

**DAM INSPECTION REPORT**  
**Lake Elbo Dam**  
**Water Structure No. DPT-0055 (NID: KS02061)**



**Inspection Date: April 15, 2025**

**Report Prepared by: Abby Mills, PE, CFM**  
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BG Project #25-1178M

**Owner of Dam: Lake Elbo Club, Inc.**  
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## **A. Executive Summary**

This inspection report is being prepared to document the findings of the inspection conducted in accordance with the Obstructions in Streams Act. Lake Elbo Dam is owned, operated and maintained by Lake Elbo Club and is located on Elbo Creek. The dam is located in the Southwest ¼ of the Southeast ¼ of Section 26, Township 9 South, Range 8 East in Pottawatomie County, Kansas (See the Aerial Location Map).

The inspection was performed by Abby Mills P.E., CFM on April 15, 2025. A prior inspection was performed on June 24, 2022, by Jason Hoskinson, P.E., PTOE and Abby Mills P.E., CFM.

The dam is currently classified as a Hazard Class C (High Hazard) water structure. Current regulations pertaining to dams in the State of Kansas require inspections to be performed on high hazard dams once every three (3) years. The current inspection of Lake Elbo Dam found the general appearance of the dam to be in good condition with two small areas of mild erosion observed on the auxiliary spillway floor. Observations and findings include, but are not limited to the following:

- A good stand of grass has been maintained on the embankment.
- New rip rap wave protection has been installed along the upstream slope.
- Two areas of erosion were observed on the auxiliary spillway midway along the flowline at the middle of the spillway and along the west edge of the spillway.
- Rip rap has been installed around the outlet pipe of the primary spillway.
- Tree and vegetation removal has been performed around the outfall of the primary spillway to allow for better access to the outlet pipe.

## **B. History**

The following historical information regarding the water structure is based on information available from records on file with the Division of Water Resources. The dam was designed by McCord & Company Engineers to be used for recreational purposes. A water structure permit was issued on December 3, 1948, and construction of the dam was completed in 1949. In 1967, modifications including raising the dam crest, installing a new principal spillway, and widening the auxiliary spillway were permitted. There are no known modifications following 1967, leaving the spillway 190' wide at elevation 99.5 (unknown datum, estimated elevation of 1119.5 based on LIDAR), a primary spillway elevation of 98.0 (unknown datum, estimated elevation of 1118.0 based on LIDAR), and a top of dam elevation of 103.2 (unknown datum, estimated elevation of 1123.2). In the 1990s the roadway across the dam was paved. In 2014 the reservoir was dredged, and a small upstream silt collection pond was constructed.

The dam is approximately 33 feet tall and 1,200 feet long. The outlet works consists of a 60" CMP riser with trash rack and an anti-vortex plate which maintains a normal pool elevation of 1118 feet above sea level. The riser connects to a 30" CMP conduit which discharges to Elbo Creek. An uncontrolled auxiliary spillway is located on the right (west) abutment. The auxiliary spillway is a vegetated earthen spillway approximately 190 feet in width. It appears that Elbo Ridge Drive, the road that runs along the top of dam and spillway, performs as the hydraulic control section.

Based on discussions with the Lake Elbo Club, no known modifications have been made to the dam or spillway following the permitted modifications in 1967.

### **C. Summary of Previous Inspections**

The site has one prior inspection on file with the Division of Water Resources. This inspection was performed on June 24, 2022, by Jason Hoskinson, P.E., PTOE, and Abby Mills, P.E., CFM. The following items were noted in the 2022 inspection report.

- A good stand of grass has generally been maintained on the embankment.
- The wave erosion protection along the upstream slope has been weathered.
- Two areas of erosion were observed on the auxiliary spillway midway along the flowline at the middle of the spillway and along the west edge of the spillway.
- Woody vegetation limit access to the outfall of the primary spillway.
- Erosion was observed around the outfall of the primary spillway.

### **D. Current Inspection Summary**

The inspection of Lake Elbo Dam was conducted on April 15, 2025, during sunny weather conditions and the temperature was approximately 45° F. The inspection was performed by Abby Mills P.E., CFM of BG Consultants, Inc.

The field inspection of the dam proceeded with a visual observation of the general conditions at the site, the downstream conditions, the upstream slope, and top of the dam. The downhill slope and auxiliary spillway were then observed, followed by the primary spillway outlet. The primary spillway intake, a drop inlet structure, was unable to be accessed during the inspection. Pictures documenting the inspection findings were recorded and have been included in this report.

- **General Condition** – The dam appears to be in good overall condition (See Photo Log). A good stand of grass is present. The gradients of the slopes and profile of the top of the dam appear to be in general conformity to the plans recorded with DWR. No deformities in the embankment which would jeopardize the performance of the structure were observed during this



inspection. There are utility poles located along the downstream slope of the dam (Photos 2, 19, & 20).

- **Fence** – There is no fence restricting access to the dam.
- **Rodents/Animals** – No rodent holes or animal paths were observed along the dam slopes or along auxiliary spillway.
- **Trees, Brush, and Grass Cover on Dam** – The dam owner has done a good job at keeping saplings/woody vegetation from growing on the embankment (See Photo Log). A good stand of grass is present throughout the embankment. Brushy vegetation is present along the auxiliary spillway (Photos 14, 15, & 16).
- **Seepage** – No seepage locations were noted during the current inspection. Overall soil/ground conditions were dry.
- **Wave Erosion/Rip Rap** – The reservoir was at normal pool elevation appears to be performing sufficiently (Photos 5, 6, & 9). Rip rap wave protection has recently been installed to prevent erosion (Photo 3). There does not appear to be any scarping along the shoreline.
- **Undesirable Paths or Trails** – No undesirable paths or trails were present at the time of inspection. Elbo Ridge Drive runs along the top of dam. The road surface is asphalt and was recently resurfaced. It is in good condition.
- **Roadway on Dam** - Elbo Ridge Drive runs along the top of the dam. The surfacing of the roadway is asphalt, except for the portion crossing the auxiliary spillway, which is concrete. The asphalt roadway was recently repaved, and both the asphalt and concrete portions are in good condition overall.
- **Primary Spillway Intake** – The primary spillway appears to be in good condition. There is no debris blocking the inflow. The trash rack and anti-vortex plate appear to be operating as intended (Photos 7 & 8). A reservoir drawdown valve was operated sometime in 2023/2024.
- **Primary Spillway Outlet** – The primary spillway outlet was flowing approximately 3 cfs at the time of inspection. The spillway outlet appeared to be operating as intended. The club recently completed a project to construct a support for the outlet pipe and line the slope with rip rap to mitigate erosion (Photos 22, 23, & 24). Trees and other vegetation have been removed around the outlet to allow better access for maintenance activities (Photos 22, 23, & 24).
- **Downstream Conditions** – Downstream conditions do not appear to have significantly changed over the last few years based upon aerial imagery.

- **Auxiliary Spillway** – There are two areas of erosion along the middle of the spillway approximately midway through and along the west side (Photos 16 & 17). Routine maintenance is planned to prevent further erosion. Other than the noted erosion, the auxiliary spillway is in good condition with adequate grass cover. A log jam was forming at the auxiliary spillway entrance to Elbo Creek (Photo 18).

#### **E. Survey Information**

A topographic survey was not conducted during the inspection. General appearances and conversation with the dam's owner indicated that no substantial modifications have been made to the structure since the most recent approved modification.

#### **F. Discharge from Spillways and Drains**

The reservoir was approximately 0.5 inches above normal pool elevation. Elevated discharge of 3 cfs (cubic feet per second) was observed from the primary spillway. No discharge was observed at the auxiliary spillway.

#### **G. Monitoring Devices/Programs**

There are no monitoring devices on the dam.

#### **H. Size/Hazard Classification**

Based on a 2017 Dam Failure Analysis completed by Amec Foster Wheeler, Lake Elbo Dam is currently classified as a Class C (High Hazard) dam. This classification indicates the dam is located in an area where failure of the dam may cause extensive loss of life and/or serious property damage. The 2017 study noted several residences and roadways downstream that would be impacted by a breach wave.

Based on the field inspection and review of the downstream characteristics, the dam should remain classified as a Class C (High Hazard) water structure for the reasons described in the previous paragraph.

#### **I. Review of Hydrology/Hydraulics**

Based on historical aerial photography on GoogleEarth, the  $\pm 3.2$  square mile watershed upstream of Lake Elbo Dam does not appear to have experienced any significant changes which would necessitate a change in the basis of design for the estimated storm water runoff. No significant changes are apparent in the reservoir area upstream of the embankment which would indicate a change in the capacity of the reservoir. Also, it does not appear that changes have been made to the outlet works which would affect the design capacity of the outlet works.

In 1967, the modifications to the dam were designed to make the dam capable of accommodating the 100-year event with approximately 1 foot of freeboard. The 100-year event with a 6-hour rainfall is 5.6 inches. Current regulations for this structure are the 40% PMP event. This event equates to 10.8 inches in a 6-hour rainfall.

In the 2022 inspection, BG Consultants, Inc. performed a basic flood routing analysis based on LIDAR elevations and information available from DWR plans and records on file. This flood routing analysis estimated that with a storm equivalent to 40% of the 6-hour Probable Maximum Precipitation (PMP) would result in the structure overtopping. Current regulations for a dam of this type require 3 feet of freeboard during the 40%, 6-hour PMP.

Based on this information, visual inspection of the dam, and observation of the watershed conditions, the dam is considered hydrologically inadequate.

#### **J. Emergency Action Plan**

The most recent EAP filed with DWR was completed in 2024.

#### **K. Operation and Maintenance Plan**

Lake Elbo Dam is operated and maintained by the Lake Elbo Club. According to the Lake Elbo Club, there is a written operation and maintenance plan on file.

#### **L. Recommendations**

*It is suggested that action be taken on the following items as soon as possible:*

1. Repair the erosion area in the middle of the auxiliary spillway channel floor. Based on previous inspections, these areas of erosion will require routine maintenance.

*The following recommendations should be programmed for future repair:*

1. Consider programming a project to bring the structure into compliance with current regulations for water structures of this type in the State of Kansas.

*The following recommendations should be implemented during routine maintenance:*

1. Monitor minor erosion areas along the auxiliary spillway.
2. Continue vegetation control activities through burning, mowing, and routine removal of undesirable vegetation.
3. Continue periodic updates of the EAP as required by Kansas rules and regulations governing water structures of this type.

## **M. Conclusion**

The Lake Elbo Club has taken on two significant maintenance projects in the replacement of riprap along the upstream slope and removal of unwanted trees/vegetation around the primary outlet, supporting the outlet pipe, and installing riprap around the outlet pipe to prevent erosion. This dam appears to be in good condition and operates as designed. Focus should be given to stabilizing any erosion in the auxiliary spillway. Routine maintenance and inspection should be continued to keep this dam in good operating condition.

**Disclaimer:** BG Consultants, Inc., by providing this Inspection Report does not assume responsibility for any unsafe condition, known or unknown, of the subject dam. The responsibility for the safety of this dam rests with the dam owner or operator, subject to the regulatory authority of the Chief Engineer as provided by the Obstructions in Streams Act, K.S.A. 82a-301 et seq. The dam owner or operator should take every step necessary to prevent any damage that could be attributable to the dam in the event of a failure of the structure.

## Dam Field Inspection Checklist

### Licensed Professional Engineer Conducting Inspection

Name: Abby Mills, PE, CFM  
 Business Name: BC Consultants  
 Phone Number: 785-796-2010  
 Email Address: abby.mills@bccons.com

### Dam Owner Information

Name: Lake Elbo Club  
 Mailing Address: 5629 Elbo Shore Drive  
 Phone Number: 785-323-7667  
 Email Address: brentmckeehan303@gmail.com

### Dam Information

Water Structure Number (WSN): DPT-0055  
 National Inventory Number: K502061  
 Inspection Team Members: Abby Mills  
 Date of Inspection: 4/15/25  
 Current Hazard Classification: ☒ High ☐ Significant ☐ Low  
 Recommended Hazard Classification: ☒ High ☐ Significant ☐ Low  
 Size Class: ☐ 1 ☐ 2 ☐ 3 ☐ 4  
 Ground Moisture Conditions:   
 Temperature (°F): 45° Weather During Inspection: Sunny

### Spillways

Primary Spillway ☒ No Primary Spillway ☐  
 Description:   
 Reservoir Level: ☒ Above or ☐ Below inlet elevation (inches or feet) 0.5"  
 Barrel Diameter (inches) 30" Riser Dimensions (Inches or feet)   
 Discharge: 3 cfs gpm/cfs ☐ No flow  
 Is there a trashrack? ☒ Yes ☐ No

Service Spillway ☐ No Service Spillway ☒  
 Description:   
 Reservoir Level: ☐ Above or ☒ Below inlet elevation (inches or feet)  
 Weir Length (feet)   
 Discharge: gpm/cfs ☐ No flow

Auxiliary Spillway ☒ No Auxiliary Spillway ☐  
 Description: Grassed spillway w/ Road @ Control (Asphalt)  
 Spillway Bottom Width (ft)   
 Discharge: gpm/cfs ☒ No flow

<b>Condition Assessment</b>	
	Satisfactory   Fair   Poor   Unsatisfactory
see discription below	(circle one)
<p><b>Satisfactory</b></p> <ul style="list-style-type: none"> <li>- Dam has no deficiencies beyond minor maintenance items such as minor brush growth or saplings, small eroded/bare areas, small areas of non-structural deterioration to concrete, metal or timber components, debris in the outlets, or similar.</li> <li>- Dam has no known structural issues.</li> <li>- Dam may have seepage/leakage issues, provided that they are longstanding, previously evaluated and deemed to be static or not presenting a stability issue.</li> <li>- Dam meets freeboard requirements.</li> </ul> <p><b>Fair</b></p> <ul style="list-style-type: none"> <li>- Dam has maintenance deficiencies beyond the minor ones allowable for "Satisfactory" dams, but these deficiencies are non-structural and do not affect the safe operation of the dam.</li> <li>- Repairs will need to be done in the future but are not required within the next 3-5 years.</li> <li>- Dam has no known structural issues.</li> <li>- Dam may have seepage/leakage issues that, though not deemed an immediate threat to the stability of the dam, have not been adequately investigated, evaluated or addressed.</li> <li>- Dam is within 1 foot of the required freeboard.</li> </ul> <p><b>Poor</b></p> <ul style="list-style-type: none"> <li>- Dam has multiple maintenance deficiencies that can affect the safe operation of the dam, some of which may be structural or need further evaluation by a qualified engineer.</li> <li>- Dam may have structural issues that need to be corrected before the next regular safety inspection.</li> <li>- Dam may have significant seepage/leakage issues that need to be addressed.</li> <li>- Dam is within more than 1 foot of the required freeboard (notify owner that dam needs to be modified to meet freeboard requirements).</li> </ul> <p><b>Unsatisfactory</b></p> <ul style="list-style-type: none"> <li>- Dam is unsafe. A dam safety deficiency exists that requires prompt remedial action for problem resolution. Reservoir restrictions may be necessary.</li> </ul>	
<b>Operational Status</b>	
<div style="border: 1px solid black; border-radius: 50%; width: 80px; height: 30px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"> Normal Operations </div>	<div style="display: flex; justify-content: space-between;"> <div>Under Investigation</div> <div>Under Planning, Permitting, or Design for Remediation</div> <div>Under Remediation</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div>Under Delay</div> <div>Not In Compliance</div> </div>
see discription below	(circle one)
<p><b>Normal Operations</b></p> <ul style="list-style-type: none"> <li>- No existing or potential dam safety deficiencies are recognized. Dam is operating without restrictions. Applies to dams with a satisfactory condition assessment.</li> </ul> <p><b>Under Investigation</b></p> <ul style="list-style-type: none"> <li>- Dam is currently under investigation or undergoing a study as a dam safety deficiency is recognized but uncertainties exist. Further investigations and studies are necessary before planning, permitting, or design can begin.</li> </ul> <p><b>Under Planning, Permitting, or Design for Remediation</b></p> <ul style="list-style-type: none"> <li>- A dam safety deficiency is recognized. Dam remediation plan is currently under planning, permitting, or design review.</li> </ul> <p><b>Under Remediation</b></p> <ul style="list-style-type: none"> <li>- A dam safety deficiency is recognized. Active construction is occurring to correct the known deficiencies.</li> </ul> <p><b>Under Delay</b></p> <ul style="list-style-type: none"> <li>- A dam safety deficiency is recognized. Owner is taking active role, but no remediation action is being taken due to funding, permits or environmental permitting issues. No progress has been made for an extended period of time.</li> </ul> <p><b>Not In Compliance</b></p> <ul style="list-style-type: none"> <li>- A dam safety deficiency is recognized. Dam owner is unresponsive and not taking risk reduction or remediation measures to make the dam meet applicable regulatory criteria. Regulatory agency may be taking enforcement action against the dam owner.</li> </ul>	



"Yes" responses need explanation added to the "comments" sections, an action box should also be checked. "No" responses indicate no issues observed during the inspection. If item is not applicable put "NA" in the comments box.

Item	Yes	No	Comments	Repair	Monitor	Investigate
<b>General Conditions</b>						
Unauthorized modifications to the dam?		X				
Evidence of significant weather event?		X				
Adequate grass cover?	X					
Fencing adequate?			N/A			
<b>Dam Crest</b>						
Settlement/misalignment?		X				
Erosion?		X				
Cracks, bulges?		X				
Undesirable vegetation?		X				
Animal damage? (i.e rodent holes, cattle trails, etc.)		X				
Roadway or trails?	X		Asphalt Road			
<b>Upstream Slope</b>						
Erosion?		X	New Rip Rap Wave protection			
Undesirable vegetation?		X				
Trees?		X				
Animal damage? (i.e rodent holes, cattle trails, etc.)		X				
Drift or debris?		X				
Cracks, settlement, bulges?		X				
<b>Downstream Slope</b>						
Erosion?		X				
Undesirable vegetation?		X				
Trees?		X				
Animal damage? (i.e rodent holes, cattle trails, etc.)		X				
Cracks, settlement, bulges?		X				
Seepage/damp spots?		X				
<b>Primary Spillway Inlet</b>						
Trashrack adequate?	X					
Obstructions in inlet?		X				
Damage?		X				
Drawdown operative? Last operated?	X		2023/2024			
<b>Primary Spillway Outlet/Stilling Basin</b>						
Damage?		X				
Leakage?		X				
Joint material lost?		X				

Under-cutting pipe?		X			
Riprap/scour protection adequate?	X				
Outlet conduit submerged?		X			
Outlet channel obstruction?		X			

#### Foundation/Toe Drains

Drain outlet submerged?		X			
Drain functional?		X			
Any flow observed?		X			
Flow contain sediment?		X			

#### Reservoir

Development or fill?		X			
Unstable banks or slopes?		X			

#### Auxiliary/Emergency/Service Spillway

Erosion?	X		Minor Erosion present in a few locations		
Obstructions?		X			
Seepage/damp spots?		X			
Animal damage? (i.e rodent holes, cattle trails, etc.)		X			
Trees or woody vegetation?		X			
Damage to concrete?		X			

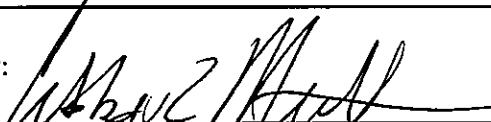
#### Downstream

Downstream development changes?		X			
Sand boils?		X			

#### Observations/Comments:

Recent maintenance projects including upstream slope Rip Rap, Supporting of primary spillway outlet pipe, Rip Rap around outlet pipe, + tree and vegetation removal around outlet.

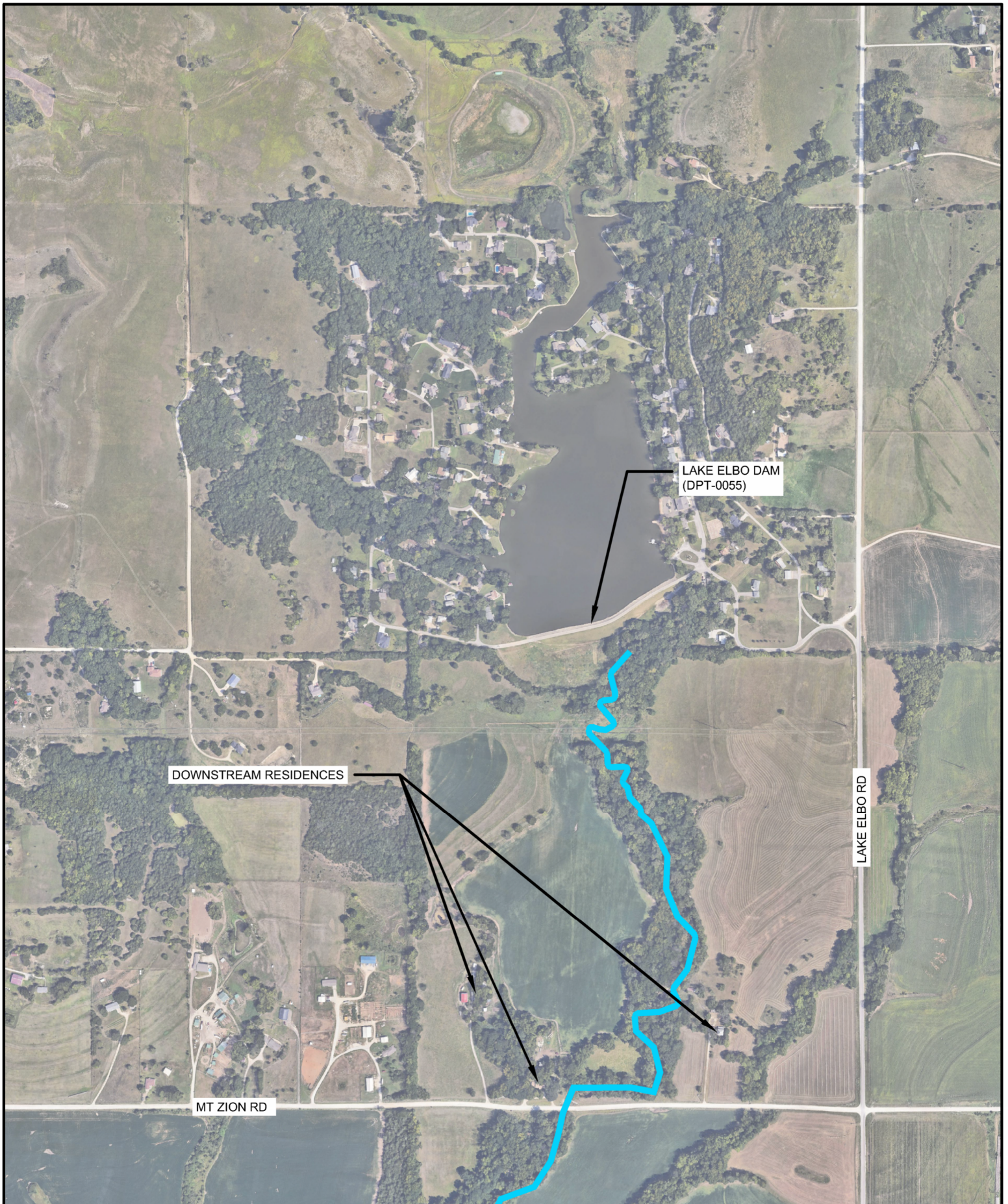
Dam grass well maintained, planned routine maintenance for erosion on Auxiliary spillway.

Inspector: 	Date: 4/15/25
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#### DISCLAIMER:

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AERIAL LOCATION MAP-LAKE ELBO DAM (DPT-0055)



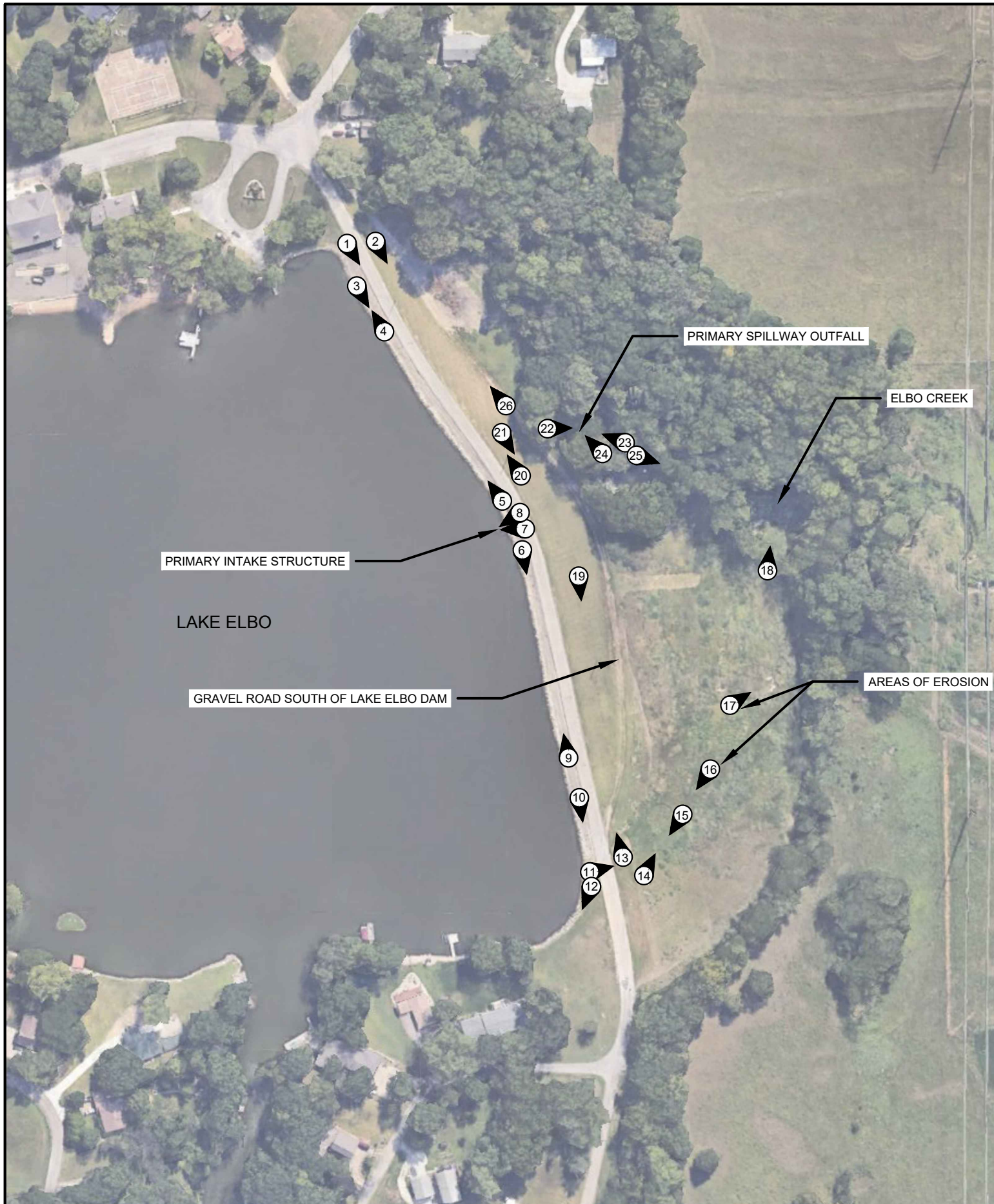




USGS TOPO MAP-LAKE ELBO DAM (DPT-0055)

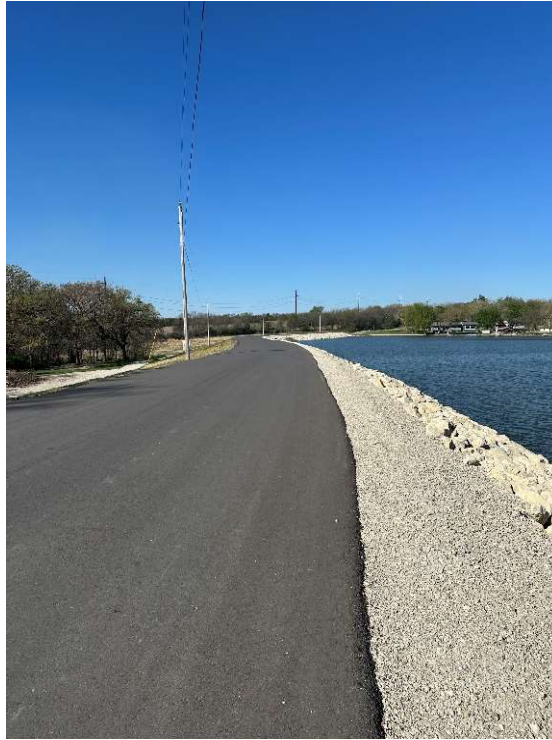






FIELD SKETCH-LAKE ELBO DAM (DPT-0055)  
 LAKE ELBO DAM CLUB  
 INSPECTION DATE: APRIL 15, 2025





**Photo #1:** Standing on left side (east) of the abutment looking west on top of dam.



**Photo #2:** Standing on the left (east) embankment looking at the downstream slope.





**Photo #3:** Standing on the left (east) abutment looking at the upstream slope.



**Photo #4:** Standing on the upstream slope looking at upstream abutment contact.



**Photo #5:** Standing near primary spillway looking east at the upstream slope, rip rap erosion protection.



**Photo #6:** Standing near primary spillway looking west at upstream slope, rip rap erosion protection.





**Photo #7:** Primary spillway intake, CMP riser with trash rack and vortex plate.



**Photo #8:** Primary spillway intake, CMP riser with trash rack and vortex plate.



**Photo #9:** Standing on right (west) abutment looking east at upstream slope.



**Photo #10:** Standing on top of dam (west side) looking at auxiliary spillway control section.





**Photo #11:** Standing north of the control looking across auxiliary spillway control section.



**Photo #12:** Standing north of the control looking west at upstream auxiliary spillway.



**Photo #13:** Standing south of control point, looking east toward dam, power pole.



**Photo #14:** Looking downstream on auxiliary spillway.





**Photo #15:** Looking upstream on auxiliary spillway.



**Photo #16:** Looking south (downstream) in auxiliary spillway channel, erosion.



**Photo #17:** Looking south (downstream) in auxiliary spillway channel, erosion.



**Photo #18:** Looking at creek that auxiliary spillway channel flows into.





**Photo #19:** Power poles running along downstream slope of embankment. Power poles appear to be above the normal pool elevation.



**Photo #20:** Looking east at downstream embankment, power pole.



**Photo #21:** Looking west at downstream embankment.



**Photo #22:** Primary spillway outlet.





**Photo #23:** Primary spillway outlet.



**Photo #24:** Primary spillway outlet.





**Photo #25:** Downstream of primary spillway outlet.



**Photo #26:** Standing on east embankment looking east along downstream slope, gravel access road.