NPS Form 10-900
(Rev. 8-86)

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NATIONAL REGISTER

OMB No. 1024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations of eligibility for individual properties or districts. See instructions in *Guidelines for Completing National Register Forms* (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property

historic name Cushman No. 1 Hydroelectric Power Plant

other names/site number N/A

2. Location

street & number ☐ not for publication

city, town Hoodsport ☒ vicinity

state Washington code WA county Mason code 045 zip code 98548

3. Classification

Ownership of Property	Category of Property	Number of Resources within Property		
		Contributing	Noncontributing	
☐ private	☐ building(s)	2		buildings
☒ public-local	☒ district			sites
☐ public-State	☐ site	7		structures
☐ public-Federal	☐ structure			objects
	☐ object	9	0	Total

Name of related multiple property listing:
Hydroelectric Power Plants in Washington State

Number of contributing resources previously listed in the National Register 0

4. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this ☒ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☒ meets ☐ does not meet the National Register criteria. ☐ See continuation sheet.

[signature] October 12, 1988

Signature of certifying official Date

Washington State Office of Archaeology & Historic Preservation

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. ☐ See continuation sheet.

Signature of commenting or other official Date

State or Federal agency and bureau

5. National Park Service Certification

I, hereby, certify that this property is:

- ☑ entered in the National Register. Patrick Andrus 12/15/88
  - ☐ See continuation sheet.
- ☐ determined eligible for the National Register. ☐ See continuation sheet.
- ☐ determined not eligible for the National Register.
- ☐ removed from the National Register.
- ☐ other, (explain:)

for Signature of the Keeper Date of Action

6. Function or Use

Historic Functions (enter categories from instructions)	Current Functions (enter categories from instructions)
INDUSTRY/energy facility	INDUSTRY/energy facility

7. Description

Architectural Classification (enter categories from instructions)	Materials (enter categories from instructions)
Other/constant-angle arch dam	foundation: concrete
Other/industrial vernacular	walls: concrete
	roof: concrete
	other:

Describe present and historic physical appearance.

Located on the North Fork of the Skokomish River on the Olympic Peninsula, Cushman Hydroelectric Power Plant No. 1 includes a constant-angle arch dam and a concrete power-house. The project consists of a storage basin one mile wide and eight and one-half miles long formed by the construction of a 280 foot high, 1,100 foot long concrete dam in a canyon between two vertical walls of basalt. The water used to operate the turbines is diverted at the dam into a reinforced concrete intake, 25 by 50 feet in section. It is conveyed by means of a 540 foot long, 17 foot diameter concrete lined power tunnel to two 150 foot long, 10 foot diameter riveted steel penstocks which carry the water under a head of 260 feet to the turbine casings. The water operates two 24,000 hp Allis Chalmers vertical turbines which drive two 21,500 KW generators.[1]

Power from the generators is carried at 13,200 volts to a transformer station at the top of the canyon walls. There the voltage is raised to 110,000 volts and the current is transmitted 44 miles to the city of Tacoma. The constituent elements of the project are described below:

HEADWORKS:

Dam (1925): Constant-angle arch dam spans narrow rock gorge. Dam rises 275 feet above bedrock. It is 1,111 feet long, including gravity wing abutments, and 52 feet thick at the base and eight feet thick at the top. The structure contains 90,000 cubic yards of concrete and impounds 440,000 acre feet of water.

The arch portion of the dam has an upstream radius at the base of 118 feet and at the crest of 210 feet; the crest length is 470 feet. The south gravity abutment wing is 278 feet long and the north gravity abutment wing is 130 feet long. At the end of the north gravity section there is a 380 foot long core wall which extends to bedrock and is supported on both sides by earth fill. Concrete parapet walls adorn the crest of the dam and form an eight foot wide roadway.

Valve (1925): A 62-inch Pelton-Johnson type control valve, installed to regulate the flow of water to Cushman No. 2, coupled with a Pelton 90-inch butterfly valve are built into the dam at elevation 520, a few feet above the original riverbed. The valve has discharge capacity of 2,000 second feet and is housed in a small concrete structure with a flat roof.

Spillway (1928): Concrete structure located south of the dam; 200 feet wide; lake level controlled by removable flashboards.

[X] See continuation sheet

WATER CONVEYANCE SYSTEM:

Main Intake (1925): Reinforced concrete; 25 by 50 feet in section ; it is protected by a trash rack of one-half by four inch steel bars spaced three inches on center.

Power Tunnel (1925): Concrete lined; 540 feet long, 17 feet in diameter, circular section. Large diameter reduces the velocity; it also reduces any pressure rise that may occur as a result of a sudden load rejection by the turbines. Maximum tunnel velocity is nine feet per second. The low water velocity and the short length of the conduit between the intake and the water wheels obviated the use of relief valves and surge chamber. Portions of the tunnel built for diversion and drainage only are 10 feet in diameter and unlined. Water is conveyed from the tunnel through two 12 foot diameter lateral branches to two steel penstocks.

Penstocks (1925): Two 150 foot long penstocks of riveted steel; 10 feet in diameter.

POWERHOUSE AND GENERATING EQUIPMENT:

Powerhouse (1925): The powerhouse is located 700 feet downstream from the dam. A three story reinforced concrete structure, the powerhouse is rectangular in plan, 134 feet by 74 feet, and 105 feet high from the bottom of the draft tube to the roof. The generator room is 58 1/2 feet high from the main floor to the roof girders and is equipped with a 100 ton Whiting Crane. The annex is two stories (36 feet) high and contains switch boards, 15,000 volt switches, station transformer banks, and station service switches and busses. On the main floor of the annex is the store room, station service transformer bank compartments, 2,500 volt General Electric Company truck type switches, and the circuit breakers. On the second floor is the control room which controls all of the equipment within the building as well as the dam structures. The control battery and powerhouse shop are also on the second floor. The building has a flat roof, entablature, pilasters between windows, and rectangular industrial sash windows. On the north, south, and east facades, the top story consists of segmental arch windows.

TRANSMISSION SYSTEM

The current from each generating unit is carried directly to the generator oil circuit breaker, through the annex roof to 13,200 volt 1,000,000 circular mil copper leads up the canyon wall, to a 20,000 KVA transformer bank installed in an outdoor substation.

Substation: Located on a plateau 2677 feet above the powerhouse, the substation originally contained two 20,000 KVA transformer banks with a spare transformer, four 110,000 volt bus circuit breakers, two 110,000 volt transmission line circuit breakers, together with the high voltage busses, 110,000 volt potential transformers, lightning arresters, and oil storage tanks. Transformer banks step up the voltage from 13,200 to 110,000 for transmission to Tacoma. A tank, which stored water for the original water-cooled transformers, stands on a hill above the substation. Water-cooled transformers are no longer used.

Station Service House: The station service house, located in the switch yard, is of reinforced concrete and rectangular in plan with a flat parapeted roof and pilasters. It originally contained transformer, oil purifier and pumps, street lighting equipment, 2,500 volt local leads, and the dam keeper's office.

Inclined Cable Tramway (ca. 1923): A 450 foot long tramway operates on a 38 degree incline to transport men and equipment between the top of the canyon and the powerhouse on the bottom of the canyon. The electrical operating machinery and controls are housed in a rectangular concrete structure located at the top of the incline. The tramway remains in operating condition.

Contributing Structures:

Diversion Intake
Gate House & Platform
Power Tunnel (inc. Diversion Tunnel and Penstocks)
Dam
Spillway
Tramway

Contributing Buildings:

Powerhouse
Transmission Service House

8. Statement of Significance

Certifying official has considered the significance of this property in relation to other properties:

☐ nationally ☒ statewide ☐ locally

Applicable National Register Criteria ☒ A ☐ B ☒ C ☐ D

Criteria Considerations (Exceptions) ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G

Areas of Significance (enter categories from instructions)	Period of Significance	Significant Dates
Engineering	1923-1938	1925
Industry		

Cultural Affiliation
N/A

Significant Person
N/A

Architect/Builder
Tacoma Light Department

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.

Cushman Hydroelectric Power Plant No. 1 is a significant example of medium head hydroelectric technology in the west from the 1920s. Located in steep, inaccessible terrain prone to flooding, the plant construction was a significant engineering feat. Moreover, the plant was the first remote hydroelectric installation in the Tacoma municipal system and, as such, was important in the expansion of that public utility. The plant is well preserved and meets the power plant registration requirements established in the Hydroelectric Power Plants in Washington Multiple Property Documentation Form.

Historical Background:

By 1917, the power load demands of the city of Tacoma were increasing at an unprecedented rate. An article in the Journal of Electricity reported that prior to 1916, the increase in domestic consumption was approximately 10 percent per year. However, during 1916 and 1917, the consumption rate increased by 33 percent, and it was estimated that this rate would be maintained. In addition, the demand for commercial power was increasing steadily.[2]

By 1917 it was clear that Tacoma's single municipal generating plant located on the Nisqually River would not be able to meet the city's escalating power load demands. As a result of the system's limited storage capacity, the Nisqually plant was particularly vulnerable to river flow fluctuations. Although the plant had the capacity to provide 32,000 hp, it could only provide 9,200 hp during low water periods. In order to insure continuity in service for its customers, the acquisition of adequate storage for the city of Tacoma became paramount. Studies indicated that the quantity of additional storage available at the Nisqually Plant would be small, and the unit cost would be high.[3] It was evident that it would be necessary to develop another site to generate the power required for Tacoma's expanding market.

Following a systematic investigation of potential power sites, city engineers selected a location on the North Fork of the Skokomish River on the Olympic Peninsula 44 miles northwest of Tacoma. The site, which initially would generate 50,000 hp for the city--almost double the capacity of the Nisqually Plant--was located in an area that was notorious for its heavy rainfall. During the construction period, an annual rainfall of 95 inches was recorded at the powerhouse site. Although the river is supplied by a watershed

☒ See continuation sheet

9. Major Bibliographical References

Gongwer, J.V. "The Cushman Hydroelectric Development," Electrical West, Volume 58, Number 3, March 1927.

☐ See continuation sheet

Previous documentation on file (NPS):
☐ preliminary determination of individual listing (36 CFR 67) has been requested
☐ previously listed in the National Register
☐ previously determined eligible by the National Register
☐ designated a National Historic Landmark
☐ recorded by Historic American Buildings Survey # ______
☐ recorded by Historic American Engineering Record # ______

Primary location of additional data:
☐ State historic preservation office
☐ Other State agency
☐ Federal agency
☐ Local government
☐ University
☐ Other
Specify repository: ______

10. Geographical Data

Acreage of property 28

Quadrangle Name: Hoodsport Scale: 1:24000

UTM References

	Zone	Easting	Northing
A	1 0	4 8 3 5 3 0	5 2 5 2 1 4 0
B	1 0	4 8 3 5 6 0	5 2 5 1 9 1 0
C	1 0	4 8 3 3 4 0	5 2 5 1 8 6 0
D	1 0	4 8 3 2 8 0	5 2 5 2 0 8 0

☒ See continuation sheet

Verbal Boundary Description

The nominated property is a rectangular parcel of land whose boundaries are described on the attached sketch map (Scale 1" = 175').

☐ See continuation sheet

Boundary Justification

The nominated property includes the headworks, powerhouse, transmission structures, and anciliary structures historically associated with the Cushman No. 1 hydroelectric power project.

☐ See continuation sheet

11. Form Prepared By

name/title Lisa Soderberg
organization Office of Arch'y & Historic Preservation date October 23, 1986
street & number 111 West 21st Avenue, KL-11 telephone (206) 753-4011
city or town Olympia state Washington zip code 98504

of almost 90 square miles, there are wide flow fluctuations. During most of the year, the water supply is abundant. The normal annual peak flow ranges from 6,000 to 8,000 second feet, while the maximum recorded flood was 17,000 second feet. However, the late summer flow can drop as low as 85 second feet. The construction of the enormous 440,000 acre feet reservoir would regulate the flow fluctuations for power purposes. But the peak flows constituted flood conditions which occurred frequently throughout the rainfall season and created many design challenges during the construction of the facility.[4]

The enormous storage facility was one of the distinctive features of the site, and a critical component in power development. The project would not have been feasible without the reservoir. Of the total 440,000 acre feet of storage, 360,000 acre feet was available for use at the Cushman No. 1 Plant. It represented 60,000,000 KW-hr. of energy at normal operating efficiencies and is sufficient to regulate both seasonal and annual fluctuations in the river flow.[5]

In 1924, contractors began work on the excavation of the powerhouse foundation. Efforts to divert the river around the dam and powerhouse site were also commenced. The water was diverted by means of an upstream cofferdam and a flume which extended from the cofferdam to a point below the powerhouse. The cofferdam consisted of two double rows of sheet piling which were spaced 12 feet apart, sealed with clay, and filled with earth and rock. The 2,000 second foot capacity timber flume was 10 by 20 feet in section.[6]

A Tacoma City Light publication reported that "the floods came sooner than expected, halting the work and filling existing excavations. Five times the canyon was transformed into a mill race. The cofferdam and flume . . . suffered severely, and work was stopped until the spring of 1925."[7] The frequent floods made it necessary to divert the river through the pressure tunnel in order to prevent damage to the flume. As a result, work on the powerhouse structure was delayed.

The Tacoma City Light promotional brochure boasted that after the spring of 1925 "work on the dam went rapidly forward with a large fleet of motor trucks delivering cement day and night--straining every facility to keep the huge cement mixers supplied. This was a real job as two yards of concrete went into the dam every three minutes, required from 4,000 to 5,000 sacks of cement daily."[8]

The concrete plant used in the dam construction included a two yard cement mixer and was located on the north rim of the canyon. Historic photographs reveal that an elaborate system of poles, pulleys, and chutes was developed to pour the concrete in place. During the initial stages of the work, the concrete was "spouted" directly into the dam. Subsequently, the system of towers and pulleys was used "for spouting to the upper portions" of the dam. A large gravel bar located directly above the dam supplied the sand and gravel for the entire project.[9]

The City of Tacoma report continued its vivid description of the plant construction:

> All day and all night, and all summer long steam engines were puffing, trucks speeding, carpenters building forms, riggers manning the concrete towers and chutes at dizzy heights--and always the grinding of the mixer and the steady flow

of concrete. With 500 men toiling ceaselessly the dam grew day by day and was finally completed Thanksgiving Day, 1925.[10]

Throughout construction, transportation of equipment and supplies was facilitated by the existence of a logging railroad and a road within a half mile of the site. Much of the equipment was shipped by water and transferred to the logging road terminal on Hood Canal. Cement was delivered on barges at Hoodsport and then hauled by truck to the project. By May 1926, the two generator units were carrying the city's entire load of 32,000 KW.[11]

The route of the transmission line to Tacoma was particularly treacherous and included some noteworthy and unprecedented crossings. The most famous was the Tacoma Narrows Crossing. When the transmission line was completed, the 67,245 foot span across the Narrows was the longest aerial electrical span in the world.[12]

Although construction of the facility represented a significant achievement for the utility, the project provided no mitigation for the serious loss of fish runs, the inundation of wildlife habitat, or the disruption to the tradition cultural and subsistence economy of the Skokomish tribe. Any assessment of the historical impact of this plant must recognize the damage inflicted on both the native inhabitants and the natural environment.

Specifically, construction of the Cushman Dam projects on the North Fork Skokomish River in 1926 and 1930 inflicted severe damages on salmon and steelhead resources and the other instream uses of the North Fork and main stem Skokomish River. Prior to the construction of the dams, the North Fork Skokomish River supported large runs of winter and summer steelhead trout; spring, summer and fall chinook salmon; coho salmon; spring, summer and fall chinook salmon; coho salmon; early and late chum salmon; and smaller runs of pink and sockeye salmon.

Besides destroying almost 80% of the historical fish runs on the Skokomish, the dam projects have had a devastating impact on the Tribe's economy and ability to provide opportunities for tribal members to earn a living and obtain food for their families. This is because the projects were sited on top of usual and accustomed fishing sites in use since ancient times.

In addition, development of the Cushman dams have greatly displaced and reduced the wildlife resources that tribal members are dependent on for their subsistence. Outflows from Cushman Powerplant No. 2 on the Hood Canal continue to attract salmon and steelhead, diverting them from their natural spawning destinations; and adequate passage areas in the Skokomish River are still blocked and are currently eliminating access to many miles of good fish habitat.

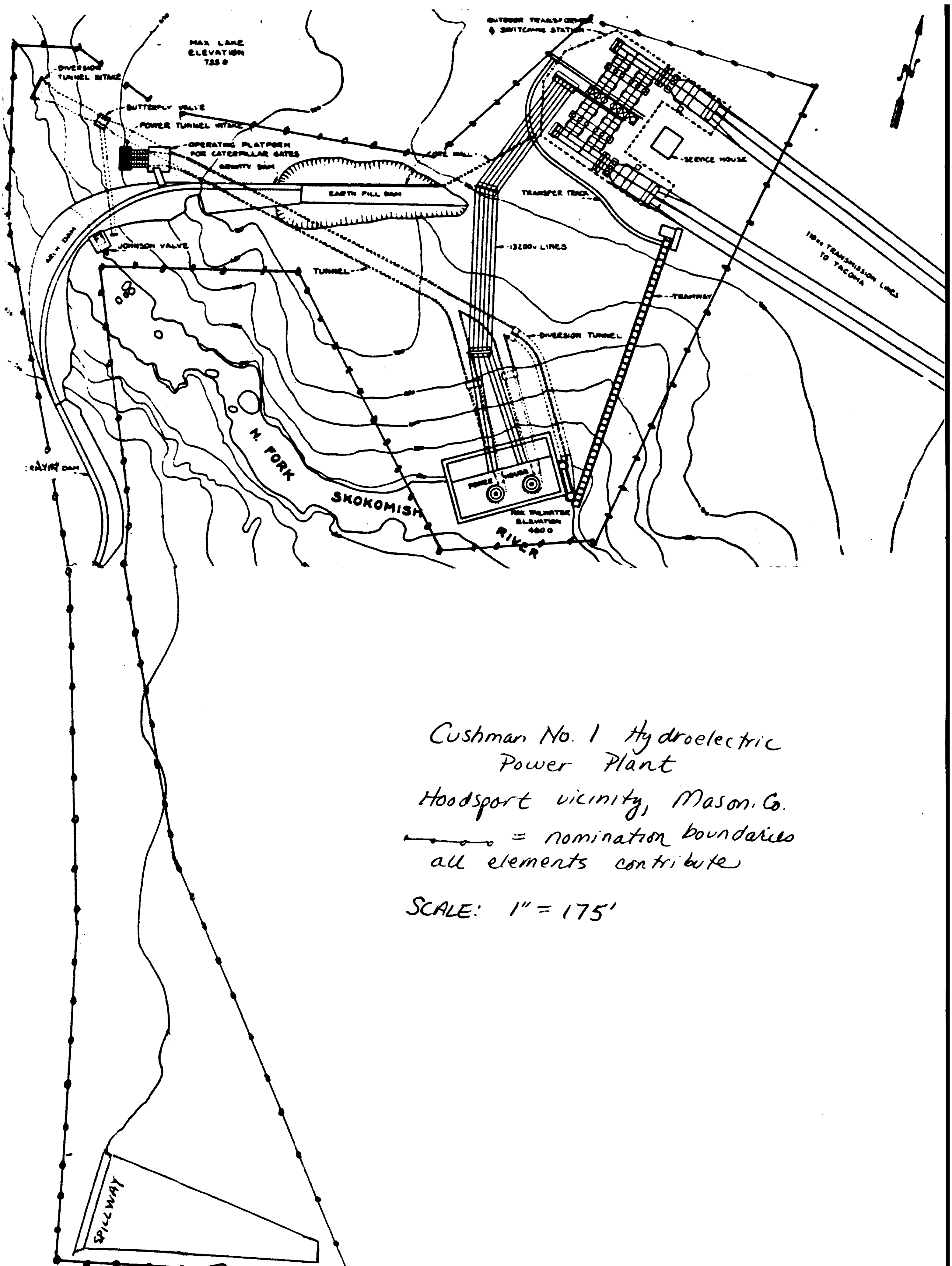
According to tribal officials, the Cushman dams also symbolize to the Skokomish Tribe the condemnation of their tribal lands and water resources for the benefit of a public utility located over 60 miles from the reservation. An equitable share of the revenues and taxes generated by the operation of these dams have never been returned to the Skokomish Tribe for helping educate, house, and provide health and social services for the tribe, according to the officials. Tribal leaders note that promises made by the City of Tacoma to provide employment opportunities and financial assistance to elders without electrical services were ignored and eventually forgotten.

The location of Lake Cushman caused by the construction of the dams has had a major impact on the destruction of major archaeological and cultural resources. To this day areas where village sites were located are being pillaged and looted by non-tribal members drawn to the sites.

[1]J.V. Gongwer, "The Cushman Hydroelectric Development," Electrical West, Vol. 58, No. 3, March 1927, p. 129.
[2]"Purchase of the Lake Cushman Power Site," Journal of Electricity, Vol. 43, No. 8, October 15, 1919, p. 361.
[3]Ibid., p. 361.
[4]Gongwer, p. 129.
[5]Ibid.
[6]Ibid., p. 131.
[7]City of Tacoma, Department of Public Utilities, Light Division, 1926-27 Information Book, Tacoma, 1928, p. 16.
[8]Ibid.
[9]Gongwer, p. 130.
[10]City of Tacoma, p. 16.
[11]Ibid.
[12]Gongwer, pp. 132-133.

UTM References Continued:

E 10 483180 5251480
F 10 483360 5251220
G 10 483180 5251220
H 10 483020 5251600



Cushman No. 1 Hydroelectric Power Plant
Hoodsport vicinity, Mason Co.
—•—•— = nomination boundaries
all elements contribute

SCALE: 1" = 175'