

## PROJECT DESCRIPTION

### PROJECT LOCATION and FACILITIES

The Blue Lake Project is located approximately 5 miles east of the City of Sitka, Alaska, on Sawmill Creek (formerly the Medvetche River). The Project consists of ten major features: the dam; a submerged intake structure; a power conduit; three powerhouses; a switchyard and a primary and two secondary transmission lines (Figures 1 and 2). The Project Boundary Map (Figure 3) shows the FERC-designated boundary around the project features and primary transmission line to Sitka.

Throughout this document, the Project features are discussed relative to their Stream Mile (SM), or the centerline distance on Sawmill Creek upstream from the Creek's mouth at tidewater, as determined from the project map. Reservoir and stream or roadway directions (left or right) are looking downstream or down-road. Elevations are referenced as heights in feet above or below mean low sea level, denoted by the term "El".

### PROJECT FEATURES.

Names of project features are in bold type on first reference in this section to introduce project terminology which will be used throughout this document.

#### **Dam**

Located at SM 2.31 on Sawmill Creek, the concrete arch **dam** is 211 feet high with a base width of 25 ft and a crest width of 256 ft. The 140 ft wide **spillway** at El 342 is centrally located in the dam, and is sized to transport 14,000 cubic feet per second (cfs). A **release valve**, installed at the base of the dam, is used to release water when the reservoir is below the spillway elevation. The valve capacity is 800 cfs. A natural **plunge pool** is located downstream of the dam, to dissipate energy from the spillway discharge.







Figure 3. Blue Lake Project FERC Project Boundary (shaded)

## **Reservoir**

A **reservoir**, known as **Blue Lake Reservoir**, was created when the dam raised the natural Blue Lake water surface from El 208 to El 342 and increased the lake surface area from 490 to 1,225 surface acres. Blue Lake is 3.25 mi long and 0.625 mi in average width. The deepest point is at El minus 126 at a depth of 468 feet below the lake surface at spill elevation. The reservoir has gross storage capacity of 145,200 acre/feet (af) and usable storage of 102,200 af at spill level. A submerged concrete **intake structure** is located approximately 400 feet north of the dam at El 210.

## **Power Conduit**

A 7,110 ft. long **power conduit** extending from the intake structure to the Blue Lake powerhouse branches to provide water to the various powerhouses and other facilities described below.

The power conduit consists of an **upper tunnel** with an unlined, 11.5 ft. diameter modified horseshoe cross-section extending 1,500 feet from the intake structure to the **upper penstock** on the right side of Sawmill Creek. The upper penstock, an 84 in. diameter, 460 ft. long, steel pipe crosses the stream supported on concrete piers and enters the **lower tunnel** on the left side of Sawmill Creek. The 4,650 ft. lower tunnel has an unlined, 10 ft. diameter modified horseshoe cross-section and extends to the **lower penstock**.

The lower penstock, an 84 in. diameter, 500 ft. long, steel pipe, has two taps immediately below the lower tunnel portal. A 36” tap supplies water to the Pulp Mill Feeder Unit and an 24” tap supplies water to the Sawmill Cove Industrial Park (SCIP), site of the former Alaska Pulp Company (APC) mill.

Approximately 90 feet below these two pipes is a 20 in. tap (the “**water supply tap**”) leading into the adjacent water treatment plant for municipal water supply. Approximately 50 feet below this tap is an 84 in. butterfly valve which allows shutdown of the main powerhouse and dewatering of the turbines while maintaining water to the Industrial Park and the Water Treatment Plant.

## **Project Powerhouses**

The project consists of three powerhouses, including the Blue Lake, Fish Valve Unit and Pulp Mill Feeder Unit powerhouses. The Blue Lake powerhouse is the primary generating unit, and the other two units provide additional generation capacity, as described in detail below.

### ***Blue Lake Powerhouse***

The **Blue Lake Powerhouse** is the primary Project generating unit. It is located on the left bank of Sawmill Creek at SM 0.15 and is a 35 ft. X 70 ft. steel superstructure, precast concrete foundation structure housing two horizontal shaft Francis **turbines** each rated at 3000 kilowatt (kW) with provision for future installation of a third unit. The turbines discharge water into the approximately 150 ft long **tailrace** which carries water from the turbines to Sawmill Creek.

The **Blue Lake Switchyard**, located adjacent to the powerhouse, receives generation energy from the Blue Lake powerhouse, the Fish Valve Unit and the Pulp Mill Feeder Unit (described below). The switchyard includes 12.47/4.16 kV and 4 .16/69 kV transformers, with associated bus-work and disconnect switches. Power from the Green Lake Project, FERC No. 2818, another hydroelectric facility owned by the City of Sitka, is also transmitted to the Blue Lake switchyard at 69 kV.

By FERC Order Amending License dated September 6, 1991, the Project was modified to include two additional generating units. These were:

### ***Fish Valve Unit (FVU)***

The **FVU**, located at SM 1.91, generates power from flows released for instream purposes through a valve located about 1900 ft. downstream of the dam. It is housed in a concrete powerhouse located approximately 175 feet below the upstream end of the upper penstock on the right side of the stream. A 36 in. diameter wye branch on the upper penstock supplies water to the FVU. An automatic bypass valve opens when the Fish Valve Unit is tripped off-line to maintain the required flow of 50 cfs in the stream at all times. A single Francis turbine spins a generator rated at 670 kW.

### ***Pulp Mill Feeder Unit (PMFU)***

The **PMFU** generates power from the water supply to the former Alaska Pulp Corporation (APC) filter plant. Since closure of the APC plant in 1993, the PMFU uses releases for bulk water export and other future uses. The PMFU consists of a 36 in. tee connected to the existing pulp mill feeder pipe and a 36 inch diameter, 24 ft. long penstock from the tee to the generating unit. The single horizontal, Francis turbine spins a generator rated at 870 kW.

Regular PMFU operation was discontinued in 1993 because of shutdown of the APC mill. The unit was returned to regular service in August, 2003.

### **Transmission Lines**

#### ***Primary Transmission Line.***

A 69 kV **primary transmission line** extends 5 miles from the Blue Lake Switchyard to the Jarvis Street and Marine Street substations in Sitka. The line consists of both H-frame and single pole, wood structures. The transmission line right of way occupies 27 acres of land. This land is administered by the U.S. Forest Service, the State of Alaska along the Sawmill Creek Highway right of way and private land owners.

***Pulp Mill Feeder Unit Transmission Line.***

Power from the PMFU is transmitted over a 470 ft. long, underground transmission line to the Blue Lake Powerhouse and connected to the main generation bus.

***Fish Valve Unit Transmission Line.***

Power from the FVU is transmitted over a 7,700 ft. long transmission line to the Blue Lake switchyard where it is transformed to 4.16 kV and connected to the main generation bus. The first 1,400 feet of the transmission line through the U.S. Forest Service Sawmill Creek recreation area is underground. The remaining portion is overhead.

**Access Roads.**

The **dam access road** is the USFS road No. 5755 (Blue Lake Road) and extends 2.19 miles to the dam from Sawmill Creek Road. Just downstream of the FVU, a **footbridge bridge** crosses Sawmill Creek at SM 1.90. Access to the Blue Lake powerhouse and the PMFU is along a licensee owned road connected to Sawmill Creek Road at mile 5.5; access to the FVU is via USFS road No. 5755. At SM 0.25, the **Blue Lake Powerhouse bridge** crosses Sawmill Creek just upstream of the Blue Lake powerhouse.

**PROJECT LANDS**

The existing facilities of the Blue Lake Project occupy 812 acres of U.S. lands administered by the Forest Service.

The project lies within U.S. Geological Survey Sitka A-4 and A-5 Quadrangle maps, within the land descriptions presented in Table 1.

**Table 1.** Land Descriptions of Blue Lake Project Features.

<b>Project Features</b>	<b>Map Locations</b>
<b>Dam, Spillway and Intake Structure</b>	Section 35 of T55S, R64E, Copper River Meridian.
<b>Power Conduit</b>	Sections 34 and 35 of T55S, R64E, Copper River Meridian.

<b>Fish Valve Unit</b>	Section 34 of T55S, R64E, Copper River Meridian.
<b>Pulp Mill Feeder Unit</b>	Section 34 of T55S, R64E, Copper River Meridian.
<b>Blue Lake Powerhouse</b>	Section 34 of T55S, R64E, Copper River Meridian.
<b>Primary Transmission Line</b>	Section 33 & 34 of T55S, R64E, Copper River Meridian; Section 4, 5 and 6 of T56S, R64E, Copper River Meridian; Section 1 of T56S, R63E, Copper River Meridian; Section 35 & 36 of T55S, R63E, Copper River Meridian.