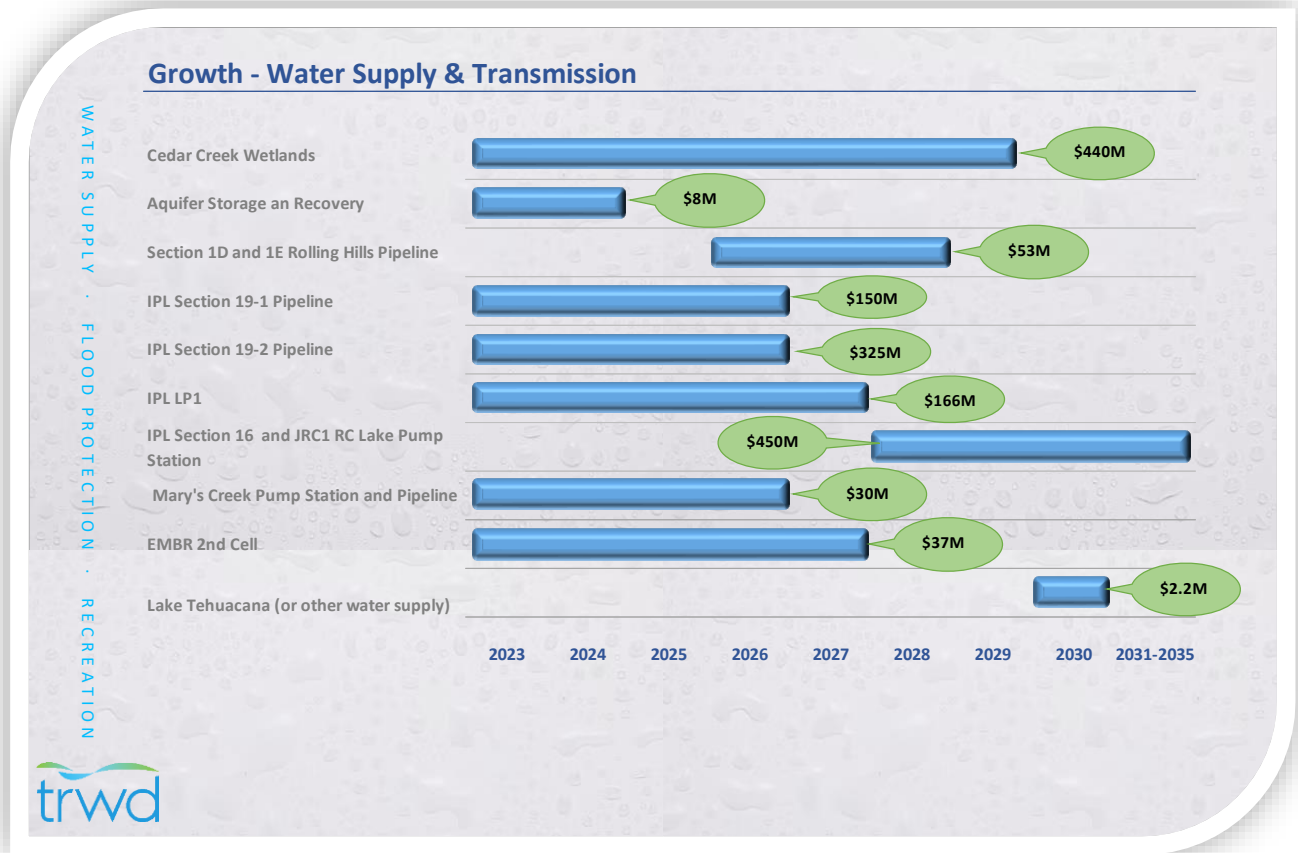


Tarrant Regional Water District

Capital Improvement Program



Cedar Creek Wetlands Water Reuse Project

Projected Start: 2021
Projected Construction Start: 2025
Projected Complete: 2029
Projected Cost: \$440,000,000
Contact: Chris.Zachry@TRWD.com / David.Schroeder@TRWD.com

Description:

The Cedar Creek Wetlands are a sister wetland facility planned to allow water reclamation and enhance supply storage and yield of Cedar Creek Reservoir. The location of the proposed constructed wetlands is approximately ten miles to the west and north of Cedar Creek Reservoir, immediately east of the main stem of the Trinity River. Water from the river will be cascaded through a similar sized and configured Cedar Creek wetland facility as the George W. Shannon Wetland in operation at Richland - Chambers Reservoir since 2013. Water courses through the wetlands to remove sediment and nutrients. The water is then re-lifted into Cedar Creek Reservoir for storage. The project will include the design and construction of a river pump station, raw water mains, sedimentation basins and wetlands cells, relift pump station, ten miles of large diameter pipe and a controlled outlet structure.

The Texas Commission on Environmental Quality (TCEQ) has already issued water rights allowing TRWD to divert highly treated wastewater from the Trinity River. Since 2014, TRWD

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has owned most of the real estate and permanent pipeline easements needed to construct the Cedar Creek Wetland and its supporting pipelines from the river to the wetland and from the wetland to the reservoir.

The 2021 Region C Plan projects the cost of the Cedar Creek Wetland to be \$226,318,000, which is based on the original 1,800 acre constructed wetlands facility footprint capable of achieving a permitted supply yield of 88,059 acre-feet. This would enhance the annual supply available from Cedar Creek from 175,000-acre-feet to more than 263,000 acre-feet – a 50% increase. TRWD is currently exploring an arrangement with Trinity River Authority to treat additional flows incorporating TRA treated reclaimed water flows, which would require significantly expanding the CC wetlands footprint and pumping/transmission facilities, and for which the projected cost of \$458,000,000 is developed.

Supply from the wetland-enhanced Cedar Creek Reservoir to TRWD's customers will utilize the current Cedar Creek Lake PS and pipeline, as well as the new JCC1 Lake Pump Station and IPL transmission pipeline. TRWD's goal is to have the new Cedar Creek Wetlands Facility operational by 2030, including two to three years to establish vegetation in the wetland's cells.

Aquifer Storage and Recovery (ASR) Demonstration Project

Project Start: 2018
Projected Construction Start: 2023
Projected Complete: 2025
Projected Cost: \$8,000,000
Contact: Zach.Huff@TRWD.com

Description:

Aquifer Storage and Recovery (ASR) is a proven technology to store water underground for later use. Benefits of ASR systems include improved resiliency in times of drought, avoidance of evaporation, storage for emergency situations, and an intermittent source of supply to be used during peak demand periods. Based on the results of studies completed for the District in 2000, 2002, and 2015, ASR appears to be a technically feasible water supply strategy for the District. A more detailed business case evaluation was completed in 2016 and based on those results and discussions with other agencies that have implemented ASR, the District decided to implement an ASR demonstration project to verify aquifer performance. The primary purposes of the project are to verify that ASR is feasible in the Trinity aquifer in this region, verify geochemistry reactions, verify recharge rates, verify feasible storage volumes, verify recovery rates, and to verify construction and operating costs.

Section 1D & 1 E Pipelines

Projected Start: 2026
Projected Construction Start: 2027
Projected Complete: 2029
Projected Cost: \$52,500,000
Contact: David.Schroeder@TRWD.com

Description:

Sections 1D (Rolling Hills WTP - B05/06 to Arlington Outlet) and 1E (RH2 to B05/06 Valves) have been part of the TRWD water delivery capital improvement planning for more than a decade. They are new pipeline sections that will ultimately connect from the Integrated

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Pipeline connection at the Kennedale Balancing Reservoir to the Rolling Hills WTP and TRWD's Benbrook Connection pipeline. Section 1D is the proposed pipeline section parallel to the existing TRWD pipelines from the Arlington Outlet to the City of Fort Worth's Rolling Hills Water Treatment Plant. Section 1E is the proposed pipeline section parallel to the existing TRWD 90-inch-diameter pipeline around the City of Fort Worth's Rolling Hills Water Treatment Plant. The existing 90" pipeline is fed by a 108" pipeline and an 84" pipeline. The system plan always included installation of a parallel pipeline next to the 90" pipeline once water demands justified a second pipeline. The additional pipeline will keep the existing 90" pipeline from experiencing high velocities, high enough to put the pipeline and valves at risk of damage. Demands for terminal storage and at the treatment plants are expected to reach the point where a parallel pipeline will be needed by the time it is designed and constructed. An additional benefit of the project is increased redundancy and resilience. By installing higher pressure class piping along this segment of the pipeline, the District will be able to reverse the flow of standard operations, and backflow water from Lake Benbrook to the Kennedale Balancing Reservoir. It is expected that both Sections 1D and 1E will be 108" pipelines to facilitate pigging between Rolling Hills and KBR. The total length will be approximately 19,000 linear feet.

IPL Section 19-1 Pipeline

Project Estimate: \$150,220,644
Projected Start: 2020
Projected Complete: 2026
Contact: Eddie.Weaver@TRWD.com

Description:

The IPL Pipeline Section 19-1 is an approximately 21-mile, 84-inch diameter pipeline that originates at the eastern end of the IPL Project at Lake Palestine and terminates just southeast of the city of Athens, Texas, where it will connect to Section 19-2 of the IPL Project. The proposed Corridor is 150' wide for the entire length of the alignment, to accommodate both the initial pipeline, as well two (2) potential, future pipelines. The Lake Palestine Pump Station and Section 19-1 and 19-2 Pipelines will deliver up to 150 MGD of water supply for Dallas Water Utilities from Lake Palestine via the Integrated Pipeline operated by Tarrant Regional Water District.

IPL Section 19-2 Pipeline

Project Estimate: \$324,642,617
Projected Start: 2020
Projected Complete: 2026
Contact: Eddie.Weaver@TRWD.com

Description:

The IPL Pipeline Section 19-2 consists of an 84-inch pipeline, approximately 21 miles long and is located entirely within Henderson County, Texas. The proposed Corridor is 150' wide for the entire length of the alignment, to accommodate both the initial pipeline, as well two (2) potential, future pipelines. The downstream portion (western end) of the pipeline begins near a proposed junction structure at the southwest corner of Cedar Creek Reservoir where Section 19-2 connects to Section 18 of the IPL pipeline. The Section 19-2 pipeline

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route runs generally east and slightly south such that the upstream portion (eastern end) of the pipeline ends at a connection to the western most point of IPL Pipeline Section 19-1, located just southeast of Athens, Tx. The Lake Palestine Pump Station and Section 19-1 and 19-2 Pipelines will deliver up to 150 MGD of water supply for Dallas Water Utilities from Lake Palestine via the Integrated Pipeline operated by Tarrant Regional Water District.

IPL LP1 Lake Pump Station

Project Estimate: \$165,657,743
Projected Start: 2023
Projected Complete: 2027
Contact: Eddie.Weaver@TRWD.com

Description:

The IPL Lake Palestine Pump Station (LP1) is one of three new lake pump stations that are part of the IPL. It is to be constructed on a new site on the southwest side of Lake Palestine approximately a mile upstream of Blackburn Crossing Dam near Frankston, Texas. The LP1 Pump Station will draw raw water from Lake Palestine via a new intake structure constructed as part of the proposed project. It will discharge flow into the new IPL Segment 19-1 Pipeline that proceeds generally west from the site and leads to the suction reservoirs associated with the new Joint Booster Pump Station Nos. 2 and 3 (JB2 and JB3, respectively). The LP1 Pump Station is designed to have 5 vertical line-shaft pumps, each equipped with a variable frequency drive (VFD) and totally enclosed water- and air-cooled (TEWAC) 4,000-horsepower (hp), 900-revolutions-per minute (rpm) electric induction motors. Flows will be discharged from each pump through 36-inch discharge piping including pump control ball valves (PCBV), an individual Venturi-type flowmeter, and an isolation valve. All flows will be discharged into an 84-inch-diameter header and pipeline that connects to IPL Segment 19-1 on the west side of the LP1 site. Design flows range from 150 million gallons per day (mgd) peak down to 15 mgd minimum.

IPL Section 16 and JRC1 RC Lake Pump Station

Project Estimate: \$450,000,000
Projected Start: 2028
Projected Complete: 2035
Contact: Eddie.Weaver@TRWD.com

JRC1

The IPL Project is a raw water supply program that integrates the TRWD and DWU water supplies from Lake Palestine, Cedar Creek Reservoir, and Richland Chambers Reservoir. The program includes raw water pipelines, raw water intakes and pumping stations, booster pumping stations, and storage reservoirs.

The upcoming Joint Richland Chambers Lake Pump Station (JRC1) is one of three new lake pump stations being built as part of the IPL project. Water supply will be pumped from JRC1 via the new Section 16 Pipeline of the IPL system.

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The following criteria and configuration information guide the preliminary design of JRC1.

The JRC1 design flow range is 250 million gallons per day (mgd) peak, down to twenty-five mgs minimum. The maximum lake flood elevation is 320 feet msl (flood easement level) with the Richland Chambers reservoir pool conservation level at 315 feet msl.

Section 16 IPL Pipeline

The future Section 16 IPL Pipeline will connect the future JRC1 Lake Pump Station on the Richland Chambers Reservoir with the rest of the IPL water transmission system. The Section 16 pipeline is designed as a 96-inch diameter pipe of either welded steel (C-200) or pre-stressed concrete cylinder (C-301) pipe. Pipeline Right-of-way between the future JB2 booster pump station and the existing Richland Chambers Lake Pump Station has already been obtained. Depending on the final location of the future JRC1 Lake Pump Station, the Section 16 pipeline may be extended further southeast to another area of the Richland Chambers Reservoir.

Mary's Creek Pump Station and Pipeline

Project Estimate:	\$30,000,000
Projected Start:	2023
Projected Complete:	2026
Contact:	??

Description:

Tarrant Regional Water District will be coordinating with the City of Fort Worth to capture treated effluent from the city's Mary's Creek Water Reclamation Facility and pump it through a pipeline to reach a nearby reservoir for water supply purposes. This capability will also protect the water quality of the downstream Mary's Creek and Clear Fork of the Trinity River, especially during extended dry periods of minimal natural stream flows.

Eagle Mountain Balancing Reservoir 2nd Cell

Project Estimate:	\$37,000,000
Projected Start:	2023
Projected Complete:	2027
Contact:	??

The Eagle Mountain Balancing Reservoir (EMBR) is a 118 million-gallon storage reservoir located in west Fort Worth. The reservoir serves several functions within TRWD's Eagle Mountain Connection Project system by providing storage, surge control, and hydraulic control.

To address increasing water supply needs of the City of Fort Worth Westside Water Treatment Plant, along with the potential need for operational flexibility, TRWD is planning on expanding the balancing reservoir to have a second cell.

The addition of a second cell will provide redundancy and the ability to bring one cell down for maintenance. The addition of approximately 86 million gallons of elevated storage in the new

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second cell of the EMBR facility will provide increased resilience in meeting Westside WTP demands in the case of extended emergencies.

Lake Tehuacana (or other water supply)

<i>Projected Start:</i>	2025
<i>Projected Complete:</i>	2045
<i>Projected Cost:</i>	\$500,000,000
<i>Contact:</i>	<i>Nicole.Rutigliano@TRWD.com</i>

Description:

Tehuacana is a proposed reservoir site on Tehuacana Creek in Freestone County. Its construction was contemplated to occur simultaneously with construction of the Richland – Chambers Reservoir. The Richland - Chambers Dam & Spillway was constructed between 1982 and 1987. However, the existing Richland - Chambers spillway is designed to pass the probable maximum flood (PMF) for an impoundment inclusive of Richland, Chambers and Tehuacana Creeks at a conservation elevation of 315 feet above mean sea level (msl).

The 2014 Integrated Water Supply Plan estimated the supply yield of Tehuacana Reservoir to be 41,000 acre-feet. However, recent studies compliant with Texas environmental flow standards project a smaller yield of 21,000 acre-feet. The 2021 initially prepared Region C Regional Water Supply plan projects a Tehuacana Reservoir yield at 28,000 acre-feet and proposes that the supply be available to the TRWD System by 2040.

The 2021 Region C Plan projects the cost of Tehuacana Reservoir to be \$325,468,000. Recent reservoir costs including mitigation have been substantial, and thus the higher projected cost of \$500 M included here. The reservoir would impound 15,000 surface acres, encompass permitting design and construction of an earthen dam and a 9,000-foot channel excavated down to elevation 290 feet above mean sea level (msl) to connect Tehuacana Reservoir to adjoin the Richland – Chambers Reservoir. Supply from the expanded Richland - Chambers - Tehuacana Reservoir is to be delivered by current and proposed TRWD transmission facilities.

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Aging Infrastructure, Increase in Capacity / Operational Flexibility



Richland Chambers Dam North Embankment Seepage/Stability Mitigation Construction - Phase 2

Project Start: 2024
Projected Construction Start: 2025
Projected Complete: 2026
Projected Cost: \$4,500,000
Contact: Louie.Verreault@TRWD.com / Dorota.Koterba@TRWD.com

Description

Description

The Richland Chambers Dam has performed very well since filling over 30 years ago. Some areas between the dam's north embankment and the TRWD constructed George Shannon Wetlands, along US 287, have exhibited seepage/wet soil conditions over the years. Construction of the wetlands has revealed sand boil formation in the treated water canal that appears to have resulted from deep-formation seepage from the reservoir or other sources. It is essential to identify and monitor these sources to determine if mitigation is required to reduce any potential hazards to the structural integrity of the dam. Subsurface hydrogeological monitoring and analysis to begin as part of Phase 1 over 2-3 years, after which time any mitigation measures will be identified to implement if needed.

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Kennedale Balancing Reservoir - Phase 3: Yard Piping and Modifications to Cells 1 & 2

Project Start: 2015
Projected Construction Start: 2022
Projected Complete: 2024
Projected Cost: \$41,000,000
Contact: Donna.Stephens@TRWD.com / James.Johnson@TRWD.com

Description:

Construction activity will be continuing at the Kennedale Balancing Reservoir (KBR). The first two phases – 108" Bypass Piping and the 3rd Cell Foundation have been completed. This third phase of construction, awarded in December 2021 and implemented over a three-year period, involves the installation of 120-inch diameter flow-through inlet and outlet piping for the existing two cells, along with large diameter yard piping and valve connections to the Cedar Creek, Richland Chambers and Integrated Pipeline pipelines that supply KBR. Two large concrete splitter box weirs will be removed, and current leakage attributed to existing cell inlets plugged. Enhanced operational flexibility and improved water quality will also result. The final phase after this construction, currently scheduled for early 2025, is to complete the new 165- million-gallon third cell at KBR providing additional emergency storage and optimized time of day operational capability.

Cedar Creek Section 2 Pipeline Replacement (11 miles) – Phase 1

Project Start: 2019
Projected Construction Start: 2024
Projected Complete: 2027
Projected Cost: \$104,000,000
Contact: Courtney.Jalbert@TRWD.com

Description:

In this area of the Cedar Creek pipeline, approximately one third of all pipe segments have pre-stressing wire breaks due to hydrogen embrittlement. Potential pipeline ruptures in this area of highly distressed pipeline would result in significant negative consequences. Moreover, loss of this section of the CC Pipeline due to a pipe failure would negatively impact TRWD's ability to deliver water to several primary customer cities fed directly from the pipeline. The recommended course of action is to remove and replace approximately eleven miles of 72" pre-stressed concrete cylinder pipe (PCCP) with 90" and 102" welded steel pipe in the Mansfield to Midlothian area which will provide additional water delivery capacity. The new 102" pipe will run west from the S2x12 Interconnect to the western end of this Phase 1 Replacement (Mouser Way), providing increased water delivery capacity from the IPL. Preliminary design began in Fall 2019, with construction planned to start in early to mid-2024 following completion of the modifications to the Kennedale Balancing Reservoir existing cells (Phase 3).

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Cedar Creek Section 4 Pipeline Replacement (5 miles)

Projected Start: 2024
Projected Construction Start: 2026
Projected Complete: 2027
Projected Cost: \$55,000,000
Contact: Courtney.Jalbert@TRWD.com

Description:

The Cedar Creek Section 4 Pipeline Replacement Project will replace 4.6 miles of the existing 72- inch prestressed concrete cylinder pipe with a new 90-inch welded steel pipe from the CC Lake Pump Station to a relative high point upstream of the Trinity River. The existing 1970s vintage pipe has operating pressures up to 225 psi and has encountered joint end failures not able to be detected by electromagnetic condition assessment technologies in this flood prone area. If a pipe break occurs in this area during a major flood event, it could result in an extended CC pipeline operations shutdown spanning several months until flood waters recede, only after which time repairs could be made and the pipeline cleared of mud and debris making this a critical area for rehabilitation. TRWD intends to replace the buried pump discharge header pipe from the CC1 lake pump station as part of the project as well. The new pipe will follow the same alignment as the existing pipe which will be taken out of service during the installation of the new pipeline. Construction is expected to begin in 2027.

CC Section 2 Pipeline Replacement (4.4 miles) – Phase 2

Projected Start: 2024
Projected Complete: 2027
Projected Cost: \$47,000,000
Contact: Courtney.Jalbert@trwd.com

Description:

Section 2 of the CC pipeline conveys water from the Waxahachie Pump Station to the Kennedale Balancing Reservoir (KBR). It can also convey IPL water through the S2x12 Interconnect. Phase 2 of the Cedar Creek Section 2 Pipeline Replacement project will continue the replacement of the 50 year old 72" PCCP with 102" welded steel pipe. In addition to the added water delivery capacity benefit, the 4.42 miles from KBR to Mouser Way would replace a few areas with high likelihood and consequence of failure. This section of pipeline has 125 out of 984 pipes with defects (13%) and 15 of those pipes are a repair priority 1 which means the pipe has the potential for failure based on risk analysis. This entire section of pipeline was installed in 1971 and is also approaching its end of useful life. Moreover, this stretch of PCCP is a known area with no shorting straps, resulting in reduced ability to protect the pipelines from corrosion if there are multiple breaks in the same pipeline. If a catastrophic failure should occur the surrounding community would be negatively impacted, so executing this project will remove additional hazards and improve community safety. Moreover, loss of this section of the CC Pipeline due to a pipe failure would negatively impact TRWD's ability to deliver water to several primary customer cities fed directly from the pipeline.

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The recommended course of action is to remove and replace approximately 4.42 miles of 72" pre-stressed concrete cylinder pipe with 102" steel pipe from ROW station 319+74 near KBR to 552+89 which will connect up to the Phase 1 project at Mouser Way and provide a continuous stretch of 102" pipe from S2x12 to KBR.

RC3H Booster Pump Station Electrical Room Cooling Improvements

Projected Start: 2022
Projected Complete: 2025
Projected Cost: \$4,500,000

Description:

The existing RC3H electrical room requires significant cooling due to heat loading from the five, 5000 hp variable frequency drives. Two-thirds of the existing cooling capability are from the original pump station installation, which have exceeded their expected service life and as a result, frequently have mechanical failures. Moreover, the district is interested in moving the air handling equipment out of the electrical room. A more reliable cooling solution will be achieved, vital to the continued operation of this critical RC3H booster pump station to move the water supply to TRWD's customers.

Eagle Mountain Old Service Spillway Gate Structure Upgrades

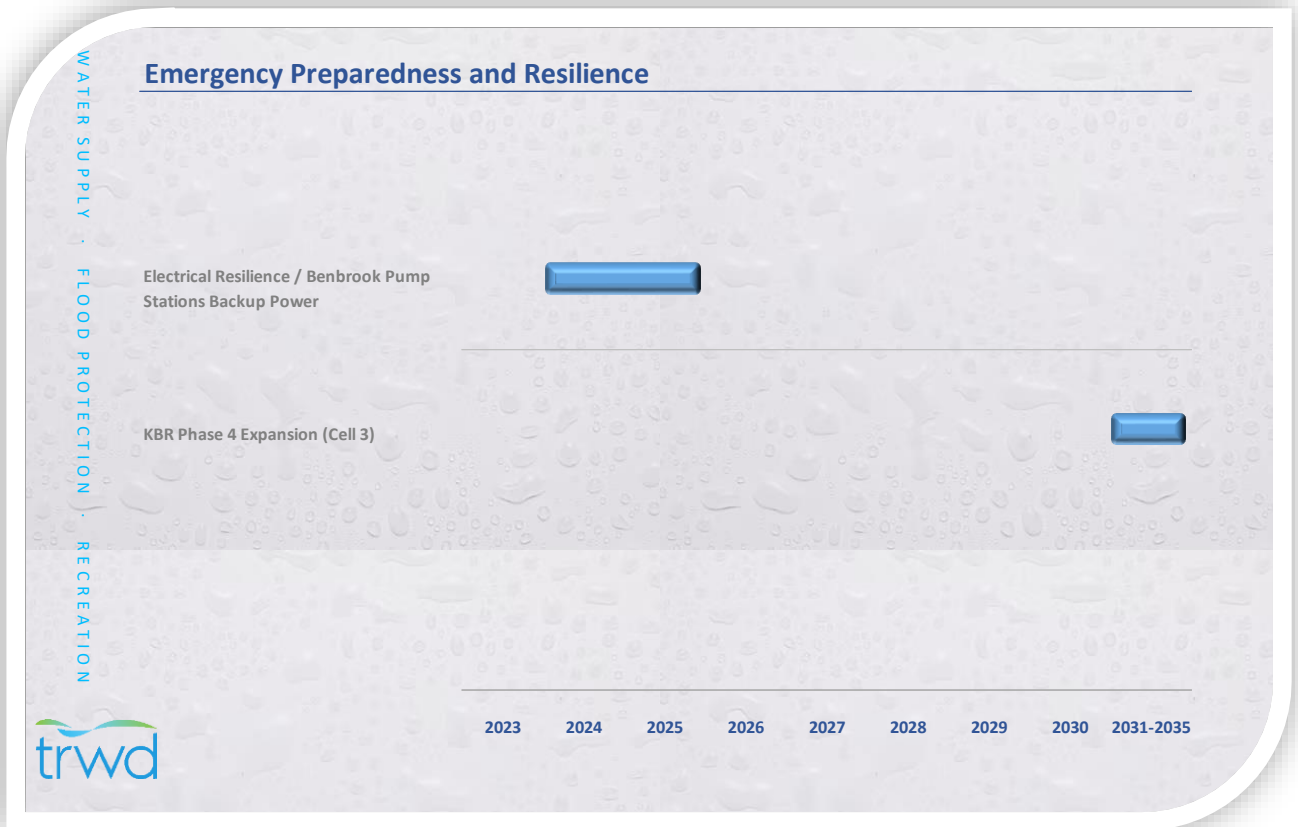
Projected Start: 2024
Projected Complete: 2025
Projected Cost: \$3,300,000

Description:

The original (old) service spillway consists of three vertical lift gates and an ungated overflow section in the fourth bay of the spillway. While the superstructure and hoists are in overall fair condition, measures are planned to improve the functionality of the gate hoisting mechanism to ensure successful operations when needed.

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Kennedale Balancing Reservoir – Phase 4: Third Cell Construction

Project Start: 2015
Projected Construction Start: 2031
Projected Complete: 2035
Projected Cost: \$50,000,000
Contact: Dorota [Koterba@TRWD.com](mailto:Dorota.Koterba@TRWD.com)

Description:

Kennedale Balancing Reservoir (KBR) currently consists of a two-cell balancing storage reservoir with a capacity of about 1,000 acre-feet. As part of a KBR expansion project, an addition of a third reservoir cell is planned to be constructed in two phases. The first phase consisting of the construction of an engineered foundation was completed in 2018. The second phase consists of the construction of the third cell directly west and adjacent to the existing cells increasing the total combined capacity to about 1,500 acre-feet. The third cell will be constructed of an earth fill embankment with a maximum height of about 65 feet and minimum 3 horizontal to 1 vertical slopes. The nominal crest elevation of the embankment will match the elevation of the existing two cells at 740 feet-msl. A 200-foot-wide overflow weir will be used as an emergency spillway for the third cell.

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Benbrook Pump Stations Backup Power

Projected Start: 2023
Projected Construction Start: 2024
Projected Completion: 2025
Projected Cost: \$5,200,000
Contact: James.Johnson@TRWD.com

Description:

TRWD is considering backup power for two pumps at our Benbrook Lake PS (with the possibility of a future upgrade to all 4 pumps), as well as backup power for our smallest pump at Benbrook Booster PS. The Benbrook Lake Pump Station can deliver very large flows of water (over 200 mgd with all 4 pumps) to nearby customers with relatively low power required when compared to East Texas pumping. However, the two Benbrook pump stations are the only two TRWD pump stations on distribution-level power, and thus more susceptible to extended power outages. TRWD through a series of coordination meetings with its customers has confirmed that they are taking measures to add additional backup power across their own systems (though not at Rolling Hills WTP due to it being served by transmission level power). Diversifying and expanding TRWD's capabilities to provide raw water to customers during extended power outages is a major driver for adding backup power at the Benbrook Lake PS, as well as for a single pump at the Benbrook Booster PS to provide raw water to FW's Westside WTP.

The required Benbrook Lake PS backup power would be somewhere in the 2.5 to 3 MW range; the Benbrook Booster Lake PS would be around a 1 MW, both at 4160 v medium voltage.

Both are on USACE property so permitting will be a consideration. All improvements are expected to be located within TRWD's existing easement with the Corp of Engineers.

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Copper Ion Feed for Benbrook Lake Pump Station for Zebra Mussel Control

Project Start: 2019
Projected Construction Start: 2023
Projected Completion: 2024
Projected Cost: \$2,500,000
Related Project: Benbrook Pump Room Cooling
Contact: James.Johnson@TRWD.com

Description:

TRWD and Carollo are working on a copper ion injection project to control zebra mussels (reduce the number that attach to infrastructure) at the Lake Benbrook Pump Station. The project is not needed yet because zebra mussels are not in the lake. But, given that they are in surrounding lakes, Lake Benbrook is identified as a high-risk for infection, and the nuisance that they are, the design is being prepared so the system can be built as soon as they appear.

TRWD uses chloramines for similar purposes at other lake pump stations. But the cost to install chloramines at Lake Benbrook is too high. Therefore, knowing some utilities have successfully used copper ions, TRWD and Carollo conducted a two-year pilot and found that copper ions are effective in reducing zebra mussel attachment and have a lower life cycle cost than chloramines.

The use of copper ions is being reviewed by the TCEQ. Upon their approval, Carollo will begin final design in order to be prepared to build the project when zebra mussels appear.

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Richland Chambers Lake Pump Station Chlorine Gas Conversion to Sodium Hypochlorite

Projected Start: 2023
Projected Construction Start: 2024
Projected Complete: 2026
Projected Cost: \$12,500,000
Contact: James.Johnson@TRWD.com

Description:

TRWD currently receives bulk chlorine and mixes it with aqueous ammonia (also called ammonium hydroxide) to form chloramines that are injected upstream of the pump station to control biofilm growth and reduce zebra mussel attachment to the transmission system. Both biofilm and attached zebra mussels reduce the flow capacity during higher flow operations.

Since chlorine is a hazardous chemical, TRWD must protect personnel and the public from risks, also maintain an EPA Risk Management Plan, and be subject to periodic inspections and audits by the EPA. In addition, chlorine deliveries can be interrupted by factors outside of TRWD's control.

In order to reduce the hazard and eliminate the EPA's requirements listed above, TRWD plans to replace the chlorine system with a sodium hypochlorite system. The sodium hypochlorite may be delivered in bulk or generated on site. While on site generation requires more equipment, and maintenance, it allows greater autonomy from the chemical market.

TRWD will contract with a design consultant and contractor to design and build this project.

Cedar Creek Pump Station Chlorine Demolition and Caustic Soda Improvements

Project Start: 2021
Projected Construction Start: 2023 (For Phase 1, Unknown for Phase 2)
Projected Complete: 2024 (For Phase 1, Unknown for Phase 2)
Projected Cost: \$1,700,000
Contact: David.Schroeder@TRWD.com

Description:

TRWD currently uses three chemicals at the Cedar Creek Lake Pump Station. The first two are chlorine gas and aqueous ammonia (also called ammonium hydroxide). They are mixed to form chloramines that are injected into the water before being pumped into the transmission system. Originally the chloramines were injected to reduce biofilm growth in the pipeline and therefore reduce the pumping cost. However, the cost/benefit did not turn out as expected because the pumping costs are dominated more by the pipe roughness than biofilm growth. These chemical feed systems are now inactive. They will only be reactivated to control zebra mussels if they appear in the lake which is only a moderate risk for Cedar Creek. (The goal of controlling zebra mussels is to reduce the number that attach to the transmission system.) The third chemical is sodium hydroxide (also called caustic soda). It is injected in the pipeline downstream of the pump station to maintain the Langlier Saturation Index to a safe range for the pipeline lining.

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TRWD is planning the following changes and improvements.

- Remove the chlorine tank, associated scrubber tank (but not the containment structure for this tank as it will be reused), and associated feed system; then demo the building that houses the chlorine tank and feed system.
- Install a new sodium hypochlorite tank and feed system. The tank will be sized to fit within the containment structure that will be reused and a covering will be added over the tank and feed pumps. The sodium hypochlorite and aqueous ammonia systems will be mixed to form chloramines for zebra mussel control. The benefits of sodium hypochlorite are that it is less hazardous, does not require an EPA Risk Management Plan, and deliveries seem to be more reliable.
- Reline the aqueous ammonia containment structure.
- Raise the sodium hydroxide tank so its feed pumps can completely drain it.

This project will be phased. Phase 1 will include all work described above except installing the new sodium hypochlorite system – it will be designed in Phase 2 but only installed if zebra mussels appear. TRWD is designing Phase 1 but plans to bid out the work. Phase 2 may be designed by a consultant and installed by a contractor.

RC Lake Pump Station Backup Sodium Hypochlorite for Zebra Mussels and Pump Discharge Valve Hydraulic Actuators Installation

Project Start: 2021
Projected Construction Start: 2023
Projected Complete: 2023
Projected Cost: \$1,200,000
Contact: David.Schroeder@TRWD.com

Description:

Following the discovery of zebra mussels at various locations in the Richland Chambers Reservoir in 2020, TRWD worked with Texas Parks and Wildlife (TPWD) and the Army Corps of Engineers (USACE) to ensure deliveries from Richland Chambers were not disrupted. Permission to pump to Lake Benbrook, an Army Corps lake that does not yet have zebra mussels, was given with some conditions: TRWD needs to have the ability to dose chloramines in the Richland Chambers pipeline 24 hours per day, 7 days per week during active zebra mussel spawning months (typically March through October of each year) to prevent the transportation of zebra mussels to currently uninfected reservoirs. To ensure that the District can meet the goal of uninterrupted service to our customers, we are installing a secondary, redundant method for dosing chloramines at the Richland Chambers lake pump station that will provide protection for the wet well, pumps, pump cans, pipeline, and appurtenances. The new method for dosing chemicals in the pipeline will operate as the backup to the current chloramine delivery system in place. Having two different methods for chloramine dosing ensures that if one system fails, a second is on stand-by to continue protecting our pipeline as well as prevent the transportation of zebra mussels between reservoirs.

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Arlington Outlet Dechlorination Facility Improvements

Projected Start: 2022
Projected Construction Start: 2023
Projected Complete: 2024
Projected Cost: \$2,900,000
Contact: Donna.Stephens@TRWD.com

Description:

The purpose of the Arlington Outlet Dechlorination Facility is to remove any chlorine residual that may remain in the raw water pipelines prior to release into Village Creek upstream of Lake Arlington for meeting water supply and terminal storage needs. Among the planned improvements to the dechlorination facility are a roof to protect the tanks, piping and pumping components from outdoor elements, improved ventilation, relocation of the sampling equipment, and additional sampling and injection taps on the three nearby TRWD transmission mains.

Richland Chambers Lake Pump Station (RC1) Electrical Building with VFD

Projected Start: 2023
Projected Complete: 2026
Projected Cost: \$23,000,000

Description:

Currently, the medium voltage 4,160 volt switchgear, soft starts and capacitor banks at the RC1 Lake Pump Station are located in the pump and basement floors of the existing pump station building. The electrical equipment is dated and does not have modern safety features. Moreover, the capacitor banks are installed in the basement and are subject to damp conditions. In addition to improved staff safety and equipment reliability, another driver for a new electrical building to house all electrical equipment is the desire by TRWD to have the capability to operate the pumps at different speeds through the installation of VFDs. This would facilitate TRWD's ability to better optimize real-time pumping system wide during peak power demand periods and times of high-power pricing variability. The use of VFDs would also eliminate the need for the existing capacitor banks installed for power factor correction purposes at RC1.

Cedar Creek Lake Pump Station (CC1) Electrical Building with VFD

Projected Start: 2025
Projected Complete: 2027
Projected Cost: \$20,000,000

Description:

Currently, the medium voltage 4,160 volt switchgear and soft starts at the CC1 Lake Pump Station, along with the master control center (MCC), are located in the existing pump station building adjacent to the mechanical equipment. Apart from the MCC, the electrical equipment is dated and does not have modern safety features. In addition to improved staff safety and equipment reliability, another driver for a new electrical building to house all

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Capital Improvement Program

electrical equipment is the desire by TRWD to have the capability to operate the pumps at different speeds through the installation of VFDs. This would facilitate TRWD's ability to better optimize real-time pumping during peak power demand periods and times of high-power pricing variability.

Eagle Mountain Old Service Spillway Gate Structure Upgrades

Projected Start: 2023
Projected Complete: 2025
Projected Cost: \$3,300,000

Description:

The original (old) service spillway consists of three vertical lift gates and an ungated overflow section in the fourth bay of the spillway. While the superstructure and hoists are in overall fair condition, measures are planned to improve the functionality of the gate hoisting mechanism to ensure successful operations when needed.