

Senate Bill 8 Report of the Repair and Maintenance Needs of Lake Wood and Lake Dunlap Dams on the Guadalupe River

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Texas Water Development Board

Texas Commission on Environmental Quality

Texas State Soil and Water Conservation Board

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Report of the Repair and Maintenance Needs of Lake Wood and Lake Dunlap Dams

Contents

Background3
Funding overview5
Dam failure and replacement planning summary6
 Lake Dunlap (TP-1)6
 Lake McQueeney (TP-3)7
 Lake Placid (TP-4)7
 Meadow Lake (TP-5)7
 Lake Gonzales (H-4)8
 Lake Wood (H-5)8
TWDB financial assistance summary8
Conclusion9

Background

In March 2016, during routine operations, one of the spillgates at the Guadalupe-Blanco River Authority's (GBRA) H5 Dam at Lake Wood on the Guadalupe River experienced a structural failure and collapse rendering the gate inoperable. Again, in May 2019, the GBRA experienced a second catastrophic spillgate failure at Lake Dunlap, also on the Guadalupe River. These failures have effectively de-watered the lakes precluding the ability to generate hydroelectricity or provide recreational access.

The spillgate failure at Lake Wood is believed to have occurred when a "tie-bar" section that connects the upstream and downstream pieces of the spillgates failed, causing a chain reaction that resulted in a portion of the downstream section of the spillgate breaking away from the dam's concrete superstructure. After review of video of the Lake Dunlap spillgate failure, it is believed that the event was also related to a failure of the original structural steel components.

Third-party engineering assessments and two spillgate failures over the course of three years at Lake Wood and Lake Dunlap reinforced the belief that the hydroelectric dams that form the lakes had aged beyond their useful life. The structural steel components of the spillgates that enable the dams to hold and maintain water level had degraded beyond repair. In their deteriorated condition, the dams posed a safety risk. After the Lake Dunlap event, an independent expert panel consisting of engineers and the Chief of the Texas Division of Emergency Management recommended specific areas around the dams to be designated as prohibited or restricted use for activities. The expert panel also recommended safety measures that have been temporarily implemented by court order until replacement gates can be constructed or the dams decommissioned.

Lake Dunlap and Lake Wood are two of the six reservoirs that create the 90 year-old Guadalupe Valley Hydroelectric System, which is owned and operated by the GBRA. The lake system, purchased by the GBRA in 1963, has provided the area with recreation and local economic activity since the 1930s. The electricity generated and sold, however, no longer provides the revenue needed to repair or maintain the existing system.

The system includes six high hazard dams that generate hydroelectricity and provide recreational opportunities in Guadalupe and Gonzales counties. Fifteen spillgates at the six dams were put into service between 1928 and 1932, and all have reached the end of their useful life. The gates provide primary control of headwater levels in their corresponding reservoirs, and while they have been regularly maintained, the advanced age of the gates and inaccessibility of failing components has resulted in increased maintenance requirements, unreliable operation,

Report of the Repair and Maintenance Needs of Lake Wood and Lake Dunlap Dams

and the unrepairable failure of gates at two of the six dams. Replacement of spill gates with a modern design is necessary to continue operations.

For reference, the following table provides information on the Guadalupe Valley Hydroelectric System dams, including their hazard category as assigned by the Texas Commission on Environmental Quality (TCEQ):

<i>Project (Ref. Code)¹</i>	<i>Year Completed</i>	<i># Gates</i>	<i>Hazard Category (2018)</i>
Lake Dunlap (TP-1)	1928	3	1 - High
Lake McQueeney (TP-3)	1928	3	1 - High
Lake Placid (TP-4)	1932	2	1 - High
Lake Nolte (Meadow) (TP-5)	1931	3	1 - High
Lake Gonzales (H-4)	1931	2	1 - High
Lake Wood (H-5)	1931	2	1 - High

In response to the 2016 and 2019 dam failures on the Guadalupe River, the 86th Texas Legislature included language in Senate Bill 8 amending Subchapter B, Chapter 201, Texas Agriculture Code, by adding Section 201.0227 (d-1) to read as follows:

(d-1) The water development board, in coordination with the state board and the Texas Commission on Environmental Quality, shall prepare a report of the repair and maintenance needs of all dams that:

- (1) are not licensed by the Federal Energy Regulatory Commission;*
- (2) do not have flood storage;*
- (3) are required to pass floodwaters; and*
- (4) have failed.*

Upon the above language becoming law, analysis by the Texas State Soil and Water Conservation Board determined that no dams under their purview (generally earthen dams designed and constructed by the U.S. Department of Agriculture, Natural Resources

¹ Parenthetical designations refer to the original owners of each dam, Texas Power (TP) or Texas Hydro (H).

Report of the Repair and Maintenance Needs of Lake Wood and Lake Dunlap Dams

Conservation Service) met the report parameters, nor had any experienced failure. Analysis by the Texas Water Development Board (TWDB) and the TCEQ determined that the above provisions applied exclusively to the dams at Lake Dunlap and Lake Wood and to no other dams within the state of Texas. The TWDB and TCEQ then worked together to produce this report in coordination with the GBRA.

Funding overview

Opportunities for repaying debt associated with rebuilding the dams have been limited. The GBRA cannot levy or collect taxes, assessments, or pledge the general credit of the State of Texas. Funding for special projects may come from state and federal grants; however, all other revenues for maintenance and operation as well as capital needs are obtained from rates charged for the products and services the GBRA provides to those customers.

All of the GBRA's operational divisions are self-sustaining with the exception of the Guadalupe Valley Hydroelectric Division, which has recorded losses in eight of the last 10 years. The deregulation of the electricity markets in 2002, coupled with competition from other sources of energy and a reliance on unpredictable river flows, created inconsistent and unsustainable revenue streams to support the ongoing repair and capital replacement needs of the system, which is beyond its useful life.

The GBRA continues to work with the adjacent property owners, the Guadalupe Valley Electric Cooperative, and other stakeholders to discuss and develop sustainable funding strategies to finance, construct, operate, and maintain operations of the Guadalupe Valley Hydroelectric System and associated lakes.

Lake Dunlap, Lake McQueeney, and Lake Placid lake associations have all taken steps to create water control and improvement districts (WCIDs). These WCIDs will utilize tax revenue to fund the replacement of the spillgates as well as their continued maintenance and operation. All three districts were approved by voter confirmation in November 2020.

The GBRA is in support of the steps the lake associations have taken and has finalized financing and operations agreements with each of the WCIDs. Per the agreements, the GBRA will contribute all gross revenues from the sale of hydroelectric power generated by each dam back to its respective WCID. The GBRA will issue the debt necessary to complete the project, with the debt service covered by the appropriate WCID. The TWDB has approved below-market rate loans to GBRA on behalf of each district.

There is no universal solution to securing a long-term future for the Guadalupe Valley Lakes, and the GBRA continues to work with Meadow Lake, Lake Wood, and Lake Gonzales stakeholders to evaluate options.

Dam failure and replacement planning summary

Since the spillgate failure at Lake Wood in 2016, the GBRA initiated numerous repairs in an effort to preserve the 90-year-old Guadalupe Valley Hydroelectric System. GBRA engineers, crews, and contractors prioritized critical components in need of repair throughout the system and evaluated the entire system's needs.

In Fiscal Year 2018, repair work began on 10 of 15 spillgates at hydroelectric dams in Guadalupe and Gonzales counties. GBRA hired consulting engineers to evaluate alternative gate systems for potential replacement of the existing bear-trap gates in the system. Eleven selection criteria were established to compare the various spillway gate options. A critical aspect in the evaluation of the replacement gate system was to match as closely as possible the capacity and discharge characteristics of the existing system to avoid adverse upstream or downstream impacts during flood event discharges. Other key considerations for the evaluation included structural modifications to the existing dams to accommodate each alternative and operation and maintenance procedures. A hydraulic crest gate system was determined to be the most robust and operationally efficient; installation of a new hydraulic crest gate system requires approximately 24 months for construction.

Concurrent with the initiated emergency repairs, the GBRA contracted with Black & Veatch to develop a preliminary design of hydraulically actuated steel crest replacement gates for the six similarly configured hydroelectric dams in the system. Emergency repairs continued during Fiscal Year 2019, until the spillgate at Lake Dunlap failed in May 2019. While projects at locations other than Lake Dunlap and Lake Wood are outside the scope of this report, a full account is listed below for reference. Availability of funding for each dam has a direct impact on the GBRA's ability to move forward with design, construction, and installation of the hydraulically actuated crest replacement gates.

Lake Dunlap (TP-1)

As noted above, one of the gates failed at Lake Dunlap Dam on May 14, 2019. This was a "sunny day" failure of the gate, meaning that it was not associated with a weather-related event. The lake drained without loss of life.

Lake Dunlap WCID was confirmed and approved to provide tax-supported revenues to pay for construction costs to replace the spillgates, and the WCID will be responsible for repair costs of

Report of the Repair and Maintenance Needs of Lake Wood and Lake Dunlap Dams

Lake Dunlap Dam and hydroelectric facilities. The GBRA provided financial assistance for the design of repairs to Lake Dunlap Dam, will provide the revenues from hydroelectric generation at Lake Dunlap WCID, will operate the facility, and will contribute to the routine operation and maintenance expenses.

The GBRA has selected a contractor for the project; construction will commence in early 2021 and is expected to be completed in 2023.

Lake McQueeney (TP-3)

Lake McQueeney WCID was confirmed and approved to provide tax-supported revenues to pay for construction costs to replace the spillgates and will be responsible for repair costs of Lake McQueeney dam and hydroelectric facilities, including ongoing maintenance and repairs.

The GBRA is providing financial assistance for the design of repairs to Lake McQueeney dam, will provide the revenues from hydroelectric generation at Lake McQueeney dam, and will operate the facility.

Engineering design is scheduled to be completed in fall 2021. The GBRA will procure a contractor in late 2021, with construction to commence in early 2022. Construction completion is expected in 2024.

Lake Placid (TP-4)

Lake Placid WCID was confirmed and approved to provide tax-supported revenues to pay for construction costs to replace the spillgates and will be responsible for repair costs of Lake Placid dam and hydroelectric facilities, including ongoing maintenance and repairs.

The GBRA is providing financial assistance for the design of repairs to Lake Placid dam, will provide the revenues from hydroelectric generation at Lake Placid dam, and will operate the facility.

Engineering design is scheduled to be completed in fall 2021. The GBRA will procure a contractor in late 2021, with construction to commence in early 2022. Construction completion is expected in 2024.

Meadow Lake (TP-5)

Meadow Lake does not have the residential or additional economic development to generate the necessary revenue required to fund needed replacements and ongoing operations.

Lake Gonzales (H-4)

Lake Gonzales does not have the residential or additional economic development to generate the necessary revenue required to fund needed replacements and on-going operations.

Lake Wood (H-5)

As noted above, one of the spillgates failed at Lake Wood Dam in March 2016. The lake drained without loss of life.

Neither the Lake Wood area nor Gonzales County has the residential or additional economic development to generate the necessary revenue required to fund needed replacements and on-going operations.

TWDB financial assistance summary

The GBRA has been working with the WCIDs to obtain below-market financing from the TWDB for improvements to restore Lakes Dunlap, McQueeney, and Placid.

Through the TWDB's Flood Infrastructure Fund (FIF) program, the GBRA submitted abridged applications in June 2020 for multiple, separate dam-related projects, not including Lake Wood. The Lake Dunlap proposal requested a total of \$40,000,000 for "Spillgate Replacement and Dam Armoring." The proposal ranked 204 of the over 280 prioritized abridged applications submitted; due to the project's ranking, the GBRA has not been invited to proceed with the application process as of the date of this report.

In August 2020, the GBRA applied for financial assistance through the Clean Water State Revolving Fund (CWSRF), also administered by the TWDB. Totaling \$120 million, the application combined the spillgate replacements at several dams in their service area under a single project called the "Guadalupe Valley Hydroelectric System." The project will replace existing bear-trap style crest gates with new hydraulically actuated steel crest gates at Lake Dunlap, Lake McQueeney, and Lake Placid dams. Replacement of the gates will include structural modifications to the existing spillway structure, upgrades to the mechanical system, upgrades to electrical distribution power, improved backup power, new instrumentation and controls, improved headwater and tailwater measurement, new video surveillance, and supervisory control and data acquisition (SCADA) system interface.

On December 3, 2020, the TWDB's governing Board approved the CWSRF financial assistance totaling \$40 million for Lake Dunlap. To implement the project, the GBRA is entering into a contract with the Lake Dunlap WCID. Confirmed by voters in November 2020, the district is located within Comal and Guadalupe counties and has a population of approximately 1,375 residents. The District will provide tax-supported revenues to pay the debt service for the

Report of the Repair and Maintenance Needs of Lake Wood and Lake Dunlap Dams

financing.

While outside the scope of this report, the TWDB approved financial assistance totaling \$80 million from the CWSRF for improvements to Lakes McQueeney and Placid on February 10, 2021.

Conclusion

In conclusion, consistent with the requirements as outlined in Senate Bill 8, 86th Texas Legislature, Section 201.0227 (d-1), the TWDB and the TCEQ determined that the provisions applied exclusively to the dams at Lake Dunlap and Lake Wood and to no other dams within the state of Texas.

The TWDB committed financial assistance to GBRA for repairs to Lake Dunlap dam. The GBRA has selected a contractor, with construction commencing in early 2021 and expected completion in 2023.

With respect to Lake Wood dam, availability of funding has a direct impact on the ability to move forward with design, construction, and installation of necessary replacement gates. Ultimately, these steps will be needed at Lake Wood Dam to restore the dam.

Finally, as with all flood-related mitigation efforts, TWDB staff recommends that the Lake Dunlap project incorporate any necessary changes due to the National Oceanic and Atmospheric Administration's Atlas 14 precipitation estimates. Revised estimates, published in 2018, show significantly increased values in parts of Texas that will result in changes to the rainfall amounts that define flood events. This recommendation also applies to any similar dam projects along the Guadalupe Valley Hydroelectric System, particularly those at Lake McQueeney and Lake Placid, and possible future projects at Meadow Lake, Lake Gonzales, and Lake Wood.