
Pre-Application Document

Chakachamna Project (FERC No. 12660)



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EXECUTIVE SUMMARY

TDX Power (TDX) is a subsidiary of Tanadgusix Corporation, Inc., a shareholder-owned Aleut Alaska Native village corporation founded in 1973. In 2006, the Federal Energy Regulatory Commission (FERC) granted TDX a three year preliminary permit under Section 4 (f) of the Federal Power Act (FPA) to study the potential for the Chakachamna Hydroelectric Project (Project), to be located at the existing Chakachamna Lake on the Chakachatna River in Kenai Peninsula Borough, Alaska. Activities to date under the preliminary permit have indicated the Project would be economically viable, and play a significant role in providing reliable energy to Alaska's "Railbelt" and meeting the long-term needs for power in Central Alaska. Further investigation is warranted to address questions concerning the optimal configuration of the Project and the potential impacts the Project could have on the existing environment.

TDX is filing this Pre-Application Document (PAD) and Notice of Intent (NOI) to initiate the formal FERC licensing process to generate the information needed to provide a comprehensive basis for an Application for an Original License under Part I of the FPA. TDX anticipates that the licensing process and accompanying environmental study plan will provide TDX and stakeholders with a solid foundation of information to develop the license application; provide FERC with the information it needs for its environmental review under the National Environmental Policy Act (NEPA); and agencies with information necessary to fulfill their statutory requirements under federal and state law.

TDX is requesting FERC to authorize the licensing of the Chakachamna Project under the Traditional Licensing Process (TLP). As described in section 2 of this PAD, TDX is requesting as part of its proposal to utilize the TLP that FERC approve the addition of certain ILP elements into the Chakachamna licensing process in order to address stakeholder concerns with the administrative record and the NEPA process. TDX anticipates that the requested TLP will proceed in a similar manner to an ILP, but with additional flexibility that is appropriate given the complex nature of the proposed Project, and general lack of existing information on the environmental characteristics of the Project area which may necessitate adjustments to study approach and schedule as the study program proceeds.

In accordance with the FERC ILP regulations, this PAD summarizes all reasonably available existing information that is relevant to the Project, as identified through an intensive information-gathering effort by TDX. In addition to providing licensing participants with important background information on the Project and associated environment, this existing information serves as the basis for identifying critical information gaps that will be addressed in the licensing study program.

TDX began systematically identifying potentially relevant information in 2008. Information was gathered through research and inquiries to resource agencies and other entities identified as potential sources of relevant information. TDX also held a series of workshops to present information on the Project and engage participants in preliminary discussions regarding potential licensing issues and information needs. In addition, TDX conducted site reconnaissance efforts

to provide additional basic information on the Project vicinity for inclusion in the PAD, and to help focus study planning.

The PAD is organized in general alignment with the requirements in the ILP regulations. Section 2 presents the licensing process plan and schedule, and summarizes TDX's proposed Communications Protocol for the pre-filing licensing effort. Section 3 summarizes information about the proposed Project facilities and operations. Section 4 describes existing information and identifies known or potential adverse impacts to environmental resources, and is subdivided into the following sections:

- River basin overview,
- Geology and soils,
- Water resources,
- Fish and aquatic resources,
- Wildlife and botanical resources,
- Wetlands, riparian, and littoral resources,
- Recreation and land use,
- Aesthetic/visual resources,
- Cultural resources,
- Socioeconomic resources, and
- Tribal resources.

Section 5 identifies licensing issues and proposed studies based on TDX's analysis of the existing information and discussions with licensing participants. TDX is proposing to develop the environmental study program in two distinct phases. Planning for Phase 1 will be initiated in 2009; Phase 1 will generate essential data in 2010 (e.g., hydrologic, imagery, bathymetry) to support the design of the balance of the environmental studies that will be initiated in 2011. Sections 6 through 7 fulfill additional PAD requirements, including documentation of due diligence in gathering reasonably available existing information and a list of all references used in preparing the PAD.

With initiation of the formal licensing process, the schedule of consultation milestones for the Project licensing is proposed. Beyond the formal consultation requirements of the process, TDX intends to create additional opportunities for interaction with stakeholders. TDX believes this enhanced consultation approach is key to working effectively within the proposed schedule constraints and to resolving, to the extent possible, issues that may arise during the pre-filing period.

TDX proposes to file its draft license application in August 2013, and a final license application in March of 2014. As noted above, Section 5 of the PAD and Appendix 5-1 summarizes TDX's preliminary list of proposed studies to address the identified licensing issues. In response to comments received from agencies and other interested stakeholders, the information in Appendix 5-1 provides a substantial amount of information regarding the anticipated study program that goes beyond a simple list of proposed studies. It is TDX's hope that this additional information will provide licensing participants with a solid foundation for engaging with TDX in developing the more detailed study plan elements to be included in the two phased study planning process.

As described in section 2, as part of its proposed communications protocol, TDX has developed a relicensing website (<http://chakachamna-hydro.com/>) to facilitate the distribution of information to all interested parties. The website provides public access to the following information: a current calendar of events; a public information library, which will house all of the information used in development of the PAD; licensing documents; and contact information. Stakeholders may also communicate with TDX by contacting Maxine Blake at (907) 762-8450 or emailing Chakachamna@tdxpower.com.

Given the significant study effort that is anticipated in support of the license application and stakeholder concerns regarding the inflexibility of many of the deadlines in the ILP, TDX is hopeful that FERC will approve the use of the TLP, with modifications, as described in the proposed communications protocol (Appendix 2-1). Should the use of the TLP not be authorized, TDX is prepared to pursue the licensing of the Project pursuant to the requirements of the ILP.

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List of Acronyms and Abbreviations

Abbrev.	Definition
Agency or Member of an Agency	
AAC	Alaska Administrative Code
AASHTO	American Association of State Highway and Transportation Officials
ABOG	Alaska Board of Game
ACHP	Advisory Council on Historic Places
ACHP	Advisory Council on Historic Preservation
ADCA	Alaska Division of Community Advocacy
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOLWD	Alaska Department of Labor and Workforce Development
ADOT&PF	Alaska Department of Transportation and Public Facilities
ARRC	Alaska Railroad Corporation
ASTM	American Society for Testing and Materials
ASTt	Arctic Small Tool tradition
AVCP	Association of Village Council Presidents
BBNA	Bristol Bay Native Association
BIA	U.S. Department of Interior, Bureau of Indian Affairs
BLM	Bureau of Land Management
CEA	Chugach Electric Association
CEMI	Canadian Environmental and Metallurgical Laboratory
CEQ	Council on Environmental Quality
CIMMC	Cook Inlet Marine Mammal Commission
CIRI	Cook Inlet Region, Inc.
CLG	certified local government
DCOM	(Alaska) Division of Coastal and Ocean Management
DOI	Department of Interior
ENSTAR	ENSTAR Natural Gas Company
EPA	U.S. Environmental Protection Agency
ERT	Environmental Research and Technology
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FPC	Federal Power Commission
FY	Fiscal Year
HDR	HDR Alaska, Inc.; HDR, Inc.
IAC	Interagency Committee for Outdoor Recreation
IPCC	Intergovernmental Panel on Climate Change
ISA	Instrumentation, Systems, and Automation Society
ISER	University of Alaska Anchorage Institute for Social and Economic Research

Abbrev.	Definition
ITC	Intermodal Transportation Center
JPA	Joint Powers Authority
JPO	Joint Pipeline Office
KPB	Kenai Peninsula Borough
MARAD	Maritime Administration
MEA	Matanuska Electric Association
ML&P	Anchorage Municipal Light and Power
MLW	Division of Mining, Land and Water
MOA	Municipality of Anchorage
MSB	Matanuska-Susitna Borough
NASA	National Aeronautics and Space Administration
NCIMA	Northern Cook Inlet Sport Fish Management Area
NDM	Northern Dynasty Mines, Inc.
NGO	Non-governmental organization
NHS	National Highway System
NIP	Non-Internet Public
NIST	National Institute for Standards and Technology
NMFS	National Marine Fisheries Service
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA/NMFS	National Oceanic and Atmospheric Administration's National Marine Fisheries Service
NPDES	National Pollutant Discharge and Elimination System
NPS	U.S. Department of the Interior, National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
OCRM	Office of Coastal Resource Management
OHMP	Office of Habitat Management and Permitting
OPMP	Office of Project Management and Permitting
PHS	U.S. Public Health Service
PL	Public Law
POA	Port of Anchorage
PUD	Public utility district
RTPO	Regional Transportation Planning Organization
RWG	Resource work group
SCS	U.S. Soil Conservation Service
SFSGR	Susitna Flats State Game Refuge
SGR	State Game Refuge
SHPO	State Historic Preservation Officer
TAPS	Trans Alaska Pipeline System
THPO	Tribal Historic Preservation Officer
TNC	Tyonek Native Corporation
TRAAK	Trails and Recreational Access for Alaskans

Abbrev.	Definition
U.S.	United States
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USDOI	U.S. Department of Interior
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Department of Agriculture, Forest Service
USFWS	U.S. Department of Interior, U.S. Fish and Wildlife Service
USGS	U.S. Department of Interior, Geological Survey
WDOE	Washington Department of Ecology
WDFW	Washington Department of Fish and Wildlife
WMS	Watershed Management Services
WRCC	Western Regional Climate Center
Document or Policy	
ACMA	Alaska Coastal Management Act
ACMP	Alaska Coastal Management Program
ACMP	Alaska Coastal Management Program
AHRS	Alaska Heritage Resources Survey
AIRFA	American Indian Religious Freedom Act
ALP	Alternative Licensing Process
ANCSA	Alaska Native Claims Settlement Act
ANHP	Alaska Natural Heritage Program
ANILCA	Alaska National Interest Lands Conservation Act of 1980
ARPA	Archaeological Resources Protection Act
AS	Alaska Statutes
BA	Draft Biological Assessment
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best management practices
BO	Biological Opinion
CEMP	Comprehensive Emergency Management Plan
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CMP	Coastal Management Plan
CPQ	Coastal Project Questionnaire
CWA	Clean Water Act
CWCS	Alaska's Comprehensive Wildlife Conservation Strategy
CZMA	Coastal Zone Management Act
DLA	Draft license application
EA	Environmental assessment
EBD	Environmental baseline document
ECPA	Electric Consumers Protection Act
EID	Environmental information document

Abbrev.	Definition
EIS	Environmental impact statement
EO	Executive order
ESA	Endangered Species Act
FPA	Federal Power Act
FEIS	Final Environmental Impact Statement
FOIA	Freedom of Information Act
FR	Federal Register
FSP	Field sampling plan
GMA	Growth Management Act
HCP	Habitat conservation plan
ILP	Integrated licensing process
IRA	Indian reorganization act
ISR-1	Phase 1 Initial Study Report
ISR-2	Phase 2 Initial Study Report
ISTEA	Intermodal Surface Transportation Efficiency Act
LA	License application
LWCF	Land and Water Conservation Fund
MBTA	Migratory Bird Treaty Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAICS	North American Industry Classification System
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NHRP	National Register of Historic Places
NOI	Notice of intent
NPL	National priority list
P&N	Purpose and need
PAD	Pre-Application Document
PI	Public involvement
PIP	Public involvement plan
PLP	Preliminary License Proposal
PME	Protection, mitigation and enhancement
PSP-1	Phase 1 Proposed Study Plan
PSP-2	Phase 2 Proposed Study Plan
REA	Ready for environmental analysis
RMP	Resource management plan
ROD	Record of decision
RSP	Revised Study Plan
SB	Senate Bill
SCORP	Statewide comprehensive outdoor recreation plan
SD1	Scoping document 1
SD2	Scoping document 2

Abbrev.	Definition
SIP	State implementation plan
SMA	Shoreline Management Act
SMP	Shoreline Management Plan
TLP	Traditional licensing process
Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970
USC	United States Code
USR	Updated study report
WRIR	Water resources investigations report
WSRA	Wild and Scenic Rivers Act
Engineering or Environmental Term	
AMSA	Area meriting special attention
ASCI	Alaska Stream Condition Index
ATV	All-terrain vehicle
AWQS	Alaska water quality standards
CE	Categorical exclusion
CEII	Critical energy infrastructure information
COC	Chain of custody
CP	Corridor preservation
CRM	Cultural resources management
GMU	Game Management Unit
GIS	Gas Insulated Switchyard
GPS	Global positioning system
IDSE	Initial distribution system evaluation
IESWTR	Interim enhance surface water treatment rule
MDC	Mine development concept
MEL	Municipal entitlement lands
MIS	Management indicator species
OE	Ordnance and explosives
PCE	Power Cost Equalization
QA	Quality assurance
QAPP	Quality assurance project plan
QC	Quality control
RBP	Rapid bioassessment protocols
RFFA	Reasonably foreseeable future action
RO/RO	Roll-on/roll-off
ROW	Right-of-way
RRSA	Rural Road Service Area
RTE	Rare, threatened and endangered
SR	State Route
TBM	Tunnel-boring machine
TCP	Traditional cultural property
WRIA	Watershed resource inventory area
WTP	Water Treatment Plant

Abbrev.	Definition
WWTF	Wastewater Treatment Facility
WWTP	Wastewater Treatment Plant
Miscellaneous Terms	
M.A.	Master of Arts
M.S.	Master of Science
n.d.	No date
n/a	Not applicable <i>or</i> not available
O&M	Operations and maintenance
OHV	Off-highway vehicle
ORV	Off-road vehicle
PDF	Portable document format
PhD	Doctor of Philosophy
Scientific Nomenclature	
µg	Microgram
µg/L	Micrograms per liter
µL	Microliter(s)
¹⁴ C	Carbon 14
ABA	Acid-base accounting
acre-feet	Do not abbreviate, except in tables, figures, etc.
agl	Above ground level
AP	Acid potential
APE	Area of potential effect
BFE	Base flood elevation
BOD	Biochemical oxygen demand
BP	Before present
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CALC	Chronic aquatic life criteria
cfm	Cubic feet per minute
cfs	Cubic feet per second
cm	Centimeter
CO	Carbon monoxide
CO ₂	Carbon dioxide
CQ	Continuous flow
CT	Contact Time
CU	Color unit
CUEQ%	Copper equivalent grade
cy	Cubic yard(s)
DAF	Dissolved Air Flootation
dB	Decibel
dB re 20 µPa	Air reference level
dB re 1 µPa	Sound intensity, in decibels, referenced to 1 micro-Pascal
dBA	A-weighted decibel
DBH	Diameter at breast height

Abbrev.	Definition
DEM	Digital elevation model
DI	Deionized
DMU	Diesel mobile unit
DO	Dissolved oxygen
DOC	Dissolved organic carbon
DPS	Distinct population segment
DRO	Diesel range organics
DTM	Digital terrain model
EFH	Essential fish habitat
feet	Do not abbreviate, except in tables, figures, etc.
feet MSL	Mean sea level
FL	Fork length
fpm	Feet per minute
fps	Feet per second
ft	Foot (feet)
g	Gram
g	Fraction of gravity
GHFS	Global High Frequency System
GIS	Geographic Information System
GLM	General linear model
gpcd	Gallons per capita per day
gpd	Gallons per day
gpm	Gallons per minute
GRO	Gasoline range organics
GS	Gaging station
GWUISW	Ground water under the influence of surface water
HAA5	Haloacetic acid
HC-3	High-gradient, contained channel
HF	High frequency
hp	Horsepower
HPT	Heterotrophic Plate Count
HWM	High-water mark
ICP	Inductively coupled plasma
Inch	Do not abbreviate, except in tables, figures, etc.
IOC	Inorganic Compounds
IQ	Instantaneous flow
kg	Kilogram
km	Kilometer
kV	Kilovolt
kVA	Kilo volt amp
kW	Kilowatts
kWh	Kilowatt hours
L	Liter(s)

Abbrev.	Definition
L/s	Liters per second
LC-1	Low-gradient, contained channel
L _{eq} ·h	Hourly equivalent level
LIDAR	Light detection and ranging
LO/LO	Load on/load off
LOW	Lacustrine open water areas (large lakes >20 acres)
LUST	Leaking underground storage tank
m	Meter(s)
M	Million
m	Meter
m ²	Square meter(s)
MC-1	Moderate-gradient, narrow, shallow, contained channel
MCE	Maximum credible earthquake
MCL	Maximum contaminant level
MDL	Method detection limit
me-Hg	Methyl-mercury
MEND	Mine environment neutral drainage
mg	Milligram(s)
MG	Million gallons
mg	Milligram
mg/L	Milligrams per liter
mgd	Million gallons per day
MHHW	Mean higher high water, tide level
MHW	Mean high water
mi ²	Square mile(s)
mile	Do not abbreviate, except in tables, figures, etc.
ml	Milliliter(s)
ML/ARD	Metal leaching/acid rock drainage
MLLW	Mean Lower Low Water, tide level
mm	Millimeter(s)
mmHg	Millimeters of mercury (atmospheric pressure)
mph	Miles per hour
MRL	Method reporting limit
MSL	Mean sea level
MVM	Million vehicle miles
MW	Megawatts (one million watts)
MWh	Megawatt-hour
NAC	Noise abatement criteria
NAVD 88	North American Vertical Datum of 1988
NGVD 29	National Geodetic Vertical Datum of 1929
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxide
NP	Neutralization potential

Abbrev.	Definition
NTU	Nephelometric turbidity unit
Nv	Calculated variance
O ₃	Ozone
°C	Degrees Celsius
°F	Degrees Fahrenheit
OHW	Ordinary high water
ORP	Oxidation-reduction potential
PAG	Potentially acid-generating
PAH	Polyaromatic hydrocarbons
Pb	Lead
PCBs	Polychlorinated biphenyls
PM ₁₀	Particulate matter up to 10 microns in diameter
PM _{2.5}	Particulate matter 2.5 microns in diameter
POLs	Petroleum, products, oils, and lubricants
pound	Do not abbreviate, except in tables, figures, etc.
POW	Palustrine open water (ponds under 20 acres)
ppm	Parts per million
PSD	Prevention of Significant Deterioration
psi	Pounds per square inch
PVC	Polyvinyl chloride
Q	Discharge
Rkm	River kilometer
RM	River mile
RPM	Rotations per minute
RRO	Residual range organics
s	Second
SEL	Sound exposure level
sf	Square foot (feet)
SPL	Sound pressure level
SVOC	Semi-volatile organic compound
SWE	Snow/water equivalent
TAH	Total aromatic hydrocarbons
TAqH	Total aqueous hydrocarbons
TDG	Total dissolved gas
TDS	Total dissolved solids
TMDL	Total maximum daily load
TOC	Total organic carbon
TSS	Total suspended solids
TTHM	Trihalomethanes
V/C	Volume-to-capacity ratio
VHF	Very high frequency
VOC	Volatile organic compound
ww	Wet weight

Abbrev.	Definition
yd	Yard(s)

Glossary of Terms

Context / Term	Definition
Abrasivity	The resistance of a rock type to abrasion or impact, i.e., its tenacity, defines its toughness
Access tunnel	A route for ventilation and power cables
Accretion	Growth or increase in size by gradual addition or inclusion; for instance, the slow accumulation of land by deposition of water-borne sediment, or the increase in river flow from tributaries
Active power pool storage	Total amount of reservoir capacity normally available for release from a reservoir below the maximum storage level (volume of water between the power tunnel intake and normal full pond)
Adfluvial	Fish that have a life history involving movement between a tributary stream and a lake or reservoir for feeding, shelter, or spawning
Affected by	Has its common sense meaning and makes the area for analysis co-extensive with the area of potential impacts.
Affected environment	The physical features, land, area, or areas to be influenced , impacted, or created by an alternative alignment under consideration; also includes various social and environmental factors and conditions pertinent to an area
Alluvial	Relating to alluvium
Alluvial fan	A stream deposit built where the gradient of a stream is abruptly decreased; especially characteristic of regions where mountain slopes rise steeply from adjacent plains
Alluvium	Sediment deposited by moving water, as in a riverbed, floodplain, or delta
Anadromous	Fish that migrate from fresh-water rivers and stream to the ocean
Applicant	TDX Power, Inc.
Aquatic macrophyte (macrophyte)	Aquatic plants, typically vascular plants, large enough to be apparent to the naked eye, i.e., larger than most algae and moss species
Area of potential effect	Geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist (may be different from the FERC boundary)
Avifauna	Birds
Basin	Land area having a common outlet for its surface water runoff
Bathymetric	Relating to water depth in the reservoir (topography of the reservoir ground surface)
Bulkhead gate	The primary maintenance gate in the upstream control system
Colluvium	Loose deposit of rock debris accumulated via gravity at the base of a cliff or slope

Context / Term	Definition
Conifer	Needle-leaved or scale-leaved, primarily evergreen, cone-bearing trees or shrubs, e.g., pines, spruces, and firs
Dependable capacity	The maximum capability of the powerhouse at the minimum normal operating reservoir level
Direct effects	Influence or occurrences caused by a given action and occurring at the same time
Distributary channel	A stream that branches off and flows away from a main stream channel; common feature of river deltas
Drawdown	Lowering of a reservoir's surface elevation and water volume by releasing (spilling or generating) the reservoir's water at a rate that is greater than the rate of water flowing into the reservoir
Drumlins	Stream-lined hills of till the result of irregular accumulations beneath actively moving ice which overrides and shapes the till into stream-lined forms
Ecotone	A transition area between two adjacent but different plant communities; it may appear on the ground as a gradual blending of the two communities across a broad area or it may manifest itself as a sharp boundary line
Emergent	Plants rising above the water's surface
Entrainment	The incidental pulling of fish and other aquatic organisms into the current and subsequently transported through a hydropower plant's conduits and generation equipment
Epilimnetic	Relating to the surface layer (i.e., epilimnion) of a thermally stratified lake or reservoir
Eskers	Elongated ridges of stratified drift. Deposits formed by deposition in drainage tunnels under or through the ice, in open channels in the ice, and in elongated re-entrants of the ice margin.
Euphotic zone	Upper portion of the water column into which light penetrates
Eutrophic	Having waters rich in nutrients that promote plant life, especially algae, which can reduce the concentration of dissolved oxygen
Fingerling	Juvenile fish, especially trout, between about 2 and 6 inches long
Fish passage tunnel	A fish bypass system connecting Chakachamna Lake to Chakachatna River to pass adult and juvenile fish when the lake level is not high enough to flow down the Chakachatna River
Fluvial (biological)	Fish that undergo in-river migrations between small spawning tributaries and mainstem reaches
Full pool	Maximum level of a reservoir under its licensed normal operating range
Glacial till	Glacial drift composed of an unconsolidated mixture of clay, sand, pebbles, cobbles, and boulders
Glaciofluvial	Geomorphic feature whose origin is related to processes associated with glacial meltwater
Global warming	The increase in the average temperature of the earth's near surface air and oceans since the mid-20 th century and its projected continuation
Grade control weir	Passageway at the Chakachamna Lake outlet through which excess water is released or "spilled" when the lake is full without going through the turbines
Granitic	Of or pertaining to granite

Context / Term	Definition
Hazard-zone boundary	The area most likely to be affected by a direct blast from volcanic eruption
Herbaceous	An herb as opposed to a woody plant
Hydrophytic	Pertaining to hydrophytes, i.e., plants adapted to grow in water
Impacts	A collective term to describe the particular positive or negative effects upon natural or human environment as a result of specific project or projects
Indirect effects	Influence or occurrences caused by a given action, occurring later in time or further removed in distance but which are reasonably foreseeable
Intake	The entrance to the power tunnel intake at Chakachamna Lake
Invasive plants	Plants not native to an ecosystem whose introduction is likely to cause economic, environmental, or human harm
Iteroparous	Offspring are produced in more than one group and across multiple seasons or other periods. Iteroparous animals survive over multiple seasons or periods
Jointing	Failure of a rock mass by fracturing when the rock has shattered and cracked without important movement or displacement along the breaks
Kelts	A spent or exhausted salmon after spawning; all species of Pacific salmon, except some steelhead and sea-run cutthroat, die at this stage
Kettle holes	Hollows formed where an ice block had been partially or completely buried; when the ice block melts, a topographic depression results
Lacustrine	Of or relating to lakes
Lahars	Poorly sorted mixture of boulders, sand, silt and water that has the consistency of wet concrete
Lahars-runout flows	Finer grained, watery flows of lahars
Lake tap	Type of water intake in the upstream water control system located within a vertical shaft
Lineament	A linear topographic feature revealing fault or subsurface structure
Lithology	Overall physical character of a rock or rock formation
Littoral	Shallow water areas where light reaches the substrate allowing attached algae and macrophytes to grow
Load	Amount of electric power or gas delivered or required at any point on a system (originates primarily at the energy consuming equipment of the customers)
Load-following	The adjustment of storage releases so that generation and load are continuously in balance
Loess	Light colored windblown deposit of fine-grained, calcareous silt or clay
Mesic	Pertaining to a moderately moist habitat
Meso-oligotrophic	Level of productivity between oligotrophic and mesotrophic but tending toward mesotrophic
Mesotrophic	Moderate amounts of nutrients and primary productivity
Mitigation measures	Specific design commitments made during environmental evaluation and study process which serve to moderate or lessen impacts deriving from the proposed action
Monomictic	Lakes and reservoirs that are deep, do not freeze over in winter, and undergo a single cycle of stratification and mixing during the year

Context / Term	Definition
Moraines	Deposits of till built along the margins of a glacier, hence with transverse ridge-like forms; or they are deposited beneath the ice and are without transverse linear elements
Muskegs	Grassy bog or a sphagnum bog often with tussocks
Nephelometric	Measurement of the size and concentration of particles in liquid by analysis of light scattered by the liquid
Oligo-mesotrophic	Level of productivity between oligotrophic and mesotrophic but tending toward oligotrophic
Oligotrophic	Low productivity, lacking in nutrients and having a large amount of dissolved oxygen
Palustrine	Non-tidal wetlands dominated by trees, shrubs, or emergent vegetation; small shallow wetlands
Peaking	Operation of generating facilities to meet maximum instantaneous electrical demands
Peak load	The maximum electrical demand in a stated period of time
Penstock	An inclined pipe used to convey water under pressure to the turbines of a hydroelectric plant
Pelagic	Open waters in lakes or reservoirs, rather than waters adjacent to shore
Periphyton	Algae growing on the substrate of rivers, lakes, or reservoirs
Physiographic	Physical features of the landscape, especially its slope and elevation
Project	Chakachamna Hydroelectric Project
Project area	Includes the area to be defined within the FERC-licensed Project boundary and adjacent/nearby areas (as defined for specific resource areas i.e., the total Chakachatna and McArthur river drainage areas for fish and aquatic resources for example)
Project location	On Chakachamna Lake bordered by the Alaska Mountain Range on the west and upper Cook Inlet on the south. The Project's powerhouse is located in the NW ¼ of Section 31 of Township 12N, Range 16W, Seward Meridian. The upstream end of the Project reservoir is located on the NW 1/4 of Section 26, Township 13N, Range 20W. The outlet of the proposed Fish Tunnel is located at Section 15, Township 13N, Range 17W.
Project vicinity	General geographic area of the Project, including Cook Inlet and the Kenai Peninsula Borough located west of Cook Inlet in southcentral Alaska
Project waters	Waters to be defined in the Project license issued by FERC to include Chakachamna Lake, Chakachatna River, and a portion of McArthur River
Pyroclastic flow	A hot, dry mixture of volcanic-rock debris and gas that flows rapidly downslope
Pyroclastic surge	Similar to pyroclastic flow but has a higher gas content
Railbelt	Southcentral Alaska area to be serviced by the electricity produced at the Project
Reservoir storage	Reservoir in which storage is held over from the annual high water period to the following low water period
Riparian	Of or pertaining to the area adjacent to a stream's or river's banks; vegetation growing along or near the stream bank

Context / Term	Definition
Riverine	Flowing, non-tidal waters with a discrete channel with persistent emergent vegetation sparse or lacking but may include areas with abundant submerged or floating-leaved aquatic vegetation
Rock-flour	Sediments of glacial origin that stays in suspension in water
Run-of-river project	Hydroelectric generating plant that operates based only on available inflow and a limited amount of short-term storage (daily/weekly pondage)
Salmon alevin	Larval salmon that have hatched but have not yet completely absorbed their yoke sacs and usually have not yet emerged from the gravel
Salmon fry	The life stage of salmon between the alevin and parr stages
Salmon parr	The life stage of salmon between the fry and smolt stages; generally reached by the end of the first summer, the young salmon have distinctive parr marks and are actively feeding in fresh water
Salmon smolt	The life stage of salmon between the parr and adult stages; the young salmon are silver in color and migrate to the sea
Secchi depth	Measure of the turbidity of surface water based on the depth of visibility of a black-and-white disk lowered into the water column
Sedimentary	Rocks composed of weathered loose material, moved and deposited by wind, water, ice or organisms
Seral	Relating to a sere
Sere	Complete sequence of ecological communities occupying an area successively from first stage to climax
Significant impacts	Any number of social, environmental, or economic effects or influences which may occur as a result of the implementation of a project; "significant impacts" may include effects which are direct, secondary, or cumulative
Species richness	Total number of species, or the number of species within a certain group of organisms (e.g., birds), associated with a defined location
Spill	Releasing water through the a grade control weir at the outlet of Chakachamna Lake rather than through the turbine units
Stakeholders	Agencies, tribes, and other stakeholders
Step-up transformer	Transformer in which the output voltage is greater than the input voltage
Storage	The volume of water in a reservoir at a given time
Substation	An assemblage of equipment for the purposes of switching and/or changing or regulating the voltage of electricity
Surge shaft or chamber	A structure located on a tunnel, penstock, or other sort of water conveyance, used to absorb and attenuate the overflow and prevent any disruption due to a sudden change in water pressure through a water conveyance
Sward	Land covered with grass; meadow
Tailrace	Channel or tunnel through which water is discharged from the powerhouse turbines
Talus slope	An accumulation of rock debris at the base of a cliff or steep mountain slope
Taxa	Plural of taxon, i.e., a taxonomic category or group of organisms, e.g., a genus or species
Taxonomy	Classification system for organisms based on natural relationships; referring to the set of species, especially similar species, occurring in a specific region

Context / Term	Definition
Tectonic	Relating to structural deformation of the earth's crust resulting from the movement of plates on the upper mantle
Terrace	Flat, usually narrow stretch of ground, often with a steep slope, that faces a river, lake, or sea
Thermistor	Automated instrument that continuously records water temperature
Transformer	Device that transforms electricity from one voltage to another
Trashrack	Mechanism on a dam or intake structure that clears the water of debris before the water passes through the structure
Trophic	Relating to the feeding habits or food relationships of organisms in a food web
Turbine	Machine that uses a flow of water to turn blades on a shaft. The shaft also has electromagnets attached, which create an electromagnetic field that can be used to create electricity
Turbine-generator	Turbine directly coupled to an electrical generator; often referred to as one unit
Usable storage capacity	(See active power pool storage)
Vegetative reproduction	Of or relating to asexual reproduction; reproduction that occurs without the union of male and female gametes
Volcanism	Phenomena associated with volcanic activity
Wetlands	Areas that are inundated or saturated with surface or groundwater at a frequency and duration sufficient to support and, that under normal circumstances, do support a prevalence of vegetation typically for life in saturated soil conditions
Wheeling	Transmission of electricity produced by one utility through facilities owned by another for a fee