WALDEN, ASHWORTH & ASSOCIATES, INC.
CONSULTING ENGINEERS
P.O. BOX 6462 • MARIETTA, GEORGIA 30065 • 770/956-7879

December 23, 2020

Mrs. Sheryl Brown
Mirror Lake Community Association Inc.
1000 Shoreline Parkway
Villa Rica, Georgia 30180

RE: MIRROR LAKE DAM INSPECTION
WA&A J.O. 4003000

Dear Mrs. Brown:

We have completed our 2020 4th quarter visual inspection of the Mirror Lake Dam in Douglas County, Georgia. The attached inspection forms and pictures presents the results of our visual inspection. This letter includes a summary of our observations, our preliminary conclusions and recommendations.

The dam site was visited on December 22, 2020 and limited field measurements were taken. Conditions were clear and cool. Visual observations of the dam and appurtenant structures were made from walking along the top of the dam and portions of both the upstream and downstream slopes. The primary spillway was observed from the upstream slope of the dam. No detailed observations were possible of the primary spillway structure because it is only accessible by boat.

No changes were observed on the upstream slope, the crest of the dam, or along the shoreline. The portion of the slope that is visible above the water line is covered with bermuda sod that appears to be in good condition. No shoreline protection such as rip rap was observed. There were no signs of shore erosion visible. The slope is estimated to be a 3 horizontal to 1 vertical (3:1) and no unusual movement on the slope was observed. No slides or sloughs were observed and the abutment contacts looked good.

The crest of the dam has a paved road that appears to be in good condition with no cracking observed. There is minor rutting located parallel with the paved road across the crest due to golf cart travel. These ruts are grassed and should continue to be monitored to ensure the rutting does not worsen and remains grassed. The horizontal and vertical alignment of the earth embankment appears to be generally good. The crest is covered with a good stand of well-maintained grass. The abutment contacts were good.

The downstream slope of the dam is covered with grass that appeared to have been mowed recently. The slope appears to be approximately 3 horizontal to 1 vertical (3:1). No signs of sloughing or sinkholes were observed. There were, however, some areas on the downstream slope near the primary spillway outlet pipes that were sparsely vegetated. These areas should be checked again in the spring and summer to ensure these areas are vegetated. There was also some minor erosion along the right downstream groin of the main dam. This area needs to be repaired and/or armored (grass, rip rap, concrete, etc.) or monitored to ensure erosion does not worsen. The wet/bubbling area at the right side toe of the dam as described by a Safe Dams inspection and inspected in April 2019 was dry during this inspection. Please refer to the Geotechnical Report dated November 2019 for additional information about this area. Currently there are rehabilitation designs being reviewed to help address this seepage.

Seepage drains are located at the downstream end of the dam and on both sides of the primary spillway outlet. The right-side seepage drain located on the right side of the primary spillway outlet had a flow of approximately 5 gallons per minute (gpm) of clear water. The seepage drain on the left side of the primary spillway outlet only had a trickle of flow. The seepage drains located along the downstream toe of the dam were difficult to access due to heavy brush. This brush needs to be cleared from the area to allow access to the toe drains. The toe drains were partially submerged. This has been the case in all previous inspections due to the topography of the area downstream of the dam. This area should be drained if possible and continue to be monitored to ensure the condition does not worsen. Rust colored water was also observed in the wet swampy area in and around the toe drains. This area looked to remain unchanged from previous inspections. This should be monitored to make sure the situation does not worsen.

The piezometers are in good condition located along the upstream side of the crest of the dam. Observation well (OW) 1 is located at the upstream center of the dam and observation well (OW) 2 is located at the center of the saddle dam where the primary spillway is located. Both wells were accessible and OW1 measured approximately 14 ft of water depth. OW2 had a locked cap on the piezometer inside and was not able to be measured.

The water level of the lake is controlled by the primary spillway which consists of (2) reinforced concrete structures with 60-inch diameter low level discharge pipes. Observations from the upstream slope of the dam indicate that it appears to be generally in good shape. The structure appears to have an adequate functioning trash rack.

Two 60 in. diameter low level discharge pipes are located near the right abutment. The low-level outlet pipes terminate at the downstream toe of the dam with a cantilevered discharge into a rip-rap lined plunge pool. The plunge pool has encroaching vegetation. Access to this area was difficult due to the vegetation. The plunge pool area needs to be cleared of brush. The plunge pool continues to provide adequate dissipation of the energy from flows discharging through the pipe.

The 300-foot-wide grassed trapezoidal channel secondary or emergency spillway located in the left abutment appears to be generally in good condition. The approach channel is unobstructed and is covered with a good stand of grass. The discharge area also appears to be clear of debris. No evidence of frequent activation of this spillway was observed. Two rip rap lined drainage ditches remain at the downstream end of the emergency spillway. There appeared to be no erosion problems in the area, however these areas should continue to be monitored to ensure no erosion takes place. The exit channel is lined with rip rap along the spillway outlet running parallel to the dam. The downstream bank has some erosion damage. This area poses no threat to the dam as it would erode away from the dam into an open grassed field and did not appear to worsen any from the previous inspection.

It is important to note that the condition of any dam depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It cannot be assumed that the present conditions of any dam will continue to represent its condition at some point in the future.

Based on our visual inspection, the dam needs some remedial work. We recommend that the following steps be taken:

1. The downstream slope around the primary spillway needs some additional vegetation.

2. Monitor crest golf cart path along road and ensure grassing remains.

3. Monitor right side groin for any changes/erosion.

4. Monitor right side toe area for seepage.

5. Clear vegetation from toe of the dam and around the plunge pool area at the primary spillway outlet.

6. Provide key or remove lock on piezometer located in observation well 2 (OW2) at the saddle dam near the primary spillway.

If you have any questions concerning our inspection, please do not hesitate to call me.

Sincerely,

Jason Rapplean

Jason Rapplean, P.E.
Senior Engineer

JR/jcw
Attachments

PHOTO LOG

Date:	**12/22/20**
Project:	**Mirror Lake Dam Visual Inspection**
Project No.:	**4003000**
Project Location:	**Douglas County, Georgia**
Report By:	**Jason Rapplean, P.E., E.O.R.**

Description:

Crest and upstream slope of dam with paved road. Note golf cart path on right side.

Description:

Upstream embankment and shore line.

PHOTO LOG

Date:	**12/22/20**
Project:	**Mirror Lake Dam Visual Inspection**
Project No.:	**4003000**
Project Location:	**Douglas County, Georgia**
Report By:	**Jason Rapplean, P.E., E.O.R.**

Description:

Primary spillway riser structures with trash rack.

Description:

Downstream slope at saddle dam with some sparsely vegetated areas. Area should have additional grassing. No change or erosion since last inspection.

PHOTO LOG

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Project:	**Mirror Lake Dam Visual Inspection**
Project No.:	**4003000**
Project Location:	**Douglas County, Georgia**
Report By:	**Jason Rapplean, P.E., E.O.R.**

Description:

Seepage area at right abutment. Area was dry at time of inspection. Temporary observation wells installed by Geotechnical Engineer.

Description:

Temporary observation wells installed by Geotechnical Engineer at toe area.

PHOTO LOG

Date:	**12/22/20**
Project:	**Mirror Lake Dam Visual Inspection**
Project No.:	**4003000**
Project Location:	**Douglas County, Georgia**
Report By:	**Jason Rapplean, P.E., E.O.R.**

Description:

Outlet pipes for primary spillway and seepage drain outlet.

Description:

Plunge pool and outlet channel for primary spillway outlet.

PHOTO LOG

Date:	**12/22/20**
Project:	**Mirror Lake Dam Visual Inspection**
Project No.:	**4003000**
Project Location:	**Douglas County, Georgia**
Report By:	**Jason Rapplean, P.E., E.O.R.**

Description:

Swampy wet area at toe of dam. Toe drains inaccessible due to heavy brush.

Description:

Swampy wet area at toe of dam. Toe drains inaccessible due to heavy brush.

PHOTO LOG

Date:	**12/22/20**
Project:	**Mirror Lake Dam Visual Inspection**
Project No.:	**4003000**
Project Location:	**Douglas County, Georgia**
Report By:	**Jason Rapplean, P.E., E.O.R.**

Description:

Downstream embankment and toe drain outlets at primary dam.

Description:

Emergency spillway. Grassed trapezoidal channel.

PHOTO LOG

Date:	**12/22/20**
Project:	**Mirror Lake Dam Visual Inspection**
Project No.:	**4003000**
Project Location:	**Douglas County, Georgia**
Report By:	**Jason Rapplean, P.E., E.O.R.**

Description:

Emergency spillway. Grassed trapezoidal channel.

Description:

Exit of emergency spillway. Rip rap lined ditches located at the exit.

PHOTO LOG

Date:	**12/22/20**
Project:	**Mirror Lake Dam Visual Inspection**
Project No.:	**4003000**
Project Location:	**Douglas County, Georgia**
Report By:	**Jason Rapplean, P.E., E.O.R.**

Description:

Erosion in the spillway exit channel on the downstream slope. No change since previous inspection.

Description:

Spillway exit channel. Upstream slope armored with rip rap.

PHOTO LOG

Date:	**12/22/20**
Project:	**Mirror Lake Dam Visual Inspection**
Project No.:	**4003000**
Project Location:	**Douglas County, Georgia**
Report By:	**Jason Rapplean, P.E., E.O.R.**

Description:

Observation well 1 on upstream side of main dam.

Description:

Observation well 2 on upstream side of saddle dam. Note locked cap on piezometer inside well.

Embankment (Earth) Dam Inspection Form

Name of Dam: Mirror Lake Dam Date: 12-22-20

Location of Dam (County): Douglas Weather: Sunny / cool

Inspected by (Print Name): Jason Rapplean

If an inspection item requires further action on your part, place a check mark to the left of the number of the item

A. Crest (refer to Glossary for description)

☐ 1. How would you describe the vegetation on the crest? (Check all that apply)

Recently Mowed_____ Overgrown_____ Good Cover ✓ Sparse_____

Other/Corrective Action (describe):_____

☐ 2. Are there any trees or other inappropriate or excessive vegetation on the crest? Yes_____ No ✓

If yes, describe (type of vegetation, size, location, etc.)/Corrective Action:_____

☐ 3. Is there a paved road or driveway on the crest? Yes ✓ No_____

If yes, describe the condition (for example, good condition, numerous cracks, newly paved)/Corrective Action:_____

asphalt pavement in good condition

☐ 4. Are there any depressions, ruts or holes on the crest? Yes_____ No ✓

If yes, describe (size, location, etc)/Corrective Action:_____

☐ 5. Are there any cracks on the crest? Yes_____ No ✓

If yes, describe (length and width, location, direction of cracking, etc.)/Corrective Action:_____

☐ 6. Other observations on the crest/Corrective Action:_____

B. Upstream Slope (refer to Glossary for description)

1. What is the reservoir level today? At Normal Pool ✓ Above Normal Pool_____Feet Below Normal Pool_____Feet

☐ 2. How would you describe the vegetation on the upstream slope? (Check all that apply)

Recently Mowed_____ Overgrown_____ Good Cover ✓ Sparse_____

Other/Corrective Action (describe):_____

☐ 3. Are there any trees or other inappropriate or excessive vegetation on the slope? Yes_____ No ✓

If yes, describe (type of vegetation, size, location, etc.)/Corrective Action:_____

☐ 4. Are there any depressions, bulges, ruts or holes (such as animal burrows) on the slope? Yes_____ No ✓

If yes, describe (size, location, etc.)/Corrective Action:_____

☐ 5. Are there any eroded areas on the slope (such as wave erosion along the shoreline)? Yes_____ No ✓

If yes, describe (size of area, location, severity, etc.)/Corrective Action:_____

☐ 6. Are there any cracks, sloughs or slides (vertical cliffs) on the slope? Yes_____ No ✓

If yes, describe (length, width, height, location, etc.)/Corrective Action:_____

↑ Check if corrective action is noted/required.

Upstream Slope (continued)

☐ 7. Is there any type of slope protection along the shoreline (such as riprap)? Yes_____ No ✓

If yes, describe what type and its condition (for example, riprap - adequate, inadequate, sparse)/Corrective Action:_____

☐ 8. Other observations on the upstream slope/Corrective Action:_____

C. Downstream Slope (refer to Glossary for description)

☐ 1. How would you describe the vegetation on the downstream slope? (Check all that apply)

Recently Mowed_____ Overgrown_____ Good Cover ✓ Sparse_____

Other/Corrective Action (describe):_____

☐ 2. Are there any trees or other inappropriate or excessive vegetation on the slope? Yes_____ No ✓

If yes, describe (type of vegetation, size, location, etc.)/Corrective Action:_____

☐ 3. Are there any depressions, bulges, ruts or holes (such as animal burrows) on the slope? Yes_____ No ✓

If yes, describe (size, location, etc.)/Corrective Action:_____

☐ 4. Are there any eroded areas on the slope (such as along abutment contacts)? Yes_____ No ✓

If yes, describe (size of area, location, severity, etc.)/Corrective Action:_____

☐ 5. Are there any cracks, sloughs or slides (vertical cliffs) on the slope? Yes_____ No ✓

If yes, describe (length, width, height, location, etc.)/Corrective Action:_____

☐ 6. Are there any wet areas or areas of hydrophilic (lush, water-loving) vegetation? Yes ✓ No_____

If yes, describe (size of area, location, etc.)/Corrective Action: along toe of Dam, - low lying area is constantly wet

☐ 7. Do any wet areas indicate seepage through the dam (such as rust-colored, stained water)? Yes ✓ No_____ N/A_____

If yes, describe (for example, new area of seepage, no change from past observations, size of area, location) /Corrective Action: along toe No change from past, difficult access

☐ 8. Are there any leaks (flowing water) from the slope or beyond the toe of the dam? Yes_____ No ✓

If yes, describe (location, rate of flow, turbidity of flow)/Corrective Action:_____

☐ 9. Other observations on the downstream slope/Corrective Action: previous area at toe on right side with observed seepage was dry

D. Plunge Pool (refer to Glossary for description)

☐ 1. Is there any type of erosion protection around the plunge pool (such as riprap)? Yes ✓ No_____

If yes, describe what type and its condition (for example, riprap - adequate, inadequate, obstructed by vegetation) /Corrective Action: rip rap adequate

☐ 2. Is there any erosion and or seeps around or going into the plunge pool? Yes_____ No ✓

If yes, describe (size of area, location, severity, etc.) /Corrective Action:_____

☐ 3. Other observations around the plunge pool/Corrective Action: area getting overgrown difficult access

↑ Check if corrective action is noted/required.

Name of Dam: Mirror Lake Dam Date: 12-22-20

E. Principal and Emergency Spillways (refer to Glossary for description)

☐ 1. What types of spillways does the dam have (such as corrugated metal, concrete or siphon pipe; concrete or earth channel)?
Principal Spillway concrete weirs Emergency Spillway earth spillway
Other/Corrective Action:

☐ 2. Has the emergency spillway activated (had flow) since the last inspection? Yes____ No ✓
If yes describe (date(s) of flow, reason for activation, depth of flow) /Corrective Action:

☐ 3. For pipe spillways, is the intake obstructed in any way (such as with excessive debris)? Yes____ No ✓
If yes, describe (type of debris, reason for obstruction, etc.) /Corrective Action:

☐ 4. For pipe spillways, what is the condition of any trash racks (for example, adequate, inadequate, damaged)? /Corrective Action:
adequate

☐ 5. For pipe spillways, are there any visible cracks, separations or holes in the pipe(s) (intake or outlet)? Yes____ No ✓
If yes, describe (location, width of crack or separation, etc.)/Corrective Action:

☐ 6. For pipe spillways, are there any apparent leaks in the pipe(s)? Yes____ No ✓
If yes, describe (location, rate of flow from leak, etc.)/Corrective Action:

7. For pipe spillways, how would you describe the overall condition of the pipe(s)? (Check all that apply)
Functioning Normally ✓ Not Functional____ Deteriorated____ Damaged____ Adequate____ Inadequate____

☐ 8. For concrete or earth channel spillways, is the entrance or channel obstructed in any way? Yes____ No ✓
If yes, describe (type of obstruction, location, etc.)/Corrective Action:

☐ 9. For earth channel spillways, how would you describe the vegetation in the spillway? (Check all that apply)
Recently Mowed____ Overgrown____ Good Cover ✓ Sparse____
Other (describe)/Corrective Action: Bermuda sod

☐ 10. For earth channel spillways, are there any trees or other inappropriate vegetation in the spillway? Yes____ No ✓
If yes, describe (type of vegetation, size, location, etc.)/Corrective Action:

☐ 11. For earth channel spillways, are there any eroded areas in the spillway? Yes____ No ✓
If yes, describe (size of area, location, severity, etc.)/Corrective Action:

☐ 12. For concrete channel spillways, are there any cracks or holes in the spillway? Yes____ No____
If yes, describe (width of crack or hole, location, etc.)/Corrective Action: N/A

☐ 13. For concrete channel spillways, are there any leaks or evidence of undermining (flow under the concrete)? Yes____ No____
If yes, describe (location, rate of flow from leak, indicators of undermining, etc.)/Corrective Action: N/A

↑ Check if corrective action is noted/required.

Principal and Emergency Spillways (continued)

14. For earth or concrete channel spillways, how would you describe the overall condition of the spillway? (Check all that apply)
Functioning Normally ✓ Not Functional___ Deteriorated___ Damaged___ Adequate___ Inadequate___

☐ 15. Other observations on the spillways/Corrective Action:_____

F. Instrumentation (refer to Glossary for description)

☐ 1. Are there any toe drains at the downstream toe or any other seepage drains on the dam? Yes ✓ No___
If yes, describe the condition (for example, clogged, free flowing, deteriorated, good condition) /Corrective Action:_____

☐ 2. For drains, is an animal guard installed at the outlet of each drain? Yes ✓ No___
If no, which drains lack animal guards? /Corrective Action:_____

☐ 3. For drains, measure the rate of flow from each drain and record below (use additional pages if necessary):

Designation/Location of Drain	Flow Rate	Flow Rate in GPM*	Turbidity of Flow (describe – clear, muddy, etc.)
TD 3	Trickle	Trickle	clear
TD 4	1 GAL 12s	5	clear

☐ 4. Are there any piezometers on the dam? Yes ✓ No___
If yes, describe the condition (for example, good condition, damaged, etc.)/Corrective Action:_____
good condition

☐ 5. For piezometers, does each piezometer have a cap with a lock? Yes ✓ No___
If no, which piezometers need caps (to prevent rain water intrusion) and/or locks (to prevent tampering)? /Corrective Action:_____

☐ 6. For piezometers, are you able to take a measurement (depth to water) in each piezometer? Yes ✓ No___
If yes, record depth to water (in feet) in each piezometer, record on a separate page, and attach to this form.

☐ 7. Are there any other monitoring devices on the dam? Yes___ No ✓
If yes, describe what type and the condition (for example, monitoring wells - good condition, damaged) /Corrective Action:

☐ 8. Other observations on instrumentation/Corrective Action: OW1 - 14 Ft
OW2 - cap was locked

G. Photographs

At a minimum, photographs should be taken of the crest, upstream slope, downstream slope and any other notable features.
List of photographs (be sure to date stamp the photos): Attached

**GPM (gallons per minute): to convert from oz/sec multiply by 0.4688; to convert from ml/sec multiply by 0.01585*

↑ Check if corrective action is noted/required.