NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICE

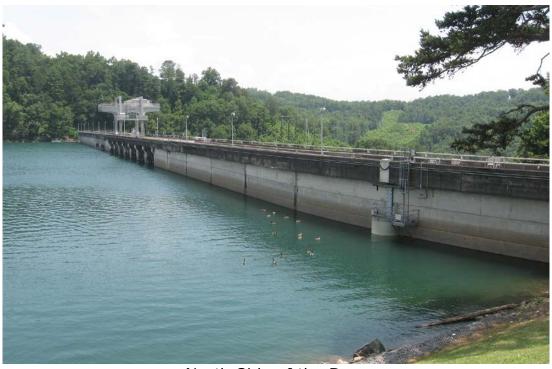
Office of Archives and History **Department of Natural and Cultural Resources**

NATIONAL REGISTER OF HISTORIC PLACES

Hiwassee Hydroelectric Project
Murphy, Cherokee County, CE0118, Listed 08/11/2017
MPS: Historic Resources of the Tennessee Valley Authority Hydroelectric System, 1933-1979 Nomination by Thomason and Associates Photographs by Thomason and Associates, June 2015



Hiwassee Dam



North Side of the Dam

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form.* If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions.

In my opinion, the property meets Signature of commenting official:	does not meet the National Register criteria. Date
State or Federal agency/bureau or Tri	bal Government
Signature of certifying official/Title:	Date
X national X statewide Applicable National Register Criteria: X A B X C	<u>X</u> local _D
recommend that this property be considered level(s) of significance:	
the documentation standards for registering	request for determination of eligibility meets properties in the National Register of Historic ional requirements set forth in 36 CFR Part 60.
3. State/Federal Agency CertificationAs the designated authority under the Nation	nal Historic Preservation Act, as amended,
2. Location Street & number: 600 Powerhouse Road City or town: Murphy State: North Not For Publication: Vicinity:	<u>Carolina</u> County: <u>Cherokee</u>
Historic Resources of the Tennessee Valle (Enter "N/A" if property is not part of a mult	
Name of related multiple property listing:	
Other names/site number:	

Hiwassee Hydroelectric Project Name of Property	Cherokee, North Carolina County and State	
4. National Park Service Certification		
I hereby certify that this property is:		
entered in the National Register		
determined eligible for the National Register		
determined not eligible for the National Register		
removed from the National Register		
other (explain:)		
Signature of the Keeper	Date of Action	
5. Classification		
Ownership of Property		
(Check as many boxes as apply.) Private:		
Public – Local		
Public – State		
Public – Federal X		
Category of Property (Check only one box.)		
Building(s)		
District		
Site		
Structure		
Object		

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Number of Resources within Pr		
(Do not include previously listed		
Contributing	Noncontributing	1 111
2	<u> </u>	buildings
0	1	sites
3	3	structures
0		objects
5	5	Total
Number of contributing resources 6. Function or Use		
Historic Functions		
(Enter categories from instruction	s.)	
INDUSTRY/PROCESSING/EXT	TRACTION/ Energy Facility_	
RECREATION AND CUTLURE	E/ Outdoor Recreation	
Current Functions		
(Enter categories from instruction		
INDUSTRY/PROCESSING/EXT		
RECREATION AND CUTLURE	Uutdoor Recreation	

iwassee Hydroelectric Project	Cherokee, North Carolin	
ame of Property	County and State	
7. Description		
Architectural Classification		
(Enter categories from instructions.)		
MODERN MOVEMENT/Streamlined Moderne		
WODERT WO VENTER 1/Sucammined Woderne		
Materials: (enter categories from instructions.)		
· · · · · · · · · · · · · · · · · · ·	Earth, Rock	
Principal exterior materials of the property:Concrete, Steel,	, Earth, Rock	

Narrative Description

(Describe the historic and current physical appearance and condition of the property. Describe contributing and noncontributing resources if applicable. Begin with **a summary paragraph** that briefly describes the general characteristics of the property, such as its location, type, style, method of construction, setting, size, and significant features. Indicate whether the property has historic integrity.)

Narrative Description

The Hiwassee Hydroelectric Project was constructed from 1936-1940 by the Tennessee Valley Authority (TVA). The primary purpose for construction of the Hiwassee project was for hydroelectric power and flood control. The name Hiwassee comes from the Cherokee word for savanna, or large meadow, which was also given to one of two Cherokee villages along the river. Located in Cherokee County, North Carolina, the Hiwassee Hydroelectric Project straddles the Hiwassee River, which originates in Georgia and flows in a northwest direction through North Carolina and into Tennessee. The Hiwassee Dam impounds Hiwassee Reservoir (also called Hiwassee Lake). The dam has a total capacity of 434,000 acre-feet and a flood-storage capacity of 205,600 acre-feet. Hiwassee Hydroelectric Project has two generator units with a net dependable capacity (the daily average power produced minus the electricity used by the dam itself) of 124 megawatts.²

¹ James Mooney, *Myths of the Cherokee and Sacred Formulas of the Cherokee*, (Nashville, TN.: C and R Elder, 1972), 512.

² Tennessee Valley Authority, "Hiwassee Reservoir," at webpage http://www.tva.gov/sites/hiwassee.htm accessed August 12, 2015.

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INVENTORY

Construction of the Hiwassee Hydroelectric Project began July 15, 1936. The facility was put into operation February 8, 1940. The Hiwassee Hydroelectric Project originally consisted of the dam, powerhouse and control building, and switchyard, which are interconnected and integral to one another (*see Photo 1*). To the south of the dam is a recreational area consisting of picnic tables, campground, a boat ramp, and restrooms. The recreational area was designed in 1940 as part of the TVA mission.

1.) Hiwassee Dam, 1940 (Contributing Structure)

The Hiwassee dam (*see Photos 2-5*) is a straight gravity concrete structure 1,287 feet in length.³ The maximum height of the dam is 307 feet, from the foundation to top of deck. The dam consists of continuous blocks from zero to twenty-seven from the north to south. Blocks zero through eight compose a non-overflow section to the north of the spillway; blocks twenty through twenty-seven compose another non-overflow section, south of the powerhouse intake. The high overflow spillway, 260 feet in length, is located seventy feet to the north of the midpoint of the original riverbed. It has seven (7) radial crest gates measuring twenty-three feet high and thirty-two feet wide. The gates are divided by six-foot-wide concrete piers. The capacity of the spillway is 130,000 cubic feet per second with the reservoir at maximum elevation. The crest is at elevation 1503.5. Additional discharge can be obtained via four (4) steel-lined sluiceways at the base of the spillway. These sluiceways measure 102 inches in diameter. The spillway overflow is contained within training walls at the base of the downstream side of the dam. Energy of discharging water is dissipated in a deep stilling pool above a concrete apron with a weir at the downstream end.⁴

The dam is designed such that each of its blocks is independently stable, without any support from adjacent blocks. The blocks withstand the water pressure, the thrust from spillway piers between the radial gates, and load from the operating bridge on which the 120-gantry crane travels. The downstream face of the dam is on a five-to-one slope, which helps to distribute base pressures. The training walls at the base of the spillway are forty-six feet in height. The south wall separates the stilling pool and the powerhouse tailrace, preventing interference during flood discharges.⁵

³ Commonly, dam design includes a section that permits the overflow of water from the reservoir (the spillway) and other sections that do not allow the passage of water (non-overflow). Together, these sections contribute to the total length of the dam structure that impounds the reservoir. A gravity type dam is one constructed of concrete or stone and uses the sheer weight of the structure to resist the horizontal pressure of the water pushing against it. Gravity dams are designed in sections that are independently stable.

⁴ Tennessee Valley Authority, *The Hiwassee Valley Projects, Technical Report No. 5, Volume 1: The Hiwassee Project: A Comprehensive Report on the Planning, Design, Construction, and Initial Operations of the Hiwassee Project,* (Washington, D.C.: United States Government Printing Office, 1946), 31, 37, 41. ⁵ Ibid., 49-50.

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Atop the dam is a gantry crane for operation of the radial gates and sluiceways. There is a roadway across the top of the dam. It is both a through-traffic road and a maintenance service road for the dam. The roadway accesses isolated farms that would have otherwise required new road construction, and a full-width roadway added little cost to the design of the dam, since a roadway was needed for the large gate operation equipment.⁶

2.) Powerhouse, 1940 (Contributing Building)

The powerhouse (*see Photo 6-19*), located on the left (south) bank, is the outdoor type.⁷ The powerhouse measures 133 feet wide, 182 feet long, and seventy-six feet high from bedrock to the generator deck. The substructure, below the turbine floor, is of massive reinforced concrete construction. Above this, the superstructure includes the service bay and electrical bay and is constructed of reinforced concrete walls, floor slabs, steel beams, columns, and girders. The powerhouse was designed for two generator units, each served by its own penstock, eighteen feet in diameter. Each penstock is designed for a flow of 4,380 cubic feet per second under a head of 190 feet. The powerhouse was originally installed with one generating unit that consists of a Francis-type turbine rated at 80,000 horsepower at 190-foor head and connected to a vertical-shaft generator rated at 64,000 kilovolt-amperes (57,600 kilovolts) 0.9 power factor, as well as with space for a second, similar unit.⁸ The Hiwassee powerhouse was placed into service with one unit operating; the second unit was added in1956. Unit two has been designated with landmark status in the field of mechanical engineering as the first integrated, reversible pumpturbine ever designed and installed.

The powerhouse is a one-story building whose north elevation abuts the dam. Its exterior walls are made of precast blocks or panels that have a textured appearance obtained by using rough-sawed lumber forms, with alternating grain in adjacent blocks. The roof is flat and has metal coping at the roofline. The roof of the powerhouse structure is the generator deck. The use of the outdoor or open-type deck resulted in a savings of \$240,000 over the conventional indoor-type powerhouse. Removable steel housing covers each generator. A gantry crane travels on the generator deck parallel to the axis of the dam. The façade (south) contains the main entrance, which is flanked by projecting, wide, concrete pilasters and topped with aluminum lettering spelling out the project name, HIWASSEE. At the east end of the façade are three vented portholes below the roofline. To the west of the main entrance is a shorter one-story wing with a continuous band of fenestration across the façade consisting of alternating three-part, aluminum casement windows and structural glass blocks.

The entrance into the powerhouse lobby has original glass and metal doors. The powerhouse lobby interior has plaster wall and ceilings, tile floors, and tile walls. The interior north wall of the lobby has aluminum letting stating, "1937- BUILT FOR THE PEOPLE OF THE UNITED STATES OF AMERICA - 1940." On the east wall is a viewing window into the control room.

⁶ Ibid., 38.

⁷ Four of TVA's hydroelectric powerhouses (Fort Loudoun, Hiwassee, Watts Bar, and Wheeler) are of the outdoor type, with the tops of the generators extending through the roofline. The units are covered with metal sheathing and are serviced by a gantry crane on the exterior of the powerhouse.

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The lobby retains original marble water fountains of an elliptical design. Some of the interior walls, as well as the walls of some stairwells, have curved corners.

The women's restrooms have tile floors, original tile walls, drop ceiling, and new grey tile wall and shower. The men's restroom has the original marble partitions. Office spaces have plaster walls and ceilings and new linoleum flooring. Original interior doors are solid metal with a central louvered vent. A conference room has been retro-fitted into the office area with pre-fab partition wall; the room has a carpeted floor, a drop ceiling, and fluorescent light fixtures. On the top floor, there is structural glass block situated between the aluminum windows. The second floor breakroom has linoleum floors and concrete board walls; some spaces have been remodeled with carpet and drop ceilings. The generator room has tile floors and poured concrete and steel structure walls. From this level, the turbine pit is accessed down a short flight of steps.

3. Switchyard and Transmission Lines, 1940 (Contributing Structure)

The switchyard is located on the left bank downstream of the dam. The main generator is connected directly to the low-voltage terminals of the main transformer bank via the oil circuit breaker. The 541-kilovolt switchyard was designed for a future main-and-transfer-bus configuration for ultimate installation of two unites and four transmission lines. All structures are galvanized and fabricated steel. The 154-kilovolt structure was designed for a maximum conductor tension of 6,000 pounds in the 1,400-foot river span and 3,000 pounds for the 400-foot land span. The 44-kilovolt structures were designed for conductor tension of 1,500 pounds, and the 12.5-kilovolt structure, 750 pounds (*see Photos 20 & 21*).

4. Grounds/Picnic Area, ca. 1972 (Non-Contributing Site)

Not original to the reservation, the grounds were developed for public use after the war. These plans were in accordance with TVA's mission to provide for public visitation to the site. The grounds include sidewalks picnic areas with tables and benches, and boat ramp (*see Photos 22 & 23*).

Maintenance Base - 4 resources (see Photo 24-26)

The maintenance base includes four utility buildings/structures:

5. Garage/Shop building ca. 1980 (Non-Contributing Building)

This is a ca. 1980 metal building with a low-pitched gable-front roof of metal has a façade with a large, overhead-tracking, metal door, and a solid metal pedestrian door.

6. Flammable Storage Building ca. 1950 (Contributing Structure)

This is a ca. 1950, two-bay, rectangular building of concrete block with flat roof. The two bays are enclosed with chain-link fence gates for ventilation of the interior; one of the gates is covered with a sheet of solid metal. Next to this structure is an open-air structure covering two large cylindrical tanks and has a gable roof of metal supported by metal posts.

7. Equipment Shed ca. 1980 (Non-Contributing Structure)

⁹ Ibid., 76-77.

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This is a ca. 1980 structure with two open-air bays, one enclosed bay of concrete block construction, and one enclosed bay with walls of sheet metal siding, all under a shed roof of metal.

8. Equipment Shed ca. 1980 (Non-Contributing Structure)

This is a ca. 1980 structure with two open-air bays, an enclosed bay of concrete block construction at one end with a large, metal, overhead-tracking door, and a two-bay, open-air lateral addition with a shorter roofline Both sections have shed roofs of metal.

9. Visitor Building, 1955 (Contributing Building)

The visitor building was constructed after the war in 1955. Its exterior walls have brick veneer and vertical wood board siding. The plan is symmetrical with a central breezeway. There are large exposed wood beams supporting the roof, which has wide eaves of wood planking and a hip roof of standing-seam metal (*see Photos 27-29*).

10. Picnic Shelter, 1972 (Non-Contributing Structure)

At the visitor building is a new picnic shelter. This is an open-air structure with five bays divided by wood posts supporting a gabled roof of standing-seam metal on a poured concrete pad (*see Photo 30*).

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8. S	Statement of Significance		
	icable National Register Criteria ("x" in one or more boxes for the criteria qualifying the prog.)	operty for National Register	
X	A. Property is associated with events that have made a sbroad patterns of our history.	significant contribution to the	
	B. Property is associated with the lives of persons significant	ficant in our past.	
Х	C. Property embodies the distinctive characteristics of a construction or represents the work of a master, or per or represents a significant and distinguishable entity individual distinction.	ossesses high artistic values,	
	D. Property has yielded, or is likely to yield, informatio history.	n important in prehistory or	
		n important in prehistory or	
	history. ria Considerations		
	history. ria Considerations x "x" in all the boxes that apply.)		
	history. ria Considerations x "x" in all the boxes that apply.) A. Owned by a religious institution or used for religious		
	history. ria Considerations « "x" in all the boxes that apply.) A. Owned by a religious institution or used for religious B. Removed from its original location		
	history. ria Considerations ("x" in all the boxes that apply.) A. Owned by a religious institution or used for religious B. Removed from its original location C. A birthplace or grave		
	history. ria Considerations ("x" in all the boxes that apply.) A. Owned by a religious institution or used for religious B. Removed from its original location C. A birthplace or grave D. A cemetery		

CONSERVATION ENGINEERING

INDUSTRY

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<u>MILITARY</u>	
<u>RECREATION</u>	
SOCIAL HISTORY	
Period of Significance	
1936-1965	
<u>1/30-1/03</u>	
0:: P D-4	
Significant Dates	
1936-1940	
Significant Person	
(Complete only if Criterion B is marked above.)	
<u>N/A</u>	
Cultural Affiliation	
N/A	
Architect/Builder	
Architect: Tennessee Valley Authority; U.S. Army Co	orps of Engineers; Roland wank;
Rudolph Mock, Mario Bianculli	
Builder: Tennessee Valley Authority	

Statement of Significance Summary Paragraph (Provide a summary paragraph that includes level of significance, applicable criteria, justification for the period of significance, and any applicable criteria considerations.)

The Hiwassee Hydroelectric Project meets National Register criteria A and C for its historical and architectural significance as an integral part of the Tennessee Valley Authority Hydroelectric Project. The Hiwassee Hydroelectric Project is significant in the expansion of energy for World War II manufacturing and improvement of quality of life through transmission of electricity, control of seasonal flooding, and creation of public recreational facilities. The Hiwassee Hydroelectric Project was one of twenty-five (25) dam sites constructed by the Tennessee Valley Authority (TVA) for the purpose of generating electrical power from, improving navigation of,

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and controlling seasonal flooding of the river system of the region. The main objective of the 1933 Tennessee Valley Authority Act was the creation of a continuously navigable nine-foot channel from the mouth of the Tennessee River to Knoxville, as well as flood control, power generation, and public benefits. The Hiwassee Hydroelectric Project was TVA's second completed tributary storage dam, contributing to the integrated TVA system. It was TVA's the sixth major construction project and the fourth for which TVA's staff prepared plans. For architecture, the Hiwassee project is significant for its Streamlined Moderne style, embodying the TVA's mission of progress in its economy of adornment, as well as the industry of the machine age. The progressive ideology extended into conservation, another area of significance; TVA's Hiwassee Hydroelectric Project not only harnessed the energy of the river, but involved reforestation of the land and introduction of progressive farming methods. The project's significance in engineering is reflected in TVA's overall plan for an integrated system of river management through site-specific designs tested on scaled models. The significance of the Hiwassee project in industry is seen through the increase of household electricity use and in warrelated manufacturing. The project is significant in military for its contribution to the war effort. The Hiwassee project is significant in recreation because of the extensive outdoor opportunities it fostered. The project is significant in social history for its role in employment, housing and land ownership, and improvement of quality of life.

Under criterion C, the Hiwassee Hydroelectric Project is a notable example of the Streamlined Moderne style of the twentieth century. This style is expressed in the design of the dam and the interior and exterior of the powerhouse. Few changes have occurred to the exterior of these structures, and they retain integrity of their original design. The Hiwassee Hydroelectric Project meets the registration requirements set forth in the Multiple Property Documentation Form, Historical Resources of the Tennessee Valley Authority Hydroelectric Project.

Narrative Statement of Significance (Provide at least **one** paragraph for each area of significance.)

TVA was created under President Roosevelt's New Deal program as part of his "First One Hundred Days." Roosevelt envisioned "a corporation clothed with the power of government but possessed of the flexibility and initiative of a private enterprise." To this end, Congress passed the TVA Act on May 18, 1933. 10 The multi-purpose legislation sought to improve navigation and flood control of the Tennessee River, spur agricultural and industrial development in the Tennessee Valley, and provide for national defense via government facilities in the proximity of Muscle Shoals, Alabama (Sec. 1). The act authorized the TVA Corporation to acquire real estate for the construction of dams, reservoirs, power houses, transmission lines, or navigations projects at any point along the Tennessee River and its tributaries (Sec. 4i). 11

¹⁰ "History of the Tennessee Valley Authority," at website http://www.policyalmanac.org/economic/archive/tva history.shtml accessed April 16, 2015.

¹¹ Tennessee Valley Authority Act of 1933, at website http://www.policyalmanac.org/economic/archive/tva_history.shtml, accessed April 16, 2015.

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Congress authorized the Hiwassee Project on August 12, 1935, and TVA followed suit on January 10, 1936. Construction began July 15, 1936. The dam was closed and the reservoir began filling on February 8, 1940. The project's first generator was placed in service on May 21, 1940, and construction was completed in December of the same year. The approval for the Hiwassee project actually came before TVA presented its unified development plan to Congress on March 31, 1936. This report recommended the construction of nine main-river dams and three or more tributary storage dams, specially emphasizing the contributions of the latter to flood control and reservoir levels needed to maintain a navigable channel on the Tennessee River. The report named Norris, Fontana, and Fowler Bend, later re-named the Hiwassee project for the river on which it would located. The Hiwassee River was flood prone, causing extensive damage 112 miles downstream at Chattanooga. Thus, management of the Hiwassee River was critical to prevention of financial losses in this major city. The support of the support of the Hiwassee River was critical to prevention of financial losses in this major city.

The Hiwassee project required the purchase of approximately 25,000 acres of land in Cherokee County, displacing 261 families. TVA visited 185 families to obtain basic demographic data to aid in their relocation. TVA also was responsible for grave relocation, investigating twenty-two cemeteries with 1,245 graves in the reservoir area. While just three of the cemeteries would be flooded, impoundment would cut off access to ten other sites. A total of 462 graves were relocated, while 109 remained in place, by the wishes of family. TVA performed the work to the standard of the North Carolina State Board of Health¹⁴

The Hiwassee project entailed the relocation and construction of approximately twelve miles of access highway, three miles of state highways, and seven miles of non-state highways, as well as almost two miles of city streets and three miles of tertiary roads. In the re-building of affected roads, TVA agreed to upgrade and improve the relocated sections to modern standards, with better alignment and greater width. Adjustments were also required for 1.65 miles of Louisville and Nashville rail lines, including an eighty-two foot bridge. A total of eight bridges totaling 975 feet were also built. The road and bridge improvements provided short-term employment and contributed to an upgrade in local infrastructure, benefitting commerce and quality of life for area residents.

Total land costs for the project amounted to \$1,233,071, which included acquisition by fee or condemnation proceedings, flowage easements, and highway relocation. Direct construction costs, such as labor, materials, equipment, transportation, totaled \$10,764,624. Indirect construction costs, including accounting, timekeeping, office supplies, and police service, came to \$1,997,834. Design and engineering expenditures, which included salaries and expenses of executive engineers, technicians, and inspectors, amounted to \$1,291,728. These amounts plus other categorized costs brought the total project to \$16,844,042.

¹² Tennessee Valley Authority, *The Hiwassee Project*, 12.

¹³ Ibid., 1-2.

¹⁴ Ibid., 248.

¹⁵ Ibid., 242.

¹⁶ Ibid., 263-64.

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After World War II the planned recreational facilities were finally completed and included a campground, picnic area, and boat launch ramp along the west shore of the lake and east of the dam. A maintenance area was also built to provide upkeep and regular maintenance for the facility and grounds.

Since its construction, the powerhouse has not been significantly altered and retains its original exterior and interior design and detailing. Of particular note is the intact original lobby with its tile floors, walls, and glass and aluminum finishes.

SIGNIFICANCE IN ARCHITECTURE

TVA's hydroelectric projects were designed to embody its mission for social progress. The goals and achievements of these projects - power production, navigation, flood control, malaria prevention, reforestation, and erosion control – reached across the Valley region penetrating America's social and economic strata. Architect Roland Wank impressed upon a receptive board of directors that government projects were beholden to their real stockholders, the American taxpayers, and should be open for public viewing. Further, Wank stated that the design of powerhouses should both welcome the public and convey strength in purpose. Thus, TVA powerhouses were designed as massive monoliths with visitor reception areas. ¹⁷ A prominently displayed message in every TVA powerhouse would emphasize the project as "Built for the People of the United States of America."

The pre-World War II TVA projects exemplify the Streamlined Moderne style, a late version of the Art Deco style popular during this period. Streamlined Moderne was an expression of progress, a particularly important underpinning of the New Deal agenda. Stylistic elements that manifested this ideology include the use of geometric shapes, basic and pure in form, sleek and shiny materials evoking machinery and movement, and restrained décor suggesting an economical design ethic. Streamlined Moderne architecture often emphasized curved forms and horizontal lines, sometime including nautical motifs.

The design of the Hiwassee dam and powerhouse reflects the "modernism" that the TVA architects and engineers strived for in the 1930s and early 1940s. The dam was built utilizing the most advanced methods of its time, and the powerhouse was built with Streamlined Moderne characteristics on both its exterior and interior. The Hiwassee powerhouse lobby retains original glazed tiles surfaces, sleek, aluminum handrails, marble water fountains and restroom partitions, glass and aluminum doors to the exterior, and interior doors of metal with narrow rectangular, louvered insets. These elements express the sleek minimalism of the Streamlined Moderne architectural style.

On the exterior, the powerhouse's block form is modern in its utilitarian simplicity. The concrete wall surface is broken into regular blocks with deep seams and given a textured effect from

¹⁷ North Callahan, TVA – Bridge Over Troubled Waters: A History of the Tennessee Valley Authority, (Cranbury, NJ: A. S. Barnes and Co., Inc., 1980), 33; and Erwin C. Hargrove, Pioneers of Myth: The Leadership of the Tennessee Valley Authority, 1933-1990, (Princeton, NJ: Princeton University Press, 1994), 30-33.

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board forms. The treatment emphasizes the rectangular form in its repetition and breaks the massive wall into smaller units on a human scale.

The dam itself embodies progress, in its engineering and its design. Its massive scale represents the immensity of the project, spatially and philosophically. The architectural design of the dam employs smooth surfaces of concrete.

SIGNIFICANCE IN CONSERVATION

In 1940, TVA transferred 18,000 acres of Hiwassee reservoir lands to the U.S Forest Service on which the two agencies would study forestry development. Of this land, 2,000 acres were selected for timber stand improvement through marking and commercial sale of decadent trees. The same practice was undertaken on portions of the Hiwassee reservation in the immediate vicinity of the dam. TVA also established fifty-three test demonstrations areas across Cherokee County related to agricultural development. These units studied the control of rainfall run-off for protection of the reservoir from siltation in concert with the use of fertilizer from Wilson dam. These demonstration sites helped inform best practices in farming of the area.¹⁸

With the completion of two upstream projects (Chatuge and Nottley) in 1942, integrated operation with the Hiwassee reservoir was successful in preventing downstream flooding at Chattanooga. Flood crests there were reduced by four, six, and ten feet, respectively, in December of 1942, March of 1944, and January of 1946. Watershed protection was also encouraged among relocated families, as was use of lime and TVA phosphate to amend the soil. ¹⁹

SIGNIFICANCE IN ENGINEERING

The Hiwassee Hydroelectric Project is an integral part of the overall engineering design of the TVA system. Located on the Hiwassee River, the Hiwassee dam's release provides power to the Apalachia Hydroelectric Project 9.8 miles downstream. Above the Hiwassee dam, the Hiwassee Reservoir forks at the confluence of the Hiwassee and Nottely Rivers. The Hiwassee Hydroelectric Project is provided release from both the Chatuge Dam (Hiwassee River) and the Nottely Dam (Nottely River).

In designing the Hiwassee Dam, TVA conducted model studies at its Norris laboratory to determine the proper design of the spillway apron and the type and location of sluices. Use of a model allowed for study and solution of many engineering problems specific to the site that could not be solved simply mathematically. The Hiwassee model was built on a scale of 1:55.

The spillway model included small, steel shapes covered with sheet metal. A non-overflow section including the powerhouse tailrace was constructed of wood, and a glass panel was installed in place of the right training wall to view the flow of water from the spillway to a point

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¹⁸ Tennessee Valley Authority, *The Hiwassee Project*, 257-259.

¹⁹ Ibid., 9, 232.

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500 feet below the axis of the dam. Various designs evaluated the effect of erosion produced in a bed of gravel passing through two mesh screens. Researchers were specifically studying whether to install at Hiwassee the Grand Coulee- or Norris-type apron.

The Grand Coulee design was a curved bucket. In Hiwassee model tests, six different designs were conducted at discharges of 50,000, 100,000, and 150,000 cubic feet per second; with bucket elevation ranging from 1120 to 1266; and bucket radii from thirty-five to fifty feet. In all combinations, this design proved unsatisfactory: without the bucket being excavated to an excessive depth, this apron type resulted in surging, high velocities below the spillway, and severe erosion downstream.

Some thirty designs were tested using the Norris-type apron, which dissipates energy through the use of a hydraulic jump. These tests were conducted simulating four elevations between 1239.75 and 1258. The distance from the crest to the end of the apron ranged from 330 to 482 feet. In general, these results were more satisfactory than those with the Grand Coulee type apron, in that there was less turbulence below the spillway. At low flows, there was very little erosion, but with higher discharged, erosion effects were severe. Once a satisfactory combination of these factors was achieved, more tests were conducted with the inclusion of four sluices. Maximum discharge through the sluices was 5,000 cubic feet per second. Horizontal sluices proved unsatisfactory; inclined sluices performed well alone and when combined with spillway discharges. The final apron design had a bucket at elevation 1,249 with an end sill located 420 feet below the crest line of the dam. This design resulted in little scour. When fewer than six spillway gates were operating, the best results were obtained when one or more of the center gates was closed unless the sluices were in operation. Also, if the sluice gates were in operation, it was undesirable to discharge through fewer than three spillway gates.²⁰

In 1956, TVA installed Unit 2 in the Hiwassee powerhouse. It was the first integrated, reversible pump-turbine ever designed and installed in the country. TVA's 1956 annual report described the unit:

"Operated as a generator, the unit has a capacity of 59,500 kilowatts [when] it is operated as a conventional generator....In reverse operation, however, the generator operates as a motor of 102,000 horsepower, turning the turbine which then acts as a pump. As a pump, the unit takes water from the reservoir of Appalachia [sic] Dam...and pumps it back up into the Hiwassee Reservoir. In a test operation, the unit pumped 4,000 cubic feet per second against a head of 238 feet....This operation helps to maintain the head of water for power generation at the project and provides additional water to be run through the Hiwassee turbines."²¹

The unit was designated with landmark status in the field of mechanical engineering in 1981.

²⁰ Ibid., 323-27.

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²¹ Edward A. Ackerman, and George O.G. Lof, *Technology in American Water Development* – 2nd ed., (NYC: Earthscan, 2011), 250.

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SIGNIFICANCE IN INDUSTRY

TVA's series of locks and channels created a navigable course on the Tennessee River, effectively boosting the economy of the region. Upstream storage reservoirs such as the Hiwassee project on the Hiwasse River contributed to navigation and flood control as an integral component of the overall river system.

Cheap electricity generated at TVA plants lured new industry to the region, influencing diversification of economy in the heretofore agriculturally-based economy of the Tennessee Valley. The workforce employed in manufacturing grew from 222,000 jobs to 382,000 from 1929 to 1950. The pay rate for a manufacturing job in the region increased by 442 percent compared with the national average gain of 282 percent. During the early post-war years, TVA supplied electricity at a rate (1.35 cents per kilowatt-hour) less than half of the national average (2.78 cents per kilowatt-hour). By 1946, the TVA's power plants had a capacity of 2.5 million kilowatts of power and brought electricity to 668,000 households in the Tennessee Valley. 23

In recent decades TVA has continued to recruit industry with attractive affordable power. Economic Development is a critical component of TVA's mission. In 2013, TVA Economic Development helped attract or retain almost 52,000 jobs and generate nearly \$5.0 billion in capital investment across the TVA region.²⁴ The Wheeler Hydroelectric Project contributes electrical power to industries throughout the region.

SIGNIFICANCE IN MILITARY

The Hiwassee Hydroelectric Project was completed in 1940, and much of its electricity went to industries essential to the military during World War II. The Hiwassee switchyard distributed 154-kilovolt current to the Apalachia facility and to the Aluminum Company of American (ALCOA). At the nation's peak of war-time activity in 1942, the TVA had completed or was in the process of building twelve hydroelectric facilities. Of the 12 billion kilowatt hours of energy produced among the TVA system, sixty-six percent was devoted to the war effort.

SIGNIFICANCE IN RECREATION

Following World War II, as middle class American households gained wealth and indoor electricity, a by-product was outdoor leisure time. The TVA's contribution to recreational activities is noteworthy. The agency's hydroelectric projects' reservoirs attracted outdoor enthusiasts who enjoyed fishing, boating, camping, and hiking in the environs the TVA helped create, re-forest, and conserve.

²² Patricia Bernard Ezzell, "Tennessee Valley Authority in Alabama (TVA)." At webpage http://www.encyclopediaofalabama.org/article/h-2380. Accessed April 22, 2015.

²³ West, 11.

²⁴ "Economic Development," at webpage http://www.tva.com/econdev/index.htm accessed May 5, 2015.

²⁵ Tennessee Valley Authority, *The Hiwassee Project*, 8.

²⁶ Ezzell, "Tennessee Valley Authority in Alabama (TVA)."

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The mountain setting of Hiwassee Reservoir is idyllic, yet its isolated location and lack of major access roads restricted its potential development as a recreational center. Additionally, Hiwassee Reservoir is subject to a maximum fluctuation of eleven feet in water level. These factors informed TVA's preliminary studies for recreation planning at the site. TVA planned the grounds of the Hiwassee project site to include landscaping and minimal visitor facilities knowing that visitation would be limited until region growth occurred. Accommodations included parking above and below the dam, a reception lobby within the powerhouse, and a Visitor Building on the right bank above the dam. Records indicate that 29,000 visited the Hiwassee dam in 1939 (while that same year, 800,000 visited Norris and more than 100,000 visited Guntersville, Wilson, and Chickamauga each).²⁷

TVA provided planning assistance to the city of Murphy, North Carolina, in recreational development. There were plans for several public recreation areas on TVA shores of Hiwassee Reservoir. Plans included a municipal park with tennis courts, picnic areas, badminton and shuffleboard courts, and parking space. Another project was a public boat dock on U.S. Forest Service-managed land. A small dam would be built on Persimmon Creek, an arm of Hiwassee Reservoir, in order to establish a seventy-acre recreational lake with a constant water level. TVA and the Forest Service would work in cooperation to maintain the Persimmon Creek project as a combination recreational-biological readjustment development for swimming, boating, and raising fish, including small- and large-mouth bass and wall-eyed pike for release into the main reservoir.²⁸

SIGNIFICANCE IN SOCIAL HISTORY

During the 1930s, TVA's projects in the Tennessee Valley included improving the land and the lives of its people, devastated by the Depression. TVA's Hiwassee project helped create new employment opportunities in a rural, isolated area and also provided instruction to farmers on improving soil and developing long-term farming practices.

TVA visited 185 families in November and December of 1936, obtaining basic data to assist with their relocation. This rugged mountainous area was eighty percent forestland, on which residents relied for resources and livelihood. When the steep mountains were cleared, and second growth was too small to harvest, almost seventy percent (128) of the families interviewed turned to farming. Of these 128 households, over half were tenants. This represents an increase from twenty percent among these families' previous generation. This increase in tenancy is the direct result of land purchases made by electric power interests, with almost forty-eight percent of tenant farms owned by one company (Southern states Power Company).²⁹

Family life among the reservoir families at Hiwassee was characterized by marriage at a young age, large families in proportionately small houses, family solidarity, and a net cash income of \$197 among farmers. Net real income (estimate of goods produced and consumed at home) was

²⁷ Ibid., 259-60.

²⁸ Ibid.

²⁹ Ibid., 28, 230.

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\$596 for farmers and \$775 for non-farmers. Agricultural subsistence in the craggy landscape is evident in the tillable land ratios: while the median size of farm among the families was eighty-five acres, the median acreage in crops was twelve and in corn, ten.³⁰

In interviews, TVA noted among the families a perpetuation of generational characteristics, chiefly a fierce embrace of personal freedom and clannish familial tendencies. These were mountain people in the New World, descendants of Scotch, Scotch-Irish, and German immigrants who settled in the isolated crevices of the Appalachians by way of Pennsylvania and Virginia. They intermingled with and married Cherokee Indians and clung to their heritage and tight-knit families. While TVA was assisted in the relocation process, as at previous projects, by the state Agricultural Extension Service, the Works Progress Administration, and the Farm Security Administration, the lead agency wisely turned to community leaders to overcome the passionate resistance to relocation among residents. At new locations, landowners offered share-cropping acreage to tenants. This relocation process illuminated both landowners' unfamiliarity with gaining clear titles and renters' limited experience with only a cash-basis rental from the power company. The sale of their reservoir land afforded those residents with the unprecedented opportunity to acquire stock and equipment. Both landowners and tenants were aided in solvency and/or land purchase through employment at the Hiwassee project. A total of ninety-one families had employment with TVA either in reservoir clearing or in construction of the dam.³¹

Located in a sparsely populated area, the Hiwassee project experienced a shortage of local labor, as well as a shortage of housing for workers coming from outside the area. TVA built Hiwassee Village on the left (east) side of the project site and within walking distance. The village was a self-contained unit consisting of forty-two permanent houses, seventy-three temporary houses, five men's dormitories, one women's dormitory, a hospital, cafeteria, community center, personnel office, and a grammar school. TVA also provided facilities for recreational and educational opportunities. Ultimately, the initial housing accommodations proved insufficient, and TVA built numerous additional private homes.³²

TVA designed several stock type dwellings (Types A-E) all one-story and having from three to six rooms. IN general, these houses had foundations of heavy oak posts set on concrete footers, exterior walls with shiplap siding over building paper, and asphalt-shingle roofs. The dwellings had standard double-hung sash windows, which were screened, as were porches and doors. Interiors had hardwood floors, wallboard sheets of paper pulp, and insulated ceilings and were designed to accommodate electrical appliances that could be rented from TVA. A duplex (Type F) was also available. Also dwelling types could be constructed for \$900-1000 per unit. ³³

Workers' dormitories were of the U-shaped Guntersville design with fifteen (15) two-man cubicles in each wing and service facilities in the yoke. At Hiwassee, however, the terrain dictated some improvisation of the plan, spreading the wing along contour lines that created a section level on the façade. This variation increased the capacity of each building from the

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³⁰ Ibid., 29.

³¹ Ibid., 230-232.

³² Ibid., 83-85.

³³ Ibid., 88, 91.

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standard sixty to 104. The dormitories were of frame construction supported by eight-inch-square creosoted wood posts. Exterior walls were sided with shiplap.³⁴

The village also had one staff dormitory and a thirty-three-person women's dormitory. The village cafeteria could seat 240 at a time. The community building was an irregular plan. The central section housed a lounge, library, soda fountain, commissary, police offices, general stores, and post office. Two rear wings were separated by brick firewalls and housed the village manager's office, four school classrooms, and an auditorium. None of the housing, dining, or community facility plans depict or mention accommodations for African Americans, as at other project sites.³⁵ This omission suggests a homogenous workforce at Hiwassee. Employment for the project peaked at more than 1,100 workers during August-October of 1938.³⁶

Upon completion of the Hiwassee project in 1940, very few of the built facilities were needed. The subsequent national defense emergency, however, created a new demand for housing, as four more hydroelectric projects were to be constructed in the Hiwassee River Valley beginning in July 1941. All permanent Hiwassee houses not sold or razed were used by workers at those projects.³⁷

SUMMARY

By 1951, the TVA hydroelectric program had resulted in construction of eighteen (18) dams: seven (7) on the Tennessee River and eleven (11) on tributaries. The projects on the main river are: Kentucky, Pickwick Landing, Wheeler, Guntersville, Chickamauga, Watts Bar, and Fort Loudon. Those on tributaries are: Apalachia, Hiwassee, Chatuge, Ocoee No. 3, Nottely, Norris, Fontana, Douglas, Cherokee, South Holston, and Watauga. Total costs for the eighteen dams were more than \$600 million.³⁸

The Hiwassee Hydroelectric Project was one of twenty-five (25) constructed by the Tennessee Valley Authority (TVA) for the purpose of generating electrical power from, improving navigation of, and controlling seasonal flooding of the river system of the region. The project brought construction jobs and later electricity to the rural area. The Hiwassee Hydroelectric Project brought new opportunities to and spurred economic development in the surrounding counties. The Hiwassee facility is an important component in the vast TVA system of flood control and power generating, as well as contributing to management of river navigation.

The Hiwassee Hydroelectric Project retains much of its integrity from its original design in the 1930s and later improvements in following decades. The dam and powerhouse control building have not been significantly altered, and the control building displays its original Streamlined Moderne design in its exterior and interior detailing. The project continues to be an integral part of the TVA system. The Hiwassee Hydroelectric Project meets the registration requirements set

35 Ibid., 88-96.

³⁴ Ibid., 91-92.

³⁶Ibid., 139.

³⁷ Ibid., 100.

³⁸ Tennessee Valley Authority, *Design of TVA Projects Technical Report No. 24, Vol. 1*, (Washington D.C.: Government Printing Office, 1952), 1.

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forth in the Multiple Property Documentation Form, "Historical Resources of the Tennessee Valley Authority Hydroelectric Project," and this MPDF contains additional contextual information concerning TVA and its hydroelectric system.

Hiwassee Hydroelectric Project	
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9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form.)

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- Callahan, North. TVA Bridge Over Troubled Waters: A History of the Tennessee Valley Authority. Cranbury, NJ: A. S. Barnes and Co., Inc., 1980.
- "Economic Development." At webpage http://www.tva.com/econdev/index.htm. Accessed May 5, 2015.
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- Tennessee Valley Authority, "Hiwassee Reservoir," at webpage http://www.tva.gov/sites/hiwassee.htm accessed August 12, 2015.
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- Tennessee Valley Authority Act of 1933. At website http://www.policyalmanac.org/economic/archive/tva_history.shtml. Accessed April 16, 2015.
- Tennessee Valley Authority. *Design of TVA Projects Technical Report No. 24, Vol. 1.* Washington D.C.: Government Printing Office, 1952.
- _____. "Norris Reservoir." At webpage http://www.tva.com/sites/norris.htm accessed August 5, 2015.

liwassee Hydroelectric Project	Cherokee, North Carolina
lame of Property	County and State
Previous documentation on file (NPS):	
preliminary determination of individual listing (36 CFR 67) has previously listed in the National Register previously determined eligible by the National Register designated a National Historic Landmark	been requested
recorded by Historic American Buildings Survey # recorded by Historic American Engineering Record # recorded by Historic American Landscape Survey #	
Primary location of additional data:	
State Historic Preservation Office	
Other State agency	
X Federal agency	
Local government	
University	
Other	
Name of repository: <u>Tennessee Valley Authority, Knoxville,</u>	Tennessee

Hiwassee Hydroelectric Pro	ject			Cherokee, North Carolina
Name of Property		_		County and State
10. Geographical Da	ıta			
Acreage of Property	y _125 _acres			
Use either the UTM s	ystem or latitude/l	ongitude coordina	ates	
Latitude/Longitude Datum if other than W	VGS84:	imal degrees) _		
(enter coordinates to 6) 1. Latitude:	6 decimal places)	Longitude:		
2. Latitude:		Longitude:		
3. Latitude:		Longitude:		
4. Latitude:		Longitude:		
Or UTM References Datum (indicated on b	USGS map):			
NAD 1927 or	NAD 1	983		
1. Zone:	Easting:		Northing:	
2. Zone:	Easting:		Northing:	
3. Zone:	Easting:		Northing:	
4. Zone:	Easting:		Northing:	
Verbal Boundary De	escription (Descri	be the boundaries	of the property.)

The boundary for the Hiwassee Hydroelectric Project is depicted as a dashed line on the accompanying US Quad map and site plan map. The boundary includes property to

encompass the adjacent recreational facilities as well as the immediate environs of the dam

and powerhouse.

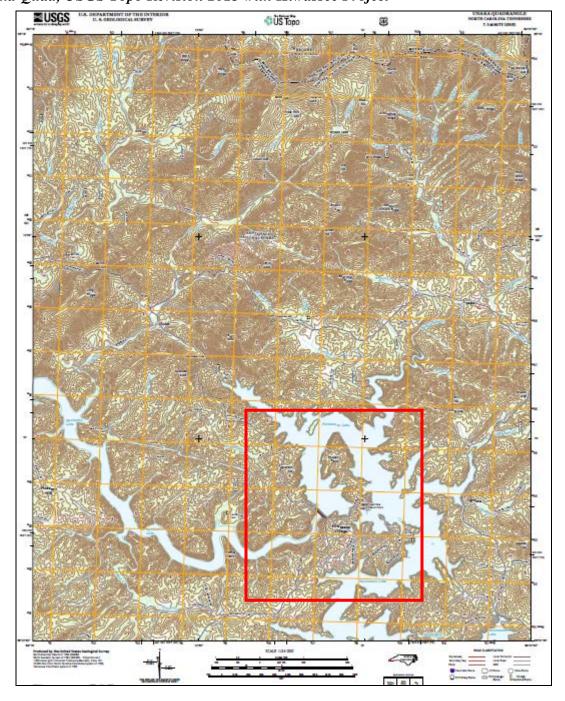
Boundary Justification (Explain why the boundaries were selected.)

The boundary includes all facilities necessary for the operation of the hydroelectric project and/or associated with the mission of TVA, which includes power generation, navigation, and public recreation. The boundary omits other TVA lands not directly associated with hydroelectric production.

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Unaka Quad, USGS Topo Revision 2013 with Hiwassee Project



Hiwassee Hydroelectric Project

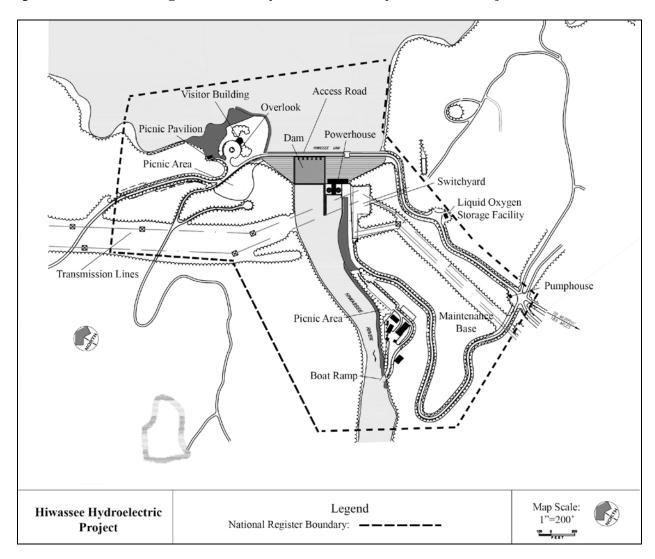
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Name of Property

Enlarged section, with NR boundary for Hiwassee Project Persimmon Lake Fowler Bend atterson Top ANNA RO Eagle Bear Paw Gap Resort Dock Hiwassee Village Farrow RIDGEWOOD DR Persimmon Lake SCALE 1:24 000 KILOMETERS

1000 500 METERS 1000 0.5 MILES 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 FEET

Site plan and National Register boundary for Hiwassee Hydroelectric Project



Hiwassee Hydroelectric Project	Cherokee, North Carolina
Name of Property	County and State
11. Form Prepared By	
name/title: _ Andra Kowalczyk Martens/ Reb	ecca Hightower/Phil Thomason
organization:Thomason and Associates	
street & number: <u>P.O. Box 121225</u>	
city or town: _Nashville state: _	Tennessee zip code: 37212
e-mailThomason@bellsouth.net	
telephone:615-385-4960_	
date: _April 16, 2015	
-	

Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** or equivalent (7.5 or 15 minute series) indicating the property's location.
- **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.
- Additional items: (Check with the SHPO, TPO, or FPO for any additional items.)

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Photographs

Submit clear and descriptive photographs. The size of each image must be 1600x1200 pixels (minimum), 3000x2000 preferred, at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map. Each photograph must be numbered and that number must correspond to the photograph number on the photo log. For simplicity, the name of the photographer, photo date, etc. may be listed once on the photograph log and doesn't need to be labeled on every photograph.

Photo Log

Name of Property: Hiwassee Hydroelectric Project

City or Vicinity: Murphy

County: Cherokee State: NC

Photographer: Thomason and Associates

Date Photographed: June 24, 2015

Description of Photograph(s) and number, include description of view indicating direction of camera:

- 1 of 30 General View of Hiwassee Dam, looking east.
- 2 of 30 Hiwassee Dam, looking northeast.
- 3 of 30 Hiwassee Dam, looking southwest.
- 4 of 30 North side of Hiwassee Dam, looking southeast.
- 5 of 30 Roadway on top of Hiwassee Dam, looking northwest.
- 6 of 30 Powerhouse exterior, south entrance, looking north.
- 7 of 30 Powerhouse exterior, south elevation, looking northeast.
- 8 of 30 Powerhouse exterior, Gantry Crane, looking west.
- 9 of 30 Powerhouse exterior, east elevation, looking west.
- 10 of 30 Powerhouse exterior, west elevation, looking east.
- 11 of 30 Powerhouse exterior, south elevation, looking north.

Hiwassee Hydroelectric Project

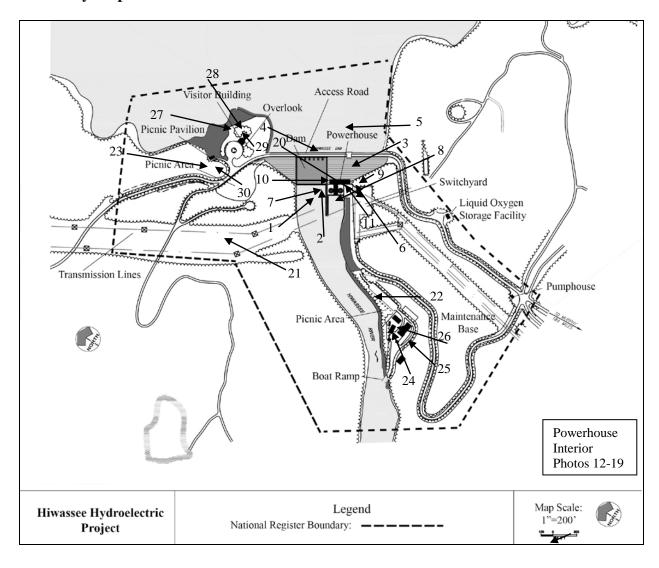
Name of Property

- 12 of 30 Powerhouse interior, lobby north elevation.
- 13 of 30 Powerhouse interior, lobby southeast elevation.
- 14 of 30 Powerhouse interior, lobby stairwell.
- 15 of 30 Powerhouse interior, restroom.
- 16 of 30 Powerhouse interior, office corridor.
- 17 of 30 Powerhouse interior, break room.
- 18 of 30 Powerhouse interior, generator governor cabinet.
- 19 of 30 Powerhouse interior, generator ground floor.
- 20 of 30 Switchyard, looking southeast.
- 21 of 30 Transmission Lines, looking northwest.
- 22 of 30 Picnic Area, looking north.
- 23 of 30 Picnic Area, looking southeast.
- 24 of 30 Maintenance Base, equipment shed and garage, looking north.
- 25 of 30 Maintenance Base, main building, looking north.
- 26 of 30 Maintenance Base, pesticide storage building, looking north.
- 27 of 30 Visitor Building, looking east.
- 28 of 30 Visitor Building, looking south.

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Photo Key Map:

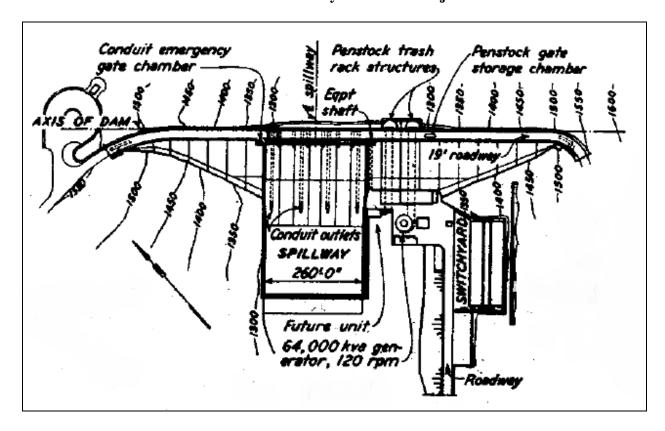


Name of Property

Site Plans

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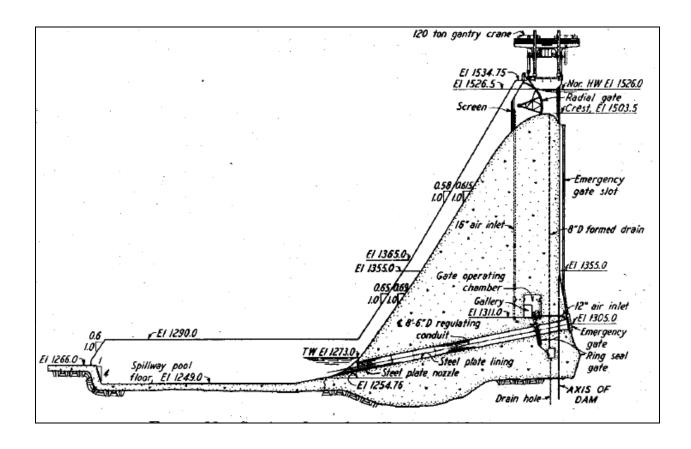
Plan of Hiwassee Hydroelectric Project.



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Section through spillway and sluiceway

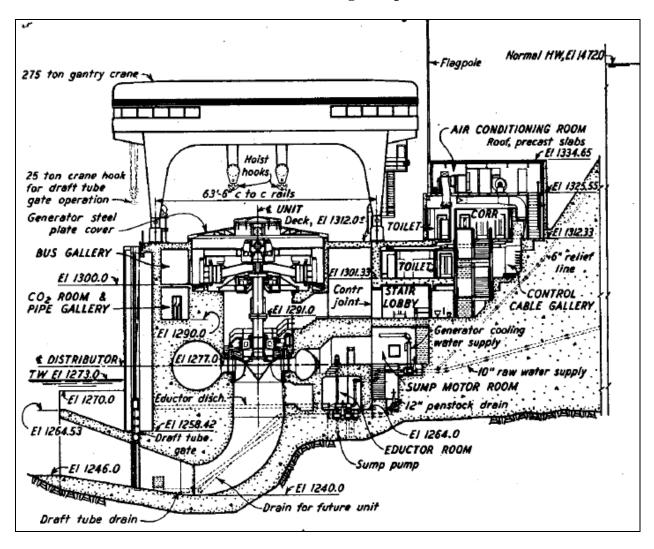


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Transverse section through the powerhouse

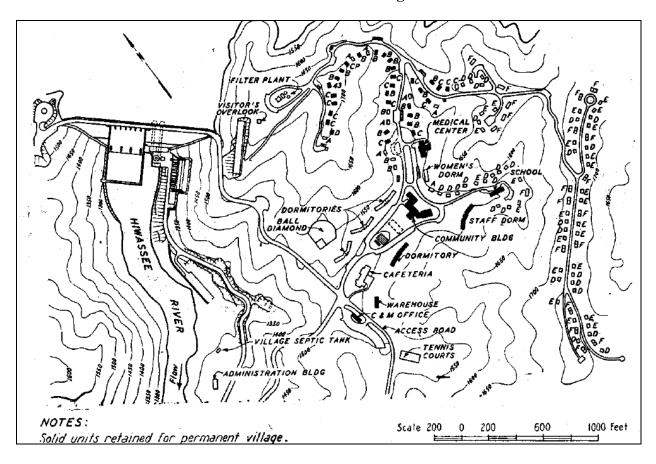


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Plan of Hiwassee Village



Hiwassee H	ydroelectric Project		Cherokee, North Carolina
Name of Prope	rty		County and State
Property Ov	wner:		
(This information	on will not be submitted to the National Park Service, but will re	main on file at the	Tennessee Historical Commission)
Name	Tennessee Valley Authority – Pat Ezzell		
Street &			
Number	400 West Summit Hill Drive 460WT7D-K	_Telephone	865-632-6461
City or			
Town	Knoxville	State/Zip T	N 37902

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C.460 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 100 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Office of Planning and Performance Management. U.S. Dept. of the Interior, 1849 C. Street, NW, Washington, DC.

United States Department of the Interior National Park Service

nal Register of Historic Places Continuation	Name of Property
	County and State
mber Page	Name of multiple property listing (if applicable
SUPPLEMENTARY LI	STING RECORD
NRIS Reference Number: 100001460	Date Listed: 8/11/2017
Property Name: Hiwassee Hydroelectric Project (Hi	istoric Resources of the TVA Hydroelectric Project)
County: Cherokee	State: NC
notwithstanding the National Park Service certificati	exceptions, exclusions, or amendments, ion included in the nomination documentati
notwithstanding the National Park Service certification of the Keeper	
Jallet Jullet	ion included in the nomination documentation
Signature of the Keeper	ion included in the nomination documentation
Signature of the Keeper Amended Items in Nomination:	Solution included in the nomination documentation included in the nomination incl
Signature of the Keeper Amended Items in Nomination: Section 8: This SLR seeks to clarify the level of significance. significant in ENGINEERING at the NATIONAL 1	The Hiwassee Hydroelectric Project is evel. All other areas of significance are a ance. The fact that the industry this project

National Register property file Nominating Authority (without nomination attachment)