North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

September 7, 2018

MEMORANDUM

TO: Kate Husband
Office of Human Environment
NCDOT Division of Highways

FROM: Renee Gledhill-Earley
Environmental Review Coordinator

SUBJECT: Historic Structures Survey Report, Replace Bridge 37 on NC 9 over Green River, BR-0040, PA 17-12-0043, Polk County, ER 18-2189

Thank you for your memorandum of August 15, 2018, transmitting the above-referenced report. We have reviewed the report and offer the following comments.

We concur that the Turner Shoals Hydroelectric Station (PL0310), which includes the dam, containment wall, powerhouse, penstocks, and worker housing as contributing features, is eligible for listing in the National Register of Historic Places under Criterion A in the area of industry as a significant example of 1920s hydroelectric development in western North Carolina that contributed to technological and economic progress in the region. The dam, penstocks, and powerhouse are also National Register-eligible under Criterion C as an excellent and intact example of the architecture and engineering of hydroelectric design from the 1920s. The proposed boundaries, as depicted on page 41 of the report, appear appropriate.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

cc: Mary Pope Furr, NCDOT, mfurr@ncdot.gov

Received: 08/24/2018
State Historic Preservation Office

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

ER 18-2189

August 15, 2018

Due -- 9/18/18

MEMORANDUM

H- ER & Hers 8/27/18

TO: Renee Gledhill-Earley
Environmental Review Coordinator
North Carolina State Historic Preservation Office

FROM: Kate Husband
Architectural Historian
NCDOT Division of Highways

SUBJECT: BR-0040: Replace Bridge NO. 37 on NC 9 over Green River, PA No. 17-12-0043, Polk County

Enclosed please find the Historic Structures Survey Report, survey site database, and additional materials for the above referenced project for your review and comment per 36CRF.800. Please contact me by phone (919-707-6075) or email (klhusband@ncdot.gov) if you have any additional questions or comments.

Mailing Address:
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Location:
1020 BIRCH RIDGE RD
RALIEGH NC 27610

HISTORIC STRUCTURES SURVEY REPORT

for

Replace Bridge No. 37 on NC 9 over Green River
Polk County
North Carolina Department of Transportation
TIP No. BR-0040
WBS No. 67040.1.1

Prepared for:
Environmental Analysis Unit
North Carolina Department of Transportation
1598 Mail Service Center
Raleigh, NC 27699-1598

Prepared by:
Acme Preservation Services, LLC
825C Merrimon Avenue, #345
Asheville, NC 28804
828-281-3852

August 2018

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828-281-3852

August 2018

Clay Griffith, Principal Investigator — Date
Acme Preservation Services, LLC

Mary Pope Furr, Supervisor — Date
Historic Architecture Section
North Carolina Department of Transportation

Replace Bridge No. 37 on NC 9 over Green River, Polk County
North Carolina Department of Transportation
TIP No. BR-0040 | WBS No. 67040.1.1

MANAGEMENT SUMMARY

The North Carolina Department of Transportation (NCDOT) proposes to replace Bridge No. 37 on NC 9 over Green River north of the Mill Spring community in Polk County. The project area is located in the north-central section of the county. NC 9 links the towns of Columbus in Polk County with Lake Lure in Rutherford County. The Area of Potential Effects (APE) for the proposed project is delineated as 500 feet from either end of the bridge and 75 feet on either side of the center line.

This project is subject to review under the Section 106 Programmatic Agreement for Minor Transportation Projects (NCDOT/NCHPO/FHWA/USFS 2015). NCDOT Architectural Historians defined an APE and conducted a site visit to identify and assess all resources of approximately fifty years of age or more within the APE. Only one resource warranted an intensive National Register eligibility evaluation, which is the subject of this report. NCDOT Architectural Historians determined that all other properties and districts are not worthy of further study and evaluation due to lack of historical significance and/or integrity.

NCDOT contracted with Acme Preservation Services, LLC (APS) in June 2018 to complete the intensive historic resources evaluation of the Turner Shoals Hydroelectric Station (PL 310), situated at the east end of Lake Adger. Architectural historian Clay Griffith conducted the fieldwork in June 2018, photographing and mapping the property, and authored the report. Primary source investigation included research at the Polk County Register of Deeds Office, Polk County Historical Museum, and Pack Memorial Library in Asheville. The North Carolina State Historic Preservation Office (HPO) survey files at the Western Office of Archives and History in Asheville were searched to provide some architectural context.

After an intensive evaluation following the National Register of Historic Places criteria for eligibility, the Turner Shoals Hydroelectric Station, along with three operators' houses, was found to be eligible under Criteria A and C in the areas of industry and engineering design. Built in 1923-1924 the Turner Shoals Hydroelectric Station was constructed by the Blue Ridge Power Company to supply power to cotton and textile mills in Piedmont North Carolina and upstate South Carolina. Founded by mill owners and industrial developers, Blue Ridge Power erected two of three planned hydroelectric facilities on the Green River in Polk and Henderson counties. The concrete multiple arch-buttress dam and brick powerhouse were designed by Mees and Mees, a prominent hydraulic engineering firm based in Charlotte. The Mees brothers utilized the arch-buttress design to save on material costs for the dam. Turner Shoals Dam was reported to be the first example of a multiple arch-buttress dam in North Carolina. The Turner Shoals plant served as the control station for the Lake Lure Dam and Hydroelectric Plant, six miles away in Rutherford County, which was designed by Mees and Mees utilizing the same arch-buttress technology in 1925-1926. Turner Shoals Hydroelectric Station is significant as an intact power generating plant built during the 1920s to expand hydroelectric production throughout the region.

APS conducted the survey and prepared this report in accordance with the provisions of the Federal Highway Administration (FHWA) Technical Advisory T 6640.8A (Guidance for Preparing and Processing Environmental and Section 4(f) Documents); the Secretary of the Interior's Standards and Guidelines for Archaeological and Historic Preservation (48 FR 44716); 36 CFR Part 60; 36 CFR Part 800; the HPO's *Report Standards for Historic Structure Survey Reports/Determinations of Eligibility/Section 106/110 Compliance Reports in North Carolina*; and NCDOT's current *Historic Architecture Group Procedures and Work Products*. This property evaluation meets the guidelines of NCDOT and the National Park Service.

SSN	Property Name	Address	PIN	Eligibility Determination	Criteria
PL 310	Turner Shoals Hydroelectric Station	3045 NC Hwy 9	P54-17, P54-350	Eligible	A, C

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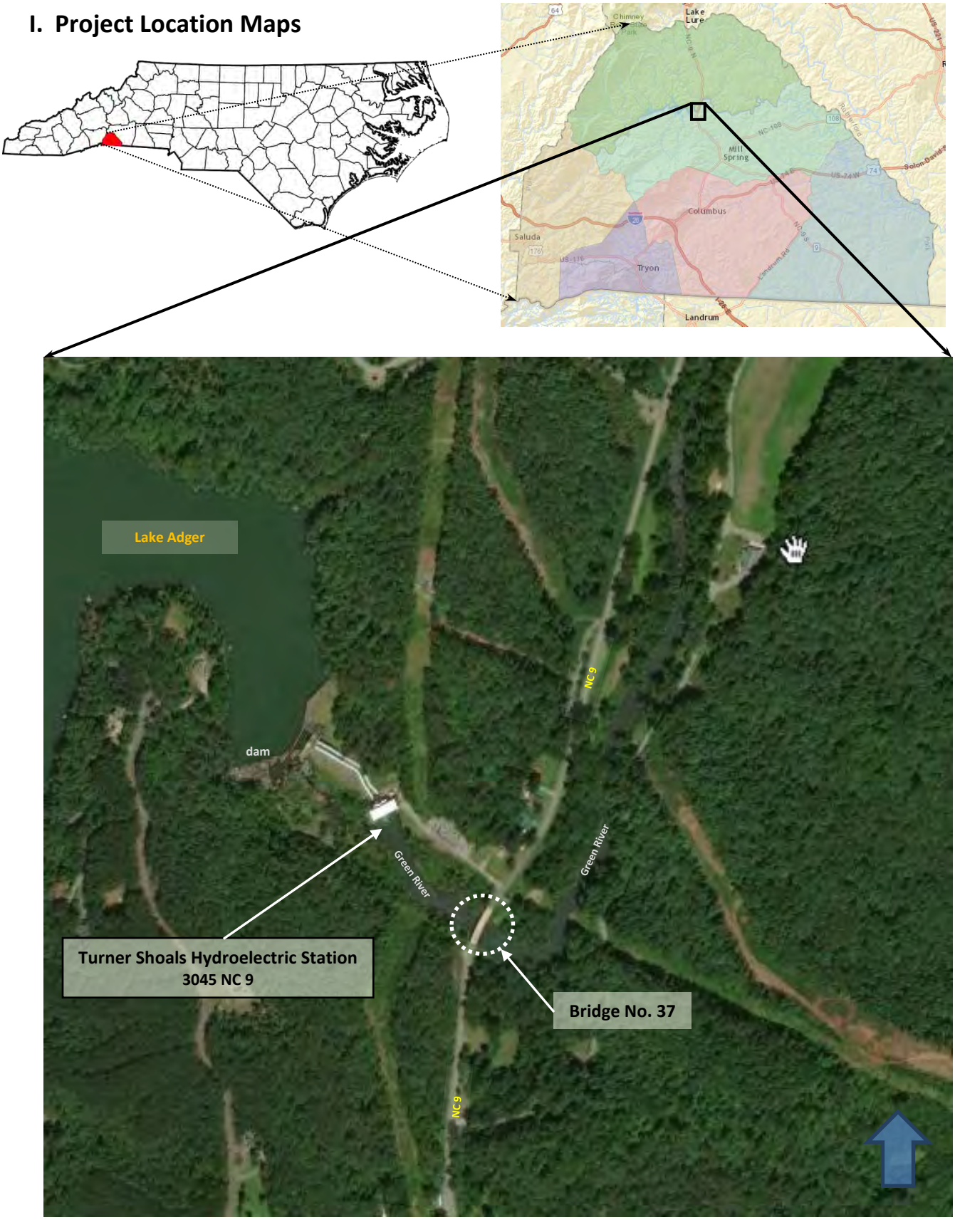
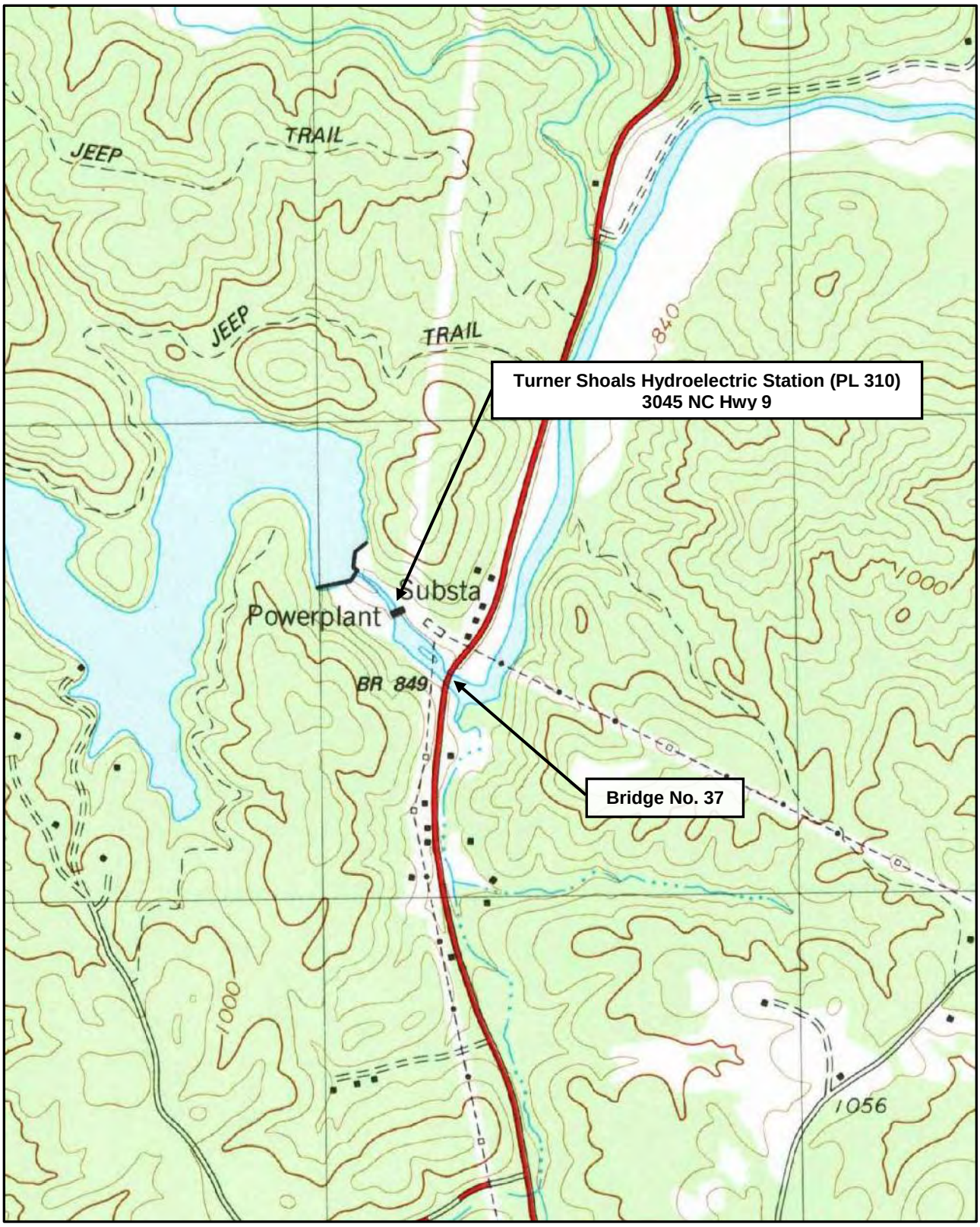
I. Project Location Maps





Location Map – *Mill Spring, NC* USGS topographic quadrangle map (1982)

Area of Potential Effects (APE) Map (boundary outlined in red)

II. Introduction

NCDOT proposes to replace Bridge No. 37 on NC 9 over Green River in Polk County. The project area is located in the north-central portion of the county approximately three miles north of the community of Mill Spring and 7.5 miles north of Columbus, the county seat. Turner's Bridge (Bridge No. 37) carries NC 9, which continues north to Lake Lure in Rutherford County, and spans the Green River just east of Lake Adger. The North Carolina State Highway and Public Works Commission constructed the reinforced concrete bridge in 1936. The bridge is located just downstream of the Turner Shoals Dam, which stands to the northwest. Approximately 200 feet below the bridge, the river makes a 90-degree bend to the northeast and continues to meander to the east and southeast before joining the Broad River on the Rutherford County line.

The Area of Potential Effects (APE) for the proposed bridge replacement project is delineated as 500 feet from either end of the bridge and 75 feet to either side of the center line of the road. Although Bridge No. 37 itself is not considered to be eligible for the National Register, the APE intersects several parcels associated with the Turner Shoals Hydroelectric Station (PL 310), which was built in 1924. The powerhouse, dam, and penstocks are located upstream of the bridge. The powerhouse stands approximately 575 feet northwest of the bridge and the dam is situated approximately 1,000 feet from the bridge.

Turner's Bridge (Bridge No. 37), NC 9 over Green River, view to north

The general project area is defined by wooded foothills where the Green River descends along the southeastern slopes of the Blue Ridge escarpment. The highway passes along the east side of two, low ridges, and the Turner Shoals Dam spans a narrow gorge to form the east end of the Green River impoundment. Downstream of the power plant and Turner's Bridge, the Green River makes a sharp bend to the northeast and flows through a valley of fertile bottomlands. Three frame houses on the west side of NC 9 immediately north of the power plant were erected around 1924 to house the plant operators. A fourth house, built during the initial construction of the facility, was demolished sometime after 1980. A concrete curb and low retaining wall lying just beyond the shoulder of the highway extends for approximately 350 feet in front of two of the houses.

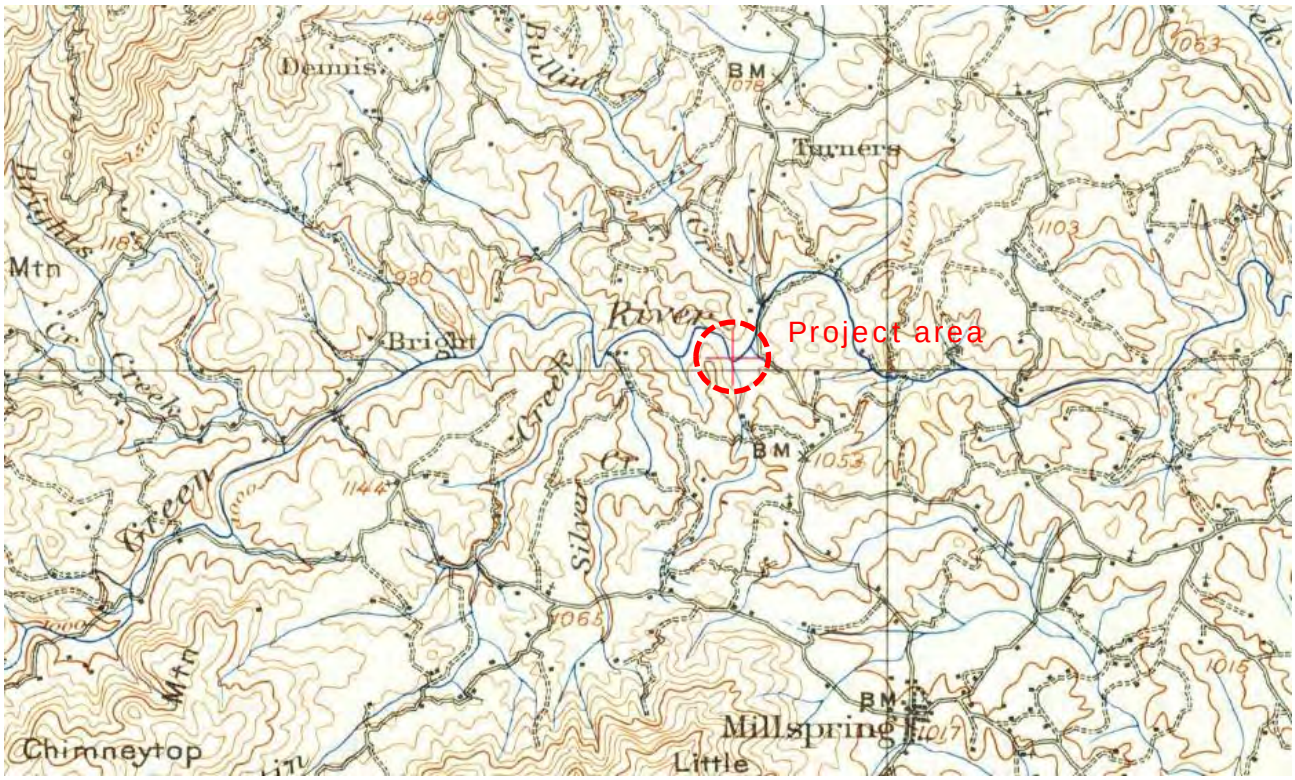
Lake Adger, aerial view by Chris Bartol (*Tryon Daily Bulletin*, February 2, 2011)

III. Methodology

A field survey for the project was conducted on June 21, 2018, and the property containing the Turner Shoals Hydroelectric Station, along with Turner's Bridge and the adjacent operators' houses, was photographed and recorded. A second site visit occurred on July 17, 2018, in coordination with representatives of Polk County, which owns the facility, and Mickey Edwards, maintenance director for Polk County Local Government, provided access to the site. Basic research on the project area was conducted by consulting with Polk County GIS records, the Register of Deeds office, the Polk County Historical Museum, and at Pack Memorial Library in Asheville. The project area is not covered by Sanborn maps, but it is shown on USGS topographic quadrangle maps dating back to 1907.

Polk County has not been comprehensively surveyed for historic architectural resources, but the North Carolina HPO's survey files at the Western Office of Archives and History in Asheville were searched to provide some architectural context. Ted Alexander conducted a reconnaissance survey of the county 1985, as part of the ten-county Western Regional Survey project, and prepared a brief summary report. In addition to the reconnaissance work, more complete surveys of the towns of Saluda and Tryon have been conducted.

A review of the HPOWEB GIS Service (http://gis.ncdcr.gov/hpoweb) revealed no recorded properties in the project area. Several resources are recorded in the community of Mill Spring, approximately three miles to the south. Two bridges in the general area have been recorded, including Bridge No. 61 (PL 171) on S. Wilson Hill Road (SR 1313) over Green River approximately 1.75 miles to the east, and Bridge No. 44 (PL 55), a pony truss bridge on Palmer Road (SR 1155) over Brights Creek at the west end of Lake Adger. No other hydroelectric facilities are recorded in Polk County, although twenty-four hydroelectric sites in North Carolina have been documented by HPO. The Tuxedo Hydroelectric Plant on the Green River, completed in 1920, in neighboring Henderson County remains undocumented. Following construction of the Turner Shoals station the engineers and work crews moved approximately six miles north to begin work on the Lake Lure Dam and Powerhouse (RF 605) in Rutherford County.



Saluda, N.C. **USGS topographic quadrangle map (1907; reprinted 1942) – detail**

Turner's Bridge (Bridge No. 37), view to northeast along NC 9

Turner's Bridge, view to southwest

Turner's Bridge and Green River, view west to Turner Shoals Dam

Green River, view southeast from Turner's Bridge

View to south along NC 9 from Turner's Bridge

Operators' Houses, view to northwest along NC 9

IV. Turner Shoals Hydroelectric Station (PL 310)

Resource Name	Turner Shoals Hydroelectric Station
HPO Survey Site Number	PL 310
Location	3045 NC 9
PIN	P54-17, P54-350
Date(s) of Construction	1923-1924
Eligibility Recommendation	Eligible under criteria A and C – industry, engineering design

Turner Shoals Hydroelectric Station (PL 310), 3045 NC 9, overall view to northwest

Description

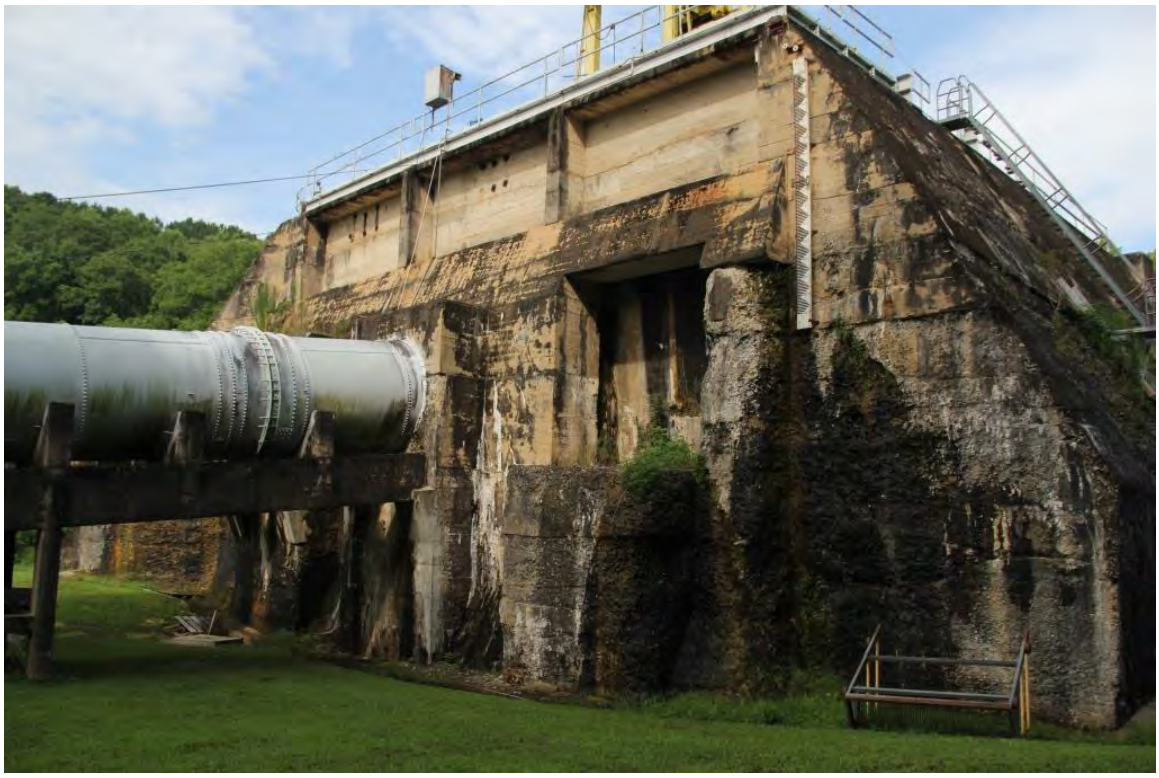
The Turner Shoals Hydroelectric Station, begun in 1923 and completed in 1924, consists of an approximately 300-foot-long, 100-foot-tall multiple arch-buttress concrete dam designed by Mees and Mees, an engineering firm from Charlotte, North Carolina. The dam utilizes a multiple arch-buttress design with a series of angled arches on the upstream side of the structure supported by tall concrete buttresses. The downstream side of the seven-bay structure appears as a series of parallel, vertical buttresses that distribute the water pressure exerted on the arches down to the foundation. The principal advantage of the arch-buttress type dam over concrete gravity dams was the significant reduction in the cost of materials. Construction of the dam impounded the Green

Turner Shoals Dam, overhead view (drone view by Toby Jenkins, March 22, 2017)

Turner Shoals Dam, east elevation (drone view by Toby Jenkins, March 22, 2017)

Turner Shoals Dam, overall view to southwest

Intake structure and penstocks, view to west



Intake structure, view to southwest

Containment wall (extension of Turner Shoals Dam), view to north

River to form a 438-acre lake, known as Lake Adger. Normal pool elevation for the lake is 911.6 feet, providing more than fourteen miles of shoreline.[1]

At the north end of the dam a gravity containment wall extends approximately 375 feet along the north bank of the lake. The wall projects approximately ten feet higher than the dam. The containment wall was added during construction after engineers discovered that the foundation rock was water-permeable, soft mica. The intake structure, located adjacent to the north end of the dam, was constructed with three bays for three penstocks, although only two penstocks were constructed. The metal penstocks are eight feet in diameter and convey the water flow approximately 350 feet to the base of the powerhouse, which is fitted with two turbines.[2]

The **powerhouse** is a tall two-story brick structure on a concrete foundation. It is six bays wide and two bays deep. The bays are defined by full-height brick pilasters that rise to a corbelled cornice and flat parapet topped by a cast-concrete coping. The panels contain large metal-frame industrial sash windows with cast-concrete lintels and sills and rectangular panels delineated by brick headers. Above and below the window sills and lintels, the brick is laid in Flemish bond with glazed headers. For the pilasters and areas adjacent to the window openings, the brick is laid in running bond with glazed brick forming decorative diamond patterns. A tall equipment bay on the north elevation provides access to the interior through a metal overhead door. The interior was not available for inspection, but it was viewed through ground floor windows during the site visit. The open space rises the full two-story height of the building with a finished concrete and terra cotta tile floor, exposed steel roof trusses, and two Westinghouse generators. A two-story wing at the rear of the building contains offices and facilities for on-duty operators. A stairwell rising above the rear wing provides roof access. A tall equipment bay on the rear elevation is accessed through a metal overhead door, which has been permanently closed and fitted with a single-leaf metal personnel door. A detached storage building is located directly to the rear of the powerhouse. It is metal frame with metal siding, a metal-clad gable roof, and a single-leaf entry door.

The powerhouse is accessed by an unpaved drive from NC 9 that begins at the north end of Turner's Bridge. The facility, which is owned by Polk County, is fenced to restrict access. A **substation** stands on the north side of the drive and east of the powerhouse. The metal poles and framework supporting the transformers and switching station were installed in 1977. Prior to that time the poles and lines were mounted on the roof of the powerhouse. A prefabricated **utility building** is located in the eastern portion of the property. Built around 1995, the utility building rests on a concrete foundation and is clad with metal siding. It has a low-pitched front-gable roof and a single-leaf, solid metal door in the south elevation.

Concurrent to the construction of the dam and powerhouse, four bungalows were constructed to house the staff needed to operate the power station. The four houses were built on the west side of NC 9 just north of the facility. One of the original houses, at some point after 1980, was demolished, but the other three remain standing.

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[1] Hartman Consultants LLC, "Water Supply Utility Appraisal of Lake Adger and Turner Shoals Dam for Polk County, North Carolina," Report for Polk County, NC (September 2016), 2.5-2.6.

[2] Hartman Consultants, 2.5-2.6; "Turner Shoals Hydro-Electric Plant of Blue Ridge Power Co. Completed at a Cost of $900,000," *Asheville Citizen*, November 11, 1924.

Powerhouse, view to west

Powerhouse, view to southwest

Powerhouse, oblique view to southwest

Powerhouse, east elevation (detail), view to west

Powerhouse, rear elevation, view to southeast

Powerhouse and storage building, view to southwest

Substation, view to west

Utility building, view to north

Operator's House, 3093 NC 9, façade, view to west [PIN P54-2]

The operator's house located at 3093 NC 9 is a one-story frame bungalow with a hip roof and projecting hip-roof porch. Resting on a concrete foundation, the house is covered with vinyl siding and displays metal-clad roof, deep overhanging eaves, interior brick chimney, and replacement one-over-one double-hung windows. The porch is carried on square posts of concrete block covered with stucco and has a replacement metal railing. The porch shelters a three-part façade window and replacement single-leaf entry door. One-bay hip-roof side wings extend to the north and south, and a breezeway connects to a garage located at the rear of the house.

The operator's house located at 3109 NC 9 is a one-story frame bungalow with a hip roof and projecting hip-roof porch. Resting on a concrete foundation, the house is covered with aluminum siding and displays an asphalt-shingle-roof, concrete block chimney flue, and replacement one-over-one double-hung windows. The deep overhanging eaves are clad with vinyl. The porch is carried on square posts of concrete block covered with stucco. The porch shelters a three-part façade window and replacement single-leaf entry door. A hip-roof ell extends to the rear.

The operator's house located at 3149 NC 9 is a one-story frame bungalow with a front-gable roof and an attached cross-gable porch that wraps around the south and east sides of the house. The house rests on a concrete block foundation and is clad with vinyl. It has a stuccoed exterior chimney and replacement one-over-one double-hung windows. The porch is carried on square concrete-block posts with an open wooden railing and turned balusters. A gable-roof side porch on the side elevation is carried on turned wood posts and shelters a single-leaf entry door flanked by one-over-one double-hung windows.

Operator's House, 3109 NC 9, façade, view to west [PIN P54-3]

Operator's House, 3149 NC 9, oblique view to northwest [PIN P54-5]

Historic Background

The idea for a hydroelectric facility in Polk County arose from a need for electric power to supply textile manufacturers in the northern portion of South Carolina and from a proposed interurban railway in the early twentieth century. The interurban railway concept dated back to 1905 and was proposed to connect Hendersonville with Chimney Rock. W. A. Smith was selected as president of the proposed Appalachian & Interurban Railroad Company, and Lucius Morse of Chimney Rock was asked to advise and assist with the selection of a route. Another route was proposed in the 1910s to link Asheville and Hendersonville. In 1917, Henderson County commissioners considered proposals for an interurban railway from Hendersonville to Riverview, South Carolina.[3]

Although the motivation for the interurban railway eventually sputtered, it had been closely promoted in connection with the development of hydroelectric power in Henderson, Polk, and Rutherford counties. Local businessmen and area promoters saw potential in the undeveloped natural resources of the region. The Manufacturers' Power Company was organized for the purpose of supplying hydroelectric power to a group of textile mills in Spartanburg County, South Carolina. Company organizers were convinced that steady hydroelectric power produced along the Green River would be more cost efficient than coal, which was becoming increasingly expensive due to rising freight rates.[4]

The first project begun from this concept was the construction of a dam and hydroelectric plant near Tuxedo in Henderson County. Mill owners John A. Law and Walter Montgomery of Spartanburg, South Carolina, who had been officers in the Manufacturers' Power Company, partnered with J. O. Bell and O. A. Meyer of Henderson County to form the Blue Ridge Power Company. Construction work began in 1918 at a site on Green River near Tuxedo. The company erected a 125-foot-high arched concrete gravity dam spanning approximately 300 feet to form Lake Summit. The powerhouse was constructed more than a mile downstream at Pot Shoals with water delivered through a 14-foot penstock constructed of cypress staves. Completed at a cost of $1,000,000, the plant produced nearly 10,000 horsepower and generated approximately 65,000 kilowatts a day.[5]

Following the successful completion of the Lake Summit Dam and Tuxedo Hydroelectric Station in 1920, the Blue Ridge Power Company announced plans for two additional in-line facilities in neighboring Polk County. Together the three plants would produce an estimated 65,000 horsepower. The second site to be developed by the Blue Ridge Power Company was located in a long, narrow valley below the eastern continental divide. The site, known as Turner Shoals, was

[3] Terry Ruscin, *A History of Transportation in Western North Carolina* (Charleston, SC: The History Press, 2016), 86-87.

[4] "The Blue Ridge Interurban Railway and the Electro-hydraulic Power of Henderson County," *The French Broad Hustler* (Resort and Good Roads Edition), May 8, 1913; James Walton Lawrence, Sr., "Lake Adger," Manuscript for paper presented to the Polk County Historical Society, January 1998 (Collection of the Polk County Historical Museum, Columbus, NC), n.p.

[5] "Power Company Plans Two New Units Along Green River in Polk," *Asheville Citizen*, December 20, 1921.

located at deep gap near the Mills Gap Road north of Mill Spring. This fertile area of Polk County contained a number of well-established farms and local residents resisted selling valuable bottomlands to the power company. Local opposition to the project led to the creation of the Polk County Land Arbitration Commission to negotiate settlements with residents.[6]

With the majority of land claims settled, work began on the new hydroelectric facility in the spring of 1923. Jack Ward, who supervised construction of the Tuxedo plant, oversaw work at Turner Shoals. He had previously served under General G. W. Goethals on the construction of the Panama Canal. Excavation of the site began in preparation for the concrete foundations and timber was cleared from the reservoir area. A saw mill was erected to produce lumber for use in the construction of plant and associated structures. Power lines from the Tuxedo plant supplied electricity to the construction site.[7]

Newspaper accounts note that "a miniature city [had] sprung up" at Turner Shoals near Mill Spring. The project employed approximately 200 individuals, with much of the labor recruited locally. The construction site included houses, warehouses, stores, workshops, a lumber mill, and a stone quarry. In addition to clearing timber, milling lumber, quarrying and crushing stone, workers were gathering sand from the river bed to use in the concrete work. Construction of new roads made transportation to the site easier. Six derricks were constructed at the site with 100-foot booms, which consisted of 50-foot lengths of Florida pine shipped to the site.[8]

The engineering firm of Mees and Mees from Charlotte designed the concrete arch-buttress-type dam for the Blue Ridge Power Company and construction began in 1923. Brothers Curtis A. Mees and Erich A. Mees were born in Columbus, Ohio, and earned their engineering degrees from Rose Polytechnic Institute in Terre Haute, Indiana. The brothers relocated to Charlotte in the early 1910s, and Curtis worked for the Southern Power Company before joining Erich to form their own consulting firm in 1917. The Mees and Mees firm specialized in dams and hydro- and steam-power generation for industrial applications.[9]

With construction of the dam well under way in November 1923, workers began winterizing the camp. Shortages of labor created some construction delays, but newspaper accounts reported that thirty skilled laborers had been brought in to help with construction. Work began on three permanent residences for the plant operatives and the new crew was assigned to complete the houses. One of the dwellings contained five rooms and the other two were designed with four rooms each. During the fall a number of cotton mill executives from Charlotte, Spindale, and

[6] Ibid.; Lawrence, n.p.; Calvin Bradley, "Electricity Comes to Polk County," Manuscript for paper presented to the Polk County Historical Society, February 2011 (Collection of the Polk County Historic Museum, Columbus, NC), n.p.

[7] "Work Progressing on New Power Project," *Polk County News*, June 14, 1923.

[8] "Turner Shoal Power Project Progressing," *Polk County News*, June 19, 1923.

[9] "Rutherford County Bridge 628," North Carolina Department of Transportation website, July 11, 2018 (https://www.ncdot.gov/initiatives-policies/Transportation/bridges/historic-bridges/search-bridges/Pages/bridge-detail.aspx?countynumber=80&bridgenumber=628; accessed July 31, 2018).

Spartanburg toured the project site. Mill owners hoped the facility would improve the future power supply to mills in the Piedmont area.[10]

Lake Adger Dam construction, ca. 1923 [Collection of Polk County Historical Museum, 1999.1748]

The winter months brought weather delays to the project, but early in the spring of 1924, resident engineer H. Bakes reported that more than sixty percent of the concrete piers had been completed and several had been connected by concrete arches. Foundations for the powerhouse and tailrace were begun and steel transmission towers had been erected to connect with mills in South Carolina.[11] During the summer workers ran into difficulty securing a northern anchorage for the dam. Engineers discovered that the foundation rock was soft mica, so a concrete gravity containment wall was extended to the north until a suitable base of solid rock could be found. The cost to extend the tapering concrete wall added another $100,000 to the project.[12]

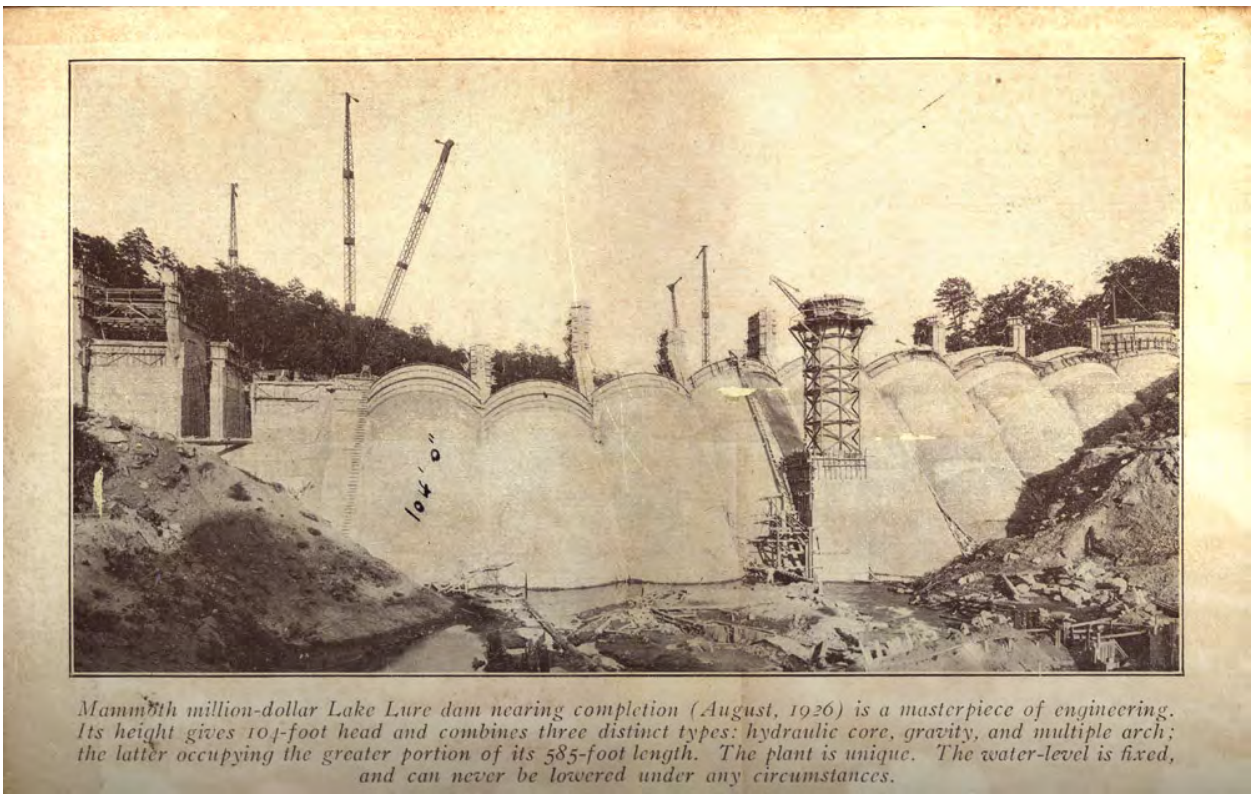
Workers poured the last concrete for the project on Thanksgiving day of 1924, and the lake began to form behind the massive structure. The dam measured nearly 300 feet across and 100 feet high according to newspaper reports with an effective head of 96 feet. The powerhouse was

[10] "Work Progressing on Huge Power Project," *Polk County News*, November 8, 1923.

[11] "Power Dam at Turner Shoals Progressing," *Polk County News*, February 28, 1924.

[12] *Asheville Citizen*, November 11, 1924.

fitted with two turbines built by S. Morgan Smith of Harrisonburg, Pennsylvania. The engineers designed the facility to accommodate a third turbine, but it was never installed. The electrical generators, switching equipment, and transformers were supplied by Westinghouse. C. F. Earnhardt, the operating superintendent, oversaw installation of the electrical equipment. Final costs for the project were estimated to be approximately $900,000.[13]



Lake Lure Dam, August 1926 [Photograph from *Herbert D. Milles Collection*, Special Collections, D. H. Ramsey Library, University of North Carolina Asheville]

Immediately following completion of the Turner Shoals Hydroelectric Station, John A. Law announced plans to build a third facility on the Green River between Tuxedo and Turner Shoals. The proposed dam was to be situated above the Narrows of the Green River and take advantage of the tremendous fall through the gorge. The proposed facility was expected to produce 70,000 horsepower. Although crews began surveying the area for Blue Ridge Power, the company never followed through on plans for the plant. In January 1925, Blue Ridge Power entered into an agreement with Lucius Morse of Chimney Rock to purchase power generated by a proposed dam at Tumbling Shoals of the Rocky Broad River in Rutherford County.[14]

[13] "Turner Shoals Dam Completed," *Polk County News*, December 4, 1924.

[14] "Millions To Be Spent by Power Group in W.N.C.," *Asheville Citizen*, December 25, 1924; "Lake Lure Power Sold To Blue Ridge Co.," *Forest City Courier*, January 29, 1925.

The Lake Lure Dam and Hydroelectric Plant were among the first facilities built by Morse's company Chimney Rock Mountains, Inc., for the development of the Lake Lure resort. The structures were built by the Carolina Mountain Power Company, a wholly owned subsidiary of Chimney Rock Mountains, Inc. Mees and Mees designed the dam utilizing the same multiple arch-buttress design as Turner Shoals, and construction occurred between 1925 and 1926. A reinforced concrete tee-beam bridge spanned the 580-foot-long top of the dam as part of the lake's 27 miles of shoreline.[15] A transmission line for conveying electricity between Turner Shoals and Lake Lure began in February 1925. G. N. Willis of Spartanburg oversaw construction of the six-mile line, which was estimated to cost approximately $20,000. The Turner Shoals station would supply electricity to the project site during construction and, after completion, power generated at Lake Lure would be fed into the Blue Ridge Power system. The Lake Lure plant was operated "through electric control" by workers at Turner Shoals.[16]

Turner Shoals, ca. 1930 [Bennett, *Polk County, North Carolina, History* (1983), p. 251]

Tullie E. McKee (1882-1957) came to Polk County in October 1925 to serve as superintendent of the newly completed Turner Shoals Hydroelectric Station. A South Carolina native, McKee studied electrical engineering and began work for Southern Power Company in 1904 at its first hydroelectric plant on the Catawba River near Charlotte. McKee married Maggie Freeman (1883-

[15] "Lake Lure Yesterday & Today," Town of Lake Lure website, 2018 (http://www.townoflakelure.com/lake-lure-yesterday-today.php; accessed July 13, 2018).

[16] *Forest City Courier*, January 29, 1925; "Lake Lure Dam to Cost $670,000," *Forest City Courier*, February 5, 1925.

1965) in 1903, and the couple raised five children. With the exception of a three-year stint (1913-1916) in Tennessee working for the Chattanooga Power Company, McKee continued to work for Southern Power at different stations in the Carolinas until 1925, when he applied for a job with Blue Ridge Power. Assigned to the Turner Shoals station, the family resided in one of the company houses beside the plant. The family attended Mill Spring Baptist Church and the three younger children graduated from Stearns High School in Columbus. In addition to his role as superintendent, McKee was appointed vice-president of Polk County Bank in 1929. McKee's health began to decline in the 1940s and he retired from Duke Power, which had purchased the Turner Shoals facility in 1927, in December 1952.[17]

Three of the McKees' sons, Broadus, Eston, and Woodrow, later worked at the Turner Shoals plant. Broadus worked on the maintenance crew, and Eston, after finishing high school, was employed as an operator. Woodrow McKee (1912-1986) was born at Duke Power's Ninety-Nine Islands Plant in South Carolina, while his father was stationed there, but largely grew up in Polk County. As a youth he sold bait and rented boats to fishermen on Lake Adger. He graduated from Stearns High School and Weaver College before joining Duke Power in 1933 as a plant operator at Turner Shoals. In 1934, he married Gertie Mae Gilbert (1915-1990), and the couple resided with their three children in a company house at Turner Shoals. Eldest son Robert W. McKee continues to own the house at 3149 NC 9. Woodrow McKee continued to work at the Turner Shoals Plant until his retirement in 1976.[18]

A little more than a year after the Turner Shoals plant went into operation Blue Ridge Power Company sold its complete system to the Broad River Power Company. In 1927, Southern Power Company reorganized as Duke Power, which then purchased much of Broad River Power's holdings including the former Blue Ridge Power Company plants.[19] Duke Power continued to expand and grow through the twentieth century, eventually becoming of the nation's leading utility companies. Around 1997, when Duke Power merged with Pan Energy to form Duke Energy, the company sold the Turner Shoals plant to Northbrook Energy. In 2009, Polk County purchased Lake Adger and the Turner Shoals Hydroelectric Station for $1.6 million. While the county owns the facility and lake as a water resource, Northbrook maintains a lease on the hydroelectric generating capabilities and continues to produce electricity at the Turner Shoals Hydroelectric Station.[20]

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[17] D. William Bennett, *Polk County, North Carolina, History* (Tryon, NC: Polk County Historical Association, Inc., 1983), 251-252; "Metcalf Named Board Chairman," *Asheville Citizen*, October 16, 1929.

[18] Bennett, 251-252. Woodrow and Gertie Mae McKee's children retain ownership of several parcels totaling more than 100 acres north of the company houses. The land is connected to a residential development known as Mountain Park at Lake Adger. Situated on the north shore of the lake, the development is accessed from NC 9 by Woodrow McKee Drive.

[19] Bradley, n.p.; Thomason and Associates, "National Register of historic Places Eligibility Study of Seven Hydroelectric Projects in the Nantahala Area, North Carolina," Report for Duke Power, Charlotte, NC (December 2003) 17-20.

[20] Leah Justice, "From Catawba Power to Duke Energy," *Tryon Daily Bulletin*, February 2, 2011; Hartman, 2-1.

Site Plan – Turner Shoals Hydroelectric Station, 3045 NC 9, Polk County, NC

V. Architectural Context

Lying on the southern slopes of the Blue Ridge Mountains, Polk County boasts of varied terrain and climate within its relatively modest borders. The crest of the Blue Ridge forms the northern border of the county while the eastern section of the county has the rolling topography of foothills. The fertile bottomlands of the Green and Pacolet Rivers were settled in the late-eighteenth and early-nineteenth centuries by wealthy planter families. The rugged, and densely forested, mountainsides remained sparsely populated until the arrival of the railroad in the 1870s, but the natural and geographic conditions strongly influenced agriculture and tourism as important components of the county's economy into the twentieth century.[21]

The geography and natural resources of Polk County also provided opportunities for hydroelectric development. Hydroelectric power systems, which evolved from centuries-old technology dating back to the ancient Greeks and Chinese, create energy by transferring the power of moving water through a turbine to drive an electric generator. Water power had been used for years throughout the region to operate belt- and axle-driven applications such as grist mills and saw mills. The first use of hydroelectric power in the United States, beginning in the 1860s, occurred at Niagara Falls. The number of hydroelectric plants began to grow rapidly in the late nineteenth century as applications for electric lights increased.[22]

The first commercial hydroelectric dam and power station erected in North Carolina was built for the Fries Manufacturing and Power Company in 1898. Located on the Yadkin River in Forsyth County, the stone dam, known as Idol's Dam, measures 410 feet in length and is ten feet high. A frame powerhouse was located at the eastern end of the dam with a brick transformer room addition. Electric current was transmitted over thirteen miles to a transforming station at Salem, where the power was distributed to service points throughout Winston-Salem for a number of local industries. The Southern Power Company acquired the dam, power plant, and transforming station in 1913.[23]

The first commercial hydroelectric facility in Polk County was organized by prominent local businessmen Carroll Rogers and Ralph Erskine, along with their brother-in-law W. A. Newell. Rogers and Erskine founded the Tryon Chair Factory in 1910, and used the factory's water power and boiler to generate electricity. From these beginnings they acquired 1,000 acres of land on Melrose and Warrior mountains in southwestern Polk County and chartered the Melrose Power

[21] Bennett, 5; Elizabeth Doubleday Frost, *Tryon Memories* (Tryon, NC: Polk County Historical Association and Tryon Publishing Company, Inc., 1995), 7-10, 27-28.

[22] Thomason, 5.

[23] Brent D. Glass, ed., *North Carolina: An Inventory of Historic Engineering and Industrial Sites* (Washington, DC: Historic American Engineering Record and North Carolina Division of Archives and History, 1975), 56-57; Heather Fearnbach, *Winston-Salem's Architectural Heritage* (Winston-Salem, NC: Forsyth County Historic Resources Commission and City of Winston-Salem, 2015), 23-24 and 580-581.

and Manufacturing Company in 1911. Melrose Power sold electricity to subscribers in Tryon and in the 1920s extended its transmission lines to Columbus.[24]

Idol's Dam, Yadkin River, Fries Manufacturing & Power Company, Clemmons, Forsyth County
[Photo by JoAnn Sieburg-Baker, August 1977, Historic American Buildings Survey]

The basic components of a hydroelectric system include a reservoir for storing water, delivery systems, and the principal moving elements to create electric current. The prime movers—turbines and generators—are typically housed in a protective building. A reservoir is formed by damming a river and provides a constant, controlled supply of water for power generation. The stored water is channeled at the dam through gates, intake towers, or spillways, and delivered to the prime mover through penstocks or flumes. The funneled water engages the turbine, a rotary engine that converts the energy of moving water into mechanical energy, and returns to the downstream channel of the dammed river through a tailrace. The amount of pressure available at a hydroelectric site is termed "head," and the higher the head the greater the pressure exerted on the prime mover.

[24] Clay Griffith, "Lynncote" National Register of Historic Places Nomination Form, Acme Preservation Services, Asheville, NC, 2010, 11; *Polk County News*, May 31, 1923.

The Southern Power Company, which was renamed Duke Power in 1927, formed in 1905 after wealthy tobacco manufacturer and industrialist James B. Duke approached William S. Lee, an engineer, and Dr. W. Gill Wylie about the possibility of developing hydroelectric power in the Carolinas. Wylie and Lee built a hydroelectric plant on the Catawba River in South Carolina, just south of Charlotte, prior to forming Southern Power with Duke. Over the next 20 years the company built a chain of dams and ten hydroelectric stations along the Catawba and Wateree river system to provide electricity for more than 300 cotton mills, factories, and cities throughout the Piedmont region.[25]

The Lookout Shoals Dam and Power Plant in Iredell County was constructed on the Catawba River in 1915. The structure consists of a concrete gravity type dam with a 933-foot spillway. The plant was the first hydroelectric facility in North Carolina constructed by the Southern Power Company. By 1928, the company owned five hydroelectric stations in North Carolina: Bridgewater (1923), Mountain Island (1923), Rhodhiss (1925), and Oxford (1928). Duke Power, which evolved from the various mergers and reorganization of the Southern Power Company, operated the largest hydroelectric system in the South.[26]

The Bridgewater Power Station in McDowell County consists of three concrete gravity dams built between 1916 and 1923. Located on the Catawba River, the three dams include the 3,155-foot Catawba Dam, 1,610-foot Paddy Creek Dam, and the 1,325-foot Linville Dam. The powerhouse is located at the Linville Dam, and the entire complex was constructed for the Southern Power Company.[27]

Construction of a dam is one of the most expensive components of a hydroelectric system, so many early companies relied on existing dams for their projects. As demand for hydroelectric facilities grew, dam building technology began to evolve, fueled by a desire to reduce material and construction costs, as well as the number of skilled laborers required. In the early twentieth century, Nils Frederick Ambursen and John S. Eastwood developed slab and buttress techniques that greatly reduced the amount concrete needed to retain the weight of the impounded water, which was distributed through thin, arched slabs of concrete that diverted forces to the vertical buttresses and subsequently into the ground.[28]

Charlotte-based engineers Mees and Mees utilized the arch-buttress design at Turner Shoals. John Eastwood had conceived the multiple arch-buttress system from several of Ambursen's patents dating to 1903 and 1904. Upon completion of the dam, resident engineer H. Bakes claimed that Turner Shoals Dam was the first multiple arch structure in the south and only the second to

[25] Joe A. Mobley, ed., *The Way We Lived in North Carolina* (Chapel Hill, NC: University of North Carolina Press, 2003), 387.

[26] Glass, 60.

[27] Ibid., 55.

[28] Thomason, 7-8.

be built in the United States.[29] Mees and Mees repeated the technique in 1925 for the construction of the Lake Lure Dam.

Prior to 2003, the Narrows Dam and Power Plant Complex in Stanly County was the only hydroelectric facility in North Carolina listed in the National Register of Historic Places. Located on the Yadkin River, the Aluminum Company of America (Alcoa) acquired the site in the 1910s to build a dam and powerhouse for an aluminum smelter in the neighboring town of Badin. The reinforced concrete overflow type dam was completed in 1917, and the Alcoa facility employed over 1,000 workers during the 1920s.[30]

Mission Hydroelectric Plant (CY 54), 1924, oblique view to southeast

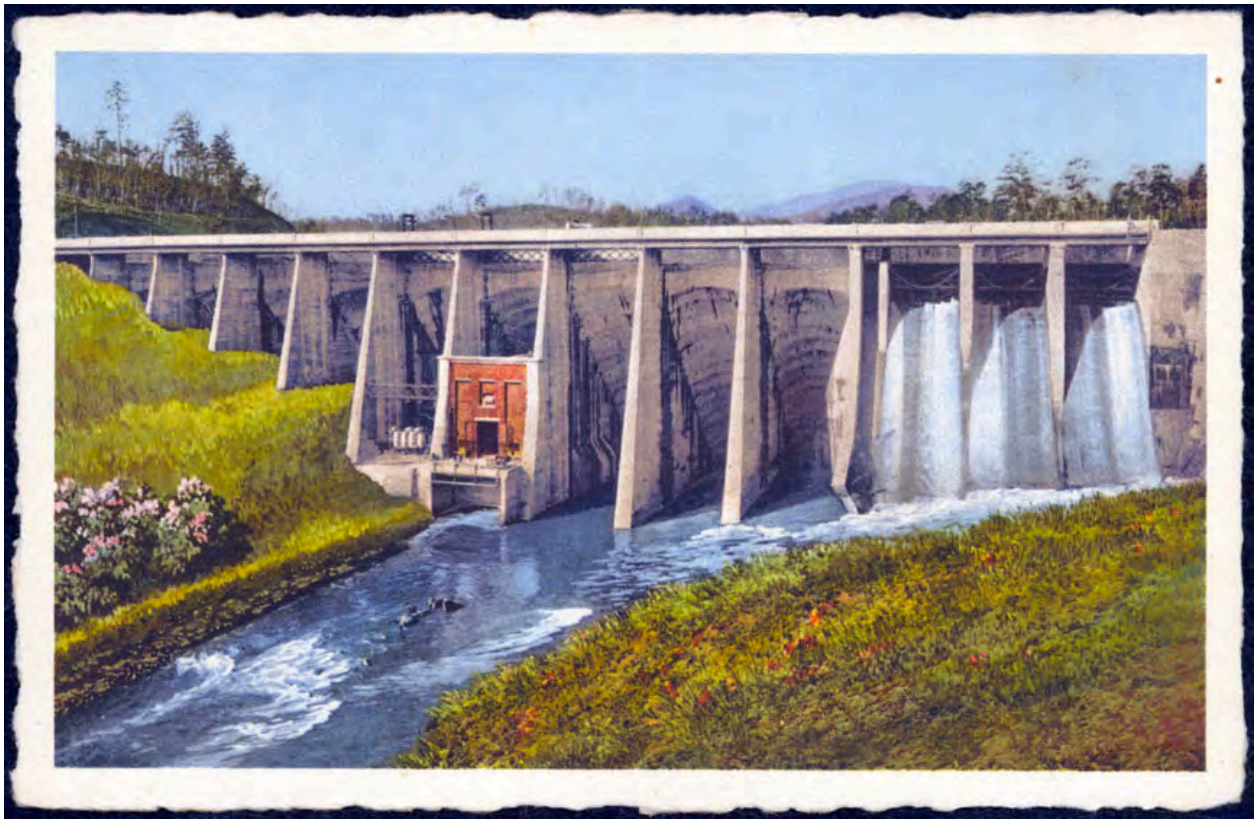
Since 2003 a number of the state's other hydroelectric facilities have been added to the National Register or determined eligible for the National Register through the Section 106 review process. The Mission Hydroelectric Plant (CY 54) in Clay County was determined eligible through relicensing of the facility by the Federal Energy Regulatory Commission (FERC). The Mission plant was one of seven submitted to FERC for relicensing by Nantahala Power & Light (NP&L) in 2003. The town of Andrews financed the Mission Hydroelectric Plant in 1924 to supply electricity to its residents and businesses. Located on the Hiwassee River in Clay County, the poured concrete dam and brick powerhouse were built by Ludlow Engineers of Winston-Salem. The compact

[29] Ibid.; "Turner Shoals Dam Unique in Engineering Annals," *Polk County News*, January 29, 1925.

[30] Thomason, 3 and 23; Brent D. Glass and Pat Dickinson, "Narrows Dam and Power Plant Complex" National Register of Historic Places Nomination, North Carolina State Historic Preservation Office, Raleigh, NC, 1983.

powerhouse is a tall one-story building laid in Flemish bond with a flat parapet roof, corbelled brick cornice, brick pilasters, and large metal-frame industrial sash windows.

The Lake Lure Dam and Hydroelectric Plant (RF 605), begun in 1925 and completed in 1926, is a 104-foot-tall concrete dam designed by Mees and Mees of Charlotte. The dam utilizes the multiple arch-buttress design employed at Turner Shoals with thirteen bays spanning 580 feet. A two-story brick powerhouse with cast-concrete accents is situated in the center arch of the dam, and the spillway occupies the three northern bays of the dam. Construction of the dam impounded the Broad River to form Lake Lure, which was conceived as the centerpiece of a "national, all year, mountain lake resort" by Dr. Lucius B. Morse in the early 1920s.[31]



Lake Lure Dam, ca. 1930 [Postcard from North Carolina Collection, AD257, Pack Memorial Library, Asheville]

The Walters Dam and Power Station in northern Haywood County was completed in 1930. Located on the Pigeon River, the dam, which is 870-feet long and 180-feet tall, is of concrete arch construction and over forty feet thick at its base. The power plant is located approximately 12 miles downriver. Penstocks to deliver water to the plant pass through a concrete-lined tunnel 14 feet in diameter and 6.3 miles long. Tunneling through the mountain allowed the dam to develop a head of 861 feet, which was for many years the highest east of Rocky Mountains. Designed by

[31] Jim Proctor, *Lake Lure*, Images of America Series (Charleston, SC: Arcadia Publishing, 2013), 29-31.

the Electric Bond and Share Company and completed by Carolina Power and Light in 1930, the facility took three years to build.[32]

Walters Hydroelectric Plant (HW 268), September 1947 [North Carolina Collection, K275-S, Pack Memorial Library]

Situated on NC 107 in Jackson County, the Thorpe Power Plant is a striking visual landmark along the Tuckasegee River. The well maintained brick building rests on a concrete foundation and is set against a steep slope. The tall one-story structure is notable for its restrained Gothic Revival detail including a five-bay façade articulated by pilasters, narrow multi-light industrial windows, pointed-arch transoms, and a terra cotta cornice. Begun in 1940 and completed in 1941, the building was added to the state study list in 1992.[33]

Nantahala Power and Light Company (NP&L), which was formed in 1929 by Alcoa to develop hydroelectric sites in western North Carolina, owned the property for some time before beginning work on a dam and powerhouse in the Glenville community. The dam, which impounds the 1,470-acre Lake Glenville, is a massive earth and rock structure 150 feet high and 1,310 feet long; it is more than 800 feet thick at its base. Workers dug three tunnels for steel penstocks to deliver water 3.5 miles to the powerhouse. The distance and elevation change create an effective head of 1,169 feet, the highest east of the Rocky Mountains. Originally known as the Glenville plant at its

[32] Glass, 58; Catherine W. Bishir, Michael T. Southern, and Jennifer F. Martin, *A Guide to the Historic Architecture of Western North Carolina* (Chapel Hill, NC: University of North Carolina Press, 1999), 352-353.

[33] Bishir, et al, 361-362.

dedication in October 1941, the facility was renamed in 1951 for J. E. S. Thorpe, president of NP&L from its founding in 1929 until his death in 1950.[34]

Thorpe Power Plant (JK 396), 1940-1941, overall view to south [Photo by Alli Marshall, *Mountain Xpress*, July 7, 2014]

Turner Shoals Hydroelectric Station is typical of the numerous facilities that were being developed for hydroelectric production in western North Carolina in the first half of the twentieth century. It is comparable in scale to many of the plants erected by local or regional power companies to fuel industrial, municipal, and residential service. The Turner Shoals plant retains its principal components and maintains a high degree of historic integrity due to minimal changes or upgrades at the facility. The multiple arch-buttress dam designed for the plant was reportedly the first application of this technique in North Carolina. The brick powerhouse exhibits a level of embellishment on par with others from the 1920s and incorporates decorative patterning and panels, pilasters, corbelled cornices, concrete accents, and large multi-light windows. Despite vast advances in technology, the Turner Shoals Hydroelectric Station continues to operate as it did in the 1920s and generate electricity through the power of moving water.

[34] Ibid.

VI. Evaluation

For purposes of compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, the Turner Shoals Hydroelectric Station (PL 310) is **eligible** for the National Register of Historic Places. The property is a good example of a hydroelectric facility built in the 1920s in western North Carolina to provide power for regional industries. The property retains integrity of location, setting, design, material, workmanship, feeling, and association. The dam, penstocks, and powerhouse retain a high degree of integrity while the operators houses have been altered with synthetic siding and replacement windows. The material changes to the houses, however, have minimal impact on the overall physical integrity of the facility.

The Turner Shoals Hydroelectric Station is **eligible** for the National Register under Criterion A (event). *To be eligible under Criterion A, a property must retain integrity and must be associated with a specific event marking an important moment in American pre-history or history or a pattern of events or historic trend that made a significant contribution to the development of a community, a state, or the nation. Furthermore, a property must have existed at the time and be documented to be associated with the events. Finally, a property's specific association must be important as well*. The construction of a dam and hydroelectric plant at Turner Shoals on the Green River in Polk County began as part of a larger plan to utilize the abundant natural resources of western North Carolina to power cotton and textile mills in the Piedmont of North Carolina and upstate South Carolina. Turner Shoals Hydroelectric Station was the second plant built by the Blue Ridge Power Company, which was formed by mill owners John A. Law and Walter Montgomery of Spartanburg, South Carolina. Electricity generated at Turner Shoals and the company's Tuxedo plant in Henderson County was transmitted to a substation in Campobello, South Carolina, and distributed to industrial sites throughout upstate South Carolina. During the sixteen month construction project, a small village developed at Turner Shoals to house and feed the more than 600 laborers who worked on the plant. The project required a quarry, saw mill, brickyard, workshops, barracks, and dining halls. Much of the labor was recruited from within the county and food was purchased from local farmers. After completion of the Turner Shoals station, the small force of plant operators and their families resided in four bungalows built adjacent to the facility. The plant has remained in continuous operation and since 1929 its electrical production is fed into the extensive Duke Power system. The Turner Shoals Hydroelectric Station is eligible under Criterion A in the area of industry as a significant example of 1920s hydroelectric development in western North Carolina that contributed to technological and economic progress in the region.

The Turner Shoals Hydroelectric Station is **not eligible** for the National Register under Criterion B (person). *For a property to be eligible for significance under Criterion B, it must retain integrity and 1) be associated with the lives of persons significant in our past, i.e. individuals whose activities are demonstrably important within a local, state or national historic context; 2) be normally associated with a person's productive life, reflecting the time period when he/she achieved significance, and 3) should be compared to other associated properties to identify those that best represent the person's historic contributions. Furthermore, a property is not eligible if its only justification for significance is that it was owned or used by a person who is or was a member of an identifiable profession, class, or social or ethnic group*. The Turner Shoals Hydroelectric Station is

associated with a number of individuals instrumental in the development of hydroelectric power in the area around Polk and Henderson counties and the design and construction of the plant, including John A. Law of the Blue Ridge Power Company, consulting engineers Curtis and Erich Mees, and construction supervisor Jack Ward. The facility is the collaborative result of many individuals' work and not the best representation of any one individual's contributions.

The Turner Shoals Hydroelectric Station is **eligible** for the National Register under Criterion C (design/construction). *For a property to be eligible under this criterion, it must retain integrity and either 1) embody distinctive characteristics of a type, period, or method of construction; 2) represent the work of a master; 3) possess high artistic value; or 4) represent a significant and distinguishable entity whose components lack individual distinction.* Designed by Mees and Mees Engineers of Charlotte, the concrete multiple arch-buttress dam is an uncommon example of its type in the region and possibly the first of its type in the state. Built at Turner Shoals on the Green River, the Mees brothers utilized the arch-buttress design to save on material costs for the 100-foot tall and 300-foot wide dam. The intact two-story brick hydroelectric powerhouse sits a short distance downstream and is fed by two metal penstocks. Three of four original bungalows erected for the plant operators remain standing adjacent to the facility. The hydroelectric station, including the dam, penstocks, powerhouse, and substation, along with the three extant operators' houses, is significant under Criterion C for its design and engineering.

The Turner Shoals Hydroelectric Station is **not eligible** for the National Register under Criterion D (potential to yield information). *For a property to be eligible under Criterion D, it must meet two requirements: 1) the property must have, or have had, information to contribute to our understanding of human history or pre-history, and 2) the information must be considered important.* Built in 1923-1924, the dam and hydroelectric plant are unlikely to contribute significant information pertaining to building technology or historical documentation not otherwise accessible from other extant resources and written records.

Boundary Description and Justification

The proposed boundary of the Turner Shoals Hydroelectric Station and associated operators' houses generally follows the legal property lines encompassing the five contiguous parcels containing all of the associated resources. The 0.35-acre tract with the powerhouse and penstocks [PIN P54-350] is completely circumscribed by an approximately 29-acre tract [P54-17] that includes the dam, containment wall, and substation and extends to the right-of-way on the west side of NC 9. The three surviving operators houses are located on three adjacent parcels covering approximately two additional acres.

The proposed boundary includes property and resources historically associated with the dam and hydroelectric plant. It provides an appropriate setting for the various structures affiliated with the power generating station. Portions of three parcels—PINs P54-2, P54-5, and P54-17—are situated on the east side of NC 9 and are not included within the boundary. The excluded areas are characterized as undeveloped land located between the highway and the river downstream from the hydroelectric plant.

Boundary Map – Turner Shoals Hydroelectric Station and Operators Houses
(*Source*: HPOWEB GIS Service)

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