LAKE EDGEWOOD CONSERVANCY DISTRICT

Board of Directors Meeting/Public Hearing
September 5, 2018, 7:00pm
Lake Edgewood Community Center
1715 W. Shore Dr., Martinsville IN 46151

Attendance: Chairperson Jennifer Staggs, Vice Chairman John Allbritten, Director John Dotson, Director James Thomas, Director Tonya Mercer, Financial Clerk Kelly Stege, Secretary Jeff Snodgrass

The meeting was called to order at 7:00PM by Chairperson Jennifer Staggs, who led us in the Pledge of Allegiance.

Secretary Jeff Snodgrass read the minutes from the July 18th meeting. Motion to accept as amended was made by Vice Chairman John Allbritten, seconded by Tonya Mercer. To vote to approve as amended was unanimous.

Financial Clerk Kelly Stege advised the budget report was not ready to present due to her working on the current audit by the State Board of Accounts.

The 2019 Annual Budget was presented to the public for discussion. Financial Clerk Kelly Stege advised nothing listed has changed from discussion at past meetings, and most items are consistent with last year's budget. The new Cumulative Improvement fund is an addition and is funded by excess boat registration fees. Copy attached to these minutes.

Chairperson Jennifer Staggs presented a proposal from CB Burke for a Sediment Management Plan. Task 1 is data gathering, Task 2 is a Sediment Budget Analysis, and Task 3 is a Sediment Management Analysis. A copy of the proposal is attached. Director John Dotson asked for and offered to obtain an additional quote. It was agreed not

to disclose CB Burke's price to others that provide a quote. Chairperson Staggs is to reach out to Burke to find out how long it will take to do the survey.

Director John Dotson noted PondsRX recommends adding additional grass carp this fall. The funds would come from the 2017 budget. PondsRX estimated the cost to be $900. Director Dotson will get an official bid from PondsRX and deliver it to board. Motion to approve up to $900 and final bid will be sent out via e-mail to all directors for final approval.

Discussion was held concerning some freeholders desire to drop the lake on a regular basis to enable freeholders to do shoreline maintenance. The Board decided to drop the lake level by approximately five feet starting in October 2019 and every three years thereafter.

It was noted that Commissioner Kenny Hale sent letters to three freeholders concerning high grass and all three have addressed the issue. Per Mr. Hale, the County will continue to watch for future issues.

Financial Clerk Kelly Stege advised the Board that we are currently undergoing an audit by the Indiana State Board of Accounts. We have forwarded all documents as requested. The cost of audit previously was approximately $50, but can now can be up to $175/hour. The State Board of Accounts was advised we do not have monies budgeted to cover the audit. We were advised it would be taken out of our tax levy, but they are unable to tell us which levy it would come out of. Financial Clerk Stege is keeping a binder of all records submitted for the audit and will submit the binder to the board once the audit is final. She expects the audit to be completed by the end of October.

New Business

Vice Chairman John Allbritten sent an e-mail to the Board around the first of August concerning some vandalism of the docks in Birdhouse

Cove. He has since talked to others and it does not seem to be a continuing issue. It was noted that we need to do a better job in 2019 with getting signed agreements from those who use the Birdhouse Cove docks. The Board also needs to address people having agreements but not using the docks.

Director Tonya Mercer suggested everyone on board should have boat registration stickers and documentation so people can get them more easily.

Public Comments

Freeholder Chuck Erle inquired about alternative weed treatment options that would reduce lake usage down time. Director John Dotson advised he will ask a representative from Ponds RX to attend the next meeting.

With no further business before the board, Director Mercer moved to adjourn the meeting. The motion was seconded by Director Thomas and the vote to adjourn was unanimous. The meeting adjourned at 8:03 PM.

Respectfully submitted by Jeff Snodgrass, Secretary. October 3, 2018.

CHRISTOPHER B.
BURKE
ENGINEERING, LLC

LAKE EDGEWOOD DAM (55-8)
2018 DAM SAFETY INSPECTION REPORT

Morgan County, IN | May 2018

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LAKE EDGEWOOD DAM (55-8)
2018 DAM SAFETY INSPECTION REPORT

MORGAN COUNTY, INDIANA

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Prepared for:

Lake Edgewood Conservancy District
P.O. Box 1931
Martinsville, IN 46151

Inspection Date: May 10, 2018

Prepared by:

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Indianapolis, Indiana 46204

CBBEL Project No. 19.R140312.00002

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Disclaimer

This report was prepared by Christopher B. Burke Engineering, LLC (CBBEL) for the Lake Edgewood Conservancy District for Lake Edgewood Dam using available data and observed conditions. CBBEL is not responsible for any conditions that could not be inspected during the field examination due to excessive vegetation, inundation, or other visual obstructions.

Information describing possible solutions to problems and concerns, repairs, and emergency actions are intended for guidance only. The dam owner should obtain detailed design plans and specifications from a qualified professional engineer experienced in dam design and construction before performing any repairs or modifications to the dam or its appurtenant works. Only qualified contractors should be employed to install necessary measures.

Permits from state or local agencies may be required to perform dam remedial work or repairs, depending on the magnitude of the repairs. The dam owner should seek professional assistance in determining the need for permits.

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Executive Summary

Lake Edgewood Dam is located approximately 1.5 miles northwest of Martinsville in Morgan County, Indiana in Section 29, Township 12N, Range 1E on the Martinsville USGS Quadrangle Map. The dam is an earthen embankment constructed across an unnamed tributary to West Fork White River and has a high hazard classification. The dam is owned by the Lake Edgewood Conservancy District (District).

The embankment is approximately 29 feet high and about 635 feet long (excluding the spillway) with an 18-foot wide crest. The 53-acre lake collects runoff from an approximately 0.9 square mile watershed. The principal spillway is located on the right side of the dam, is 70 feet wide, and consists of an approximately 374-foot long, three-cycle reinforced concrete labyrinth weir with a reinforced concrete chute with baffle blocks. For purposes of reference, left and right are based on a view looking downstream. A 6-foot high chain-link security fence is mounted on top of the spillway retaining walls. The drawdown system consists of three 10-inch resilient wedge gate valves located at the downstream apexes of the labyrinth weir.

The Lake Edgewood Dam was constructed in 1959 without approval from the Indiana Natural Resources Commission, now the Indiana Department of Natural Resources (IDNR) Division of Water. In June 2010, Christopher B. Burke Engineering, LLC (CBBEL) completed a Preliminary Engineering Report for the rehabilitation of the Lake Edgewood Dam. The study analyzed various alternatives for rehabilitating the dam and increasing the spillway capacity to bring it into compliance with IDNR standards. CBBEL subsequently prepared design plans for the rehabilitation project which included replacement of the existing principal spillway, flattening the downstream embankment slope, and installation of a toe drain to address a previously observed seepage condition. RL Turner Corporation was the prime contractor for the project which was considered substantially complete in February 2012. The work was completed under IDNR Construction in a Floodway Permit #FW-26139.

CBBEL personnel performed a visual dam safety inspection of Lake Edgewood Dam on May 10, 2018. CBBEL's office is located at 115 W. Washington Street, Suite 1368 South, Indianapolis, Indiana. The inspection was performed by Aaron J. Fricke, P.E., and Jeffrey D. Fox, P.E., both having specialized experience in dam design, construction, and inspection. Several members of the District were present during the inspection including Jennifer Staggs, District Chairman.

The May 10, 2018 dam safety inspection revealed that the overall condition of the dam is considered to be "**Satisfactory**" based on IDNR rating criteria. The dam appears to be a stable structure with no obvious deficiencies that would cause concerns for immediate embankment failure. Some maintenance and monitoring is required to continue the overall "Satisfactory" rating and to prevent maintenance items from affecting the safety or performance of the dam. The risk of dam failure is considered to be low.

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Appendix 1 contains the IDNR Dam Inspection Report Form completed by CBBEL for the 2018 safety inspection. This form will be submitted to IDNR along with this report. The component ratings, overall conditions rating, and recommendations to maintain an overall "Satisfactory" condition rating are summarized in the following table.

Component	Rating	Recommendations	Schedule	Importance
Upstream Slope	Good	• Remove or spray weeds in riprap • Monitor scarping on the upstream slope • Monitor crawfish burrows	• Immediately • Ongoing • Ongoing	• Low • Low • Low
Crest	Good	• No action needed at this time	• N/A	• N/A
Downstream Slope	Good	• No action needed at this time	• N/A	• N/A
Seepage	Acceptable	• Clear vegetation around the toe drain outlet • Monitor downstream toe of slope on the left side of the dam for potential seepage • Repair or replace damaged toe drain riser lids	• Immediately • Ongoing • Within 1 yr	• Medium • Low • Low
Principal Spillway	Good	• Remove or spray weeds in riprap • Monitor cracks in concrete	• Immediately • Ongoing	• Low • Low
Auxiliary Spillway	N/A	• N/A	• N/A	• N/A
Maintenance and Repairs	Good	• Monitor, maintain, and repair dam as noted above	• Ongoing	• Low
Overall Conditions	**Satisfactory**	• **See above**	• N/A	• N/A

Notes:
1. Possible Component Ratings: Good, Acceptable, Deficient, Poor
2. Possible Overall Conditions Ratings: Satisfactory, Fair, Conditionally Poor, Poor, Unsatisfactory

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1.0 Background

1.1 Project Location

Lake Edgewood Dam is a 29-foot tall earthen embankment constructed across an unnamed tributary to West Fork White River that creates a 53-acre lake that is utilized for recreation. The dam is located approximately 1.5 miles northwest of Martinsville near the intersection of State Road 67 and South Shore Drive in Morgan County, Indiana. The dam is owned by the Lake Edgewood Conservancy District (District).

1.2 File Review

Unless otherwise noted, information presented in this report is from the visual inspection, information obtained from the Indiana Department of Natural Resources (IDNR) files, in-house files from previous work on the dam completed by Christopher B. Burke Engineering, LLC (CBBEL) , aerial photography, topographic information, and maps publicly available through the Indiana Spatial Data Portal. An extensive review of IDNR's file was not considered necessary for this inspection due to CBBEL's previous research and ongoing involvement with the dam. Primary sources of information include:

- *Phase I Inspection Report for Lake Edgewood Dam* prepared for the United States Army Corps of Engineers by Berger Associates, Ltd. in 1979
- *Lake Edgewood Dam Preliminary Engineering Report* prepared by CBBEL in June 2010
- *Lake Edgewood Dam Construction in a Floodway Permit Report* prepared by CBBEL in March 2011
- Record drawings titled *Lake Edgewood Dam Rehabilitation* prepared by CBBEL dated July 20, 2012
- *Lake Edgewood Dam IEAP Light* prepared by CBBEL dated February 2015
- 2016 State of Indiana Orthophotography and LiDAR data
- Mooresville East 7.5 minute USGS topographic map
- "Wabash Valley Seismic Zone". Central United States Earthquake Consortium. Accessed 3 May 2016 <http://www.cusec.org/earthquake-information/wabash-valley-seismic-zone.html>
- "Indiana Earthquake History". United States Geological Survey. Accessed 4 May 2016 <http://earthquake.usgs.gov/earthquakes/states/indiana/history.php>
- "Search Earthquake Archives". United States Geological Survey. Accessed 4 May 2016 <http://earthquake.usgs.gov/earthquakes/search/>
- *Lake Edgewood Dam 2016 Inspection* prepared by CBBEL in May 2016

1.3 History of the Dam

Lake Edgewood Dam was constructed in 1959 without approval from the Indiana Natural Resources Commission, now IDNR Division of Water. Lake Edgewood was rehabilitated in 2011 and 2012 under IDNR Construction in a Floodway Permit #FW-26139.

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Prior to the rehabilitation project, the former spillway was significantly damaged following an extreme rainfall event on June 6-7, 2008. CBBEL subsequently prepared design plans for the rehabilitation project which included replacement of the existing principal spillway, flattening the downstream embankment slope, and installation of a toe drain to address a previously observed seepage condition. RL Turner Corporation was the prime contractor for the project which was considered substantially complete in February 2012. The project was funded through a grant from the Office of Community and Rural Affairs (OCRA).

History of the dam prior to the June 2008 rainfall event is extensive and is omitted for brevity. More information can be found in CBBEL's preliminary engineering report and 2014 dam safety inspection report.

1.4 Previous Inspections

In accordance with Indiana Code 14-27-7.5-9, high hazard dam owners must have a licensed professional engineer inspect the dam at least one time every two years and submit a report regarding the structure's condition. Periodic inspections were performed by IDNR between 1968 and 2002. In addition to periodic safety inspections, a Phase I inspection was completed in 1979 by Berger Associates, Ltd. for the United States Army Corps of Engineers, Louisville District, under the authority of Public Law 92-367, the National Dam Inspection Act. In June 2008, the dam was damaged by flooding and was subsequently rehabilitated. Following completion of the project in 2012, a new schedule for biennial inspections was established. This is the third biennial inspection since the dam was rehabilitated.

Table 1 is a summary of the component ratings and overall condition ratings from previous inspections based on IDNR criteria.

Table 1: Previous Inspection Ratings (2008-2016)

Component	Condition Ratings Per Inspection			
	2008	**2010**	**2014**	**2016**
Upstream Slope	Good	Good	Good	Good
Crest	Good	Good	Good	Good
Downstream Slope	Acceptable	Acceptable	Good	Good
Seepage	Acceptable	Acceptable	Good	Acceptable
Principal Spillway	Deficient	Deficient	Good	Acceptable
Auxiliary Spillway	N/A	N/A	N/A	
Maintenance and Repairs	Good	Good	Good	Good
Overall Condition	**Fair**	**Fair**	**Satisfactory**	**Satisfactory**

Notes:
1. Possible Component Ratings: Good, Acceptable, Deficient, Poor
2. Possible Overall Conditions Ratings: Satisfactory, Fair, Conditionally Poor, Poor, Unsatisfactory

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1.5 Historical Events

In June 2008, a large area of central Indiana experienced unusually intense rainfall events. An hourly rainfall gage in Martinsville, Indiana (located just south of the watershed) recorded 8.7 inches of rainfall in an approximately 18-hour period on June 6 and 7. Within that 18-hour period, approximately 6.4 inches of the total rainfall occurred within a 6-hour period beginning at around 1:30 a.m. and ending around 7:30 a.m. on June 7, 2008. Lake Edgewood experienced unusually high lake levels, considerable deterioration of the former spillway channel, and significant erosion along the southern spillway channel bank resulting from the intense overnight and morning rainfall. The peak lake level was reportedly within one foot of the dam crest. In April 2018 a large rainfall event resulted in the dislodging of riprap downstream of the principal spillway. The lake level during this event was not recorded.

1.6 Emergency Preparedness

Lake Edgewood Dam is classified as a high hazard structure. CBBEL performed an approximate dam breach analysis as part of the 2010 Preliminary Engineering Report and prepared an inundation map. The estimated dam breach inundation area includes numerous single-family residences, some multi-family dwellings, and businesses on the west side of Martinsville. The majority of the inundation area is farmland. Several roads are also located within the inundation area, including State Road 67, State Road 39, and numerous local and county roads. These roads or portions of them may be impassable during and after a dam failure flood. Some residences that are not within the dam failure flood inundation area may have limited or no access due to roads being impassable. It is expected that there could be numerous utilities within the dam failure flood inundation area, including, but not limited to, electric, gas, water, telephone, fiber optics, storm sewer, sanitary sewer, and septic tanks. Many of these utilities may be underground, but damage is still possible.

A levee along the West Fork White River, part of a levee system known as the Martinsville Levee System, appears on aerial photography as well as the effective Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM). This 6,600-ft (+/-) long levee is located northwest of Martinsville and extends from the north side of State Road 39 to high ground near N. Main Street. The area behind the levee is located in Zone X (Area with Reduced Flood Risk due to Levee) on FEMA FIRM Community-Panel #18109C0266E and #18109C0258E, effective October 2, 2014. This area is outside of the regulatory 100-year floodplain. Although the 100-year discharge on West Fork White River is greater than the dam failure flood peak discharge, the ability of the levee to provide flood protection against a dam failure flood is unknown. Areas behind the levee that are below the dam breach wave elevation at the levee are included in the inundation area.

An Incident and Emergency Action Plan (IEAP) was completed in February 2015 by CBBEL under a contract with the Indiana Department of Homeland Security

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(IDHS), made possible by a grant from the Indiana Office of Community and Rural Affairs (OCRA). The previously developed dam failure flood inundation map was incorporated into the IEAP.

The dam is accessible during dry weather or flood events at the left abutment from East Shore Drive, an asphalt road. No auxiliary power is necessary because the dam and spillway do not have electrical components. The principal spillway is accessible via the dam crest.

1.7 Hydrology

According to *Lake Edgewood Dam Preliminary Engineering Report* prepared by CBBEL in June 2010 and record drawings from the rehabilitation project, Lake Edgewood has a normal surface area of approximately 53 acres at an elevation of 632.0 feet, North American Vertical Datum of 1988 (NAVD 88), with a corresponding storage volume of roughly 753 acre-feet. The watershed drainage area tributary to the lake is 0.9 square mile (576 acres) and is comprised primarily of deciduous forest, grassland or pasture, and low-intensity residential.

Dams classified as high hazard by IDNR are required to safely pass the rainfall runoff from the 100% PMP event without overtopping. A PMP storm event is the Probable Maximum Precipitation that can be expected during specific storm durations. The design storm duration is generally dictated by the size of the dam's watershed. For the location and size of the Lake Edgewood Dam Watershed, the 6-hour Probable Maximum Precipitation is 27.3 inches.

The hydrologic and hydraulic analysis performed by CBBEL as part of the preliminary engineering report shows that the spillway is capable of safely passing runoff from the 100% PMP storm event without overtopping the embankment. The spillway was designed for a 6-hour rainfall depth of 27.3 inches utilizing the SCS Type B rainfall distribution. The water surface elevation resulting from the PMP is 635.9 feet (NAVD 88).

1.8 Geologic Features

The following narrative describing geologic features is from *Geotechnical Engineering Evaluation of Lake Edgewood Dam*, completed by ATC Associates, Inc. dated May 21, 2010.

"Lake Edgewood Dam is located within the Martinsville Hills physiographic subdivision, which is part of the Southern Hills and Lowlands Region. It is just south of the southern extent of Wisconsin Glacial Deposition in Indiana. According to geological mapping, the depth to bedrock is less than about 50 ft below the general ground surface, which was confirmed by the EEI test borings. The upper bedrock below the site belongs to the Mississippian Age Borden Group, which consists primarily of siltstone, shale and sandstone with thin limestone layers.

There are no known active faults that are likely to produce earthquakes in the

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immediate vicinity of the site. The Mount Carmel Fault is located in eastern Monroe County approximately ten miles south of the site. However, any ground shaking from earthquakes would likely result from fault movements within either the New Madrid Seismic Zone, which is located in southeastern Missouri, or the Wabash Valley Fault System located in southwestern Indiana. Based on Figure 23-2 of the 1997 Uniform Building Code, Morgan County is within Seismic Risk Zone I, a zone of relatively low seismic risk. For the anticipated subsurface conditions at the Lake Edgewood Dam site, there is virtually no probability of 'liquefaction' (a phenomenon whereby ground shaking causes a severe loss of soil strength) under any reasonably anticipated ground shaking."

Although the seismic risk is low and the possibility of liquefaction minimal, the dam is located in an area that could be impacted by earthquakes from the Wabash Valley Seismic Zone in southwest Indiana and southeast Illinois or the New Madrid Seismic Zone centered in southeast Missouri according to information from the Central United States Earthquake Consortium and the United States Geological Survey. Three earthquakes of magnitude 7.3 or greater occurred near New Madrid, Missouri in 1811 and 1812 which were most likely felt in south-central Indiana. USGS records show that the largest recorded earthquake with its epicenter in Indiana was a magnitude 5.1 that occurred on September 27, 1909 near the Illinois border between Vincennes and Terre Haute. Several other earthquakes have occurred in Indiana and Illinois within the Wabash Valley Seismic Zone, many since the dam was constructed. The most notable is a magnitude 5.4 that occurred on April 18, 2008, near Mount Carmel, Illinois which is about 105 miles southwest of Lake Edgewood Dam. This earthquake was felt in Morgan County. A magnitude 3.8 earthquake occurred on September 12, 2004, approximately 45 miles east of the dam near Shelbyville, Indiana. Most recently, a magnitude 3.8 earthquake occurred west of Mount Carmel, Illinois on September 19, 2017 which was felt in Morgan County. There has been no documented damage to Lake Edgewood Dam as a result of earthquakes.

1.9 Dam and Lake Characteristics

Lake Edgewood Dam is a 29-foot tall earthen embankment that impounds an unnamed tributary to West Fork White River to create a 54-acre reservoir. The dam is approximately 700 feet long (including the spillway). The embankment has a crest width of 18 feet. The upstream slope is about 3:1 (H:V) and is armored with riprap around the normal pool level. The downstream slope is also about 3:1 (H:V). The embankment contains a toe drain comprised of stone, geotextile fabric, and 6-inch diameter perforated double wall high-density polyethylene (HDPE) pipe. There are five cleanouts along the toe drain. The toe drain outlet is located roughly 35 feet downstream of the toe of slope and about 130 feet northeast of the north spillway abutment wall.

The spillway is a 70-foot wide, 61-foot deep, three-cycle labyrinth weir with a reinforced concrete baffled chute at the southwest abutment. The weir length is approximately 386 feet. The walls are 9 feet tall. The area at the base of the chute

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is armored with riprap. A filter diaphragm and drain system was constructed in conjunction with the spillway. The spillway was designed to safely pass runoff from the 100% PMP storm event without overtopping the embankment.

The following is a summary of pertinent information regarding the dam, lake, and spillway system.

DAM HEIGHT	29 feet +/-
CREST LENGTH	635 feet (excluding the spillway) +/-
CREST WIDTH	18 feet
U/S SLOPE (H:V)	3:1 (H:V) +/-
D/S SLOPE (H:V)	3:1 (H:V) +/-
LAKE NORMAL POOL	632.0 feet (NAVD 88)
LAKE AREA	53 acres (normal pool), 65 acres (dam crest)
LAKE VOLUME	753 ac-ft (normal pool), 990 ac-ft (dam crest)
DRAINAGE AREA	0.9 square mile
PRINCIPAL SPILLWAY CREST	632.0 feet (NAVD 88)
DAM CREST	636.0 feet (NAVD 88)

1.10 Drawdown System

The dam is equipped with a drawdown system to lower the lake level. The drawdown system is comprised of three 10-inch diameter cleanout/drawdown valves, one at each at each downstream apex of the weir walls. The valves are opened and closed using a wheel to turn the operator at the top of the valve. According to *Lake Edgewood Dam Construction in a Floodway Permit Report* prepared by CBBEL in March 2011, the drawdown the valves were designed to not exceed a drawdown rate of 1 foot per day.

1.11 Downstream Features

Downstream of the dam, the unnamed tributary to West Fork White River generally flows southeast for roughly 0.4 mile to its confluence with West Fork White River. Roughly 720 feet downstream of the dam, the unnamed tributary is conveyed under State Road 67 via culvert. Downstream of State Road 67, the unnamed tributary enters the broad, relatively flat floodplain valley of West Fork White River.

2.0 Observed Conditions

CBBEL personnel performed a visual dam safety inspection of Lake Edgewood Dam on May 10, 2018. The inspection was performed by Aaron J. Fricke, P.E. and Jeffrey D. Fox, P.E., both having specialized experience in dam design, construction, and inspection. Several members of the District were present during the inspection including Jennifer Staggs, District Chairman. The weather conditions during the inspection were

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dry and sunny with a temperature of approximately 67 degrees Fahrenheit. The lake level was approximately at normal pool.

Narrative descriptions of the inspection findings are provided below. The IDNR Inspection Report Form summarizing the inspection findings and containing descriptions of the rating criteria can be found in **Appendix 1**. The IDNR Inspection Report Form from the previous inspection (2016) is included in **Appendix 2**. Refer to **Appendix 3** for photographs taken the day of the inspection. **Appendix 4** contains the dam inspection checklist completed during the inspection. Refer to the **Exhibits** section of this report for a site location map, topographic map, and a map showing the locations of inspection findings.

2.1 Upstream Slope

The upstream slope of the embankment is approximately 3:1 (H:V) from the crest to the shoreline and is armored with an adequate cover of riprap to about two feet above the normal pool elevation. The remainder of the upstream slope above this elevation is grass-covered. Scarping about 6 inches high was observed along the slope at the interface of the riprap and grass. Numerous crawfish burrows ranging in depth from a few inches to 4 feet and diameters of 2 inches were observed along the upstream slope. There was no visual evidence of depressions, sinkholes, cracks, slides, soil sloughs, or other deficiencies on the upstream slope. The upstream slope was considered to be in **"Good"** condition according to IDNR rating criteria.

2.2 Crest

The crest of the dam has adequate grass cover and no visual evidence of vertical or horizontal alignment problems, instabilities, cracks, bulges, or other deficiencies. The crest was considered to be in **"Good"** condition according to IDNR rating criteria.

2.3 Downstream Slope

The downstream slope of the embankment is approximately 3:1 (H:V) from the crest to the toe. The slope appears to have adequate grass cover with no observed depressions, sinkholes, cracks, slides, soil sloughs, or other deficiencies found. The downstream slope was considered to be in **"Good"** condition according to IDNR rating criteria.

2.4 Seepage

A wet area was observed near the downstream toe of slope on the left side of dam from the abutment to the near west end of the gravel drive from East Shore Drive (a distance of approximately 200 feet). The wet area was approximately 20 feet in width and 30 feet in length near the left abutment. This area has been observed to be wet in the past, even prior to the dam rehabilitation. The wetness appears to be due to surface runoff from the dam and left abutment. No vegetative growth that would suggest the persistence of wet conditions was identified, and no oily sheen

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that would suggest seepage was observed. No discharge was observed in the toe drain cleanouts.

The outlet of the drain was found underneath heavy vegetative growth that had to be partially cleared. The cover on the toe drain cleanout near the middle of the dam is cracked. The seating of the toe drain cleanout cover directly upstream of the toe drain outlet has been damaged such that the cover no longer securely fits. It appears that both of these cleanouts were damaged by a mower.

Based on these observations, seepage was considered to be **"Acceptable"** according to IDNR rating criteria.

2.5 Principal Spillway

The principal spillway is 70 feet wide and consists of an approximately 374-foot long, three-cycle concrete labyrinth weir with a concrete chute and baffle blocks. A 6-foot high chain-link security fence is mounted on top of the spillway retaining walls. An adequate cover of Class I riprap was observed at the end of the concrete chute and extends to the downstream channel. A small portion of the riprap approximately 50 feet downstream of the chute was recently displaced resulting in a small head cut. A few weeds were growing in the riprap. A debris boom, anchored to the upstream ends of the spillway abutment walls, was observed and was clear of buildup.

The reinforced concrete structure appears to be in good condition with minor surface cracks on the slab and walls. Some cracks appear to have been sealed. The spillway drain pressure relief valves appear to be operational. No additional concrete deterioration, misalignment, separated joints, undermining, or other deficiencies were observed. The principal spillway has adequate capacity to pass the spillway design flood.

Three 10-inch resilient wedge gate valves are located at the downstream apexes of the labyrinth weir and are accessible via the concrete chute for drawdown of the reservoir and sediment flushing. The valves are operated by turning the wheel on the top of the bonnet. The bonnets on all three valves were replaced in 2016 to address previously observed cracking in the right and center valves. All three valves were operated during the inspection and appear to be in good condition. Some sediment and debris was discharged as a result of the valve operation, but flow eventually became clear.

The principal spillway was considered to be in **"Good"** condition according to IDNR rating criteria.

2.6 Auxiliary Spillway

The Lake Edgewood Dam does not have an auxiliary spillway.

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2.7 Maintenance and Repairs

The maintenance of Lake Edgewood Dam was considered to be **"Good"** according to IDNR rating criteria. Continued maintenance should be completed on a regular basis and include mowing, spraying for weeds, monitoring the downstream toe of the embankment for signs of seepage, visually inspecting the principal spillway structure for concrete deterioration, clearing trash from the debris boom, and operation of the three drawdown valves. Continued maintenance should be completed as discussed in Section 4.0.

2.8 Overall Condition

The overall condition of Lake Edgewood Dam was considered to be **"Satisfactory"** based on IDNR rating criteria. Based on IDNR guidelines, the potential overall condition ratings include, from worst to best, Unsatisfactory, Poor, Conditionally Poor, Fair, and Satisfactory. A "Satisfactory" dam is one that has "no existing or potential dam safety deficiencies recognized. Safe performance is expected under all anticipated loading conditions, including such events as infrequent hydrologic and/or seismic events." Maintenance and monitoring are required to continue a "Satisfactory" rating, as noted on the IDNR Dam Inspection Report Form.

3.0 Risk of Dam Failure

CBBEL utilized the results of the dam inspection to evaluate the potential for failure of Lake Edgewood Dam. There are typically two types of dam failures that could occur:

- Type 1 – component failure of a structure that does not result in a significant release from the lake
- Type 2 – uncontrolled breach failure of a structure that results in a significant release.

Refer to **Appendix 5** for more details of types of failure and definitions of risk levels. CBBEL evaluated the risk for both types of failures.

3.1 Risk of dam component failure (Type 1)

CBBEL evaluated the risk for Type 1 component failure at Lake Edgewood Dam after the inspection was completed by considering possible failure of each dam component. The components that were evaluated include the upstream slope, the downstream slope, the embankment crest, the principal spillway, drawdown system, and the dam abutments. After considering the dam's current condition and the potential maximum loadings, CBBEL has estimated the risk of failure for each component as follows.

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Component	Risk Level
Upstream slope	low
Downstream slope	low
Embankment crest	low
Principal spillway	low
Drawdown system	low
Dam abutments	low

3.2 Risk of uncontrolled breach failure (Type 2)

CBBEL evaluated the potential for uncontrolled breach failure at Lake Edgewood Dam after the inspection was completed by considering possible failure modes. Embankment dams such as Lake Edgewood Dam generally have three potential modes of uncontrolled breach failure: 1) hydraulic failure, 2) seepage failure, and 3) structural failure. The factors that pose a risk to embankment dams and can result in dam failure can be categorized into four groups: 1) structural factors, 2) natural factors, 3) human factors, and 4) operating factors. Refer to Appendix 5 for more information about failure modes and risk factors.

At the present time, Lake Edgewood Dam appears to have a low risk for uncontrolled breach failure. Structural factors are summarized below.

Structural Factors	Risk Level	Failure Mode
Vegetation around toe drain outlet	low	Seepage
Broken/damaged toe drain riser lids	low	Seepage
Scarping on upstream slope	low	Structural/Hydraulic
Crawfish burrows	low	Seepage

Natural and human risk factors were also considered. Severe storms present a low risk to Lake Edgewood Dam due to the capacity of the lake and spillway system. Earthquakes also present a low risk based on the history of the dam with respect to previous earthquakes. However, the dam's proximity to the Wabash Valley and New Madrid Seismic Zones (based on a map from the Central United States Earthquake Consortium) cannot be ignored. **It should be noted that there is always some risk for dam failure at all dams, and that risk cannot be completely eliminated.**

Natural Factors	Risk Level	Failure Mode
Severe storms	low	Hydraulic
Earthquakes	low	Structural

Human Factors	Risk Level	Failure Mode
Vandalism	low	Structural
Terrorism	low	Structural

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Operating Factors	Risk Level	Failure Mode
Maintenance Practices	low	Hydraulic/Structural
Access	low	Hydraulic/Structural
Mechanical Equipment	low	Hydraulic/Structural

4.0 Recommendations

This section presents CBBEL's recommendations for action based on the findings of the dam safety inspection, CBBEL's assessment of the risk of dam failure at Lake Edgewood Dam, and CBBEL's assessment of the priority for repairs of each observed deficiency. The recommendations are summarized by dam feature, such as the upstream slope, crest, etc. Based on inspection findings, Lake Edgewood Dam requires some maintenance and monitoring to continue IDNR's "Satisfactory" rating. CBBEL's objective is to make engineering recommendations that minimize the risk of failure to an acceptable level. A summary of the 2018 inspection ratings and recommendations are provided in **Table 2**.

Table 2: Inspection Ratings and Recommendations

Component	Rating	Recommendations	Schedule	Importance
Upstream Slope	Good	• Remove or spray weeds in riprap • Monitor scarping on the upstream slope • Monitor crawfish burrows	• Immediately • Ongoing • Ongoing	• Low • Low • Low
Crest	Good	• No action needed at this time	• N/A	• N/A
Downstream Slope	Good	• No action needed at this time	• N/A	• N/A
Seepage	Acceptable	• Clear vegetation around the toe drain outlet • Monitor downstream toe of slope on the left side of the dam for potential seepage • Repair or replace damaged toe drain riser lids	• Immediately • Ongoing • Within 1 yr	• Medium • Low • Low
Principal Spillway	Good	• Remove or spray weeds in riprap • Monitor cracks in concrete	• Immediately • Ongoing	• Low • Low
Auxiliary Spillway	N/A	• N/A	• N/A	• N/A
Maintenance and Repairs	Good	• Monitor, maintain, and repair dam as noted above	• Ongoing	• Low
Overall Conditions	**Satisfactory**	• **See above**	• N/A	• N/A

Notes:
1. Possible Component Ratings: Good, Acceptable, Deficient, Poor
2. Possible Overall Conditions Ratings: Satisfactory, Fair, Conditionally Poor, Poor, Unsatisfactory

Reasons for rating changes from the previous inspection are described below.

Principal Spillway – The rating was changed from "Acceptable" to "Good" due to the repair of the cracked gate valve bonnets.

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EXHIBITS

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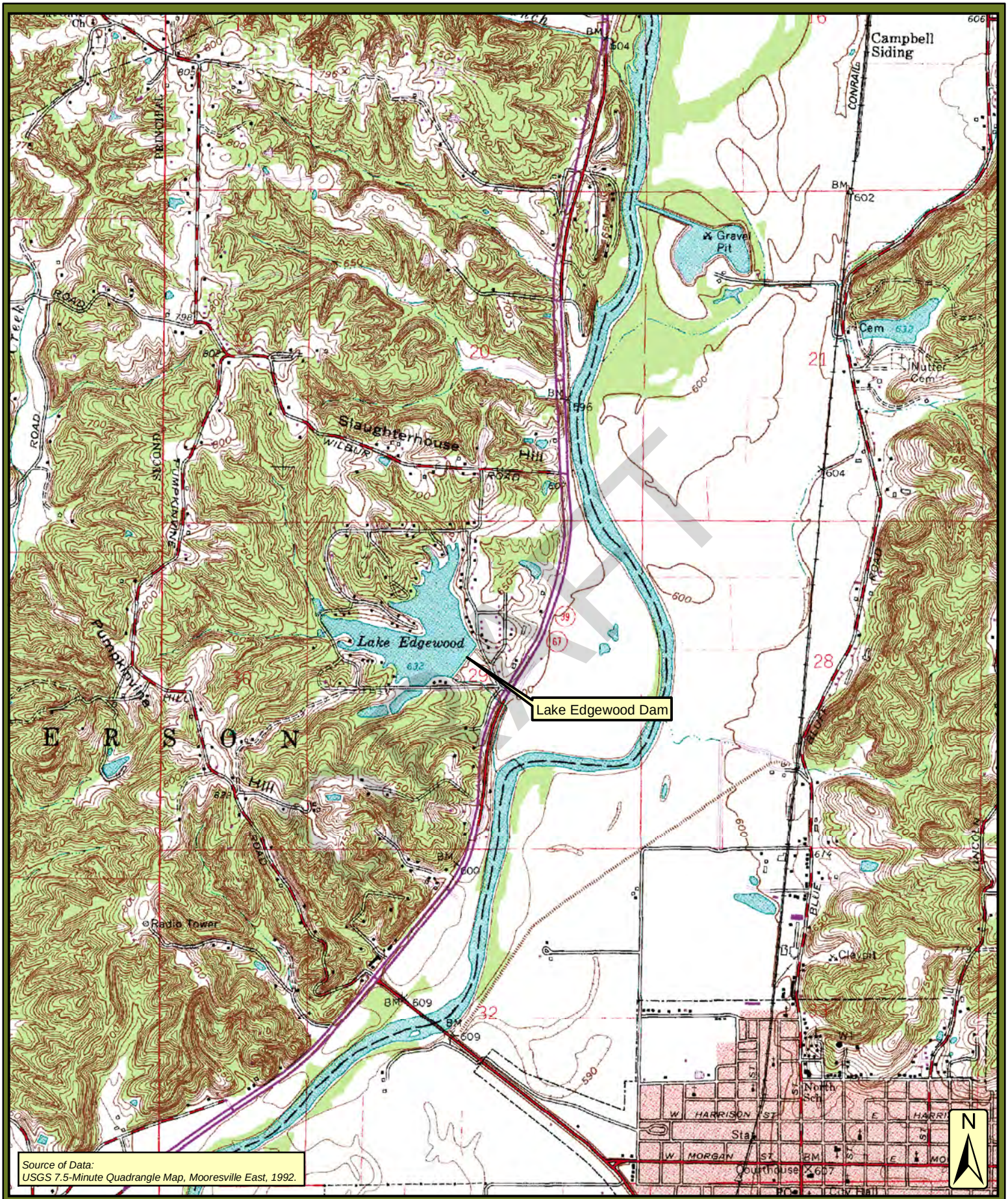

Source of Data:
USGS 7.5-Minute Quadrangle Map, Mooresville East, 1992.

Christopher B. Burke Engineering, LLC
PNC Center, Suite 1368 South
115 West Washington Street
Indianapolis, Indiana 46204
(t) 317.266.8000 (f) 317.632.3306

PROJECT: Lake Edgewood Dam 2018 Dam Safety Inspection		PROJECT NO. 14-0312.00002	APPROX. SCALE 1 " = 2,000 '
TITLE: USGS Quadrangle Map (Selected Portions of Martinsville Quad)			DATE: 05/2018
			EXHIBIT 1

Christopher B. Burke Engineering, LLC
PNC Center, Suite 1368 South
115 West Washington Street
Indianapolis, Indiana 46204
(t) 317.266.8000 (f) 317.632.3306

PROJECT: Lake Edgewood Dam 2018 Dam Safety Inspection		PROJECT NO. 14-0312.00002	APPROX. SCALE 1 " = 2,000 '
TITLE: Aerial Photograph			DATE: 05/2018
			EXHIBIT 2

Source of Data:

Aerial Photography: 2016 National Agriculture Inventory Program (NAIP) obtained from IU Spatial Data Portal (http://gis.iu.edu/)

Christopher B. Burke Engineering, LLC
PNC Center, Suite 1368 South
115 West Washington Street
Indianapolis, Indiana 46204
(t) 317.266.8000 (f) 317.632.3306

PROJECT: Lake Edgewood Dam 2018 Dam Safety Inspection	PROJECT NO. 14-0312.00002	APPROX. SCALE 1 " = 200 '
		DATE: 05/2018
TITLE: Inspection Summary		EXHIBIT 3

APPENDIX 1
IDNR DAM INSPECTION REPORT FORM
(May 10, 2018)

DRAFT

Print Form

SUGGESTED DAM INSPECTION REPORT (Refer to pages 5 and 6 for instructions.)

Name of Professional Conducting Inspection	Professional License No. (Indiana)
Aaron J. Fricke, P.E., Jeffrey D. Fox, P.E.	PE11100305, PE11100632
Business Address	**Phone:** (day) 317 - 266 - 8000
115 West Washington Street, Suite 1368, Indianapolis, IN 46204	(evening) 765 - 506 - 2472

Company Name: Christopher B. Burke Engineering, LLC

INSPECTION PREPARATION: Reviewed all pertinent technical documentation related to this dam and site in the State's and the Owner's files: Yes ☒ No ☐ Comment

MULTIDISCIPINARY:I am experienced in the technical disciplines or I am working with other professionals experienced in the technical disciplines to properly inspect this dam and appurtenant works. Technical disciplines, in additional to the general civil engineering, may include geotechnical, geological, hydrologic, structural, and mechanical. Yes ☒ No ☐ Comment

Dam Name	Quad.	Date of Inspection
Lake Edgewood Dam	Martinsville	05 / 10 / 2018

State Dam ID	Permit (if unapproved see pg. 6)	County	Sec.	T.	R.	Last Inspection
55-8	Docket# M-3128/FW-26139	Morgan	29	12 N	1 E	05 / 12 / 2016

Owners Name	Owner's Phone
Lake Edgewood Conservancy District	( )

Address/Zip Code: P.O. Box 1931, Martinsville, IN 46151

Contact's Name	Contact's Phone	Spillway Width	Ft. FBD.
Jennifer Staggs	(day) 765 - 349 - 9274 (evening) 765 - 349 - 9274	Top 70' Bot. 70'	4'

Hazard	Drainage Area	Surface Area	Height	Crest Length	Crest Width	Inlet Below Crest	Slope: Up / Down
High	0.9 MI^2	53 AC	29 FT	635 +/- FT	18 FT	4 FT	Up 3:1 (H:V) Down 3:1 (H:V)

FIELD CONDITIONS OBSERVED

Water Level - Below Dam Crest 4 Ft.

Ground Moisture Condition: Dry ☒ Wet ☐ Snowcover ☐ Other

DRAWDOWN STRUCTURE

☒ Yes ☐ None

Comment: 3-10" Wedge Gate Valves

MONITORING ☒ Yes ☐ None [☐ Gage Rod ☒ Piezometers ☐ Seepage Weirs ☐ Survey Monuments ☐ Other]

Comments: Two monitoring wells were located - one on the embankment crest and one on the downstream slope.

A UPSTREAM SLOPE

GOOD	☒
ACCEPTABLE	☐
DEFICIENT	☐
POOR	☐

PROBLEMS NOTED: ☐ (A-1) None ☐ (A-2) Riprap - Missing, Sparse, Displaced, Weathered ☒ (A-3) Wave Erosion-with Scarps ☐ (A-4) Cracks-with Displacement ☐ (A-5) Sinkhole ☐ (A-6) Appears Too Steep ☐ (A-7) Depressions or Bulges ☐ (A-8) Slides ☒ (A-9) Animal Burrows ☐ (A-10) Trees, Brush, Briars ☐ (A-11) Other

Comments:

A-3: Minor scarps (height of 6 in.) along the interface of riprap and grass along most of the embankment
A-9: Numerous Crawfish Burrows along slope

B CREST

GOOD	☒
ACCEPTABLE	☐
DEFICIENT	☐
POOR	☐

PROBLEMS NOTED: ☒ (B-1) None ☐ (B-2) Ruts or Puddles ☐ (B-3) Erosion ☐ (B-4) Cracks with Displacement ☐ (B-5) Sinkholes ☐ (B-6) Not Wide Enough ☐ (B-7) Low Area ☐ (B-8) Misalignment ☐ (B-9) Inadequate Surface Drainage ☐ (B-10) Trees, Brush, Briars ☐ (B-11) Other

Comments:

Spillway Width refers to the open channel (typically the emergency or auxiliary spillway) at the control section.
Ft. FBD. refers to the vertical distance from the emergency (auxiliary) spillway control section to the lowest point of the crest of the dam.
Inlet Below Crest refers to the vertical distance from the inlet of the principal spillway to the crest of the dam.

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C DOWNSTREAM SLOPE

GOOD	☒
ACCEPTABLE	☐
DEFICIENT	☐
POOR	☐

PROBLEMS NOTED: ☒ (C-1) None ☐ (C-2) Livestock Damage ☐ (C-3) Erosion or Gullies ☐ (C-4) Cracks with Displacement ☐ (C-5) Sinkholes ☐ (C-6) Appears too Steep ☐ (C-7) Depression or Bulges ☐ (C-8) Slide ☐ (C-9) Soft Areas ☐ (C-10) Trees, Brush, Briars ☐ (C-11) Animal Burrows ☐ (C-12)Other_____

Comments:

D SEEPAGE

GOOD (NONE)	☐
ACCEPTABLE	☒
DEFICIENT	☐
POOR	☐

PROBLEMS NOTED: ☐ (D-1) None ☐ (D-2) Saturated Embankment Area ☐ (D-3) Seepage Exits on Embankment ☐ (D-4) Seepage Exits at Point Source ☐ (D-5) Seepage Area at Toe ☐ (D-6) Flow Adjacent to Outlet ☐ (D-7) Seepage Clear/Muddy

[**DRAIN OUTFALLS SEEN**____No__X__Yes ☐ (D-8) Flow Clear/Muddy ☐ (D-9) Dry/Obstructed]

☒ (D-10) Other See below. Describe location of drains and indicate amount and quality of discharge.

Comments:

D-10: Located toe drain outlet under heavy vegetation growth
D-10: Cover on toe drain cleanout near the middle of the dam is cracked
D-10: Seating of the toe drain cleanout cover directly upstream of the toe drain outlet has been damaged such that the cover no longer securely fits; D-10: Wet area at downstream toe on left side appears to be surface runoff

E PRINCIPAL SPILLWAY

GOOD	☒
ACCEPTABLE	☐
DEFICIENT	☐
POOR	☐

DESCRIPTION: 70-foot wide, 61-foot deep, three-cycle labyrinth spillway with a reinforced concrete baffled chute

PROBLEMS NOTED: ☐ (E-1) None ☐ (E-2) Deterioration ☐ (E-3) Separation ☒ (E-4) Cracking ☐ (E-5) Inlet, Outlet Deficiency ☐ (E-6) Stilling Basin Inadequacies ☐ (E-7) Trash Rack ☒ (E-8) Other See below.

Comments:

E-4: Minor hairline cracks on slab, weir walls, and abutment walls
E-8: A few weeds growing in riprap near the base of the spillway chute

F AUXILIARY SPILLWAY

GOOD	☐
ACCEPTABLE	☐
DEFICIENT	☐
POOR	☐

DESCRIPTION: N/A

PROBLEMS NOTED: ☐ (F-1) None ☐ (F-2) No Auxiliary Spillway Found ☐ (F-3) Erosion-with Backcutting ☐ (F-4) Crack with Displacement ☐ (F-5) Appears to be Structurally Inadequate ☐ (F-6) Appears too Small ☐ (F-7) Inadequate Freeboard ☐ (F-8) Flow Obstructed ☐ (F-9) Concrete Deteriorated/Undermined ☐ (F-10) Other _____

Comments:

G MAINTENANCE AND REPAIRS

GOOD	☒
ACCEPTABLE	☐
DEFICIENT	☐
POOR	☐

PROBLEMS NOTED: ☐ (G-1) None ☐ (G-2) Access Road Needs Maintenance ☐ (G-3) Cattle Damage ☐ (G-4) Spillway Obstruction ☐ (G-5) Brush, Weeds, Tall Grass, on Upstream Slope, Crest, Downstream Slope, Toe ☐ (G-6) Trees on Upstream Slope, Crest, Downstream Slope ☐ (G-7) Rodent Activity on Upstream Slope, Crest, Downstream Slope, Toe ☐ (G-8) Deteriorated Concrete-Facing, Outlet, Spillway ☐ (G-9) Gate and/or Drawdown Need Repair ☐ (G-10) Other _____

Comments:

H OVERALL CONDITIONS

Based on this inspection and recent file review, the overall surficial condition is determined to be: ☒ (H-1) Satisfactory ☐ (H-2) Fair ☐ (H-3) Conditionally Poor ☐ (H-4) Poor ☐ (H-5) Unsatisfactory

IMPORTANT: IF THIS RATING IS DIFFERENT THAN PREVIOUS IDNR RATING, PLEASE ATTACH EXPLANATION AND REASONS FOR CHANGE ON PAGE 4.

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DAM NAME Lake Edgewood Dam STATE DAM I.D. 55-8 DATE 05 / 10 / 18

RECOMMENDATIONS AND ITEMS REQUIRING ACTION BY OWNER TO IMPROVE THE SAFETY OF THE DAM

MAINTENANCE-MINOR REPAIR-MONITORING

❒ (1) Provide Additional Erosion Protection: _____

❒ (2) Mow: _____

☒ (3) Clear Trees and/or Brush From: Around toe drain outlet.

❒ (4) Initiate Rodent Control Program and Properly Backfill Existing Holes: _____

☒ (5) Repair: Broken/damaged toe drain riser lids

❒ (6) Provide Surface Drainage For: _____

☒ (7) Monitor: Downstream toe of slope on the left side of the dam for potential seepage; cracks on spillway; scarping on US slope

☒ (8) Other: Remove/spray weeds in riprap areas; Monitor crawfish burrows

❒ (9) Other: _____

ENGINEERING-EMPLOY AN ENGINEER EXPERIENCED IN DESIGN AND CONSTRUCTION OF DAMS TO:

(Plans & Specifications must be approved by State prior to construction.)

❒ (10) Prepare Plans and Specifications for the Rehabilitation of the Dam: _____

❒ (11) Prepare As-Built Drawings of: _____

❒ (12) Perform a Geotechnical Investigation to Evaluate the Stability of the Dam: _____

❒ (13) Perform a Hydrologic Study to Determine Required Spillway Size: _____

❒ (14) Prepare Plans and Specifications for an Adequate Spillway: _____

❒ (15) Set up a Monitoring Program: _____

❒ (16) Refer to Unapproved Status of Dam: _____

❒ (17) Develop an Emergency Action Plan: _____

❒ (18) Other: _____

❒ (19) Other: _____

Recommended schedule for upgrades/comments (Please prioritize and note importance of each item.)

ITEM	SCHEDULE	IMPORTANCE
Remove vegetation around toe drain outlet	Immediately	Medium
Remove or spray weeds in riprap areas	Immediately	Low
Repair or replace broken/damaged toe drain riser lids	Within 1 year	Low
Monitor downstream toe of slope on the left side of the dam for potential seepage	Ongoing	Low
Monitor cracks on the principal spillway	Ongoing	Low
Monitor scarping on the upstream slope	Ongoing	Low
Monitor crawfish burrows on upstream slope	Ongoing	Low

Photographs ☒ Attachments ☒

ENGINEER'S INSTRUCTION Instructed owner on the safety concerns with the structure and how to monitor and inspect the dam and appurtenant works in the interim period between the regulatory two-year inspections. Yes ☒ No ❒

Comment

Professional Engineer's Signature _____ Date

Reviewed By _____ Date

Owner/Owner's Representative

DRAFT

EXPLANATION FOR CHANGE IN RATINGS (Describe all repairs, upgrades or improvements made if dam conditions and rating have improved since the last inspection. Describe deteriorating conditions if ratings have worsened.)

REASONS FOR RATING CHANGE:

Principal Spillway - The rating was changed from "Acceptable" to "Good" due to the cracked gate valve bonnets being replaced.

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PREVIOUS RECOMMENDATIONS FOR MAINTENANCE, REPAIRS, AND UPGRADES:

HAVE THEY BEEN PERFORMED ☒ YES ☒ NO (If no, please explain:)

The toe drain riser lids that were damaged were not replaced.

Heavy vegetative growth was not cleared around toe drain outlet.

Supporting Documentation

Photographs ☒ Attachments ☒ Calculations ❒ Drawings ❒ Other ❒

Comments:

INSTRUCTIONS FOR COMPLETING DAM VISUAL INSPECTION REPORT

1. Complete all items that are applicable; if not applicable, write in "N/A". For concrete dams, complete all applicable items and use "comments" section to cover items not included in the check boxes. Also indicate that the dam is concrete in the comments section.

2. Use page 6 to determine ratings of each dam component (items A through G) and for Overall Conditions (Item H).

3. Please write legibly and concisely.

4. Inspector must be knowledgeable with the type of dam, materials, and components being inspected. If not, qualified assistance shall be engaged.

5. The inspector shall review the dam owner's and IDNR project files prior to the inspection. Previous inspection reports shall be closely reviewed for previous problems and deficiencies.

6. If the ratings of the components (items A through G) or the Overall Conditions (item H) of the dam have changed since the last inspection, please complete page 4. If a rating has improved, dam repairs, improvements, analyses, or maintenance must have been performed and documented on page 4.

7. For a dam to have a satisfactory "Overall Conditions" rating, it must have no existing or potential dam safety deficiencies recognized. Safe performance is expected under all anticipated loading conditions, including infrequent hydrologic events (PMP for high hazard dams) and seismic events. The dam owner's project files must contain hydrologic and hydraulic analyses of the dam and its spillways to verify performance. The files must also contain slope stability analyses to verify embankment stability under full reservoir conditions and rapid-draw down conditions. The dam and all of its components must meet current IDNR and design standards. "Normal" deficiencies such as minor erosion, minor seepage, or normal concrete aging may not make a dam unsatisfactory or unacceptable. For a satisfactory "Overall Conditions" rating to be assigned, items A through G generally should all have a "good" rating; however, in some cases an "acceptable" rating may be satisfactory if the "Problems Noted" are minor, or "normal" conditions, such as minor erosion rills, small puddles on crest, or if grass needs mowed, but is in good condition.

8. An inspection report form must be submitted to IDNR along with a formal technical inspection report as described in Chapter 4.0 of Part 3 of the Indiana Dam Safety Inspection Manual.

9. Please sign and date this page in the space below to verify that you have read and understand these instructions.

DRAFT

Inspector's Signature: _____ Date: _____

GUIDELINES FOR DETERMINING CONDITIONS

CONDITIONS OBSERVED - APPLIES TO UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, PRINCIPAL SPILLWAY, AUXILIARY SPILLWAY

GOOD	ACCEPTABLE	DEFICIENT	POOR
In general, this part of the structure has a good appearance, and conditions observed in this area do not appear to threaten the safety of the dam.	Although general cross-section is maintained, surfaces may be irregular, eroded, rutted, spalled, or otherwise not in new condition. Conditions in this area do not currently appear to threaten the safety of the dam.	Continued deterioration and/or unusual loading may threaten the safety of the dam.	Conditions observed in this area appear to threaten the safety of the dam. Conditions observed in this area are unacceptable.

CONDITIONS OBSERVED - APPLIES TO SEEPAGE

GOOD (NONE)	ACCEPTABLE	DEFICIENT	POOR
No evidence of uncontrolled seepage. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions do not appear to threaten the safety of the dam.	Some seepage exists at areas other than the drain outfalls, or other designed drains. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions observed do not currently appear to threaten the safety of the dam.	Excessive seepage exists at areas other than drain outfalls and other designed drains. Seepage needs to be evaluated. Increased flow and/or continued deterioration in seepage conditions may threaten the safety of the dam.	Excessive seepage conditions observed appear to threaten the safety of the dam and is unacceptable. Examples: 1) Designed drain or seepage flows have increased without increase in reservoir level. 2) Drain or seepage flows contain sediment. i.e., muddy water or particles in jar samples. 3) Widespread seepage, concentrated seepage or ponding appears to threaten the safety of the dam.

CONDITIONS OBSERVED - APPLIES TO MAINTENANCE AND REPAIR

GOOD	ACCEPTABLE	DEFICIENT	POOR
Dam appears to receive effective on-going maintenance and repair, and only a few minor items may need to be addressed.	Dam appears to receive maintenance, but some maintenance items need to be addressed. No major repairs are required.	Level of maintenance of the dam needs significant improvement. Major repairs may be required. Continued neglect of maintenance may threaten the safety of the dam.	Dam does not receive adequate maintenance. One or more items needing maintenance or repair has begun to threaten the safety of the dam. Level of maintenance is unacceptable.

OVERALL CONDITIONS

SATISFACTORY - No existing or potential dam safety deficiencies recognized. Safe performance is expected under all anticipated loading conditions, including such events as infrequent hydrologic and/or seismic events. Project Files contain necessary hydrologic, and other engineering calculations to verify dam safety and performance.

FAIR - No existing dam safety deficiencies are recognized for normal loading conditions. Infrequent hydrologic and/or seismic events would probably result in a dam safety deficiency.

CONDITIONALLY POOR - A potential safety deficiency is recognized for unusual loading conditions which may realistically occur during the expected life of the structure. CONDITIONALLY POOR may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency; further investigations and studies are necessary.

POOR - A potential dam safety deficiency is clearly recognized for normal loading conditions. Immediate actions to resolve the deficiency are recommended; reservoir restrictions may be necessary until problem resolution.

UNSATISFACTORY - A dam safety deficiency exists for normal conditions. Immediate remedial action is required for problem resolution.

HAZARD CLASSIFICATIONS OF DAMS (STRUCTURE)

LOW HAZARD- A structure the failure of which may damage farm buildings, agricultural land, or local roads

SIGNIFICANT HAZARD- A structure the failure of which may damage isolated homes and highways, or cause the temporary interruption of public utility services.

HIGH HAZARD-A structure the failure of which may cause the loss of life and serious damage to homes, industrial and commercial buildings, public utilities, major highways, or railroads.

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UNAPPROVED STATUS OF DAM

A dam that has been given an unapproved status (see entry for permit) means that plans, construction specifications, hydraulic analyses, and/or a geotechnical investigation on your dam, proving the safety of the structure, have not been received and approved by the Indiana Department of Natural Resources (IDNR). IDNR records indicate that no progress has been made to secure this approval. The fact that the dam is inspected under the Regulation of Dams Act (IC 14-27-7.5) in no way alters the illegal status of the structures.

If your dam is indicated to be unapproved, it is requested that your engineer contact the Indiana Department of Natural Resources,

APPENDIX 2
PREVIOUS IDNR INSPECTION REPORT FORM
(May 12, 2016)

DRAFT

Print Form

SUGGESTED DAM INSPECTION REPORT (Refer to pages 5 and 6 for instructions.)

Name of Professional Conducting Inspection	Professional License No. (Indiana)
Aaron J. Fricke, P.E., David R. Haas, P.E.	PE11100305, PE10911246
Business Address	**Phone:** (day) 317 - 266 - 8000
115 West Washington Street, Suite 1368, Indianapolis, IN 46204	(evening) 765 - 506 - 2472

Company Name: Christopher B. Burke Engineering, LLC

INSPECTION PREPARATION: Reviewed all pertinent technical documentation related to this dam and site in the State's and the Owner's files: Yes ☒ No ☐ Comment

MULTIDISCIPINARY:I am experienced in the technical disciplines or I am working with other professionals experienced in the technical disciplines to properly inspect this dam and appurtenant works. Technical disciplines, in additional to the general civil engineering, may include geotechnical, geological, hydrologic, structural, and mechanical. Yes ☒ No ☐ Comment

Dam Name	Quad.	Date of Inspection
Lake Edgewood Dam	Martinsville	05 / 12 / 2016

State Dam ID	Permit (if unapproved see pg. 6)	County	Sec.	T.	R.	Last Inspection
55-8	Docket# M-3128/FW-26139	Morgan	29	12 N	1 E	05 / 13 / 2014

Owners Name	Owner's Phone
Lake Edgewood Conservancy District	( )

Address/Zip Code: P.O. Box 1931, Martinsville, IN 46151

Contact's Name	Contact's Phone	Spillway Width	Ft. FBD.
John Dotson	(day) 765 - 318 - 0709 (evening) 765 - 318 - 0709	Top 70' Bot. 70'	4'

Hazard	Drainage Area	Surface Area	Height	Crest Length	Crest Width	Inlet Below Crest	Slope
High	0.9 MI^2	53 AC	29 FT	635 +/- FT	18 FT	4 FT	Up 3:1 (H:V) Down 3:1 (H:V)

FIELD CONDITIONS OBSERVED

Water Level - Below Dam Crest 4 Ft.

Ground Moisture Condition: Dry ☒ Wet ☐ Snowcover ☐ Other

DRAWDOWN STRUCTURE

☒ Yes ☐ None

Comment: 3-10" Wedge Gate Valves

MONITORING ☒ Yes ☐ None [☐ Gage Rod ☒ Piezometers ☐ Seepage Weirs ☐ Survey Monuments ☐ Other]

Comments: Two monitoring wells were located - one on the embankment crest and one on the downstream slope.

A UPSTREAM SLOPE

GOOD	☒
ACCEPTABLE	☐
DEFICIENT	☐
POOR	☐

PROBLEMS NOTED: ☐ (A-1) None ☐ (A-2) Riprap - Missing, Sparse, Displaced, Weathered ☒ (A-3) Wave Erosion-with Scarps ☐ (A-4) Cracks-with Displacement ☐ (A-5) Sinkhole ☐ (A-6) Appears Too Steep ☐ (A-7) Depressions or Bulges ☐ (A-8) Slides ☐ (A-9) Animal Burrows ☐ (A-10) Trees, Brush, Briars ☐ (A-11) Other

Comments:

A-3: Minor scarps (height less than 6 in.) along the interface of riprap and grass along most of the embankment

B CREST

GOOD	☒
ACCEPTABLE	☐
DEFICIENT	☐
POOR	☐

PROBLEMS NOTED: ☒ (B-1) None ☐ (B-2) Ruts or Puddles ☐ (B-3) Erosion ☐ (B-4) Cracks with Displacement ☐ (B-5) Sinkholes ☐ (B-6) Not Wide Enough ☐ (B-7) Low Area ☐ (B-8) Misalignment ☐ (B-9) Inadequate Surface Drainage ☐ (B-10) Trees, Brush, Briars ☐ (B-11) Other

Comments:

Spillway Width refers to the open channel (typically the emergency or auxiliary spillway) at the control section.
Ft. FBD. refers to the vertical distance from the emergency (auxiliary) spillway control section to the lowest point of the crest of the dam.
Inlet Below Crest refers to the vertical distance from the inlet of the principal spillway to the crest of the dam.

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C DOWNSTREAM SLOPE

GOOD	☒
ACCEPTABLE	☐
DEFICIENT	☐
POOR	☐

PROBLEMS NOTED: ☒ (C-1) None ☐ (C-2) Livestock Damage ☐ (C-3) Erosion or Gullies ☐ (C-4) Cracks with Displacement ☐ (C-5) Sinkholes ☐ (C-6) Appears too Steep ☐ (C-7) Depression or Bulges ☐ (C-8) Slide ☐ (C-9) Soft Areas ☐ (C-10) Trees, Brush, Briars ☐ (C-11) Animal Burrows ☐ (C-12)Other_____
Comments:

D SEEPAGE

GOOD (NONE)	☐
ACCEPTABLE	☒
DEFICIENT	☐
POOR	☐

PROBLEMS NOTED: ☐ (D-1) None ☐ (D-2) Saturated Embankment Area ☐ (D-3) Seepage Exits on Embankment ☐ (D-4) Seepage Exits at Point Source ☐ (D-5) Seepage Area at Toe ☐ (D-6) Flow Adjacent to Outlet ☐ (D-7) Seepage Clear/Muddy
[**DRAIN OUTFALLS SEEN** X No ___ Yes ☐ (D-8) Flow Clear/Muddy ☐ (D-9) Dry/Obstructed]
☒ (D-10) Other See below. Describe location of drains and indicate amount and quality of discharge.
Comments:

D-10: Unable to locate toe drain outlet due to heavy vegetative growth
D-10: Cover on toe drain cleanout near the middle of the dam is cracked
D-10: Seating of the toe drain cleanout cover directly upstream of the toe drain outlet has been damaged such that the cover no longer securely fits; D-10: Wet area at downstream toe on left side appears to be surface runoff

E PRINCIPAL SPILLWAY

GOOD	☐
ACCEPTABLE	☒
DEFICIENT	☐
POOR	☐

DESCRIPTION: 70-foot wide, 61-foot deep, three-cycle labyrinth spillway with a reinforced concrete baffled chute

PROBLEMS NOTED: ☐ (E-1) None ☐ (E-2) Deterioration ☐ (E-3) Separation ☒ (E-4) Cracking ☐ (E-5) Inlet, Outlet Deficiency ☐ (E-6) Stilling Basin Inadequacies ☐ (E-7) Trash Rack ☒ (E-8) Other See below.
Comments:

E-4: Minor hairline cracks on slab, weir walls, and abutment walls
E-8: A few weeds growing in riprap near the base of the spillway chute
E-8: The center and right gate valve bonnets are cracked.

F AUXILIARY SPILLWAY

GOOD	☐
ACCEPTABLE	☐
DEFICIENT	☐
POOR	☐

DESCRIPTION: N/A

PROBLEMS NOTED: ☐ (F-1) None ☐ (F-2) No Auxiliary Spillway Found ☐ (F-3) Erosion-with Backcutting ☐ (F-4) Crack with Displacement ☐ (F-5) Appears to be Structurally Inadequate ☐ (F-6) Appears too Small ☐ (F-7) Inadequate Freeboard ☐ (F-8) Flow Obstructed ☐ (F-9) Concrete Deteriorated/Undermined ☐ (F-10) Other _____
Comments:

G MAINTENANCE AND REPAIRS

GOOD	☒
ACCEPTABLE	☐
DEFICIENT	☐
POOR	☐

PROBLEMS NOTED: ☐ (G-1) None ☐ (G-2) Access Road Needs Maintenance ☐ (G-3) Cattle Damage ☐ (G-4) Spillway Obstruction ☐ (G-5) Brush, Weeds, Tall Grass, on Upstream Slope, Crest, Downstream Slope, Toe ☐ (G-6) Trees on Upstream Slope, Crest, Downstream Slope ☐ (G-7) Rodent Activity on Upstream Slope, Crest, Downstream Slope, Toe ☐ (G-8) Deteriorated Concrete-Facing, Outlet, Spillway ☐ (G-9) Gate and/or Drawdown Need Repair ☐ (G-10) Other _____
Comments:

H OVERALL CONDITIONS

Based on this inspection and recent file review, the overall surficial condition is determined to be: ☒ (H-1) Satisfactory ☐ (H-2) Fair ☐ (H-3) Conditionally Poor ☐ (H-4) Poor ☐ (H-5) Unsatisfactory

IMPORTANT: IF THIS RATING IS DIFFERENT THAN PREVIOUS IDNR RATING, PLEASE ATTACH EXPLANATION AND REASONS FOR CHANGE ON PAGE 4.

DRAFT

DAM NAME Lake Edgewood Dam STATE DAM I.D. 55-8 DATE 05 / 12 / 16

RECOMMENDATIONS AND ITEMS REQUIRING ACTION BY OWNER TO IMPROVE THE SAFETY OF THE DAM

MAINTENANCE-MINOR REPAIR-MONITORING

- ☐ (1) Provide Additional Erosion Protection: _____
- ☐ (2) Mow: _____
- ☒ (3) Clear Trees and/or Brush From: around toe drain outlet.
- ☐ (4) Initiate Rodent Control Program and Properly Backfill Existing Holes: _____
- ☒ (5) Repair: or replace gate valve bonnets and broken/damaged toe drain riser lids
- ☐ (6) Provide Surface Drainage For: _____
- ☒ (7) Monitor: Downstream toe of slope on the left side of the dam for potential seepage; cracks on spillway; scarping on US slope
- ☒ (8) Other: Remove/spray weeds in riprap areas
- ☐ (9) Other: _____

ENGINEERING-EMPLOY AN ENGINEER EXPERIENCED IN DESIGN AND CONSTRUCTION OF DAMS TO:

(Plans & Specifications must be approved by State prior to construction.)

- ☐ (10) Prepare Plans and Specifications for the Rehabilitation of the Dam: _____
- ☐ (11) Prepare As-Built Drawings of: _____
- ☐ (12) Perform a Geotechnical Investigation to Evaluate the Stability of the Dam: _____
- ☐ (13) Perform a Hydrologic Study to Determine Required Spillway Size: _____
- ☐ (14) Prepare Plans and Specifications for an Adequate Spillway: _____
- ☐ (15) Set up a Monitoring Program: _____
- ☐ (16) Refer to Unapproved Status of Dam: _____
- ☐ (17) Develop an Emergency Action Plan: _____
- ☐ (18) Other: _____
- ☐ (19) Other: _____

Recommended schedule for upgrades/comments (Please prioritize and note importance of each item.)

ITEM	SCHEDULE	IMPORTANCE
Repair or replace cracked gate valve bonnets (or entire valves if warranted)	Within 1 year	High
Remove vegetation around toe drain outlet.	Immediately	Medium
Remove or spray weeds in riprap areas .	Immediately	Low
Repair or replace broken/damaged toe drain riser lids	Within 2 years	Low
Monitor downstream toe of slope on the left side of the dam for potential seepage.	Ongoing	Low
Monitor cracks on the principal spillway.	Ongoing	Low
Monitor scarping on the upstream slope.	Ongoing	Low

Photographs ☒ Attachments ☒

ENGINEER'S INSTRUCTION Instructed owner on the safety concerns with the structure and how to monitor and inspect the dam and appurtenant works in the interim period between the regulatory two-year inspections. Yes ☒ No ☐

Comment

Professional Engineer's Signature Aaron J. Fricke Date 10/25/16

Reviewed By Alex Bigley, Vice Chair, Lake Edgewood Commission Date 6/24/16
Owner/Owner's Representative

DRAFT

EXPLANATION FOR CHANGE IN RATINGS (Describe all repairs, upgrades or improvements made if dam conditions and rating have improved since the last inspection. Describe deteriorating conditions if ratings have worsened.)

REASONS FOR RATING CHANGE:

Seepage - The rating was changed from "Good" to "Acceptable" since the toe drain outlet was not located due to dense vegetative growth.

Principal Spillway - The rating was changed from "Good" to "Acceptable" due to the cracked gate valve bonnets.

DRAFT

PREVIOUS RECOMMENDATIONS FOR MAINTENANCE, REPAIRS, AND UPGRADES:

HAVE THEY BEEN PERFORMED ☒ YES ❒ NO (If no, please explain:)

Supporting Documentation

Photographs ☒ Attachments ☒ Calculations ❒ Drawings ❒ Other ❒

Comments:

INSTRUCTIONS FOR COMPLETING DAM VISUAL INSPECTION REPORT

1. Complete all items that are applicable; if not applicable, write in "N/A". For concrete dams, complete all applicable items and use "comments" section to cover items not included in the check boxes. Also indicate that the dam is concrete in the comments section.

2. Use page 6 to determine ratings of each dam component (items A through G) and for Overall Conditions (Item H).

3. Please write legibly and concisely.

4. Inspector must be knowledgeable with the type of dam, materials, and components being inspected. If not, qualified assistance shall be engaged.

5. The inspector shall review the dam owner's and IDNR project files prior to the inspection. Previous inspection reports shall be closely reviewed for previous problems and deficiencies.

6. If the ratings of the components (items A through G) or the Overall Conditions (item H) of the dam have changed since the last inspection, please complete page 4. If a rating has improved, dam repairs, improvements, analyses, or maintenance must have been performed and documented on page 4.

7. For a dam to have a satisfactory "Overall Conditions" rating, it must have no existing or potential dam safety deficiencies recognized. Safe performance is expected under all anticipated loading conditions, including infrequent hydrologic events (PMP for high hazard dams) and seismic events. The dam owner's project files must contain hydrologic and hydraulic analyses of the dam and its spillways to verify performance. The files must also contain slope stability analyses to verify embankment stability under full reservoir conditions and rapid-draw down conditions. The dam and all of its components must meet current IDNR and design standards. "Normal" deficiencies such as minor erosion, minor seepage, or normal concrete aging may not make a dam unsatisfactory or unacceptable. For a satisfactory "Overall Conditions" rating to be assigned, items A through G generally should all have a "good" rating; however, in some cases an "acceptable" rating may be satisfactory if the "Problems Noted" are minor, or "normal" conditions, such as minor erosion rills, small puddles on crest, or if grass needs mowed, but is in good condition.

8. An inspection report form must be submitted to IDNR along with a formal technical inspection report as described in Chapter 4.0 of Part 3 of the Indiana Dam Safety Inspection Manual.

9. Please sign and date this page in the space below to verify that you have read and understand these instructions.

DRAFT

Inspector's Signature: Aaron J. Fricke Date: 10/25/16

GUIDELINES FOR DETERMINING CONDITIONS

CONDITIONS OBSERVED - APPLIES TO UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, PRINCIPAL SPILLWAY, AUXILIARY SPILLWAY

GOOD	ACCEPTABLE	DEFICIENT	POOR
In general, this part of the structure has a good appearance, and conditions observed in this area do not appear to threaten the safety of the dam.	Although general cross-section is maintained, surfaces may be irregular, eroded, rutted, spalled, or otherwise not in new condition. Conditions in this area do not currently appear to threaten the safety of the dam.	Continued deterioration and/or unusual loading may threaten the safety of the dam.	Conditions observed in this area appear to threaten the safety of the dam. Conditions observed in this area are unacceptable.

CONDITIONS OBSERVED - APPLIES TO SEEPAGE

GOOD (NONE)	ACCEPTABLE	DEFICIENT	POOR
No evidence of uncontrolled seepage. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions do not appear to threaten the safety of the dam.	Some seepage exists at areas other than the drain outfalls, or other designed drains. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions observed do not currently appear to threaten the safety of the dam.	Excessive seepage exists at areas other than drain outfalls and other designed drains. Seepage needs to be evaluated. Increased flow and/or continued deterioration in seepage conditions may threaten the safety of the dam.	Excessive seepage conditions observed appear to threaten the safety of the dam and is unacceptable. Examples: 1) Designed drain or seepage flows have increased without increase in reservoir level. 2) Drain or seepage flows contain sediment. i.e., muddy water or particles in jar samples. 3) Widespread seepage, concentrated seepage or ponding appears to threaten the safety of the dam.

CONDITIONS OBSERVED - APPLIES TO MAINTENANCE AND REPAIR

GOOD	ACCEPTABLE	DEFICIENT	POOR
Dam appears to receive effective on-going maintenance and repair, and only a few minor items may need to be addressed.	Dam appears to receive maintenance, but some maintenance items need to be addressed. No major repairs are required.	Level of maintenance of the dam needs significant improvement. Major repairs may be required. Continued neglect of maintenance may threaten the safety of the dam.	Dam does not receive adequate maintenance. One or more items needing maintenance or repair has begun to threaten the safety of the dam. Level of maintenance is unacceptable.

OVERALL CONDITIONS

SATISFACTORY - No existing or potential dam safety deficiencies recognized. Safe performance is expected under all anticipated loading conditions, including such events as infrequent hydrologic and/or seismic events. Project Files contain necessary hydrologic, and other engineering calculations to verify dam safety and performance.

FAIR - No existing dam safety deficiencies are recognized for normal loading conditions. Infrequent hydrologic and/or seismic events would probably result in a dam safety deficiency.

CONDITIONALLY POOR - A potential safety deficiency is recognized for unusual loading conditions which may realistically occur during the expected life of the structure. CONDITIONALLY POOR may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency; further investigations and studies are necessary.

POOR - A potential dam safety deficiency is clearly recognized for normal loading conditions. Immediate actions to resolve the deficiency are recommended; reservoir restrictions may be necessary until problem resolution.

UNSATISFACTORY - A dam safety deficiency exists for normal conditions. Immediate remedial action is required for problem resolution.

HAZARD CLASSIFICATIONS OF DAMS (STRUCTURE)

LOW HAZARD- A structure the failure of which may damage farm buildings, agricultural land, or local roads

SIGNIFICANT HAZARD- A structure the failure of which may damage isolated homes and highways, or cause the temporary interruption of public utility services.

HIGH HAZARD-A structure the failure of which may cause the loss of life and serious damage to homes, industrial and commercial buildings, public utilities, major highways, or railroads.

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UNAPPROVED STATUS OF DAM

A dam that has been given an unapproved status (see entry for permit) means that plans, construction specifications, hydraulic analyses, and/or a geotechnical investigation on your dam, proving the safety of the structure, have not been received and approved by the Indiana Department of Natural Resources (IDNR). IDNR records indicate that no progress has been made to secure this approval. The fact that the dam is inspected under the Regulation of Dams Act (IC 14-27-7.5) in no way alters the illegal status of the structures.

If your dam is indicated to be unapproved, it is requested that your engineer contact the Indiana Department of Natural Resources,

APPENDIX 3
INSPECTION PHOTOGRAPHS
(May 10, 2018)

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Top:	Upstream slope from left side. Note minor scarp at the interface of riprap and grass along entire slope.
Bottom:	Upstream slope from right side.

Top:	Upstream slope crawfish burrow. Note burrows identified along entire slope with max depth of 50 inches.
Bottom:	Upstream slope crawfish burrow. Note burrows identified along entire slope with max depth of 50 inches.

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Top:	Dam crest from left side.
Bottom:	Dam crest from right side.

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Top:	Downstream slope from left side. Note uniform slope and adequate grass growth.
Bottom:	Downstream slope from right side. Note uniform slope and adequate grass growth.

Top:	Downstream slope near left abutment. Note wet area which appears to be the result of surface runoff.
Bottom:	Downstream slope near middle of embankment. Note damaged toe drain cleanout cover.

Top:	Downstream slope (directly upstream of toe drain outlet). Note damaged cleanout with cover not fitting securely.
Bottom:	Downstream slope toe drain outlet.

Top:	Principal spillway baffled chute. Note adequate riprap protection in downstream portion.
Bottom:	Principal spillway labyrinth weir. Note lake level at normal pool at time of inspection.

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Top:	Principal spillway labyrinth weir. Note lake level at normal pool at time of inspection.
Bottom:	Debris boom immediately upstream of principal spillway.

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Top:	Principal spillway right abutment. Note area is armored with riprap.
Bottom:	Principal spillway labyrinth weir walls with pressure relief valve on slab.

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Top:	Principal spillway labyrinth weir walls. Note good condition of concrete.
Bottom:	Principal spillway right gate valve. Note operation of valve was performed at time of inspection.

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Top:	Principal spillway labyrinth weir wall and left spillway abutment wall. Note good condition of concrete.
Bottom:	Principal spillway left gate valve. Note operation of valve was performed at time of inspection.

	Principal spillway middle gate valve. Note operation of valve was performed at time of inspection.

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APPENDIX 4
DAM INSPECTION CHECKLIST
(May 10, 2018)

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Dam Safety Inspection Checklist

Complete All Portions of This Section (Pre-inspection)
Date of Inspection: May 16th, 2018
Name of Dam: Lake Edgewood dam File Number: 55-8
EAP: (yes, no) OM&I: (yes, no)

Review Inventory - Highlight missing information (Pre -inspection)
Owner=s Name(s): Lake Edgewood Conservacy District
Address: P.O. Box 1931
City: Martinsville State: IN Zip (+4): 46151

Telephone (Home): — Telephone (Work): —
Contact Person: Jen Slaggs Telephone: 765-349-9274
Designed By: Rehab Design by CBBEL
Constructed By: Rehab constructed by RL Turner Corporation
Year Completed: 1959 (original), 2012 (Rehab) Plans Available (Yes, No) (location):
Purpose of dam: Recreation

Interview with Owner (at the site):
Owner/Representative present: (Yes, No) Name(s): Jen Slaggs and other representatives

Double check address, telephone #, purpose (check ->) G
How long have you owned dam - previous name/owner?

EAP/OM&I: up-dated-(yes, no) & location:
Operate lake drain (times per year, accessibility): Operated once a year and during inspection

Mowing (times per year): Mowed biweekly, Weed treatment twice a year
Prior problems (wet areas, erosion, slides): There have been no major problems since the Dam has been rehabilitated

Repair or modification (what & when): The dam was rehabilitated in 2011 and 2012. The scope of work included replacement of the existing principal spillway, flattening the downstream embankment slope, and installation of a toe drain.

Failure/Incident/Breach (max. pool): No major incidents or failures since the dam was re habilitated

Downstream hazard status (recent changes): This is a high hazard dam

Do you know the in-depth details of the construction of your dam? (If yes - ask next three questions, if no - go to Field Information Section)
Core trench material and location: —
Volume of fill (earth or rock) in dam: —
Foundation (earth or rock) of dam: —

Field Information (while at site)
Pool Elevation (during inspection): Normal Pool Time: 9:00 (a.m. p.m.)
Site Conditions(temp., weather, ground moisture): 61°, sunny, dry

Inspection Party: Aaron J. Tricke and Jeffrey Fox
Maximum Height: 29 Ft (measured or inventory appears correct)
Normal Pool Surface Area: 53 Ac (measured or inventory appears correct)

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UPSTREAM SLOPE

Gradient: Horizontal: 3 Vertical: 1 (est, meas.)

Required Action: None | Monitor | Maintenance | Engineer

☐ ***VEGETATION*** [no problem]

- ☐ Trees: Quantity: (<5, sparse, dense) — ☑ ☐ ☐ ☐
  Diameter: (<6", 6-12", >12")
  Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
  Notes:
- ☐ Brush: Quantity: (sparse, dense) — ☑ ☐ ☐ ☐
  Location:(adj. to structure, entire slope, lt end, rt end, middle, see dwg)
  Notes:
- ☐ Ground Cover: Type:(grass, crown vetch) Other: — ☑ ☐ ☐ ☐
  Quantity: (bare, sparse, adequate, dense)
  Appearance: (too tall, too short, good))
  Notes:

☑ ***SLOPE PROTECTION*** [no problem, could not inspect thoroughly]

- ☐ None — ☐ ☐ ☐ ☐
- ☐ Riprap: Average Diameter: 9" ± — ☐ ☐ ☐ ☐
  (adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no)
  Notes:
- ☐ Wave Berm: — ☑ ☐ ☐ ☐
  Vegetation: (adequate, bare, sparse, improper vegetation)
  Notes:
- ☐ Concrete Slabs: (cracked, settlement, undermined, voids, deteriorated, vegetation) — ☑ ☐ ☐ ☐
  Notes:
- ☐ Other: — ☑ ☐ ☐ ☐
  Notes:

☐ ***EROSION*** [no problem, could not inspect thoroughly]

- ☐ Wave Erosion (Beaching): Scarp: Length: Height: — ☐ ☑ ☐ ☐
  Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
  Notes: Top of riprap
- ☐ Runoff Erosion (Gullies): Quantity: — ☑ ☐ ☐ ☐
  Depth: Width: Length:
  Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
  Notes/Causes:

☑ ***INSTABILITIES*** [no problem, could not inspect thoroughly]

- ☐ Slides: Transverse Length: Longitudinal Length: — ☐ ☐ ☐ ☐
  Scarp: Width: Length:
  Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
  Crack: Width: Depth:
  Notes/Causes
- ☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other — ☐ ☐ ☐ ☐
  Quantity: Length: Width: Depth:
  Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
  Notes/Causes:

DRAFT

None | Monitor | Maintenance | Engineer
Required Action

Required Action

None | Monitor | Maintenance | Engineer

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other ☑ ☐ ☐ ☐
Quantity: Length: Width: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☐ Bulges ☐ Depressions ☐ Hummocky ☑ ☐ ☐ ☐
Size: Height: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☐ Bulges ☐ Depressions ☐ Hummocky ☑ ☐ ☐ ☐
Size: Height: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☑ ***OTHER*** [no problem, could not inspect thoroughly]
☑ Rodent Burrows: (few, numerous) ☐ ☐ ☐ ☐
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes: Appear to be [illegible]

☐ Ruts: ☑ ☐ ☐ ☐
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Depth: Width Length:
Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian)

☐ Other: ☑ ☐ ☐ ☐
Notes:

DRAFT

CREST Length: 6[illegible] Width: [illegible] (est, meas.)

☑ ***VEGETATION*** [no problem]
☐ Trees: Quantity: (<5, sparse, dense) ☑ ☐ ☐ ☐
Diameter: (<6", 6-12", >12")
Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)
Notes:

☐ Brush: Quantity: (sparse, dense) ☑ ☐ ☐ ☐
Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)
Notes:

☑ Ground Cover: Type: (grass, crown vetch) Other: ☑ ☐ ☐ ☐
Quantity: (bare, sparse, adequate, dense)
Appearance: (too tall, too short, good)
Notes:

☑ ***EROSION*** [no problem, could not inspect thoroughly]
☐ Runoff Erosion (Gullies): Quantity: Depth: Width: Length: ☑ ☐ ☐ ☐
Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)
Notes/Causes:

None | Monitor | Maintenance | Engineer

Required Action

Required Action

None Monitor Maintenance Engineer

☑ ***ALIGNMENT*** [no problem, could not inspect thoroughly]

☐ Vertical: ☐ Low Area: ☑ ☐ ☐ ☐

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Elevation Difference: Length:

Notes/Causes:

☑ ☐ ☐ ☐

☐ Horizontal:

Notes/Causes:

☐ ***WIDTH*** [no problem]

☐ Too Narrow ☑ ☐ ☐ ☐

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes/Causes:

☑ ***INSTABILITIES*** [no problem, could not inspect thoroughly]

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other ☑ ☐ ☐ ☐

Quantity: Length: Width: Depth:

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes/Causes:

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other ☑ ☐ ☐ ☐

Quantity: Length: Width: Depth:

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes/Causes:

☐ Bulges ☐ Depressions ☐ Hummocky ☑ ☐ ☐ ☐

Size: Height: Depth:

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes/Causes:

☐ Bulges ☐ Depressions ☐ Hummocky ☑ ☐ ☐ ☐

Size: Height: Depth:

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes/Causes:

☐ ***OTHER*** [no problem, could not inspect thoroughly]

☐ Rodent Burrows: (few, numerous) ☑ ☐ ☐ ☐

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes:

☐ Ruts: ☑ ☐ ☐ ☐

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Depth: Width Length:

Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian)

☐ Other: ☑ ☐ ☐ ☐

Notes:

None Monitor Maintenance Engineer

Required Action

DRAFT

Required Action

DOWNSTREAM SLOPE Gradient: Horizontal: 3 Vertical: 1 (est, meas.)

None Monitor Maintenance Engineer

☑ ***VEGETATION*** [no problem]

☐ Trees: Quantity: (<5, sparse, dense)
Diameter: (<6", 6-12", >12")
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes:

☑ ☐ ☐ ☐

☐ Brush: Quantity: (sparse, dense)
Location:(adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes:

☑ ☐ ☐ ☐

☐ Ground Cover: Type: (grass, crown vetch) Other:
Quantity: (bare, sparse, adequate, dense)
Appearance: (too tall, too short, good)
Notes:

☑ ☐ ☐ ☐

☑ ***EROSION*** [no problem, could not inspect thoroughly]

☐ Runoff Erosion (Gullies): Quantity: Depth: Width: Length:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☑ ☐ ☐ ☐

☑ ***INSTABILITIES*** [no problem, could not inspect thoroughly]

☐ Slides: Transverse Length: Longitudinal Length:
Scarp: Width: Length:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Crack: Width: Depth:
Notes/Causes

☑ ☐ ☐ ☐

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other
Quantity: Length: Width: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☑ ☐ ☐ ☐

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other
Quantity: Length: Width: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☑ ☐ ☐ ☐

☐ Bulges ☐ Depressions ☐ Hummocky
Size: Height: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☑ ☐ ☐ ☐

☐ Bulges ☐ Depressions ☐ Hummocky
Size: Height: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☑ ☐ ☐ ☐

None Monitor Maintenance Engineer

Required Action

DRAFT

Required Action

None | Monitor | Maintenance | Engineer

☑ ***OTHER*** [no problem, could not inspect thoroughly] ☑ ☐ ☐ ☐

☐ Rodent Burrows: (few, numerous)
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes:

☐ Ruts: ☑ ☐ ☐ ☐
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Depth: Width Length:
Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian)

☐ Other: ☑ ☐ ☐ ☐
Notes:

☑ ***SEEPAGE*** [no problem, could not inspect thoroughly]

☑ Wet Area ☐ Flow ☐ Boil ☐ Sinkhole ☐ ☑ ☐ ☐
Flow Rate — Size: 20' x 35'
Location: Left abutment
☐ Aquatic Vegetation ☐ None
☐ Rust Colored Deposits ☐ None
☐ Sediment in Flow ☐ None
☐ Other:
Notes/Causes: 20'x35' appears to be local runoff from the road and dam

☐ Wet Area ☐ Flow ☐ Boil ☐ Sinkhole ☐ ☐ ☐ ☐
Flow Rate Size:
Location:
☐ Aquatic Vegetation ☐ None
☐ Rust Colored Deposits ☐ None
☐ Sediment in Flow ☐ None
☐ Other:
Notes/Causes:

☑ ***EMBANKMENT DRAINS*** [none, none found, no problem, could not inspect thoroughly]
Type: ☑ Toe Drain ☐ Relief Wells ☐ Other: ☐ ☐ ☑ ☐
Flow Rate: — Size: 6" Number:
Location: Right side of Dam, DS slope
Notes: clear vegatation at outlet

☑ ***MONITORING INSTRUMENTATION*** [none, none found, no problem, could not inspect thoroughly]
☐ None Found ☐ Piezometers ☐ Weirs/Flumes ☐ Other ☑ ☐ ☐ ☐
☐ Periodic Inspections by:
Notes:

None | Monitor | Maintenance | Engineer

Required Action

DRAFT

PRINCIPAL SPILLWAY

Required Action: None | Monitor | Maintenance | Engineer

☑ ***GENERAL INLET*** [no problem, could not inspect thoroughly] - Labyrinth Spillway - 76' wide
- ☐ Anti-Vortex Plate [None] Dimensions: _____ (adequate, too small,) — ☐ ☐ ☐ ☐
  - Type: (steel, concrete, aluminum, stainless steel, corrugated metal wood, other): _____
  - Deterioration: (missing sections, rusted, collapsed) _____
  - Notes: _____
- ☐ Flash Boards [None] — ☑ ☐ ☐ ☐
  - Type: (metal, wood): _____
  - Deterioration: _____
  - Notes: _____
- ☑ Trashrack [None] Opening Size: _____ (adequate, too small, too large) — ☑ ☐ ☐ ☐
  - Type: (metal bars, fence, screen, concrete, baffle, other): Debris boom
  - Deterioration: (broken bars, missing sections, rusted, collapsed) None
  - Notes: _____

☐ ***INLET OBSTRUCTION*** [no problem, could not inspect thoroughly]
- ☐ Debris: (leaves, trash, logs, branches, ice) — ☑ ☐ ☐ ☐
- ☐ Trees: Quantity: (<5, sparse, dense) — ☑ ☐ ☐ ☐
  - Diameter: (<6", 6-12", >12")
  - Location: (entire inlet, lt side, rt side, middle, see dwg)
  - Notes:
- ☐ Brush: Quantity: (sparse, dense) — ☑ ☐ ☐ ☐
  - Location: (entire inlet, lt side, rt side, middle, see dwg)
  - Notes:
- ☐ Other:(beaver activity, trashrack opening too small, partially/completely blocked, i.e.) — ☑ ☐ ☐ ☐
  - Notes:

☐ ***INLET MATERIALS*** [no problem, could not inspect thoroughly] - underwater
- ☐ Metal
  - (loss of coating/paint, surface rust, corrosion (pitting, scaling), rusted out, pipe deformation) — ☑ ☐ ☐ ☐
  - Dimensions:
  - Location:
  - Notes/Causes:
- ☑ Concrete
  - (bug holes, hairline crack, efflorescence) — ☑ ☐ ☐ ☐
  - (spalling, popouts, honeycombing, scaling, craze/map cracks) — ☐ ☐ ☐ ☐
  - (isolated crack, exposed rebar, disintegration, other) — ☑ ☐ ☐ ☐
  - Dimensions/Location:
  - Notes/Causes: Underwater
  - (bug holes, hairline crack, efflorescence) — ☑ ☐ ☐ ☐
  - (spalling, popouts, honeycombing, scaling, craze/map cracks) — ☑ ☐ ☐ ☐
  - (isolated crack, exposed rebar, disintegration, other) — ☑ ☐ ☐ ☐
  - Dimensions/Location:
  - Notes/Causes:
- ☐ Plastic
  - (deterioration, cracking, deformation) — ☑ ☐ ☐ ☐
  - Dimensions:
  - Location:
  - Notes/Causes:

DRAFT

None | Monitor | Maintenance | Engineer
Required Action

Required Action

☐ None ☐ Monitor ☐ Maintenance ☐ Engineer

☐ Earthen

☐ Ground Cover: Type: (grass, crown vetch) Other:
Quantity: (bare, sparse, adequate, dense)
Appearance: (too tall, too short, good)
Notes:

☐ Erosion: (wave, surface runoff)
Description (height/depth/length/etc):
Notes:

☐ Ruts:
Location: (entire inlet, lt side, rt side, middle, see dwg)
Depth: Width Length:
Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian)

☐ Riprap: Average Diameter:
(adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no)
Notes:

☐ Rock-Cut (weathered, erosion)
Description:
Notes:

☐ Other:

☐ ***OTHER INLET PROBLEMS*** [no problem, could not inspect thoroughly]

☐ Mis-Alignment:(pipe, chute, sidewall, headwall) ☐ Pipe Deformation
Location/Description:
Notes/Causes:

☐ Separated Joint ☐ Loss of Joint Material
Location/Description:
Notes/Causes:

☐ Undermining:
Location/Description:
Notes/Causes:

☐ Other:

☐ ***OPEN CHANNEL CONTROL SECTION*** [no problem, could not inspect] **Width** (est., ms.) **Brdth** (est., ms.)
Notes: Not applicable

☐ ***OUTLET OBSTRUCTION*** [no problem, could not inspect thoroughly]

☐ Debris: (leaves, trash, logs, branches, ice)
☐ Trees: Quantity: (<5, sparse, dense)
Diameter: (<6", 6-12", >12")
Location: (entire outlet, lt side, rt side, middle, see dwg)
Notes:

☐ Brush: Quantity: (sparse, dense)
Location:(entire outlet, lt side, rt side, middle, see dwg)
Notes:

Required Action

☐ None ☐ Monitor ☐ Maintenance ☐ Engineer

☐ Other:(beaver activity, partially/completely blocked, i.e.)

Notes:

{Upstream Slope, Crest, Downstream Slope, Seepage, **Principal Spillway-Inlet/Outlet**, Emergency Spillway, Lake Drain}

DRAFT

Required Action

☐ ***OUTLET MATERIALS*** [no problem, could not inspect thoroughly]

☐ Metal (loss of coating/paint, surface rust, corrosion (pitting, scaling), rusted out, pipe deformation) ☑ None ☐ Monitor ☐ Maintenance ☐ Engineer

Dimensions:

Location:

Notes/Causes:

☑ Concrete

(bug holes, hairline crack, efflorescence) ☐ None ☑ Monitor ☐ Maintenance ☐ Engineer

(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ None ☑ Monitor ☐ Maintenance ☐ Engineer

(isolated crack, exposed rebar, disintegration, other) ☑ None ☐ Monitor ☐ Maintenance ☐ Engineer

Dimensions/Location:

Notes/Causes: a few minor

(bug holes, hairline crack, efflorescence) ☐ None ☐ Monitor ☐ Maintenance ☐ Engineer

(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ None ☐ Monitor ☐ Maintenance ☐ Engineer

(isolated crack, exposed rebar, disintegration, other) ☐ None ☐ Monitor ☐ Maintenance ☐ Engineer

Dimensions/Location:

Notes/Causes:

☐ Plastic (deterioration, cracking, deformation) ☑ None ☐ Monitor ☐ Maintenance ☐ Engineer

Dimensions:

Location:

Notes/Causes:

☑ Earthen

☐ Ground Cover: Type: (grass, crown vetch) Other: ☑ None ☐ Monitor ☐ Maintenance ☐ Engineer

Quantity: (bare, sparse, adequate, dense)

Appearance: (too tall, too short, good)

Notes:

☐ Erosion: (other, surface runoff) ☑ None ☐ Monitor ☐ Maintenance ☐ Engineer

Description (width/depth/length/etc):

Notes:

☐ Ruts: ☑ None ☐ Monitor ☐ Maintenance ☐ Engineer

Location: (entire inlet, lt side, rt side, middle, see dwg)

Depth: Width Length:

Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian)

☑ Riprap: Average Diameter: IN/Dot Class I ($d_{50} \geq 18$" ±) ☑ None ☐ Monitor ☐ Maintenance ☐ Engineer

(adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no)

Notes:

☐ Rock-Cut (weathered, erosion) ☑ None ☐ Monitor ☐ Maintenance ☐ Engineer

Description/Notes:

☐ Other: ☑ None ☐ Monitor ☐ Maintenance ☐ Engineer

☑ ***OTHER OUTLET PROBLEMS*** [no problem, could not inspect thoroughly] ☑ None ☐ Monitor ☐ Maintenance ☐ Engineer

☐ Mis-Alignment:(pipe, chute, sidewall, headwall) ☐ Pipe Deformation

Location/Description:

Notes/Causes:

☐ Separated Joint ☐ Loss of Joint Material ☐ None ☐ Monitor ☐ Maintenance ☐ Engineer

Location/Description:

Notes/Causes:

☐ Undermining: ☑ None ☐ Monitor ☐ Maintenance ☐ Engineer

Location/Description:

Notes/Causes:

☐ Other: ☐ None ☐ Monitor ☐ Maintenance ☐ Engineer

{Upstream Slope, Crest, Downstream Slope, Seepage, **Principal Spillway-Outlet**, Emergency Spillway, Lake Drain}

Required Action

DRAFT

Required Action

None | Monitor | Maintenance | Engineer

OUTLET EROSION CONTROL STRUCTURE (Stilling Basins) – Baffle Blocks

☐ None

☐ (endwall/headwall, plunge pool, impact basin, flip bucket, USBR, baffled chute, rock lined channel) ☑ ☐ ☐ ☐

Notes:

Components (baffle blocks, chute blocks, endsill)

☐ ***MATERIAL*** [no problem, could not inspect thoroughly]

☐ Riprap: Average Diameter: ☐ ☐ ☐ ☐

(adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no)

Notes:

☐ Concrete

(bug holes, hairline crack, efflorescence) ☐ ☑ ☐ ☐

(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐

(isolated crack, exposed rebar, disintegration, other) ☑ ☐ ☐ ☐

Dimensions/Location:

Notes/Causes: Minor hair line Cracks

(bug holes, hairline crack, efflorescence) ☐ ☐ ☐ ☐

(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐

(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐

Dimensions/Location:

Notes/Causes:

☐ ***OTHER*** [no problem, could not inspect thoroughly] ☑ ☐ ☐ ☐

☐ Mis-Alignment:(sidewall, headwall, entire struct.)

Location:

Description:

Notes/Causes:

☐ Separated Joint ☐ Loss of Joint Material ☑ ☐ ☐ ☐

Location:

Description:

Notes/Causes:

☐ Undermining: ☑ ☐ ☐ ☐

Location:

Description:

Notes/Causes:

☐ Other: ☑ ☐ ☐ ☐

☑ ***DRAINS*** [none, none found, no problem, could not inspect thoroughly] (See ***SEEPAGE*** Section for Toe Drains & Relief Wells)

Type: ☐ Weep Holes ☑ Relief Drains ☐ Other: ☑ ☐ ☐ ☐

Flow Rate: None Size: Number:

Location: Throughout Structure

Notes: ~~Operable twice on year~~ No problems

Type: ☑ Weep Holes ☐ Relief Drains ☐ Other: ☐ ☐ ☐ ☐

Flow Rate: Size: Number:

Location: Left wing wall

Notes: No flow

None | Monitor | Maintenance | Engineer

Required Action

{Upstream Slope, Crest, Downstream Slope, Seepage, **Principal Spillway-Outlet Erosion Control Structure**, Emergency Spillway, Lake Drain}

DRAFT

EMERGENCY SPILLWAY

Required Action: None | Monitor | Maint. | Engineer

☑ None Found ☐ ☐ ☐ ☐

☐ ***GENERAL INLET*** [no problem, could not inspect thoroughly]

☐ Anti-Vortex Plate [None] Dimensions: _____ (adequate, too small,) ☐ ☐ ☐ ☐

Type: (steel, concrete, aluminum, stainless steel, corrugated metal wood, other): _____

Deterioration: (missing sections, rusted, collapsed) _____

Notes: _____

☐ ☐ ☐ ☐

☐ Flash Boards [None]

Type: (metal, wood): _____

Deterioration: _____

Notes: _____

☐ Trashrack [None] Opening Size: _____ (adequate, too small, too large) ☐ ☐ ☐ ☐

Type: (metal bars, fence, screen, concrete, baffle, other): _____

Deterioration: (broken bars, missing sections, rusted, collapsed) _____

Notes: _____

☐ ***INLET OBSTRUCTION*** [no problem, could not inspect thoroughly]

☐ Debris: (leaves, trash, logs, branches, ice) _____ ☐ ☐ ☐ ☐

☐ Trees: Quantity: (<5, sparse, dense) ☐ ☐ ☐ ☐

Diameter: (<6", 6-12", >12")

Location: (entire inlet, lt side, rt side, middle, see dwg)

Notes:

☐ Brush: Quantity: (sparse, dense) ☐ ☐ ☐ ☐

Location: (entire inlet, lt side, rt side, middle, see dwg)

Notes:

☐ Other:(beaver activity, trashrack opening too small, partially/completely blocked, i.e.) _____ ☐ ☐ ☐ ☐

Notes:

☐ ***INLET MATERIALS*** [no problem, could not inspect thoroughly]

☐ Metal

(loss of coating/paint, surface rust, corrosion (pitting, scaling), rusted out, pipe deformation) _____ ☐ ☐ ☐ ☐

Dimensions/Location: _____

Notes/Causes: _____

☐ Concrete

(bug holes, hairline crack, efflorescence) ☐ ☐ ☐ ☐

(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐

(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐

Dimensions/Location: _____

Notes/Causes: _____

(bug holes, hairline crack, efflorescence) ☐ ☐ ☐ ☐

(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐

(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐

Dimensions/Location: _____

Notes/Causes: _____

☐ Plastic ☐ ☐ ☐ ☐

(deterioration, cracking, deformation) _____

Dimensions/Location: _____

Notes/Causes: _____

DRAFT

None | Monitor | Maintenance | Engineer
Required Action

Required Action

None Monitor Maintenance Engineer

☐ Earthen
- ☐ Ground Cover: Type: (grass, crown vetch) Other: ☐ ☐ ☐ ☐
  Quantity: (bare, sparse, adequate, dense)
  Appearance: (too tall, too short, good)
  Notes:

- ☐ Erosion: (wave, surface runoff) ☐ ☐ ☐ ☐
  Description (height/depth/length/etc):
  Notes:

- ☐ Ruts: ☐ ☐ ☐ ☐
  Location: (entire inlet, lt side, rt side, middle, see dwg)
  Depth: Width Length:
  Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian)

- ☐ Riprap: Average Diameter: ☐ ☐ ☐ ☐
  (adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no)
  Notes:

☐ Rock-Cut (weathered, erosion) ☐ ☐ ☐ ☐
Description:
Notes:

☐ Other: ☐ ☐ ☐ ☐

☐ ***OTHER INLET PROBLEMS*** [no problem, could not inspect thoroughly]
- ☐ Mis-Alignment:(channel, chute, sidewall, headwall) ☐ Pipe Deformation ☐ ☐ ☐ ☐
  Location/Description:
  Notes/Causes:

- ☐ Separated Joint ☐ Loss of Joint Material ☐ ☐ ☐ ☐
  Location/Description:
  Notes/Causes:

- ☐ Undermining: ☐ ☐ ☐ ☐
  Location/Description:
  Notes/Causes:

- ☐ Other: ☐ ☐ ☐ ☐

☐ ***OPEN CHANNEL CONTROL SECTION*** [no problem, could not inspect] **Width** (est., ms.) **Brdth** (est., ms.) ☐ ☐ ☐ ☐
Notes:

☐ ***OUTLET OBSTRUCTION*** [no problem, could not inspect thoroughly]
- ☐ Debris: (leaves, trash, logs, branches, ice) ☐ ☐ ☐ ☐
- ☐ Trees: Quantity: (<5, sparse, dense) ☐ ☐ ☐ ☐
  Diameter: (<6", 6-12", >12")
  Location: (entire outlet, lt side, rt side, middle, see dwg)
  Notes:

- ☐ Brush: Quantity: (sparse, dense) ☐ ☐ ☐ ☐
  Location:(entire outlet, lt side, rt side, middle, see dwg)
  Notes:

Required Action

None Monitor Maintenance Engineer

- ☐ Other:(beaver activity, partially/completely blocked, i.e.) ☐ ☐ ☐ ☐
  Notes:

{Upstream Slope, Crest, Downstream Slope, Seepage, Principal Spillway, **Emergency Spillway-Inlet/Outlet**, Lake Drain}

DRAFT

Required Action

☐ ***OUTLET MATERIALS*** [no problem, could not inspect thoroughly]

☐ Metal (loss of coating/paint, surface rust, corrosion (pitting, scaling), rusted out, pipe deformation) ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

Dimensions:

Location:

Notes/Causes:

☐ Concrete (bug holes, hairline crack, efflorescence) ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

(isolated crack, exposed rebar, disintegration, other) ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

Dimensions/Location:

Notes/Causes:

(bug holes, hairline crack, efflorescence) ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

(isolated crack, exposed rebar, disintegration, other) ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

Dimensions/Location:

Notes/Causes:

☐ Plastic (deterioration, cracking, deformation) ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

Dimensions:

Location:

Notes/Causes:

☐ Earthen

☐ Ground Cover: Type: (grass, crown vetch) Other: ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

Quantity: (bare, sparse, adequate, dense)

Appearance: (too tall, too short, good)

Notes:

☐ Erosion: (other, surface runoff) ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

Description (width/depth/length/etc):

Notes:

☐ Ruts: ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

Location: (entire inlet, lt side, rt side, middle, see dwg)

Depth: Width Length:

Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian)

☐ Riprap: Average Diameter: ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

(adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no)

Notes:

☐ Rock-Cut (weathered, erosion)

Description: ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

Notes:

☐ Other: ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

☐ ***OTHER OUTLET PROBLEMS*** [no problem, could not inspect thoroughly]

☐ Mis-Alignment:(channel, chute, sidewall, headwall) ☐ Pipe Deformation ☐ None ☐ Monitor ☐ Maintenance ☐ Engineer

Location/Description:

Notes/Causes:

☐ Separated Joint ☐ Loss of Joint Material ☐ None ☐ Monitor ☐ Maintenance ☐ Engineer

Location/Description:

Notes/Causes:

☐ Undermining: ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

Location/Description:

Notes/Causes:

☐ Other: ☐ None ☐ Monitor ☐ Maint. ☐ Engineer

{Upstream Slope, Crest, Downstream Slope, Seepage, Principal Spillway, **Emergency Spillway-Outlet**, Lake Drain}

Required Action

DRAFT

Required Action

None Monitor Maint. Engineer

OUTLET EROSION CONTROL STRUCTURE (Stilling Basins)

☐ None ☐ ☐ ☐ ☐

☐ (endwall/headwall, plunge pool, impact basin, flip bucket, USBR, baffled chute, rock lined channel) ☐ ☐ ☐ ☐

Notes: _____

Components (baffle blocks, chute blocks, endsill) _____

☐ ***MATERIAL*** [no problem, could not inspect thoroughly]

☐ Riprap: Average Diameter: ☐ ☐ ☐ ☐

(adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no)

Notes:

☐ Concrete

(bug holes, hairline crack, efflorescence) ☐ ☐ ☐ ☐

(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐

(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐

Dimensions/Location: _____

Notes/Causes: _____

(bug holes, hairline crack, efflorescence) ☐ ☐ ☐ ☐

(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐

(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐

Dimensions/Location: _____

Notes/Causes: _____

☐ ***OTHER*** [no problem, could not inspect thoroughly] ☐ ☐ ☐ ☐

☐ Mis-Alignment:(sidewall, headwall) _____

Location: _____

Description: _____

Notes/Causes: _____

☐ Separated Joint ☐ Loss of Joint Material ☐ ☐ ☐ ☐

Location: _____

Description: _____

Notes/Causes: _____

☐ Undermining: ☐ ☐ ☐ ☐

Location: _____

Description: _____

Notes/Causes: _____

☐ Other: _____ ☐ ☐ ☐ ☐

☐ ***DRAINS*** [none, none found, no problem, could not inspect thoroughly] (See ***SEEPAGE*** Section for Toe Drains & Relief Wells)

Type: ☐ Weep Holes ☐ Relief Drains ☐ Other: _____ ☐ ☐ ☐ ☐

Flow Rate: _____ Size: _____ Number: _____

Location: _____

Notes: _____

Type: ☐ Weep Holes ☐ Relief Drains ☐ Other: _____ ☐ ☐ ☐ ☐

Flow Rate: _____ Size: _____ Number: _____

Location: _____

Notes: _____

None Monitor Maintenance Engineer

Required Action

{Upstream Slope, Crest, Downstream Slope, Seepage, Principal Spillway, **Emergency Spillway-Outlet Erosion Control Structure**, Lake Drain}

DRAFT

LAKE DRAIN

Required Action: None | Monitor | Maint. | Engineer

☑ ***GENERAL***
- ☐ None Found ☐ Does not have one — ☑ ☐ ☐ ☐
- ☑ Type of Lake Drain (isolated control/intake tower, valve vault w/ outlet conduit, valve in riser/drop inlet, siphon) — ☑ ☐ ☐ ☐
  Notes: replaced and repained in 2016. Bonnets were cracked. Operated twice a year
- ☑ Operated During Inspection (yes, no) — ☑ ☐ ☐ ☐
  Notes: All three operated

☑ ***ACCESS TO VALVE/SLUICE GATE*** [no problem, could not inspect thoroughly]
- ☑ Type (not accessible, from shore, boat, walkway, other) from spillway — ☑ ☐ ☐ ☐
  Notes:
- ☐ Walkway/Platform:
  - ☐ Concrete Deterioration ☐ Cracks (platform, piers, end supports, railing) — ☑ ☐ ☐ ☐
    Location:
    Notes:
  - ☐ Wood Deterioration — ☐ ☐ ☐ ☐
    Notes:
  - ☐ Metal Deterioration — ☐ ☐ ☐ ☐
    (minor, moderate, extensive, other)
    Notes:

☑ ***LAKE DRAIN COMPONENTS*** [no problem, could not inspect thoroughly]
- ☐ Concrete Structure — ☑ ☐ ☐ ☐
  Location:
  Description: (deterioration, misalignment, cracks):
  Notes/Causes:
- ☐ Valve Control (Operating Device)
  ☐ No Operating Device ☐ No Stem ☐ Bent/Broken Stem ☐ Other — ☑ ☐ ☐ ☐
  Notes/Operability:
- ☑ Valve / Sluice Gate — ☑ ☐ ☐ ☐
  - ☐ Metal Deterioration: (surface rust, minor, moderate, extensive, other)
    Location:
    Flow Rate:
    Notes/Causes:
  - ☐ Misalignment — ☑ ☐ ☐ ☐
    Notes/Causes:
  - ☐ Leakage - Flow Rate: — ☑ ☐ ☐ ☐
    Notes/Causes:
- ☐ Valve / Sluice Gate — ☐ ☐ ☐ ☐
  - ☐ Metal Deterioration: (surface rust, minor, moderate, extensive, other)
    Location:
    Flow Rate:
    Notes/Causes:
  - ☐ Misalignment - Notes/Causes: — ☐ ☐ ☐ ☐
  - ☐ Leakage - Flow Rate: — ☐ ☐ ☐ ☐
    Notes/Causes:

Required Action: None | Monitor | Maintenance | Engineer

DRAFT

Required Action

None | Monitor | Maintenance | Engineer

☐ Outlet Conduit

☐ Metal:(loss of coating/paint, surface rust, corrosion (pitting, scaling), rusted out) ☑ ☐ ☐ ☐
Location:
Notes/Causes:

☐ Concrete (bug holes, hairline crack, efflorescence) ☑ ☐ ☐ ☐
(spalling, popouts, honeycombing, scaling, craze/map cracks) ☑ ☐ ☐ ☐
(isolated crack, exposed rebar, disintegration, other) ☑ ☐ ☐ ☐
Dimensions/Location:
Notes/Causes:

☐ Plastic:(deterioration, cracking) ☑ ☐ ☐ ☐
Location:
Notes/Causes:

☐ Conduit Deformation ☐ Mis-Alignment: ☑ ☐ ☐ ☐
Location:
Notes/Causes:

☐ Separated Joint ☐ Loss of Joint Material ☑ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☐ Undermining: ☑ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☐ Vegetation (trees, brush) ☑ ☐ ☐ ☐
Notes:

☐ Other: ☑ ☐ ☐ ☐
Notes:

☐ Energy Dissipator

☐ Type (endwall, plunge pool, impact basin, stilling basin, rock-lined channel, none) ☐ ☑ ☐ ☐
Notes: April 2018 large event resulted in erosion, small head cut

☐ Riprap: Average Diameter: ☐ ☐ ☐ ☐
(adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no))
Notes:

☑ Concrete (bug holes, hairline crack, efflorescence) ☐ ☑ ☐ ☐
(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☑ ☐ ☐
(isolated crack, exposed rebar, disintegration, other) ☑ ☐ ☐ ☐
Dimensions/Location: few, minor
Notes/Causes:

☐ Mis-Alignment: ☑ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☐ Separated Joint ☐ Loss of Joint Material ☐ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☐ Undermining: ☑ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☐ Other: ☑ ☐ ☐ ☐
Notes:

Required Action

None | Monitor | Maintenance | Engineer

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APPENDIX 5
EMBANKMENT DAM FAILURE MODES AND RISK FACTORS

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Failure Modes of Embankment Dams

IDNR classifies dam failures in two categories: Type 1, component failure of a structure that does not result in a significant reservoir release; and, Type 2, uncontrolled breach failure of a structure that results in a significant reservoir release.

Type 1 failures include localized seepage and structural failures of dam components that do not breach the dam into the reservoir. Type 1 failures are generally local failures of a dam feature, such as an embankment slide that does not breach the crest, a spillway structural failure, a piping condition in its early stage of formation, a trash rack failure, or settlement on an earth dam embankment that does not extend to the water level. Type 1 failures are critical, require immediate attention, and may lead to a Type 2 failure. However, they do not result in a significant release of reservoir water and generally do not pose an immediate dam safety risk.

Type 2 failures are failures that do result in a significant release of the reservoir and may eventually result in a dam breach with total release of the reservoir. There are three general categories of Type 2 failures: (1) hydraulic failures, (2) seepage failures, and (3) structural failures. Type 2 failures often result from Type 1 failures that were improperly corrected or were ignored.

Embankment dams have three potential modes for Type 2, uncontrolled breach failure:

1. hydraulic failure (dam overtopping, wave erosion, dam toe erosion, severe erosion)

2. seepage failure (pervious reservoir rim or bottom, pervious foundation, pervious dam, leaking conduits, cracks in dam, piping through dam or along conduits, inappropriate vegetation, windblown trees, animal burrows)

3. structural failure (dam and foundation slides, dam failure, dam settlement, spillway cracks or failure)

The presence of any of these conditions poses a degree of risk for dam failure, however, failure typically will not occur until the conditions become severe enough to allow water to flow out of the reservoir in an uncontrolled manner. Therefore, when the dam deficiencies are minor and do not threaten the stability or safety of the dam, the risk of dam failure is low. If the deficiencies are serious and do pose a likely threat to the dam safety, the risk of dam failure is high.

Risk Factors that can Cause Dam Failure

The factors that pose a risk to embankment dams can be categorized into four groups:

1. structural factors (design, construction, and condition of embankment, foundation, abutments, and spillways)

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2) natural factors (earthquakes, storms, floods, landslides, sedimentation)

3) human factors (vandalism, terrorism, mistakes, operational mismanagement)

4) operating factors (poor maintenance practices, lack of operator training, poor access, lack of proper inspection program, reliability of electrical and mechanical equipment)

For purposes of this report, the potential risk of dam failure is defined as follows:

Low risk – the dam or its appurtenant works has a minor deficiency that does not pose an imminent threat to the dam safety. However, if left unattended, these deficiencies may progress and ultimately lead to a dam failure. Low risk conditions should be monitored and/or repaired within 4 years. If the deficiency is minor and is progressing very slowly, it may be appropriate to monitor the condition, and reassess it every year. In some cases it may be appropriate to complete the repairs immediately and be done with it. If the dam is a high hazard dam, a shorter time limit for performing low risk repairs may be warranted to ensure that the work will be completed before the next formal technical safety inspection. Repairs or correction of low risk deficiencies are typically a low priority. A minor deficiency with a low risk of dam failure may be assigned a medium priority repair schedule if the deficiency makes it impossible or difficult to perform a visual inspection. An example of this is excessive vegetation of the embankment; the excessive vegetation may present a low risk of dam failure, but because it prevents a proper visual inspection, removal of the brush may be assigned a medium or high priority.

Medium risk - the dam or its appurtenant works has a deficiency that lies between minor and serious. Medium risk conditions should be corrected as soon as possible, but no later than 3 years. Corrective repairs may need to be performed sooner if the deficiency is progressing rapidly. Repairs or correction of medium risk deficiencies are typically a medium priority.

High risk – the dam or its appurtenant works has a severe deficiency that poses an imminent threat to the dam safety. The dam will fail if the deficiency is not corrected. High risk conditions must be corrected within 1 year. Repairs or correction of high risk deficiencies are typically a high priority.

The risk assessment should always be tempered with the potential downstream safety hazards. A minor deficiency on a low hazard dam may have a lower priority for repair than the same deficiency on a high hazard dam.

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