



Report of:

2019 Lake Lemon Dam Inspection

Unionville, Indiana

Prepared for:

Lake Lemon Conservancy District

7599 North Tunnel Road

Unionville, Indiana 47468

DLZ Indiana, Inc.

157 East Maryland Street

Indianapolis, IN 46204

Phone: (317) 633-4120

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DLZ Job No. 1963-5019.90

February 2019

Prepared by:



It is recommended that all woody vegetation near the former stream channel area on the downstream embankment be removed so that this area can be monitored visually on a monthly basis. Seepage or soft ground should be reported immediately to the dam engineer.

3.2 Principal Spillway (West)

The visible portions of the principal spillway appeared satisfactory and the stilling basin conditions appeared to remain unchanged from previous inspections. There is a large crack observed in the left wall near the end of the stilling basin. The channel immediately downstream of the stilling basin appears to be scoured deeply. The footings for the retaining walls downstream of the stilling basin appear to be undermined. The record drawings for the stilling basin show that there are cut-off walls beneath the retaining wall footings that are up to 3-feet below the bottom of footing. The scour depth may be nearly that deep and corrective measures should be implemented to bury the retaining wall footings. It is recommended the scoured area be backfilled with properly-sized riprap or be backfilled with concrete. Because of the high hydraulic forces in the stilling basin and downstream channel when the principal spillway is operating at high flow, riprap size is expected to be very large in order to remain in place in the channel.

3.3 Auxiliary Spillway (East)

The auxiliary spillway did not change significantly since the last inspection. The previous inspection noted minor displacements of $\frac{1}{2}$ to $\frac{3}{4}$ inches at joints located at the spillway. There appeared to be no significant changes in the joint displacements since the 2016 inspection.

Erosion at the spillway could not be verified at the time of inspection due to the amount of water flowing over the spillway.

There is significant erosion along the outside of the east slope wall. Erosion measures should be used in this area and continue to monitor for slope wall movement.

4.0 CONCLUSIONS

Based on our observations, it appears the dam facility condition has not changed significantly since the 2016 inspection. The overall surficial condition of the project was determined to be "Satisfactory."

5.0 RECOMMENDATIONS

1. Remove the woody vegetation within the following locations:
-



INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

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February 27, 2019

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1.0 INTRODUCTION

The Lake Lemon Conservancy District requested DLZ Indiana, Inc. (DLZ) perform a field inspection of the Lake Lemon Dam. The Lake Lemon Dam is located near Unionville, Indiana in Monroe County. On February 27th, 2019, the inspection of the dam embankments and spillways were performed by DLZ staff.

2.0 PROJECT INFORMATION

2.1 General

The Lake Lemon reservoir was constructed in the 1950's and its primary function at that time was to provide the City of Bloomington its primary source of drinking water. The reservoir is used today for recreation and as a secondary source of drinking water supply for the City of Bloomington. The normal pool area is approximately 1,700 acres and is located within portions of Monroe and Brown counties. The reservoir's watershed covers approximately 71 square miles.

The dam's earthen embankment is roughly 50 feet high with a crest length of approximately 660 feet. The crest width is approximately 13 feet, and the upstream and downstream slopes are inclined at approximately 1:Vertical to 3.5:Horizontal. All references to locations on the dam and spillways assume the reference point is from the reservoir and facing the upstream dam face. The principal spillway consists of a 42 inch diameter reinforced concrete pipe near the left abutment from its inlet to the outlet via a gatewell. Flow through the pipe is controlled by a slide-gate located within the fenced in gatewell. The pipe discharges into a stilling basin near the downstream toe of the dam. The auxiliary spillway is a 329-foot long, concrete ogee-type overflow structure. The auxiliary spillway is in a valley northeast of the earthen embankment. The dam embankment and spillway location map are presented in **Appendix I**.

Photographs taken during the 2019 inspection and a Photograph Index Map can be found within **Appendix II**. This report contains all the observations and recommendations resulting from the 2019 inspection. The previous inspection report from 2016 was also reviewed as part of the inspection. The completed IDNR Dam Inspection Report for the 2019 inspection is presented in **Appendix III**.

2.2 Recent Maintenance Activities

In the 2016 Inspection Report, recommendations were made for additional monitoring and maintenance. It is understood that the vegetation (brush, trees) have been removed from the western end of the embankment. Additional recommended tasks from the 2016 report have been furthered in the Recommendations section of this report.

2.3 Security

The access to the dam embankment is along a private drive with a locked gate. The lake manager has access to this lock, as does the City of Bloomington Utilities. While the embankment, principal spillway, and south end of the auxiliary spillway have no public access, there is public access to the north end of the auxiliary spillway structure at Spillway Road.

3.0 FIELD INSPECTION

Weather conditions during the inspection were partly cloudy. The high temperature of the day was 45°F. The inspection was completed on February 27 with the previous rainfall for the Bloomington area showing 0.3 inches on February 21, 2019.

3.1 Embankment

There were no serious problem areas in the physical condition of the embankment found by DLZ. The slopes were relatively uniform and there were no significant bulges or depressions noted. Grass and vegetation on the embankment slopes and crest had been mowed. The lake supervisor stated the embankment is typically mowed two times a year. The embankment's upstream slope was found to have riprap surfacing to a height of about 5 feet above the normal pool elevation. The riprap surfacing extends below the normal pool elevation and it appears to have protected the embankment from wave-caused erosion.

Woody vegetation was found extending onto both the left and right abutments at both the upstream and downstream faces. Any vegetation growing on the embankment faces should be fully removed, as well as any brush piles. Clearing all woody vegetation will enable more thorough inspection of abutment and downstream embankment areas. The abutment areas form 'valleys' that concentrate surface water drainage from the valley and embankment slopes which increases the potential for erosion.

There were no signs of animal burrows present during the inspection. However, if burrows are found they should be filled with well compacted material. If burrows cannot be readily filled with compacted soil, Portland cement grout can be poured into burrows to remediate them. The embankment should be regularly monitored for animal burrows because they can create seepage pathways if not filled.

On the northwest side of the downstream embankment there were several downed trees lying along the abutment. These trees should be removed immediately as they can cause problems with erosion which can lead to more serious problems. Downed trees can kill the underlying vegetation exposing bare dirt which will more easily erode away during rainfall events. Downed trees can also cause ponding of the rainfall runoff which also can lead to erosion of the soil. These downed trees as well as the brush was subsequently removed (see Photo 3A in the photo log).

- i. Downed trees along the western side of the downstream embankment should be removed immediately as they can cause serious problems if left unattended to. (Photograph 3). *Update: within a week of the inspection, Photo 3A came in showing this area had been cleared*

All undesirable vegetation growth within these areas should be removed by cutting or spraying as part of an annual maintenance program.

2. Dam should be monitored on a regular basis for the presence of any animal burrows on the embankment. If animal burrows are found at any time they should be filled with competent, well compacted material. If deemed necessary, a rodent control program should be implemented.
3. Repair the scoured area in the channel bottom immediately downstream of the principal (western pipe spillway) stilling basin using riprap or concrete. The design velocities for the outflow will need to be evaluated to properly size the riprap.

Sincerely,

DLZ INDIANA, LLC



Anthony J. Hinkle, P.E.
Civil Engineer II

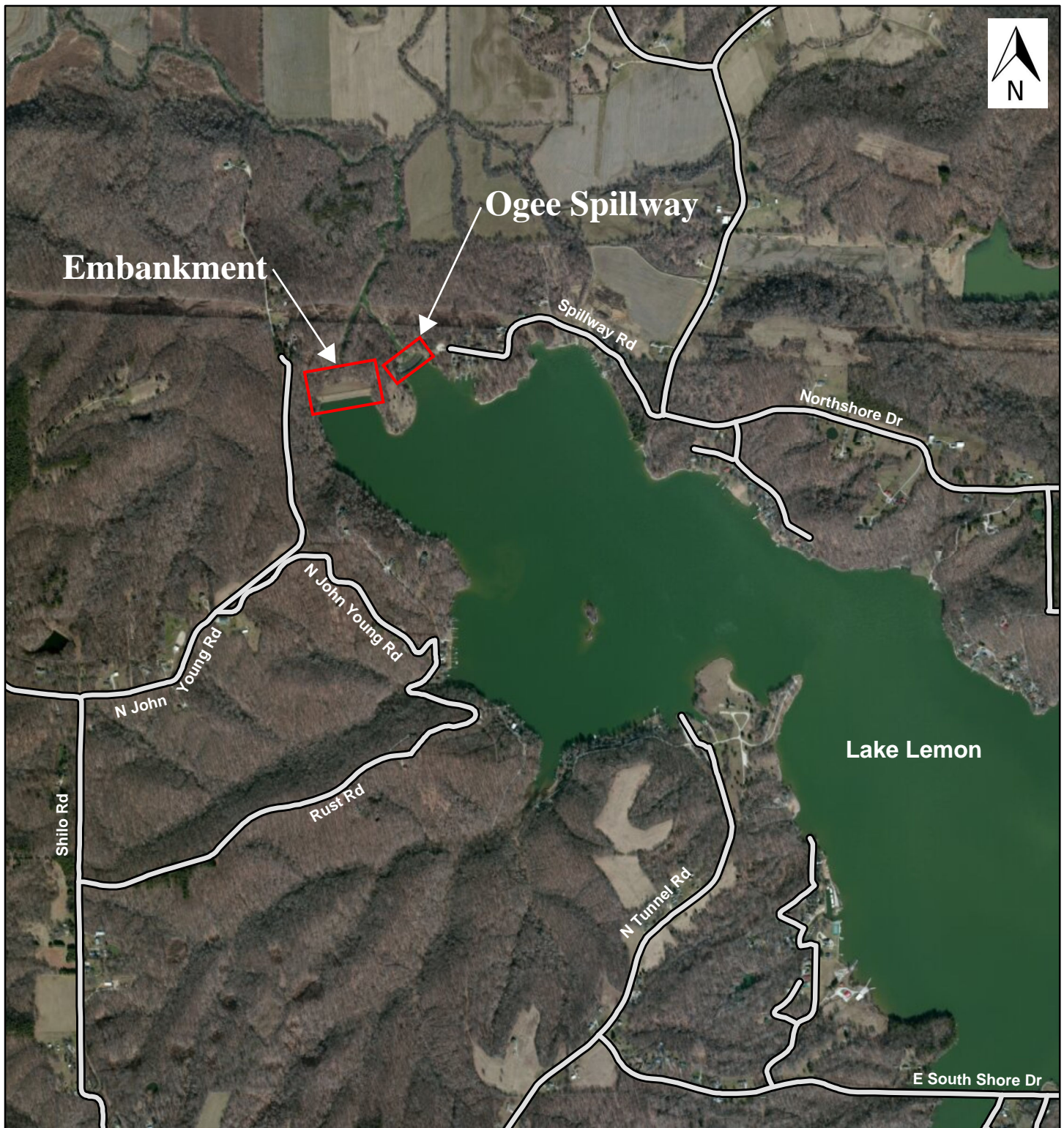


Jonathan E. LaTurner, P.E.
Division Manager

APPENDIX I

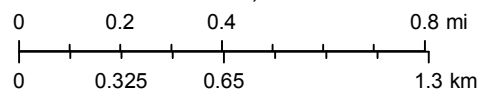
DAM EMBANKMENT AND SPILLWAY LOCATION

Lake Lemon Dam Embankment and Spillway Location



Date: February 27, 2019
Inspector: Jonathan E. LaTurner, P.E.

Scale: 1: 24,000



LEGEND:

— Minor Road

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

APPENDIX II

INSPECTION PHOTOGRAPHS

INSPECTION PHOTOGRAPHS



Photograph No. 1

Looking east - top of dam - minor rutting



Photograph No. 2

Looking west on the downstream midpoint of the embankment.



LAKE LEMON DAM
UNIONVILLE, INDIANA

Date Photographs Taken: 2/27/2019

Inspector: JEL and AJH

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INSPECTION PHOTOGRAPHS



Photograph No. 3

Looking west at the west end of embankment (thorny debris to be removed). Debris has since been removed (see 3A below)



Photograph No 3A

Looking west at the west end of embankment (debris has been removed)



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INSPECTION PHOTOGRAPHS



Photograph No. 4

Looking east at westerly toe of dam - no seepage



Photograph No. 5

Looking east at easterly toe of dam - no seepage



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INSPECTION PHOTOGRAPHS



Photograph No. 6

Looking east at wide shot of ogee spillway



Photograph No. 7

Looking east at near shot of ogee spillway



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INSPECTION PHOTOGRAPHS



Photograph No. 8

Looking vertically down west retaining wall of ogee (no panel displacement)



Photograph No. 9

Looking west along upstream toe of the embankment (no erosion).



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INSPECTION PHOTOGRAPHS



Photograph No. 10

Looking west along upstream toe of the embankment showing embedded riprap.



Photograph No. 11

Looking downstream along east ogee retaining wall showing some erosion to the toe



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INSPECTION PHOTOGRAPHS



Photograph No. 12

Panorama of ogee spillway looking upstream



Photograph No. 13

Looking east at northern slope of dam - no seepage



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INSPECTION PHOTOGRAPHS



Photograph No. 14

Looking south at northern slope of dam - no seepage



Photograph No. 15

Looking south at northern slope of dam - no seepage



**LAKE LEMON DAM
UNIONVILLE, INDIANA**

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Inspector: JEL and AJH

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INSPECTION PHOTOGRAPHS



Photograph No. 16

Looking north at downstream 42" principle spillway outlet stilling basin



Photograph No. 17

Looking south at downstream 42" principle spillway outlet stilling basin



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INSPECTION PHOTOGRAPHS



Photograph No. 18

Looking south at downstream 42" principle spillway outlet stilling basin



Photograph No. 19

Looking west at downstream 42" principle spillway outlet stilling basin



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INSPECTION PHOTOGRAPHS



Photograph No. 20

Looking west at downstream 42" principle spillway outlet stilling basin



Photograph No. 21

Looking south at downstream 42" principle spillway outlet stilling basin



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INSPECTION PHOTOGRAPHS



Photograph No. 22

Looking north at downstream 42" principle spillway outlet channel



Photograph No. 23

Looking south at downstream 42" principle spillway outlet channel and stilling basin



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INSPECTION PHOTOGRAPHS



Photograph No. 24

Looking south at downstream 42" principle spillway outlet channel and stilling basin



Photograph No. 25

Looking south at vegetation north of earthen embankment toe



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INSPECTION PHOTOGRAPHS



Photograph No. 26

Looking south at vegetation north of earthen embankment toe



Photograph No. 27

Looking north at channel downstream of earthen embankment



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INSPECTION PHOTOGRAPHS



Photograph No. 28

Looking north at low spot in channel downstream of earthen embankment



Photograph No. 29

Looking south at earthen embankment at toe



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INSPECTION PHOTOGRAPHS



Photograph No. 30

Looking north at west slope wall for Auxiliary Spillway



Photograph No. 31

Looking east at west slope wall for Auxiliary Spillway



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UNIONVILLE, INDIANA

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INSPECTION PHOTOGRAPHS



Photograph No. 32

Looking east at edge of west slope wall for Auxiliary Spillway



Photograph No. 33

Looking east at edge of west slope wall for Auxiliary Spillway



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UNIONVILLE, INDIANA

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INSPECTION PHOTOGRAPHS



Photograph No. 34

Looking south at west slope wall for Auxiliary Spillway



Photograph No. 35

Looking west along upstream toe of the embankment (no erosion).



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UNIONVILLE, INDIANA

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INSPECTION PHOTOGRAPHS



Photograph No. 36

Looking west along Auxiliary Spillway



Photograph No. 37

Looking north along east slope wall of Auxiliary Spillway



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UNIONVILLE, INDIANA

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INSPECTION PHOTOGRAPHS



Photograph No. 38

Looking west at east slope wall of Auxiliary Spillway



Photograph No. 39

Looking west at east slope wall of Auxiliary Spillway



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UNIONVILLE, INDIANA

Date Photographs Taken: 2/27/2019

Inspector: JEL and AJH

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INSPECTION PHOTOGRAPHS



Photograph No. 40

Looking west at east slope wall of Auxiliary Spillway (possible separation)



Photograph No. 41

Looking south along east slope wall of Auxiliary Spillway



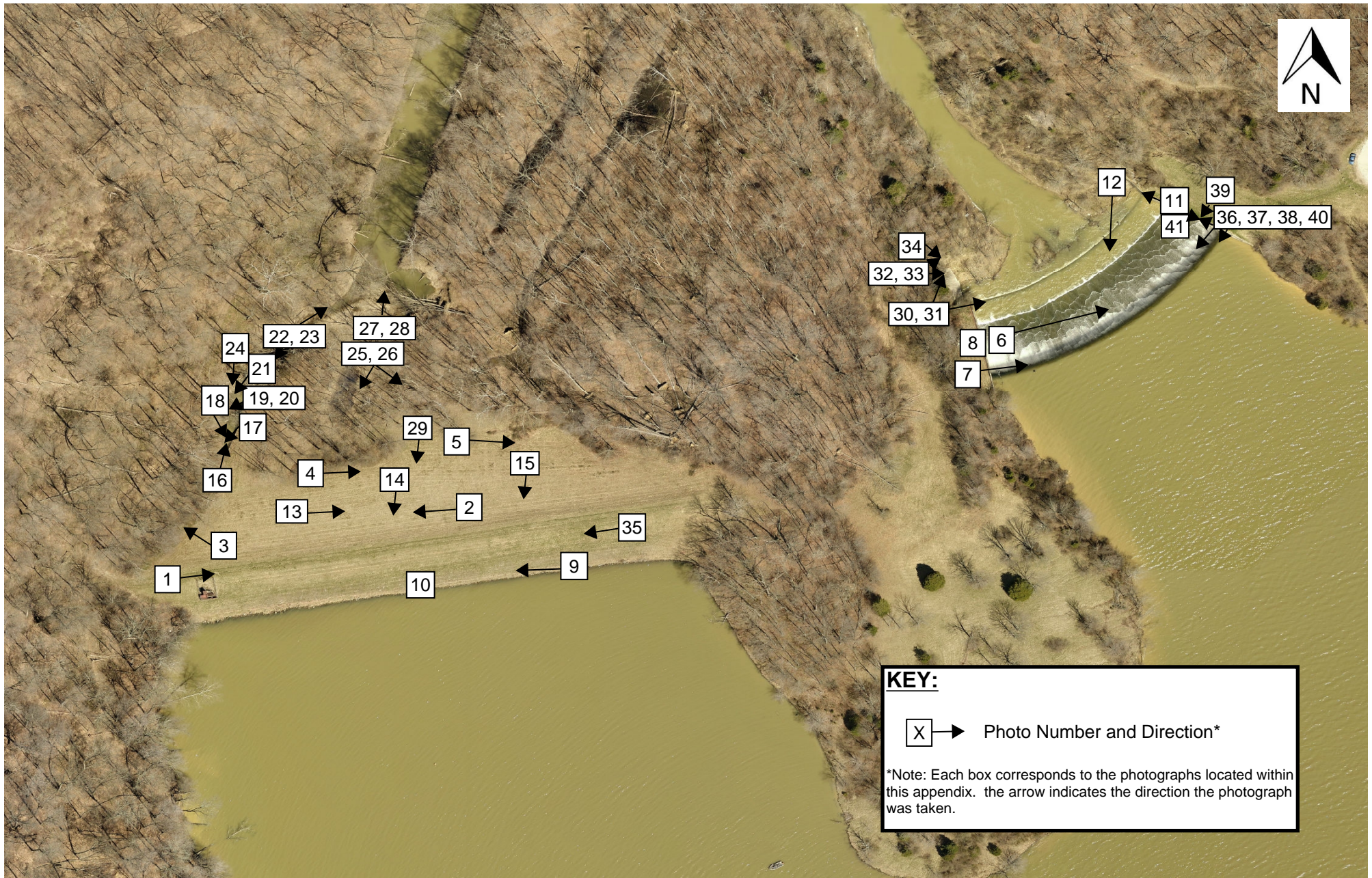
LAKE LEMON DAM
UNIONVILLE, INDIANA

Date Photographs Taken: 2/27/2019

Inspector: JEL and AJH

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Lake Lemon Photograph Location Map



Date: February 27, 2019

Inspector: Jonathan E. LaTurner, P.E.
Anthony J. Hinkle, P.E.

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

APPENDIX III

COMPLETED IDNR DAM INSPECTION FORM & DAM SAFETY INSPECTION CHECKLIST

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

Name of Professional Conducting Inspection Jonathan E. LaTurner, P.E.		Professional License No. (Indiana) PE910028
Business Address 157 East Maryland St., Indianapolis, IN 46237		Phone: (day) 317 - 633 - 4120 (evening) _____

Company Name DLZ Indiana LLC
INSPECTION PREPARATION: Reviewed all pertinent technical documentation related to this dam and site in the State's and the Owner's files: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Comment <u>Last inspection report was reviewed prior to inspection. IDNR's file on the project was previously reviewed, including the original construction documents. The inspection occurred in February 2019.</u>
MULTIDISCIPLINARY: 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 addition to the general civil engineering, may include geotechnical, geological, hydrologic, structural, and mechanical. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Comment _____

Dam Name Lake Lemon Dam		Quad. Hindustan	Date of Inspection 02 / 27 / 2019	
State Dam ID 58-1	Permit (if unapproved see pg. 6) State Approved Construction Completed in 1952	County Monroe	Sec. T. R. 28 10 N 1 E	Last Inspection 03 / 10 / 2017
Owners Name City of Bloomington Utilities			Owner's Phone ()	
Address/Zip Code P.O. Box 1216, Bloomington, IN 47401				
Contact's Name Adam Casey, Manager		Contact's Phone (day) 812 - 334 - 0233 (evening) 812 - 320 - 2841		Spillway Width Top Bot. ~330 ~16
Hazard High	Drainage Area ~71 MI²	Surface Area ~1700 AC	Height ~50 FT	Crest Length ~660 FT
			Crest Width ~13 FT	Inlet Below Crest ~16 FT
				Slope: Up 3 1/2: 1 Down 3 1/2: 1

FIELD CONDITIONS OBSERVED	DRAWDOWN STRUCTURE
Water Level - Below Dam Crest ~15.8 Ft.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> None
Ground Moisture Condition: Dry <input type="checkbox"/> Wet <input type="checkbox"/> Snowcover <input type="checkbox"/> Other <u>Surficial Moisture but not 'wet'</u>	Comment <u>A 42-in. diameter R.C. pipe with a gateway and stilling basin.</u>
MONITORING <input type="checkbox"/> Yes <input checked="" type="checkbox"/> None [<input type="checkbox"/> Gage Rod <input type="checkbox"/> Piezometers <input type="checkbox"/> Seepage Weirs <input type="checkbox"/> Survey Monuments <input type="checkbox"/> Other]	
Comments _____	

A UPSTREAM SLOPE	PROBLEMS NOTED: <input type="checkbox"/> (A-1) None <input type="checkbox"/> (A-2) Riprap - Missing, Sparse, Displaced, Weathered <input type="checkbox"/> (A-3) Wave Erosion-with Scarps <input type="checkbox"/> (A-4) Cracks-with Displacement <input type="checkbox"/> (A-5) Sinkhole <input type="checkbox"/> (A-6) Appears Too Steep <input type="checkbox"/> (A-7) Depressions or Bulges <input type="checkbox"/> (A-8) Slides <input type="checkbox"/> (A-9) Animal Burrows <input checked="" type="checkbox"/> (A-10) Trees, Brush, Briars <input type="checkbox"/> (A-11) Other _____
	Comments: Minor woody scrub brush present along the west end of upstream toe at the waters edge.

B CREST	PROBLEMS NOTED: <input type="checkbox"/> (B-1) None <input checked="" type="checkbox"/> (B-2) Ruts or Puddles <input type="checkbox"/> (B-3) Erosion <input type="checkbox"/> (B-4) Cracks with Displacement <input type="checkbox"/> (B-5) Sinkholes <input type="checkbox"/> (B-6) Not Wide Enough <input type="checkbox"/> (B-7) Low Area <input type="checkbox"/> (B-8) Misalignment <input type="checkbox"/> (B-9) Inadequate Surface Drainage <input type="checkbox"/> (B-10) Trees, Brush, Briars <input type="checkbox"/> (B-11) Other _____
	Comments: Slight rutting due to tire tracks.

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.

C DOWNSTREAM SLOPE

GOOD	<input type="checkbox"/>
ACCEPTABLE	<input checked="" type="checkbox"/>
DEFICIENT	<input type="checkbox"/>
POOR	<input type="checkbox"/>

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:

Appears to be soft soils at surface only with no seepage apparent. Woody vegetation observed at the west abutment area and at the toe of the downstream slope. There remain several downed trees that have fallen onto the west abutment of the downstream embankment.

D SEEPAGE

GOOD (NONE)	<input checked="" type="checkbox"/>
ACCEPTABLE	<input type="checkbox"/>
DEFICIENT	<input type="checkbox"/>
POOR	<input type="checkbox"/>

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 ☐ Yes ☐ (D-8) Flow Clear/Muddy ☐ (D-9) Dry/Obstructed
☐ (D-10) Other _____ Describe location of drains and indicate amount and quality of discharge.

Comments:

No apparent seepage observed.

E PRINCIPAL SPILLWAY

GOOD	<input type="checkbox"/>
ACCEPTABLE	<input checked="" type="checkbox"/>
DEFICIENT	<input type="checkbox"/>
POOR	<input type="checkbox"/>

DESCRIPTION:

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 _____

Comments:

Long vertical crack in the west wing wall of the stilling basin at end of sluiceway. There is also a problem with scouring downstream of the stilling basin at end of sluiceway.

F AUXILIARY SPILLWAY

GOOD	<input type="checkbox"/>
ACCEPTABLE	<input checked="" type="checkbox"/>
DEFICIENT	<input type="checkbox"/>
POOR	<input type="checkbox"/>

DESCRIPTION: A 329-foot long concrete ogee-type (curved crest) structure located in a valley northeast of the dam.

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 See below

Comments:

The concrete ogee section and retaining walls appeared unchanged since the 2016 inspection. The spillway appeared to be in satisfactory condition. Minor concrete panel displacement on eastern retaining wall. Minor erosion protection needed at outside of north end of retaining wall.

G MAINTENANCE AND REPAIRS

GOOD	<input type="checkbox"/>
ACCEPTABLE	<input type="checkbox"/>
DEFICIENT	<input type="checkbox"/>
POOR	<input type="checkbox"/>

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:

Refer to page 3 of 6.

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.

**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: _____ ☐ Remove vegetation along downstream toe near midpoint of the embankment and on the west abutment at
- ☒ (3) Clear Trees and/or Brush From: ☒ downstream side. Remove fallen trees on the downstream west abutment.
- ☐ (4) Initiate Rodent Control Program and Properly Backfill Existing Holes: _____
- ☒ (5) Repair: Repair the riprap that has been scoured from the downstream side of the stilling basin of the drawdown sluiceway.
- ☐ (6) Provide Surface Drainage For: _____
- ☐ (7) Monitor: Monitor gully outside of eastern ogee retaining wall. Add rip rap to eroded area to stabilize.
- ☒ (8) Other: Monitor the gully located at the west abutment area for additional erosion and potential seepage.
- ☒ (9) Other: Monitor animal activities on the embankment, erosion conditions downstream of the stilling basin and any movement of the spillway.

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.)

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

It is recommended the Lake Manager and Lake Staff continue to visually monitor possible seepage on a regular basis and after significant rainfall events. Contact a qualified engineering firm if any changes are noted.

Professional Engineer's Signature Jon LaTurner

Date 3/1/19

Reviewed By _____

Date

Owner/Owner's Representative

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:

PREVIOUS RECOMMENDATIONS FOR MAINTENANCE, REPAIRS, AND UPGRADES:

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

* An emergency action plan for the Lake Lemon Dam was prepared by Christopher B. Burke Engineering in 2015.

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.

Inspector's Signature: 

Date: 3/1/2019

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