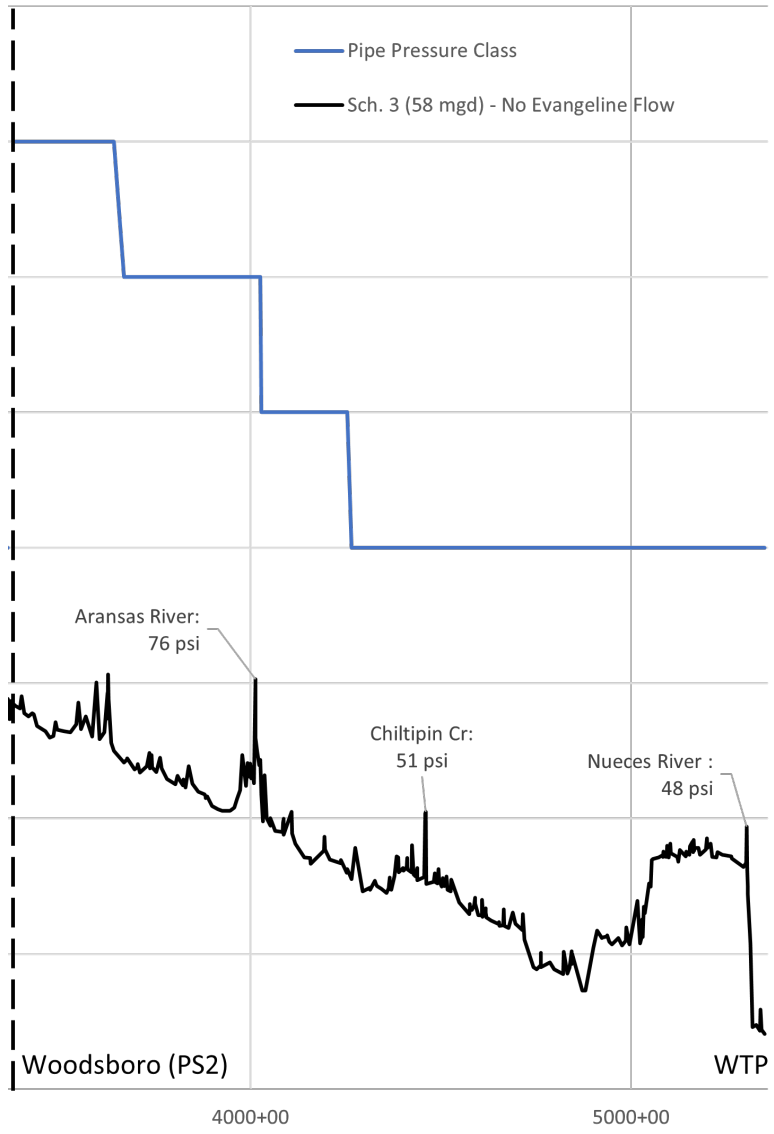
Pressure Exceedance: 55-58 MGD (Sch. 3) – LNRA to Bloomington



Pressure Exceedance: 55-58 MGD (Sch. 3) – Bloomington to Woodsboro

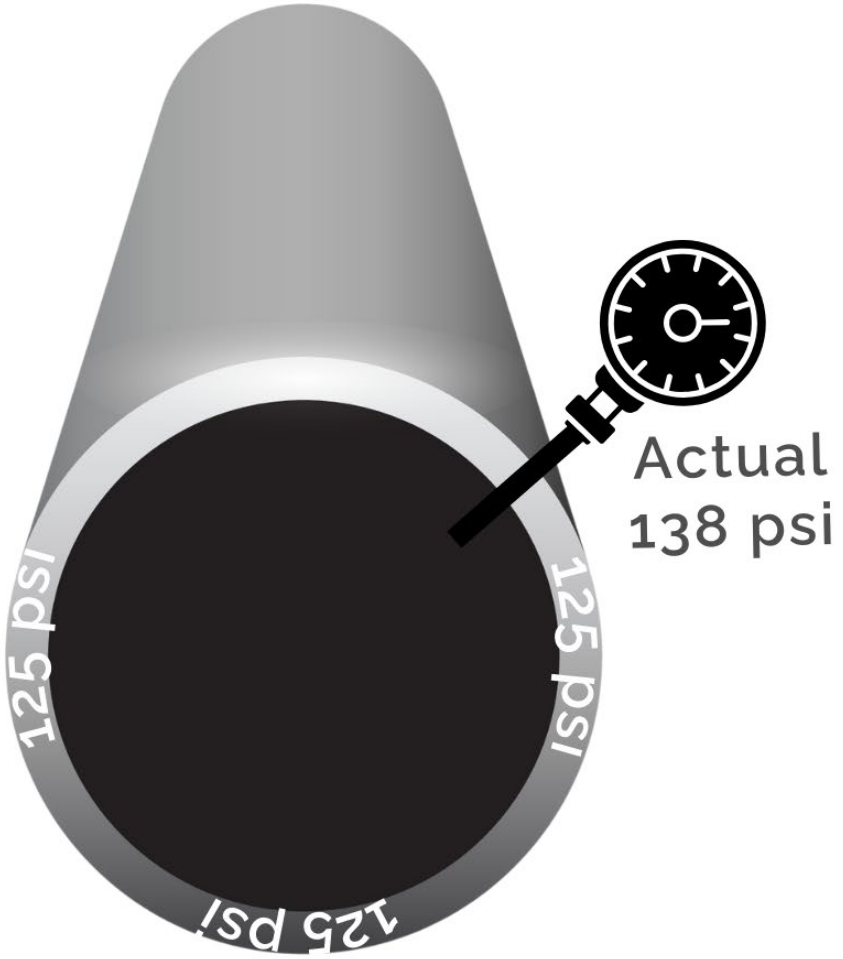


Pressure Exceedance: 55-58 MGD (Sch. 3) – Woodsboro to ONSWTP

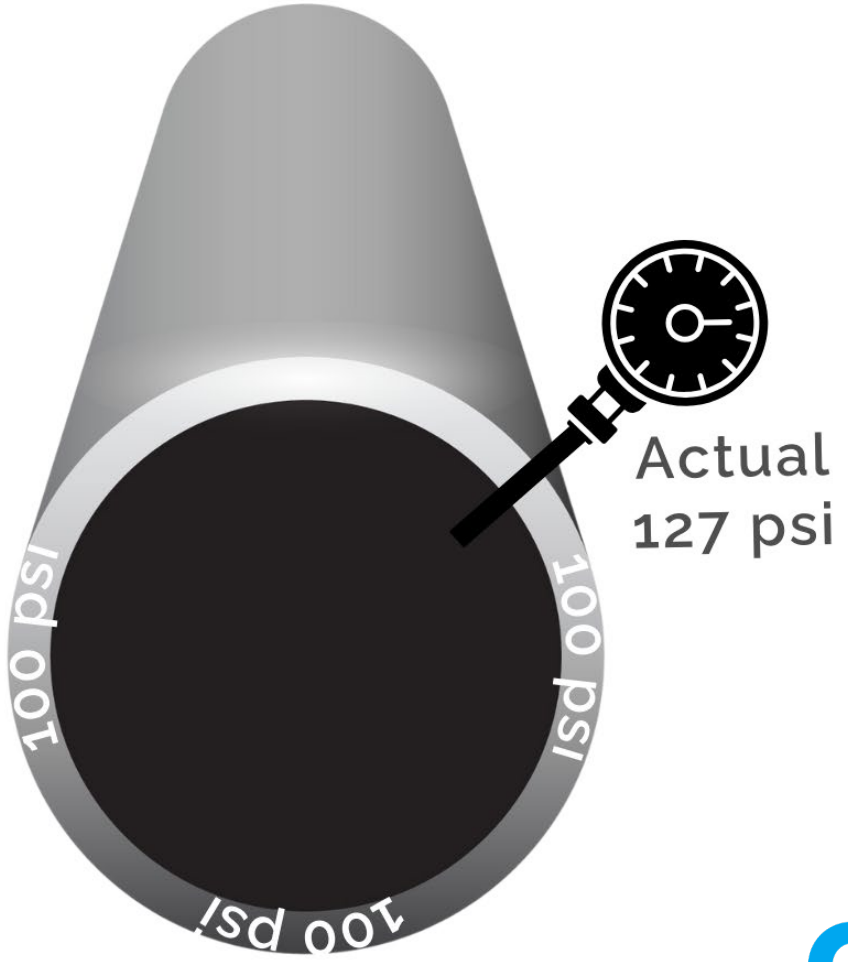


Pipe Rating and Actual Pressure

46 MGD (Sch. 2B) Garcitas Creek



58 MGD (Sch. 3) San Antonio River



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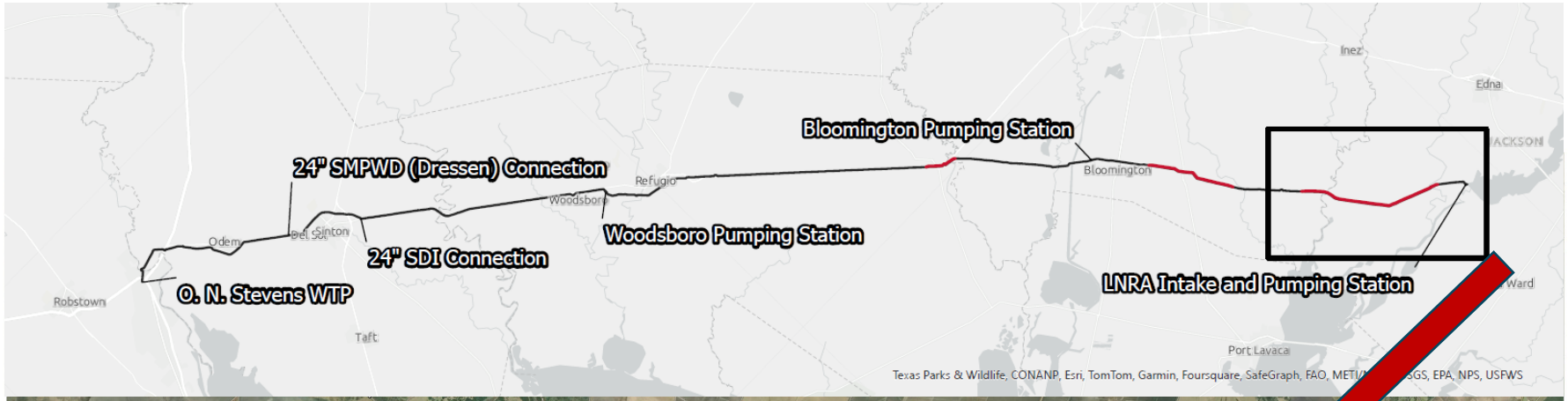
Action Items and Recommendations

- Continue existing CCW operation and maintenance programs (ARV replacement, mowing, etc.)
- Install pressure monitors at identified locations and review operational pressure data
- Stabilize erosion at identified locations
- Mary Rhodes Pipeline pump station system improvements – project no. E13037
- Maintenance and upgrade of cathodic protection system – project no. 23064
- Begin design and installation of parallel MRP at pressure exceedance areas - **Discussion and decision point**

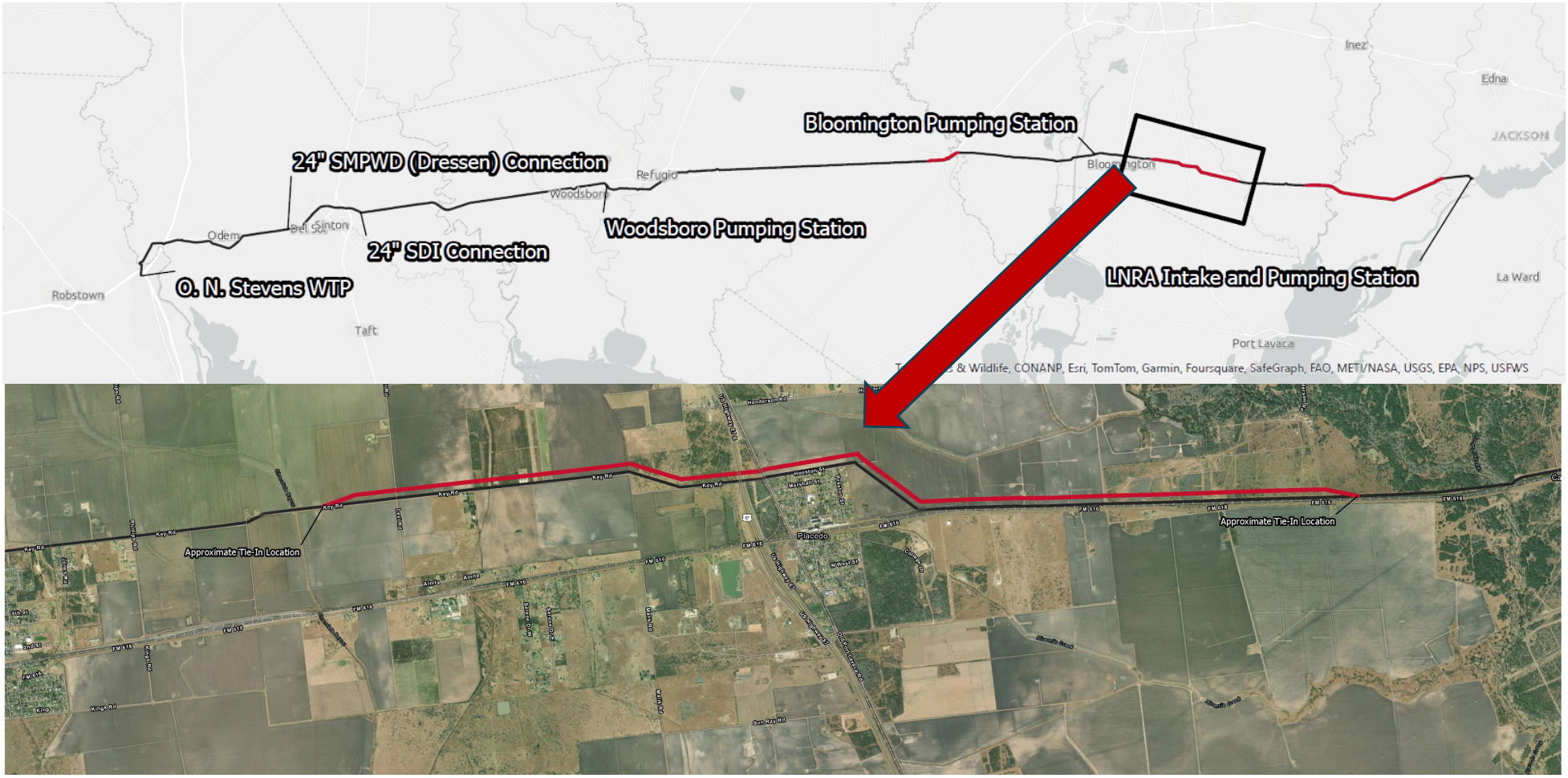
Parallel Pipeline Installation

- **Location 1**
  - North side of Lavaca River to south side of Garcitas Creek = 9 miles



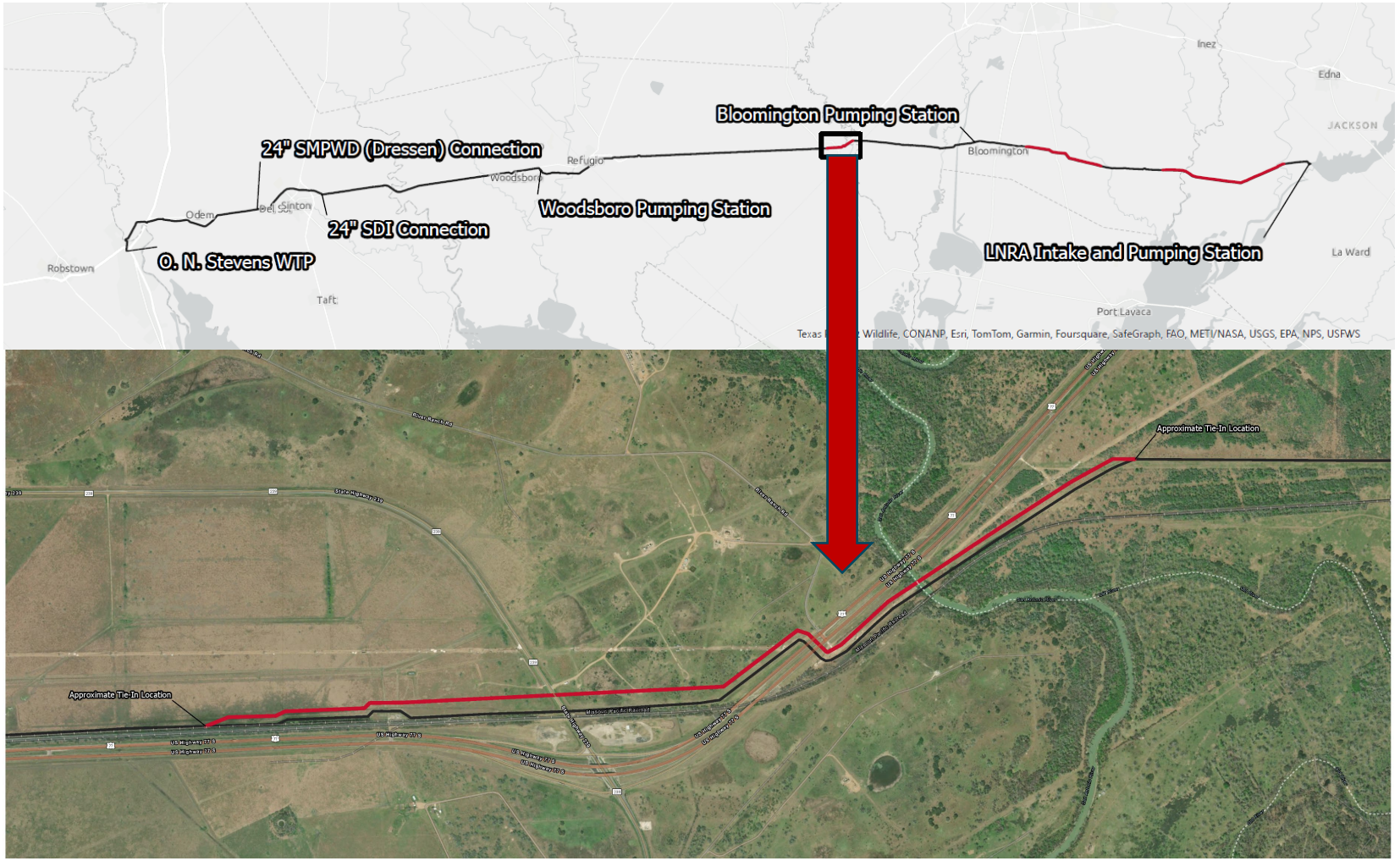
Parallel Pipeline Installation

- **Location 2**
  - East of Placedo = 2 miles



Parallel Pipeline Installation

- **Location 3**
  - San Antonio River Crossing = 0.5 miles



Parallel Pipeline Cost and Rate Impact

- Estimated cost:
  - $90-$105 million for 11 miles of 64” steel pipe (open-construction) and 0.5 miles of 64” pipe (trenchless construction)

- Estimated rate impact based on current rate model:
  - Increase of $0.19/1,000 gallons on raw water charge

Parallel Pipeline Installation Timeline

	Timeline	CCW procurement of long lead-time items
Traditional RFQ/Design/Bid/Build	42 months	36 months
Alternative delivery (Design/Build, CMAR)	36 months	NA
Design Amendment/Bid/Build	32 months	26 months

Thank you!

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