August 31, 2012

Ms. Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

RE: Juneau Hydropower Inc. Submission of a Draft License Application and simultaneous of Request for Waiver of 90 day review period for Draft License Application under C18 CFR 4.38 (C) (5) for Project FERC P-13563

Dear Secretary Bose,

Juneau Hydropower, Inc (JHI) is filing its Draft License Application today, August 31, 2012 simultaneous to our submission we would like to request a waiver of the Draft License Application period under 18 CFR 4.38(c) (5) for the following reasons:

1) Juneau Hydropower has a strong and productive working relationship with the public and our Federal, State, Local, and Tribal stakeholders.
2) JHI would like to have time to fully incorporate the feedback received from our Federal, State, local and Tribal partners in order to ensure a fully compliant and acceptable License Application.
3) Our approved ALP Communications Protocol calls for a 60 day review of documents and therefore this request for a 60 day period is not different from usual and customary comment period already established in our Communications Protocol.
4) Consultation is continuing with applicable stakeholders to ensure that this waiver would be in the best interest of the project.

JHI presently holds a Preliminary Permit for the proposed Sweetheart Lake Hydroelectric Project FERC No. 13563 issued December 14, 2009. JHI herein files its Draft Application for Original License-Unconstructed Major Project Greater than 5 MW (Application). The proposed project would be located near the City of Juneau located within the City and Borough of Juneau on Sweetheart Lake. The proposed Project would have an installed capacity of 19.8 MW and would operate as a storage project.

JHI files its application pursuant to the Federal Energy Regulatory Commission’s (FERC or Commission) regulations at Subpart E- Application for Major Unconstructed Project and Major Modified Project, 18 CFR 4.34 (i) Alternative Procedures. JHI requested and received Commission approval to use the Alternative Licensing Process (ALP) under the regulations, provides the Preliminary Draft Environmental Assessment (PDEA) in lieu of Exhibit E. The
PDEA includes information required in the Commission’s regulation for the Exhibit E Environmental Report 18 CFR 4.41 (f) and the Commission’s regulations implementing the National Environmental Policy Act (NEPA).

The filing consists of the following elements:

Volume 1
Initial Statement
Exhibit A describing proposed project facilities
Exhibit B describing proposed project operations and utilization of the resource
Exhibit C describing JHI’s proposed construction schedule
Exhibit D estimated costs and financing

Volume 2
PDEA

Volume 3
Exhibit F preliminary drawings of project features CEII with geologic report

Volume 4
Exhibit G project maps and boundary information

Volume 5
Preliminary and completed technical reports from environmental and engineering studies.

JHI looks forward to continuing consultation and with agencies and interested stakeholders and coordination with the FERC staff as this draft application and PDEA is processed. If you have any questions, please contact me at (907) 789-2775 or my cell phone at (907) 723-2481.

Sincerely,

[Signature]

Duff W. Mitchell
VP & Business Manager
APPLICATION FOR LICENSE

SWEETHEART LAKE
HYDROELECTRIC PROJECT

FERC NO. P-13563

VOLUME 1 OF 5

DRAFT LICENSE APPLICATION
(Exhibits A, B, C, and D)
Prepared by:

Juneau Hydropower, inc.
AUGUST 2012
UNITED STATES OF AMERICA
BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION
APPLICATION FOR LICENSE
FOR MAJOR NEW WATER PROJECT

18 CFR §5.5(b):

(1) The potential applicant or existing licensee's name and address.

Juneau Hydropower, Inc.
P.O. Box 22775
Juneau, AK 99802
Telephone Number (907) 789-2775
E-Mail Address duff.mitchell@juneauhydro.com

(2) The project number, if any.

FERC No. P-13563--Alaska

(3) The license expiration date, if any.

Not applicable. This application is for an original license.

(4) An unequivocal statement of the potential applicant's intention to file an application for an original license, or, in the case of an existing licensee, to file or not to file an application for a new or subsequent license.

Juneau Hydropower, Inc. (JHI) intends to file an application for an original license for the Sweetheart Lake Hydroelectric Project (Project), located on Gilbert Bay approximately 30 miles south of Juneau, Alaska.

(5) The type of principal project works licensed, if any, such as dam and reservoir, powerhouse, or transmission lines.

There are no existing Project works already licensed. All Project features mentioned herein would be installed after this license application has completed its NEPA review and all permits have been received.

(6) The location of the project by state, county, and stream, and, when appropriate, by city or nearby city.

The Project is located in Southeast Alaska within the City and Borough of Juneau, approximately 30 miles south of Juneau, Alaska on Gilbert Bay and will utilize the waters of the Sweetheart Lake basin which drains into Sweetheart Creek which drains into the eastern shore of Gilbert Bay.

Prelim. Draft License App., Sec. A, B, C, D, ii Sweetheart Lake Hydroelectric Project August 2012 P-13563
(7) The installed plant capacity, if any.

The generating capacity of the Project will be approximately 19.8 megawatts.

(8) The names and mailing addresses of:

(i) Every county in which any part of the project is located, and in which any Federal facility that is used or to be used by the project is located;

Alaska does not have counties, but does have boroughs. The Project will be in the City and Borough of Juneau. No Federal facility will be used as none exist near the Project.

City and Borough of Juneau
155 S. Seward Street
Juneau, AK 99801
Phone Number: (907) 586-5278

(ii) Every city, town, or similar political subdivision:

(A) In which any part of the project is or is to be located and any Federal facility that is or is to be used by the project is located, or

The Project is to be located approximately 30 miles south of Juneau, Alaska. A combination of submarine and overland cables will traverse from the Project across Gilbert Bay and Port Snettisham where it will convert to a buried line and interconnect with the Snettisham Transmission Line which was financed by the Federal Government and is now owned by the Alaska Industrial Development and Export Authority. No Federal facilities will be involved.

(B) That has a population of 5,000 or more people and is located within 15 miles of the existing or proposed project dam;

There is no community within the United States that is within 15 miles of the Project and has a population of 5,000 or more people. The closest community, Juneau, Alaska, has a population of 31,275 (Census 2010).

(iii) Every irrigation district, drainage district, or similar special purpose political subdivision:

(A) In which any part of the project is or is proposed to be located and any Federal facility that is or is proposed to be used by the project is located; or

There are no special purpose political, or otherwise, subdivisions in the project boundary.
(B) That owns, operates, maintains, or uses any project facility or any Federal facility that is or is proposed to be used by the project;

None of the Project facilities proposed are owned, operated, or maintained by an irrigation district, drainage district or special purpose political subdivision.

(iv) Every other political subdivision in the general area of the project or proposed project that there is reason to believe would be likely to be interested in, or affected by, the notification; and

Not applicable.

(v) Affected Indian tribes.
UNITED STATES OF AMERICA
BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION
APPLICATION FOR LICENSE
FOR MAJOR NEW WATER PROJECT

18 CFR, CH. I, SUBCHAPTER B, PART 4, SUBPART E, 4.40

INITIAL STATEMENT

1. Juneau Hydropower, Inc., hereafter referred to as “Applicant”, applies to the Federal Energy Regulatory Commission (FERC) for a license for the Sweetheart Lake Hydroelectric Project, FERC Project No. P-13563, hereafter referred to as “Project” as described in the attached exhibits. The existing preliminary permit (P-13563) for the Project was issued December 14, 2009, which expires on November 30, 2012.

2. The location of the Project is:

State: Alaska
County: City and Borough of Juneau
Nearest Town: Juneau
Lake: Lower Sweetheart Lake-Sweetheart Creek
3. The exact name, address, and telephone number of the Applicant are:

Company: Juneau Hydropower, Inc.
Address: P.O. Box 22775
         Juneau, AK 99802
Telephone: (907) 789-2775
Fax: (907) 375-2973
E-mail: duff.mitchell@juneauhydro.com

4. The exact name, address, and telephone number of each person authorized to act as agent for the Applicant in this application are:

Name: Duff Mitchell
       Vice President and Business Manager
Company: Juneau Hydropower, Inc.
Address: P.O. Box 22775
         Juneau, AK 99802
Telephone: (907) 789-2775
Fax: (907) 375-2973
E-mail: duff.mitchell@juneauhydro.com

5. Juneau Hydropower, Inc. is a corporation organized and existing in the State of Alaska. The Applicant is making no claim to preference under Section 7(a) of the Federal Power Act.

6. Statutory or regulatory requirements

   (i) The statutory or regulatory requirements of the State of Alaska in which the project would be located and that affected the project as proposed, with respect to bed and banks and to the appropriation, diversion and use of water for power purposes, and with respect to the right to engage in the business necessary to accomplish the purposes of the license under the Federal Power Act are:

      Water Right Permit
      Alaska Department of Natural Resources, Division of Mining, Land, and
      Water (AS 46.15)

      Alaska Department of Natural Resources. 2004. Alaska's Outdoor Legacy:

      Special Use Authorization
404 Permit
Federal Clean Water Act (Section 404). For construction within waters of the United States, issued by the US Army Corps of Engineers.


401 Certification
In the State of Alaska, certification is carried out via the US Army COE permitting process, unless FERC is not involved.

Alaska Coastal Management Program Consistency Review
This program is not in existence at this time.

<table>
<thead>
<tr>
<th>Permit or Approval</th>
<th>Agency</th>
<th>Statute or Regulation</th>
<th>Status</th>
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<tr>
<td>Water Rights Permit</td>
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<tr>
<td>Land Use Permit</td>
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<tr>
<td>Submerged Lands Permit</td>
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<td>Fish Habitat Permit</td>
<td>ADF&amp;G</td>
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<td>Individual Permit</td>
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<td>Essential Fish Habitat Permit</td>
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<td>DCOM Consistency Review</td>
<td>DCOM</td>
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</tbody>
</table>

(ii) Utility routes and facilities
The steps which the Applicant has taken or plans to take to comply with each of the laws cited above are:

Water Rights Permit
Water rights have been applied for but are not issued until after the project starts using water.

Special Use Authorization
The Applicant has filed and received a Special Use Authorization for the purpose of investigating the hydropower potential of the project boundary. Upon license, the Applicant will file for Special Use Authorization for construction and operations.

404 Permit
A permit application has not been submitted to the COE, but the Applicant plans to do so by the time that a Final License Application is filed.

401 Certification
A letter to DEC for 401 Certification has not been submitted but will be filed simultaneously with Final License Application. However, DEC will have the COE permitting process cover their statutory requirements via an MOA that exists between the two agencies.

ACMP Consistency Review
At this time the ACMP is non-existent, but could be resurrected and funded at a future date.

7. Brief description of the Project:

The proposed project would consist of: (1) the existing Lower Sweetheart Lake, raised from a surface water elevation of 551 feet (MLLW) and a surface area of 1,414 acres to a new surface water elevation of 576 feet and a new surface area of 1,702 acres; (2) a new, approximately 105 feet (from the downstream toe to the top of dam 278-foot-long, 105-foot-high, 100 foot-thickness at the base roller compact concrete dam, constructed at the outlet of Lower Sweetheart Lake; (3) an intake on the dam connecting to a 12-foot-diameter, 9,593-foot-long unlined tunnel; (4) a 8-foot-diameter, approximately 980-foot-long penstock installed within the lower portion of the tunnel, connecting to the powerhouse; (5) a powerhouse containing three new Francis generating units (6.6 MW each) with a total installed capacity of 19.8 MW; (6) a new tailrace discharging flows to Sweetheart Creek; (7) a new approximately 4,400-foot-long road from the powerhouse to the dock/landing site; (8) a new dock/landing site for boat, seaplane, and/or helicopter access, located on the east shore of Gilbert Bay; (9) a new 138-kilovolt transmission line that would be a total of 45,900 feet long (25,700 feet of submarine cable in two segments; 15,400 feet of overhead transmission line on Snettisham Peninsula; and 4,400 feet of buried transmission line in two segments); and (10) appurtenant facilities.

8. Lands of the United States affected (shown on Exhibit G):

The Project would be located in Southeast Alaska, approximately 30 miles south of the City of Juneau, located within the City and Borough of Juneau in Gilbert Bay in Exhibit F-1. All terrestrial lands to be occupied by the Sweetheart Lake Hydroelectric Project are Federal lands administered by the Tongass National Forest, U.S. Forest Service (USFS or Forest Service) as described below.

The total amount of Federal land enclosed within the proposed project boundary is estimated to be 1,882 acres. The proposed project is surveyed and is described by township, range, and section. The estimated acreage is based on:

- Reservoir boundary = 650 foot contour
The Tongass National Forest of the USFS has designated the lands around and within the project boundary as Semi Remote Land Use Designation and Timber Harvest Land Use Designation. According to the 2008 Tongass Land and Resource Management Plan:

**Semi-Remote Recreation**  - Provide motorized and non-motorized recreation opportunities in natural and natural-appearing environments where interaction with others is low and the opportunity for independence and self-reliance is moderate to high. Allow occasional concentrated recreation and tourism facilities in a natural-appearing setting. When present, roads are few and used primarily to expand and improve access to recreation opportunities or to permit access to other parts of the Forest and other ownerships. Timber harvest is limited to salvage of catastrophic events or beach log recovery.

**Timber Production** – Manage the area to maintain and promote industrial wood production. These lands will be managed to advance conditions favorable for the timber resource and for long-term timber production. Roads are permitted.

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Fitting energy projects into the Tongass National Forest, which includes significant portions of the Tongass National Forest, is a complex issue and must be resolved by the Washington D.C. offices of the USFS and the Department of Agriculture.

Transmission line lands (submarine cable; submerged lands with a 200-foot-wide corridor) that are State of Alaska submerged lands and total approximately 131.3 acres are:

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<th>Township and Range</th>
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<th>Project Features</th>
<th>Acres</th>
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<tr>
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<td>Powerhouse Tideland</td>
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<td>T45S R72E</td>
<td>R72E Sec 4-7, R71E Sec 1,12</td>
<td>Port Snettisham Submarine Line</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>STATE OF ALASKA land</td>
<td>131.3</td>
</tr>
</tbody>
</table>

9. There are no existing project features. Construction is expected to start immediately upon but no later than within two years of license issuance.
This _____________________ is executed in the State of Alaska, City and Borough of Juneau: Duff W. Mitchell, 3274 Pioneer Ave. P.O. Box 22775 Juneau, AK 99801 who, being duly sworn, deposite(s) and say(s) that the contents of this _____________________ are true to the best of (his or her) knowledge or belief. The undersigned applicant(s) has (have) signed the ________________ this ___ day of _____________ 2012.

(Applicant(s))

By: Duff W. Mitchell

State of Alaska   )
Ss
City and Borough of Juneau   )

On this _______ day of __________, 2012, before me, a Notary Public, in and for the State of Alaska, personally appeared Duff W. Mitchell personally known to me (or proved to me on the basis of satisfactory evidence) to be the person who executed this instrument. Sworn to and subscribed before me this _______ day of ________, 2012.

________________________________
Notary Public
State of Alaska
My commission expires:
(seal)
OTHER INFORMATION

There are no federal, state, local political entities and facilities identified, or Indian tribes affected by this Project. Notices issued in local newspapers and their proof of publication for this licensing can be found in the Appendix V: Agency Consultation.

I hereby certify that electronic copies of this License Application were made available to the following parties:

a. FERC – Washington D.C.
b. FERC – Portland Regional Office
c. U.S. Forest Service – Ketchikan Ranger District
d. National Marine Fisheries Service
e. U.S. Fish & Wildlife Service
f. U.S. Environmental Protection Agency
g. U.S. Army Corp of Engineers
h. U.S. National Park Service
i. Alaska Department of Fish & Game
j. Alaska Department of Natural Resources – Mining, Land, and Water
k. Alaska Department of Environmental Conservation
l. Alaska Department of Natural Resources – State Historical Preservation Officer

On this ______ day of ___________________, 2012, before me, a Notary Public, in and for the State of Washington, personally appeared ______________________ personally known to me (or proved to me on the basis of satisfactory evidence) to be the person who executed this instrument. Sworn to and subscribed before me this ______ day of ___________________, 2012.

________________________________
Notary Public
State of Washington
My commission expires:

(seal)
PROJECT DESCRIPTION

(1)  PROJECT STRUCTURES

(i)  Marine Access Facilities

The Sweetheart Lake Hydroelectric Project sites (dock, powerhouse access road and powerhouse) on Gilbert Bay and at Sweetheart Lake (dam site, work yard) are not accessible by roads, and construction of an access road from the nearest road system (in Juneau) is not considered feasible due to the distance, multiple water body crossings steep terrain and the visual impacts of such a road. Therefore, the Applicant proposes to access the sites for both construction and operation primarily by water, with additional access by air. The proposed dock location on Gilbert Bay just north of Sweetheart Creek provides a convenient and deep water location for construction of marine access facilities, as follows:

- A dual height marine ramp for loading and unloading freight barges and landing craft. The ramps will have a minimum width of 50 feet, a slope of 15-20 %, and an compacted rock surface. The toe of the ramp will be near El. 15 allowing low tide access without grounding of the vessels. The ramp will slope up to El. 25 for high tide access. The sides and front slopes will be protected with rock rip rap.

- Floating docks will provide seaplane and boat access for passengers and freight during construction and maintenance. The seaplane float is nearly 1800 square feet with three fendered faces for multi direction access to accommodate weather conditions. It will be attached to a 3000 square foot heavy duty steel and timber small boat float. The floats will be secured by 8 - 24inch diameter steel piles. A 100 foot x 14 foot drive down ramp will connect the float to the staging area concrete abutment. The ramp will have open grating deck.

- Staging area will be constructed adjacent to the docks and float ramp and connect them to the powerhouse access road. Similar to the access ramps, the staging area will be constructed of clean shot rock with sides slopes protected with rock riprap. The staging area will be approximately 150 feet wide by 200 feet long to allow for materials, equipment, and personnel needs for construction.

- Rock for the ramps, staging area, and road will come from quarries located adjacent to the construction areas and from powerhouse and tunnel excavation.

(ii)  Access Roads

There will be one main access road for the project. JHI has developed two alternative roads and selected the 4400 feet long Coastal Road Alternative as it is shorter and
provides better aesthetics and less environmental intrusion. The road will be constructed with clean shot rock and built to USFS standards.

Forest Road Alternative

From the dock location the forest road alternative would ascend a 15% slope and meanders in a partial loop to an between El. 200 and 275 feet and heads south to the proposed powerhouse site. The road would be approximately 5900 feet. It would be a single land gravel road with turnouts similar to a logging road. This route crosses some ravines and gullies and would require culverts. The subgrade width would be up to 25 feet to provide for large construction machinery necessary for the tunnel boring machine (TBM) and powerhouse turbines. The subgrade will be surfaced with additional material obtained from the power tunnel construction (TBM spoils) or quarried along the right of way.

The transmission line segment from the Powerhouse to the dock area marine terminal (where the transmission line will enter Gilbert Bay) would be conventional overland transmission line rated for 138kV. This will require a swath of trees to be removed in order to prevent deadfall and danger trees entering the right of way and damaging the transmission line. Although this road alternative was developed as the primary alternative to mask the road and transmission line for aesthetic purposes, it appears that this alternative would disturb more terrain and be less attractive from an aesthetic point of view.

Coastal Road Alternative-Preferred Road Alternative.

The coastal road alternative would have the marine facilities situated in the same location under both alternatives. The Coastal Road Alternative is substantially shorter in distance with 4400 feet. However, instead of immediately meandering uphill, the coastal road would traverse southward just under the rock ledge that occurs along the eastern shore of Gilbert Bay for just over 2000 feet. This road would be laid with fill derived from a quarry that would be cut above the marine facility area. The subgrade width would be up to 25 feet to provide for large construction machinery such as the TBM and powerhouse turbines. The subgrade will be surfaced with additional material obtained from the power tunnel construction (TBM spoils) or quarried along the right of way.

(iii) Sweetheart Lake Dam

The Main Dam will be a roller compacted concrete (RCC) dam with an estimated height of 105 feet (from the downstream toe to the top of dam) and a crest length of 275 feet. The top of dam will be at El. 645 feet and the overflow spillway crest will be at El. 636 feet (the high normal pool elevation). The dam section will consist of a vertical upstream face and a stepped downstream face with an overall slope of 0.85 horizontal to 1.0 vertical (0.85H:1.0V). It is anticipated that the steps on the downstream face will be four feet high with a horizontal “tread” of 3.4 feet. The overall section geometry was selected based on preliminary gravity stability analyses in accordance with FERC criteria.
The RCC dam will extend across the full valley and tie into approved rock foundation on both abutments. An overflow spillway will be constructed in the center of the RCC dam and flow will be discharged directly down the stepped downstream face of the RCC to the base of the dam. Outside of the spillway limits the dam will include a 20 foot wide vertical chimney section. Concrete parapets will be constructed at the crest of the dam to El. 645 feet.

RCC will be placed sequentially in one foot thick lifts and there is a tendency for seepage to develop along the lift lines, particularly when using dry (high vebe time) RCC mixes. To control seepage along these lift lines, most RCC dams include a low permeability upstream facing system in combination with carefully designed RCC mix, and attention to lift joint preparation and treatment. The proposed dam will include a grout enriched RCC (GERCC) upstream face to lower the permeability between adjacent lifts of RCC. Air entrained RCC will be used to improve the freeze-thaw durability. In addition, a low vebe time (wetter mix) will be used in conjunction with a retarding admixture to improve the bond between lifts.

Dental and leveling concrete will be used in the foundation to fill discontinuities and to provide a level surface to start efficient RCC production. On the abutments, dental concrete will be applied and grout enriched RCC will be used against the steep irregular rock surface. Following construction of the RCC dam, a foundation grouting program will be initiated from the crest of the dam. Drill holes will be advanced through the dam in an orientation to intercept potential discontinuities based on geologic mapping performed on the foundation prior to construction. Grouting after construction of the RCC dam will take this activity off of the critical path and will provide better access to steep abutment slopes from the top of the dam.

(iv) Stream Diversion Tunnel and Cofferdam

During construction, the river will be diverted through a tunnel in the right abutment. The tunnel will be excavated by the drill-and-blast method (DBM) to a 10 foot wide by 10 foot high straight leg horseshoe shape, and will be approximately 500 feet long. Temporary lined rockfill cofferdams will be constructed upstream and downstream of the proposed dam to provide protection from routine storms and to provide vehicular access across the stream channel.

An upstream cofferdam will be constructed approximately 150-feet upstream of the main dam to El. 565 feet, which is roughly 14 feet above the current pool elevation. Approximately 5 feet of freeboard will be provided during a 10-year rainfall event. The downstream cofferdam will be constructed to El. 555 feet to control water from entering the dam excavation footprint from the downstream direction.

(v) Spillway

The spillway will be located in the center of the Main Dam. The spillway will consist of the following:

- A 125-foot-wide overflow spillway. The spillway will pass the 100-year rainfall event with the maximum water surface at El. 643.4 feet (1.6 feet below the top of dam crest) with only the spillway operating (no outlet works or power plant discharge). All routings assume that the starting reservoir elevation is at the
spillway crest El. 636 feet. The PMF will overtop the non-overflow sections of the Dam with a maximum water surface at El. 650.4 feet (5.4 feet over the top of dam).

- The peak outflow for the 100-year rainfall event is estimated to be 7,007 cubic feet per second (cfs). The peak outflow during the PMF is 24,322 cfs.
- The downstream face of the dam has a slope of 0.85H:1.0V and four foot high steps for energy dissipation. Based on preliminary geologic investigations, and evaluation of topographic conditions downstream of the dam, we have assumed that a formal stilling basin will not be required. We have assumed that some armoring and anchoring of weak seams in the rock may be warranted. Additional geotechnical investigations and rock scour analyses will be performed during final design.

(vi) Reservoir Outlet Works

At the end of dam construction, the diversion tunnel will be converted to a reservoir outlet works. During excavation of the diversion tunnel, a vertical shaft will be constructed from the top of the diversion tunnel just upstream of the proposed axis of the dam. Following dam construction, a concrete bulkhead will be constructed downstream of the shaft and a roller gate will be installed to control future discharges. A portion of the tunnel under the dam will be lined and the rock will be grouted from the interior of the tunnel, as needed. A concrete slab will be constructed over the vertical shaft and a small gate house will be erected at the top of dam to protect the gate hoist system.

The outlet works will consist of the following:

- A concrete headwall structure at the upstream portal of the diversion tunnel, with provisions for installing trashracks and stoplogs or a steel bulkhead.
- A concrete lined section of the tunnel under the dam crest, with a concrete bulkhead for mounting the roller gate.
- A single 8foot x 8foot roller gate for draining the lake if required.

The outlet works have been sized to allow drawdown of the reservoir from El. 636 feet (maximum normal pool) to El. 576 feet (minimum normal pool) in 39 days assuming an 8-foot by 8-foot gate installed in the diversion tunnel, a base flow of 500 cfs into the reservoir, and no flow through the power tunnel.

(vii) Power Tunnel and Penstock

The power tunnel will have a 12 foot-diameter by 9593 foot-long power tunnel from portal to portal. The tunnel will be either machine-bored or excavated by DBM. This application is based on use of a TBM because of its environmental and technical advantages. The final decision on excavation method will be made at the time of construction based on contractor bids on each option.

A 15-foot straight leg horseshoe starter tunnel will be excavated by DBM from the outlet portal and extend 200 feet along the power tunnel alignment. The starter tunnel is required as an assembly, set-up and launching structure for the TBM; the total excavated volume of the starter tunnel is approximately 1,485 cubic yards (cy). The TBM tunnel
diameter will be 12 feet and the spoil volume will be approximately 40,150 cy, resulting in a total of 41,635 cy excavated for the entire power tunnel structure. The tunnel will be excavated from a single heading from the lower portal near the powerhouse, and the spoils will be used for surfacing the access roads, aesthetic mound to mask powerhouse from Sweetheart Creek and for aggregate for the dam. Spoils from the tunnel will be re-conveyed to the dam site if it is determined by contractor to be an economically viable option. Rock quality based on initial tests is expected to be very good, therefore it is expected that the tunnel will be mostly unlined. The alignment has been selected to minimize the length of lined tunnel and provide a convenient location for future construction of a surge tank if that becomes warranted. Rock bolts will be installed as necessary, and the tunnel will be lined with shotcrete in areas of poor quality rock such as shear zones, faults, or highly fractured zones. In addition, linings will be installed near the portals; lining is planned as 500 feet of 10 foot diameter steel liner with concrete backfill and 1200 feet of 10 foot diameter reinforced concrete lining.

At the lower portal of the tunnel, the steel liner will transition to a manifold branching to three four-foot diameter penstocks feeding the turbines. The manifold and branch penstocks will be buried in fill with a minimum of 3 feet of cover.

(viii) Powerhouse

The powerhouse will be located in a deep excavation approximately 600 feet northwest of the anadromous barrier on Sweetheart Creek, and approximately 2,000 feet east of the confluence of Sweetheart Creek and Gilbert Bay. Juneau Hydropower will build the powerhouse in the deep excavation to minimize disturbances, allow infrastructure to blend in with surroundings, and to mitigate light and noise emitting from operations. The intended goal is to lessen or virtually eliminate scenic and audio disturbance in the area of powerhouse operations.

The powerhouse will be approximately 50 feet wide and 150 feet long. Floor level of the powerhouse will be at El 40, with an eave height of about 35 feet and concrete substructure up to 20 feet deep. The powerhouse will be constructed with concrete walls and a metal or concrete roof. The powerhouse will include three generator bays and a service area.

(ix) Tailrace

The tailrace will consist of a 12 foot tunnel extending from the powerhouse approximately 475 feet to a small tributary to Sweetheart Creek. Approximately 225 feet of the tunnel will be cut and cover excavated into rock and the remaining 250 feet will be constructed by DBM. An open excavation will be constructed to install a concrete outlet structure at the discharge end of the tunnel. A 35-foot long concrete weir will control discharge from the outlet structure into the existing drainage channel. This channel will be restored as a natural channel, lined with boulders and trees. It has been assumed that the average side slopes of this channel will be approximately 1H:1V.

(x) Switchyard

The switchyard will be located adjacent to the powerhouse on fill over the penstocks. This location has been selected to allow screening by existing vegetation to the maximum extent possible. The switchyard will include the following equipment:
• Three 7.5/8.4 MVA 6.9-138 kV transformers, with concrete basin foundations.
• Roof assemblies over the transformers to protect them from snow shedding off the powerhouse roof.
• Three 145 kV circuit switchers for disconnect and isolation of the main power transformers.
• One 145 kV SF$_6$ circuit breaker.
• Three pair of manual disconnect switches for isolating the circuit breaker.
• Interconnection with the submarine transmission cable
• Associated buswork and metering transformers
• 100 kW diesel generator for providing station service when the plant is not operating, including a double-walled fuel storage tank.
• Oil-water separator

(2) IMPOUNDMENT
The reservoir created by the main dam and saddle dam will have the following characteristics:

- Normal maximum water level ..............................................636 feet mllw
- Surface area at normal maximum water level .......................1,701.5 acres
- Storage capacity at normal maximum water level ...............128,109 acre-feet
- Normal minimum water level .............................................576 feet mllw
- Surface area at normal minimum water level .......................1449 acres
- Storage capacity at normal minimum water level ...............33,969 acre-feet
- Active storage capacity .........................................................97,800 acre-feet
- Maximum water level (PMF) ..............................................646 feet mllw
- Storage capacity at PMF water level .................................141,791 acre-feet

(3) GENERATING UNITS
(i) Turbines and generators
The powerhouse will contain three generating units with the following characteristics (preliminary):

- Turbine type ...............................................................Francis, horizontal axis
- Turbine rated head .....................................................557 feet
- Turbine rated flow .......................................................162 cfs
- Turbine speed .............................................................720 rpm
- Generator type ............................................................Synchronous
- Generator voltage ..........................................................4,160 V
• Generator rated capacity ............................................6,600 kW

(4) PRIMARY TRANSMISSION LINE

The primary transmission line will consist of five component segments:

A buried 138 kV transmission cable from the proposed powerhouse to the marine facility situated on the eastern shore of Gilbert Bay with a length of 4400 feet.

A submarine 138 kV transmission cable from the marine facility on the eastern shore of Gilbert Bay to a marine facility on the western shore of Gilbert Bay consisting of 9700 feet.

An overhead 138 kV transmission cable from the marine facility on the western shore of Gilbert Bay to a marine facility located past Sentinel Point on the southern shore of Port Snettisham consisting of 15,400 feet.

A submarine 138 kV transmission cable from the marine facility on the southern shore of Port Snettisham to a marine facility located east of Mist Island on the northern shore of Port Snettisham consisting of 16,000 feet.

A buried 138 kV transmission cable from the marine facility on the northern shore of Port Snettisham of 400 feet.

To minimize fisheries interference, the Gilbert Bay submarine cable is positioned to minimize impact on known Dungeness fishing grounds and traditional anchorage areas. Exhibit G-1 shows the transmission boundaries.

(i) APPURTENANT EQUIPMENT

(ii) Accessory Mechanical and Electrical Equipment

The powerhouse will contain the following accessory mechanical and electrical equipment:

• 48 inch butterfly-type turbine shutoff valves (per generating unit)
• 25 Ton bridge crane with 10 ton auxiliary hook
• Hydraulic power units (per generating unit)
• Electronic governors (per generating unit)
• Static exciters (per generating unit)
• 125 VDC station battery
• 6.9 kV switchgear (per generating unit)
• Electronic control system for remote automatic operation

(iii) Plant Switchyard

The switchyard at the Soule power plant will include:

• Three 7.5/8.4 MVA 6.9-138 kV transformers
• Three 145 kV circuit switchers
• One 145 kV SF6 circuit breaker
• Associated buswork, metering transformers, fencing, and containment systems
• 100 kW emergency diesel generator.

(iv) O&M Equipment (replace with Sweetheart)

Because the project area will only be accessible by boat and helicopter, for operation and maintenance of the project the Applicant will assign to the project a landing craft for moving large equipment and materials and two boats for moving personnel and small cargo. Other O&M equipment on site will include a backhoe, ATV with trailer, snowcat, and snow removal equipment.

(5) LANDS OF THE UNITED STATES

All project features except for portions of the coastal road alternative and adjacent buried transmission line will be located on lands of the United States (Tongass National Forest).

The project boundary shown on Exhibit G-1 encompasses 1881.6 acres of Tongass National Forest land, as indicated in the table A-1 below. Additionally, the Project encompasses 131.3 Acres of non-federal tideland and submerged lands of the State of Alaska, as indicated in the table A-2 below. The project boundary has been determined as follows:

• For the reservoir, the 650 foot contour,
• For the power tunnel, 100 feet each side of the centerline,
• For the access roads, 100 feet each side of the centerline,
• For other features, a boundary approximately 100 feet beyond the expected area of disturbance.
### Table A-1
**Lands of the United States**

<table>
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<th>Township and Range</th>
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**TOTAL FEDERAL LAND** 1881.6

### Table A-2
**Lands of the STATE OF ALASKA**

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**State of Alaska land** 131.3
SWEETHEART LAKE HYDROELECTRIC PROJECT

EXHIBIT B

PROJECT OPERATION AND RESOURCE UTILIZATION

(1) ALTERNATIVE SITES

(i) Alternative Sites in and around the Juneau Area

On December 14, 2009, the Applicant was issued preliminary permit P-13563 for the investigation of a lake tap, Lake Siphon hydroelectric development on the Lower Sweetheart Lake and Sweetheart Creek.

In our analysis, we reviewed all sites in Juneau listed in previous governmental publications related to the hydropower resources that could serve the growing commercial and residential demand in the City and Borough of Juneau. The Applicant reviewed several sites within and beyond the City and Borough of Juneau. Many of these alternative sites are identified in USGS Water Supply Paper 1529 and the Federal Power Commission, Water Powers of Southeast Alaska (1947). These sites include previously developed project sites such as Sheep Creek and Tease Lake along with other small projects. Further sites were identified such as the Whiting River or the damming of the Taku River as proposed in the early 1950’s. Damming salmon bearing rivers would pose monumental environmental issues and would not be further considered by this developer or the general public. Additionally, AEL&P has developed Lake Dorothy I that with proper license amendments and financing could develop Lake Dorothy II as an alternative site.

None of these undeveloped alternative sites were determined to be superior to the Sweetheart Lake Hydroelectric Project site in generating economically viable energy at a reasonable cost of development that could serve the Juneau market demand. No other undeveloped sites within the Juneau market and service area were worthy of additional investigation of time and investigation resources. In addition, not all undeveloped sites are federal power site classifications. The designation as a federal power site provides the federal withdrawal of the land for the reserved purpose of developing hydropower resources for the citizens of the United States. Sweetheart Lake Hydroelectric Project is listed as a federal power site under PLO 382b as Power Site Classification 221 March 6, 1929.

(ii) Alternative Sites in and around the Sweetheart Lake Hydroelectric Development

The proposed project site is clearly the superior dam site and powerhouse locations in the Sweetheart Lake watershed for development of a storage dam and reservoir due to the narrow gorge just below the Lower Sweetheart Lake as it empties into the steep and narrow Sweetheart Creek. This determination of superior attributes is reinforced by previous governmental studies that invested substantial resources in configuring the location and determining the water power resource of the Sweetheart Lake watershed.

Previous studies located the powerhouse closer to Gilbert Bay at a lower elevation of Sweetheart Creek. This would provide an additional 30 to 35 feet of head and would improve the economics of the project. However, this alternative of locating the
powerhouse at Gilbert Bay would likely destroy the natural and stocked salmon runs and would have secondary and third order negative impacts on the Sweetheart Creek ecosystem and the recreational attributes.

A storage project requiring a small dam as proposed is necessary to efficiently and economically utilize the Sweetheart Lake watershed resource because of the highly variable stream flows.

Nonetheless, the Applicant has identified and considered the Upper Sweetheart Lake, as described below:

The Upper Sweetheart Lake drops from an elevation of 1750 for development of storage, the waterway would consist of about 1000 feet of tunnel connecting with about 2000 feet of penstock to a powerhouse located on Sweetheart Lake. This alternative could generate up to 2.5 MW.

Although this project could be developed at a future date this alternative plan was not selected because: 1) generation would only be possible during about 6 months of the year when the value of power is lowest, and 2) mobilization of equipment and material would be prohibitive and 3) the entire cost of the transmission line for the full development would need to be borne by the alternative, which makes the alternative cost of power economically prohibitive.

(2) ALTERNATIVE DESIGNS AND OPERATIONS

(i) Alternative Reservoir Capacities and Power Plant Hydraulic Capacities

The generation by the Project will be determined primarily by two characteristics: 1) the reservoir capacity, and 2) the power plant hydraulic capacity. Other factors (such as the tunnel diameter or number of generating units) will also influence the generation, but to a much lesser extent than the reservoir capacity and the power plant hydraulic capacity. The Applicant conducted an economic analysis to determine the values for these two main characteristics as proposed in this application (maximum reservoir at EL 637, hydraulic capacity of 486 cfs). The economic analysis was based on the assumptions described in Exhibit D. Alternative maximum reservoir levels at 600 feet, 650 feet, and 700 feet were evaluated, as were alternative hydraulic capacities of 500 cfs, and 600 cfs.

This economic analysis indicates that a maximum reservoir elevation of 637 ft with 60 ft of storage (to a minimum of 677 ft) and a maximum hydraulic capacity of approximately 450 cfs makes effective use of the hydropower resource while mitigating adverse environmental impacts.

However, the analysis is sensitive to the assumptions used for the financing conditions, construction costs, and critically the market price for power by time of day and season. The actual conditions cannot be finalized at this stage of development. The Project was initiated as a 30 MW project, but our optimization analysis indicated that a lower MW capacity plant intended for baseload generation rather than peaking would make full use of the hydropower resource while preserving the environmental attributes of the ecosystem in maintaining required stream flows necessary for anadromous salmon. The
Applicant has elected to propose in this application a project with the reservoir size and hydraulic capacity at an optimized efficiency that provides stable stream flows for the anadromous reach of Sweetheart Creek.

(ii) Alternative Dam Types

The proposed dam type is a roller compacted concrete (RCC) gravity dam with a 125 foot wide overflow spillway that discharges over the RCC. This type of dam is simple, robust, and can be constructed quickly (within a single construction season). The geometry was conservatively selected to meet current FERC stability criteria for various loading conditions including the PMF. Numerous mid-sized to very large RCC dams have been built worldwide in cold and wet climates similar to conditions expected at the Sweetheart Lake Project.

The Lower Sweetheart site is remote and poses significant challenges regardless of the dam type. It is anticipated that the power tunnel will be constructed first and the aggregate produced from the tunnel will be crushed and stockpiled near the powerhouse area for use as aggregate for the RCC dam. Upon completion of the tunnel, a batch plant will be set up in the powerhouse area and RCC will be conveyed through the tunnel to the dam site. This will reduce the disturbed area at Lower Sweetheart Lake and reduce the amount of equipment and materials necessary at the dam site.

Other dam types considered for the site include a concrete faced rockfill dam and conventional concrete. A conventional concrete dam would be similar in size to an RCC gravity dam. However, it would take more than one season to construct a concrete dam due to the limited construction season and the number of placements required by this type of construction. Extending dam construction into a second year would significantly increase the overall cost. In addition, the thermal issues associated with conventional mass concrete would increase the cost of construction.

A concrete faced rockfill dam cannot convey flows over the top of the dam and the existing stream valley is narrow, with very steep side slopes. Considering the site geometry, excavation of a large overflow spillway on an abutment is not a cost effective or practical solution. For this type of dam, a riser structure and outlet pipe would serve as the primary spillway. Due to the limited hydraulic capacity of these types of spillways we assumed that storms larger than the 100-year rainfall event up to the PMF would be conveyed through a small (~50-foot-wide) overflow auxiliary spillway excavated into rock on the abutment. Due to the limited hydraulic capacity, the height of the dam to safely pass the PMF would be considerably higher than an RCC dam. Considering the slopes of a typical rockfill dam it is estimated that the base of the dam (upstream to downstream) would be approximately 500 feet (vs. about 100 feet for the RCC option). The large footprint, the volume of material required for this option, and the additional cost of a large riser spillway and steep abutment excavation make this option less feasible than an RCC dam.

Power Tunnel: The power tunnel could be constructed with conventional drill-and-blast method (DBM) as is typical in many areas in southeast Alaska. However, it is
anticipated that the advance rate for driving the tunnel can be significantly reduced by constructing with at tunnel boring machine (TBM). A TBM mined tunnel has the following advantages over a tunnel excavated by the DBM: 1) excavating a circular tunnel minimizes the quantity of tunnel muck generated by cutting the most efficient cross-sectional area required for flow; 2) a bored tunnel reduces head losses by providing a smooth flow path as compared to the rough contours in DBM construction; 3) ground support requirements in hard rock tunneling are typically minimized using a TBM. The primary advantage of driving a tunnel using the DBM allows for better handling of poor quality and adverse ground conditions as ground support elements can be installed quickly at the tunnel heading. In comparison, support of poor quality ground in bored tunnels is installed from the rear of the machine after the cutting head has passed the unstable/difficult ground section. The initial concept for driving the Sweetheart Lake power tunnel is by using a TBM; further analysis of the viability of this method will be conducted once laboratory testing has been completed to determine the estimated advance rate and power requirements of the machine. The final decision on TBM vice DBM will need to be made at the time of bidding, with contractors offered the option of either type.

(iii) Alternative Access Road Alignments

The proposed access road alignment has been selected based on cost, functionality, and environmental impact criteria. One primary objective is to mitigate the impact on a designated roadless area. Although hydropower developments are an approved road building activity in the Tongass National Forest, the Applicant has sought to lessen the road construction activity in the Project plan. On May 24, 2011 Judge Sedwick entered a Roadless Rule order that ruled in part regarding hydropower developments in the Tongass National Forest, “…Nothing in this judgment shall be construed to prohibit any person or entity from seeking, or the U.S. Department of Agriculture from approving, otherwise lawful road construction, road reconstruction, or the cutting or removal of timber for hydroelectric development pursuant to the standards and procedures set forth in the Federal Power Act, 16 U.S.C. §§ 791-823d” (emphasis added) 1

In the initial evaluation of the Project by the Applicant and developed in prior governmental hydropower studies on Sweetheart Lake, there was a several mile length road proposed in the project development. In a 1983 Sweetheart Lake plan of development called for a 2.25 mile road from tidewater to damsite. This road would cut through a Semi Remote Recreation Land Use Designation that encompasses the eastern shore of Gilbert Bay and the project area. This alternative road would have crossed wetlands and would have left a visible scar on the scenic landscape that could be seen from any point in Gilbert Bay. This alternative was ruled out by the Applicant as unnecessary and environmentally obtrusive. A secondary objective of the Applicant was to minimize visibility of the necessary road corridor that would traverse from the proposed dock area on the eastern shore of Gilbert Bay to the powerhouse. Two alternatives were developed: An upland forest road alternative and a high tide coastal road alternative. Based on several environmental factors, aesthetics and habitat

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1 John W. Sedwick Roadless Rule Judgment Case 1:09-cv-00023-JWS Document 85 Filed 05/24/11
disruption being primary selection criteria, the coastal alternative was selected by the Applicant.

This preferred Coastal Road Alternative is a 4400 ft. road that is aligned just below the cliff face along the eastern shore for 2000 feet. This section of road is at or just below the mean high tide and is extremely rocky. This section of road would be built along this rocky section of the beach and the road specifically designed and constructed to have a reverse slope where the road slopes interior. This strategic construction design would mask the existence of a road from the Gilbert Bay anchorage area. As the road meanders toward the grassy Sweetheart estuary, the road would head east for 3400 feet and increase in elevation toward the powerhouse located at EL 50.

The powerhouse access road preferred route is the coastal alternate that runs parallel to the beach at elevation 25 feet climbing to 50 feet near the powerhouse / tailrace. The road will be gravel surface single lane and pullouts and be constructed from clean shot rock to USFS standards.

The Applicant would bury a portion or all of the transmission cable from the powerhouse to the dock area using this Coastal Road Alternative. Burying the cable would eliminate avian impact of eagles and waterfowl that frequent Gilbert Bay. It is the applicant’s view that the preferred alternative provides superior environmental attributes as compared to the Forest Road Alternative.
A Forest Road alternative of routing has been considered, but is not preferred. The Forest Road Alternative would originate in the same dock area and would

(iv) Alternative Power Plant Locations

Initially, the Applicant reviewed previous plans to determine what was previously studied. All previous federal and state agency plans called for a tidewater powerhouse. Unfortunately, these tidewater power plant locations would either impair or materially destroy the natural runs of salmon and would negatively impact the recreational and personal use sockeye fishery. For these reasons, the previous suggested power plant locations were ruled out by the Applicant as unacceptable.

The terrain is rocky, uneven, steep and difficult alongside Sweetheart Creek and it is understandable that previous studies desired to avoid the additional engineering design and construction necessary to place the powerhouse upstream where the hydroelectric project would have little or no impact on anadromous species.

The Applicant selected an area on the north side of Sweetheart Creek where a tailrace could re-enter water below the barrier falls of Sweetheart Creek. Several engineering reconnaissance trips were conducted in the area at different times of the year. In 2012, the Applicant had the entire area surveyed. Based on the survey and overlaid with Lidar, a power plant location was selected in this difficult terrain.

The selected power plant location was subsequently chosen because; 1) it minimizes potential impacts to Sweetheart Creek by discharging back into Sweetheart Creek just below the barrier falls of the anadromous reach. 2) This location allows partial screening of the power plant by existing forest and hidden by strategic placement of mounds to minimize aesthetic disturbance 3) the location allows the power plant to be partially buried in order to minimize acoustic disturbance. 4) This location provides an opportunity to for the Project to expand the natural spawning habitat by employing a natural tailrace that will extend the spawning reach of anadromous species.

(v) Alternative Transmission Line Types and Alignments

There are two transmission line alternatives from the power plant location to a marine terminal/dock area located at Gilbert Bay. These alternatives will be discussed first before exploring the transmission line interconnection alternatives from Gilbert Bay to the connection at the Snettisham transmission line.

Topography between the Sweetheart Creek powerhouse and extending to the Gilbert Bay marine terminal/dock area is rocky and forested on the upland and has lower elevation forest and rock beach fringe at the lower elevations along the shoreline. The Applicant first explored and surveyed a forest road alternative because it was thought that this would intuitively be the preferred environmental alternative. This road would travel from the powerhouse area and head north and then traverse down a steep slope to the marine facility and dock. This alternative road would have an overhead transmission line that due the dense forest would require a right of way timber clearance of 200 feet. The opening of the forest area would impact the current habitats and would need large cut and fills in order to lay a road sufficient to move equipment and turbines. In addition, many culverts would be required and future washouts from gullies would require diligent maintenance.
This alternative would require a large scar on the aesthetic appearance on the eastern shore of Gilbert Bay of a similar terrain scarred nature that is current with the Snettisham transmission line. Due to the aesthetic scarring effect of this road/transmission alternative and upon consultation with the Applicants environmental engineers, another alternative was developed that would have less impact on the environment.

The Applicant has developed a Coastal Road alternative that would require less invasiveness of the environment in that it is shorter in length and would require less cutting into the hillsides. The coastal road would emplace a more expensive buried transmission line that would serve to eliminate avian impacts from eagles, coastal birds, and seasonal waterfowl. Over the 50 year life of the project, the buried transmission line would not only eliminate aesthetic disturbance but it will virtually eliminate any chance of an avian strike. The Applicant has designed the road with a reverse slope and will place rock in a strategic manner that will mask and mitigate much of the aesthetic impact of the coastal road alternative. For these reasons, the Applicant selected the Coastal Road Alternative with a buried transmission line.

(vi) Gilbert Bay to Snettisham Interconnection Transmission Line Alternatives.

The Applicant considered two alternatives from the marine facility/dock at Gilbert Bay to a Snettisham transmission line interconnection just north of Mist Island on the northern shore of Port Snettisham.

The Applicant’s 2012 survey with personal use fishermen indicated that the large response of survey respondents were equally divided on an all submarine cable versus a combination submarine overland cable.

The Applicant conducted an analysis and gave an in depth consideration to routing a 100% submarine transmission line, but abandoned that idea due to the likely interference with longline and crab fishermen who harvest thousands of pounds of fishery resource with gear that uses anchors. The socio economic impact on commercial fishermen over the life of the project was weighed in the transmission routing considerations as over 40,000 lbs of commercial harvest occurs in Gilbert Bay annually. It was determined that there could be a high likelihood of gear/anchor interaction with a 100% submarine transmission cable would not only economically impact the fishermen with potential lost gear but that lost gear would continue to ghost fish and not be environmentally friendly. Another factor was that longline gear and anchors interactions and potential snagging on the cable could lessen the longevity and useful life of the marine transmission cable.

The Applicant has selected the combination overland submarine cable for several reasons. 1) The personal use fishermen survey was equally divided so there was no clear preference. 2) The west shore of Gilbert Bay is a Timber Harvest Land Use Designation, the least restrictive LUD for timber harvest, road building and emplacing Transportation and Utility Systems (TUS) LUD. Therefore a Transmission and Utility System corridor is consistent with this land use designation. 3) This alternative lessens the socio impact on commercial fish harvesters who use Gilbert Bay on a large commercial basis. The impact of these fishermen and on the harvestable fishery resources for the life of the project is an
important economic consideration. 4) Lost gear and entangled gear on an all submarine cable could ghost fish but lost longline gear is known to tangle with humpback whales, an endangered species that frequents Gilbert Bay.

Construction of a conventional overhead/submarine cable transmission line was judged to be preferable over an all submarine cable. The routing of the submarine portions of the overland/submarine transmission alternative was strategically analyzed to avoid crab and shrimp producing and productive harvesting areas.

The proposed project terminates the primary transmission line at the existing Snettisham Transmission line at the proposed Sweetheart/Snettisham interconnection point just east of Mist Island on the north side of the Snettisham entrance.

An alternative was considered that would have the routing cross the eastern shore of Gilbert Bay then traverse to cross the Whiting River and then cut across the Port
Snettisham to interconnect with the Snettisham Power line. However this alignment would be longer and the terrain is steeper and therefore would be more costly. Therefore the alternative was abandoned.

PROPOSED OPERATION

(vii) Operation Mode

The project will normally operate under automatic control, with manual control as a selectable option.

(viii) Annual Plant Factor

The estimated plant factor is 64% (annual generation of 111 GWh and an installed capacity of 19.8 MW).

(ix) Operation During Adverse, Mean, and High Water Years

The project will be operated to provide firm power according to a schedule determined by the power offtakers and in accordance with the water release agreements. For the purposes of this application, the Applicant has assumed a delivery schedule to maximize revenue from power sales to serve a steady commercial load with excess generation to be called upon by the utility receiving power. This schedule assumes steady operation during all months and allowing the reservoir to fill from spring/summer run off. The Applicant’s modeling of the project operation has determined the delivery schedule shown in Table B-1 maximizes the delivery of firm power and is robust during adverse water years.

Table B-1 Assumed Dependable Capacity MW
During adverse water years, the Project will be able to generate little more than the firm energy schedule during the winter, and the reservoir will be drawn down to near minimum levels by late April or early May. The reservoir will refill during the summer and fall, and any surplus water will be released for non-firm generation at a rate to maximize efficiency and revenue.

During mean water years, there may be somewhat more water available during the winter months than in adverse years. Nevertheless, the Project will be operated to provide only the required firm power delivery, and the reservoir will not draw down as far as in adverse water years. Once the reservoir refills in the summer, there will be more water available for non-firm generation. There may be some brief periods during the summer when the inflows are so high that additional water must be released through the spillway or the outlet works.

During high water years, the operation will be similar to that during mean water years, except there will be longer periods of non-firm generation and spill.

Figure B-4 shows reservoir levels during typical adverse, mean, and high water conditions. The numerical modeling of the reservoir included ten continuous years, and the level of reservoir during one year is affected by the water conditions of the previous year. Therefore the lowest reservoir levels are not necessarily during the driest years, nor are the highest levels during high water years. The highest and lowest conditions for the reservoir are shown.

(1) Firm capacity is based on the year (1922) with the lowest annual power production during the ten-year simulation discussed in section (3), ESTIMATED GENERATION.

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<tr>
<td>October</td>
<td>12.4</td>
</tr>
<tr>
<td>November</td>
<td>12</td>
</tr>
<tr>
<td>December</td>
<td>12</td>
</tr>
</tbody>
</table>

(1) Firm capacity is based on the year (1922) with the lowest annual power production during the ten-year simulation discussed in section (3), ESTIMATED GENERATION.
ESTIMATED GENERATION

(i) Energy Production

The firm power production is estimated to be 106 GWh/year and the average annual generation is estimated to be 111 GWh/year. Monthly dependable capacities are the values shown in Table B-1. These energy production values have been determined by numerical simulation of ten years of continuous hydrologic record from calendar years 1921-1930 and reservoir and turbine operation. This period of record has the desirable characteristics of having the same mean annual flow as the entire period of record and contains both the driest and second wettest years on record. Firm power and monthly dependable capacities are based on the year (1922) with the lowest annual power production during the ten-year simulation. The components of the simulation and project operation are discussed below.

(ii) Hydrology

In 2011, the Applicant contracted with Civil Science Inc. to establish and maintain a stream and lake gage for the Project. The stream gage was installed at Sweetheart Creek at the same location, just below the barrier falls, as the USGS gage operated between 1915 through 1927 (Gage 15030000). The Applicant conducted extensive research to find original USGS records in order to install the stream gage at the exact site of the gage that operated in early of the last century. The newly installed gages began recording on September 26, 2011. A second gage was added at the potential dam site (i.e. at the outlet

<table>
<thead>
<tr>
<th>Month</th>
<th>Recorded Flows, cfs (1)</th>
<th>Extended Flows, cfs (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>Mean</td>
</tr>
<tr>
<td>January</td>
<td>17</td>
<td>136</td>
</tr>
<tr>
<td>February</td>
<td>17</td>
<td>67</td>
</tr>
<tr>
<td>March</td>
<td>24</td>
<td>74</td>
</tr>
<tr>
<td>April</td>
<td>27</td>
<td>146</td>
</tr>
<tr>
<td>May</td>
<td>99</td>
<td>389</td>
</tr>
<tr>
<td>June</td>
<td>291</td>
<td>636</td>
</tr>
<tr>
<td>July</td>
<td>257</td>
<td>525</td>
</tr>
<tr>
<td>August</td>
<td>149</td>
<td>468</td>
</tr>
<tr>
<td>September</td>
<td>76</td>
<td>517</td>
</tr>
<tr>
<td>October</td>
<td>103</td>
<td>426</td>
</tr>
<tr>
<td>November</td>
<td>33</td>
<td>276</td>
</tr>
<tr>
<td>December</td>
<td>26</td>
<td>178</td>
</tr>
<tr>
<td>Annual</td>
<td>17</td>
<td>324</td>
</tr>
</tbody>
</table>
at Sweetheart Lake). By using the two gages it was determined that approximately 3% of
the flow at the lower gage is due to accretion in Sweetheart Creek.

The data from the USGS gage at Sweetheart Creek is classified as “Excellent”. The data
was adjusted to represent the site of the hydropower intake as discussed above. After
adjustment, the average annual flow was 324 cfs. However the approximately 11 years of
record was insufficient to design the hydropower system.

Civil Science Inc. developed an extended flow record based on data from the USGS gage
at Long River (15034000). The USGS extended the record of Sweetheart Creek by
estimating the runoff in the 1917-18, 1928-32 and 1940-56 water years from records of
the Long River near Juneau and relationships between monthly runoff of Sweetheart
Creek.

The correlation was used to create synthetic data for 1927-1932 and 1952-1968, and for
the gap in the Sweetheart Creek data between 1917-1918. The synthetic record, combined
with the original USGS data and data from the new flow gages, yielded approximately 36
years of flow data, including two 17 year periods of continuous record. The final
extended record showed an average annual flow of 332 cfs. Minimum, mean, and
maximum average daily flows for the extended record are shown in Figure B-2.

An allowance of 3 cfs was made for 1) evaporation, assumed to be minimal because the
area around Sweetheart Creek is cool and wet and 2) seepage through the dam. These
allowances may be refined as the project progresses to final design.

No fish with commercial or recreational value utilize the Sweetheart Creek in the reach
between the proposed dam site and the barrier falls. Therefore, the Applicant does not
propose to release instream flows from the dam, and the numerical modeling of the
project operation does not include any adjustment for instream flows. The Applicant
believes the environmental impact of eliminating flows in the reach will be De Minimis.
Even so, seepage from the dam and natural accretion in the reach will provide some water
for smaller creatures.

Monthly dependable capacities are based modeling of the continuous period of record
from 1921-1930. This period has the same average annual flow as the entire extended
record and includes the driest year on record.

(ii) Reservoir Characteristics

Capacity and area curves for the reservoir are shown in Figures B-3a and B-3b. As
described above, the project will not be operated on a rule curve, but rather on a firm
energy delivery schedule. Therefore, a rule curve is not provided. The planned reservoir

\footnote{USGS Water Supply Paper 1529 page 49}
operation will draw down the water level a maximum of 60ft from the dam spillway. Figure B-4 shows reservoir elevations during mean, adverse and high water conditions.

(iii) Turbine and Generator Characteristics

Francis turbines are proposed to maximize efficiency of the plant. Three turbines are proposed to maximize efficiency, flexibility and dependability of the system. Each turbine is rated for 162 cfs and 557 ft of net head. The 60 ft fluctuation of the reservoir (+- approximately 5% of net head) is well within the acceptable operating limits of the turbine. Peak turbine efficiency is 93.0%, and the generator efficiency is >95%. The turbine-generator characteristics are based on a quote from a reputable turbine manufacturer dated August 2012. During normal operation, two turbines will operate at near peak efficiency (300-325 cfs total). The third turbine will be used to pass additional water during wet summers. Any one of the turbines can be serviced without affecting normal operation, minimizing downtime. Figure B-6 shows the plant capability vs. head.

(iv) Tailwater Rating Curve

<table>
<thead>
<tr>
<th>Elevation (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>0</td>
</tr>
<tr>
<td>46.5</td>
<td>200</td>
</tr>
<tr>
<td>46.7</td>
<td>250</td>
</tr>
<tr>
<td>47</td>
<td>300</td>
</tr>
<tr>
<td>47.2</td>
<td>350</td>
</tr>
<tr>
<td>47.4</td>
<td>400</td>
</tr>
<tr>
<td>47.6</td>
<td>450</td>
</tr>
<tr>
<td>47.8</td>
<td>500</td>
</tr>
</tbody>
</table>

Figure B-5 tailwater rating curve.

(v) Power Plant Capability

Each turbine-generator unit is rated at 6.6MW. The three turbines have a total rated capacity of 19.8MW. The turbines will operate with up to 10% service factor. Any combination of the three turbines may be used. The actual output of the turbines will depend on the flow available to the turbines and the elevation of the reservoir and the tailwater.

(4) GENERATION UTILIZATION

(i) Power Needs

The project will be interconnected with the federally owned Snettisham Transmission line (managed and operated by Alaska Electric Light & Power). Theoretically, generation could be utilized by AELP or any customer outside their certificated service area. Currently, the Kensington Mine located within the City and Borough of Juneau (CBJ) is not connected to the Juneau grid system and is outside the AEL&P service area. The CBJ Comprehensive Plan and the CBJ Climate Action Plan call for connecting industrial loads currently serviced by diesel electrical generation to renewable
hydropower generation. The Kensington Mine alone represents 60,000,000 kWh annually.

In past years, the Hecla Greens Creek mine has been disconnected and not served power since they are on an interruptible power sales contract. When water levels are low in the AELP hydropower portfolio, or when demand from firm rate customers is high, this industrial load is cut off of supply and must operate on more expensive diesel electric generation.

In addition, the City and Borough Juneau is researching the viability of reopening the Alaska Juneau (AJ) Gold Mine which is owned 66 2/3% by the CBJ and is 33 1/3% owned by AJT properties a subsidiary of the same company that owns AEL&P. A CBJ 2011 condition place in the memorandum of agreement calls for the operations of the AJ Mine to be on renewable energy. The expected life of the AJ mine based on previous and extensive studies is 30 to 50 years.

In addition 2/3 of the visiting cruise ships are not connected to shore electricity although this interconnection is planned once there is capacity to deliver electricity to them. Juneau, Alaska has up to 1 million tourists visiting annually. Each underserved cruise ship can take between 6 to 8 MW of power for the period that they are tied to the Juneau dock system. A further consideration is that the cruise ship industry must shift from high sulfur fuel sources to more expensive low sulfur fuel sources to meet international treaty and environmental protection agency air quality standards. The underserved seasonal electrical demand for the cruise ship industry could be served by the Sweetheart Lake Hydroelectric Project.

A more immediate and direct power need is the local phenomena of ratepayers switching from more expensive diesel heating fuel for space heating needs to electric heat.

(ii) Power Sales

The Applicant expects to sell all of the project generation to the certificated Juneau utility for demand within their service area and to sell directly by contract to industrial demand customers outside the certificated boundary of the Juneau utility. Juneau is not interconnected to any other utility system at this time and it is not likely to be interconnected for the foreseeable future. Energy use on-site will be insignificant.

(5) PLANS FOR FUTURE DEVELOPMENTS

The Applicant does not plan any future development in the Sweetheart Lake basin.
Fig. B-1: Mean, Minimum and Maximum Average Daily Flows for the Extended Sweetheart Lake Outlet Record
Fig. B-2: Flow Duration Curve, Sweetheart Lake Outlet
Extended flow record based on approximately 36 years of data
Fig. B-3a: Sweetheart Lake Capacity (above existing lake level el. 551)
Fig. B-4: Reservoir Level During Adverse, Mean and High Water Conditions

Reservoir Elevation (ft.)

- Adverse
- Mean (19)
- High (19)
Fig. B-6: Power Plant Capability vs. Head

Net Head (ft)

Power Plant Output (kW)

- 1 Unit Operating
- 2 Units Operating
- 3 Units Operating

El. 637
El. 617
El. 697
El. 577

0 5,000 10,000 15,000 20,000
Exhibit C is presented herein and addresses the FERC regulation 18 CFR 4.41 (d).

Exhibit C is a proposed construction schedule for the project. The information required may be supplemented with a bar chart. The construction schedule must contain:

4.41(d)(1) The proposed commencement and completion dates of any new construction, modification, or repair of major project works;

(1) COMMENCEMENT AND COMPLETION DATES

A preliminary construction schedule is shown in Figure C-1, based on the following assumptions:

- License issued in mid-2013, with commencement of construction to be followed upon license issuance and final design with completion of construction by early 2016. Access road, and tunnel mobilization, late 2013/early 2014.
- Construction financing required by late 2013 before mid-2014 and completion of construction required before mid-2016.
- License does not include articles that make the project infeasible.
- Final design initiated soon after the license issued.

Based on these assumptions, the Applicant expects that construction would start in late 2013, early 2014 and construction could be completed by late 2015.

The critical path construction tasks are:

- Access road to the powerhouse site, tunnel portal
- Diversion tunnel, including inlet structure
- Main dam
- Installation of equipment in the intake structure
- Installation of salmon smolt intake
- Reservoir filling to minimum pool
- Start-up and testing of generation and control equipment

The damsite mobilization will be supported by moving equipment and material through portal with larger items transported in pieces by helicopter. Fall 2013 Gilbert Bay ramp construction in order to expedite the access road construction.

4.41(d)(2) The proposed commencement date of first commercial operation of each new major facility and generating unit; and

(2) COMMENCEMENT OF COMMERCIAL OPERATION

Based on the schedule described above, the Applicant expects that full commercial operation of the Project would be in 2016. The generation and control systems are expected to be installed by late 2015, and sufficient water can be stored prior to the spring runoff to allow testing.
Reservoir filling will take up to 6 months depending on timing of completion. It is expected that all generating units will become operational at the same time.

4.41(d)(3) If any portion of the proposed project consists of previously constructed, unlicensed water power structures or facilities, a chronology of original completion dates of those structures or facilities specifying dates (approximate dates must be identified as such) of:
(i) Commencement and completion of construction or installation;
(ii) Commencement of first commercial operation; and
(iii) Any additions or modifications other than routine maintenance.

(3) EXISTING STRUCTURES AND FACILITIES

There are no existing structures and facilities at the site.

Figure C-1 Design and Construction Schedule

<table>
<thead>
<tr>
<th>SWEETHEART LAKE HYDROELECTRIC PROJECT</th>
<th>DESIGN AND CONSTRUCTION SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>J  A  S  O  N  D</td>
</tr>
<tr>
<td>Final Design and Permitting</td>
<td></td>
</tr>
<tr>
<td>Environmental Studies</td>
<td></td>
</tr>
<tr>
<td>Geotechnical Investigations</td>
<td></td>
</tr>
<tr>
<td>Permit Application Preparation</td>
<td></td>
</tr>
<tr>
<td>Permit Application Processing</td>
<td></td>
</tr>
<tr>
<td>Final Design by Infrastructure component</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td>J  F  M  A  M  J  J  A  S  O  N  D</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>Construction Management</td>
<td></td>
</tr>
<tr>
<td>Mobilization</td>
<td></td>
</tr>
<tr>
<td>Marine Ramp</td>
<td></td>
</tr>
<tr>
<td>Access Road</td>
<td></td>
</tr>
<tr>
<td>Tunnel Portal</td>
<td></td>
</tr>
<tr>
<td>Tunnel Boring and Tunnel Construction</td>
<td></td>
</tr>
<tr>
<td>Conveyor Construction, RCC Batch Plant</td>
<td></td>
</tr>
<tr>
<td>Diversion Structure Equip. &amp; Mat.</td>
<td></td>
</tr>
<tr>
<td>Diversion Structure Installation</td>
<td></td>
</tr>
<tr>
<td>Cofferdam Construction</td>
<td></td>
</tr>
<tr>
<td>Clearing and Excavation of Dam Footprint</td>
<td></td>
</tr>
<tr>
<td>Rock Foundation</td>
<td></td>
</tr>
<tr>
<td>RCC Production GERRC Face</td>
<td></td>
</tr>
<tr>
<td>Foundation Grouting from Top of Dam</td>
<td></td>
</tr>
<tr>
<td>Concrete Spillway Cap</td>
<td></td>
</tr>
<tr>
<td>Clearing Reservoir</td>
<td></td>
</tr>
<tr>
<td>Generating Equipment Procurement</td>
<td></td>
</tr>
<tr>
<td>Grouting, gate structure in Diversion Tunnel</td>
<td></td>
</tr>
<tr>
<td>Piping to extend tunnel in Lake</td>
<td></td>
</tr>
<tr>
<td>Powerhouse Fabrications</td>
<td></td>
</tr>
<tr>
<td>Powerhouse Construction</td>
<td></td>
</tr>
<tr>
<td>Transmission Line Construction</td>
<td></td>
</tr>
<tr>
<td>Testing and Start-Up</td>
<td></td>
</tr>
</tbody>
</table>

LEGEND:
- Continuous activity
- Intermittent activity
Exhibit D is presented herein and addresses the FERC regulation 18 CFR 4.41 (e).

Exhibit D is a statement of project costs and financing
4.41(e)(1) A statement of estimated costs of any new construction, modification, or repair, including:
(i) The cost of any land or water rights necessary to the development;
(ii) The total cost of all major project works;
(iii) Indirect construction costs such as costs of construction equipment, camps, and commissaries;
(iv) Interest during construction; and
(v) Overhead, construction, legal expenses, and contingencies;

(1) COSTS OF NEW CONSTRUCTION

(i) Cost of Land and Water Rights

The Project will occupy lands of the United States managed by the United States Forest Service (USFS) in the Tongass National Forest and occupy tidelands of the State of Alaska managed the Alaska Department of Natural Resources (ADNR). The Applicant does not expect any capital costs associated with the Federal and State lands. The Applicant has applied for Water Rights with the Alaska Department of Natural Resources and has paid the $900 application fee. The marine facilities and the coastal road will require a tidelands lease from the Alaska Department of Natural Resources (ADNR).

(ii) Cost of Major Project Works

The construction cost estimate for the Project is summarized in Table D-1. The total direct construction cost is estimated at $134,873,193 (2013 bid level, 2016 on-line), which includes a contingency allowance of 30%. These costs were compiled in August 2012.

The construction cost has been determined by applying unit costs to construction quantities from specialized engineers and contractors experienced in their respective discipline and specialized area of construction. For example, road and dock costs were developed from a road and marine construction contractor; transmission line costs were developed from an experienced transmission line design and construction firm. Each component of infrastructure has a derived cost from an experienced and specialized engineering and construction contractor that, in theory, should provide for the most accurate cost for each component.

The construction quantities have been calculated from the preliminary layout of the project structures as shown in Exhibit F, and the unit costs have been determined from published data, preliminary equipment and materials quotations, and the Applicant’s contractors experience with construction of construction, tunnel, transmission and hydropower projects in Southeast Alaska.

Escalation of prices has been assumed at 3.0% per year from 2012 to the estimated midpoint of the construction period (2 years of escalation). Applicant expects the rate to
remain the same for the next few years. The total direct construction cost for the expected 2016 on-line date is estimated to be $134,873,193.

(iii) Indirect Construction Costs

Indirect construction costs are estimated to be 10% of the direct construction costs, including:

- Licensing and permitting .....................1.0% of direct construction cost
- Design engineering .............................4.5% of direct construction cost
- Construction management ....................4.0% of direct construction cost
- Administrative and legal costs ..........0.5% of direct construction cost

For planning purposes, the total indirect cost was estimated at 10% of the direct construction costs: $13,487,319

(iv) Interest During Construction

Interest during construction is estimated to be 5.0% of the direct construction cost, based on a preliminary cash flow projection for a 2 year construction period and an interest rate of 5.0%. The sum of the direct construction costs, indirect construction costs, and interest during construction is termed the total investment cost, and amounts to $163,196,564.

(v) Other Costs

Additional capital costs are estimated as follows:

- Financing costs.................................1.5% of total investment cost
- Reserve Fund .....................................one year of debt service

The reserve fund is assumed to be a financing requirement, but the applicant will seek less funds to be set aside in a Reserve Fund. Interest earned on the reserve fund is estimated at 2% per year.

The sum of the total investment cost, financing costs, and Reserve Fund is termed the total capital requirement, and amounts to $174,054,513

4.41(e)(2) If any portion of the proposed project consists of previously constructed, unlicensed water power structures or facilities, a statement of the original cost of those structures or facilities specifying for each, to the extent possible, the actual or approximate total costs (approximate costs must be identified as such) of:

(2) ORIGINAL COST OF EXISTING STRUCTURES AND FACILITIES

Not applicable, as there are no existing structures or facilities.

4.41(e)(3) If the applicant is a licensee applying for a new license, and is not a municipality or a state, an estimate of the amount which would be payable if the project were to be taken over pursuant to section 14 of the Federal Power Act, 16 U.S.C. 807, upon expiration of the license in effect including: ...

(3) AMOUNT PAYABLE PURSUANT TO FPA SECTION 14
The Applicant is applying for an original license, not a new license. Therefore, an estimate of the amount payable if the Project were taken over pursuant to Section 14 of the Federal Power Act is not applicable.

(i) Cost of capital (equity and debt);
(ii) Local, state, and Federal taxes;
(iii) Depreciation or amortization,
(iv) Operation and maintenance expenses, including interim replacements, insurance, administrative and general expenses, and contingencies; and(v) The estimated capital cost and estimated annual operation and maintenance expense of each proposed environmental measure;

(4) AVERAGE ANNUAL PROJECT COSTS

(i) Cost of Capital

There are no instruments in place yet for financing the construction cost, nor can there be until after the license is issued, delivered cost of power finalized, and a power sales agreement is in place. Therefore, the calculation of the cost of capital must be based on assumptions regarding the financing terms. For the purposes of this application, the financing has been assumed to 80% by debt with an interest rate of 5.0% and a term of 30 years. The applicant will pursue the Alaska Industrial Development and Export Agency (AIDEA) renewable energy loan and loan guarantee program which the Applicant would be eligible for. The term under this program for hydroelectric projects is 50 years but it is unclear at this time if the program interest will be competitive or advantageous in reducing the cost of delivered power from the Project.

The Applicant will prepare a detailed plan of finance for review and approval by the Commission prior to the start of construction.

(ii) Taxes and Fees

Based on current policies, the Applicant expects the taxes and fees to be incurred directly by the Project are ADNR water rights and submerged land fees and FERC annual charges. For this application, the total of these fees plus any others has been assumed as 0.2% of the total investment cost, or $326,392,000/yr.

Federal taxes would depend on variables such as the finalized financing costs, depreciation schedules and therefore cannot be determined at this time. As a State of Alaska registered corporation, the Applicant would be expected to pay the appropriate state and federal income tax. Depending on variables that impact taxable income from the project the estimated annual tax payment would be between $500,000 and $1,500,000.

(iii) Depreciation and Amortization

Depreciation and amortization rates are applied on a straight line basis. The industry average annual depreciation rate applied to hydroelectric facilities is 2.00% which equates to a 50 year life of the facilities. The annual depreciation expense is estimated at $3,263,931. Taxable depreciation may be calculated with an accelerated rate.

(iv) Operation and Maintenance
Annual operating costs are estimated to be as follows (2020 cost level):

- $444,000 operations and maintenance cost (labor and expenses)
- Administrative and general costs equal to 30% of the O&M cost
- Insurance cost equal to 0.1% of the total investment cost
- Interim replacements cost of $300,000/year.
- Earnings on reserve fund of 2% per year.

Based on these assumptions, the first-year cost of power at a 2016 cost level is estimated to be as follows:

Debt service .............................................$8,410,000
Taxes and fees ...........................................$326,392
Operating costs .......................................$3,071,000
Earnings on reserve fund .............................$168,200
Total annual cost ....................................$11,974,592

(v) The estimated capital cost for environmental measures and the estimated annual operation and maintenance expense of each proposed environmental measure;

The estimated capital cost and estimated annual operation and maintenance expense of each proposed environmental measure is listed in Table D–1 and Table D–2 respectively.
### Table D-1
Estimated Additional Capital Cost for each proposed Environmental Measure

<table>
<thead>
<tr>
<th>Measure</th>
<th>Component of Measure</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>Buried Powerhouse- Additional Cost of Capital over traditional powerhouse</td>
<td>$2,000,000.00</td>
</tr>
<tr>
<td></td>
<td>Buried Powerhouse for natural aesthetics to blend with environment</td>
<td></td>
</tr>
<tr>
<td>Buried Transmission line Coastal Road Powerhouse to Dock</td>
<td>Buried Transmission to improve aesthetics and eliminate avian interference</td>
<td>$780,000.00</td>
</tr>
<tr>
<td>Sockeye Salmon Smolt Intake and Transport system</td>
<td>Improve aesthetics by replacing smolt line with smolt tank transport; Improving fisheries</td>
<td>$2,000,000.00</td>
</tr>
<tr>
<td>Natural Tailrace from powerhouse to creek</td>
<td>Improve aesthetics and improve spawning habitat</td>
<td>$1,000,000.00</td>
</tr>
<tr>
<td>Submarine Cable Gilbert Bay</td>
<td>Improve aesthetics</td>
<td>$2,000,000.00</td>
</tr>
<tr>
<td>Buried Pennstock Additional Cost of capital</td>
<td>Improve aesthetics</td>
<td>$400,000.00</td>
</tr>
<tr>
<td>Avian APLIC protocol BMP Transmission Lines</td>
<td>reduce and eliminate avian interference</td>
<td>$1,000,000.00</td>
</tr>
<tr>
<td>Total Additional Capital Requirements for Environmental Infrastructure Measures</td>
<td></td>
<td>$9,180,000.00</td>
</tr>
<tr>
<td>Environmental Compliance</td>
<td>Monitor (ECM)</td>
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<tr>
<td>Geology &amp; Soils</td>
<td>Best Management Practices (BMP’s)</td>
<td>$200,000</td>
</tr>
<tr>
<td></td>
<td>Maintenance of slope stability and prevention of severe erosion</td>
<td></td>
</tr>
<tr>
<td>Erosion and Sediment Control Plan (ESCP)</td>
<td>Protection during construction and implementation of postconstruction ground restoration efforts to stabilize disturbed areas and prevent future erosion</td>
<td>$200,000</td>
</tr>
<tr>
<td>Hazardous Materials Containment/Fuel Storage Plan</td>
<td>Project/Contractor Requirement</td>
<td>$25,000</td>
</tr>
<tr>
<td>Spill Prevention, Control and Containment Plan (SPCCP)</td>
<td>Project/Contractor Requirement</td>
<td>$25,000</td>
</tr>
<tr>
<td>Restoration of temporary access route, disturbed areas</td>
<td>Project elements of concern: temporary construction access route</td>
<td>$200,000</td>
</tr>
<tr>
<td>Water Use and Quality</td>
<td>Stream Gauging</td>
<td>$200,000</td>
</tr>
<tr>
<td></td>
<td>Install and Maintain permanent stream gauges, collect and analyze data</td>
<td></td>
</tr>
<tr>
<td>Weather Station Rain Gauge</td>
<td>Install and Maintain permanent weather station and rain gauges; collect and analyze data</td>
<td>$50,000</td>
</tr>
<tr>
<td>Aquatics</td>
<td>Monitoring equipment for Smolt intake</td>
<td>$25,000</td>
</tr>
<tr>
<td></td>
<td>Install and maintain permanent monitoring equipment to collect and analyze data</td>
<td></td>
</tr>
<tr>
<td>Terrestrial-Vegetation, Wetlands, Habitat</td>
<td>Vegetation Management Plan (VMP)</td>
<td>$20,000</td>
</tr>
<tr>
<td></td>
<td>Restoration of any disturbed areas, weed/invasive species management</td>
<td></td>
</tr>
<tr>
<td>Wetland Mitigation Measures</td>
<td>Creation, restoration, and perhaps payments in lieu of mitigation</td>
<td>$200,000</td>
</tr>
<tr>
<td>Recreation</td>
<td>Recreation Management Plan</td>
<td>$40,000</td>
</tr>
<tr>
<td></td>
<td>Signage, maintain road and trail</td>
<td></td>
</tr>
<tr>
<td>Total Additional Capital Requirements for Environmental Measures</td>
<td></td>
<td>$1,197,000.00</td>
</tr>
</tbody>
</table>
Table D-2
Estimated Annual Operation and Maintenance Expense of Proposed Environmental Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Components of Measure</th>
<th>Annual Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Compliance Report</td>
<td>Yearly report summarizing compliance with PM&amp;E measures</td>
<td>TBD</td>
</tr>
<tr>
<td>Geology and Soil Sedimentation</td>
<td>Developed for Construction, will continue through O&amp;M</td>
<td>TBD</td>
</tr>
<tr>
<td>Hazardous Materials Containment/Fuel Storage Plan</td>
<td>Developed for Construction, will continue through O&amp;M</td>
<td>TBD</td>
</tr>
<tr>
<td>Spill Prevention, Control and Containment Plan (SPCCP)</td>
<td>Developed for Construction, will continue through O&amp;M</td>
<td>TBD</td>
</tr>
<tr>
<td>Stream Gauging</td>
<td>Install and Maintain permanent stream gauges, collect and analyze data</td>
<td>TBD</td>
</tr>
<tr>
<td>Section 404/ Section 401</td>
<td>Application and compliance: 404 Permit and 401 Certificate of Reasonable Assurance</td>
<td>TBD</td>
</tr>
<tr>
<td>HazMat Plan Measures</td>
<td>Developed for Construction, will continue through O&amp;M</td>
<td>TBD</td>
</tr>
<tr>
<td>Water Right Measures</td>
<td>Water Right compliance</td>
<td>TBD</td>
</tr>
<tr>
<td>Minimum Instream Flows</td>
<td>Develop and implement instream flow measurements</td>
<td>TBD</td>
</tr>
<tr>
<td>Ramping rates</td>
<td>Develop and implement ramping rates to safeguard effect on aquatics</td>
<td>TBD</td>
</tr>
<tr>
<td>Vegetation Management Plan</td>
<td>Restoration of disturbed areas, weed/invasive species management</td>
<td>TBD</td>
</tr>
<tr>
<td>Waste Management Plan</td>
<td>Contractor requirements: waste management to reduce bear-human interactions</td>
<td>TBD</td>
</tr>
<tr>
<td>Recreation Management Plan</td>
<td>signage, recreation restriction to switchyard, maintain road/trail</td>
<td>TBD</td>
</tr>
</tbody>
</table>

.41(e)(5) A statement of the estimated annual value of project power based on a showing of the contract price for sale of power or the estimated average annual cost of obtaining an equivalent amount of power (capacity and energy) from the lowest cost alternative source of power, specifying any projected changes in the costs (life-cycle costs) of power from that source over the estimated financing or licensing period if the applicant takes such changes into account;

(5) VALUE OF PROJECT POWER

Power generated by the Sweetheart Lake Hydroelectric Project will be sold to a utility within the service area of Juneau or to customers outside the service area of Juneau. The proposed addition of the Sweetheart Lake Hydroelectric Project provides additional capacity and flexibility in Juneau utility system operations. Under certain circumstances, the Juneau utility would be able to maintain a higher lake level at some of their hydropower storage facilities with available flow from the Project.

The Applicant expects to enter into a power purchase agreement with an area utility or large end user customer for the long-term sale of the power generation, but it would be premature to begin
negotiations before receipt of the FERC license, since the license provisions can significantly affect the marketability of the power.

Within the current system load, the Juneau utility could utilize the Project capacity during low and average water years. The Applicant is expected to generate 111 GWh/year of clean renewable hydropower from the Sweetheart Lake Hydroelectric Project with an approximate avoidance of 7,929,500 gallons of diesel fuel currently used by mines, docking cruise ships, and home heating space demand.

At the current cost of diesel home heating fuel ($4.06)\(^1\) the annual expenditures are projected to be $32,193,770 in of offsetting diesel fuel with lower cost and cleaner electricity. The savings to the Juneau business and residential community are significant.

<table>
<thead>
<tr>
<th>Project Utilization</th>
<th>Avoided Diesel</th>
<th>Diesel Cost</th>
<th>Annual Diesel Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>GWh/Year</td>
<td>Gallons/Year</td>
<td>Gallon</td>
<td></td>
</tr>
<tr>
<td>Sweetheart System Load</td>
<td>111</td>
<td>7,929,500</td>
<td>$4.06</td>
</tr>
</tbody>
</table>

In addition to the savings in direct fuel costs associated with the burning diesel to generate electricity, the Juneau community would receive benefits associated with reduced costs and environmental effects associated with fuel handling and storage; and, positive aesthetics and health benefits resulting from reduced emissions associated with burning diesel.

Estimated Revenue

The Applicant has estimated the revenue from the sale of project power based on the following assumptions:

- The bulk of the output (90 GWh annually) would be sold into the Juneau electrical market to meet current and future residential and industrial demand on a firm basis.
- The balance of power can be used to seasonally supply the 2/3 of cruise ships not currently connected to shore power in the summer and to assist AEL&P offset diesel generation during winter months in low and average water years.

The Applicant has modeled the project operation and generation for a 36 year period of streamflows, including two 17 year periods of continuous record as described in Exhibit B of this application. The calculated generation and revenue for the first year of operation are as follows (2016 cost level).

\(^1\) Alaska Department of Commerce Current Community Conditions Alaska Fuel Price Reports July 2012
Based on the estimated power sales revenue and annual costs described above, the first year net annual benefit will be $3,546,000 (2016 cost level). The revenue will increase with time as the power sales rate escalates, but the annual costs will increase at a slower rate since most of the cost is fixed debt service. To account for this and to provide a more complete measure of the project benefits, the Applicant has calculated a levelized net annual benefit according to the following assumptions:

- 2016 first full year of operation
- The assumed non-firm energy price of $67/MWh escalates at 3.15% per.
- The assumed firm energy price of $140/MWh escalates at 3.15% per year.
- Operating costs escalate at 3.0% per year
- 30-year term of analysis
- 5.0% discount rate (to 2016)

Based on these assumptions, the 25-year levelized annual revenue, costs, and net benefits will be as follows (2016 cost level):

- Levelized annual revenue ........................................ $15,521,000
- Levelized annual costs ........................................... $11,974,592
- Levelized net annual benefits before taxes ............... $3,546,000

*JHI does not represent in this estimate any indication of the future value of wholesale electric energy or Project production levels.*
4.41(e)(6) A statement describing other electric energy alternatives, such as gas, oil, coal and nuclear-fueled powerplants and other conventional and pumped storage hydroelectric plants;

(6) ELECTRIC ENERGY ALTERNATIVES

(i) Fossil-Fueled Power Plants

The Applicant does not consider fossil-fueled power plants (i.e., coal, natural gas, oil, or nuclear) to be legitimate alternatives to the Project, even though the cost of power from such sources may, in some cases, be less than the cost of power from the Project. Diesel fuel prices have aggressively and steadily increased 36% since the preliminary permit was awarded for this project. The State of Alaska projections\(^2\) for its North Slope oil revenues are predicted to be higher in the future which translates that diesel fuel prices are not expected to abate or decrease over the life of this project. There are no supplies or supply chain logistics, or distribution networks from coal or natural gas suppliers for the community of Juneau. In 2011, Juneau energy was consumed for transportation (43%), buildings (40%), mining (12%), and powering various kinds of heavy equipment (5%). The burning of fossil fuels generates 75% of local energy used, mostly for transportation and home heating. Electricity, which powers most lighting, appliances, and some building heating systems, provides the remaining 25% of energy consumed in the borough\(^3\).

Some utilities are facing mandates to obtain an increasing amount of power from renewable sources, regardless of cost. This is not the case in Juneau as the local utility generates the bulk of its power generation from legacy hydropower. However, capacity issues combined with low or average water years are requiring more capacity as demand for electricity is increasing. The Juneau firm ratepayer demand increased by 5.66% from 2010 to 2011\(^4\). This capacity is more economical to fill with additional hydropower resources than from fossil fuel or other alternative sources.

Additionally, the City and Borough of Juneau’s Comprehensive Plan and the City and Borough of Juneau’s Climate Action Plan call for the reduction of fossil fuel use and therefore it is unlikely that additional major fossil fueled power plants will meet local public acceptance. Therefore the Applicant believes that the only legitimate and cost effective alternatives are other renewable energy sources. Accordingly, no description of fossil-fueled or nuclear powered alternatives is provided in this Exhibit.

(ii) Other Hydroelectric Power Plants

There are other existing hydroelectric projects in the City and Borough of Juneau of larger size, comparable and of smaller size that operate at varying efficiencies. There are no transmission interconnections to Juneau for any project located outside the City and Borough of Juneau and no interconnection is foreseeable at this time. These existing local hydroelectric facilities operate at maximum efficiency in low and average water

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\(^3\) City and Borough of Juneau Climate Action Plan. November 2011

\(^4\) AELP Tariff 400-1 December 13, 2011, Sales Report
years. Each of these projects has their own macro economics, environmental considerations and feasibility/financing considerations. While the internal cost projections of these projects is not shared publicly, it is highly unlikely, based on hydrology and construction cost from their engineering aspects, that any of the yet preliminarily planned and unconstructed projects are competitive in power cost with the Sweetheart Lake Hydroelectric Project. Sweetheart Lake has been analyzed by the US Government for construction on several occasions and the determination not to proceed was due to lack of market for the generated power. Market conditions have changed and the demand for electricity in Juneau is now present and growing.

Because of these characteristics, the Applicant expects that the Project will be very competitive in future power considerations with the local Juneau utility and with industrial customers outside the Juneau service area.

The Applicant does not consider pumped storage hydroelectric to be a legitimate alternative to the Project. Pumped storage is valuable for utilizing excess baseload generation and for allowing integration of intermittent generation, such as generation by wind and solar projects. There is a significant loss of energy involved with pumped storage. The Project is primarily a direct substitute for fossil-fueled generation and a direct substitute for diesel home heating. With its significant amount of storage, the Project could also be used to some degree for integration of intermittent generation, without the energy loss associated with pumped storage.

(iii) Other Renewable Power Plants

The Applicant expects to compete with developers of other types of renewable generation (primarily other hydropower projects) for power sales contracts. The Applicant’s analysis, as summarized in this Exhibit, indicates that the Project should be very competitive. Due to ever increasing diesel fuel (the only local substitute to locally produced hydropower) and policy/regulatory mandates to increase the use of renewable energy sources, the Applicant believes there will be a ready market for all types of price-competitive renewable generation.

4.41(e)(7) A statement and evaluation of the consequences of denial of the license application and a brief perspective of what future use would be made of the proposed site if the proposed project were not constructed;

(7) CONSEQUENCES OF LICENSE APPLICATION DENIAL

If the license application is denied, then the renewable energy that could be generated by the Project would not be available to displace generation by fossil fuels now or in the immediate future. The Project would provide energy security and a hedge against the continuous cost increases in diesel home heating fuels. These community benefits would be denied with a license denial. The energy security and the hedge against future fuel oil increases leave the capital city of Alaska vulnerable and at risk with diesel fuel price volatility. Home heating fuel prices have increased over a $1.075 (36%) since the Applicant received the Project preliminary permit to now. Once the Project is built, the cost of electricity from the project will be stable and

5 Alaska Department of Commerce Current Community Conditions Alaska Fuel Price Reports July 2011-July 2012

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predictable and will become a safe energy cost hedge for the community of Juneau. The safeguard against future oil increases is in itself a persuasive public benefit reason to approve the license application.

Another aspect is that the Project meets the City and Borough of Juneau’s Climate Action Plan goals of reducing Greenhouse Gasses and Pollutants. Although FERC regulations do not request Applicants to quantify these costs, the Project will significantly reduce and offset the amount of emissions and pollutants generated in the City and Borough of Juneau. As Table D-4 and D-5 depict, the Project generation of 111 GWh will reduce the greenhouse gas emissions in the City and Borough of Juneau by 111,002,281 kg (or 244,205,018 lbs).\(^6\)

**Table D-4** Greenhouse Gas Emissions and Criteria Pollutants reduced by 1 kWh of hydropower

<table>
<thead>
<tr>
<th>Greenhouse Gases</th>
<th>kg</th>
<th>Criteria Pollutants</th>
<th>kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO(_2)</td>
<td>1</td>
<td>CO</td>
<td>0.00015</td>
</tr>
<tr>
<td>CH(_4)</td>
<td>0.00001</td>
<td>NMVOC’s</td>
<td>0.0002</td>
</tr>
<tr>
<td>N(_2)O</td>
<td>0.00001</td>
<td>SO(_2)</td>
<td>0.005</td>
</tr>
<tr>
<td>SF(_6)</td>
<td>0.0000055</td>
<td>NO(_x)</td>
<td>0.0025</td>
</tr>
</tbody>
</table>

Source: International Carbon Bank & Exchange

**Table D-5** Greenhouse Gas Emissions and Criteria Pollutants reduced by Sweetheart Lake Hydroelectric Project

<table>
<thead>
<tr>
<th>Greenhouse Gases</th>
<th>kg</th>
<th>Criteria Pollutants</th>
<th>kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO(_2)</td>
<td>111,000,000</td>
<td>CO</td>
<td>16,650</td>
</tr>
<tr>
<td>CH(_4)</td>
<td>1110</td>
<td>NMVOC’s</td>
<td>2,220</td>
</tr>
<tr>
<td>N(_2)O</td>
<td>1110</td>
<td>SO(_2)</td>
<td>555,000</td>
</tr>
<tr>
<td>SF(_6)</td>
<td>61.05</td>
<td>NO(_x)</td>
<td>277,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>111,002,281</strong></td>
<td><strong>851,370</strong></td>
<td></td>
</tr>
</tbody>
</table>

Furthermore, Tables D-6 and D-7 help identify the health benefits associated by offsetting diesel electrical generation and diesel space heating with Project generation. These benefits of reduced greenhouse gas emissions and lower levels of pollutants would be lost as a consequence if the Applicant is not granted a license.

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Table D-6 Toxic Air Contaminants in Diesel Exhaust

<table>
<thead>
<tr>
<th>Compound</th>
<th>Compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>acetaldehyde</td>
<td>inorganic lead</td>
</tr>
<tr>
<td>acrolein</td>
<td>manganese compounds</td>
</tr>
<tr>
<td>aniline</td>
<td>mercury compounds</td>
</tr>
<tr>
<td>antimony compounds</td>
<td>methanol</td>
</tr>
<tr>
<td>arsenic</td>
<td>methyl ethyl ketone</td>
</tr>
<tr>
<td>benzene</td>
<td>naphthalene</td>
</tr>
<tr>
<td>beryllium compounds</td>
<td>nickel</td>
</tr>
<tr>
<td>biphenyl</td>
<td>4-nitrophenyl</td>
</tr>
<tr>
<td>bis[2-ethylhexyl]phthalate</td>
<td>phenol</td>
</tr>
<tr>
<td>1,3-butadiene</td>
<td>phosphorus</td>
</tr>
<tr>
<td>cadmium</td>
<td>polycyclic aromatic hydrocarbons (PAHs)</td>
</tr>
<tr>
<td>chlorine</td>
<td>polycyclic organic matter</td>
</tr>
<tr>
<td>chlorobenzene</td>
<td>propionaldehyde</td>
</tr>
<tr>
<td>chromium compounds</td>
<td>selenium compounds</td>
</tr>
<tr>
<td>cobalt compounds</td>
<td>styrene</td>
</tr>
<tr>
<td>creosol isomers</td>
<td>toluene</td>
</tr>
<tr>
<td>cyanide compounds</td>
<td>xylene isomers and mixtures</td>
</tr>
<tr>
<td>dibutylphthalate</td>
<td>m-xylene</td>
</tr>
<tr>
<td>dioxins and dibenzofurans</td>
<td>o-xylene</td>
</tr>
<tr>
<td>ethyl benzene</td>
<td>p-xylene</td>
</tr>
<tr>
<td>formaldehyde</td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: California Air Resources Board, 1996.

NOTE:

a. According to the California Health and Safety Code, a “toxic air contaminant” is “an air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health.”
If the Project is not constructed, then the Applicant speculates that the site would retain its existing wilderness character for the near future. However, the Applicant believes that the value of renewable energy is so great (economically and greenhouse gas reduction benefits) that if the license application by the Applicant is denied, some other party will pursue development of the hydropower potential of the site in the relatively near future. It should be noted that this project has been federally withdrawn as a Power Site Classification for the specific purpose to be developed as a hydropower site for the citizens of the United States.

4.41(e)(8) A statement specifying the sources and extent of financing and annual revenues available to the applicant to meet the costs identified in paragraphs (e) (1) and (4) of this section;

(8) SOURCES AND EXTENT OF FINANCING

The Project is a large investment that is within the capability of the Applicant and its shareholders to finance through either equity or debt. Therefore, the Applicant anticipates the potential of some form of capital raising but more likely debt in order to finance the construction and operation of the Project. The Applicant’s analysis, as summarized in this Exhibit, indicates

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8 The Diesel Dilemma, Union of Concerned Scientists January 2004

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that the value of the Project exceeds the cost by a significant amount such that the project remains an attractive renewable energy investment.
### Table D-8
Estimated Construction Costs and Capital Requirements

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land and Land Rights</td>
<td></td>
</tr>
<tr>
<td>Mobilization</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Logistics</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Marine Access Facilities</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Access Roads</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Dams and Reservoir</td>
<td>33,000,000</td>
</tr>
<tr>
<td>Powerhouse Excavation</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Tunnel and Penstock</td>
<td>16,894,563</td>
</tr>
<tr>
<td>Powerhouse and Tailrace</td>
<td>21,131,485</td>
</tr>
<tr>
<td>Turbines and Switchyard</td>
<td>$6,450,000</td>
</tr>
<tr>
<td>Transmission and Switchyard/Substation</td>
<td>$13,400,000</td>
</tr>
<tr>
<td>Subtotal</td>
<td>$97,876,048</td>
</tr>
<tr>
<td>Contingencies (30%)</td>
<td>$29,362,814</td>
</tr>
<tr>
<td>Subtotal</td>
<td>$127,238,862</td>
</tr>
<tr>
<td>Escalation (2 years at 3%)</td>
<td>$7,634,332</td>
</tr>
<tr>
<td>Direct Construction Cost (Bid 2013, on-line 2016)</td>
<td>$134,873,193</td>
</tr>
<tr>
<td>Indirect Costs (2)</td>
<td>13,487,319</td>
</tr>
<tr>
<td>Interest During Construction (3)</td>
<td>14,836,051</td>
</tr>
<tr>
<td>Total Investment Cost</td>
<td>$163,196,564</td>
</tr>
<tr>
<td>Financing Costs (1.5%)</td>
<td>$2,447,948</td>
</tr>
<tr>
<td>Reserve Fund (4)</td>
<td>5,844,000</td>
</tr>
<tr>
<td>Total Capital Requirements (Bid 2013, on-line 2016)</td>
<td>$171,488,513</td>
</tr>
</tbody>
</table>

(1) Land and land rights costs included in annual costs as taxes and fees.
(2) Indirect costs include licensing, engineering, construction management and administration.
(3) Based on 2 year construction period and 3.5% interest rate.
(4) Approx. one year of debt service.

(9) **An estimate of the cost to develop the license application; and**

(9) **COST TO DEVELOP LICENSE APPLICATION**

The estimated cost to develop the FERC license application is $1.7 million. This cost is included in the total construction cost estimate of $134,973,193.

(10) **The on-peak and off-peak values of project power, and the basis for estimating the values, for projects which are proposed to operate in a mode other than run-of-river.**

(10) **ON and OFF PEAK VALUES OF PROJECT POWER**
The Project, as proposed will operate as a storage project. The project will generate approximately 90 GWh of firm power and associated values with the balance of the annual production at non-firm. The value of the firm power was rated higher than non-firm demand. The 90 GWh is a conservative estimate. In the JHI power output analysis the lowest annual output was 106 GWh, as described in this application. The basis for estimating values of the energy was based on an internal optimization analysis that looked at a variety of factors, such as underserved demand in the Juneau area (and beyond the utility service area), stabilizing capacity and current avoided costs.