3.0 PROPOSED ACTION AND ALTERNATIVES

In accordance with NEPA, the EIS will consider the following alternatives as appropriate:

(1) Cascade Creek's proposed action and alternatives;
(2) Commission staff's alternative; and
(3) the no-action alternative.

3.1 Cascade Creek's Proposed Action

3.1.1 Proposed Project Facilities

The project consists of a lake siphon at Swan Lake, elevation approximately 1514', with a gatehouse and valve entry to an approximately three mile long 12' diameter tunnel complex of horizontal and vertical shafts. The power tunnel leads to a powerhouse at tidewater on Thomas Bay. Transmission would be a combination of overland and undersea cable to a point of connection at Petersburg, Alaska, approximately 15 miles to the southwest. The Applicant anticipates selling power from the project to local and regional markets.

At maximum surface elevation Swan Lake has an elevation of 1,520 feet mean sea level (msl) and surface area of 579 acres. Water would be delivered to the powerhouse from the lake siphon via a drilled and excavated 12-foot-diameter

mostly unlined rock tunnel (***See Appendix E***). The siphon would be housed in a 46-foot long, 34-foot wide, and 25-foot high concrete intake control structure. The tunnel would originate at an elevation of 1,430 feet at the intake structure and would extend 13,100 feet at a slope of approximately 1 percent. From this point, it would drop into a 1,290-foot long vertical shaft/vent. The vertical shaft would be connected at the bottom end to another 1,624-foot long tunnel at a slope of approximately 1 percent that would terminate at the power penstock at an elevation of approximately 300 feet msl. The penstock would consist of a 600-foot long, 9-foot diameter buried steel pipe that would connect to the powerhouse at an elevation of approximately 35 feet mean sea level.

The proposed project would not require construction of a dam for ***operational*** storage purposes, but would include an outlet control structure. ***This structure will amount to a very small, low head weir approximately 4-6' high above the lowest elevation of the lake outlet. The structure will serve several purposes: minimize outflow leakage through the shallow substrata, provide for minimum in-stream flow contribution if required, facilitate lake level management by adding the ability to store or release water as necessary in drought or flood conditions to help maintain the desired lake level, and allow for emergency overflow discharge to the stream outlet of Swan Lake. The outlet control structure will be designed to allow fish to emigrate from the lake as has occurred naturally.***

The powerhouse would consist of a concrete and metal building embanked by rock fill. The powerhouse foundation would be cast-in-place concrete, founded on bedrock. The walls would be concrete and act as a retaining wall for the proposed penstock exit. The superstructure would be a metal building with a sloped metal roof. ***Cascade Creek proposes to site the structure at least 200' set back from the marine shoreline to provide an aesthetic vegetative buffer and avoid effect to the coastal zone.*** Inside the powerhouse, an overhead crane would provide access to place and maintain the turbine generating units. The building would have a plan area of approximately ***140 feet by 80 feet***. The turbine

housings would be cast in the concrete substructure. It would house three generating units, each consisting of a vertical-shaft Pelton turbine rated at 23,000 kilowatts. Water would drop vertically from the Pelton units to the tailrace below.

Associated mechanical and electrical equipment in the power plant would include:

- three turbine generating units, and associated hydraulic power units;
- turbine inlet valves to close off water-flow in an emergency;
- emergency diesel generator for black-start capability;
- battery bank to power DC hydraulic pumps in emergency power outage;
- accumulator bank to close inlet valves in emergency power outage;
- control house with switchgear and controls for the power plant; and
- overhead 50-ton crane.

The project tailrace is proposed as a low gradient open stream channel lined with natural rock/cobble/boulder materials approximately 450 feet long and 40' wide, discharging as a new outlet to Thomas Bay. The tailrace would exit the powerhouse in a southern direction for approximately 300 feet, and then turn west to Thomas Bay for approximately 100 feet. This is to provide a tree screen to visually hide the powerhouse from Thomas Bay. ***The tailrace would be designed to deter use by anadromous fish.***

Appendix E contains preliminary site design drawings and a project boundary map.

3.1.2 Transmission

The Applicant originally proposed two transmission and powerhouse site access alternatives, A and B, in SD1. Alternative A would involve construction of 1.5 miles of new road, reconditioning and widening of approximately 2 miles of old logging road, construction of new bridges and disruption of existing old growth forest tracts. A section of the new road would be located within the Spires Roadless Area #202. The effect of this alternative would be to create a road corridor that would impart a permanent visual alteration to the landscape

in a linear form, portions of which would be visible from Thomas Bay. In light of comments received regarding potential environmental effects, further examination of constructability, and the availability of a lesser impacting alternative, Cascade Creek has removed Alternative A from consideration. The proposed alternative (B) minimizes land disturbance and clearing as well as potential effects to wildlife by utilizing an undersea cable across Thomas Bay and a mostly existing road corridor overland.

The previous "Transmission Line Route Alternative B" ***and now proposed alternative***, would extend from the powerhouse to the dock facility and then cross Thomas Bay as a 2.4-mile-long undersea cable. The cable would be "jetted in," or buried in the near-shore areas[6]. ***The transmission line*** would extend approximately 4.5 miles from the shoreline of Thomas Bay across the Patterson Delta to the shoreline of Frederick Sound. The transmission line would continue as a 6.5-mile long undersea cable to the shoreline of Mitkof Island, at which point it would continue as a 2.6-mile long overhead line to the Scow Bay substation in Petersburg (Appendix E). ***As Section 6.4 details, Cascade Creek is implementing wildlife surveys to assess the potential effects of overhead transmission on mammals, birds, and amphibians. Cascade Creek also proposes to work with state and federal wildlife agencies to develop management practices to minimize potential effects of transmission lines.***

Cascade Creek is not proposing construction of new interconnect facilities and/or substations. It anticipates working through existing system upgrade requirements prior to and during interconnection discussions. This will occur post-licensing.

3.1.3 Proposed Project Operation

Pre-development lake levels are naturally regulated by the lake outlet elevation, the outlet channel shape and seasonal inflows. There also appears to be some subsurface leakage near the lake outlet which the Applicant is now in

[6] ***As part of its PDEA and license application Cascade Creek will include NOAA chart data for the proposed undersea cable transmission route .***

the process of documenting. Comparison of mid-winter and mid-summer aerial and shoreline photographs over several years indicates the lake fluctuates perhaps 4+ feet in elevation annually. Based on 38 years of stream gaging at the mouth of Cascade Creek, it is apparent that there are typical and non-typical water years. Discharge has been observed to vary between 15cfs during winter on the low end to over 2,400 cfs during peak runoff. Average annual discharge is approximately 250 cfs. The Project does not propose to impound Swan Lake above its natural ordinary high water elevation and will not operate outside the standard, natural drawdown of the lake.

The Project will withdraw lake water for power generation in a manner that maintains the natural pre-development lake level fluctuation based on historical discharge records correlated to lake elevation stage. Power production will generally match the annual Swan Lake/Cascade Creek discharge hydrograph (Appendix E). The project powerhouse has been designed to accommodate approximately 95% of the typical water year flow regime. The minimum hydraulic capacity of the powerhouse would be 35 cfs. The proposed maximum hydraulic capacity of the powerhouse would be 670 cfs. High flows that exceed the plant capacity of 670 cfs (plus any in-stream flow requirement) would be stored in-lake if storage was available (i.e. a foot or two), and/or released via the outlet structure if storage capacity was not available. Any post development high flow that overtopped the outlet structure would be at least 670cfs less than pre-development high flow, as the plant would be running at full capacity during this time. Accordingly, high flows that previously would overtop the outlet structure would be attenuated due to plant operation.

On-going hydrology and lake level monitoring by Cascade Creek will document actual rise and fall throughout 2010 and beyond to accurately determine the timing and extent of lake level fluctuation. As stated previously, this new data will be correlated to prior discharge records to establish the relationship between discharge and lake level stage. During low flow periods water would typically be withdrawn from the lake until the minimum lake level

elevation is met for that time period. No additional water withdrawal would occur until an equal or greater ratio of input to withdrawal was established. Furthermore, if the lake level was mandated to be raised as the season progresses, withdrawal may be reduced until new higher lake level requirements are met.

Lake level management will utilize two different controls. The first will be the power tunnel, which will include an inlet control structure comprised of intake pipe placed in-lake with an approximate depth of 40' routed to a gate house/valve system to control water flow to the power tunnel. In addition, there will be a valve system at the powerhouse end of the tunnel to regulate water flow through the powerhouse. This means that lake level would fluctuate between ordinary high water and ordinary low water stages on an annual basis and would be at or near the lake elevation stage that corresponds to the typical pre-development discharge for a given time of year. The anticipated regulatory scenario is that a minimum lake level would be established for different periods of the year. It is also possible that a maximum rate of lake level change (up or down) per unit time may be established.

Once water exits the powerhouse to the tailrace there would be approximately 500' of open, naturalized channel flow to tumble the discharge and expose it to natural atmospheric conditions before entering Thomas Bay. Combined tail race and Cascade Creek post development discharge volumes will closely resemble the pre-development discharge of Cascade Creek's natural regime on a seasonal, weekly basis, except that a portion of the predevelopment discharge from Cascade Creek will be relocated approximately ¼ mile south of the mouth of Cascade Creek. Pre-development and post development discharge volumes to Thomas Bay will be the same on a seasonal, weekly basis. No significant change in oceanographic conditions is anticipated as operations will closely mimic the natural discharge regime.

The Applicant's proposed project operations are based on best available data and have been augmented by initial field studies. Cascade Creek is implementing additional hydrologic study as described in Section 6.2. Cascade Creek anticipates developing operational protocols including lake level management, minimum stream flows, and drought and flood operation programs post licensing as compliance items.

3.1.4 Conceptual Construction Methods and Activities

The powerhouse, related facilities, and construction areas would be situated entirely within a previously logged and immature timber tract. An area ranging from 8.3 to 8.8 acres would be cleared to provide for the construction of the tunnel, powerhouse, substation and switchyard, accessory buildings, and equipment areas. A concrete walled and rock embanked tailrace would discharge from the powerhouse to Thomas Bay as an articulated channel in order to maintain a visual tree screen of the powerhouse from Thomas Bay. ***The tailrace is intended to pass through the 200' shoreline setback as a constructed but naturalize stream channel. A footbridge of location, design and materials approved by the USFS will be provided if desired.***

The Applicant does not anticipate any long-term construction effects to environmental or cultural resources. Construction activities may temporarily affect various species; however, this will be limited to a brief period. The Applicant will work with state and federal agencies to develop best construction management practices to minimize identified effects. Additionally, the Applicant will develop construction timelines in consultation with agencies to minimize and avoid affecting wildlife (marine and terrestrial) during sensitive periods such as mating or rearing seasons. NOAA chart data will be used to site submarine cables. Additionally, the Applicant will work collaboratively with licensing participants to develop project infrastructure designs that limit effects to the overall aesthetic values of the project area. The measures proposed in the following sections can and will be modified as final designs are prepared post licensing.

Construction of hydroelectric facilities has the potential to displace a limited amount of existing wildlife and mhabitat. While not anticipated, the Project could potentially affect overall use of the project area by wildlife. Section 6.0 details studies the Applicant proposes to examine the scope and scale of long term Project effects to these resources and uses.

Site Access

In SD1 the Applicant originally proposed two site access alternatives which included an option to recondition an approximately 5.1-mile section of existing road network, construction of new bridges over the Patterson River and Delta Creek, and subsequently developing 1.5 miles of new road construction to the powerhouse site south of Cascade Creek. This alternative required the clearing and grading of approximately 11 acres of forest lands comprising first and second growth timber. In response to comments received on this proposal, Cascade Creek has removed this option from consideration and presents its original "Access Route B" - which involves significantly less disturbance of the project area - as its proposed site access plan.

Access Route B, ***which Cascade Creek now presents as its preferred and proposed access***, would involve the construction of a new dock facility immediately adjacent to the powerhouse site south of Cascade Creek. The new dock would be ***approximately 290 feet on a fixed pier with a ramp down to a 60 feet by 30 feet float stationed to piling. The dock and an adjacent barge loading ramp*** would provide direct access to the powerhouse site without any offsite road construction (See Appendix E). An access driveway would lead from the dock to the powerhouse. ***While not specifically part of developing the PDEA and license application, it is the Applicant's intent to make this structure available to the general public after completing project construction. A new dock, if made available to the public, has the potential to provide safe landing access for any upland use purposes.***

Workers would construct the powerhouse, and maintain it from two proposed housing units located south of the powerhouse. ***These houses will remain after construction for use by plant operators. Water, wastewater, and waste management will be compliant with Alaska State Department of Health standards. Systems will be closed tank/containers if onsite development is not feasible. No significant light, noise, or intrusion is anticipated for other area users due to the proposed housing location and screening from public view.*** Transportation between Wrangell and Petersburg to the powerhouse and project site would be by float plane, landing in Thomas Bay, or by boat.

Site Naturalization

Rock excavated from the tunnel would be distributed onsite below the tunnel exit as an appropriately shaped geoform feathered into the adjacent topography and re-vegetated. ***The Applicant anticipates tunnel excavation materials will be placed within the lowest elevation, depressed and recessed areas below the tunnel outlet. After these areas are filled, any remainder will be layered over existing topography and tapered into the adjacent terrain to maintain a natural grade appearance. When a final grade is established, the Applicant proposes to top dress disturbed areas with previously stockpiled soil and processed mulch recycled from the clearing phase of the powerhouse site preparation. These areas will then be replanted with native trees and shrubs selected in consultation with state and federal agencies.***

As previously stated, the Applicant intends to work with licensing participants to develop site designs that limit the effects to the overall project aesthetics. This may be accomplished through vegetative plantings surrounding or shielding project infrastructure (intake and powerhouse) or design specification related to the materials or colors of construction materials. Cascade Creek anticipates that much of this effort will occur post licensing as it finalizes design. Accordingly, it anticipated including construction specific license conditions requiring collaborative consultation prior to any construction activities to finalize design and establish site specific construction mitigation

requirements. Cascade Creek further anticipates state and federal agency feedback and direction during construction permitting processes. In all instances Cascade Creek will use best management practices which will include re-vegetation of exposed soils and/or disturbed areas using appropriate, native species.

COMMENTS ON PROPOSED FACILITIES

PMPL: ***Please provide documentation of consultation with adjacent landowners and a cost estimate to acquire land for purposes of siting and constructing a new substation associated with the proposed Project.***

Applicant Response: ***Cascade Creek does not propose to construct a new substation offsite.***

USFS: ***The type of outlet control structure needs additional description; will the spillway be designed to control lake level, other than the low-flow water release?***

PMPL: ***Please advise why a structure at least 10-feet in height and spanning a lake outlet is not a "dam."***

ADFG: ***How will construction activities affect seal concentrations at the mouth of Cascade Creek and Patterson River?***

Applicant Response: ***See Section 3.1.3.***

Smith: ***CCLLC should submit a written evaluation of recent climate change data and establish a plan which addresses the potential problems of lower-than-expected water flows.***

Applicant Response: ***See Section 3.1.3. While it is outside the scope of the licensing process to estimate the potential effects of any climate change on***

project operations, Cascade Creek anticipates development of several operational parameters in collaboration with consulting agencies.

Knight: ***How does Cascade Creek intend to "re-vegetate" rock fill that is excavated from the tunnel for the long-term.***

USFS: ***Does the Applicant plan to use houses during operations? How will water supply and wastewater be developed and decommissioned? What measures would be taken to minimize effects of residents on the Cascade Creek cabin?***

USFS: ***How will the tailrace be designed to accommodate people walking from the cabin to the Cascade Creek trail?***

Applicant Response: ***See Section 3.1.4.***

ADFG: ***Will the proposed hydroelectric facilities and infrastructure at Cascade Creek and Delta Creek displace trappers from these two highly productive furbearer trapping locations?***

Applicant Response: ***See Section 3.1.4 and Section 6.0.***

PMPL: ***Please provide specifics regarding boat docking, airplane access and road construction at Thomas Bay.***

ADFG: ***Request for more specific information about the proposed construction activities. How long do engineers expect construction to take once it commences? To what extent will planes and helicopters be used in the project area, specifically near Swan Lake and the surrounding terrain?***

Applicant Response: ***See Section 3.1.4; Specific construction access details will be developed as part of Cascade Creek's construction activities, but to the extent possible, these items will be identified in the license application and PDEA.***

USFS: ***The size and architecture of the powerhouse seems inconsistent with the existing recreation facilities in the area. Additional methods of reducing the visibility of the facility need to be developed.***

USFS: What characteristics would be used to assess whether the "new landform" appears "appropriate"? In addition, what is the process for vegetating large amount of recently excavated rock?

Applicant Response: ***See Section 3.1.and 7.7. The powerhouse will be constructed at the lowest feasible elevation, screened by existing trees and surrounded on three sides by direct earth embankment and setback earth berming. It will not be visible except from the air or directly onsite.***

USFS: ***The method of outflow management during construction should be described, and how proposed operations would alter the existing flow regime of Cascade Creek.***

Applicant Response: ***More specific information related to construction activities will be provided throughout the application process.***

ADFG: ***More information on the location and footprint of the Project is needed to assess impacts to OGRs, SOGRs, Scenic View shed LUD, and Remote Recreation LUD.***

Applicant Response: ***See Appendix E.***

COMMENTS ON SITE ACCESS

ADFG: ***How will the construction of a dock influence hunter access to mountain goat populations?***

Applicant Response: ***See Section 3.1.4.***

ADFG: ***How will increased road access affect trapper effort and success, and is increased access likely to negatively impact furbearer populations?***

Applicant Response: ***The Applicant has withdrawn this alternative and does not propose to develop road access.***

PMPL: ***Please provide evidence of consultation with and any comments received from the PIA and also all of the landowners where new road construction would occur.***

Applicant Response: ***Appendix A contains consultation records.***

PMPL: ***What consultations have you had with land owners for upgrading and maintaining roads in the vicinity of the Project?***

Applicant Response: ***The Applicant has withdrawn this alternative and does not propose to develop road access.***

COMMENTS ON TRANSMISSION LINE

USFW: ***Recommends transmission Alternative B to minimize impacts to Old Growth Reserves and beach and estuary fringe habitat. In addition, it recommends that overhead transmission lines be eliminated or minimized through the use of underwater cables to minimize bird transmission line collisions.***

ADFG: ***As currently proposed, the construction of an overhead transmission line would require clearing a corridor through the SOGR, potentially resulting in further loss of high-volume old growth habitat. The proposed transmission line extending above-ground from Delta Creek to north of Brown Cove appears as though it may bisect a second SOGR.***

ADFG: ***Construction of the transmission lines should follow design guidelines available to reduce impacts of transmission lines on all bird species, and monitoring should be conducted pre- and post-construction to fully assess impacts and provide mitigation.***

Varsano: ***Transmission lines should be sea floor cables only and no new power line corridors should be cut through public lands.***

Applicant Response: ***See Section 3.1.2.***

EPA: ***Recommends that the EIS describe a monitoring program designed to assess both impacts from the project and the effectiveness of measures utilized to mitigate such impacts.***

Applicant Response: ***Noted. The Applicant is committed to working closely with the state and federal agencies to develop and implement studies providing appropriate and relevant information related to potential transmission line effects. This information will assist agencies and the Applicant in analyzing potential effects and identifying the preferred alternative. As necessary, the Applicant will develop appropriate mitigation and monitoring programs in consultation with state and federal agencies.***

ADFG: ***A sidescan sonar survey of the bottom in the proposed cable area is needed.***

Applicant Response: ***See Section 3.1.4.***

ADFG: ***Will beam trawls, Tanner, Dungeness, and red king crab gear become snared ore entangled on the submarine cable in Thomas Bay?***

ADFG: ***What will the impacts of powerline and submarine cable development to the commercial and personal use Dungeness fisheries around Point Agassiz?***
ADFG: ***Will beam trawl gear interact with the submarine cable as trawls pass perpendicular to the cable in the northeast shore of Mitkof Island, from Sandy Beach to Frederick Point?***

Applicant Response: ***The transmission line will be buried in the intertidal and shallow sub-tidal zone upon installation and is anticipated to otherwise settle in and slowly become covered with sediment where otherwise laid upon the bottom. No interference is anticipated with various fisheries. Cascade Creek anticipates working with the U.S. Coast Guard prior to construction to determine if it is necessary to provide additional location detail to update navigation hazard mapping.***

COMMENTS ON OPERATIONS

USFS: ***More information should be provided regarding proposed lake-level management in terms of active storage.***

Applicant Response: ***Please review updated Section 3.1.2.***

ADFG: ***Why is the Project characterized as run-of-river?***

Applicant Response: ***See Section 3.1.3.***

ADFG: ***How will project operations impact ice cover in the bay during the winter?***

Applicant Response: ***See narrative See Section 3.1.3.***

USFS: ***The discrepancy between typical run-of-river operations and the proposed lake drawdown needs to be explained.***

Applicant Response: ***See Section 3.1.3***

ADFG: ***Monitoring is requested in order to determine exactly what the natural lake fluctuation is.***

Applicant Response: ***See Section 3.1.3 and Section 6. 2 & 6.3.***

Wood: ***The Project should be scaled back to only operate the facility using Swan Lake's natural water level fluctuation of around six feet. The "sill" should not be constructed.***

Applicant Response: ***See Section 3.1.3.***