

EXHIBIT A – FAYETTEVILLE SCOPE OF SERVICES

The following scope of services is for preliminary environmental and engineering evaluations of the following dams in Fayetteville:

1. Strickland Bridge Dam (NC05990)
2. Upper Rayconda Dam (NC05621)
3. Lower Rayconda Dam (NC00035)
4. Arran Lakes Dam (NC01144)

The purpose of the dam evaluations is to determine an opinion of probable project cost for the repair/rehabilitation of these four (4) dams to repair damage caused by Hurricane Matthew. The evaluations will include measures to bring the dams into compliance with NCDEQ dam safety regulations and guidelines, including hydraulic capacity of spillways (15A NCAC 02k).

Preliminary environmental evaluations will be required at each site to determine potential mitigation costs, if any, along with other permit requirements. Criteria for determining property owners that will benefit, and to what level, if these dams are repaired will be included along with recommendations for special assessments to those properties.

These dams are all registered dams under NCDEQ jurisdiction and are owned by private home owner associations.

A brief site visit was performed for the four structures by FNI to ascertain the nature of damage and general setting at the dam sites for scope formulation. All four of these structures were damaged to varying degrees during hurricane Matthew.

- Emergency repairs have been conducted on Upper Rayconda Dam which included installation of a 48-inch RCP culvert to pass flows from the upper dam to the lower reservoir, new earthfill, repair and grading of a portion of the upstream and downstream slopes, and replacement of Siple Avenue across the dam.
- Lower Rayconda Dam has severe headcutting damage from widespread overtopping. Ancon Drive across the dam has been closed on both ends of the dam for public safety reasons, and no repairs have been made to the dam.
- Strickland Bridge Dam overtopped on the left abutment in the area of the principal spillway and at the right abutment. The HOA has repaired headcutting around the right abutment as a temporary repair and has lowered the pool level.
- Arran Lakes Dam sustained a complete breach.

BASIC SERVICES:

These dams are scoped as one project from an administrative standpoint, but separate stand-alone deliverables will be developed for each dam. The services outlined below will be performed on a lump sum basis as Basic Services:

- A. Field Surveys
- B. Environmental Evaluation
- C. Hydrologic and Hydraulic (H&H) Evaluation*
- D. Rehabilitation Alternative Development*
- E. Technical Memorandum*
- F. Project Management and Administration
- G. Benefited Property Owners and Special Assessment Criteria
- H. Simplified Breach Analysis

* For Arran Lakes, these tasks will only apply to the review and verification of WK Dickson's Arran Lakes Dam Evaluation dated 11/28/16. The City will be responsible for obtaining and providing the model from this study.

A. Field Surveys

A ground survey by a North Carolina licensed professional surveyor will be conducted to gather site information pertinent to and sufficient for conceptual alternative development and cost estimating purposes. The survey data will be used to supplement any survey data available and provided by the City and publicly available LiDAR data. The surveys will include the following items:

1. Spillway and outlet works locations, elevations, and pertinent dimensions (accessible by land)
2. Locations and dimensions of guardrails;
3. Pertinent roadway data including edge of pavement and centerline elevations, curb locations and elevations;
4. Locations and elevations of storm drain pipes and structures
5. Topography of dam including upstream slope, crest, downstream slope, and toe area (approx. 25 feet from toe) to include current conditions of damage. This area will include the abutment areas to a sufficient distance to evaluate grades for possible dam raise scenarios;
6. Location of overhead or other utilities that would be affected by rehabilitation construction or may be pertinent to alternative design selection;
7. Spot slab elevations of homes directly adjacent to dam abutments;
8. Channel information including low point and toe and top of bank in direct vicinity of toe of dam (50 feet or less from toe).

We assume that the City will provide any additional available topographic and utility information in the direct vicinity of the dams. All horizontal surveys will be tied to the NC State Plane Coordinate System (NAD 1983) and all vertical surveys will be referenced to NAVD 1988. FNI will furnish a copy of all surveys to the City in ASCII and AutoCAD format.

B. Environmental Evaluation

A significant portion of project costs for dam repairs could be related to mitigation fees for impacts to wetlands that may have formed from drained lakes. If wetlands have established within drained lakes, delineations will be needed to determine to what extent. To determine the potential environmental impact, FNI will perform on-site stream and wetland delineations and involve regulatory agencies as needed. The Environmental Evaluation scope will include the following items:

1. Consult with U.S. Army Corps of Engineers (USACE) to verify within what timeframe refilling of the lake will be permitted without additional mitigation costs if wetlands have formed.
2. Perform on-site stream and wetland delineations and collect GPS location of jurisdictional features.
3. Submit Preliminary Jurisdictional Determination (JD) request forms and figures to U.S. Army Corps of Engineers (USACE) if needed.
4. Coordinate with USACE as needed to include up to one (1) site visit with Corps representative for final JD if needed.

C. Hydrologic and Hydraulic Evaluation

It is our understanding that all four of the dams were overtopped during Hurricane Matthew, indicating that none of the structures were able to pass the flow from that precipitation event which was estimated somewhere between a 500-year and 1000-year event. All four dams are classified as Small in size, and all but Lower Rayconda are registered High Hazard dams. In order to meet NCDEQ inflow design flood (IDF) criteria, High Hazard dams must contain or safely pass the runoff associated with the 1/3 Probable Maximum Flood (PMF). Lower Rayconda Dam, is shown to be a Small, Low Hazard exempt (due to height) structure, therefore there is no State regulatory requirement for an IDF. However, we recommend, and will perform the evaluation of Lower Rayconda, as if it were a regulatory structure and use the 50-year storm as its IDF.

In order to assess what is required to bring the dams into compliance with NCDEQ IDF standards, a hydrologic and hydraulic analysis (H&H) must be performed for each structure. The following tasks will be included:

1. Delineation of watershed using available LiDAR data;
2. IDF determination: SCS unit hydrograph methodology will be used to generate hydrographs and peak flows for all four structures. We will utilize HEC-HMS to model storms of various return periods and durations. Modeling of the watershed will be based on flows derived from current land use as well as flows for future land use per City zoning information. We will develop the models using the following criteria:
 - a. Six-hour rainfall design storm for 2, 5, 10, 25, 50, 100-year and 1/3 PMP events.
 - b. Rainfall input in 5-minute increments with a calculation time step sufficient to capture peak flow and time to peak for the catchments and confluences contained in the model.
 - c. Storm flows from each analyzed design storms will not be increased from pre-hurricane conditions.

3. Hydraulic Analyses: Analyses and calculations to evaluate hydraulic performance of existing spillway structures (if operable), and if needed, determine sizes of new structures needed to pass the IDF.
 - a. Hydraulic Analysis will not be conducted downstream of the dam.
 - b. Flow rates downstream will not be increased from pre-hurricane conditions for any analyzed design storm.
 - c. Modeling is intended to analyze detention effects of dam alternatives and not considered a watershed-wide model.
 - d. A dam raise scenario that results in extensive modeling upstream to tie water surface elevations is excluded from this scope.

D. Rehabilitation Alternative Development

FNI will utilize information from Tasks A and C to evaluate conceptual rehabilitation alternatives. There may be several alternatives available for each dam to repair damage and upgrade the dams to NCDEQ standards, but to limit the scope and corresponding fee, we will limit each dam to no more than four (4) alternatives. A “No Action” and “Dam Removal” will be included in the four alternatives with up to two rehabilitation alternatives. Each alternative will be described with a narrative of the components of the alternative, pros and cons of each alternative considering constructability, land rights/easements, permitting, and cost. Conceptual costs will be developed for budgetary purposes only and should be considered rough-order-of-magnitude estimates (+/- 30%). Costs will include estimates for construction, engineering, permitting, and easements. Conceptual drawings/figures will be developed in GIS to visually depict the alternatives. We have estimated no more than one (1) drawing per alternative, per dam.

Within the pros and cons development, the public function of a restored lake will be included. This may include items such as stormwater detention, public accessibility, etc.

Since these are private dams and it is assumed the City has no information on these dams, this task will also include research of NCDEQ dam safety files for any pertinent reports or drawings that may affect the alternatives development.

E. Technical Memorandum

A Technical Memorandum will be developed for each dam and will include all analyses and evaluations, drawings/figures, and cost estimates. Each report will be submitted at one draft stage for City review and comment. A final Technical Memorandum will be prepared for each dam incorporating the review comments from the City. One (1) meeting with the City will be held to review final deliverables.

F. Project Management and Administration

Project management will consist of project kick-off meetings, internal project administration and invoicing, weekly updates, and monthly one-page reports for the project assuming one lump sum project with four phases, one for each dam.

G. Benefited Property Owners and Special Assessment Criteria

With input from City staff, criteria will be established for each of the four dams to determine who the benefited property owners are within each watershed. A listing of those property owners recommended for special assessment, and at what rate, will be established. Scope for this task includes:

1. Initial meeting with the City to discuss benefited property owner criteria for each dam and each alternative reported in Item E.
2. Upon final selection of ranking criteria, FNI will implement ranking system within the watershed to identify the benefited property owners and prepare a figure and listing of those properties.
3. FNI will again meet with City staff to determine Special Assessment criteria and varying weights to be given to various properties (if any).
4. FNI will prepare a memorandum with recommendations for the Special Assessment rate within the watershed for each property impacted.
5. Mapping on boards and handouts will be prepared for presentations at Council Meetings and Public Meetings.
6. Attend and present findings at up to two (2) Council Meetings.
7. Facilitate up to four (4) public meetings – one (1) per dam identified in this scope.

H. Simplified Breach Analysis

The City has requested dam break inundation mapping for each of the dams in conjunction with the “No Action” case. This will not apply to Aaran Lakes Dam which remains in a breached condition. FNI intends to perform this task using the North Carolina Simplified Inundation Maps for EAPs procedures. This has been included in the time and materials special services because there may be cases where the dam owner may be able to provide a usable inundation study, thereby reducing the scope of this task or eliminating it altogether for certain dams.

Basic Services Compensation

This work will be performed on a lump sum basis as a single project with four separate deliverables. The compensation breakdown is listed below.

Strickland Bridge Dam

SCOPE	FEE
SURVEY	\$7,200
ENVIRONMENTAL EVALUATIONS	\$4,840
H&H EVALUATIONS	\$7,400
ALTERNATIVES DEVELOPMENT	\$13,600
TECHNICAL MEMORANDUM	\$6,100
PROJECT MANAGEMENT	\$2,300
BENEFITED PROPERTY OWNERS/SP. ASSESSMENT	\$11,500
SIMPLIFIED BREACH ANALYSIS	\$2,000
TOTAL	\$54,940

Upper Rayconda Dam

SCOPE	FEE
SURVEY	\$7,000
ENVIRONMENTAL EVALUATIONS	\$4,840
H&H EVALUATIONS	\$7,400
ALTERNATIVES DEVELOPMENT	\$13,600
TECHNICAL MEMORANDUM	\$6,100
PROJECT MANAGEMENT	\$2,300
BENEFITED PROPERTY OWNERS/SP. ASSESSMENT	\$11,500
SIMPLIFIED BREACH ANALYSIS	\$2,000
TOTAL	\$54,740

Lower Rayconda Dam

SCOPE	FEE
SURVEY	\$8,200
ENVIRONMENTAL EVALUATIONS	\$4,840
H&H EVALUATIONS	\$7,400
ALTERNATIVES DEVELOPMENT	\$13,600
TECHNICAL MEMORANDUM	\$6,100
PROJECT MANAGEMENT	\$2,300
BENEFITED PROPERTY OWNERS/SP. ASSESSMENT	\$11,500
SIMPLIFIED BREACH ANALYSIS	\$2,000
TOTAL	\$55,940

Arran Lakes Dam

SCOPE	FEE
SURVEY	\$7,600
ENVIRONMENTAL EVALUATIONS	\$4,840
H&H EVALUATIONS	\$2,500
ALTERNATIVES DEVELOPMENT	\$3,700
TECHNICAL MEMORANDUM	\$1,240
PROJECT MANAGEMENT	\$1,600
BENEFITED PROPERTY OWNERS/SP. ASSESSMENT	\$11,500
SIMPLIFIED BREACH ANALYSIS	\$2,000
TOTAL	\$34,980

TOTAL LUMP SUM for 4 Dams.....\$200,600