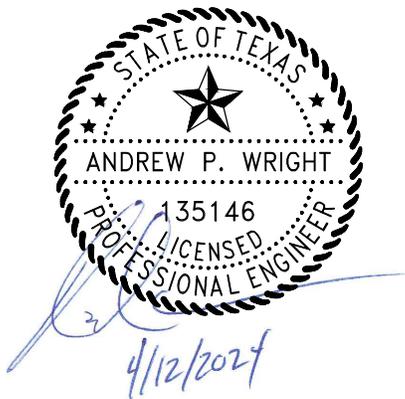


Lake Gladewater Dam TX03725

Dam Inspection Report



November 2023
Revised: March 2024

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GENERAL INFORMATION

Inventory No.: TX03725

Water Rights Authorization: Adj. 04762

Dam: Lake Gladewater Dam

Owner: City of Gladewater

Stream: Glade Creek

Basin: Sabine River

County: Upsher

General Location: Northwest Gladewater, Texas

Dam Height: 33 feet

Downstream Hazard: High

Normal Capacity: 6950 ac-ft

Maximum Capacity: 12,095 ac-ft

Normal Water Level: 300 ft msl

Current Water Level: 299.75 msl

Previous Inspection Date: August 30, 2022

Current Inspection Date: November 8, 2023

Inspection By: Andrew Wright, P.E., Mike Simmons, Fire Chief

Personnel Contacted:

- Mike Simmons, Fire Chief

SUMMARY

Lake Gladewater Dam is an intermediate-size, high-hazard earthen embankment in Upsher County. This embankment was inspected at the request of Mike Simmons, Fire Chief as a part of the annual maintenance and operations of this Dam. The last known inspection was conducted by TCEQ on August 30, 2022. The overall condition of the dam is **poor condition** with significant voids behind some of the spillway's concrete panels, settling of concrete panels, and water seeping through the panel gaps in some places. Some of the deficiencies noted in this report are maintenance related. Other deficiencies, such as the hydraulic inadequacy will require a more detailed design and analysis conducted by a Texas Licensed Professional Engineer.

BACKGROUND

Lake Gladewater Dam was constructed in 1951-1952 for the purpose of stormwater management, flood control, water supply, and recreation. This Dam is owned by the City of Gladewater, Texas, and is located in Upsher County on Glade Creek approximately 1.25 miles upstream of US Highway 80. The outlet works of this Dam consist of a low flow underdrain outlet located on the eastern side of the embankment, a concrete-lined trapezoidal-shaped principal spillway located on the west end of the embankment, and a grass-lined trapezoidal-shaped emergency spillway located in the west abutment of the dam. According to information located in the Emergency Action Plan, the Principal spillway is capable of handling flows up to the 5-year storm event. Flows in excess of the 5-year storm, pass through the emergency spillway.

PRE-INSPECTION MEETING

A pre-inspection meeting was held with the Fire Chief and several other City employees prior to the Dam Inspection. Most of the discussion was focused on the holes that were noticed in the spillway drop section near the downstream water level. Chief Mike Simmons, Andrew Wright, P.E., Captain Hill, Firefighter Shane Barnes, and Firefighter Brian Ray created a plan to access these holes via the water utilizing Gladewater Fire Department's swift water rescue gear. We also discussed what to look for in a visual inspection, what warrants immediate attention, and what falls under the regular O&M scope of work.

POST-INSPECTION MEETING

A post-inspection meeting will be held to discuss the results of this inspection as well as review previous inspections conducted by TCEQ.

INSPECTION FINDINGS

Figure 1 is a location map of Lake Gladewater Dam in relation to the City of Gladewater, Figure 2 is an aerial view of Lake Gladewater Dam with 10-ft contours and stream flow lines and Figure 3 is an aerial view of Lake Gladewater Dam with markers indicating the location and direction of photos taken during the inspection.

Crest (Photo No. 1-3)

The crest of the dam is in fair condition with a traditional uniform crest elevation. Areas of rutting were present near the raw water intake structure for the Gladewater Water Treatment Plant. These ruts were approximately 8"-12" deep and held water on the crest of the dam. The grass vegetation on the crest of the dam was in fair condition with poor vegetative cover in the wheel paths from vehicles traveling across the crest of the dam. The soil on the crest of the dam consists of iron ore rock and a mixture of clay and sandy material. The overall width of the crest varies from 14-ft to 20-ft wide with an average width of 16-ft.

Upstream Slope (Photo No. 4-1, 11)

The upstream slope is in fair condition with sparse grass coverage. Rock riprap covers the slope to within 5-ft of the crest of the dam. Sparse grass is growing between the voids of the riprap. Large debris litters the waterline and small trees less than 8' tall are growing near the waterline and in the voids of the riprap. The overall slope is estimated to be 3:1 (H:V). Aquatic weeds and vegetation are present at the waterline of the upstream slope. No animal burrows were identified at the time of inspection on the upstream slope. Significant erosion was noted on the slope underneath the manway leading out to the raw water intake structure for the water treatment plant.

Downstream Slope (Photo No. 10, 12-15)

The downstream slope is in poor to fair condition with steep slopes greater than (3:1 H:V) and sparse tall grass coverage with much of the ground between the tall grasses bare and uncovered. Vegetative cover has improved since the 2022 inspection as a result of mowing, but it still remains sparse. The steep slopes are proving to be difficult to maintain with small trees starting to grow as a result. The overall slope varies from as steep as 1.5:1 to as flat as 3:1. Erosion is noted in several areas along the top of the downstream slope. The toe of the slope is dry with no evidence of seepage on the downstream side of the embankment.

Outlet Works (Photo No. 16-18)

The manually controlled outlet works for the Lake Gladewater Dam consists of a concrete raw water intake structure located near the eastern abutment of the lake with 3 slide gates at different elevations. The intake structure and walkway are in good condition. An 18-inch diameter reinforced concrete pipe extends under the embankment from the intake structure to the raw water intake pumps for the water treatment plant. A gate valve is located in the general area where the low flow underdrain outlet was expected, however, the downstream end of the underdrain could not be located and appeared to be covered by soil and vegetation. The function of the low flow outlet could not be verified. The condition of this outlet is classified as poor as it was not capable of being evaluated.

Service Spillway (Photo No. 19-35)

The service spillway appears to be in poor condition. A close inspection was conducted at the time of inspection. The principal (service) spillway is located on the western abutment and is a reinforced concrete trapezoidal weir with a 200-ft bottom width, 1:1 side slopes, and an overall depth of approximately 12-ft. This spillway sits at a normal pool elevation of 300-ft msl. Concrete damage can be seen on both the eastern and western side of the spillway on the lower section near the stilling pools normal water level. Concrete pitting was observed across the downstream side of the structure. Holes and settling were also seen in the slabs of the structure with water jetting out perpendicular to the concrete slabs and vertical separation between adjacent slabs. Water was also observed to be flowing from behind the concrete slabs through the concrete joints. This suggests that

there may be voids present under the concrete slabs. Vegetation was growing in cracks and joints in the concrete slabs. The plunge pool downstream of this spillway structure appeared to be in good condition.

Emergency Spillway (Photo No. 36-37)

The emergency spillway is in good condition. This structure consists of a 300-ft wide grass-lined trapezoidal shaped open channel spillway. This spillway has a crest elevation at approximately 304-ft msl. Good grass coverage was present throughout the emergency spillway and channel. Park facilities and fencing were present in the emergency spillway at the time of inspection.

Downstream Channel

The downstream channel consists of a natural channel with heavy vegetation and tree cover. The plunge pool/stilling basin is in good condition as well as the area that transitions to the downstream channel. No significant erosion was noted in this transition zone.

CONFIDENTIAL

Downstream Hazards

US Highway 80 and a residential area are located approximately 1.25 miles downstream of the Lake Gladewater Dam. US Highway 80 is an arterial highway which falls under the classification of a main highway. Both US Highway 80 and the residential area would be impacted by a breach of Lake Gladewater Dam. High-hazard classification is appropriate for this structure.

Hydraulic & Hydrologic (H&H) Analysis

According to 30 TAC 299.15(a)(1)(A), a high hazard classification, intermediately sized dam should be able to pass 75% of the Probable Maximum Flood (PMF). An H&H analysis performed by Adams engineering in 2008 was submitted and approved by TCEQ which stated that Lake Gladewater Dam and its spillways could safely pass 25% of the PMF and therefore considered hydraulically inadequate.

Operation and Maintenance (O&M) Plan

No O&M plan was available at the time of inspection; however, the Fire Chief Simmons did state that a plan is being created and will be available soon.

Emergency Action Plan (EAP)

An EAP was created in 2011 and submitted to TCEQ for filing. No record of updates to the EAP since 2011 were available. 30TAC299.61(g) states that the EAP should be reviewed and updated, if necessary, annually. Updated copies of the EAP should be submitted to the executive director. City staff is currently working with TCEQ to update these records.

REQUIREMENTS / RECOMMENDATIONS

The following requirements & recommendations are provided as a result of this inspection:

1. The owner should consider upgrading the capacity of the spillways or making modifications to the dam to ensure that this structure is capable of passing 75% of the PMF. Plans should be evaluated and signed and sealed by a Texas Licensed Professional Engineer. Plans should also be submitted to TCEQ for approval prior to any construction taking place.

2. Review and update the EAP and send an updated copy to TCEQ for review.
3. Damage to the concrete spillway structure should be evaluated by a PE and repaired as needed. Construction plans to repair the structure if needed, should be sent to TCEQ for review and approval.
4. Uncover and test the low flow outlet. This structure should be inspected by a PE when uncovered to verify appropriate operation and recommend repairs if needed.
5. Create and implement an O&M plan to ensure this structure is maintained in an appropriate manner. Some items to consider in the O&M plan include:
 - a. Repair rutting on the crest of the dam
 - b. Repair erosion on the intersection of slopes and crest
 - c. Ensure there are no animal burrows present on this structure. If animal burrows or holes are detected, repair should occur immediately.
 - d. Maintain dense grass coverage on slopes and crest of the dam.
 - e. Remove undesirable vegetation from embankments such as trees, thick brush, and weeds. Tall grass should be mowed to facilitate frequent visual inspection of the dam.

CONCLUSIONS

The owner of this dam may be liable for downstream damages in the event of a breach. It is the owner's responsibility to maintain the dam in a safe condition in order to prevent loss of life and limit the potential for property damage. In addition, regular maintenance may reduce future rehabilitation and repair costs. This structure should be visually inspected every quarter by the owner or their representative and yearly by a Texas Licensed Professional Engineer. TCEQ should conduct an inspection every 5 years or as needed with any modifications or upgrades.



Photo No. 1 – View facing East. Rutting on crest of embankment.



Photo No. 2 – View facing West. Rutting on crest of embankment.



Photo No. 3 – View facing West. Example of lack of vegetation in wheel path on crest of embankment.



Photo No. 4 - View facing Lake Gladewater. Raw Water Intake Structure for Gladewater Water Treatment Plant.



Photo No. 5 – View facing East. Riprap armoring along upstream slope. Dormant Aquatic vegetation at base of riprap.



Photo No. 6 4 - View facing West. Riprap armoring along upstream slope. Dormant aquatic vegetation at base of riprap.



Photo No. 7 - View facing South. Erosion occurring below the walkway for the raw water intake structure



Photo No. 85 - View facing Lake. Erosion occurring below the walkway for the raw water intake structure



Photo No. 9 - View facing West. Erosion starting to undercut walkway to intake structure.



Photo No. 60 - View facing West. Downstream slope, dormant vegetation, sparse coverage between stands of plant.



Photo No. 71 - View facing South. Example of lack of vegetation along upstream slope



Photo No. 128 - View facing East. Sparse vegetation cover on the downstream slope of embankment & at toe of embankment.



Photo No. 13 - View facing North. Sparse vegetation cover on the downstream slope of embankment. Erosion on slope of embankment



Photo No. 14 - View facing East. Variable slope can be identified in this photo. Top half of downstream embankment is approximately 1.5:1 (H:V) and lower half is approximately 3:1 (H:V).



Photo No. 15 - View facing South from top of embankment. Low flow outlet discharge located in trees. Sparse vegetation coverage on slope.



Photo No. 16 - View facing East. Low flow outlet valve covered by dense brush and small trees. Unable to test operation.



Photo No. 17 - View facing North. Low flow outlet valve.



Photo No. 18 - View facing South. Assumed discharge point for low flow outlet. Outfall of pipe is not locatable. It appeared to be inundated in soil and vegetation.



Photo No. 19 - View facing East. Service spillway discharging at time of inspection. Vegetation growing from joints in concrete.



Photo No. 20 - View facing West. Service spillway discharging at time of inspection. Vegetation growing from joints in concrete.



Photo No. 21 - View facing East. Vegetation growing from concrete joints.



Photo No. 22 - View facing South. Slab misalignment noted.



Photo No. 23 - View facing North from Plunge Pool. Vegetation growing in slab joints.



Photo No. 24 - View facing North. Water flowing from concrete joint. Severe pitting in concrete. Vegetation growing from concrete joints.



Photo No. 25 - View facing East Abutment. Concrete damage at Plunge Pool normal pool elevation. Approximately 18" long.



Photo No. 26 – Image inside of concrete damage hole shown in photo 25.



Photo No. 27 – Image inside of concrete damage hole shown in photo 25.



Photo No. 28 – Image inside of concrete damage hole shown in photo 25.



Photo No. 29 - View of West Abutment. Concrete damage at Plunge Pool normal pool elevation.



Photo No. 30 - View of West Abutment. Concrete damage at Plunge Pool normal pool elevation.



Photo No. 31 - View of West Abutment. Concrete damage at Plunge Pool normal pool elevation.



Photo No. 32 - View of West Abutment. Concrete damage at Plunge Pool normal pool elevation. Inside of concrete damage.



Photo No. 33 - View of West Abutment. Concrete damage at Plunge Pool normal pool elevation. Inside of concrete damage hole.



Photo No. 34 – Aerial Image of Principal Spillway.



Photo No. 35 – Aerial Image of Lake Gladewater Dam.



Photo No. 36 - View facing North East. Inside emergency spillway channel.



Photo No. 37 - View facing West. Emergency spillway across lake. Good vegetation cover, well maintained. Park equipment located in side spillway mouth.