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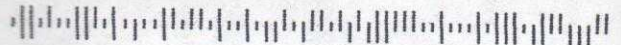
TEXAS COMMISSION ON
ENVIRONMENTAL QUALITY
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EXPERIMENTAL MAIL

Mr. Louis Prudhomme, Secretary
Frontier Lakes POA
P.O. Box 1758
Willis, Texas 77378

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Protecting Texas by Reducing and Preventing Pollution

November 2, 2022

Louis Prudhomme, Secretary
Frontier Lakes POA
2251 N Loop 336 W, Ste C
Conroe, TX 77304

Re: Dam Safety Complaint Inspection Report for Lake Dodge Dam (TX05265)
Montgomery County, Texas

Dear Mr. Prudhomme:

Members of the Texas Commission on Environmental Quality (TCEQ) Dam Safety program performed a safety inspection of the Lake Dodge Dam on February 23, 2022, as a result of a complaint made by an observer and as part of the routine inspection schedule. An observer informed TCEQ Region 12, on February 9, 2022, that water from the dam was 'leaking' from the dam. On March 1, 2022, they also informed the TCEQ Dam Safety that they noted a 'pocket of water underground that you can feel moving when you walk.'

The dam was also due for its routine safety inspection as part of the regular inspection schedule. The dam was found in poor condition during the inspection, because the thick growth of trees and brush prevented a close inspection of the downstream slope. Also, the seepage site that triggered the complaint was on a downstream resident's property that was fenced. This prevented the inspectors from accessing the site to closely inspect the seepage. The downstream slope is in need of extensive tree and brush clearing on the downstream slope. Please see the attached report for direction on how to safely clear the overgrowth. Once cleared, a Texas Licensed Professional Engineer (P.E.) needs to inspect the downstream slope, downstream toe area, and any seepage sites located, including the site that triggered the complaint. A copy of the report is enclosed.

Maintenance items that need attention include: the area of seepage that triggered the complaint inspection was on a downstream residence's fenced off property and could not be closely inspected; two areas of seepage/standing water along the downstream toe, one was originating 3-ft. up from the downstream toe, the location of the seepage sites is different than what has been historically reported, though the condition of the seepage seems to be the same as reported; the overgrown tree and brush growth obscured the lower two-thirds of the downstream slope and prevented a close inspection of the downstream slope and downstream area for any signs of structural instability or possible indicators of necessary repairs, including sites of seepage; erosion gullies, up to 4-ft. long and 0.7-ft. deep, were found in the upstream slope at the crest shoulder; and large erosion gullies, up to 4-ft. long and 3-ft. deep, were found in the downstream slope.

It is understood that certain proposed corrective actions require a Texas Licensed Professional Engineer (P.E.), and your written response for these specific recommendations may be limited to notifying us of your time frame for retaining a P.E. to address the related area of concern.

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Louis Prudhomme, Frontier Lakes POA

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November 2, 2022

Please be aware that any engineering reports or plans regarding the dam should be reviewed and approved by TCEQ prior to construction.

An accepted Emergency Action Plan (EAP) is required. TCEQ records indicate that no draft has been received. A draft EAP should be done and submitted to TCEQ Dam Safety for review and acceptance, as required for this structure as per Title 30 of the Texas Administrative Code (TAC) §299.61. Due to the degree of downstream development, a P.E. should conduct a breach analysis for the dam and submit it to TCEQ Dam Safety for review and approval. Once approved, the generated inundation zone from the study should be included in the draft EAP.

There is no Hydrologic and Hydraulic (H&H) study in the TCEQ files. An (H&H) analysis should be conducted by a P.E. and the results submitted to TCEQ Dam Safety for review and approval, as required for this structure as per Title 30 of the TAC §299.15. Depending on the results, a P.E. should design and oversee the construction of any modifications to increase the hydraulic capacity of the dam and ensure that the dam safely routes spillway flows away from the dam. Any and all construction plans and technical specifications should be submitted to TCEQ Dam Safety for review and approval prior to construction.

Please review the attached report and provide our office a written plan of action for addressing each area of concern for the dam by January 31, 2023. Please also submit a plan of action that addresses an update on the anticipated completion date for the EAP, and a date for providing the H&H study (an electronic copy is acceptable) with this letter's response. TCEQ appreciates your assistance in these areas. Your efforts will minimize the owner's liability by reducing the threat to life and property. The TCEQ appreciates the efforts that have been made to improve the safety of dams in Texas. If you have any questions or need assistance, please contact me at (512)-239-4283 or trina.lancaster@tceq.texas.gov.

Sincerely,



Trina Lancaster, PE
Engineer, Dam Safety Section
Critical Infrastructure Division, MC-177

Enclosure: Dam Safety Inspection Report for Lake Dodge Dam (TX05265)



DAM SAFETY SECTION

CRITICAL INFRASTRUCTURE DIVISION

DAM SAFETY INSPECTION REPORT

GENERAL INFORMATION

INVENTORY No.: TX05265

DAM: Lake Dodge Dam

OWNER: Frontier Lakes Property Owners Association (POA)

STREAM: Unnamed Tributary of Camp Creek

BASIN: San Jacinto Costal Basin

COUNTY: Montgomery

GENERAL LOCATION: 2 miles North of Willis

DAM HEIGHT: 24.3 feet (ft.)

SIZE CLASSIFICATION: Small

NORMAL CAPACITY: 44 acre feet (ac.-ft.)

MAXIMUM CAPACITY: 55 ac.-ft.

NORMAL WATER LEVEL: 371.0 feet above mean sea level (ft.-msl)

CURRENT WATER LEVEL: 367.3-ft.-msl.

PREVIOUS INSPECTION DATE: April 4, 2018

CURRENT INSPECTION DATE: February 23, 2022

INSPECTION BY TCEQ PERSONNEL: Trina Lancaster, P.E.; and Alexandra Dueitt, E.I.T.

PERSONNEL CONTACTED: Brenda Pilgrim, CMI Management Company (Former Management Company); Louis Prudhomme, Frontier Lakes POA-Secretary

SUMMARY

Lake Dodge Dam, a small-sized earthen dam, was inspected by TCEQ staff on February 23, 2022, as a result of a complaint and as part of the routine inspection schedule. An observer informed TCEQ Region 12, on February 9, 2022, that water was 'leaking' from the dam. On March 1, 2022, after the inspection, they also informed TCEQ Dam Safety that they noted a 'pocket of

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water underground that you can feel moving when you walk.' The owner was notified of the inspection on February 17, 2022. The dam was found in overall poor condition due to the following primary issues of concern:

- the area of seepage that triggered the complaint inspection was on a downstream residence's fenced off property and could not be closely inspected;
- two additional areas of seepage/standing water along the downstream toe, one of which originated 3-ft. up from the downstream toe near the right/middle side of the dam;
- the overgrown tree and brush growth that obscured the lower two-thirds of the downstream slope and prevented a comprehensive inspection of the downstream slope and downstream area for any signs of structural instability or possible indicators of necessary repairs, including sites of seepage;

Additional issues of concern included:

- erosion gullies, up to 4-ft. wide and 0.7-ft. deep, that were found in the upstream slope at the crest shoulder;
- large erosion gullies, up to 4-ft. wide and 3-ft. deep, that were found in the downstream slope;
- a draft emergency action plan (EAP) is not on file for the dam;
- a breach analysis has not been performed for the dam, and;
- the hydraulic adequacy of the dam is unknown.

A verbal exit interview (by phone), explaining the results of the inspection, was conducted on the same day of the inspection with Mr. Louis Prudhomme.

BACKGROUND

Lake Dodge Dam was reportedly built in 1976; however, there is conflicting data in TCEQ files that indicates the dam may have been built in 1965. The dam was first inspected by the Texas Department of Water Resources (TDWR, a predecessor agency of the TCEQ), on June 30, 1982 as a result of the dam owner's phone call to the agency. The (now abandoned) drop inlet service spillway at the time had failed, so the dam owner requested the inspection. The drop inlet was blocked, which resulted in the inlet being inundated at the time of the inspection, so it could not be inspected.

TCEQ Dam Safety records indicate that an inspection was conducted in 1994. However, a copy of this report was not found in the files. The next safety inspection was conducted on March 7, 2000 by the Texas Natural Resource Conservation Commission (TNRCC, another predecessor agency).

The dam was found to be in overall poor condition due to lack of maintenance on the structure. A seepage area immediately downstream of the middle of the dam was observed. An area of wet/saturated soil was found in the downstream area near the right/middle of the dam. Several erosion gullies were found. One extended into the crest on the upstream slope of unknown dimensions. The others were on the downstream slope, up to 12-in. deep.

On November 28, 2001, the TNRCC conducted another safety inspection of the dam. The dam was found in poor condition. Many of the trees had been removed from the slopes, but the stumps remained and both slopes had erosion damage from the tree removal equipment. A new area of seepage 3-ft. up from the downstream toe was found immediately upstream of the area of historic seepage at the middle of the dam. Flowing water was found in the historic wet area, but it could not be determined if the flow was from seepage flow or runoff from the rainfall occurring at the time of the inspection. Erosion gullies (of unknown dimensions) were found on both slopes that cut into the crest near the middle/left side of the dam.

On July 5, 2006, the TCEQ Dam Safety Program conducted another safety inspection of the dam. It was again found to be in poor condition due to lack of maintenance. The previous seepage areas could not be inspected due to the overgrown vegetation. Erosion gullies (of unknown dimensions) were found on both slopes that cut into the crest near the middle/left side of the dam. These were the same erosion gullies found during the 2001 inspection.

On December 5, 2006, the TCEQ Dam Safety Program conducted another dam safety inspection. Flowing seepage was observed in the historical seepage areas. The flow rate was not listed, and no fines/sediment were found in the seepage according to the photos in the report. Erosion gullies (of unknown dimensions) were found on both slopes that cut into the crest near the middle/left side of the dam. These were the same erosion gullies found during the 2001 and July 2006 inspections.

On June 5, 2007, the dam owner emailed their plan of action to address the issues listed in the report for the December 5, 2006 inspection. The plan of action included getting information about the cost and procedures needed to repair the erosion gullies on the upstream and downstream slopes.

On May 18, 2011, the TCEQ Dam Safety Program conducted another dam safety inspection. The dam was found to be in overall poor condition. A longitudinal crack 6-ft. long and 1-ft. deep was found near the midsection of the crest. The erosion into the crest shoulders was still present. The seepage was not noted, which the inspectors indicated may have been because of the

drought at the time of the inspection. Other concerns were routine maintenance issues.

On December 11, 2012, the TCEQ Dam Safety Program conducted another dam safety inspection. Standing water from the seepage was found. The condition of the seepage was not indicated. Other concerns with the dam were routine maintenance issues. The photos indicated that the erosion on the downstream slope had been partly repaired. The erosion gullies on the downstream slope cutting into the crest that were noted in past inspections were not present at the time of this inspection according to the photos in the report. The erosion gullies on the lower two-thirds of the downstream slope and upstream slope were still present.

The most recent inspection was conducted on April 4, 2018, by the TCEQ Dam Safety Program. The dam was found to be in poor condition. The dam could not be properly inspected due to the overgrown vegetation on the dam.

PRE-INSPECTION MEETING

Ms. Brenda Pilgrim and Mr. Louis Prudhomme indicated that CMI Management Company had historically been responsible for performing maintenance work on the dam on behalf of Frontier Lake POA. However, recently Frontier Lake POA had taken responsibility for maintaining the dam, so CMI is no longer associated with Lake Dodge Dam. A POA representative was not present during the inspection. After the inspection, the inspectors called Mr. Louis Prudhomme to give him the cursory inspection findings. Mr. Louis Prudhomme mentioned during the exit interview that beavers had been seen around the dam.

INSPECTION FINDINGS

Figure 1 is a location map. Figure 2 is an aerial photo of the dam with 10-ft. contours. Figure 3 is an aerial photo of the dam and surrounding area, indicating photo locations. Note that right and left indications are from the perspective of an observer looking downstream. Field measurements were taken during the inspection using a hand-level and survey rod. The water level was at approximately 367.3 ft.-msl., or 7.0-ft. below the top of dam elevation. It was drizzling at the time of the inspection, so the seepage amount may be inaccurate to a certain extent.

Crest [Photos 1-3]

- According to 2017 light detection and ranging (LiDAR) elevation data, the crest width varies from 6-ft. to 18-ft.

- According to 2017 LiDAR data, there is a low area approximately 5-ft. long at an elevation of 374.3-ft.-msl on the right side of the dam. This is the effective top of dam elevation.
- The overgrown vegetation had been removed and grass cover had been mowed since the 2018 inspection.
- An animal trail/foot path was found along the left side of the crest.
- Anthills (approximately 1-ft. in diameter) were found on the crest.
- The crest was found to be in good condition.

Upstream Slope [Photos 4-7]

- The 2 horizontal to 1 vertical [2 H:1 V] upstream slope of the earthen embankment was covered with a fair grass cover that appeared to have been recently mowed. The upstream slope had been cleared of the tree and brush growth noted during the 2018 inspection.
- Some root balls from the brush and tree growth remained in the slope.
- There were a few small erosion gullies. The largest one measured was on the left side of the dam and measured 4-ft. wide and 0.7-ft. deep at the shoulder.
- A small tree was growing below the water line in close proximity to the upstream toe.
- The low water level in the reservoir allowed a portion of the lower upstream slope to be visible on the left side of the dam, near the service spillway entrance.
- The upstream slope was found to be in good condition.

Downstream Slope [Photos 8-14]

- The 3 H:1 V downstream slope of the earthen embankment was covered with a good grass cover on the upper-third of the slope. The lower two-thirds of the downstream slope and toe were covered with trees, brush, and thorny vines. Most of the lower two-thirds of the downstream slope was obscured from view and could not be inspected. The right end of the downstream toe and an area extending up approximately one-fourth of the slope was fenced off as part of a downstream resident's private property. This area was visually appraised from behind the fence but could not be closely inspected.
- The upper-third of the downstream slope that was mowed had no active sites of erosion (such as erosion gullies) at the time of the inspection. The surface of the dam slope was uneven due to past erosion.
- The area of seepage that triggered the complaint was on the private property, found on the right/middle side of the dam. Since it was fenced off, it could not be closely inspected. Flow from the seepage traveled along the toe to the left for approximately 10-ft. then flowed away from the dam. This appears to be located in the approximate

location that the historic seepage was first noted in the November 2001 inspection report; however, it was undetermined if the seepage in this area had increased or otherwise changed.

- Several large erosion gullies were noted in the downstream slope below the tree line on the right side of the dam, but the vegetation growth prevented an accurate measurement. The closest measurement taken was 4-ft. wide and 3-ft. deep. The left side of the downstream slope could not be inspected for erosion because of the overgrown vegetation.
- Holes (cause unknown) were found in the downstream slope. The largest one measured was 4-ft. deep and 3-ft. in diameter.
- Two additional areas of seepage/standing water indicated by filamented iron ochre were found along the downstream toe near the right/middle side of the dam. One seepage site was found along the toe and the second was approximately 3-ft. up the downstream slope from the downstream toe. No visible flow or suspended fines/sediment were found.
- The downstream slope was found to be in poor condition due to the overgrown vegetation which limited the inspection.

Service Spillway [Photo 15]

- The service spillway is located at the left end of the dam.
- The service spillway consists of a concrete channel 8-ft. wide and 1-ft. deep that discharges into a natural channel.
- Most of the service spillway was obscured due to tree and brush growth. The visible portions of the service spillway had trees, brush, leafy debris, and downed trees within the channel that could impede flow away from the dam.
- The service spillway was found to be in poor condition due to the debris and vegetative growth obstructing the channel.

Emergency Spillway [Photo 16]

- The emergency spillway is an undefined low area located immediately to the left of the service spillway.
- Historically, it has been listed as being 15-ft. wide and had an elevation 2-ft. below the top of dam elevation.
- A review of 2017 light detection and ranging (LiDAR) elevation data indicated that the low area is approximately 51-ft. wide and between 372.5-ft.-msl. and 372.9-ft.-msl (ranges between 1.4-ft and 1.8-ft below top of dam). The area is undefined, so measurements are general approximations.
- The emergency spillway was overgrown with brush and trees. It could not be closely inspected.

- The emergency spillway was found to be in poor condition due to the overgrown condition obstructing the channel and limiting the inspection.

Low Area [Photo 17]

- The inspectors noted a low area to the right of the dam. A review of the 2017 LiDAR data indicated that this natural low area has an effective elevation of 373.6-ft.-msl (0.7-ft below top of dam) that widens from 8-ft. to 47.6-ft.
- Since this area does not appear to have appreciable flow capacity, it is inadequate to function as a spillway. Therefore, it is not considered to affect the hydraulic capacity of the dam to a significant degree.
- However, two houses are within the direction of flow from this area and have foundation elevations below the effective top of dam elevation. Therefore, these houses may be impacted should even low amounts of flow pass through this low area.

Downstream Channel

The channels downstream of the service and emergency spillways were obscured with brush and tree growth. Scattered tree growth was in the low area at the right end of the dam. A review of 2020 aerial imagery from Google Earth shows that the downstream channels and the downstream area have a thick growth of trees and vegetation, which could impede flows away from the dam. Two houses were also noted in the downstream area that could be affected by flows around the right end of the dam. The downstream channels were in poor condition.

CONFIDENTIAL

Downstream Hazards

There is no breach analysis in TCEQ records for the dam. The dam was first classified as a high hazard dam on March 7, 2000, due to the presence of several residential structures within the estimated inundation area, based on a desktop hazard review of the downstream area.

A current desktop hazard review was conducted using 2020 aerial imagery. TCEQ's simplified breach equation was used to calculate an inundation length of 1.2 miles for the dam. Twenty-one residential structures were noted in the estimated inundation zone.

The following additional structures were noted downstream. Note that these do not affect the hazard classification of the dam, they are listed for the dam owner's information. Grand Oaks Drive (not classified by the Texas

Department of Transportation (TxDOT) and minor highway by TCEQ) approximately 0.5 miles downstream of the dam, and Rodgers Road (classified by the Texas Department of Transportation (TxDOT) as a minor collector and secondary highway by TCEQ) located 0.7 miles downstream.

This dam is classified as a high hazard dam due to the presence of 3 or more residential structures in the estimated inundation zone. It should be noted that the hazard classification is not a description of the condition of the structure, but rather, a description of the potential for loss of downstream life or property in the event of a failure of the dam. The high hazard classification indicates that some potential for loss of life exists.

Hydrologic / Hydraulic (H&H) Analyses

This dam is required to safely pass 75% of the Probable Maximum Flood (PMF). A hydrologic and hydraulic study has not been conducted for the dam. Therefore, the hydraulic capacity and adequacy of the dam is unknown.

OPERATION AND MAINTENANCE (O&M) PLAN

The owner indicated that no written O&M plan is available. However, tree and brush removal had been done on the crest, upstream slope, and upper-third of the downstream slope.

EMERGENCY ACTION PLAN (EAP)

An EAP is required for this dam, according to 30 TAC §299.61. An EAP deadline extension was requested August 5, 2011 and granted August 22, 2011. The deadline was extended to September 1, 2012. To date a draft EAP has not been submitted for TCEQ Dam Safety's review.

REQUIREMENTS/RECOMMENDATIONS

The following requirements and/or recommendations are provided (not prioritized):

1. All excessive vegetation, brush, and trees with a trunk diameter less than 4 inches should be removed from the area near the upstream toe (when reservoir water levels allow), lower two-thirds of the dam embankment's downstream slope, and the area located within 15-20 feet of the embankment's downstream toe. After removal, a short grass cover should be established over the affected areas. A short grass cover provides an ideal surface to protect against erosion, prevents harborage for burrowing animals, and allows for easier detection of incipient problems. Mowing should be performed as

needed (prior to any future inspections (including owner inspections), and/or typically not less than twice yearly).

Trees on the downstream slope, toe, and in the immediate downstream area that are larger than 4 inches in diameter may remain until their natural death, at which time the tree and roots are to be removed, the resulting holes backfilled with properly compacted non-dispersive clay, and a vegetative cover established. Removal of larger trees and backfill repairs should be supervised by a Texas Licensed Professional Engineer (P.E.) with dam experience. Trees provide a cover for burrowing animals, prevent a thorough inspection of the embankment, limit grass growth, provide avenues for seepage as roots decay, and if a large tree is uprooted during heavy winds, the loss of soil around the root mass can lead to a slope failure.

The root balls left in the upstream slope should be removed and any resulting voids filled with compact clay like material. A good grass cover should be established over these repair areas.

Additionally, larger trees on the downstream slope and along the toe should be pruned up high to facilitate mowing and light penetration for grass growth. Any associated vines found growing around the trees should also be removed.

2. A Texas Licensed Professional Engineer (P.E.) should inspect the seepage sites, and any related underground pockets of water that triggered the complaint inspection, along the right half of the dam behind the fence, all of the historic seepage sites, and the downstream toe area for any new seepage sites. Depending on the results of the inspection, the P.E. should design and oversee any necessary repairs or modifications to any unsafe seepage sites. TCEQ Dam Safety should receive a copy of the P.E.'s inspection report and findings/recommendations. Also, TCEQ Dam Safety must review and approve any and all related construction plans and technical specifications before construction may begin.

3. Once the downstream slope, toe and immediate downstream area are cleared of excessive tree and brush growth, the downstream slope and toe should be inspected by a P.E. for signs of structural instability or other deficiencies hidden during the inspection. Depending on the results of the inspection, the P.E. should design and oversee any necessary repairs or modifications to any locations with signs of structural instability. The P.E. should also oversee repairs to the erosion gullies on the lower two-thirds of the downstream slope. TCEQ

Dam Safety must review and approve any and all construction plans and technical specifications before construction may begin.

4. The two areas of seepage in the downstream toe area and on the downstream toe should be routinely monitored. Also, the areas of historic seepage that may have been obscured from view should also be routinely monitored, even if they could not be found during this inspection. The normal amount should be estimated, and the seepage monitored at least monthly for any increase, especially if there is no corresponding rise in reservoir elevation. Recording seepage rates and corresponding reservoir level observations in a maintenance log will help identify potentially critical areas where water may be seeping through the embankment or foundation; extra care should be taken to detect seepage when reservoir levels are high. The downstream toe area should also be routinely monitored for new areas of seepage, and their conditions, as listed previously, recorded.

If the historic seepage locations move (or emerge) high up on the embankment and/or historic seepage flowrates should increase drastically or include suspended soil (fines) or boils, then it is possible/likely that a piping condition exists and your P.E., as well as TCEQ Dam Safety, should be contacted immediately. The reservoir may need to be lowered or drained to prevent an emergency situation from developing.

5. All trees (regardless of size), brush, and excessive vegetation should be removed from within the service and emergency spillways and their discharge channels to ensure adequate flow conveyance. The leafy debris and downed trees in the service spillway channel should also be removed.

For any larger/mature trees immediately adjacent to the concrete service spillway channel, it may be preferred to cut the tree and leave the stump in place, if removal of the root ball would cause damage/movement to the concrete channel. Any remaining stumps should be treated with a sealant to inhibit/prolong decay. Once cleared, a P.E. should inspect the spillways for any defects that may have been hidden by the trees and overgrown vegetation. Depending on the results of the inspection, the P.E. should design and oversee any necessary repairs or modifications to the spillway(s). TCEQ Dam Safety must review and approve any and all construction plans and technical specifications before construction may begin.

6. In 30 Texas Administrative Code (TAC) Chapter 299, §299.43(a), a written O&M plan is required to be developed. The owner may use the

most current version, at the time of the plan's development, of the agency's *Guidelines for Operation and Maintenance of Dams in Texas*, a manual, a checklist, or some other written procedure to demonstrate implementation of the program. The *Guidelines for Operation and Maintenance of Dams in Texas* can be downloaded at:

https://www.tceq.texas.gov/publications/gi/gi_357/index.html

This plan should be designed to provide the owner or owner's representatives clear instructions for everyday operation of the dam, as well as maintenance guidance. The plan is for the owner's records and should be accessible if requested by TCEQ; however, the plan is not required to be submitted to, nor is the plan approved by TCEQ. Your O&M plan shall include items addressed in the requirements/recommendations portion of this report. The method and the timeframe for addressing these items are left up to the owner, and it is recognized that finances may govern when the work can be undertaken. The following deficiencies need to be monitored in conjunction with your O&M plan:

- a. Continue to mow and remove trees and brush from the crest and upstream slope of the dam.
- b. Monitor the erosion gullies on the upstream slope.

If conditions worsen with any of the deficiencies, then a P.E. should be consulted to determine the level of damage and recommend repairs/improvements, if needed.

7. In 30 TAC Chapter 299, §299.61, an EAP is required. The *Guidelines for Developing Emergency Action Plans for Dams in Texas* (and associated electronic templates) can be downloaded at:

https://www.tceq.texas.gov/compliance/investigation/damsafetyprog.html#guide_eaps

The dam owner needs to submit a draft EAP to TCEQ Dam Safety for review and acceptance.

Due to the degree of downstream development, a P.E. should be retained to conduct a breach analysis of the dam to determine the predicted inundation zone and submit their findings to TCEQ Dam Safety for review and approval. Once approved the generated inundation zone should be included in the EAP.

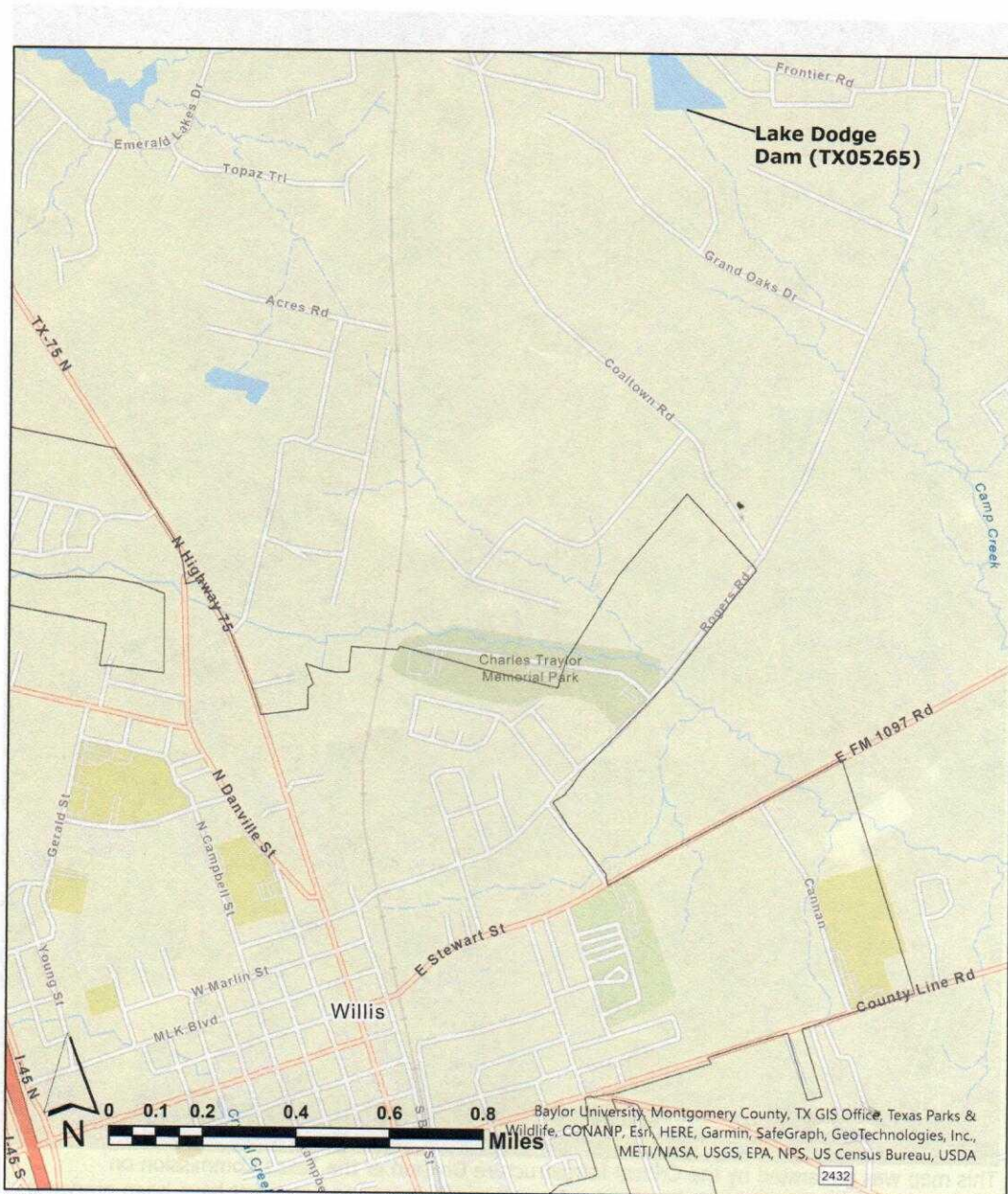
8. In 30 TAC Chapter 299, §299.15, the hydraulic requirements for dams and spillways are indicated. A Texas Licensed P.E. should conduct a level survey of the dam and the service and emergency spillways for use in an H&H analysis to determine the hydraulic capacity of the dam and submit their findings (including the level survey report) to TCEQ Dam Safety for review and approval. Depending on the results of the analysis once it is approved, a Texas Licensed P.E. may need to design necessary modifications to increase the hydraulic capacity of the dam to make it hydraulically adequate and safely convey flows away from the dam. Any and all associated construction plans for modifications must be submitted to TCEQ Dam Safety for review and approval prior to the start of construction.
9. The noted holes should be backfilled with properly compacted non-dispersive clay, and a vegetative cover should be established. Burrowing activity can create flow paths and can otherwise weaken the integrity of the embankment. Assistance in removing nuisance animals can be obtained from the Texas Wildlife Services Program. Burrowing animals should be discouraged from inhabiting the dam.

CONCLUSIONS

The owner of this dam may be liable for downstream damages in the event of a spill or 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 loss. In addition, regular maintenance may reduce future rehabilitation and repair costs. This dam was found to be in poor condition due to the following: the area of seepage that triggered the complaint inspection was on a downstream residence's fenced off property and could not be closely inspected; two areas of seepage/standing water along the downstream toe, one of which originated 3-ft. up from the downstream toe near the right/middle side of the dam; and the overgrown tree and brush growth that obscured the lower two-thirds of the downstream slope and prevented a close inspection of the downstream slope and downstream area for any signs of structural instability or possible indicators of necessary repairs, including sites of seepage. This structure will be scheduled for reinspection in 2 years, or in conjunction with any modifications.

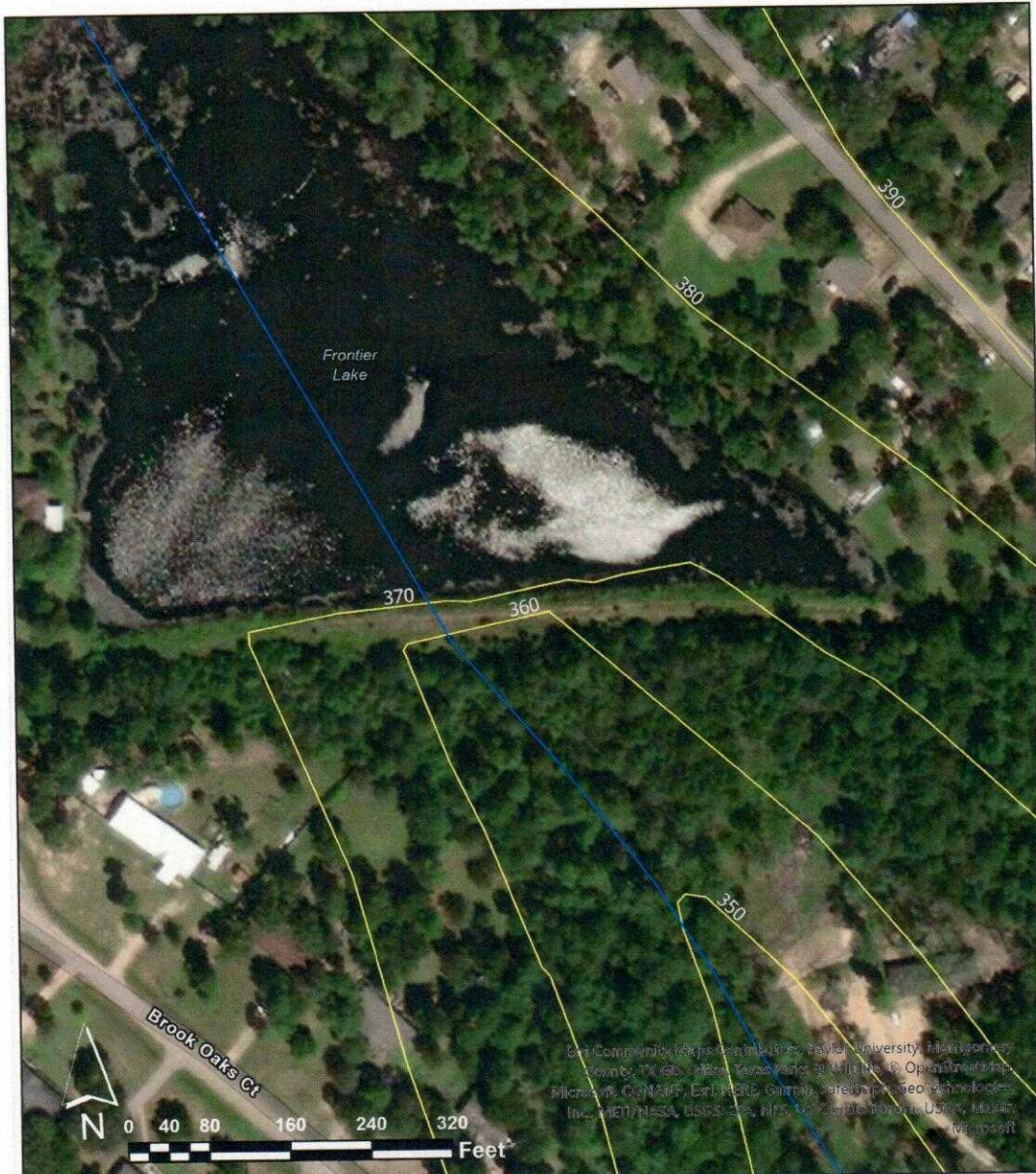


Trina Lancaster, P.E.
Dam Safety Section
Critical Infrastructure Division



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Figure 1: Location map of the dam



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Figure 2: Aerial image (2017) of the dam with 10-ft. contours and flowlines

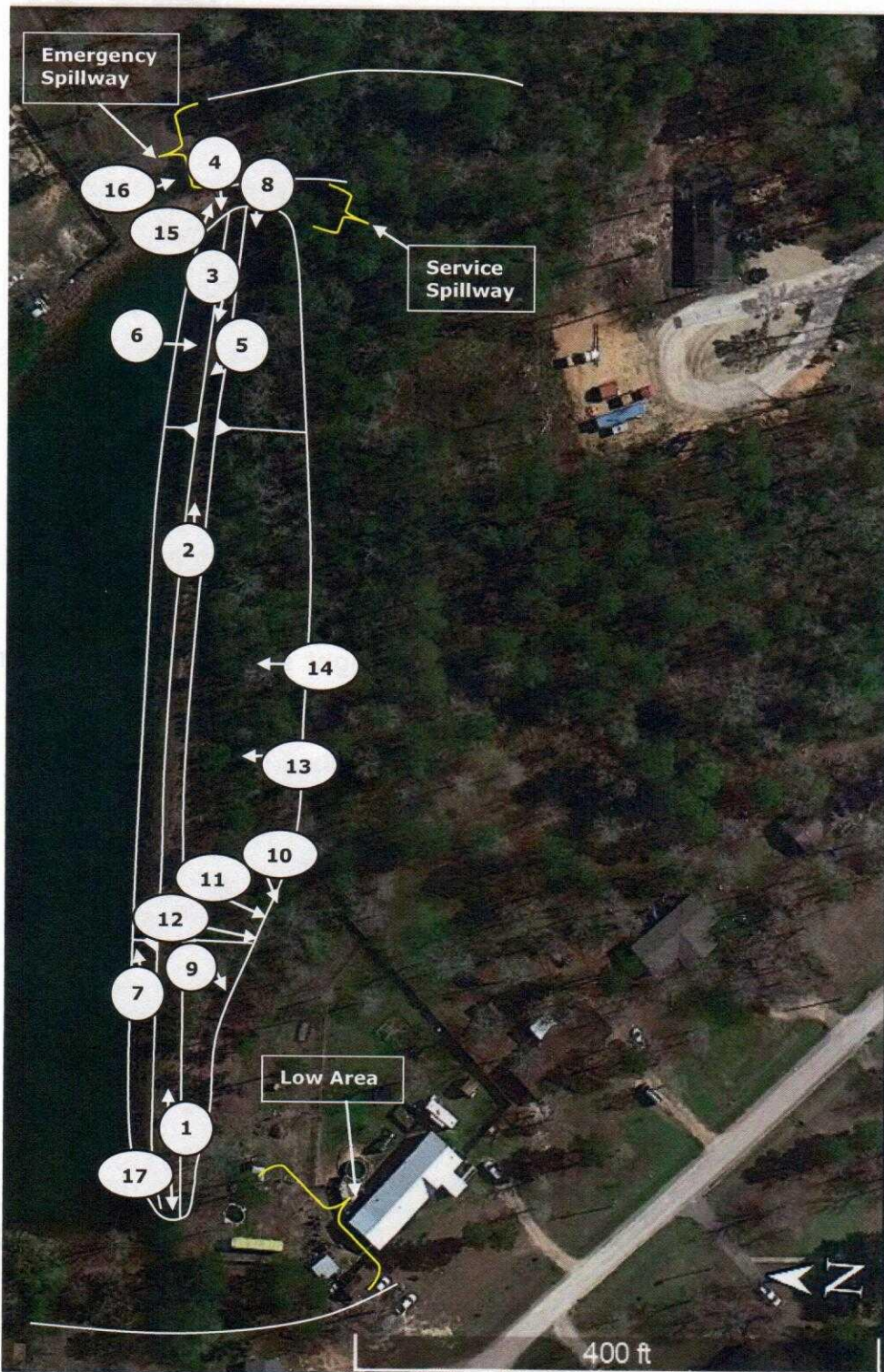


Figure 3: Aerial image (2020) of the dam with structure and photo locations

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Photo 1: View of the dam crest, from the right side of the dam, facing left (east). Note the fair grass cover and animal trail/foot path.



Photo 2: View of the dam crest, from the left/middle side of the dam, facing left (east). Note the fair grass cover and more defined animal trail/foot path compared to the path in photo 1.



Photo 3: An example of the anthills noted in the dam crest. This example was found on the left side of the dam, facing northwest.



Photo 4: View of the upstream slope, from the left end of the dam, facing right (west). Also note that the upstream slope had been cleared of brush and trees and had a fair grass cover.



Photo 5: View of the reservoir from the left side of the crest, facing northwest. Note the trees growing near the upstream toe (only the top of the tree is above the water line).



Photo 6: An example of the erosion gullies in the upstream slope at the crest shoulder. This example was 4-ft. wide and 0.7-ft. deep, on the left side of the dam, facing downstream (south).



Photo 7: An example of the root balls (circled) and stumps left in the upstream slope. This photo was taken on the right side of the dam, facing northeast.



Photo 8: View of the downstream slope, from the left end of the dam, facing right (west). Note the thick tree and brush growth along the lower two-thirds of the slope and downstream area.



Photo 9: View of the seepage area (circled) that triggered the complaint inspection, on the right side of the downstream toe, facing downstream (southwest). Note that the area was fenced off, so the origin of the seepage was not closely inspected.



Photo 10: View of the flow from the seepage noted in photo 9. This photo was taken from the right side of the dam at the edge of the fence line, facing the upstream direction of the seepage flow (southwest).



Photo 11: View of the seepage (arrow) emerging from the downstream slope, approximately 3-ft. up the downstream slope from the toe. This photo was taken on the right side of the downstream slope, facing downstream (southwest).



Photo 12: View of an area of standing water, on the right side of the downstream toe, facing downstream (south).



Photo 13: An example of the erosion gullies found on the downstream slope. This example measured approximately 4-ft. wide and 3-ft. deep. This example was found near the middle of the dam, facing upstream (north).



Photo 14: An example of the holes found in the downstream slope. This example measured to be 3-ft. wide and 4-ft. deep. This photo was taken on the right/middle side of the dam, facing upstream (north).

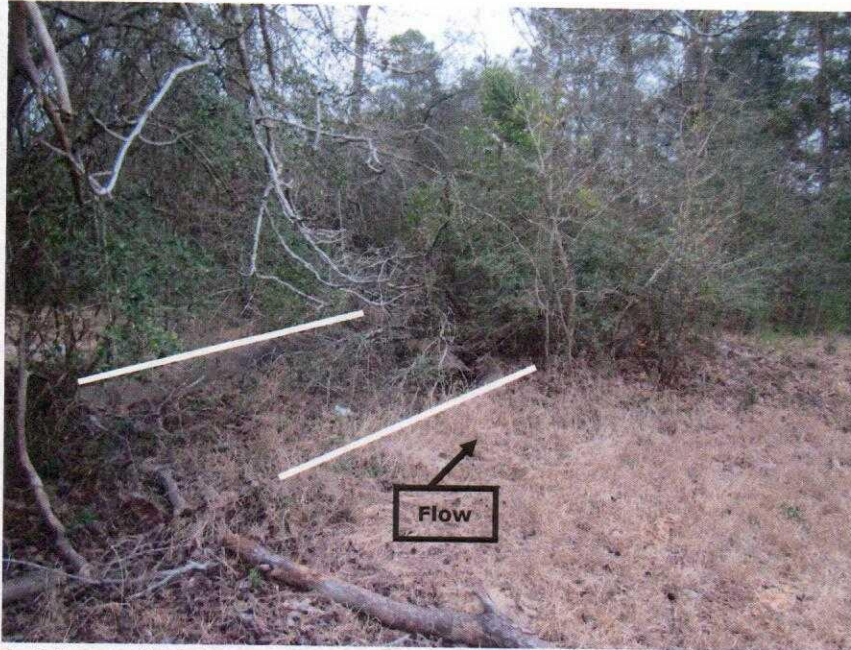


Photo 15: View of the service spillway channel entrance (lines), from its right/upstream corner, facing downstream (southeast). Note that the channel is almost obscured by brush, trees, and debris.



Photo 16: View of the emergency spillway entrance, from the left/upstream corner of the service spillway chute, facing downstream (southeast). Note that the channel is lined with thick tree growth that would impede flow.



Photo 17: View of the low area to the right of the dam, from the right end of the crest, facing right (west). Note the trees in the immediate channel.