

HYDROELECTRIC FACILITY CONDITION ASSESSMENT

~ REQUEST FOR QUALIFICATIONS ~

The Metropolitan Sewerage District of Buncombe County, North Carolina (MSD) is soliciting Statements of Qualifications for Professional Engineering Services associated with the Hydroelectric Facility Condition Assessment project. The project includes a condition assessment of all components associated with the Hydroelectric Facility and recommendations for rehabilitation and appropriate upgrades.

General Background of MSD

MSD is a regional wastewater utility serving the greater Asheville, NC area, and serves a population of approximately 201,000 customers. Raw wastewater is conveyed from the collection system to MSD's French Broad River Water Reclamation Facility (WRF) in Woodfin, NC. The plant treats an average flow of 23 million gallons per day and consumes approximately 18.4 GWh of electricity annually. MSD operates a hydroelectric facility adjacent to the WRF that produces electricity and is sold back to Duke Energy's electrical grid. On average, the hydroelectric facility offsets more than 40% of the total electrical demand at the WRF.

Project Background

MSD's Hydroelectric Facility and the Craggy Dam Reservoir (originally named Weaver Dam) were constructed in 1904 for electric generation by the W.T. Weaver Power Company and supplied power to Asheville Electric Power Company to operate the City's street railways. In 1926, Carolina Power and Light Company bought the dam and operated it until 1963 at which time it was deemed uneconomical, and operations were discontinued. Soon thereafter, MSD purchased the hydroelectric dam and power generating facility from Carolina Power and Light Company.

During the early phases of construction of MSD's WRF (mid 1960s), State Highway 251 (Riverside Drive) was relocated to the west to expand the plant's allowable footprint. As a result, approximately two-thirds of the existing Hydroelectric Facility's original flume was filled in and abandoned. In 1984, MSD rehabilitated the facility, reconstructed portions of the flume, and began generating power to offset a significant amount of the plant's annual electrical demand. Improvements made during the 1984 upgrade included:

- Minor crest smoothing on the dam for roughly 30 feet at the east end (dam elevation was not changed).
- New concrete flume wall parallel to the riverbank to replace the original flume that was filled in due to State Highway 251 relocation. The new flume wall was connected to the old flume wall approximately 600 feet upstream of the power plant (i.e. approximately 2,200 feet of new flume was constructed).
- Installed three new Allis-Chalmers 850kW hydraulic turbines to replace the old units. All new turbines are tube type of the same size and connected to external induction generators through a speed increaser. One turbine is equipped with adjustable blades to accommodate variable flow conditions. During low river flows, the adjustable turbine is typically the only turbine in use.

MSD's Hydroelectric Facility is generally comprised of the following major components: Craggy Dam (FERC P-7497), flume intake/gate structure, flume, power plant influent gate structure, and power plant. The length of the flume from the dam to the downstream power plant is approximately 2,800 feet. The power plant houses three (3) horizontal turbine generating units with increasing gearboxes, one (1) hydraulic power unit for influent gate control and actuation of adjustable blade turbine unit, three (3) induction generators, and electrical switchgear and controls. Two generating units are driven by fixed blade turbines and the third unit is driven by an adjustable blade turbine, each capable of generating approximately 850 kW at average or above average flow conditions.

During dry periods, the amount of water allowed through the hydroelectric facility is reduced to ensure the river's main channel level is sustainable for wildlife. Currently, MSD only operates one (1) or two (2) turbines at a time due to ongoing maintenance. Known system deficiencies include the following:

Flume influent gates and intake structure – Concrete at the flume intake structure has deteriorated and caused the guide channels for each of the three gates to warp, making operation difficult. To shut the gates, staff have implemented a jacking system to push them closed.

Each influent gate has an electric hoist to pull the large steel gates open. Due to the warping mentioned above, as well as the age of the hoists (38yrs old), the units for gates 1 and 3 are no longer adequate and struggle to lift the required load.

Based on MSD's inspection, the gates themselves are in good condition and may be reused for the foreseeable future if rehabilitated with new seals and fresh paint. Immediately upstream of the gates are coarse bar screens that catch large debris. The screens as well as the existing mechanical rake are in good condition; however, the rake's hydraulic actuator system is aging and should be evaluated.

The intake structure has visible signs of concrete deterioration throughout (i.e. cracking, spalling). The entire structure shall be evaluated and recommendations made for concrete repair or replacement.

Flume – The flume wall is believed to be in good overall condition; however, some concrete deterioration has been observed. There are several locations where small holes exist in the flume wall and water can be seen weeping or spouting out of the flume and into the river. The flume wall shall be inspected in its entirety.

Power Plant and Intake Gates – The power plant intake gates are difficult to slide up and down and have excessive movement while closed. The gates are believed to be in poor condition and will require replacement. The gates are hydraulically actuated via a Hydraulic Power Unit (HPU), the same unit that provides actuation to the adjustable blade turbine. Due to the age and criticality of the HPU, a new unit will likely be needed.

The major pieces of equipment inside the power plant (Allis-Chalmers turbines and Siemens-Allis induction generators) were installed in 1984 and are outdated. Parts are obsolete and difficult to find. The shaft coupling which connects the turbine shaft to the increasing gearbox is split on Unit No. 1 and is in the process of being replaced. Each of the three turbine units have experienced multiple bearing failures over the past decade which leads to prolonged outages.

The power plant itself is antiquated and lacks proper ventilation to keep the generators cool. At present, large, portable floor fans are utilized to keep equipment temperatures down. Plant staff requested that ventilation fans be installed in each of three existing louver openings to circulate fresh, cooler air inside the building. The study shall evaluate HVAC options for maintaining equipment at manufacturer recommended temperatures.

The Hydroelectric Facility requires constant maintenance, but has proven to be an effective means of offsetting electrical costs and producing green energy, an aspect that is important to MSD as

well as its environmentally conscious customer base. Over the last 20 years, the facility has averaged a total generation of approximately 8.3GWh annually, offsetting the cost of energy each year by \$300,000-\$600,000 (variation in savings dependent on river level and capital maintenance).

Figure 1 shows the Hydroelectric Facility in relation to MSD's WRF.

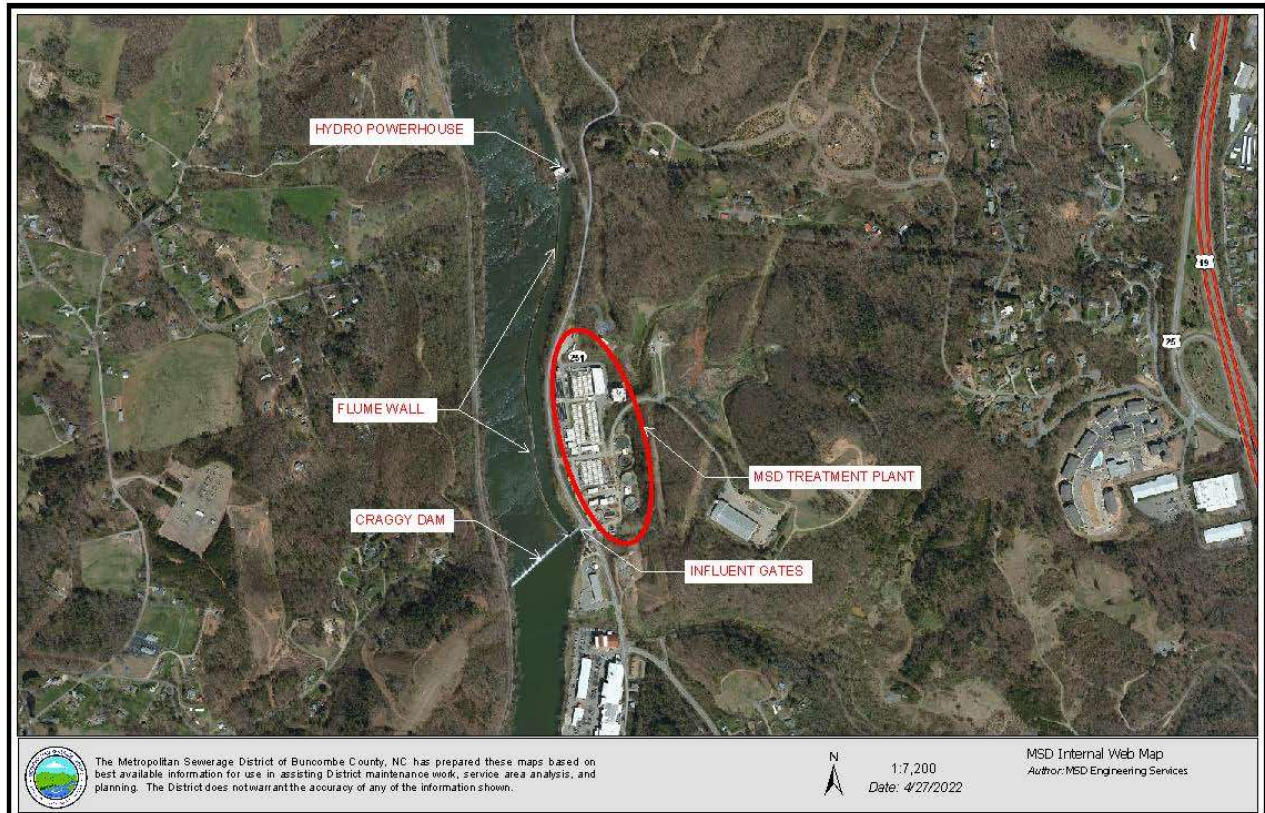


Fig. 1. Hydroelectric Facility Map

General Scope of Work

The firm selected shall review all available data, perform on-site inspections, and generate a preliminary engineering report. The report shall provide an in-depth conditional assessment of all structures, equipment, materials, electrical gear and controls associated with the facility. The report shall include an estimate of remaining service life for major facility components and shall identify all deficiencies and operational inefficiencies discovered. The report shall provide recommendations for improvements (rehabilitation and/or replacement), and include an Opinion

of Probable Construction Cost for each improvement.

The conditional assessment shall include all aspects of the Hydroelectric facility, beginning at the Craggy Dam and continuing through the power plant. A description of all deficiencies found with supporting images, if applicable, shall be included. A phased, priority-based list of improvements shall be generated which will be incorporated into MSD's 10-yr Capital Improvement Program (CIP) budget for implementation over multiple fiscal years.

The report shall also include a detailed cost analysis demonstrating the effectiveness of the CIP recommendations, and identifying the payback period for each phase of improvements. Include a final cost to benefit analysis to determine if improvements are economical and support the continued use of the facility.

All work shall be completed by June 30, 2023. The final signed/sealed report shall be provided in PDF as well as paper format.

Additional Resources Provided

The following items are being provided as supplemental information. Additional material/data may be available upon request.

- Craggy Dam Hydro Project Record Drawings (1984)
- Craggy Dam Hydro Project O&M Manual – Section 7 (Hydrogenerating Units)
- FERC Dam Safety Inspection – August 16, 2012
- Power Production and Usage data (multiple years)

Optional Site Visits

Two optional site visits will be held prior to the RFQ submittal deadline. Attendance is not required to submit a Statement of Qualifications but is highly encouraged. Interested firms may attend one or both available time slots listed below. No other times will be made available during the RFQ advertisement period.

- Monday, July 11th – 9:00am-11:00am
- Wednesday, July 13th – 9:00am-11:00am

Submittal Requirements

NOTE: Qualifications shall not exceed ten (10) pages in length. Brevity, clarity, and conciseness are strongly encouraged.

1. Transmittal cover letter. The cover letter will designate the firm's contact person with phone number, mailing address, fax number and email address.
2. Project Manager. Identify the project manager and describe their experience related to this project. Provide references of other clients (including contact name, phone number and address) for other projects similar in scope. Discuss the experience of the project manager with the other members of the project team.
3. Project team and sub-consultants. Identify other project team members and sub-consultants and their relative experience. Discuss the role of key team members. Specify the location of the offices and the percentage and type of work that will be performed at each location.
4. Firm Qualifications. Discuss the firm's work on projects similar. Firm must have extensive knowledge and expertise in design and operations of hydroelectric facilities, dams, gates and debris screens, and electrical design. Firm must have **no less than 25** designs and successful installations or rehabilitation of similar hydroelectric facilities. The firm must also have experience in permitting systems of equal size and scope. Indicate firm's history of meeting established schedules and budgets.

Evaluation of Statement of Qualifications

The selection committee will develop a short list of firms for the project. Short listed firms may be asked to participate in a presentation/interview process.

The selection committee will choose a firm for the proposed project based in part on the following criteria:

1. Experience on projects of similar type and magnitude, and the firm's ability to adequately address the items in the General Scope of Work above within the specified timeframe.
2. Qualifications and experience of the proposed team and location of team members.

3. Completeness of the submittal.
4. Innovative approaches or any other experience or criteria deemed applicable to the project.

To Respond

If your firm is interested in this project and qualified based on the requirements above, please submit FIVE (5) copies of the Statement of Qualifications to Tim Hensley before 2:00 P.M on Friday, July 29, 2022 to:

MSD of Buncombe County, N.C.
Mull Building
2028 Riverside Drive
Asheville, N.C. 28804

For questions regarding the RFQ process, optional site visits, or to review information, please contact Tim Hensley directly at (828) 225-8331, or e-mail thensley@msdbc.org.

The Metropolitan Sewerage District reserves the right to reject any and all Statements of Qualifications.