



March 27, 2017

Mr. Joe Starr, PE
Senior Consultant
Hart & Hickman, PC
3334 Hillsborough St.
Raleigh, NC 27607

Re: Preliminary Engineering Evaluation
Town of Chapel Hill – American Legion - Pond

Dear Joe:

Garrett & Moore, Inc. (Engineer) is pleased to provide this letter report summarizing our review of the pond at the American Legion property in the Town of Chapel Hill (the Town). The Town is considering purchasing the land and desires to understand the benefits and consequences of keeping and maintaining the pond versus breaching the pond's dam and removing the pond should they take ownership of the property.

We completed a review of the current Chapel Hill stormwater master plan and stormwater ordinances as they pertain to the pond, a review of NC Dam Safety criteria and rules as they pertain to the pond, and identification of engineering tasks (and budgets) that would be required for a detailed evaluation of the pond options (keep & maintain vs. remove). The purpose of this preliminary engineering step was for us to develop a mutual understanding of the goals of the project and to identify regulatory and engineering requirements and costs necessary to prepare a comprehensive evaluation for the pond options.

Site / Pond Description

The American Legion property is located at 1714 Legion Road in Chapel Hill, NC. The property is 35.12 acres and includes an approximate 2.7 acre pond. Information regarding the pond's dam height and storage capacity are not readily available to the author at this time and the pond does not appear in the current (November 2016) NC Dams Inventory.

Preliminary review of the property indicates it is within Chapel Hill's town limits, is located within the Lower Booker Creek drainage basin, and is within Chapel Hill's Watershed Protection District and the greater Jordan Lake Watershed Protection District. The pond is not located within the floodplain. According to the Town of Chapel Hill Interactive Map, the pond outfall appears to form an intermittent stream, which flows generally southwest as a tributary to Booker Creek.

Preliminary Engineering Evaluation

Task 1 – Review Chapel Hill's Stormwater Masterplan and Applicable Ordinances.



Figure 1. The American Legion Property in Chapel Hill.

The American Legion property (**Figure 1**) site contains an existing earthen dam, one stream along the northeastern boundary of the site, another stream leading out of the dam from its discharge point, and protected buffer areas around the dam and the pond it encloses, as well as the northeastern stream (**Figure 2**).

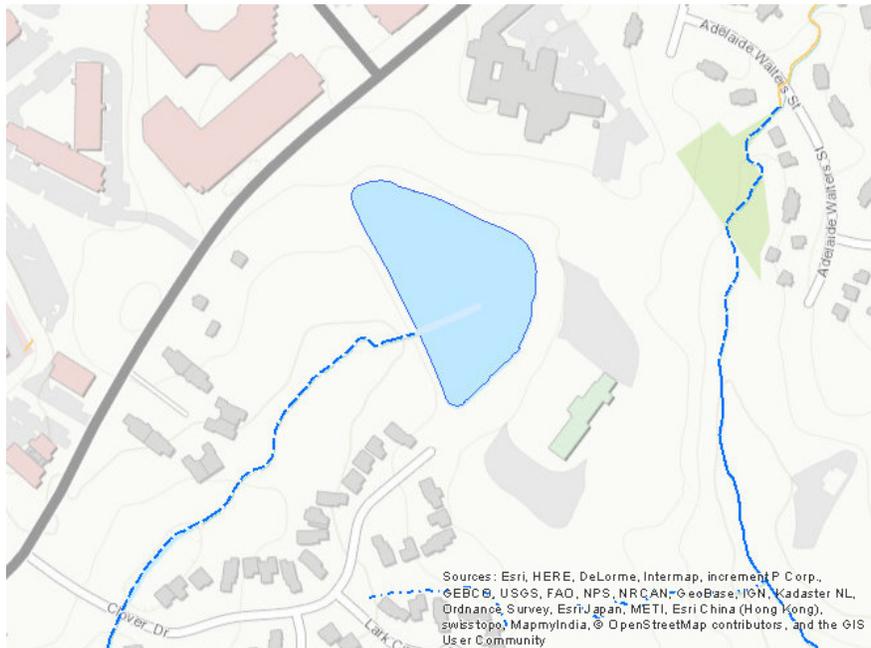


Figure 2. Property streams.

The conditions of the dam are as follows:

- Upstream: The area upstream of the dam is lined with trees up to 17-inches in diameter, and there is freeboard from about 4-feet to 2-feet.
- Crest: The crest of the dam ranges from 8- to 10-feet wide and is approximately flat. This area does not contain any trees, but contains some visible tree root growth.
- Downstream: at the downstream edge, the dam is about 15-feet high at the center alignment. The downstream slope of the dam is between 1.5:1 and 2:1, and is lined with trees up to 21-inches in diameter. An 8-inch PVC overflow device extends out of the southern face of the dam, near the center alignment. This overflow device has separated at a joint, and erosion at this break has created a hole that is about 4-feet deep and 3-feet wide, as well as a narrow below-grade channel between the 4-foot hole and the toe of the dam.
- Toe: The toe of the dam contains trees of varying size, up to 21-inches in diameter. There is no energy dissipater or geotextile at the outlet of the PVC device, and as such there is minor erosion at this point. There are no other major signs of erosion or seepage.
- Groins: Trees cover the groins of the dam. There are no signs of erosion or seepage.



Figure 3. Buffers on the American Legion property.

The stream along the northeastern boundary of the site is perennial at its eastern-most point, and transitions into an intermittent stream at the northern edge of the property. The protective buffer around the perennial portion of this stream is 150-foot wide (50-feet for stream side, 50-feet for managed use, and 50-feet for the upland region). The buffer around the intermittent portion is 50-foot wide, for stream side only. The Town has determined that a 50-foot buffer applies to the pond (**Figure 3**).

The stream leading from the outlet of the dam is entirely intermittent, based on discharges from the dam. GIS data does not identify a protected buffer for this stream (**Figure 3**).

The site does not appear to be part of the Chapel Hill Stormwater Management Program Master Plan, nor to contain impaired waters or monitoring sites, so the Town’s stormwater rules do not currently apply.

A Stewart Engineering boundary survey demarcated the pond contained by the dam, the northeastern stream, and the intermitted stream from the dam outlet as wetland features on the site. Based on the Hart-Hickman review of applicable stream buffers and wetland rules, maintenance of the on-site dam is an activity that can be exempted from the limitations imposed upon the Wetlands Protection District.

The U.S. Army Corps must make a jurisdictional determination regarding the pond, as to whether or not it is a Water of the United States. The current indication is that it is non-jurisdictional.

Task 2 – Review NC Dam Safety Criteria and Rules as They Pertain to the Pond.

Garrett & Moore reviewed the following rules as they apply to the site:

- Dam Safety Law of 1967 (NCGS 143-215.23 through 37)
- Senate Bill 1004
- NCAC Title 15A Subchapter 2K: Dam Safety

The Engineer has determined, based on the area downstream of the dam in question, that the hazard associated with the dam should be classified as ‘High’ (**Table 1**). This should be verified by the state.

Table 1. Dam hazards classification.

Hazard Classification	Description	Quantitative Guidelines
Low	Interruption of road service, low volume roads	Less than 25 vehicles per day
	Economic damage	Less than \$30,000
Intermediate	Damage to highways, Interruption of service	25 to less than 250 vehicles per day
	Economic damage	\$30,000 to less than \$200,000
High	Loss of human life*	Probable loss of 1 or more human lives
	Economic damage	More than \$200,000
	*Probable loss of human life due to breached roadway or bridge on or below the dam.	250 or more vehicles per day

Two flow charts delineating the procedural paths for the actions of interest to this evaluation: 1) Repair / modify a dam, and 2) Breach a dam, are attached at the end of this letter. The flow charts outline the procedures/steps to follow for the two scenarios under consideration.

Whether or not a permit is required per the Dam Safety Rules, the States procedures for the ensuing work will be followed.

Task 3 – Engineering Task Budgets & Construction Planning Cost Estimates.

Preliminary planning budget cost estimates for the construction and maintenance work anticipated for both pond options are presented in Tables 2 and 3. Please note that these are preliminary estimates for the dam maintenance only. A more refined cost estimate would be needed if the project moved forward to fully capture costs that extend beyond dam maintenance (e.g., fish removal and restocking, a safety shelf, a pier, etc.).

Figure 4 and Figure 5 provide preliminary conceptual plans for each option, which were the basis for the quantity estimates in the cost evaluations.

In following the State's procedures for the work, both the Repair and the Removal options will require that the pond be drained and the dam be breached.

If the Repair option is chosen, 401/404 permits generally do not apply, but section 5.18.7 (Requirements for Uses and Activities) of the Chapel Hill Riparian Buffer Protection Ordinance should be abided by. The riser barrel structure of the dam will be replaced and a filter diaphragm, an energy dissipater, and a drainage blanket will be added. The preliminary budget estimate for the Repair option is approximately \$400,000.

If the Removal option is chosen, the Army Corps jurisdictional determination of the pond will affect the scope and the timeline of the project. If non-jurisdictional, then just as for the Repair option, 401/404 permits do not apply but the Use table of the Buffer Protection Ordinance should be followed. If jurisdictional, we can proceed with the breaching of the dam, but the pond must be left for several months (6 to 12, or longer, to allow for at least a growing season) to see if the pond is fed by a groundwater recharge or if a wetland is reestablished. If a stream or wetland emerges, then we will need to proceed with another jurisdictional determination and 401/404 permitting prior to filling the pond. As before mentioned, the current indication is that it is non-jurisdictional. If the pond is considered non-jurisdictional by the Corps, the preliminary budget estimate for the Removal option is approximately \$400,000. If the Corps determines that the pond is jurisdictional, then the cost to remove the pond could approach \$600,000 or more.

Future work on the pond and earthen dam includes obtaining the preliminary jurisdictional determination from the Army Corps and proceeding with the Repair or the Removal of the dam and pond as determined by the Town.

In closing, we appreciate the opportunity to assist you with this project. If you have any questions or need additional information, please call.

Sincerely,

GARRETT & MOORE, INC.



Bernie Garrett, P.E.

Table 2. Dam Repair preliminary budget estimate.

Dam Repair					
No.	Item	Quantity	Unit	Unit Cost	Cost
1	Dam Engineering & Permitting	1	LS	\$ 25,000	\$ 25,000
2	401 / 404 Permitting	1	LS	\$ 3,000	\$ 3,000
3	Compensatory Mitigation (401 / 404)	1	LS	\$ -	\$ -
4	Bid/Construction Documents	1	LS	\$ 25,000	\$ 25,000
5	Silt Fence - Double Row	700	LF	\$ 10	\$ 7,000
6	Sediment Trap	1	LS	\$ 10,000	\$ 10,000
7	Dewatering Pump	1	LS	\$ 10,000	\$ 10,000
8	Coffer Dam / Dewatering Pit	1	LS	\$ 15,000	\$ 15,000
9	Clear Trees on D/S Slope of Dam	1.5	AC	\$ 7,000	\$ 10,500
10	Remove & Dispose Stumps on D/S Slope of Dam	1.5	AC	\$ 3,000	\$ 4,500
11	Pipe Trench Excavation/Backfill	250	CY	\$ 15	\$ 3,750
12	Riser Barrel Structure	1	LS	\$ 40,000	\$ 40,000
13	Filter Diaphragm	1	LS	\$ 10,000	\$ 10,000
14	Energy Dissipator	1	LS	\$ 5,000	\$ 5,000
15	Select Fill - Drainage Blanket	5,000	CY	\$ 20	\$ 100,000
16	Backfill (Off-site Soils)	2,500	CY	\$ 15	\$ 37,500
17	Hydroseeding	1.5	AC	\$ 5,000	\$ 7,500
18	Surveying	1	LS	\$ 5,000	\$ 5,000
19	Engineer Site Visits/Certification	1	LS	\$ 20,000	\$ 20,000
	Subtotal				\$ 338,750
	Contingency	20%		\$ 67,750	\$ 67,750
Total Budget Estimate					\$ 406,500

Table 3. Dam Removal preliminary budget estimate.

Dam Removal					
No.	Item	Quantity	Unit	Unit Cost	Cost
1	Dam Engineering & Permitting	1	LS	\$ 25,000	\$ 25,000
2	Individual Permit (404 Corps permit)	1	LS	\$ 40,000	\$ 40,000
3	Pond Mitigation (404 Jurisdiction)	1.5	AC	\$ 80,000	\$ 120,000
4	Bid/Construction Documents	1	LS	\$ 25,000	\$ 25,000
5	Silt Fence - Double Row	700	LF	\$ 10	\$ 7,000
6	Sediment Trap	1	LS	\$ 10,000	\$ 10,000
7	Dewatering Pump	1	LS	\$ 10,000	\$ 10,000
8	Clear Trees on D/S Slope of Dam	1.5	AC	\$ 7,000	\$ 10,500
9	Remove & Dispose Stumps on D/S Slope of Dam	1.5	AC	\$ 3,000	\$ 4,500
10	Excavate and Stockpile Unsuitable Soils	10,000	CY	\$ 8	\$ 80,000
11	Excavation/Backfill (On-site Soils)	10,000	CY	\$ 10	\$ 100,000
12	Hydroseeding	4.2	AC	\$ 5,000	\$ 21,000
13	Surveying	1	LS	\$ 5,000	\$ 5,000
14	Engineer Site Visits/Certification	1	LS	\$ 30,000	\$ 30,000
	Subtotal				\$ 488,000
	Contingency	20%		\$ 97,600	\$ 97,600
Total Budget Estimate (if pond is deemed jurisdictional by Corps)					\$ 585,600
Total Budget Estimate (if pond is deemed non-jurisdictional by Corps)					\$ 393,600

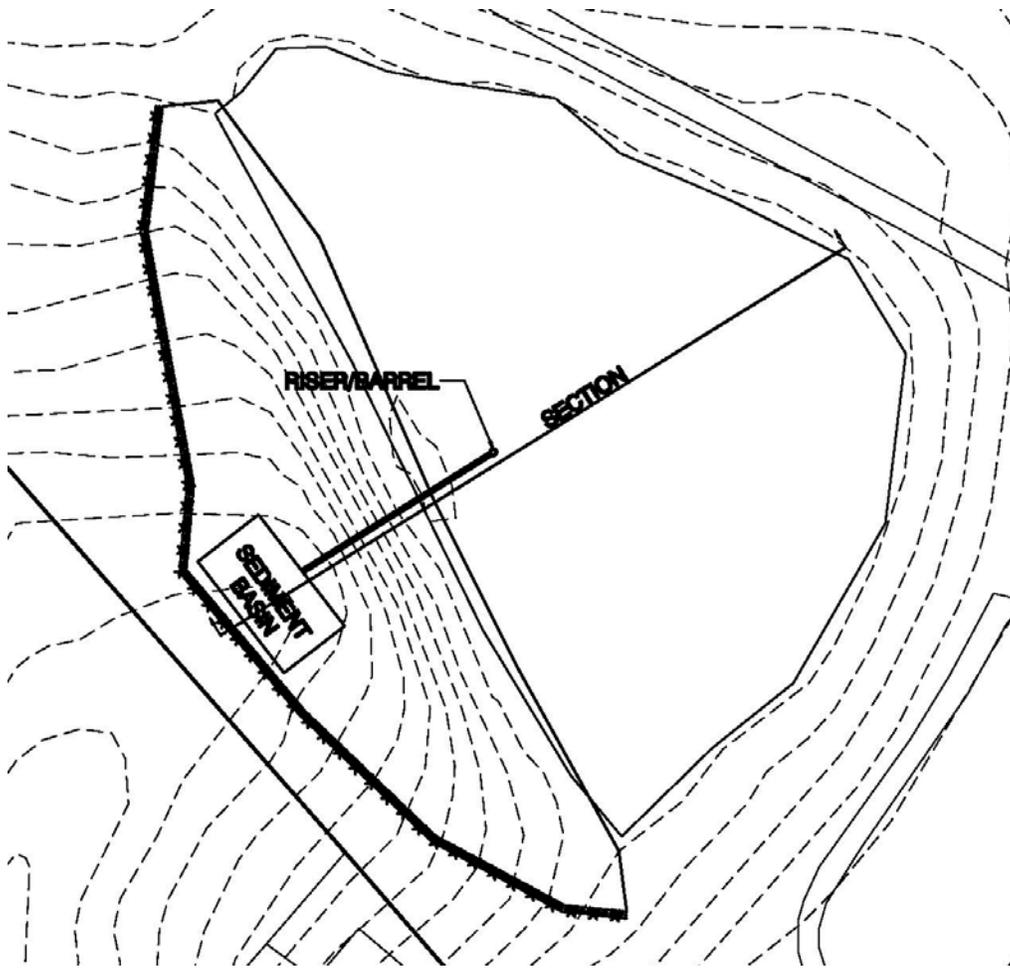


Figure 4. Dam Repair Option plan view.

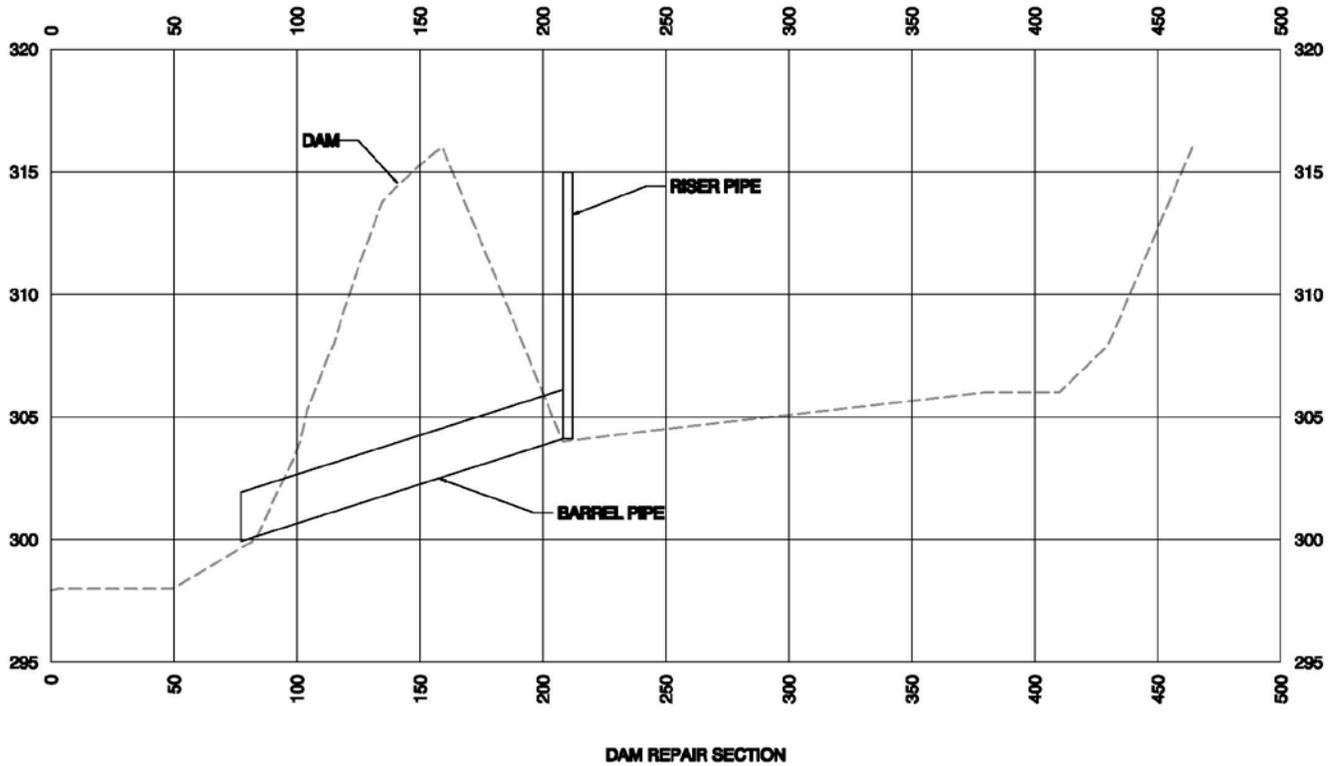


Figure 5. Dam Repair Option profile view.

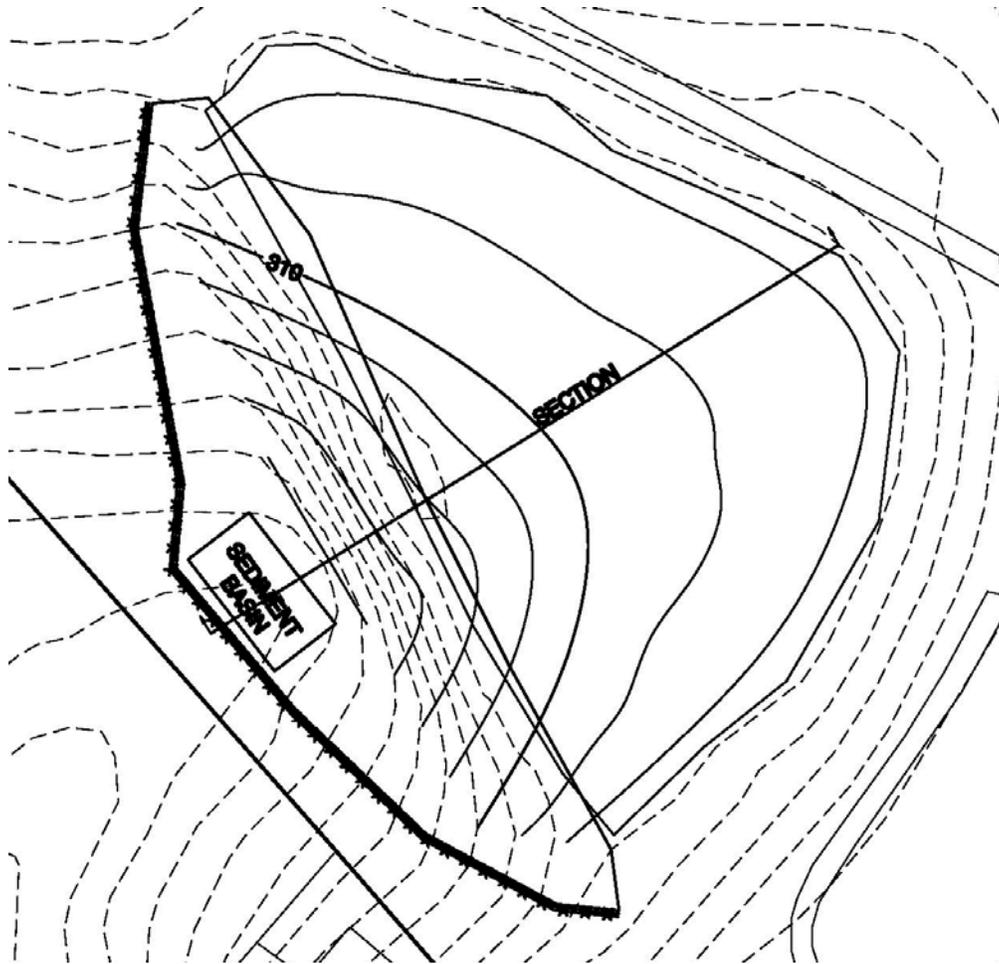


Figure 6. Dam Removal Option plan view.

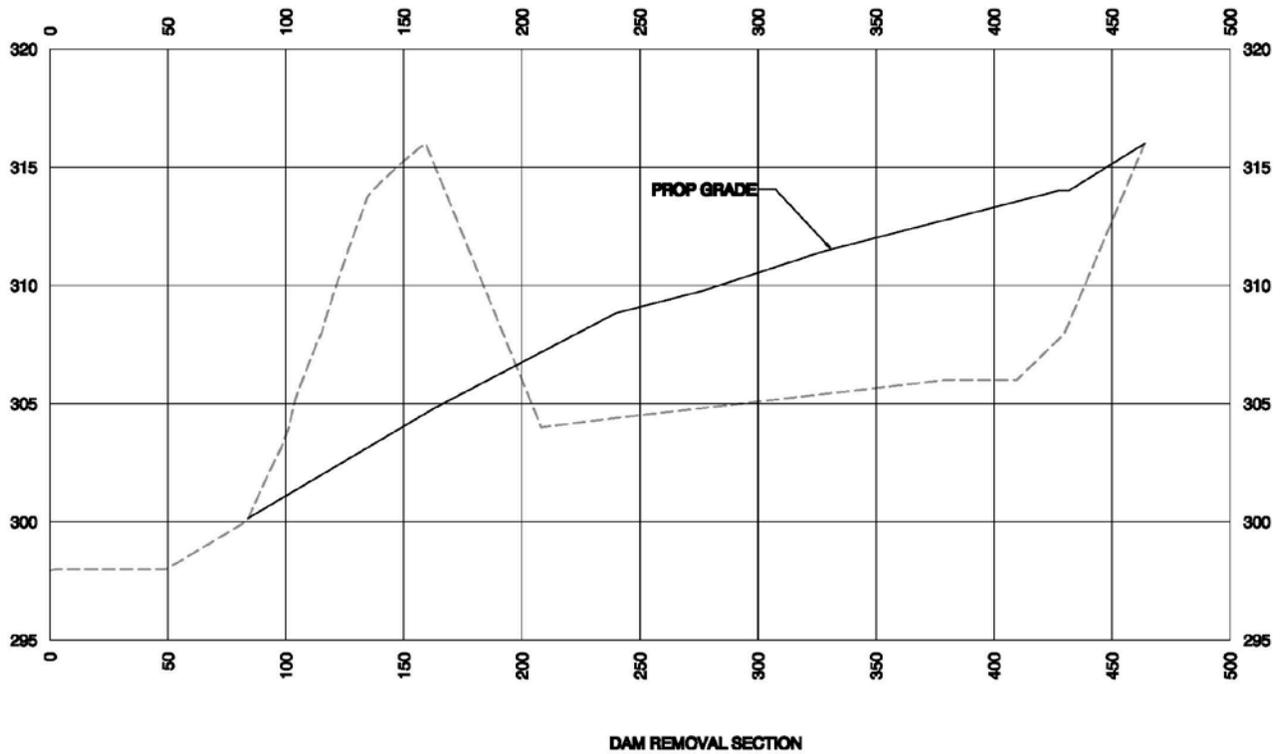
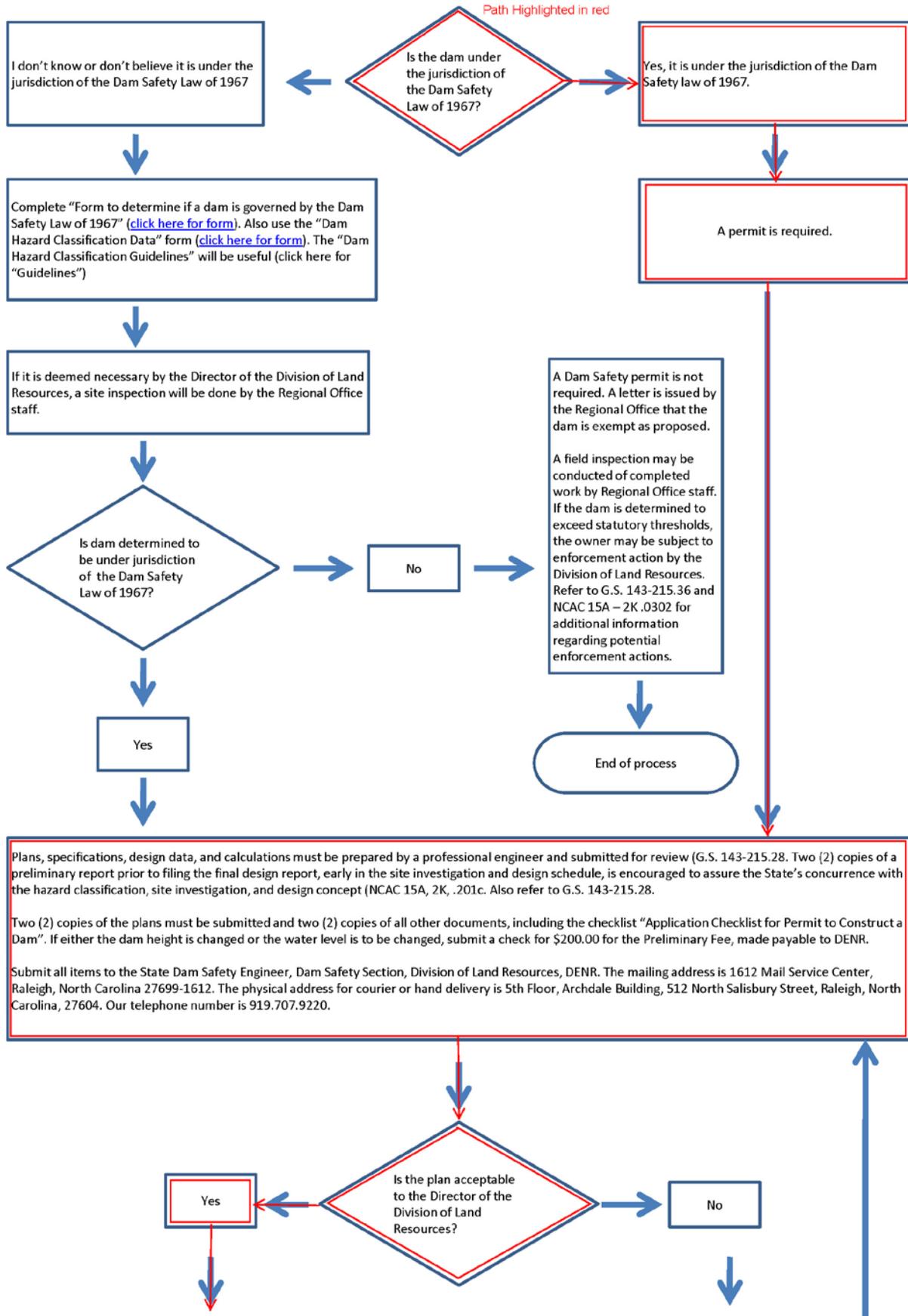


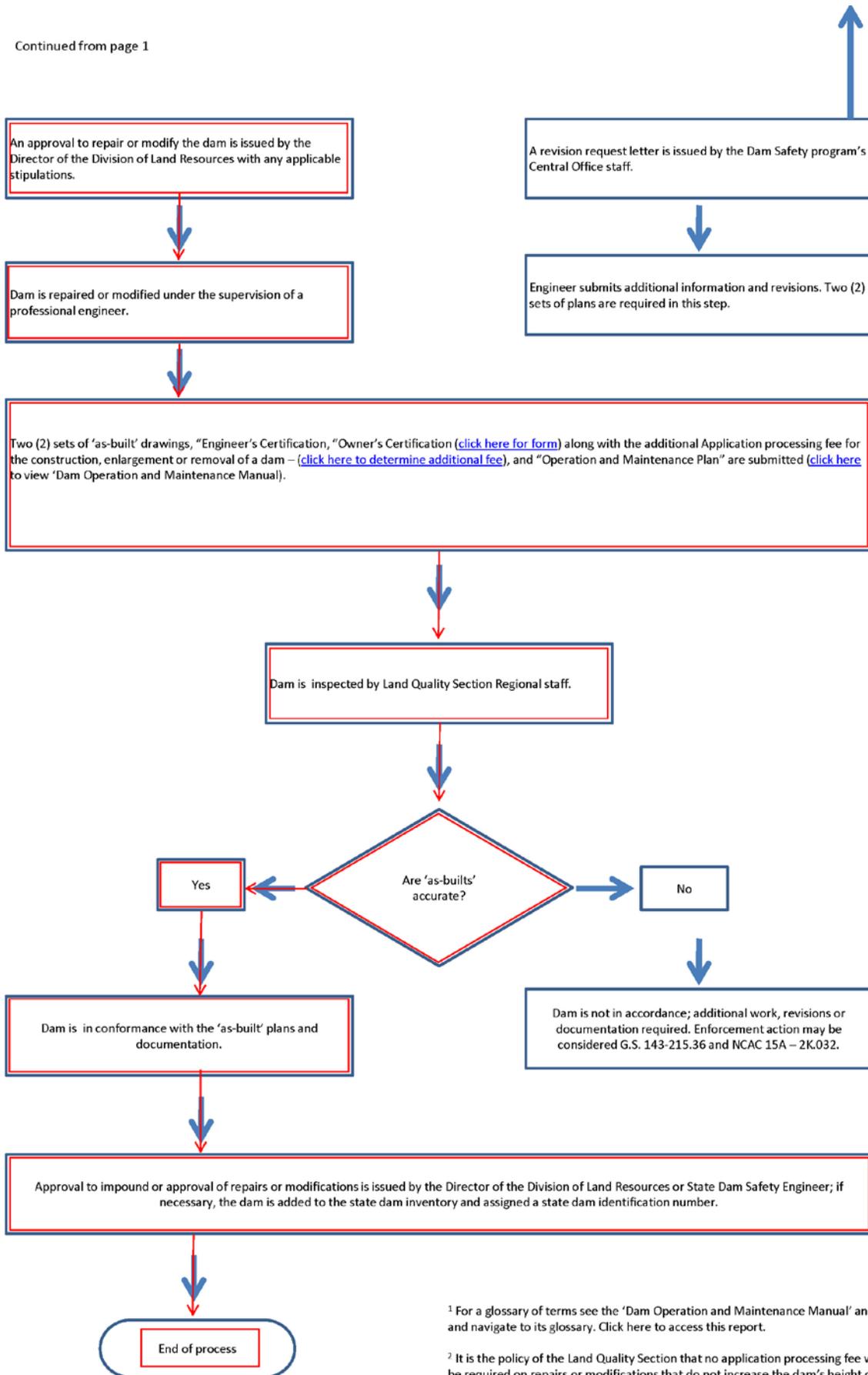
Figure 7. Dam Removal Option profile view.

Procedure to repair or to modify a dam

Rev. 3.0 – 25 February 2013



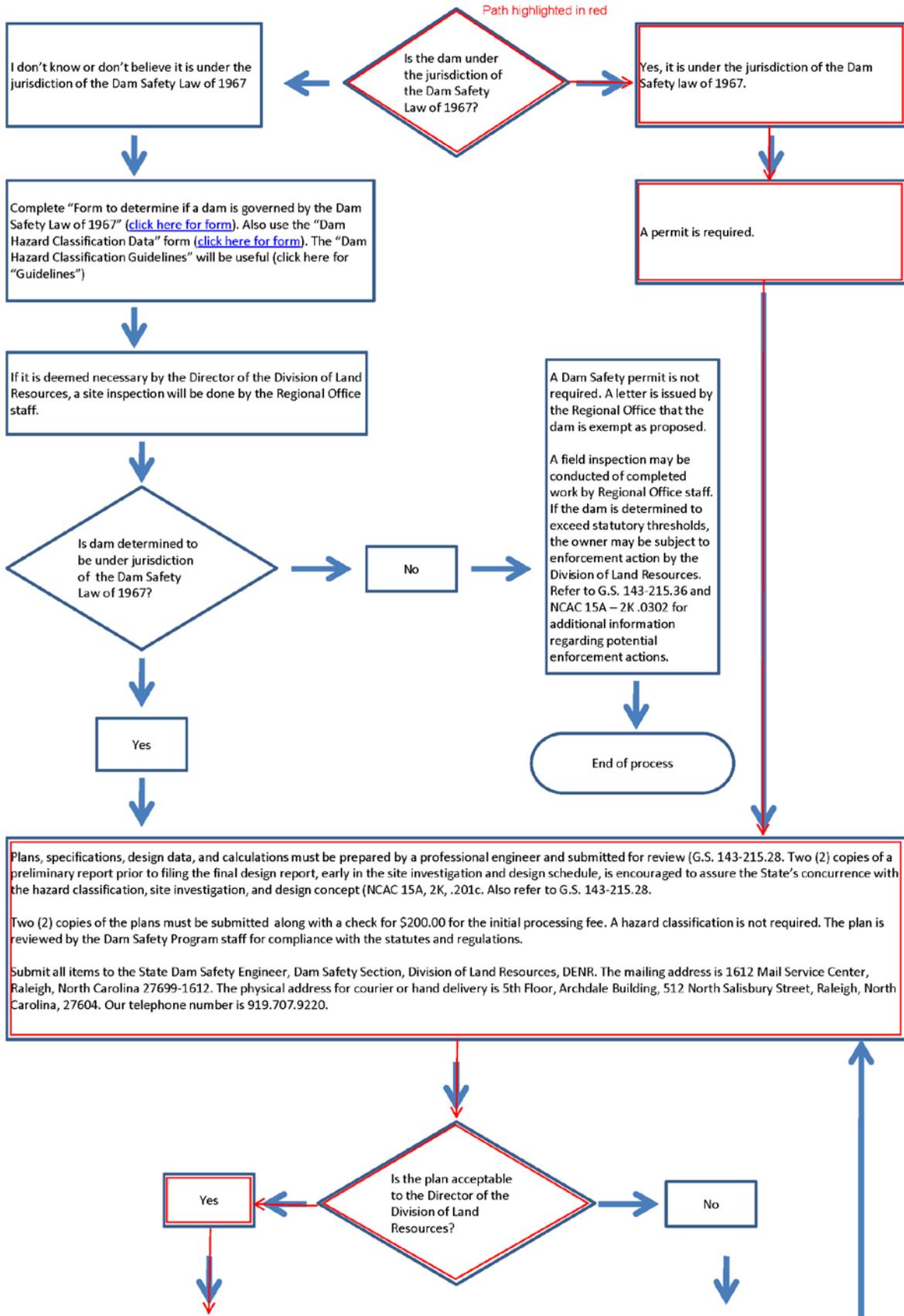
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¹ For a glossary of terms see the 'Dam Operation and Maintenance Manual' and navigate to its glossary. [Click here to access this report.](#)

² It is the policy of the Land Quality Section that no application processing fee will be required on repairs or modifications that do not increase the dam's height or the impoundment's normal pool.

Procedure to breach a dam ¹
 Rev. 3.0 – 25 February 2013

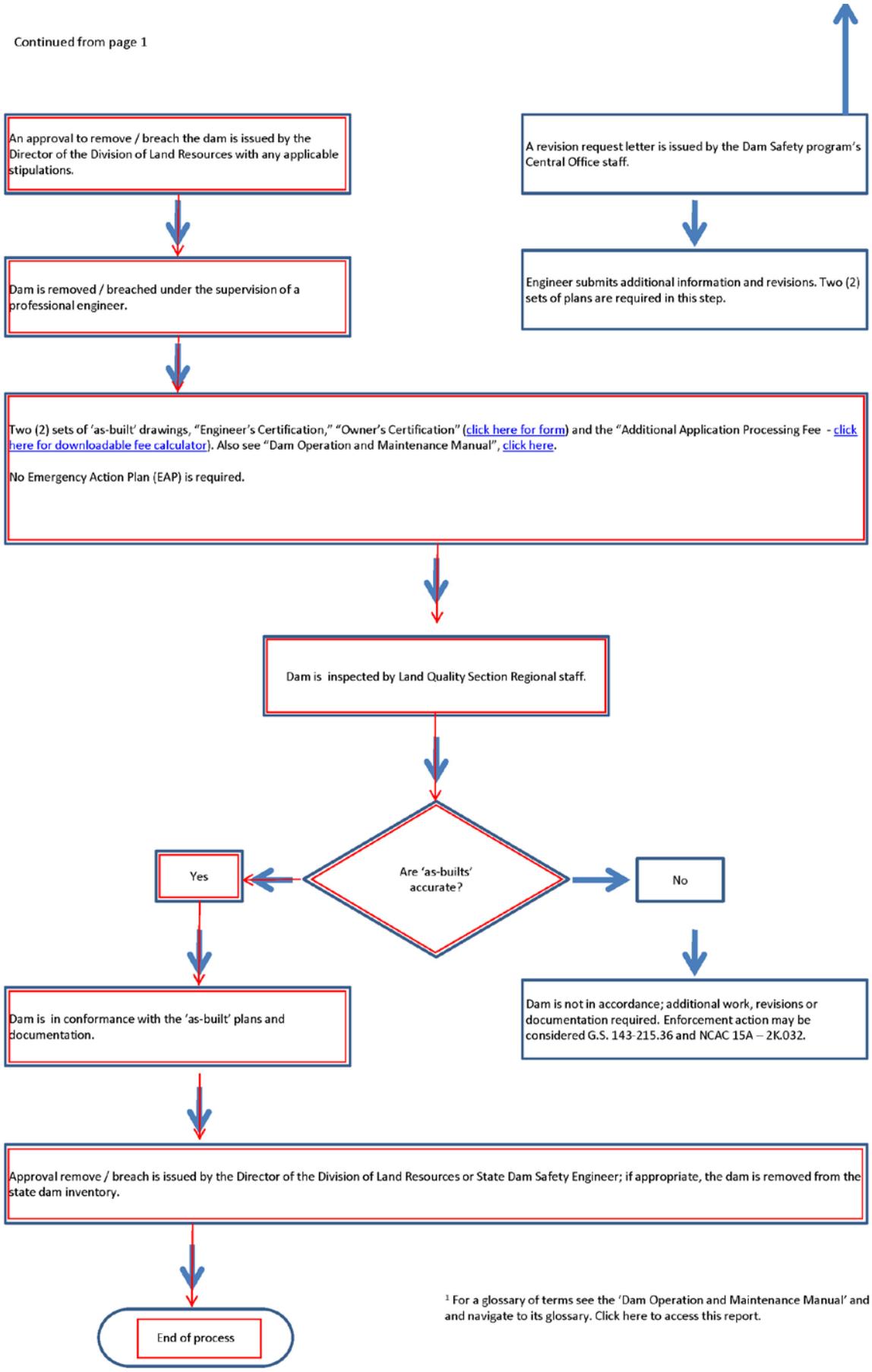


Plans, specifications, design data, and calculations must be prepared by a professional engineer and submitted for review (G.S. 143-215.28. Two (2) copies of a preliminary report prior to filing the final design report, early in the site investigation and design schedule, is encouraged to assure the State's concurrence with the hazard classification, site investigation, and design concept (NCAC 15A, 2K, .201c. Also refer to G.S. 143-215.28.

Two (2) copies of the plans must be submitted along with a check for \$200.00 for the initial processing fee. A hazard classification is not required. The plan is reviewed by the Dam Safety Program staff for compliance with the statutes and regulations.

Submit all items to the State Dam Safety Engineer, Dam Safety Section, Division of Land Resources, DENR. The mailing address is 1612 Mail Service Center, Raleigh, North Carolina 27699-1612. The physical address for courier or hand delivery is 5th Floor, Archdale Building, 512 North Salisbury Street, Raleigh, North Carolina, 27604. Our telephone number is 919.707.9220.

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¹ For a glossary of terms see the 'Dam Operation and Maintenance Manual' and and navigate to its glossary. Click here to access this report.