



United States  
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Agriculture

Forest Service

Tongass  
National Forest  
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# Angoon Hydroelectric Project

## Final Environmental Impact Statement

**Tongass National Forest  
Admiralty Island National Monument  
Juneau, Alaska**



# Angoon Hydroelectric Project

## Summary

### 1. WHAT ACTION IS PROPOSED?

In 2003, Kootznoowoo, Inc. (Kootznoowoo), the Alaska Native Claims Settlement Act (ANCSA) corporation for the city of Angoon, asked the Forest Service to begin the National Environmental Policy Act (NEPA) process necessary to develop a hydroelectric project to lower the cost of power generation and electric bills in Angoon. In 2004, Kootznoowoo requested Forest Service terms and conditions for the Angoon Hydroelectric Project.

The hydroelectric facility proposed by Kootznoowoo to the Forest Service is described in *The Angoon Hydrologic Project Feasibility Evaluation Report* (Feasibility Report) prepared for Kootznoowoo by HDR Alaska, Inc. in 2000, and is identified in that report as the Selected Project Arrangement.

Kootznoowoo's Selected Project Arrangement included building a diversion dam, intake structure, marine facility, three access roads, two staging areas, transmission lines, a power plant, a surge tank, 6,100 feet of 42-inch diameter pipeline and 510 feet of 36-inch diameter pipe. The hydroelectric plant would be a run-of-river facility using only the water available in the natural flow of Thayer Creek. The project area is located within Admiralty Island National Monument, Tongass National Forest, Alaska. The proposed hydroelectric dam would be constructed on Thayer Creek with power delivered to Angoon. The project area was defined through the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) as T. 49 S., R. 67 E. and T. 50 S., R 67 E, Copper River Base and Meridian.

The Forest Service Proposed Action (Alternative 2) includes modifications, in the form of terms and conditions in the Special Use Authorization (SUA), to Kootznoowoo's Selected Project Arrangement to reduce potential effects to resources in the project area and to meet specific requirements found in the 2008 Tongass Land and Resource Management Plan (Forest Plan).

The terms and conditions proposed are generally project design elements – many of them Best Management Practices (BMPs) and practices related to meeting specific requirements in the Forest Plan – intended to reduce potential effects to resources in the project area (see Sections 2.2 and 2.3.2 in the Final Environmental Impact Statement - FEIS). These elements are related to engineering and structural specifications, resource protection requirements, and safety requirements in addition to other special clauses deemed appropriate by the Forest Service. Chapter 2 describes the proposed action in detail in Section 2.3.3.

## 2. WHY IS THIS PROPOSED?

In 2003, Kootznoowoo asked the Forest Service to begin the NEPA process necessary to develop a hydroelectric project to lower the cost of power generation and electric bills in Angoon. In 2004, Kootznoowoo requested Forest Service terms and conditions for the Angoon Hydroelectric Project.

Through the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), Congress has:

- granted Kootznoowoo certain rights for development of a hydroelectric facility at Thayer Creek;
- mandated the decision space and level of involvement of the Secretary of Agriculture (Forest Service); and
- specifically exempted the hydropower project from the requirements of the Wilderness Act.

The Purpose and Need for the Proposed Action is to comply with the requirements of ANILCA Section 506(a) by establishing resource protection measures to be required for the development of the hydroelectric project proposed by Kootznoowoo at Thayer Creek within Admiralty Island National Monument. ANILCA granted Kootznoowoo the right to develop the hydroelectric project subject to conditions prescribed by the Forest Service for protection of water, fishery, wildlife, recreational, heritage, and scenic values of Admiralty Island.

## 3. WHAT OTHER ACTION/S WOULD MEET THE SAME NEED?

Two additional action alternatives (Alternatives 3 and 4) are described and considered in the Final EIS. The action alternatives are all based on the Selected Project Arrangement proposal submitted by Kootznoowoo. Alternatives 3 and 4 include changes to the components to meet specific requirements found in the Forest Plan that reduce potential effects to resources in the project area. See Chapter 2 of the Final EIS for a complete description of the alternatives and for maps displaying the components of Kootznoowoo's proposal that would change by alternative.

### ALTERNATIVE 3

Alternative 3 was developed as a means of reducing the amount of vegetative clearing required along the transmission line corridor, reducing potential effects to fish habitat in Thayer Creek, and reducing potential effects of road and pipeline/penstock construction on karst terrain and on steep slopes along Thayer Creek. Consideration of a buried transmission line is also a requirement of the Forest Plan. Under Alternative 3 the terms and conditions included in the SUA would be the same as those displayed for all the action alternatives (see Elements Common to the Action Alternatives, 2.3.2). To reduce resource effects, Alternative 3 would also result in the following changes to the Proposed Action (see Figures 2-3 and 2-2):

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- Require that all transmission lines be buried where feasible
- Require a higher level of water discharge into the bypass reach on Thayer Creek. A minimum instream flow of 40 cubic feet per second (cfs) would be maintained at all times to minimize freezing temperatures and loss of stream continuity in the bypass reach.
- Require that all water not needed for power generation be returned to Thayer Creek at the diversion dam and sent through the bypass reach.
- Require that the tailrace discharge be returned above or immediately below the lowest anadromous fish barrier on Thayer Creek to minimize the length of anadromous stream affected by the diversion.
- Require that the road from the marine facilities to the powerhouse be rerouted to minimize effects to areas identified as high vulnerability karst and the streams that flow to the features and that the diversion dam access road be rerouted away from steep slopes along Thayer Creek
- Require that the dam include a low gate feature to pass bedload during specified windows of high flows in May-June and September-October.
- Require that floating wood accumulating behind the dam be disposed of into the bypass reach during high flows in May-June and September-October.
- Require that trees that are in the reservoir be left standing to avoid ground disturbance associated with cutting and removal and to provide habitat complexity.

### **ALTERNATIVE 4**

Alternative 4 was developed to eliminate uplands impacts associated with the construction of an access road and transmission line from the marine facilities to Kootznahoo Inlet; Alternative 4 would do this by submerging the transmission line in Chatham Strait. Consideration of a submerged transmission line is also a requirement of the Forest Plan. Under Alternative 4 the terms and conditions included in the special use authorization would be the same as those displayed for all the action alternatives (see Elements Common to the Action Alternatives, 2.3.2). This alternative would be similar to Alternative 3, except that Kootznoowoo would not be authorized to construct an overland transmission line from the marine facility to Kootznahoo Inlet. The only feasible way for Kootznoowoo to comply with this restriction would be to utilize a submarine transmission cable laid off-shore of Admiralty Island to the City of Angoon (Figure 2-4).

## **4. WHAT WOULD IT MEAN TO NOT MEET THE NEED?**

Under the No Action alternative (Alternative 1), the Forest Service would not issue a special use authorization (SUA) for the project, and the proposed project would not be constructed. Diesel generators would continue to be used to supply energy for the community of Angoon unless alternative energy sources are developed. Although selection of this alternative would deny Kootznoowoo the statutory rights granted by

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ANILCA, CEQ regulations (40 CFR 1502.14d) require that a “no action” alternative be analyzed in every EIS. This alternative represents the existing condition against which other alternatives are compared.

Under the No Action alternative, electricity prices, already exceptionally high, would continue to fluctuate based on crude oil prices, potentially leading to further population decline. Continuing high electrical rates would also limit opportunities for economic growth and the present high rate of unemployment would continue or increase.

Under Alternative 1, diesel generator capacity is and would remain limited. With fuel deliveries by barge of 27,000 to 38,000 gallon range at each delivery, five times per year, the potential for a large fuel spill exists. The consequences of a spill would be devastating to Angoon as well as commercial and recreational fisheries. Additionally under Alternative 1 the current permit would allow for considerable growth in fossil fuel use with corresponding carbon dioxide and air pollution emissions.

Other resources in the Project Area, such as water, fish, wildlife and recreation would not be affected by the No Action alternative – natural processes and existing uses would continue in this largely unmodified area.

### **5. WHAT ARE THE EFFECTS OF THE ALTERNATIVES?**

Table S-1 displays the actions of the alternatives. Table S-2 displays a very brief summary of the effects of the alternatives. Chapter 3 of the FEIS further describes the effects of the alternatives on the Project Area’s resources.

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**Table S-1. Comparison of Alternatives by Activity**

Activity	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Buried Trans. line	Alternative 4 Submerged Trans. Line
Special Use Authorization	No	Yes	Yes	Yes
Above-ground transmission line	0	6.2 miles	minimized	minimized
Buried transmission line	0	0	6.2 miles as feasible	2.2 miles as feasible
Submerged transmission line	0	0.5 mile	0.5 mile	4.6 miles
Access Rd Marine Fac. to Powerhouse	0	2.2 miles	2.2 miles	2.2 miles
Access Rd Powerhouse to Dam	0	1.4 miles	2.1 miles	2.1 miles
Access Rd Marine Fac. to Kootznahoo Inlet	0	4.0 miles	4.0 miles	0
Temporary Access Rd Surge Tank	0	0.2 mile	0	0
Road/Trans Line Clearing Width	0	46-200 feet	46-70 feet (50 feet avg.)	46-70 feet (50 feet avg.)
Diversion Dam Access Road Location	None	On steep slopes in Thayer Cr canyon	Reroute avoids steep slopes in Thayer Creek canyon	Reroute avoids steep slopes in Thayer Creek canyon
Pipeline Location	None	Follows the contour in Thayer Creek canyon	Follows the contour in Thayer Creek canyon	Follows the contour in Thayer Creek canyon
Penstock Location	None	Same for all alternatives	Same for all alternatives	Same for all alternatives
Marine Facility	None	Same for all alternatives	Same for all alternatives	Same for all alternatives
Switchyards	0	3	3	3
Tailrace Discharge location	None	450 feet downstream of fish barrier	Above or immediately below the lowest anadromous fish barrier	Above or immediately below the lowest anadromous fish barrier

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**Table S-2. Comparison of Alternatives by Resource**

Activity	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Buried Trans Line	Alternative 4 Submerged Trans Line
<b>Geology</b>				
Effects to karst	No Effect	0.2 mile of road cross high vulnerability karst lands; sediment and debris would enter karst system. A Forest Plan amendment would be needed	Due to avoidance there are no effects	Due to avoidance there are no effects
<b>Soil</b>				
Project area exposed to surface erosion (acres)	0	45.5	48.2	24.9
Road in areas over 67% slope (feet)	0	1,650	1,500	150
<b>Water<sup>1</sup></b>				
Minimum Instream Flow (CFS)	26 (predicted natural extreme minimum flow)	20	40	40
Winter Streamflow	No effect	Moderate effects	Moderate effects	Moderate effects
Summer Streamflow	No effect	Minor effects	Minor effects	Minor effects
Spring and Fall Streamflow:	No effect	Negligible effects	Negligible effects	Negligible effects
Sediment supply from above dam	No effect	Minor to moderate	Negligible to minor	Negligible to minor
Large wood supply	No effect	Minor	Negligible	Negligible
Winter minimum water temperature and dissolved oxygen	No effect	Moderate effects	Moderate effects	Moderate effects
Summer maximum water temperature	No effect	Minor effects	Negligible to minor effects	Negligible to minor effects
Erosion and sediment (from ground-disturbing activities)	No effect	Major effects	Minor effects	Minor effects

<sup>1</sup> Impacts increase from no effect to negligible to minor to moderate to major; definitions of the level of effects are located in Chapter 3 in the Water Resources section.

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Activity	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Buried Trans Line	Alternative 4 Submerged Trans Line
<b>Fisheries</b>				
Effects of flows on fish and fish habitat	No change (no effect)	For Reaches B & C: Low flow periods would extend earlier into the fall and later into the spring; would support few, if any, incubating eggs or resident fish through the winter; may freeze for longer periods in the winter or increase to potentially lethal temperatures during the summer.	This alternative will mimic more natural flow regimes. Dewatering will be less likely. Additional flow will provide increased pool depth, greater stream connectivity, and decrease harmful icing conditions	This alternative will mimic more natural flow regimes. Dewatering will be less likely. Additional flow will provide increased pool depth, greater stream connectivity, and decrease harmful icing conditions
Effects due to location of discharge water from the power plant	No change (no effect)	Discharge location would likely cause a moderate reduction in anadromous fish populations	Flows would mimic natural conditions; little potential effect to anadromous fish and habitat below the barrier	Flows would mimic natural conditions; little potential effect to anadromous fish and habitat below the barrier
Effects to Thayer Creek from road parallel to Thayer Creek	No change (no effect)	Road could degrade riparian habitat and increase the suspended sediment load.	Greatly reduced potential for landslides and introducing sediment and debris into creek	Greatly reduced potential for landslides and introducing sediment and debris into creek
<b>Vegetation</b>				
Sensitive Plants	No effect	No adverse effect	No adverse effect	No adverse effect
Invasive Species	No effect	Low potential to introduce invasive species in area up to 40 acres	Low potential to introduce invasive species in area up to 40 acres	Low potential to introduce invasive species in area up to 30 acres
<b>Wetlands</b>				
Linear miles of road built on wetlands	0	2.6 miles	2.6 miles	1.1 miles

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Activity	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Buried Trans Line	Alternative 4 Submerged Trans Line
<b>Biodiversity and Wildlife</b>				
Effect on Connectivity (acres of productive old-growth removed from beach fringe and riparian management)	0	57	28	23
Effects on Management Indicator Species and Migratory Birds	No Effect	Small loss (less than 1%) of potential habitat; expected to maintain viable, well dispersed populations of MIS.	Small loss (less than 1%) of potential habitat; expected to maintain viable, well dispersed populations of MIS.	Small loss (less than 1%) of potential habitat; expected to maintain viable, well dispersed populations of MIS.
Relative Effects of Alternatives on Management Indicator Species and Migratory Birds	No Effect	Greatest effect of action alts. on MIS because of larger acreage of forest habitat converted for transmission line clearing and easier access	Intermediate effect of action alts. on MIS because access is similar to Alt. 2, but forest habitat loss is lower than Alt. 2	Lowest impact of action alts. on MIS because it affects the least POG and foraging habitat, and provides the least access improvement
<b>Threatened, Endangered, and Sensitive Species</b>				
BE Effects Determination for humpback whale and Steller sea lion	No effect	No effect	No effect	No effect
BE Effects Determination for Kittlitz's murrelet, osprey, Peale's peregrine falcon, and trumpeter swan	No impacts	No impacts	No impacts	No impacts
BE Effects Determination for Northern goshawk	No impacts	May impact individuals	May impact individuals	May impact individuals

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Activity	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Buried Trans Line	Alternative 4 Submerged Trans Line
<b>Scenery</b>	No Effect	Most visibility of the transmission line. Constructs access roads and transmission line above ground	Some visibility of the transmission line. Constructs access roads, and buries majority of transmission line along road corridor	Least visibility of the transmission line. Constructs access roads, and submerges majority of transmission line under water
<b>Cultural Resources</b>	No Historic Properties Affected	Historic Properties not adversely affected	Historic Properties not adversely affected	No Historic Properties Affected
<b>Subsistence</b>	No Effect	Does not pose a significant possibility of a significant restriction on subsistence	Does not pose a significant possibility of a significant restriction on subsistence	Does not pose a significant possibility of a significant restriction on subsistence
<b>Wilderness<sup>2</sup></b>				
Effects (outside the project area) to “undeveloped” and “outstanding opportunities for solitude” Wilderness characteristics	No Effect	Most negative effects due to visibility and maintenance of road and transmission line.	Some negative effects due to road; less visible impact due to buried line.	Least negative effects due to elimination of the overland transmission corridor.
<b>Socio-economics</b>				
Estimated cost comparison for transmission lines <sup>3</sup>	None	\$1,235,000	\$1,303,000	\$1,415,000

<sup>2</sup> The Forest Service recognizes that Congress exempted the project area from requirements of the Wilderness Act through ANILCA section 506 (a)(3)(D)

<sup>3</sup> Alternative costs differ primarily in terms of construction and maintenance costs of the transmission line. Dollar values are from an estimate done in 2000.

## **6. WHAT FACTORS WILL BE USED IN MAKING THE DECISION?**

Based on the environmental analysis in this EIS, the Tongass Forest Supervisor will decide the required terms and conditions, if any, to be included in the SUA to protect water, fisheries, wildlife, recreation, heritage, and scenic values of Admiralty Island potentially affected by this project. Authorities to prescribe these conditions are found in the Federal Land Policy and Management Act of October 21, 1976 and ANILCA.

## **7. WHAT MONITORING IS NECESSARY?**

Monitoring requirements are established in the approved Plans of Operations required by the Forest Service SUA and in permits and approvals issued by other State and Federal agencies. Monitoring related to concerns with karst and caves, vegetation, soils and wetlands, cultural resources, fisheries and water resources, wildlife, and design plans is prescribed. Kootznoowoo, Inc. and the Forest Service hold most of the monitoring responsibilities. Additional detail on resource monitoring, including water resource monitoring, is found in Chapter 2, Table 2.1.