

TO: Steve Rapson, County Administrator

FROM: Phil Mallon, Public Works

DATE: July 28, 2016

RE: Longview Dam (a.k.a. Margaret Phillips Lake Dam) Update

Background

Longview Dam (a.k.a. Margaret Phillips Lake Dam) is classified by the Georgia Safe Dams Program as a Category 1 structure. Under the authority of the Safe Dam Act, the Georgia Safe Dams Program maintains an inventory and classification system of all the dams in the state. They also establish minimum design and maintenance standards for Category I (high hazard) structures through inspection and permitting.

This dam is approximately 16-feet high, 670 feet long, has a top width of 20 feet, and impounds a 16-acre lake. Longview Road runs across the top of the dam. Fayette County owns and operates the dam. In order to meet Georgia Safe Dams Program requirements, Fayette County shall either:

- Upgrade the dam;
- Breach the dam;
- Modify the dam to remove the downstream flood risk; or
- Remove or modify the downstream structures at risk.

Of these four options, upgrading the dam and breaching the dam are the most practical options.

Fayette County authorized Walden, Ashworth & Associates to serve as the “Engineer of Record” for this project to develop upgrade and dam breach options for County review (attached). A summary follows.

Option I - Dam Upgrade

Walden reviewed all the Safe Dams Programs files on Longview Dam and performed a field inspection. They did not perform a detailed hydrological and hydraulic evaluation because of cost constraints. The inspection confirmed that significant work is needed to bring this dam up to Category I standards. Noted concerns include: slope stability since the toe of the dam is chronically wet, the presence of longitudinal cracks along the road, and severe erosion around the main drain pipe. Maintenance and repair work includes: removing vegetation, flattening slopes to a 3:1 (or flatter); and installing a seepage collection and removal system.

Based on previous experience and taking into consideration both the drainage basin and lake size, Walden assumed that a 20-foot wide labyrinth weir would be required for outlet control of the improved dam. An outlet structure of this size requires a bridge for the road and underground utilities would have to be relocated.

The Consultant’s order-of-magnitude cost estimate for the Dam Upgrade option is \$1,409,815. This includes design and construction but excludes acquisition costs for approximately 40,000 square feet of new right-of-way and easements.

Option 2 - Dam Breach

The dam breach option returns the watershed to free-flow (i.e., natural) conditions by draining the lake and cutting out a portion of the dam. The Option also calls for Longview Road to be permanently cut/broken, thereby avoiding the cost of a new culvert or bridge. Instead, cul-de-sacs will be provided on either side of the breach location to provide turn-around points for Longview Road. Work to breach Longview Dam includes:

- Environmental permitting;
- Acquiring proposed right-of-way and easements for the project.
- Draining the lake;
- Breaching the dam with a 20-ft cut and 4:1 side slopes;
- Breaking of Longview Road and installation of two cul-de-sacs;
- Installation of guard rail; and
- Installation of a drain pipe and concrete weir wall for control of peak flows.

Breaching the dam removes the dam from any further operations and maintenance requirements by the Georgia Safe Dams Act. For a conceptual cost estimate, County staff assumed the Dam Breach option would be \$704,907, one-half the estimated amount to upgrade the dam. Similar to Option 1, this excludes right-of-way and easement costs.

Recommendation

Staff recommends Option 2, Dam Breach. This option provides the double benefit of 1) meeting the required Ga Safe Dams Act Category I standards and 2) removing the structure from future State operation and maintenance requirements. Although Longview Road is a Collector, it lends itself to be changed from a thru road to a dead-end road since there are alternate roads (i.e., SR 314) providing the same connectivity.

Direction is needed from the Board of Commissioners regarding which option to pursue. Further design and permitting is on hold until guidance is provided.

COST ESTIMATES FOR LONGVIEW DAM TO MEET GEORGIA SAFE DAMS CATEGORY 1 REQUIREMENTS

Option 1 – Dam Upgrade: \$1,409,815

Option 2 – Dam Breach (*preferred*): \$704,907

**ORDER OF MAGNITUDE OPINION OF COST
FOR THE REHABILITATION
OF MARGARET PHILLIPS LAKE DAM
FOR**



FAYETTE COUNTY BOARD OF COMMISSIONERS
STEVE BROWN, CHAIRMAN
CHARLES ODDO, VICE CHAIRMAN
DAVID BARLOW
RANDY OGNIO
ALLEN McCARTY



Margaret Phillips Lake Primary Spillway

August 5, 2013



WALDEN, ASHWORTH & ASSOCIATES, INC.

Consulting Engineers

**MARGARET PHILLIPS LAKE DAM
FAYETTE COUNTY, GEORGIA
ORDER OF MAGNITUDE
OPINION OF COST**

**WALDEN, ASHWORTH & ASSOCIATES, INC.
CONSULTING ENGINEERS**

August 5, 2013
WA&A J.O. 3301700





WALDEN, ASHWORTH & ASSOCIATES, INC.

CONSULTING ENGINEERS

P.O. BOX 6462 • MARIETTA, GEORGIA 30065 • 770/956-7879

August 5, 2013

Mr. Phil Mallon, P.E.
Fayette County Engineer
115 McDonough Rd
Fayetteville, Georgia 30215

**RE: MARGARET PHILLIPS LAKE DAM
FAYETTE COUNTY, GEORGIA
ORDER OF MAGNITUDE - OPINION OF COST
WA&A J.O. 3301700**

Dear Mr. Mallon:

We have completed our Order of Magnitude Opinion of Cost for the Margaret Phillips Lake Dam and are pleased to present the results in the attached report. We appreciate the opportunity to assist Fayette County on this project.

If you have any questions, please do not hesitate to call.

Very truly yours,

WALDEN, ASHWORTH & ASSOCIATES, INC.

Martin L. Walden, P.E.
President

MLW/jcw

Attachment



**MARGARET PHILLIPS LAKE DAM
FAYETTE COUNTY, GEORGIA
ORDER OF MAGNITUDE COST ESTIMATE**

INTRODUCTION

This report, which was authorized through an agreement with the Fayette County Board of Commissioners, provides an Order of Magnitude Opinion of Cost for the rehabilitation of the Margaret Phillips Lake Dam and includes a summary of the assumptions and procedures used to develop that Opinion of Cost.

SCOPE

Our Order of Magnitude Opinion of Cost to rehabilitate the Margaret Phillips Lake Dam and bring it into compliance with current requirements for Category I, high hazard dams is based on a brief visual inspection of the dam, a review of available data and our experience with similar dams. The visual inspection was made without the benefit of surveying equipment and no measurements were taken. The scope of the site visit was limited to visible elements only and excluded covered, buried, or hidden conditions. The scope of work did not include any calculations, special investigations, equipment testing, field or laboratory testing, geotechnical investigations or material testing.

DATA SEARCH - GEORGIA SAFE DAMS PROGRAM FILES

The purpose of the Georgia Safe Dams Act, 1977, is to protect the health, safety and welfare of all citizens of the state by reducing the risk of dam failure, thus reducing the risk of death and injury. Under the authority of the Safe Dam Act, the Georgia Safe Dams Program maintains an inventory and classification system of all the dams in the state, an inspection and permitting system, and sets certain minimum design standards for those dams that are considered to be Category I (high hazard) structures.

The Safe Dams Program maintains a file of all known data, inspection reports, correspondence and permitted improvements to all Category I dams. Because the Margaret Phillips Dam is classified as a Category I structure, the Safe Dams Program maintains such a file for it. As part of the scope of work, we reviewed the file for the dam at the office of the Safe Dams Program.



DESCRIPTION OF DAM

The Margaret Phillips Lake Dam is an estimated 670 feet long and has a top width of 20 feet. The dam is approximately 16 feet high and impounds a lake having a surface of approximately 16 acres at normal pool with a drainage basin of approximately 860 acres (1.3 sq. mi.). The normal pool elevation of the lake is controlled by a Corrugated Metal Pipe (CMP) riser located near the center of the dam. The secondary spillway consists of two 24 inch diameter reinforced concrete culverts under the road on top of the dam.

ASSUMPTIONS USED IN OPINION OF COST

Our Opinion of Cost assumes that all of the deficiencies noted by the Georgia Safe Dams Program and our brief inspection will be addressed in the renovation of the dam and will include such items as removal of inappropriate vegetation on both the upstream and downstream slopes; flattening of both slopes to a 3:1 slope; installation of a seepage collection and removal system including a full height chimney/blanket drain and toe drain and additional spillway capacity.

It is not possible to determine the adequacy of the capacity of the spillways without a detailed hydrological and hydraulic evaluation. Such an evaluation is beyond the scope of this Order of Magnitude estimate. Therefore, based on the size of the lake and its drainage basin, we have assumed that a 20 foot wide labyrinth weir type structure will be required. It is important to understand that a more detailed engineering evaluation will be required before a more refined opinion of cost can be developed.

The construction of the labyrinth weir spillway will require the excavation of a section completely through the dam. The rectangular concrete spillway structure will be constructed along with the appropriate seepage control drains in this excavated notch in the dam and select fill will be backfilled against the structure. In order to maintain the roadway, a bridge spanning across the spillway structure will be required. The water line will be suspended under the bridge.

Using criteria established by the Georgia Safe Dams Program, the structure will have a design storm of 25% of the Probable Maxim Precipitation (PMP) based on Antecedent Moisture Condition III (AMC III) which reflects a saturated watershed from antecedent rains. This condition results in the highest runoff potential.



EASEMENTS

The work required to rehabilitate the Margaret Phillips Lake Dam will include construction of a seepage control system and flattening of the downstream slope. To accomplish this work will require construction that will be outside of the right of way and, therefore, on property owned by others. Before this work can be done, property and/or easements must be obtained from the individual property owners affected. It is important to note that the final amount of property owned by others that will be impacted cannot be determined until the final design has been completed. The cost for obtaining this property and/or easements has not been included in the Order of Magnitude Opinion of Cost.

Based on our very preliminary evaluation, the following parcels will be impacted by the areas indicated.

PARCELS IMPACTED

PARCEL NO.	AREA IMPACTED (SQ FT)
0544-037	16,000
0544-121	17,000
0544-0008a	8,700

APPENDIX

A copy of the letter from the Georgia Safe Dams Program outlining the items they have identified that must be addressed to bring the dam into compliance with Category I standards can be found in the appendix of this report.



**MARGARET PHILLIPS LAKE DAM
FAYETTE COUNTY, GEORGIA
ORDER OF MAGNITUDE
OPINION OF COST**

Our Opinion of Cost is based on limited data and does not have the benefit of detailed design and/or drawings. We have made assumptions based on our observations, available data and our experience with similar dams. A more definitive cost estimate cannot be prepared without detailed design.

The American Association of Cost Engineers recommends dividing engineering construction cost estimates into three basic categories as follows:

Order of Magnitude Estimate

This is an estimate made without detailed engineering data. Some examples would be an estimate from cost-capacity curves, an estimate using scale-up or scale-down factors and an approximate ratio estimate.

Budget Estimate

Budget in this case applies to the owner's budget and not to the budget as a project control document. A budget estimate is prepared using flow-sheets, layouts and equipment details.

Definitive Estimate

As the name implies, this is an estimate prepared from very defined engineering data. As a minimum, the data must include fairly complete plans and elevations, piping and instrumentation diagrams, one-line electrical diagrams, equipment data sheets and quotations, structural sketches, soil data and sketches of major foundations, building sketches and a complete set of specifications. The "maximum" definitive estimate would be made from "Approved for Construction" drawings and specifications.

The construction cost estimate for the rehabilitation of this dam is an Order of Magnitude estimate.



The following is a breakdown of the expected cost for the rehabilitation of the Margaret Phillips Lake Dam. The Opinion of Cost presented here is an Order of Magnitude estimate based on a Category I classification of the dam by the Georgia Department of Natural Resources, Safe Dams Program. On the following page is a breakdown of the Order of Magnitude Opinion of Construction Cost.

PROFESSIONAL SERVICES

Surveying for Design	\$ 9,000
Geotechnical Exploration	\$ 20,000
Design and Preparation of Construction Documents	\$ 45,000
Preconstruction Notification (PCN) to USACOE	\$ 3,000
State Waters Buffer Encroachment Variance Application	\$ 1,000
*Construction Administration Services	\$ 15,000
*Geotechnical Construction Monitoring	\$ 100,000

* Assumes 3 month construction monitoring

CONSTRUCTION

Opinion of Construction Cost	<u>\$ 1,216,815</u>
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TOTAL REHABILITATION COST **\$ 1,409,815**

Total Rehabilitation Cost does not include any cost for land or easement acquisition that may be required.

WALDEN, ASHWORTH & ASSOCIATES, INC.
CONSULTING ENGINEERS



**MARGARET PHILLIPS LAKE DAM
ORDER OF MAGNITUDE
OPINION OF CONSTRUCTION COST**

Description	Quantity	Units	Unit Price	Cost
Mobilization	1	LS	\$25,000.00	\$25,000
Erosion Control	1	LS	\$20,000.00	\$20,000
Clearing & Grubbing	1.5	AC	\$5,000.00	\$7,500
Control of Water	1	LS	\$30,000.00	\$30,000
Under Drain Sand	25	TN	\$50.00	\$1,250
Under Drain # 89 Stone	20	TN	\$39.50	\$790
Under Drain # 57 Stone	50	TN	\$39.50	\$1,975
Under Drain Pipe	385	LF	\$20.00	\$7,700
Concrete	400	CY	\$1,000.00	\$400,000
Earthwork	5,000	CY	\$15.00	\$75,000
Grassing	5,725	SY	\$2.50	\$14,313
Rip Rap	1,220	TN	\$80.00	\$97,600
Blanket / Chimney Drain	770	TN	\$50.00	\$38,500
Toe Drain	500	LF	\$80.00	\$40,000
Toe Drain Outlets / Clean Outs	2	EA	\$2,500.00	\$5,000
Water Line	100	LF	\$30.00	\$3,000
Paving	320	SY	\$60.00	\$19,200
Bridge	675	SF	\$200.00	\$135,000
SUBTOTAL				\$921,828
GENERAL CONDITIONS (7%)				\$64,531
OVERHEAD & PROFIT (15%)				\$138,274
CONTINGENCY (10%)				\$92,183
SUBTOTAL				\$294,988
Total Estimated Construction Cost Budget				\$1,216,815

The American Association of Cost Engineers recommends dividing engineering construction cost estimates into three basic categories: Order-of-Magnitude, Budget and Definitive Estimates. The Order of Magnitude Estimate is defined as follows:

This is an Estimate is made without detailed engineering data. Some examples would be an estimate from cost-capacity curves, an estimate using scale-up or scale-down factors and an approximate ratio estimate.



APPENDIX

Georgia Department of Natural Resources

Environmental Protection Division

Safe Dams Program

4244 International Parkway, Suite 110

Atlanta, Georgia 30354

Linda MacGregor, P.E., Branch Chief

(404) 362-2678

November 5, 2012

FILE COPY

The Honorable Herb Frady, Chairman
Fayette County Board of Commissioners
140 Stonewall Avenue West
Suite 100
Fayetteville, Georgia 30214

SUBJECT: Margaret Phillips Lake Dam
Fayette County

Dear Chairman Frady:

As we previously informed Fayette County by letter dated May 13, 2009, the subject dam has been determined to be within the jurisdiction of the 1978 Georgia Safe Dams Act (Act) by virtue of its hazard classification. A detailed visual inspection of the dam, as is also provided for by the Act, has now been performed by the Environmental Protection Division (Division). Copies of the Visual Inspection Report are enclosed. The inspection revealed that the dam does not comply with certain paragraphs of the Rules for Dam Safety (Rules), specifically the following items from Section 391-3-8-.09:

1. Paragraph (3)(a) Stability – “The design and/or evaluation of new and existing dams shall conform to accepted practices of engineering profession and dam safety industry.” Based on standard engineering practice, the downstream slope of the dam is steep and the toe of the dam is wet, which may affect the stability of the dam. There are longitudinal cracks along the road on the crest of the dam with slight displacement towards the downstream edge of the pavement. This may be a stability concern and needs investigation.
2. Paragraph (3) (d) – The dam shall have a means of draining the reservoir to a safe level. It is unknown whether there is a low-level outlet and if it is functional.
3. Paragraph (3) (e) – “All earthen embankments shall be protected from surface erosion by appropriate vegetation, or some other type of protective surface such as riprap, and shall be maintained in a safe condition.” The slopes of the dam have trees/brush that need to be removed and replaced with a low growing grass. There is severe erosion in the plunge pool where the principal spillway pipe outlets. There needs to be erosion protection around the plunge pool area and along the waterline.
4. Paragraph (3) (f) – “Each dam shall be capable of safely passing the fraction of flood developed from the PMP hydrograph depending on the sub classification of the dam.” The spillway system has to be evaluated for adequacy of the system to be able to pass the required storm event.
5. Paragraph (3) (g) – There is seepage/wet area at the toe of the dam that needs further investigation.
6. Paragraph (3) (j) – “appropriate freeboard for wave action shall be considered...” The spillway system needs to be evaluated for compliance with this standard.
7. Paragraph (4) – “Other design standards may be imposed as deemed appropriate...” The condition of the CMP through the dam is unknown and should be taken out of service.

The Rules require that you, an owner/operator of the dam, retain an experienced professional engineer recognized as an "Engineer of Record" to assist you with bringing the dam into compliance with the Act. Approved Engineer of Record lists are enclosed for your information. The dam may be brought into compliance by either addressing the noted deficiencies or by addressing the downstream hazard potential. The options are as follows:

- **Upgrade the dam:** Your Engineer of Record must perform a detailed investigation of the noted deficiencies and design remedial measures as necessary. After review and approval of the detailed investigation report, construction plans and specifications, and the schedule for any necessary improvements, we will recommend that the Director of the Division (Director) issue a Construction and Operation Permit for the dam. Once the remedial measures have been implemented, the dam will remain a permitted Category I structure and will be inspected on a regular basis to ensure that it is being maintained properly and remains in compliance. You will be required to perform your own routine inspections, maintain the dam and address any future deficiencies if they arise.
- **Breach the dam:** You will be required to fill out a breach application, and your Engineer of Record will be required to submit design plans for safely breaching the dam, such that it can no longer retain water. Once the breach plans have been approved and the dam has been breached, you will have no further responsibilities related to the Act and Rules.
- **Modify the dam to remove the downstream flood risk:** Your Engineer of Record must perform an extended dam failure flood study to identify all potential structures at risk downstream, such as homes, businesses, churches, etc., and submit design plans for the necessary modifications to the dam that would prevent flooding at these structures in the event of a dam failure. It should be noted that for classification purposes the Division typically only identifies one structure at risk. There may be additional structures in the dam failure flood zone. Once the flood study and design plans have been approved and the modifications implemented, the dam may be reclassified either Category II (low hazard) or exempt at the Director's discretion. A permit from the Division will no longer be required for operation of the dam. The classification may change if future development occurs in the dam failure flood zone.
- **Remove or modify the downstream structure(s) at risk:** Your Engineer of Record must perform an extended dam failure flood study to identify all potential structures at risk. All identified structures will have to be permanently removed from the dam failure flood zone or in some cases may be flood-proofed (design plans for flood-proofing will have to be reviewed and approved). Once the structures have been removed or adequately flood-proofed, the dam may be reclassified Category II at the Director's discretion, and a permit from the Division will no longer be required for operation of the dam. You should be aware that the classification may change if future development occurs in the dam failure flood zone.

Your engineer should be able to provide you with the feasibility of each option. All options require that your engineer inspect any necessary work as it is being performed. After the work is completed, your engineer must certify in writing that the work was performed in accordance with any approved plans and specifications. It is important that you do not attempt to modify the dam yourself. Often an improper repair attempt can do more harm than good, and the law requires that modifications to Category I dams be developed by an engineer and receive prior approval from the Division.

Please inform the Division's Safe Dams Program in writing at 4244 International Parkway, Suite 110, Atlanta, Georgia, 30354 before **January 15, 2013** with the name of the engineer you have retained to assist you with bringing the dam into compliance. It would be our recommendation that partial owners of the same dam work together to retain a common engineer. An engineering report must be submitted no later than **April 15, 2013**.

The files of all dams, which are regulated by the Division, are public information. Representatives of engineering firms interested in remedial dam design work may see a copy of this letter in our files and contact you offering a proposal for the design work. The Division does not recommend any engineering firm to a dam owner. We suggest that you solicit proposals from several firms (a minimum of three) and then compare the experience and prices in making your selection.

If you have any questions about the contents of the enclosed report or your responsibilities with regard to the Act and Rules, please contact the Safe Dams Program at 404/362-2678, or write us and we will be glad to address your questions.

Sincerely,



Dallon Thomas Woosley, P.E.
Program Manager
Safe Dams Program

DTW:ks

Enclosures

cc: Thomas Concrete of Georgia, Inc.