4.7. Wetlands, Riparian, and Littoral Resources

4.7.1. Introduction

This section describes the wetlands, riparian, and littoral habitat areas surrounding, and potentially affected by, the Project and conforms to the content requirements of 18 CFR § 5.6(d)(3)(vi). The assessment area includes potential effects, both direct and indirect, caused by access road and transmission-line corridors; hydrologic changes, including flooding of terrestrial areas; dam facilities; and filled areas. The information presented in this section relies heavily on the findings of studies conducted for the APA Project in the early 1980s, as summarized in the reports cited below and in the draft amended FERC license application (APA 1985). Additional information is incorporated from the terrestrial wildlife data-gap analysis completed for the Project (ABR 2011).

4.7.1.1. Wetlands and Littoral Habitats

A cooperative agreement between the APA and the USFWS in the 1980s resulted in the production of a preliminary wetlands map of the APA Project area at a scale of 1:63,360, through the National Wetlands Inventory (NWI) program (USFWS 1984). The NWI maps for the APA Project area were based on the vegetation mapping done by McKendrick et al. (1982), and incorporated additional modifications from stereoscopic interpretation of aerial photos. The original vegetation classes were converted into wetland classes using the classification scheme of Cowardin et al. (1979). Although the APA Project differs from the currently proposed Project, wetlands constituted <10 percent of the project area habitats for the original APA Project (APA 1985). Wetland types in the project area consisted of Riverine (rivers, creeks, and gravel bars) and Palustrine wetlands (bogs, marshes, forested lowlands, shrublands, and meadows) and open waters (ponds), but were dominated by Palustrine forested and scrub–shrub and Riverine habitats. No lakes (and therefore, littoral habitats) were considered likely to be impacted directly by the APA Project. Because mapping was not finalized by the time the amended license application (APA 1985) was submitted to FERC, a table of wetland classes identified during the APA Project study was prepared and is reproduced here as the best summary of wetlands occurrence in the area of the proposed Project (Table 4.7-1).The plant species most commonly found in wetlands in the project area are listed in Table 4.7-1 and descriptions of wetland vegetation types are provided in Section 4.6 (Botanical Resources).

An update of mapping of existing wetlands has not been conducted yet for the Project. Figures 4.7-1 and 4.7-2 provide an indication of the occurrence of wetland habitats in areas potentially affected by the project.

Table 4.7-1. Wetlands (NWI classes[1]) mapped for the APA Susitna Hydroelectric Project (adapted from USFWS 1984).

NWI Class / NWI Code	Description
Lacustrine (Lakes)	
L1UBH	Permanently flooded, open-water areas greater than 8.1 hectares (20 ac) in size. The water depth usually exceeds 2 m (6.6 ft).
Riverine (Rivers and Streams)	
R3UBH (formerly R3OWH)	Permanently flooded, open-water channels of upper perennial rivers and streams.
R3USC	Seasonally flooded river flats and bars within upper perennial river channels.
Palustrine (Ponds)	
PUBH (POWH)	Permanently flooded, small open waterbodies (ponds). Vegetation is generally lacking within the open-water area, but aquatic beds or emergents may provide sparse cover (<30 percent) along the pond edge.
PUB/AB3H (formerly POW/AB3H)	Permanently flooded ponds supporting aquatic (floating- leaved) vegetation. Dominant plants include yellow pond lily (*Nuphar polysepala)* and pondweed (*Potamogeton* spp.).
Palustrine Wetlands	
PEM1B	Saturated, emergent, bog-type wetlands in depressions below the tree line, and high-elevation sedge–grass tundra areas on poorly drained soils. Common emergent species include cottongrass (*Eriophorum* spp.), sedges (*Carex* spp.), and bluejoint (*Calamagrostis canadensis*).
PEM1C	Seasonally flooded emergent marshes occurring in the floodplain of small streams and on the periphery of ponds and lakes. Surface water is present in these areas for 1–2 months during the growing season. Species of primary importance include sedges, cottongrass, bluejoint, and horsetails (*Equisetum* spp.).
PEM1F	Semipermanently flooded emergent marshes. These marsh areas usually exhibit standing water throughout the growing season in most years. This wetland type usually occurs in wetter portions of typical emergent and shrub bog situations, and along the periphery of ponds and lakes. Dominant vegetation includes water sedge (*Carex aquatilis*), marsh horsetail (*Equisetum palustre*), buckbean (*Menyanthes trifoliata*), marsh cinquefoil (*Potentilla palustris*), and rushes (*Juncus* spp.).
PEM1H	Permanently flooded emergent marshes. These areas exhibit standing water throughout the year in all years. The dominant vegetation consists of water sedge, horsetails, and buckbean.
Palustrine Scrub–Shrub Wetlands	
PSS1A	Temporarily flooded, dense shrub areas on river and stream floodplains consisting primarily of willows (*Salix* spp.) and alders (*Alnus* spp.). This wetland type often occurs on riverbars that have become stable enough to

NWI Class / NWI Code	Description
	support persistent woody vegetation.
PSS1/USA	Temporarily flooded areas on river and stream floodplains consisting of a mix of shrubs and unvegetated riverine flats. Shrub species are primarily willows and alders.
PSS1B	Saturated, dense shrub wetlands usually occurring in seepage areas on slopes. Tall willow and alder are the most common species.
PSS1/EM1B	Saturated bogs and moist tundra areas on poorly drained soil with 30 percent or more of the canopy consisting of low broad-leaved deciduous shrubs. The remaining portion of the canopy consists of persistent emergent vegetation. Common shrub species include dwarf birch (*Betula nana*), resin birch (*B. glandulosa*), willows, bog blueberry (*Vaccinium uliginosum*), Labrador tea (*Ledum groenlandicum*), crowberry (*Empetrum nigrum*), bog rosemary (*Andromeda polifolia*), and bearberry (*Arctostaphylos* spp.). Dominant emergent species include cottongrass, sedges, and bluejoint.
PSS1/EM1C	Seasonally flooded areas occurring on floodplains in stream and creek corridors. These wetlands are characterized by a mixture of broad-leaved deciduous shrubs and emergent vegetation. Common shrubs include tall willow and alder. Emergent species of primary importance include sedges, cottongrass, bluejoint, and horsetails.
PSS1/EM1F	Patterned bogs (string bogs and reticulate bogs) and other semipermanently flooded complexes of emergents and broad-leaved deciduous shrubs. This wetland type is sometimes found in areas influenced by beaver activity. In patterned bog areas, the shrub species include those described for PSSI/EMIB wetlands. Dominant emergent species include sedges, horsetails, marsh cinquefoil, buckbean, and rushes.
PSS4B	Saturated, closed-canopy black spruce (*Picea mariana*) scrub wetlands. The black spruce in these areas is less than 6 m in height.
PSS4/EM1B	Saturated, open-canopy black spruce scrub wetlands with an emergent understory.
PSS4/1B	Saturated, open-canopy black spruce scrub wetlands with a dense deciduous shrub understory. The deciduous shrub species include dwarf birch, Labrador tea, bog blueberry, and willows.
Palustrine Forested Wetlands	
PFO4B	Saturated, black spruce forested wetlands. These areas are characterized by a closed canopy of black spruce.
PFO4/SS1B	Saturated, open-canopy black spruce forested wetlands with an understory of broad-leaved deciduous shrubs. The areal coverage of the black spruce is between 30 percent and 50 percent.
PFO4/SS4B	Saturated, open-canopy black spruce forested wetland with an understory of scrub black spruce.
PFO4/SS1A	Temporarily flooded wetlands adjacent to streams and rivers that are a complex of black spruce on higher terraces and deciduous shrubs on lower terraces. Willows and alders are the common shrub species.

NWI Class / NWI Code	Description
PFO4/EM1B	Saturated, open-canopy black spruce forested wetlands with an emergent understory.
PFO4/1B	Saturated, closed-canopy forested wetlands consisting of a mix of broad-leaved deciduous and needle-leaved evergreen trees. Black cottonwood (*Populus trichocarpa*) and balsam poplar (*P. balsamifera*) are the dominant deciduous species. Black spruce is the dominant evergreen species.
PFO1A	Temporarily flooded, deciduous forest wetlands occurring on river floodplains. Balsam poplar and black cottonwood are the common trees on these sites.
PFO1/SS1A	Temporarily flooded wetlands on river and stream floodplains consisting of a mix of broad- leaved deciduous forest and broad-leaved deciduous shrubs. Dominant tree species are balsam poplar and black cottonwood. Willows and alders are the dominant species in the shrub areas.
PFO5C	Seasonally flooded, dead-tree forested wetlands generally found along streams and small rivers. The dead trees usually result from beaver activity.

[1] NWI = National Wetland Inventory (based on the *Classification of Wetlands and Deepwater Habitats of the United States,* Cowardin et al. 1979). NWI codes in parentheses were used in the original classification but are no longer valid.

4.7.1.2. Riparian Habitats

Ecological succession on the Susitna River floodplain is highly dynamic, both spatially and temporally. Riparian habitats are shaped largely by the responses of different plant species to disturbance by flooding and ice scour, the dominant physical processes affecting them. Until sufficient silts and sands are deposited by wind and water to provide parent material for soil development, the establishment of vegetation occurs slowly on the Susitna floodplain.

Floodplain vegetation is dominated by riverine herbaceous, scrub, and forest types and can be grouped into three successional community types, depending on the extent of recent disturbance. The description of these successional types below is based on the APA Project Phase I vegetation mapping conducted along the Susitna River from Devils Canyon to Talkeetna and on vegetation succession studies conducted in the floodplain between Gold Creek and the Deshka River (Figure 4.6-18) (McKendrick et al. 1982, UAFAFES 1985).

4.7.1.2.1. Early Successional Stages

Early successional communities accounted for five to ten percent of the vegetated habitats on the floodplain and generally become established between 5 and 25 years after island or river bar stabilization. The ground cover in these types usually is dominated by meadow horsetail and/or Drummond mountain-avens (*Dryas*); in the shrub layer, balsam poplar and/or willow are dominant. Characteristically, these communities have little total vegetative cover (often >50 percent bare ground). Plant species in these types generally have rhizomes or horizontal underground stems, which can extend for considerable distances and are effective at binding loose sand and silt. Drummond mountain-avens is especially important in stabilizing gravelly sites. In most stands, balsam poplar and willow occur at greater densities than do other woody species, but alders have relatively rapid growth rates and begin to overtop willow and balsam

poplar within two to three years after establishment. Young balsam poplar and willow stands may last up to 25 years or more from the time of the last major disturbance. Aging of these stands is difficult because floods frequently bury several years' plant growth in silt, and new growth is present above the silt. This cycle may be repeated a number of times before vegetation succession advances to the mid-successional stage.

4.7.1.2.2. Mid-successional Stages

Deposition of sands and silts that raise the elevation of river bar and island sites above the level of frequent flooding is necessary for the transition of vegetation from the early successional to the mid-successional stage. Mid-successional stands accounted for about 20 percent of the vegetated habitats surveyed in the Susitna floodplain. Thinleaf alder and balsam poplar, which develop into tall shrubs or immature trees, dominate these stands. The alder type is the first phase and appears to dominate from 25 to 50 years after stabilization. Balsam poplar appears to dominate from 50 to 90 years after stabilization, but stands of this type are much less common than are the younger alder-dominated stands. As noted earlier, alder overtops balsam poplar during the transition from early to mid-successional stages. After about 20 years, however, the balsam poplar that remains increases rapidly in height, thereby overshadowing the alder and developing into the immature balsam poplar stands of the mid-successional stage. In both alder and balsam poplar stands, there is very little bare ground. As balsam poplars become more dominant and the trees become larger, their density and that of thinleaf alder and feltleaf willow decline. Other shorter shrub species, such as Sitka alder, prickly rose, and highbush cranberry, increase in density in the balsam poplar-dominated stands, however.

4.7.1.2.3. Late Successional Stages

As the balsam poplar stands of the mid-successional stage mature, white spruce may appear in the canopy. Mature and decadent balsam poplar stands dominate from 90 to 170 years after stabilization. Eventually the large balsam poplars die, leaving space for the development of more balsam poplar or white spruce and paper birch, if no disturbances interrupt the process. Mixed paper birch–white spruce forests probably dominate from 170 to 300 years or more after stabilization. Mature and decadent (gradually dying) balsam poplar stands were found on 25 to 40 percent the vegetated floodplain, and mixed stands of birch and spruce occupied 23 to 32 percent of the area studied. Mixed birch–spruce forest types had the greatest variation in stand structure of the vegetation types found on the floodplain, and there is some evidence that these stands are self-perpetuating. Upon reaching over-maturity, the birch overstory tends to fall, making the spruce more susceptible to wind-throw, and thereby allowing a shrubby paper birch–alder–highbush cranberry–prickly rose community to develop. That shrub community then progresses again to the mixed birch–spruce forest stage.

4.7.1.2.4. Riparian Ecology

Descriptions of the potential effects of the APA Project on the riparian ecology of the Susitna River drainage focused on the river reaches downstream from the proposed Watana dam and impoundment. There is no current detailed description of riparian areas upstream of the proposed

dam. In general, the upstream riparian areas are confined to a narrow canyon with fairly steep slopes, a well-defined river channel, and very few islands; in contrast to downstream, where the floodplain is better-developed with a wider variety of riparian habitats. The successional stages described above by UAFAFES (1985) were considered to be generally applicable to the "middle river" (defined in that study as extending from the Oshetna River mouth downstream to the Chulitna River confluence, thus including parts of the upper and middle reaches defined for the Project). The vegetation types that would have been affected by the APA Project Stage I (Low Watana) reservoir consisted principally of open and closed white and black spruce forest, as was described in Section 4.6. Those types are common in the riparian zone upstream from the proposed Watana dam.

A number of recent studies provide further background regarding ecological interactions on riparian floodplain habitats downstream from the Project. Helm and Collins (1997) examined the dynamics of vegetation succession on the Susitna floodplain at 29 sites located from Chase (above Talkeetna) downstream to the mouth of the Deshka River (near Willow). That paper was based on field work conducted in the early 1980s during the original APA Susitna Hydroelectric Project studies, supplemented with additional work conducted in 1995, plus comparisons with historical aerial photos from 1951. The same successional stages were described as above — Early Shrub (*Dryas*, juvenile poplar, willow, horsetail), Intermediate (alder, young poplar), and Late (old poplar, birch–spruce). The youngest stage of succession comprised four distinct communities based on substrate texture. The effects of a variety of factors—flooding, ice scour, wind, browsing by herbivores, and human activities such as logging—were assessed and a conceptual model of successional pathways was developed. The authors concluded that the major factors influencing vegetation succession were sedimentation and erosion from flooding and herbivory by wildlife. Vegetation establishment varied annually in relation to precipitation and flooding.

Nutrient dynamics on the Susitna floodplain are influenced by both downstream and upstream sources. The presence of spawning salmon in freshwater systems is an important, well-documented mechanism through which marine-derived nutrients (especially nitrogen and phosphorus) are transported into terrestrial ecosystems (Cederholm et al. 1999, Naiman et al. 2002), where they are cycled further by the wildlife that feed on salmon (Hilderbrand et al. 1999, 2004; Helfield and Naiman 2006). In the floodplain of the Tanana River (interior Alaska), hyporheic water is an important source of nitrogen for willows on early successional silt bars (Koyama and Kielland 2011). That source of nitrogen may explain the sustainability of highly productive plant communities on the floodplain despite the apparently inadequate rates of nitrogen mineralization in the soil. Several recent studies have shown that subsurface hydrology directly affects nitrogen availability in the floodplain forests of Interior Alaska (e.g., Lisuzzo et al. 2008). Thus, flow regimes affect nutrient availability for plants through changes in hydrology as well as sediment input.

The riparian zones of Alaska rivers, including the Susitna, provide important foraging habitats for herbivores, principally moose, snowshoe hares, and beavers, which exert profound effects on vegetation succession and nutrient cycling (Helm and Collins 1997, Collins and Helm 1997, Kielland et al. 1997, Butler and Kielland 2008). Changes in habitat distribution and productivity of important forage species, such as willows, poplars, and paper birch, may affect the populations of these mammals. Conversely, herbivory is an important factor affecting the species

composition and successional patterns of riparian vegetation (Kielland et al. 1997, Hanley 2008). Thus, effects on herbivore populations may lead to changes in riparian plant communities. More generally, because aquatic and terrestrial food webs in riparian zones are interdependent (Ballinger and Lake 2006), changes in flooding regimes can affect transfer of energy between riparian and terrestrial ecosystems in ways that are difficult to predict.

4.7.2. Potential Adverse and Positive Impacts

4.7.2.1. Wetlands, Waters, and Littoral Habitats

Wetland impact analysis of the Project footprint, including the impoundment zone, Project facilities, construction sites, and three alternative access corridors alternatives being considered (Figures 4.7-1 and 4.7-2), will be generated after the USFWS releases the new digital versions of the NWI mapping for spatial analysis and new detailed wetland mapping is completed. The direct loss of wetlands as a result of inundation and fill placement during development of APA Project Stage I (Low Watana; analogous to the Project) was quantified in the draft amended FERC application for the APA Project (APA 1985) and is reproduced in Table 4.7-2. The primary wetland types lost to the Watana dam, impoundment, and spillway would include black and white spruce and balsam poplar forests; scrub–shrub; and forest–scrub–shrub complexes. The Denali Corridor alternative is similar to an alignment considered for the APA Project. The wetland types primarily affected within the Denali Corridor would be primarily scrub-shrub (Table 4.7-2).

Impacts are prioritized on the basis of resource vulnerability, the probability of the impact occurring, and the duration of the impact. Direct losses of wetland habitats are judged to be most important because of the certainty and the permanence of the impact. The importance of the loss of specific wetland types depends on the magnitude of the acreage lost in relation to their total abundance in the project area and their regional significance. Indirect changes in plant communities are considered less important than direct losses because changes are less predictable and often of shorter duration than permanent losses.

The greatest wetland impacts from the APA Project would have occurred on the northern side of the Susitna River, where the slope to the river edge generally is not as steep as on the southern side, particularly in the area of the proposed Watana reservoir (APA 1985). Palustrine scrub–shrub, forested and forest–shrub lowlands, and rivers and streams were the wetland types that would be affected most. Approximately 45 percent of the black spruce woodland (Palustrine scrub–shrub) in the vegetation mapping area was predicted to be lost. The losses of these and other vegetation types represented important habitat losses for some wildlife, especially black bear, moose, marten, beaver, raptors, small mammals, and passerine birds.

Based on data collected in July 1981, wetlands in the project area support low densities of waterbirds in the summer (10 adults/40 hectares [100 ac]). Scoters, scaup, Mallard, American Widgeon, swans, Arctic Tern, and other waterbird species were found during surveys. Although the lakes and ponds in the project area were used more by migratory birds during spring and fall migrations, the density and diversity of bird species were lower in the Susitna project area than in other areas of interior Alaska (Kessel et al. 1982). Emergent wetland types along the margins

of ponds and lakes are the most valuable to breeding waterfowl, providing food, cover, and nesting areas. None of the lakes in the general vicinity of the project area were expected to be affected by the APA Project, but some small ponds would have been affected by the impoundment and dam, access roads, and construction camps.

Indirect wetland losses may occur as a result of erosion, permafrost melting, landslides and mass wasting, ORV use, blow-down of trees, and other causes (see Section 4.7.4.2 above). Although some of these losses would be short-term and would be followed by typical vegetation succession or by shifts to new vegetation types, long-term vegetation losses enduring for 30 to >100 years may occur on sites degraded by continual erosion, land slumping, or ORV use. The acreages that may be lost as a result of those factors would be small compared with the acreages lost to inundation by the proposed Watana reservoir, however.

Table 4.7-2. Acreage of wetland types expected to be lost to APA Project Stage I (Low Watana) development (reproduced from APA 1985).

Wetland Type[1]		Impoundment & Dam	APA Access Road[2]
Palustrine			
Forested		636	0
Forested with scrub–shrub		843	1
Forested with emergent vegetation		8	0
Scrub–shrub		1,553	41
Scrub–shrub with forest		12	0
Scrub–shrub with emergent vegetation		155	42
Emergent vegetation		36	8
Emergent vegetation with forest		16	0
Emergent vegetation with scrub-shrub		29	11
Ponds (open water)		31	1
	Subtotal	3,319	104
Lacustrine			
Lakes (open water)		0	0
Riverine			
Rivers and creeks (open water)		3,768	1
Gravel/sand bars		432	0
	Subtotal	4,200	1
Total		7,519	105

[1] Based on the NWI classification system (Cowardin et al. 1979).
[2] Similar to Project Denali Corridor alternative.

4.7.2.2. Riparian Habitats

The Project would affect riparian areas both upstream and downstream from the proposed dam. Project construction and operation would inundate approximately 39 mi of riparian habitat within the impoundment zone upstream from the Watana dam.

Downstream ecological effects involving vegetation and wildlife habitats were addressed in the riparian vegetation succession study by the University of Alaska–Fairbanks Agricultural and Forestry Experiment Station (UAFAFES 1985). The narrative below is summarized from that report and from APA (1985). The purpose of the riparian succession study was to provide an understanding of existing downstream floodplain dynamics and to predict the changes likely to result from construction and operation of the APA Project.

Project operations would have the effect of greatly reducing natural fluctuations in river flow throughout the year. Following construction, river levels in summer would be lower than under natural conditions. Summer flood or high-flow events would be reduced in severity and frequency. High-flow events would be notable in the middle river only if extreme flooding occurred upstream when the reservoir was nearly full. In winter, water levels would be higher than normal, and ice formed at those higher levels may encase vegetation for up to four months each winter at some locations. The duration of ice cover will change due to increased water temperatures, relative to existing conditions.

Between the Oshetna and the Chulitna rivers, summer flooding events would be fewer and less severe. No bedload sediments would be transported from the upper river because they would be trapped in the reservoir. Fine silts and clays would continue to pass through the middle river, but would not be deposited. The riverbed would likely develop an "armor" layer as fine sediments are scoured and not replaced. Due to the more uniform flow, the channel may become deeper and narrower, with some vegetative encroachment occurring upstream of the maximum ice-front progression. Below the dam, the upper portion of the middle river would no longer have winter ice cover. Below that, spring melt likely would be slower, with little or no ice jamming or associated flooding and scouring.

In the lower river, long-term aggradation would be likely to occur in the first few mi below the Chulitna River confluence, causing the Chulitna delta to expand farther toward the east bank of the Susitna River. A well-defined channel eventually would develop through that delta due to the stabilized flows in the middle river. The magnitude of changes due to high-flow events would decrease, although the difference would be less marked than in the middle river, because the lower river also is affected by floods generated in the Chulitna and Talkeetna rivers. No major changes in ice dynamics are expected in the lower river.

Reduced seasonal fluctuations in the river level potentially would affect the establishment of poplar and willows in early successional habitats on the Susitna floodplain. Seeds of those species are dispersed during spring floods (the only time they are viable). Seedlings establish and grow during summer, after the water level recedes. Reduced flooding likely would limit seed dispersal on suitable substrates and lower summer flows may affect seedling growth and survival negatively. Construction of the project may affect succession at sites where vegetation is already established. Under natural conditions, succession frequently is "reset" by summer floods and winter ice jams. With those events reduced in frequency and severity during project operation, the relative abundance of vegetation at different successional stages may be altered. Such alteration could affect forage availability for some wildlife species, such as moose and snowshoe hare, because browse abundance differs among successional stages.

Generally, the likely overall effects of the project on riparian habitats downstream would be a more stabilized floodplain, a decreased number of subchannels, and increased vegetative cover. The expected lower summer flows would have three principal effects: (1) more land would be available for possible plant colonization; (2) soil moisture levels would be drier, and (3) water level fluctuations would be reduced. The lower level of existing vegetation appears to be related to flows between the average summer flow (23,000 cfs) and the mean annual flood (52,000 cfs), except in a few locations where ice jams regularly occur. More than 75 percent of the terrain elevations representing the lower vegetation limit correspond to flows greater than 23,000 cfs, but less than 10 percent correspond to flows greater than 52,000 cfs. The absence of ice jams would result in the lower limit of vegetation coinciding with summer flows, assuming all that land is suitable for colonization by plants. Hence, the area between elevations corresponding to the post-construction summer flows and the natural summer flows likely would become vegetated, or at least would not be inhibited by floods or other disturbance factors.

Stanford et al. (2005) described the naturally shifting habitat mosaic of river ecosystems. Damming a river alters these mosaic patterns resulting in effects such as the loss of seasonal fluctuations in water level and the natural disturbance regime. These changes increase the rate of colonization by nonnative, invasive plants and senescence of native riparian species. Research in both Montana (Nyack River) and Alaska (Susitna and Talkeetna rivers) has shown that flood-related disturbance is important for maintaining habitat diversity in riparian areas (Helm and Collins 1997, Bowen et al. 2003, Whited et al. 2007, Hanley 2008). In rivers where flow is regulated by dams, changes in the flooding regime can affect the distribution of both individual species and habitat types across the landscape (Nilsson et al. 1997, Whited et al. 2007). The complexity of such interactions has been investigated using modeling (e.g., Tealdi et al. 2011) that demonstrates the important influences of uncertain flow regimes and sediment transport on riparian vegetation. In both the Nyack and Talkeetna floodplains, species richness of vascular plants was highest at sites with the finest alluvium (Mouw et al. 2008). The spatial distribution of alluvium texture was determined by flow energy, and thus could likely to be altered by hydroelectric development. In Sweden, plant species richness and dominance were affected by the distribution of anchor ice (Engstrom et al. 2011), which also would be expected to change directly downstream from dams.

4.7.3. Potential Protection, Mitigation, and Enhancement

4.7.3.1. Wetlands and Littoral Habitats

Wetland impacts from project construction will be minimized by reducing volume requirements for borrow extraction and co-locating access and transmission lines, which would reduce the overall project footprint. This reduction could be accomplished by using alignments that avoid wetlands and follow well-drained upland terrain with soils suitable for use as construction material; the use of excavated material from dam site in construction of facilities to minimize borrow sites; the location of borrow sites in upland areas; the use of side-borrow and balanced cut-and-fill road and railroad construction techniques; and incorporating a flexible road-design speed to avoid the necessity for deep side hill cuts requiring excessive fill. The borrow and quarry sites will be located near the Watana dam site, minimizing the length of haul roads and centralizing areas of disturbance. The disposal of spoil from construction and borrow

excavations would create the potential for wetland impacts either through direct burial or through clearing for spoil disposal sites. A cost-effective way to avoid removing vegetation for spoil disposal would be to deposit the spoil within the impoundment areas. However, that option would be limited by the need to prevent fines from being entrained by surface water flow. Thus, locations for spoil disposal within the impoundment areas would need to be selected carefully and designated clearly in areas that would pond quietly during filling, well away from turbulent flows associated with intake structures.

Additionally, the siting and alignment of all facilities will be designed to avoid wetlands to the maximum extent feasible. Access by ORVs would be discouraged to minimize indirect wetland impacts. Agency coordination and review of detailed engineering design and construction planning of Project facilities would be conducted to minimize potential wetland impacts.

Rehabilitation of temporary impacts on wetlands would be conducted to the maximum extent possible. Provided that the appropriate hydrologic and soil characteristics are not extensively altered, wetland recovery would proceed at various rates (which are difficult to quantify), depending on factors such as slope, aspect, elevation, soil types, moisture and drainage conditions. A specific restoration plan would be developed for each area to be rehabilitated. Guidelines and best management techniques for erosion and sedimentation control would be followed (e.g., Densmore et al. 2000, Wright and Hunt 2008).

Wetland mitigation measures will be determined in conjunction with the USACE 404 permitting process.

4.7.3.2. Riparian Habitats

To mitigate direct and indirect impacts on riparian habitats, several recommendations were made for the APA Project, which may be considered for this Project (UAFAFES 1985). They identified logging of mature paper birch–white spruce stands as being the most promising option for establishing riparian habitat, because logged areas have been shown to produce abundant birch browse, as well as rose and highbush cranberry, which also are attractive forage species for herbivores. Controlled burns also could be used to create similar desirable effects. The nature of riparian habitats generally precludes extensive natural fires, and burning would release nutrients to the soil that would not occur with logging.

Flows may be manipulated to enhance riparian conditions below the Project.

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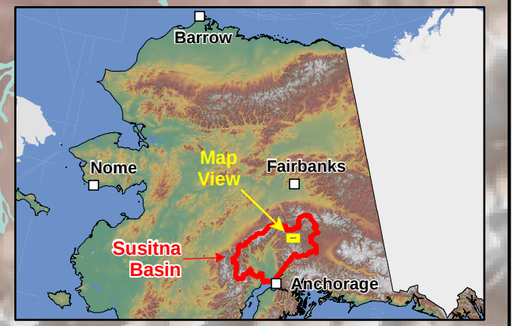
148°30'0"W
148°20'0"W
148°10'0"W
148°0'0"W
147°50'0"W
62°55'0"N
62°50'0"N
62°45'0"N



extent of mapping

ABR File: Susitna_NWI_NE_AEA_11-159.mxd; 9 December 2011

National Wetland Inventory Descriptions (Wetlands Only)

- Lake
- Upper Perennial River
- River Bar
- Pond
- Seasonally Flooded Pond
- Beaver Pond
- Aquatic Bed
- Emergent Marsh
- Emergent Wet Meadow
- Scrub Shrub
- Forested
- Unknown (to be determined)
- Study Area

Wetlands mapping is from draft digital conversion of NWI maps produced by USFWS in 1984 from vegetation mapping conducted in 1982 for the original Susitna Hydroelectric Project. Draft data were provided courtesy of the USFWS NWI office in Anchorage, AK, for presentation purposes only.

N

0.5 0 0.5 1 1.5 2 Miles

1 0 1 2 3 Kilometers

ALASKA ENERGY AUTHORITY

Date: Dec 2011
Scale = 1:103,000

State of Alaska
Susitna-Watana Hydroelectric Project FERC No. 14241

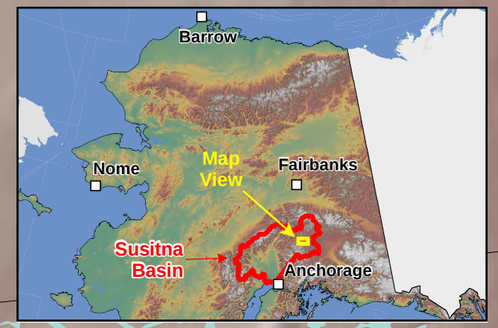
Figure 4.7-1

Wetlands Mapped in the Western Portion of the Proposed Watana Reservoir Study Area

148°0'0"W
147°50'0"W
147°40'0"W
147°30'0"W
147°20'0"W
62°45'0"N
62°40'0"N
62°54'29"N
62°40'0"N

extent of mapping

extent of mapping



ABR File: Susitna_NWI_SE_AEA_11-159.mxd; 9 December 2011

National Wetland Inventory Descriptions (Wetlands Only)

- Lake
- Upper Perennial River
- River Bar
- Pond
- Partially Flooded Pond
- Seasonally Flooded Pond
- Beaver Pond
- Aquatic Bed
- Emergent Marsh
- Emergent Wet Meadow
- Scrub Shrub
- Forested
- Unknown (to be determined)
- Study Area

Wetlands mapping is from draft digital conversion of NWI maps produced by USFWS in 1984 from vegetation mapping conducted in 1982 for the original Susitna Hydroelectric Project. Draft data were provided courtesy of the USFWS NWI office in Anchorage, AK, for presentation purposes only.

N

0.5 0 0.5 1 1.5 2 Miles

1 0 1 2 3 Kilometers

ALASKA ENERGY AUTHORITY

Date: Dec 2011
Scale = 1:100,000

State of Alaska
Susitna-Watana Hydroelectric Project FERC No. 14241

Figure 4.7-2

Wetlands Mapped in the Eastern Portion of the Proposed Watana Reservoir Study Area

4.8. Rare, Threatened and Endangered Species

This section identifies species that have both a special state or federal conservation designation and a habitat range that intersects the general study area. It also includes a brief description of each type of conservation status.

4.8.1. Plant Species

No plant species listed or under consideration for listing under authority of the Endangered Species Act (ESA) are known or suspected to occur in areas that might be directly affected by Project construction or operation, including changes in riverine habitats downstream of the dam. The single ESA-listed plant species in Alaska occurs on the Aleutian Islands, approximately 1,300 mi from the Project area (USFWS 2011b).

The BLM has developed lists of Sensitive and Watch List plant species. The agency manages special status species on BLM-administered lands according to BLM Manual 6840 (BLM 2008a). It also includes among its special status species those species listed as threatened or endangered, and those considered as candidate or proposed species, under the ESA, as well as species that have been de-listed from the ESA in the past five years. An objective of its special status species policy pertinent to this Project is "to initiate proactive conservation measures that reduce or eliminate threats to Bureau sensitive species to minimize the likelihood of and need for listing of these species under the ESA." It further references the State Director's responsibility for "[i]nventorying BLM lands to determine which BLM special status species occur on public lands, the condition of the populations and their habitats, and how discretionary BLM actions affect those species and their habitats." Implementation of BLM policies regarding sensitive species may include "[d]etermining, to the extent practicable, the distribution, abundance, populations, condition, current threats, and habitat needs for sensitive species, and evaluating the significance of BLM-administered lands and actions undertaken by the BLM in conserving those species." Watch List species "are not subject to the [BLM] sensitive species policy, and they have no implied relevance to the NEPA process" (BLM n.d.). Sponsors of natural resource development projects recently proposed in Alaska have been required or asked to perform rare plant surveys on BLM-administered lands as part of the baseline information development effort.

The State of Alaska does not have jurisdiction over plant species based on their rarity, nor does it have any programs other than the BIOTICS Database of the Alaska Natural Heritage Program (AKNHP) for managing rare species (AKNHP 2011b). The AKNHP's BIOTICS Database tracks the locations of plants that available data indicate may be rare or imperiled on a statewide or global basis. A plant's appearance on this list does not itself confer any regulated status.

Data searches for this analysis have not identified any known occurrences of rare or other special status plant species in the approximate Project footprint (AKNHP 2008, FERC 1984, Hultén 1968, Lipkin and Murray 1997, MON 2011, Santosh 2011). The AKNHP database indicates that 19 rare vascular plant taxa with S1 (critically imperiled) and S2 (imperiled) rankings have been collected in the regional search area, which includes the Susitna River drainage (Table 4.8-1). One of these taxa, an aquatic species known as flatleaf pondweed or Robbins pondweed

(*Potamogeton robbinsii*), has been recorded in the Project area in Watana Lake (McKendrick et al. 1982), evidently representing a second record for the species in the search area (the only other record was near the Summit airstrip in 1953). *Potamogeton robbinsii* is listed as S1S2 within Alaska and as G5 (demonstrably secure globally), indicating that populations are more numerous outside Alaska. Like most rare species, many of the taxa on the list of 19 rare plant taxa considered in this assessment often occur in a narrow range of habitats (e.g., *Artemisia dracunculus* on exposed bluffs) but, given the wide array of habitats available in the Susitna basin, ranging from alpine areas to lowland forests, meadows, and aquatic habitats, it is possible that one or more of the other 18 rare plant taxa may occur in or near the Project area.

Table 4.8-1. Rare vascular plant taxa[1] that have been collected in a broad region of Southcentral Alaska, including the Susitna River drainage.

Scientific Name	Common Name	No. of Collections	State Rank[2]	Global Rank[3]
Arnica diversifolia	Sticky arnica	1	S1	G5
Arnica lessingii ssp. *norbergii*	Norberg arnica	1	S2	G5T2Q
Arnica mollis	Hairy arnica	1	S1	G5
Artemisia dracunculus	Dragon wormwood	2	S1S2	G5
Blysmopsis rufa	Red clubrush	1	S1	unranked
Botrychium ascendens	Upward-lobed moonwort	1	S2	G2G3
Carex athrostachya	Slender beak sedge	1	S1S2	G5
Carex parryana	Parry sedge	2	S1	G4
Ceratophyllum demersum	Common hornwort	1	S1	G5
Chamaerhodos erecta ssp. *nuttallii*	Nuttall's ground-rose	1	S1S2	G5T4T5
Cicuta bulbifera	Bulb-bearing water-hemlock	1	S2	G5
Eleocharis kamtschatica	Kamchatka spike-rush	1	S2S3	G4
Eriophorum viridicarinatum	Green-keeled cottongrass	1	S2	G5
Erysimum asperum var. *angustatum*	Wallflower	1	S1S2	unranked
Glyceria striata var. *stricta*	Fowl mannagrass	3	S2	G5T5
Maianthemum stellatum	Starry solomon-plume	4	S2	G5
Potamogeton obtusifolius	Blunt-leaf pondweed	2	S2S3	G5
Potamogeton robbinsii [4]	Flatleaf pondweed	1	S1S2	G5
Potentilla drummondii	Drummond cinquefoil	1	S2	G5

[1] Data from the Alaska Natural Heritage Program's spatially explicit database of rare species (AKNHP 2011b).
[2] State rarity rankings: S1 = critically imperiled, S2 = imperiled, and S3 = vulnerable.
[3] Global rarity rankings: G2 = imperiled, G3 = vulnerable, G4 = apparently secure, G5 = demonstrably secure, T = rank of subspecies or variety, and Q = indicates uncertainty about taxonomic status that may affect global rank.
[4] Recorded by McKendrick et al. (1982) in the upper Susitna River basin (Watana lake), representing the second record for this species in the region searched (see text).

4.8.2. Special Status Birds

The area considered for the potential presence of RTE birds includes the area that may be directly affected by Project construction or operation, including riverine areas downstream from the dam to the Talkeetna and Chulitna River confluences.

No bird species listed as threatened, endangered, proposed, or candidate under the federal Endangered Species Act or endangered under Alaska Statute 16.20.190 occur in the Project area

(USFWS 2009a, ADF&G 2011c). The Project area includes habitat for other birds that are identified as special status species by state and federal agencies in Alaska that will be involved in the WHP review process. The USFWS and FERC have recently developed a Memorandum of Understanding regarding protection of migratory birds (FERC and USFWS 2011). While it covers all species of migratory birds, it emphasizes Species of Concern that are identified in other documents prepared by the USFWS and multi-organization working groups. Those categories of special status species are among those described below and a complete list of special status species can be found in Table 4.8-2.

The USFWS defines Birds of Conservation Concern (BCC) as species, subspecies, and populations that are not already federally-listed as threatened or endangered but that without additional conservation actions are likely to become candidates for federal listing (USFWS 2008a). The USFWS identifies Birds of Management Concern (BMC) that present management challenges for reasons such as population declines, small or restricted populations, dependence on restricted or vulnerable habitats, or overabundance to the point of causing ecological or economic damage (USFWS 2009b).

The Boreal Partners in Flight (PIF) lists species of conservation priority using a species prioritization process found in the Landbird Conservation Plan for Alaska Biogeographic Regions (Andres 2000).

The BLM designates sensitive species and their habitats "to promote their conservation and reduce the likelihood and need for such species to be listed pursuant to the ESA" (BLM 2008a). They must be native species found on BLM-administered lands, and either: 1) be thought to be in a downward trend such that its viability is at risk in at least a signification portion of this range; or 2) depend on ecological refugia or unique habitat on BLM lands, and such areas may be threatened with alteration that might cause risk to the species' viability there (BLM 2008a). They also include ESA-designated candidate species, proposed species, and delisted species for the period extending five years following the species' delisting. BLM's responsibilities include determining the "distribution, abundance, population condition, current threats, and habitat needs for sensitive species, and evaluating"...the significance of its actions in conserving those species (BLM 2008a). BLM also manages a broader group of "special status species" comprised of its sensitive species and species listed as threatened or endangered under the ESA.

The State of Alaska no longer maintains a list of Species of Special Concern. It uses its Comprehensive Wildlife Conservation Strategy (sometimes referenced as its Wildlife Action Plan) to assess the conservation needs of particular species (ADF&G 2011c). In that plan, it identified featured species (FS). The ADF&G developed its featured species list based on a set of 11 criteria that includes declines in abundance or productivity, deformity, disease or other mortality, rarity, at-risk species, endemics, seasonal use of restricted local range, sensitivity to environmental disturbance, status of species is unknown, species is representative of a broad array of other species in a particular habitat, and international importance (ADF&G 2006).

Three other plans cited in the Memorandum of Understanding between FERC and USFWS regarding migratory bird species identify conservation objectives and priorities for various bird species. These include: the North American Waterfowl Management Plan (NAWMP), the North

American Waterbird Conservation Plan (NAWCP), and the Alaska Shorebird Conservation Plan (ASCP) (NAWMP 2004; Kushlan et al. 2006; Alaska Shorebird Group 2008).

Table 4.8-2 Special status bird species that may occur in the study area.

Common Name	Scientific Name	Conservation Status[1]
American Three-toed Woodpecker	*Picoides dorsalis*	FS
American Dipper	*Cinclus mexicanus*	PIF
American Golden-plover	*Pluvialis dominica*	ASCP
America Wigeon	*Anas americana*	BMC, NAWMP
Bald Eagle	*Haliaeetus leucocephalus*	FS
Bank Swallow	*Riparia riparia*	FS
Belted Kingfisher	*Megaceryle alcyon*	FS
Blackpoll Warbler	*Dendroica striata*	BLM-S, PIF, FS
Black Scoter	*Melanitta americana*	BMC, NAWMP
Black-backed Woodpecker	*Picoides arcticus*	PIF, FS
Blue-winged Teal	*Anas discors*	BMC, NAWMP
Bohemian Waxwing	*Bombycilla garrulus*	PIF
Boreal Owl	*Aegolius funereus*	PIF, FS
Boreal Chickadee	*Poecile hudsonicus*	FS
Brant	*Brant bernicla*	BMC
Brown Creeper	*Certhia americana*	FS
Canada Goose	*Branta canadensis*	BMC, NAWMP
Canvasback	*Aythya valisineria*	BMC, NAWMP
Cliff Swallow	*Petrochelidon pyrrhonota*	FS
Common Loon	*Gavia immer*	FS, NAWCP
Common Goldeneye	*Bucephala clangula*	BMC, NAWMP
Dark-eyed Junco	*Junco hyemalis*	FS
Gadwall	*Anas strepera*	BMC, NAWMP
Golden Eagle	*Aquila chrysaetos*	BLM-S, FS
Golden-crowned Sparrow	*Zonotrichia atricapilla*	PIF
Gray-cheeked Thrush	*Catharus minimus*	BLM-W, PIF
Greater white-fronted Goose (Tule)	*Anser albifrons*	BMC, NAWMP
Green-winged Teal	*Anas crecca*	BMC, NAWMP
Great gray Owl	*Strix nebulosa*	FS
Great-horned Owl	*Bubo virginianus*	FS
Greater Scaup	*Aythya marila*	BMC, NAWMP
Gyrfalcon	*Falco rusticolus*	PIF, FS
Harlequin Duck	*Histrionicus histrionicus*	BMC, NAWMP
Hairy Woodpecker	*Picoides villosus*	FS

Common Name	Scientific Name	Conservation Status[1]
Hermit Thrush	*Catharus guttatus*	FS
Horned Grebe	*Podiceps auritus*	BCC, FS, NAWCP
Hudsonian Godwit	*Limosa haemastica*	ASCP, BLM-W
Lesser Yellowlegs	*Tringa flavipes*	BCC,BMC,FS, ASCP
Lesser Scaup	*Aythya affinis*	BMC, NAWMP
Long-tailed Duck	*Clangula hyemalis*	BMC, NAWMP
Mallard	*Anas platyrhynchos*	BMC, NAWMP
Merlin	*Falco columbarius*	FS
Northern Shrike	*Lanius excubitor*	PIF
Northern Flicker	*Colaptes auratus*	FS
Northern Harrier	*Circus cyaneus*	FS
Northern Goshawk	*Accipiter gentilis*	FS
Northern Hawk Owl	*Surnia ulula*	FS
Northern Shoveler	*Anas clypeata*	BMC, NAWMP
Northern Pintail	*Anas acuta*	BMC, NAWMP
Olive-sided Flycatcher	*Contopus cooperi*	BCC, BLM-S, PIF, FS
Osprey	*Pandion haliaetus*	FS
Pacific Loon	*Gavia pacifica*	FS, NAWCP
Peregrine Falcon[2]	*Falco peregrinus anatum*	BCC, FS
Pine Grosbeak	*Pinicola enucleator*	FS
Pine Siskin	*Spinus pinus*	FS
Redhead	*Aythya americana*	BMC, NAWMP
Red-throated Loon	*Gavia stellata*	BCC, BLM-W, FS, NAWCP
Red-breasted Nuthatch	*Sitta canadensis*	FS
Red-necked Grebe	*Podiceps grisegena*	FS, NAWCP
Red-tailed Hawk	*Buteo jamaicensis*	FS
Ring-necked Duck	*Aythya collaris*	BMC, NAWMP
Rusty Blackbird	*Euphagus carolinus*	PIF, BCC, BLM-S, FS
Short-eared Owl	*Asio flammeus*	BLM-S, FS
Sharp-shinned Hawk	*Accipiter striatus*	FS
Smith's Longspur	*Calcarius pictus*	BCC, PIF, FS
Snow Goose	*Chen caerulescens*	BMC
Solitary Sandpiper	*Tringa solitaria*	BCC, BMC, FS, ASCP
Surf Scoter	*Melanitta perspicillata*	BMC, NAWMP
Surfbird	*Aphriza virgata*	ASCP
Townsend's Warbler	*Dendroica townsendi*	BLM-W, PIF, FS
Trumpeter Swan	*Cygnus buccinator*	BLM-S, BMC

Common Name	Scientific Name	Conservation Status[1]
Tundra Swan	*Cygnus columbianus*	BMC
Upland Sandpiper	*Bartramia longicauda*	BCC, BMC, ASCP
Varied Thrush	*Ixoreus naevius*	PIF, FS
Violet-green Swallow	*Tachycineta thalassina*	FS
Western Wood-pewee	*Contopus sordidulus*	PIF
Whimbrel	*Heteroscelus incanus*	BCC, BMC, ASCP
White-tailed Ptarmigan	*Lagopus leucurus*	PIF
White-winged Crossbill	*Loxia leucoptera*	PIF, FS
White-winged Scoter	*Melanitta fusca*	BMC, NAWMP
White-crowned Sparrow	*Zonotrichia leucophrys*	FS
Wilson's Warbler	*Wilsonia pusilla*	FS
Wilson's Snipe	*Gallinago delicata*	BMC

[1] Conservation Status: FS = Featured Species (ADF&G 2006); BCC = Birds of Conservation Concern (USFWS 2008); BMC = Birds of Management Concern (USFWS 2009b); PIF = Boreal Partners in Flight Working Group (Andres 2000); NAWMP = the North American Waterfowl Management Plan (NAWMP 2004); NAWCP = North American Waterbird Conservation Plan(Kushlan et al. 2006); ASCP = Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2008); BLM-S = BLM Sensitive Species; BLM-W = BLM Watch List Species (BLM n.d.; AKNHP 2011b)

[2] Previously listed as Threatened under ESA, the American Peregrine Falcon was de-listed August 1999

The Bald and Golden Eagle Protection Act provides for the protection of the Bald Eagle and the Golden Eagle by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. The USFWS developed the *National bald eagle management guidelines* in May 2007, which should be followed to comply with the Eagle Act. Protection of Bald Eagles has included definition of zones around nest trees that are guidelines for avoidance of disturbance. The primary zone extends 330 ft from the nest tree, and land clearing or construction may be discouraged year round. Human disturbance is discouraged particularly during the spring-summer nesting season. A secondary zone ranges to a distance of 660 ft from the nest, and human disturbance must be minimized during the breeding season, but construction may be possible outside the nesting season. A third zone that extends up to one-quarter to one-half mile from the nest, depending on topography and line of sight to the nest, permits most activities, timber clearing, construction blasting, and similar major disturbances outside the breeding season (USFWS 2007).

Some activities and projects are eligible for federal permits under the Bald and Golden Eagle Protection Act. The regulation set forth in 50 CFR § 22.26 provides for issuance of permits to "take" bald eagles and golden eagles where the taking is associated with, but not the purpose of, the activity and cannot practicably be avoided. Most take authorized under this section will be in the form of disturbance; however, permits may authorize non-purposeful take that may result in mortality (50 CFR § 22.26).

4.8.3. Special Status Mammals

The Distinct Population Segment of beluga whale that inhabits Cook Inlet (CIBW) was listed as an endangered species under the Endangered Species Act (ESA) on October 22, 2008 (73 FR 62919) and a depleted stock under the Marine Mammal Protection Act. Section 7 of the ESA requires that federal agencies must ensure they do not fund, authorize, or carry out any actions (e.g., issuance of a FERC license) that would jeopardize the continued existence of the listed species, or destroy or adversely modify designated critical habitat. Beluga whale occurrence and habitat use in the Susitna River area are discussed in the Project data gap analysis for aquatic resources (HDR 2011).

No other terrestrial or marine mammals listed (threatened, endangered, proposed, candidate) under the ESA are likely to use the study area (USFWS 2009a, NOAA 2011a). There are no state-listed endangered mammal species in the area potentially affected by the Project (ADF&G 2011c). The little brown bat (*Myotis lucifugus*) is listed as a featured species by the ADF&G and likely occurs in the study area (ADF&G 2006). The Alaska tiny shrew (*Sorex yukonicus*) is the only mammal listed by the BLM as sensitive that may be in the Project area (BLM 2010aa); AKNHP 2011b).

This analysis summarizes knowledge related to CIBW mammal use of the Susitna River, its mouth, and delta, for use in identifying potential impacts of the proposed Susitna-Watana Hydroelectric Project.

Five stocks of beluga whale occur in Alaskan waters: Cook Inlet; Bristol Bay; eastern Bering Sea; eastern Chukchi Sea; and Beaufort Sea (Allen and Angliss 2010). The Cook Inlet stock is an isolated population likely confined to Cook Inlet throughout the year (Rugh et al. 2000; Hobbs et al. 2006; Hobbs and Shelden 2008; Hobbs et al. 2008; NMFS 2008). The estimated abundance for the CIBW was 340 individuals in 2010 (Shelden et al. 2010).

Aerial surveys of CIBWs were carried out in 1982 and 1983 as part of the original licensing effort (Harza-Ebasco 1985), confirming the summer aggregation of belugas at the Susitna Delta also documented by more recent surveys (NMFS 2008; Shelden et al. 2010). A time series of data from annual aerial surveys of CIBWs exists for the period between 1993 and 2010 (NMFS 2008; Shelden et al. 2010). Surveys are conducted at the peak of seasonal use of the study area during June and July to support annual abundance estimates. Additional surveys are conducted in August to document presence of calves.

4.8.3.1. Cook Inlet Beluga Whale Occurrence

Aerial surveys conducted since 1993 have consistently documented high CIBW use of Knik Arm, Turnagain Arm, Chickaloon Bay, and the Susitna River delta areas of the upper inlet (NMFS 2008). Satellite tagging data further support the high use of these areas by belugas (Hobbs et al. 2005).

Several factors likely influence beluga whale distribution in Cook Inlet. Prey availability, predator avoidance, sea-ice cover and other environmental factors, reproduction, sex and age

class, and human activities play an important role in beluga seasonal distribution within Cook Inlet (Rugh et al. 2000; NMFS 2008). Seasonal movement and density patterns as well as site fidelity appear to be closely linked to prey availability, coinciding with seasonal salmon and eulachon concentrations (Moore et al. 2000). CIBWs forage intensely during the summer when prey availability is high and locally concentrated near river mouths (Huntington 2000; Moore et al. 2000). This seasonal feeding is presumably important in providing energy storage and reserves for the winter. Availability of prey species appears to be the most influential environmental variable affecting Cook Inlet whale distribution and relative abundance (Moore et al. 2000). The patterns and timing of eulachon and salmon runs have a strong influence on beluga whale feeding behavior and their movement during the spring and summer (Nemeth et al. 2007; NMFS 2008). The presence of prey species may account for the seasonal change in beluga group size and composition (Moore et al. 2000). Belugas frequent areas near coastal mud flats and river mouths in Cook Inlet from spring through fall (Goetz et al. 2007; NMFS 2008). Beluga whales tend to concentrate at rivers and bays in upper Cook Inlet during summer and fall, then disperse to waters in the mid-inlet during winter and spring (NMFS 2008).

CIBWs exhibit site fidelity to distinct summer concentration areas and are reliably found annually in these areas (Seaman et al. 1986), typically near river mouths and associated shallow, warm, and low-salinity waters (Moore et al. 2000). Aerial surveys conducted in late April and early May reported beluga whales in the upper inlet as eulachon runs reached the Susitna and Twenty mile rivers (NMFS 2008). During the summer, beluga whales are frequently observed along Susitna Flats, gathering at the Susitna and Little Susitna rivers and other small streams on the western side of Cook Inlet, following runs of eulachon, Chinook salmon, and coho salmon (Hobbs and Shelden 2008; NMFS 2008; Allen and Angliss 2010). In late summer and fall, beluga whales aggregate near the mouths of streams on the western side of the inlet south from Susitna Flats to Chinitna (NMFS 2008).

CIBWs appear to calve primarily in the Susitna Flats portion of upper Cook Inlet (Huntington 2000). Calves represented 7-8 percent of whales observed in the Susitna Flats area during various surveys, including aerial and boat-based surveys (Funk et al. 2005; McGuire et al. 2008; McGuire et al. 2009). However, during 2009 photo-identification surveys, 63 percent of whale groups photographed in Knik Arm contained neonates, compared with 47 percent of groups in Susitna, indicating there may be more than one nursery area in upper Cook Inlet (McGuire et al. 2011).

The traditional ecological knowledge (TEK) of Alaska Natives and NMFS aerial survey data document a historical contraction of the summer range of CIBWs (Huntington 2000; NMFS 2008; Rugh et al. 2010; Carter and Nielsen 2011). While belugas were once abundant and frequently sighted in the lower inlet during summer, they are now primarily concentrated in the upper half of the inlet (Rugh et al. 2010). Potential explanations for the range contraction include:

- Habitat change;
- Predator avoidance; or
- Use of spatially limited optimal habitat by a remnant population.

The first indication of a possible recovery may be reoccupation of more peripheral habitats (Rugh et al. 2010).

Large groups of belugas arrive at the Susitna River mouth in the spring during eulachon runs in May and June, and suggesting that Cook Inlet beluga whale distribution is associated with the seasonal presence of prey species (Calkins 1984; Hazard 1988; Nemeth et al. 2007; NMFS 2008). Eulachon runs in the Susitna River number in the several hundred thousand individuals during May, with several million fish present in June (Calkins 1989). Eulachon filled the stomach of one beluga whale harvested at the Susitna delta in 1998 (NMFS 2008), suggesting the importance of Susitna River spring eulachon runs to CIBWs. In summer, as runs of eulachon decline in abundance, belugas begin feeding heavily on Pacific salmon (NMFS 2008).

4.8.3.2. Cook Inlet Beluga Whale Critical Habitat

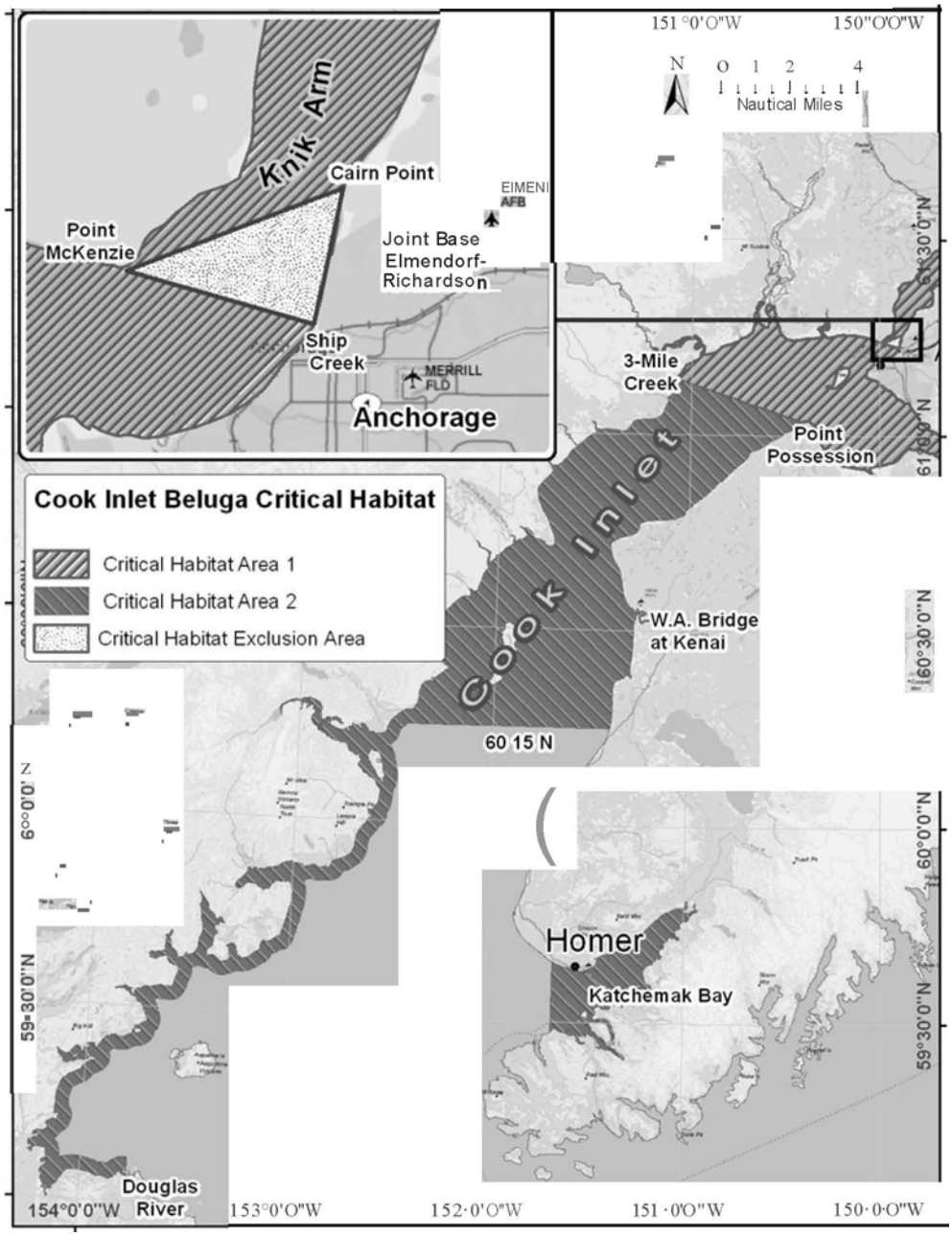
Critical habitat was designated for CIBWs by the NMFS on April 11, 2011 (76 FR 20180). The critical habitat area includes upper Cook Inlet from the upper end of Knik and Turnagain arms to an area south of Kalgin Island, Kachemak Bay, and near shore areas extending from Tuxedni Bay to Kamishak Bay (Figure 4.8-1). Proposed critical habitat for the Cook Inlet beluga whale is present in lower reach and mouth of the Susitna River. The lower Susitna River, mouth, and delta are located in Area 1 of the designated critical habitat.

NMFS identified five primary constituent elements (PCEs) in the final ruling that are essential to the conservation of CIBWs:

- **PCE 1** -Intertidal and subtidal water of Cook Inlet with depths <30 ft (mean low lower water) and within 5 miles of high and medium flow anadromous fish streams
- **PCE 2** -Primary prey species consisting of four species of Pacific salmon (Chinook, sockeye, chum, and coho), eulachon, Pacific cod (*Gadus macrocephalus*), walleye pollock (*Theragra chalcogramma*), saffron cod (*Eleginus gracilis*), and yellow fin sole (*Limanda aspera*)
- **PCE 3** -Waters free of toxins or other agents of a type or amount harmful to CIBWs
- **PCE 4** -Unrestricted passage within or between the critical habitat areas
- **PCE 5** -Waters with in-water noise below levels resulting in the abandonment of critical habitat areas by CIBWs

Although PCEs 1-5 are present in the lower Susitna River and its mouth, only PCEs 1 and 2 could potentially be directly affected by the proposed hydroelectric project. Potential effects of the Susitna-Watana Project on Cook Inlet beluga whale critical habitat are described below.

Figure 4.8-1 Cook Inlet beluga whale critical habitat



Source: http://www.[ala.noaa.gOY/newsreleases/images/cibelugachmap.jpg

4.8.3.3. Cook Inlet Beluga Whale use of the Susitna River area

Available information indicates that the Susitna River mouth and delta are vital habitats for the Cook Inlet beluga whale. The lower reach of the Susitna River lies within critical habitat Area 1. Area 1 critical habitat contains shallow tidal flats, river mouths, or estuarine areas, and is important as foraging and calving habitat. These habitats may also serve other biological needs, such as molting or escape from predators (Shelden et al. 2003).

Area 1 critical habitat has the highest concentrations of belugas from spring through fall as well as the greatest potential for adverse impact from anthropogenic threats. Intensive summer feeding by belugas occurs in the Susitna delta area. Risk from harm from anthropogenic factors in Area 1 is increased by the fact that whales occur here in high densities.

Though belugas are known to enter Cook Inlet area streams, information on their distribution and occurrence of is limited[18]. The NMFS (NMFS 2008) identified beluga "feeding hotspots" in Cook Inlet as the Susitna and Little Susitna rivers, Knik Arm from Eagle Bay to the Eklutna River, the Ivan River, the Theodore River, the Lewis River, the Chickaloon River, and Chickaloon Bay. Whales may gather in estuaries or river mouths in order to carry out biologically important, such as:

- Calving or breeding, because warm water may facilitate thermoregulation in neonates and/or adults (Calkins 1989; Moore et al. 2000; NMFS 2008)
- Feeding in spring when blubber resources are lowest (Calkins 1989; NMFS 2008)
- Escaping predators (Shelden et al. 2003; NMFS 2008)
- Sheltering during storms (Calkins 1984; Huntington 2000)

HDR (2010) reviewed CIBW presence upriver of the mouths of various tributaries of Cook Inlet. Whales were found to be present upriver in spring, summer, and autumn (approximately April-September). Documented presence of whales upriver was confirmed for the Susitna River, Kenai River, Twenty mile River, Placer River, Knik River, and Beluga River (as far upriver as Beluga Lake at RM 30. Bird Creek, Chickaloon River, Glacier Creek, Fox River, Ivan River, Lewis River, Little Susitna River, McArthur River, and Theodore River (HDR 2010).

Tags applied to adult salmon migrating up the Susitna River at RM 20, 22 and 80 during the 1980s APA Project Aquatic Studies Program were recovered in January 1986 from the stomach of a male beluga whale found stranded in Turnagain Arm (Calkins 1989). Since it is unlikely that a spawning adult salmon would migrate up to 80 miles downstream to exit the river, and belugas are not known to feed on dead or dying fish, (Calkins 1989) the whale may have taken the salmon upriver. In spite of this, crews manning fish-tagging stations along the Susitna River did not see whales upstream of RM 3 (Calkins 1989).

Traditional hunting areas for beluga whales included upriver feeding locations in the Susitna, Little Susitna, Ivan, Theodore, and Lewis rivers (Calkins 1989). According to traditional ecological knowledge, CIBWs are known to ascend the Susitna River at least as far as the power lines near RM 5 and occasionally as far as RM 30 to 40 (Huntington 2000).

Whales have also been observed above tidewater in seven other Cook Inlet streams, including the nearby Beluga River, Kenai River, and streams entering both Knik and Turnagain Arms (HDR 2010), indicating a pattern of frequenting upriver habitats.

4.8.4. Special Status Fish

No fish species listed under the ESA may be found in the project area (USFWS 2009a, NOAA 2011a). The State of Alaska does not identify any fish species as endangered which may be in the Project area or affected by the Project. Three salmon stocks in the Susitna watershed have

been designated as "stocks of concern" by the ADF&G and the Alaska Board of Fisheries (BOF). A "stock of concern' is defined by the Alaska *Policy for Management of Sustainable Salmon Fisheries* (5 AAC 39.222) as a salmon stock that exhibits a yield, management or conservation concern. A conservation concern is the highest level of concern under this policy and none of these stocks have this status. Susitna River sockeye salmon were established as a stock of "yield concern" under this policy in 2008. A "yield concern", is defined as a chronic inability, despite specific management efforts to maintain expected harvestable surpluses above the stock's escapement needs. The BOF also found the Willow and Goose Creeks Chinook salmon stock to be a yield concern in February of 2011. ADF&G provided a stock status report, action plan, and research plan for these stocks at the February 2011 BOF meeting (ADF&G 2011d).

The Alexander Creek Chinook salmon stock was designated a stock of "management concern" under the policy in February 2011. A "management concern" is a higher level of concern than a "yield concern" and results from a chronic inability to achieve the sustainable escapement goal for the stocks despite the use of specific management efforts. Stock status reports, action plans and research plans were developed for these stocks (ADF&G 2011d, 2011e) and the BOF modified fishing regulations to address the concern (Alaska Board of Fisheries 2011).

4.8.5. Special Status Amphibians and Reptiles

No amphibian or reptile species listed under the ESA may be found in the project area (USFWS 2009a). The BLM does not show any amphibians or reptiles on its Alaska sensitive or watch lists (BLM n.d.). The ADF&G lists the wood frog as a featured species, and it is likely to found in the Project area (ADF&G 2006).

4.8.6. Essential Fish Habitat

The Project area includes essential fish habitat (EFH), as explained below. The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the federal law that governs U.S. marine fisheries management. In 1996 Congress added new habitat conservation provisions to that act in recognition of the importance of fish habitat to productivity and sustainability of U.S. marine fisheries which includes freshwater habitat utilized by anadromous[3] species. The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a federal fisheries management plan. The MSA requires federal agencies to consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (MSA §305[b][2]).

Congress defined EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The NMFS EFH guidelines further interpret the EFH definition:

- "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate
- "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities
- "Necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem
- "Spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle

The EFH mandate applies to all species managed under a federal fishery management plan, which includes all five species of Pacific salmon. Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon and includes those waters identified in ADF&G's *Catalog of waters important for the spawning, rearing, or migration of anadromous fishes* (ADF&G 2011a). This catalog designates anadromous waters in the main stem of the Susitna River extending upstream to the mouth of the Oshetna River at approximately river mile 225.

4.8.7. Relevant Biological Opinions, Status Reports, and Recovery Plans

The following reports may be pertinent to the only ESA-listed species potentially affected by the project:

Biological Opinions:

- Fort Richardson – US Army, Section 7 Consultation Biological Opinion on the Resumption of Year-Round Firing Opportunities at Fort Richardson, 05/2011 (NMFS 2011aa)

- Knik Arm Bridge And Toll Authority: Knik Crossing, ESA Section 7 Consultation Biological Opinion, Knik Arm Crossing, 11/2010 (NMFS 2010aa)

- Port of Anchorage Expansion, Endangered Species Act, Section 7 Consultation Biological Opinion for the Marine Terminal Redevelopment Project at the Port of Anchorage, Alaska, 07/2009 (NMFS 2009aa)

- List of additional consultation documents for projects related to the Cook Inlet beluga whale are available on the NOAA website (NMFS 2011bb)

Status Reports:

- Stock Assessment report, 2010 (Allen and Angliss 2011aa)

- Status Review Supplement for Cook Inlet, 10/2008 (Hobbs and Shelden 2008aa)

- 2008 Status Review for Cook Inlet, 04/2008 (Hobbs et al. 2008aa)

    - Not published in the FR

- 2006 Status Review for Cook Inlet, 03/24/2006 (Hobbs et al. 2006aa)
- 73 FR 14836

Recovery Plans:

- Notice of intent to prepare a recovery plan for the Cook Inlet beluga whale. 75 FR 4528, January 28, 2010 (NMFS 2010cc)
- Recovery Outline for Cook Inlet Beluga whales, 02/2010 (NMFS 2010bb)
- Conservation Plan for the Cook Inlet Beluga Whale, 10/2008 (NMFS 2008aa)
  - Discusses the need for a Recovery Plan under the ESA

4.8.8. Potential Adverse and Positive Impacts

Potential adverse impacts to RTE species, populations, and habitats require an understanding of the project footprint, locations of construction activities, project operations, habitats, and refined inventories of RTE species and their use of affected areas relative to their full ranges. Some of the Project information is still under development or unknown. Once it is refined, the Project and species information can be analyzed to describe potential impacts to RTE species, potentially limited by lack of species information specific to the Project area.

4.8.8.1. Plant Species

The Project would not affect any ESA-listed plant species. Due to the lack of past floristic surveys conducted within the study area, potential adverse impacts to other rare or sensitive plant species cannot yet be determined. If individuals of RTE plant species occur within areas directly affected by the Project, adverse impacts could include physical disturbance or destruction through Project construction or operation. The Project could potentially eliminate individual populations of special status plants. Because no federally-listed threatened or endangered plant species live in the Project area, the stringent species protection measures of the ESA would not be applicable.

4.8.8.2. Animal Species

Construction of Project structures and Project operations would alter habitat and its use by RTE species. The only species listed under the ESA that might be affected is the Cook Inlet beluga whale. The beluga whale could be affected if its habitat (for example, mudflats) or prey species were affected. These prey species particularly include anadromous species: Chinook, sockeye, chum, and coho salmon; eulachon, and saffron cod (NMFS 2008aa). They could also include marine species that use the Susitna River mouth and delta: Pacific cod, walleye pollock, and saffron cod (Moulton 1997).

4.8.8.2.1. Cook Inlet Beluga Whale Critical Habitat

PCE 1 - Areas of shallow mudflats surrounding and within the Susitna River mouth and delta are part of critical habitat PCE 1. If maintenance of these mudflats is dependent on the sediment output of the Susitna River, possible changes in sediment-loading at the river mouth due to the project could affect PCE 1.

Shallow mudflat habitats have been shown to correlate highly with beluga whale presence (Goetz et al. 2007). CIBWs frequent deeper waters during the winter, and shallower areas during summer and autumn. Sediment discharged by glacial tributaries makes up the majority of substrate, as well as rain, snowmelt runoff, and the Alaska Coastal Current (Schumacher et al. 1989). Possible functions of shallow habitats:

- Concentrate prey, increasing availability to belugas (NMFS 2008)
- Provide predator escape habitat (NMFS 2008)
- Provide optimal conditions for molting, calving, and nurturing young

Shallow areas may serve to concentrate fish, with the result that belugas may preferentially use areas with favorable bathymetry over areas with greater prey concentrations (NMFS 2008). For example, belugas do not often feed at the Kenai River mouth although salmon return there in high concentrations (NMFS 2008).Belugas gather at the edge of the Susitna River delta at lower tides to feed on salmon holding in this area before they migrate upstream at higher tides, and belugas have been reported to block channel entrances to the river delta in order to feed (Huntington 2000).

Data needs for assessing potential impacts to this PCE will be fulfilled under data gaps identified under Hydrology, Ice, Sediment, Geomorphology, and Climate, Section 8.

PCE 2 - PCE 2 consists of the following primary prey species for beluga whales : Chinook, sockeye, chum, and coho salmon; eulachon; Pacific cod; walleye pollock; saffron cod; and yellowfin sole. All of these species, except yellowfin sole, have been caught offshore of the Susitna Delta (Moulton 1997). Occurrence of marine fish species in the mouth and lower (tidal) reaches of the river are unknown. Chinook, sockeye, chum and coho salmon; and eulachon spawn in the Susitna River (Harza-Ebasco 1985). Concentrations of saffron cod in the shallow near shore areas may create a valuable prey source for belugas during spring (NMFS 2008).

Pacific salmon (Chinook, sockeye, chum, and coho), Pacific eulachon, Pacific cod, walleye pollock, saffron cod, and yellowfin sole constitute were identified as the most important food sources for CIBWs through research and TEK. Stomach sampling indicates the above species make up the majority of prey consumed by weight during the ice-free season. A hydroelectric project that could potentially affect fish stocks spawning in the Susitna River or using habitat in its mouth or delta could impact Cook Inlet beluga whale critical habitat PCE 2.

PCE 3 - PCE 3 consists of waters free of toxins or other agents of a type or amount harmful to CIBWs. Potential for effects on beluga whale critical habitat from the Project exists since the Project has potential to affect water quality and contaminant-loading of sediment of the Susitna River, although the effects, if any, will likely be attenuated by tributary inflows below Watana Dam. Upper Cook Inlet has been designated a Category 3 water body, or a water for which there

is insufficient or no data to determine whether any designated use would be impaired; therefore, there are no identified water quality concerns or total maximum daily loads for Cook Inlet. Water quality of the river mouth and contaminant-loading of sediment at the mouth are unknown.

PCE 4 - Changes in water levels could change belugas access to estuarine and upriver habitats in the Susitna River. If waters become too shallow, whales may not physically be able to enter them. Belugas have been documented traveling in large, tightly packed groups in both the east and west tributaries of the Susitna River, thought to be pursuing fish (Rugh et al. 2000). Belugas may use bathymetric features such as river banks and shallow mud flats in order to increase their hunting success. Changes in water levels could affect feeding success.

PCE 5 - Noise levels in critical habitat areas are not expected to be affected by the project since no noise impacts are expected at the river mouth/delta, as the proposed dam would be more than 180 miles upriver.

4.8.8.3. Essential Fish Habitat

Construction activities and project operation could alter and affect Essential Fish Habitat. The effects will become better known as Project features are sited and additional information is developed on the salmon use of areas directly affected by Project components and flow changes. FERC will need to analyze potential adverse effects to EFH, develop appropriate mitigation measures, and consult with NMFS regarding EFH conservation.

4.8.9. Potential Protection, Mitigation, and Enhancement

Protection, mitigation, and enhancement measures (PM&Es) will be developed during the FERC licensing process.

4.8.10. References

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4.9. Aesthetic Resources

As described in APA's 1985 Susitna Hydroelectric Project FERC License Application (APA 1985a), the APA Project facilities, including the transmission line, would be located within two of Alaska's physiographic regions: the Southcentral Region and the Interior Region (see Figure 4.9-1).

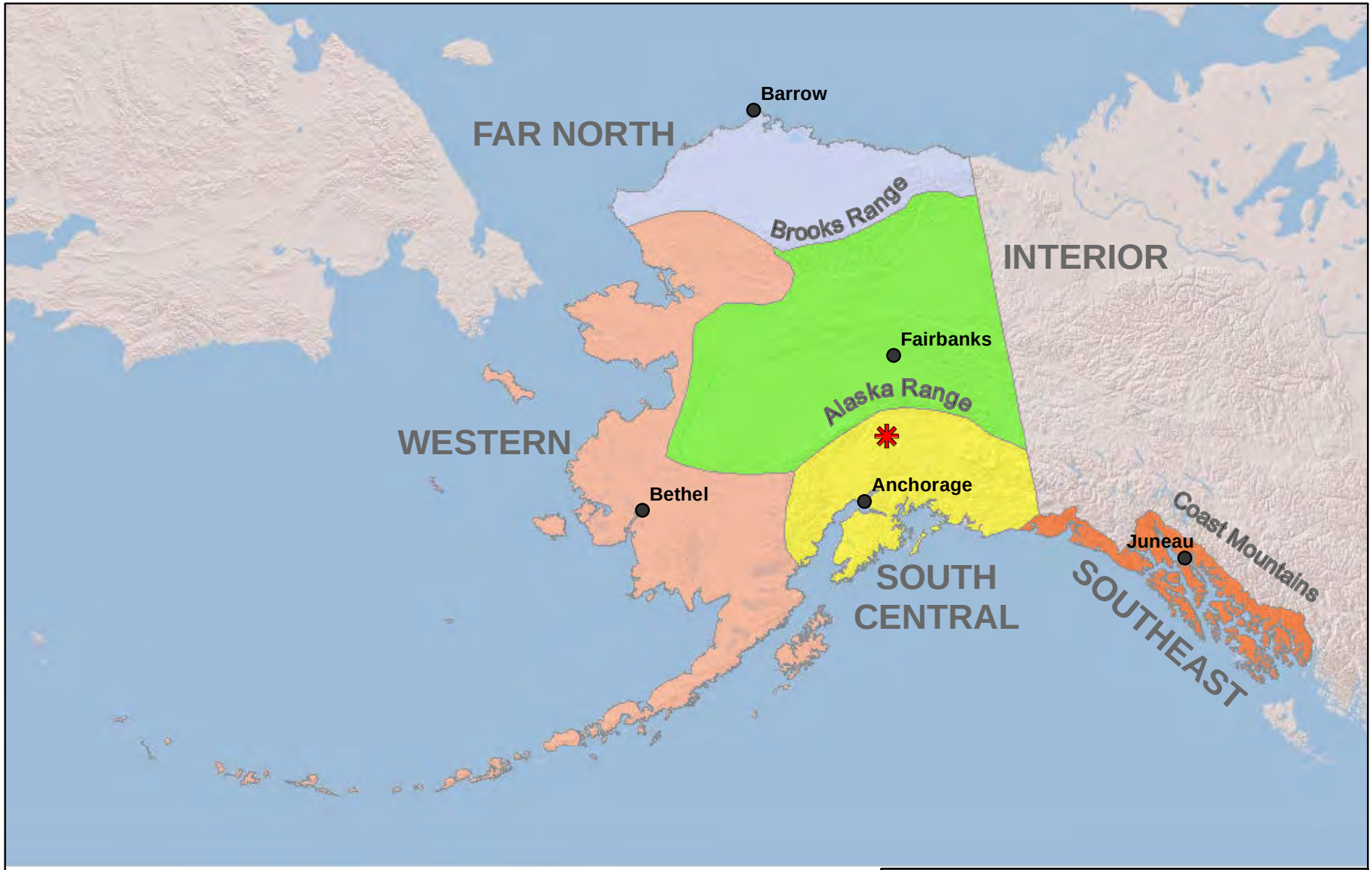
The Southcentral Region is bounded by the Alaska Range to the north and west, the Wrangell Mountains to the east, and the Chugach Mountains and Gulf of Alaska to the south. This region, which encompasses most of the Susitna Project features, is characterized by rugged mountainous terrain, plateaus and broad river valleys. Anchorage, the state's largest city, is located in the Southcentral Region.

Mount McKinley, the highest mountain in North America, is on the Southcentral Region's northwest border. Spruce-hemlock and spruce-hardwood forests, wetlands, moist and wet tundra, plateau uplands and a number of active glacially-bedded mountain valleys are also present. These diverse landscapes include a wide variety of wildlife and fishery resources.

The Interior Region is bordered by the Brooks Range to the north, the Bering Sea to the west, Canada to the east, and the Alaska Range to the south. It is generally characterized as a broad and open landscape of large, braided and meandering rivers and streams. River valleys are primarily vegetated with spruce-hardwood forests giving way to treeless tundra, brush covered highlands, and large wetland areas. The Yukon River, which bisects the Interior Region, is its most prominent natural features. Fairbanks, the state's second largest city, is located in the Interior Region.

The 39,000-square-mile Middle Susitna River basin is located entirely in the Southcentral region. The basin is bordered by the Alaska Range to the north, the Chulitna and Talkeetna Mountains to the west and south, and the northern Talkeetna Plateau and Gulkana Uplands to the east. Although the basin is not considered to be unusually scenic in comparison to other areas of Alaska, it has distinct and diverse combinations of landforms, waterforms, vegetation, and wildlife species. The deep V-shaped canyons of the Susitna River, the Talkeetna Mountains, and the upland plateau to the east are the dominant topographic forms. Elevations in the basin range from approximately 700 ft to over 6,000 ft. Distinctive landforms include panoramic tundra highlands, active and post-glacial valleys, and numerous lakes. The most well-known features in the basin are the vertical-walled Devils and Vee Canyons on the Susitna River.

Tributaries to the Middle Susitna River in the vicinity of the Proposed Project include Portage Creek, Devil Creek, Fog Creek, Tsusena Creek, Deadman Creek, Watana Creek, Kosina Creek, Jay Creek, and Butte Creek. Scenic waterfalls occur on several creeks near their confluences with the Susitna River. The most notable falls occurs on Devil Creek.



Legend

Proposed Watana Dam and Powerhouse

Alaska Regions

- Far North
- Interior
- Southcentral
- Southeast
- Western

N

0 100 200 400 Miles

ALASKA ENERGY AUTHORITY

Date: Nov 2011
Scale: As Noted

State of Alaska
Susitna-Watana Hydroelectric Project, FERC No.14241

Figure 4.9-1

Physiographic Regions

Wildlife species present in the middle Susitna River basin include Dall sheep, moose, caribou, grizzly and black bears, bald and golden eagles, trumpeter swans, and numerous migratory waterfowl. All five Alaskan salmon species, grayling, burbot, rainbow trout, and lake trout occur in the basin. Devils Canyon rapids serve as a barrier to upstream migration of salmon. As a result, few salmon are found upstream of the canyon.

The Denali Highway passes through the northern portion of the basin. The highway is about 135 mi long and connects Paxson Lodge on the Richardson Highway (east end) with Cantwell junction on the Parks Highway (west end). It is generally open from mid-May to October 1, and is paved only for the first 21 mi west of Paxson and 3 mi east of Cantwell. Several short roads and trails traverse the tundra to mining claims, fishing lodges, and hunting lodges. The main Susitna-Watana Project facilities are located approximately 35 mi south of the Denali Highway. Access into this part of the Susitna River basin is generally limited to hiking, float planes, all-terrain vehicles (ATVs), watercraft, and snowmachines when conditions permit.

Recent photographs of the Project region are included in Appendix 4.9-1.

4.9.1. Existing Aesthetic Resource Conditions

APA's 1985 Susitna Hydroelectric Project FERC License Application included a detailed assessment of the aesthetic resources in the vicinity of the proposed Project vicinity. This assessment included a description of landscape character types; notable natural features; viewers and views; aesthetic value ratings; visual absorption capability; and composite ratings. The assessment, which remains valid and relevant to the proposed Project, is summarized below.

4.9.1.1. Landscape Character Types

Landscape character types are a description and classification of land areas with common distinguishing visual characteristics. They are used as a frame of reference to classify physical features of an area and are based, in large part, on physiographic units. Using aerial photographs and USGS topographic maps, physiographic units were identified as part of the previous FERC licensing effort. These units were subsequently verified and inventoried in the field. The inventory included evaluations of four major landscape characteristics:

- Landforms: Physiographic units defined by their degree of enclosure, geologic history and composition, slope gradient and distinguishing landscape patterns, and notable natural features.
- Waterforms: The location of water bodies, lakes, rivers, streams, wetlands, and the pattern and character of their occurrence. Rarity is also noted.
- Vegetation: A description of the vegetation patterns that exist within the basin. Special or unusual vegetation occurrences are noted.
- Views: A description of special visual characteristics within a landscape character type, panoramic views, and potential viewers.

Landscape character types identified in the vicinity of the proposed Project are graphically shown on Figure 4.9-2 and described in detail in Appendix 4.9-2. These landscape character types include:

- Mid Susitna River Valley
- Susitna River Near Devil Creek
- Susitna River
- Vee (River) Canyon
- Susitna Upland Wet Tundra Basin
- Portage Lowlands
- Chulitna Moist Tundra Uplands
- Chulitna Mountains
- Wet Upland Tundra
- Talkeetna Uplands
- Talkeetna Mountains
- Susitna Upland Terrace
- Susitna Uplands

4.9.1.2. Notable Natural Features

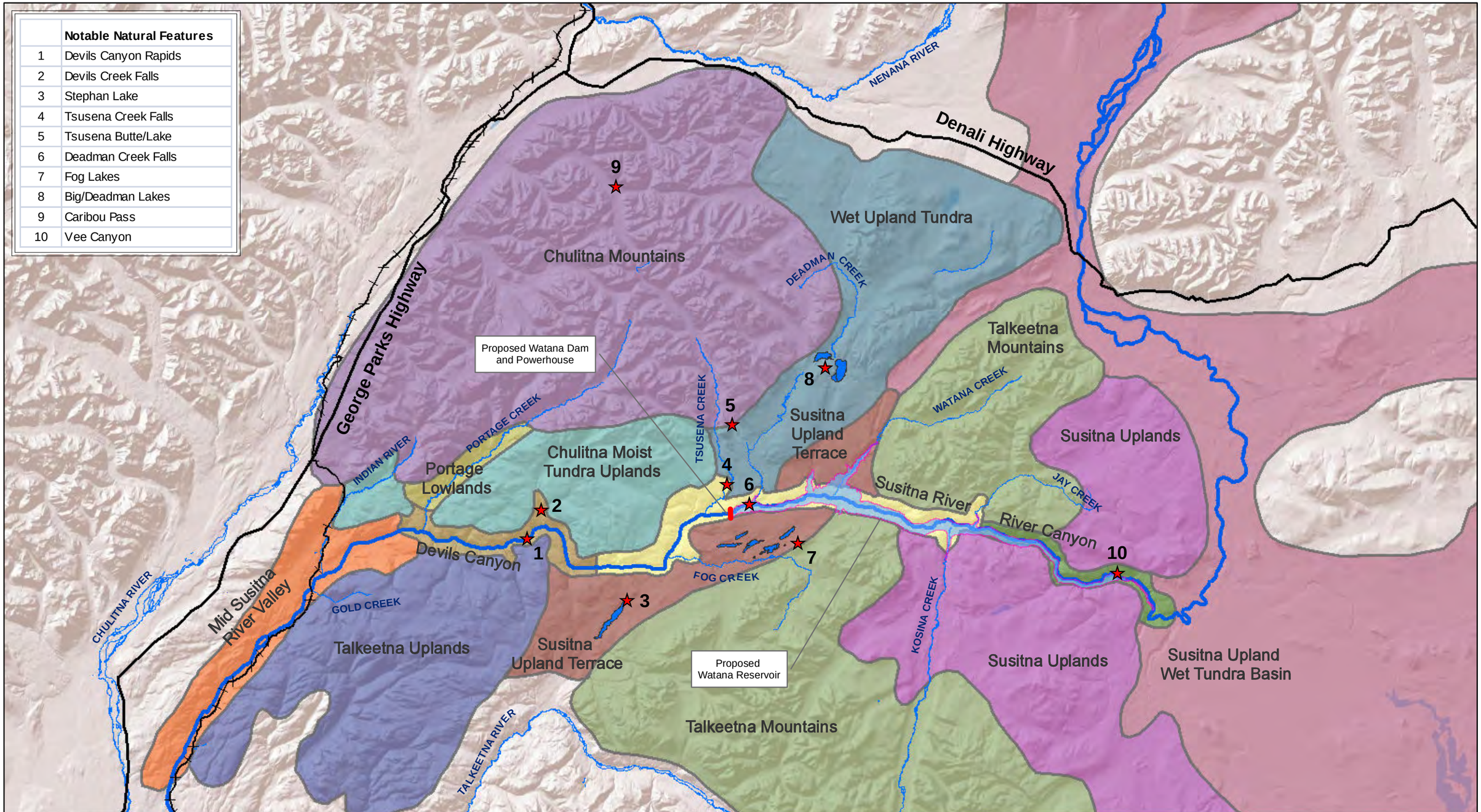
Notable natural features may serve as destinations for visitors and residents seeking recreation opportunities. Notable natural features were identified during the previous FERC licensing effort. The location of these features is shown on Figure 4.9-2. Photographs of these features (taken as part of the previous FERC licensing effort) are included as Appendix 4.9-3.

Devils Canyon, which surrounds an 11-mile stretch of the Susitna River, begins just downstream of the mouth of Devil Creek and ends approximately 1.5 mi upstream of Portage Creek. High volumes of glacial water, steep inaccessible canyon walls and large boulders highlight this turbulent and dynamic landscape. Four sets of rapids, known collectively as Devils Canyon rapids, encompass approximately five mi of the canyon. These rapids are Class VI (the most difficult rating) on the International Whitewater Scale. Between the Class VI rapids, the fast-moving whitewater is rated Class II or Class III. Because of the extreme challenge that the rapids present, few kayakers are known to have attempted to run Devils Canyon.

Two large waterfalls pass through narrow gorges on Devil Creek, just upstream of its confluence with the Susitna River. Vertical rock walls and colorful vegetation punctuate the settings.

Stephan Lake, a large waterbody located at the base of the Talkeetna Mountains, has one fishing/hunting lodge and several cabins (collectively known as Stephan Lake Lodge) along its shore. Wetlands and gentle hills covered with mixed woods and tundra comprise the lake's natural shoreline. Stephan Lake is used as a staring place for kayaking and rafting on the Talkeetna River. A trail leads southwest from the lake to nearby Murder Lake and Daneka Lake.

	Notable Natural Features
1	Devils Canyon Rapids
2	Devils Creek Falls
3	Stephan Lake
4	Tsusena Creek Falls
5	Tsusena Butte/Lake
6	Deadman Creek Falls
7	Fog Lakes
8	Big/Deadman Lakes
9	Caribou Pass
10	Vee Canyon



Legend

- Notable Natural Features
- Proposed Watana Dam and Powerhouse
- Proposed Watana Reservoir
- Highway
- Alaska Railroad
- Susitna River
- Selected Tributaries and Nearby Streams

Landscape Character Types

- Chulitna Moist Tundra Uplands
- Chulitna Mountains
- Devils Canyon
- Mid Susitna River Valley
- Portage Lowlands
- River Canyon
- Susitna River
- Susitna Upland Terrace
- Susitna Upland Wet Tundra Basin
- Susitna Uplands
- Talkeetna Mountains
- Talkeetna Uplands
- Wet Upland Tundra

N

0 5 10 20 Miles

ALASKA ENERGY AUTHORITY

Date: Nov 2011
Scale: As Noted

State of Alaska
Susitna-Watana Hydroelectric Project, FERC No.14241

Figure 4.9-2

Landscape Character Types

A spectacular rocky canyon covered with mixed woods and tundra, and a series of rapids and cataracts provide the backdrop for Tsusena Creek Falls. The falls are located on Tsusena Creek, approximately three mi above its confluence with the Susitna River.

Located at the edge of the Chulitna Mountains, Tsusena Butte Lake was created by a glacial moraine. The Tsusena Creek valley includes a large variety of tundra landscapes and colorful rock formations.

Similar to other tributary falls that flow into the Susitna River, Deadman Creek Falls occurs in a steep, small-scale rocky canyon.

The Fog lakes are a series of large, linear lakes on the south side of the Susitna River. They occur in a gently rolling to flat landscape covered with wetlands, mixed forest, and open tundra vegetation.

Big Lake and Deadman Lake are picturesquely set between three large, tundra-covered buttes. There are many outstanding views from the lakes into the middle Susitna River basin.

Two long lakes, surrounded by glaciated mountains, are located in a narrow valley known as Caribou Pass. Wetlands and tundra cover the valley floor where the middle fork of the Chulitna River has its headwaters.

Vee Canyon is a narrow, vertical, rocky canyon that encloses the Susitna River for over a mile. Located upstream of the confluence with Jay Creek, the canyon includes a double hairpin bend, a deeply cut channel, and a stretch of whitewater rapids. The canyon's steep ridges, varied coloration, and rock formations make it a visually interesting feature.

4.9.1.3. Viewers and Views

Aesthetic resource assessment requires an understanding of who the viewers are, when and where they view the landscape, what they can see, and what preconceptions they bring with them about views.

Existing viewers in the vicinity of the Project include hunters, anglers, guides, flyers, boaters, packrafters, motorists, and hikers. Concentrated at places such as Stephan Lake, many of these viewers are attracted to the area because of its remote setting and recreational opportunities. The Parks Highway has been recognized as both a National and Alaska State Scenic Byway.

Significant views of the Project vicinity were identified as part of the previous FERC licensing effort. These views incorporate foreground (0-0.5 mile from viewer), middleground (0.5-3 mi from viewer), and background (greater than 3 mi) landscape elements. There are many important foreground views within the valleys of Chulitna Mountains, within the Parks and Denali Highway corridors, within the Alaska Railroad corridor, and within the Susitna River corridor. Panoramic views, which incorporate middleground and background landscape elements, include:

- From Parks Highway, looking northwest towards the Alaska Range
- From Denali Highway, looking north towards the Alaska Range

- From Deadman Creek, looking northeast to southeast towards the Clearwater Mountains
- From Big Lake and Deadman Lake vicinity, looking south across the Susitna River towards the Talkeetna Range
- From high ground located north of the Susitna River and west of its confluence with Tsusena Creek, looking south across the Susitna River towards the Talkeetna Range

4.9.1.4. Aesthetic Value Ratings

Each landscape character type was evaluated for its aesthetic value (high, medium, low) during the previous FERC licensing effort. Aesthetic value was defined as a relative measure of the visual landscape based on the following three characteristics:

- Distinctiveness: The visual impression of an area, based on patterns of landforms, waterforms, rocks, vegetative patterns, etc.
- Uniqueness: The relative scarcity or commonality of the landscape and natural features. Due to Alaska's varied and numerous high quality landscapes and natural features, uniqueness is assessed at statewide and Project area scales.
- Harmony and Balance: The degree to which all elements of the landscape form a unified composition. This includes how well man-made elements are integrated into the natural setting.

The characteristics above were evaluated by on on-site examination of each landscape character type. This on-site examination also considered visibility and the potential for views.

4.9.1.5. Visual Absorption Capability

Each landscape character type was evaluated for its visual absorption capability during the previous FERC licensing effort. Visual absorption capability was defined as the relative ability of a landscape to absorb physical change. Each landscape character type was rated as high, medium, or low, based on aesthetic value, topographic enclosure, vegetative cover, ground plane color, and visibility. Each landscape character type was also evaluated through on-site examination with respect to potential project facilities.

The ratings for aesthetic value and visual absorption capability are included in Appendix 4.9-4.

4.9.1.6. Composite Ratings

The aesthetic value rating and visual absorption capability rating for each landscape character type were combined to create a composite rating as part of the previous FERC licensing effort. The range of relationships can be stated as follows:

- The most durable and easily altered landscape character types are those with a high visual absorption capability and low aesthetic character rating.
- The most fragile and difficult to alter landscape character types are those with a low visual absorption capability and high aesthetic character rating.

These relationships, and others, are illustrated in Table 4.9-1, below.

Table 4.9-1. Aesthetic Impact Potential Composite Ratings.

	Aesthetic Value			
Visual Absorption Capability		High	Medium	Low
	Low	9	7	4
	Medium	8	5	2
	High	6	3	1
	(High) <---------- Aesthetic Impact ----------> (Low)			

Composite Ratings 9 and 8 describe landscapes with high aesthetic value and moderate to low ability to visually absorb Project features. Facility designs should be similar in character and equal in boldness with the landscape, or remain visually subordinate to the natural surroundings.

Composite Ratings 7, 6, and 5 describe landscapes with moderate to high ability to visually absorb Project features. Facility designs may visually dominate the landscape, but should relate to the surrounding form, line, color, and texture to be compatible with the surroundings.

Composite Ratings 4, 3, 2, and 1 describe landscapes with low to moderate aesthetic value and high ability to visually absorb Project features. New elements may add to aesthetic quality by introducing visual interest and/or complementing the landscape.

4.9.2. Potential Adverse and Positive Impacts

The potential visual impacts described below are based on the Project as currently envisioned. Development of the proposed facilities would change the visual character of portions of the Project area from an undeveloped, remote setting to an area characterized by development and increased human activity and noise. Temporary visual and noise impacts would be generated by construction personnel, traffic, materials, staging areas, and worker camps.

The Project would have positive visual impacts. The access roads, reservoir, and recreational facilities would provide new recreational and viewing opportunities to the public. Viewing of the notable natural features in the vicinity would substantially increase as a result of Project access and recreational facilities. Additionally, the dam is expected to be visually interesting to many.

Anticipated aesthetic impacts associated with construction and operation of the Project are described below.

4.9.2.1. Watana Dam and Reservoir

Construction of the dam and associated structures, the impoundment area, and the construction camp would substantially alter the landscape, especially in the Middle Susitna River Valley Landscape Character Type and in the southern portion of the Wet Upland Tundra Landscape Character Type. The currently remote and largely undisturbed Susitna River valley would become an area of increased human activity, noise and development.

The dam and reservoir would become the most prominent visual feature in the previously natural setting of the middle Susitna River basin. The geometric lines and forms of the dam and associated structures would contrast with the natural forms, lines, colors, and textures of the valley. These structures would be viewed by Project personnel, support staff, recreationists in the area, and individuals flying overhead.

Visual changes resulting from the Project may include inundation of Vee Canyon rapids and Deadman Creek Falls, which are notable natural features of local or regional importance. Much of Vee Canyon and its scenic rock formations would remain, since its location in the upper reaches of the Watana Reservoir prevents complete inundation. The other notable natural features described in 4.9.1.2 would not be directly affected by the Project. Indirect visual changes on Devils Canyon and Devil Creek Falls could result from changes to hydrology in the Susitna River immediately below the proposed dam.

A maximum reservoir drawdown would generally take place in the spring (April and May) and would result in exposure of substantial silt bars. In places, these silt bars would be more than a mile wide and visible to people near the reservoir once the snow and ice cover melted. They would be visible from late spring until midsummer (i.e., until the reservoir refills each year).

4.9.2.2. Borrow Areas and Camps

While their exact locations are yet to be determined, a number of borrow areas would be located upstream and downstream of the proposed dam. The presence of borrow areas not inundated by the reservoir would create long term visual impacts. Borrow areas along the river below the dam would be in full view from the dam area. Borrow areas located above the reservoir shoreline would create rigid, angular forms visible to visitors in the area. Trucks and other equipment used for borrow operations would generate noise.

The development of a temporary construction camp near the proposed dam (a site near the north abutment is currently proposed) would cause short-term and long-term visual impacts. Short-term visual impacts would include roads, structures, and appurtenant facilities. Short-term noise impacts would also occur.

The development of a permanent camp near the proposed dam (a site near the north abutment is currently proposed) would cause short-term and long-term visual impacts. Short-term visual impacts would include construction of housing, offices, storage/maintenance buildings and related infrastructure. Short-term noise impacts would result from the removal of native

vegetation and development of camp facilities. Operation and maintenance of the permanent camp would generate low-moderate levels of noise.

An airstrip, about 8,000 ft-long, would be built to accommodate movement of construction personnel and supplies. This airstrip would become a permanent feature; resulting in short-term and long-term impacts. Short-term visual and noise impacts would result from construction of the airstrip. Long-term visual and noise impacts would result from removal of native vegetation and use of the airstrip by planes and helicopters.

4.9.2.3. Access Routes and Transmission Facilities

Access routes and transmission facility alignments have yet to be finalized. Figure 1-1 describes 3 potential corridors. These corridors have been labeled "Denali," "Chulitna," and "Gold Creek."

Construction of road and transmission routes could result in substantial visual impact to the landscape. Cutting, filling, and vegetative clearing would take place. Areas of potential erosion could be created. Borrow areas located adjacent to the access routes could create rigid, angular forms visible to visitors in the area. Some people may consider the access routes to be a visual intrusion that detracts from their enjoyment of the natural landscape. At the same time, the access routes would provide new access to scenic views for visitors and recreationists. Such views would include panoramic scenes of the Alaska Range, Clearwater Range, and Talkeetna Mountains.

Transmission towers could be 100 ft or more in height. Some single steel-pole structures could be used for angles and steep slopes. The right-of-way could be 300-500 ft wide. The transmission line towers and conductors would be silhouetted against the sky from various viewpoints along the road and from viewpoints near the dam. Through wooded areas, the cleared right-of-way would be highly visible from the air.

4.9.3. Potential Protection, Mitigation, and Enhancement

APA's 1985 Susitna Settlement Plan (APA 1985b) and associated 1985 Susitna Hydroelectric Project FERC License Application included Visual Resource PM&E measures. These measures, many of which remain valid and relevant to the proposed Project, include best development practices, siting refinements, and design considerations intended to minimize the visual impacts identified above. These measures are described below.

Refinement of the measures will continue throughout the FERC licensing phase of the Project and into the design phase in order to reflect new or updated site-specific engineering information.

4.9.3.1. Best Development Practices

Best development practices (BDPs) are general measures typically used in construction projects to avoid or reduce impacts. BDPs commonly include measures for erosion control, educational programs for workers, rehabilitation techniques, and construction guidelines. Most BDPs can be

implemented at no additional cost to a project. In addition to BDP measures identified here, measures identified in BMP manuals developed specifically for the Project would help reduce or avoid visual impacts.

Best development practices related to the Project could include:

- Consolidate structures to minimize the amount of disturbance and need for rehabilitation.
- Site facilities to minimize vegetation clearing.
- Identify areas of notable vegetation before construction that are not necessary to remove, and mark them for protection.
- Develop an environmental briefing program for construction personnel that includes visual resource concerns.
- Use fracture and bench construction methods for cut slopes to avoid uniform cut slope appearances and to provide spaces for debris to collect and vegetation to grow.
- Adhere to standard erosion control practices for areas around stream crossings.
- Feather clearings in forested areas rather than making straight-edged clearings.
- Provide dust control for roads, parking, construction areas that are not paved.
- Round cut-and-fill slopes for side borrow construction of access roads to match the rolling character of the surrounding landscape.
- Grade borrow sites for access roads to minimize steep cuts and conform to surrounding topography.
- Screen borrow sites from significant view corridors.
- Prioritize borrow sites so that sites with the least visual impact would be used first.
- Complete reclamation and revegetation as soon as borrow sites, construction camp, and other facilities are no longer being used.
- Consolidate railhead facilities to reduce the amount of disturbance and rehabilitation needed (if applicable).
- Keep parking areas at railheads dark-toned, if paved, to reduce visual contrast (if applicable).
- Use non-specular conductors unless the hazard to aircraft is too great.
- Minimize transmission line clearing and construction activities in vicinity of streams.
- Limit transmission line clearing to material that poses a hazard.
- Vary transmission line right-of-way and create openings in the forest edge where line must parallel a roadway.

4.9.3.2. Siting Refinements

Siting refinements are adjustments in the location of facilities made in the detailed design stage. They are used to reduce adverse visual impacts. In addition, siting refinements can avoid impacts that would require costly mitigation.

Siting refinements for the Project could include:

- Locate Project recreation facilities in borrow areas and in locations with good views of the dam, impoundment, and natural features.

- Refine road locations to: minimize cut and fill; select stream crossings for bridge locations; establish horizontal and vertical curves to take advantage of long side valley views; and avoid passing through forested areas, staying at the tundra edge whenever possible.
- Coordinate road siting and transmission line siting to minimize views of transmission line from roads.
- Orient roads to maximize distant views of Mt. McKinley.
- Maintain vegetated buffers between roads and borrow areas.
- Consolidate structures with the construction areas to minimize disturbance and need for rehabilitation.
- Use land forms, vegetation, and minor alignment adjustments during detailed transmission design to screen towers from significant views.
- Locate transmission lines so intervening vegetation interrupts views down the rights of way.
- Site transmission lines along natural linear features (such as the bottom of a ridge, valley, or cliff) or along edges of muskeg openings or forests (instead of siting in middle of muskeg or forests).
- Cross major roadways with transmission lines as near to perpendicular as possible to allow for maximum setback of facility structures and minimum visibility from the roadway into the right-of-way on each side.

4.9.3.3. Design Considerations

Design considerations are recommended modifications to facilities to reduce visual contrast with surroundings and/or enhance the visual quality of an area. They range widely in cost and overlap with siting refinements as part of the planning and design process. Because of design constraints imposed by weather conditions and construction cost, there may be substantial limitations on making major changes during the detailed design phase.

Design considerations for the Project could include:

- Locate recreation facilities to maximize views and interpretive opportunities.
- Use materials (stone, concrete, etc.) in the design of recreation and other Project facilities that visually integrate the facilities with the dam and natural surroundings.
- Coordinate reclamation of borrow sites with views from access roads and recreation facilities. Excavate borrow edges above reservoir water line to follow natural contours.
- Reclaim access road borrow areas according to designated post-construction land uses (campsites, trailheads, ponds, etc.).
- Make maximum use of elevated paths and pads to reduce soil and vegetation degradation in the construction camp.
- Use long spans and tall towers where transmission lines must cross valleys to retain as much existing vegetation as possible and to reduce construction impacts to slopes.

4.9.3.4. Site Restoration and Aesthetics Plan

AEA anticipates preparing a Site Restoration and Aesthetics Plan for the Project in consultation with resource agencies and other interested parties. The following elements are likely to be included in this plan:

- Introduction
- Existing Conditions
- Proposed Project Features
- Strategies for Blending Project Works into the Existing Environment
- Disposal of Cleared Vegetation and Spoil Materials
- Screening from Key Viewpoints
- Temporary Revegetation
- Permanent Revegetation
- Monitoring Program and Reports
- Procedures to Revegetate Unsuccessful Areas
- Implementation Schedule and Estimated Costs
- Consultation
- Literature Cited

Strategies for blending project works into the existing environment are likely to include the best development practices, siting refinements, and design considerations described above.

4.9.4. References

Alaska Power Authority (APA). 1985a. *Susitna Hydroelectric Project License Application.*

Alaska Power Authority (APA). 1985b. *Susitna Settlement Plan*.

4.10. Recreation and Land Use

The Project facilities, including the transmission line, would be located in the Southcentral region of Alaska. Since recreational and land use planning for the Project must fit within the framework of existing and future regional recreation and land uses, it is important to understand the regional and Project area patterns and trends.

4.10.1. Introduction

While most of Alaska's 322 million acres of public lands are available for recreation, about 168 million ac, or 46 percent of Alaska, is managed for wildland recreation. Sixty percent of America's national park acreage, the country's largest state park system, and the nation's two largest national forests (the Tongass in Southeast with 17 million ac, and Chugach in Southcentral with 5.7 million ac) though not managed exclusively for recreation, are located in Alaska. The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) placed large

parts of Alaska in the nation's conservation, wilderness, and recreation systems, wild and scenic rivers, forests, wildlife refuges, and parks. Combined with the older federal reserves and an expanding state park system, these designations create opportunities for outdoor recreation unsurpassed anywhere (ADNR 2009).

Approximately 12 percent of state land is under some form of legislative designation that protects or enhances wildland recreation. Approximately 82.4 million acres of federal land and 400,000 acres of state land are designated as wilderness. Alaska's state parks are the primary roadside gateways to outdoor recreation. In addition, millions of acres of general state-owned land (managed by the ADNR, Division of Land) and federal domain land (managed by the BLM) are open to wildland recreation. These lands are becoming increasingly popular. There are few regulations imposed on users of these lands. The state also owns about 65 million acres of tidelands, coastal submerged lands, and lands under navigable waters, all having virtually unlimited potential for wildland recreation (ADNR 2009).

The Alaska Department of Transportation and Public Facilities (ADOT&PF) is also one of the most important providers of recreation within the state. Alaskans rely on roads for a broad spectrum of recreational opportunities. Alaska has over 13,250 mi of public roads, approximately 26 percent (or 3,500 mi) of which are paved. Most recreation occurs along, or is accessed from the road system. Viewing wildlife and scenery from vehicles and bicycling along the road are important components of the state's tourism industry, as well as resident recreation (ADNR 2009).

4.10.1.1. Regional Recreation

The Southcentral (a.k.a., Railbelt) region extends from the hydrographic divide of the Alaska Range on the north to the Matanuska-Susitna Borough (MSB) boundary on the west, Kodiak Island on the south, and the Alaska/Canada border on the east. It abounds with ocean shorelines, freshwater lakes, free-flowing rivers, massive mountains, wildlife, and glaciers. The diversity of landscapes and natural resources offer a wide variety of outdoor recreational opportunities. Figure 4.10-1 shows existing and proposed regional recreational amenities.

The Southcentral region contains a more developed transportation system than other portions of the state. Paved highways and gravel secondary roads provide access to many of the cities and villages in the region, as well as access to many of the recreational lands in the region. Use of planes to reach areas not accessible by road is also prevalent. The Alaska Railroad and ferry systems also serve portions of the Southcentral region. These transportation systems, combined with the population concentration, make the region's recreational opportunities more accessible and, therefore, more heavily used than in other portions of Alaska.

The bulk of the state park system acreage and units (78 units, including 19 marine parks) lie within the Southcentral region including Chugach, Denali, and Kachemak Bay state parks. Additionally, nearly 20 million acres of national park land, including Kenai Fjords National Park, Denali National Park and Preserve, and Wrangell-St. Elias National Park, the 1.9 million-acre Kenai National Wildlife Refuge, the 5.7 million-acre Chugach National Forest, and 16 state special areas (critical habitat areas, sanctuaries, and refuges) are located within this region. The Tanana Valley State Forest has 1.8 million acres (ADNR 2009).

The proposed Project is within the northwest corner of the BLM Glennallen Field Office Planning Area. The planning area includes approximately 7.1 million acres in east Alaska, including approximately 5.5 million acres of lands that are selected by the State of Alaska or Alaska Natives. Management measures outlined in the BLM's East Alaska Resource Management Plan (BLM 2006) apply only to BLM-managed land in the planning area; no measures have been developed for private, state, or other federal agency lands. The BLM prepared this Resource Management Plan to provide direction for managing public lands within the Glennallen Field Office boundaries. The primary types of regulated recreational activities on lands managed by the Glennallen Field Office are guided hunting, guided sport fishing, guided float trips, and use of BLM campgrounds and waysides.

Fairbanks
Kukon-Charley Rivers National Preserve
Tanana Valley S.F.
Denali NP and Preserve
Denali Hwy.
Richardson Hwy.
Tetlin NWR
Denali SP
Nelchina Public Use Area (ADNR)
George Parks Hwy.
Wrangell-St. Elias NP
Glenn Hwy.
Chugach SP
Anchorage
Chugach NF
Lake Clark NP
Kenai NWR
Kenai Fjords NP
Kachemak Bay SP
Kachemak Bay SP

Legend

- Proposed Watana Dam and Powerhouse
- Borough
- Highway
- Susitna_River
- CIRI Lands (Patented and Interim Conveyed)
- BLM East Alaska Resource Management Planning Area
- Iditarod National Historic Trail
- State Forest (SF)
- State Park (SP)
- National Park (NP)
- National Forest (NF)
- National Wildlife Refuge (NWR)
- Public Use Area

N

0 15 30 60 Miles

ALASKA ENERGY AUTHORITY

Date: Nov 2011
Scale: As Noted

State of Alaska
Susitna-Watana Hydroelectric Project, FERC No.14241

Figure 4.10-1

Southcentral Alaska Recreational Amenities

Dalton Highway
Steese Highway
Elliot Highway
Minto Flats
State Game Reserve
Ester
Fairbanks
Chena River
State Rec. Area
North Pole
George Parks Highway
Alfred Starr Cultural Center
Nenana
Ester Gold
Complex
Richardson Highway
Alaska Railroad Museum
Anderson
Nenana River
Bridge Wayside
Denali Visitors Center
Healy
McKinley Park
Glacier
Eielson Visitors Center
Denali National Park
and Preserve
Cantwell
Chulitna River
Wayside
Broad Pass
Denali Highway
Mount McKinley
Hurricane Gulch
Glacier
Indian River
Denali View North Campground
Chulitna
Denali View North Wayside
Canyon
Proposed South Denail
Visitors Center Complex
Gold Creek
Alaska Veterans Memorial
Byers Lake Campground
Denali
State
Park
Lower
Troublesome Creek
Nelchina
Public Use Area
Denali View South Wayside
Talkeetna
Chase
Talkeetna/Denail
Visitors Center
Glenn Highway
George Parks Highway
Glenn Highway

Legend

- Proposed Watana Dam and Powerhouse
- Selected Populated Place
- Highway
- George Parks Highway Scenic Byway
- Alaska Railroad
- Susitna_River
- Denali NP Road RFB

Point of Interest

- Point of Interest
- Campground

- CIRI Land (Patentend and Interim Conveyed)
- BLM East Alaska Resource Management Planning Area
- State Forest
- State Park
- National Park
- National Forest
- National Wildlife Refuge
- Public Use Area

N

0 10 20 40

Miles

ALASKA ENERGY AUTHORITY

Date: Oct 2011
Scale: As Noted

State of Alaska
Susitna-Watana Hydroelectric Project, FERC No.14241

Figure 4.10-2

George Parks Highway Recreational Amenities

The Iditarod Trail Sled Dog Race is an annual sled dog team race across Alaska. A portion of the race is run along the Iditarod National Historic Trail. Mushers and teams of 12-16 dogs cover the 1,000-1,100 mi between Anchorage and Nome in 9-15 days. A northern route is taken in even years and a southern route in odd years. The race begins on the first Saturday in March. The Iditarod began in 1973 as an event to test the best sled dog mushers and teams but evolved into today's highly competitive race. The race is the most popular sporting event in Alaska. The race crosses the lower Susitna River near the Town of Susitna.

Recreational facilities in the Southcentral region include those along the George Parks Highway, the Denali Highway, and along the Alaska Railroad right-of-way.

The George Parks Highway (numbered Interstate A-4 and Alaska Route 3) runs 323 mi from the Glenn Highway 35 mi north of Anchorage to Fairbanks in the Alaska Interior (Figure 4.10-2). The highway was completed in 1971, and given its current name in 1975. The highway, which mostly parallels the Alaska Railroad, is one of the most important roads in Alaska. It is the main route between Anchorage and Fairbanks (Alaska's two largest metropolitan areas), the principal access to Denali National Park and Preserve and Denali State Park, and the main highway in the Matanuska-Susitna Valley.

The Parks Highway, open year-round, has been recognized as both a National and Alaska State Scenic Byway. Driving along the Parks Highway for sightseeing purposes is a major recreational use.

The Denali Highway is about 135 mi long and connects the Cantwell junction (located just north of Broad Pass) on the Parks Highway with Paxson Lodge on the Richardson Highway. A loop trip originating and returning to Fairbanks is about 436 mi. A loop trip from Anchorage is close to 600 mi. Several days travel is required for either of these trips. The Denali Highway is generally open from mid-May to October 1. As described by the BLM (2008), numerous recreational amenities are located on or near the Denali Highway (Figure 4.10-3)

The Alaska Railroad extends from Seward and Whittier, in the south, to Fairbanks (passing through Anchorage), and beyond to Eielson Air Force Base and Fort Wainwright in the interior of that state. Uniquely, the Alaska Railroad carries both freight and passengers throughout its system. The railroad has a mainline over 470 mi long, and is well over 500 mi long when branch lines and sidings are included. It is currently owned by the State of Alaska. The railroad is a major tourist attraction in the summer. The Alaska railroad coach cars feature single-level seating throughout the train, with dome cars that are available for passengers to enjoy. The wide windows and domes provide a great view of the Alaskan scenery. Private cars owned by the major cruise companies are towed behind the Alaska Railroad's own cars, and trips are included with various cruise packages.

Located at the confluence of the major rivers (the Susitna, the Talkeetna and the Chulitna River) is the historic village of Talkeetna, which was established during construction of the Alaska Railroad. Panoramic views of the Alaska Range can be enjoyed and photographed from the village. Talkeetna is a popular base for flightseeing, packrafting, fishing, riverboat tours (including jetboat tours on the Susitna River upstream to the bottom reach of Devils Canyon), hiking, Nordic skiing, mushing, and mountain climbing (AlaskaTours.com 2011).

Gold Creek, located between Talkeetna and Hurricane, is a flag stop on the "Hurricane Turn" train. Hunters, anglers, those rafting down the Susitna River, homesteaders, and those with mining claims in the area frequent the area in summer. Nine seasonal use cabins are found in the Gold Creek vicinity. The town has one permanent resident. Additional stops used by recreationists along the "Hurricane Turn" line include: Curry, Chulitna, Sherman, Chase, Indian River, and Hurricane.

Healy
McKinley Park
Alaska Range
Glacier
Richardson Highway
Denali National Park & Preserve
Cantwell
George Parks Highway
Clearwater Mountains
Denali Highway
Paxson
Delta Wild & Scenic River
Gulkana Wild River
Denali State Park
Nelchina Public Use Area

Point of Interest		Point of Interest	
1	Paxson Lodge and Denali Highway Cabins	16	Waterfowl Lakes
2	Alaska Range - Glacial Geology	17	Clearwater Wayside/Outhouse
3	Wrangell Mountain Viewpoint	18	Eskers
4	Tangle Lakes Archaeological District	19	Susitna River
5	Tangle River Inn	20	Gracious House
6	Pavement ends/begins	21	Valdez Creek Mine Viewpoint
7	Tangle Lakes Campground	22	Alaska Range Viewpoint
8	Delta National Wild and Scenic River Wayside	23	Alaska Range Interpretive Sign
9	Tangle Lakes Lodge	24	Adventures Unlimited
10	Landmark Gap Viewpoint	25	Brushkana Creek Campground
11	Alaska Range and Maclaren River Viewpoint	26	Taiga
12	Palsa	27	Denali Highway Orientation Sign
13	Kettle Lakes	28	Nenana River
14	Maclaren River Lodge, Maclaren Glacier Viewpoint, Maclaren River Bridge	29	Mt. McKinley Viewpoint
15	Crazy Notch	30	Pavement begins/ends
		31	Junction with Parks Highway

Legend

- Proposed Watana Dam and Powerhouse
- Selected Populated Place
- Highway
- Alaska Railroad
- Susitna_River
- BLM East Alaska Resource Management Planning Area
- CIRI Land (Patented and Interim Conveyed)
- Point of Interest
- State Forest
- State Park
- National Park
- National Forest
- National Wildlife Refuge
- Public Use Area
- National Wild and Scenic Rivers

N

0 4.5 9 18
Miles

ALASKA ENERGY AUTHORITY

Date: Nov 2011
Scale: As Noted

State of Alaska
Susitna-Watana Hydroelectric Project, FERC No.14241

Figure 4.10-3

Denali Highway Recreational Amenities

4.10.1.2. Project Area Recreation

Big Lake and Deadman Lake are situated between three large, tundra-covered buttes located about ten miles northeast of Deadman Creek's confluence with the Susitna River. There are many outstanding views from the lakes into the middle Susitna River basin. Private cabins exist at Big Lake.

The Nelchina Public Use Area covers about 2.5 million acres in the Talkeetna Mountains. The Public Use Area was established by the Alaska legislature in 1985 and is managed by the ADNR Division of Mining, Land, & Water. The Nelchina Public Use area is the biggest legislatively designated area on state land in Alaska. It is an outstanding area for hunting, fishing, recreation, and mining. The vast area is home for the Nelchina Caribou herd, the third largest caribou herd in Alaska. It also supports important populations of trumpeter swans, moose, Dall's sheep, and brown bear. The Susitna River forms the northern boundary of the Nelchina Public Use Area, and portions of the proposed Project area located south of the river are within its boundaries. These areas are located within Nelchina Management Area 13. Stephan Lake and the Fog lakes area also located in the Public Use Area.

Stephan Lake, a large waterbody located at the base of the Talkeetna Mountains, has one fishing/hunting lodge and several cabins (collectively known as Stephan Lake Lodge) along its shore. Private cabins also exist at Stephan Lake. Wetlands and gentle hills covered with mixed woods and tundra make up the lake's natural shoreline. Stephan Lake is used as a starting place for kayaking and rafting on the Talkeetna River. As described below, a trail leads southwest from the lake to nearby Murder Lake and Daneka Lake.

The Fog lakes are a series of large, linear lakes on the south side of the Susitna River. They occur in a gently rolling to flat landscape covered with wetlands, mixed forest, and open tundra vegetation.

Devils Canyon, which surrounds an 11-mile stretch of the Susitna River, begins just downstream of the mouth of Devil Creek and ends approximately 1.5 mi upstream of Portage Creek. Four sets of rapids, known collectively as Devils Canyon rapids, encompass approximately five mi of the canyon. These rapids are Class VI (the most difficult rating) on the International Whitewater Scale. Between the Class VI rapids, the fast-moving whitewater is rated Class II or Class III.

The Recreation Opportunity Spectrum (ROS) Class on lands managed by the BLM in the vicinity of the proposed Project is "Primitive" (BLM 2006). These lands, located within the BLM Glennallen Field Office's East Alaska Resource Management Plan Planning Area, are characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal.

Multiple trails and routes exist in the Susitna-Watana Project area. The State of Alaska has formally identified six Revised Statute (RS) 2477 trails in the Project area. Many of these are still are used to access mining claims, fishing and hunting areas, or remote cabins from communities such as Chase, Curry, and Hurricane that exist along the rail corridor. Use of these

trails is governed by the generally allowed uses defined by the State. Recognized RS 2477 public right-of-way trails in or around the Project area include (HDR Alaska 2011):

- Susitna River Trail (also referred to as the Gulkana/Denali Winter Trail, RS Trail 294: Access to this 125-mile long trail is from the Denali Highway where the highway crosses the Susitna River. The trail travels southeast, following the river to its junction with the Maclaren River. The trail continues up the Maclaren River and ultimately connects with trails originating from the Lake Louise area.
- Curry Landing Strip to Lookout Tower Trail (RS Trail 1509): This trail is access from the Curry Station along the Alaska Railroad right-of-way and travels west to the lookout tower. The trail is used to access views of the Alaska Range and Mt. McKinley.
- McWilliams/Gold Creek Trail (RS Trail 469): This trail is accessed from the railroad station and community of Gold Creek at Mile 263 of the Alaska Railroad. The trail heads east, following the base of the hills, climbs the plateau south of the Susitna River, and then continues south-southeast toward mining claims on John Creek. The trail is approximately 36 mi long.
- Indian River-Portage Creek Trail (RS Trail 100): This trail is accessed from the Chulitna Station at Mile 274 of the Alaska Railroad. It heads eastward, crossing the Indian River, and continuing east to cabins on Portage Creek. The trail is approximately eight mi long.
- Murder Lake North to Ridgeline Trail (RS Trail 80): This trail is accessed from Murder Lake and heads northwest to a ridge. Historically used for berry picking and hunting access purposes, the trail is two mi long.
- Stephan Lake to Murder Lake Trail (RS Trail 61): This trail connects the south shore of Stephan Lake to Murder Lake. The trail is approximately one-half mile long and has been used for access between landowners on Stephan Lake and Murder Lake, and as a recreational trail to access fishing on Murder Lake.
- Stephan, Murder, and Daneka Lakes Connector Trail (RS Trail 377): This trail is access from the west end of Stephan Lake, and heads southwest to Murder Lake. It then continues southward, crossing Prairie Creek and terminating at Daneka Lake. It is used to access cabins and for recreational fishing, hiking, and hunting.

Most of the lands in the Project area are currently owned by the Cook Inlet Region, Incorporated (CIRI). Visitors may access and use CIRI land on a limited basis with written permission. Guides, hunters and anglers, campers, tour operators, photographers, scientists, dog mushers and other outdoor enthusiasts are encouraged to respect CIRI land and contact the CIRI Land and Resources Department to learn more about land use policies (CIRI 2011).

Several ANCSA 17(b) easements are located in the Susitna-Watana Project vicinity. These easements (see Appendix 4.10-1) provide access through private Native lands to public lands and waters. Reserved and managed by the federal government, these easements (ADNR 2010a) include:

- 26a: Existing Stephan Lake west shore campsite, managed by BLM state office.
- 26: Existing trail, running west from 26a, managed for general public use by ADF&G.
- 27a: Existing Stephan Lake east shore campsite, managed by ADF&G.
- 28: Existing trail, running southeast from 27a.

- 46a: Existing Stephan Lake north shore campsite, managed by BLM state office.
- 46: Existing trail, running north from 46a to 14, managed by BLM district office and State of Alaska.
- 22d: Existing Fog lakes campsite, managed by ADF&G.
- 22a: Proposed trail, running south from 22d, sponsored by ADF&G.
- 14: Existing Susitna River west (Talkeetna Mountains USGS Quadrangle D-4) campsite, managed by BLM district office and ADF&G.
- 71: Existing Susitna River east (Talkeetna Mountains USGS Quadrangle D-4) campsite, managed by BLM district office and ADF&G.
- 72: Proposed trail, running north from 71, sponsored by BLM district office and BLM.
- 48: Existing general public use trail from Gold Creek to lands south of Devils Canyon.
- 18: Existing general public use trail from Chulitna to lands north of Devils Canyon, managed by State of Alaska and ADF&G.

4.10.2. Current Recreational Use of the Region and Project Vicinity

Recreational use within the Southcentral Region and within the Project vicinity is described below.

4.10.2.1. Regional Recreational Use

As described in the "Socioeconomic, Recreation, Air Quality, and Transportation Data Gap Analysis" (HDR Alaska 2011), outdoor recreation is a key part of the way of life in Alaska. Alaskans participate in wildland recreation at twice the rate of the rest of the country; 96 percent of resident survey respondents said that parks and recreation were important or very important to their lifestyle (ADNR 2009). Alaska offers a considerable amount of space and facilities for outdoor recreation. The state is home to 60 percent of the acreage of the National Park System, the nation's two largest national forests, and the nation's largest state park system (ADNR 2009).

Outdoor recreation in Alaska includes a diversity of activities. In 2009, the Statewide Comprehensive Outdoor Recreation Plan (SCORP) reported that the ten favorite activities Alaskans participate in include hiking, fishing, hunting, snow machining, cross country skiing, camping, biking, OHV riding, skiing and snowboarding, and running. Other popular activities include bird and wildlife watching, walking the dog, backpacking, berry picking, using playgrounds, driving for pleasure and sightseeing, recreational mining, mountaineering, whitewater rafting, spelunking, dog mushing, kayaking, power boating and participating in beach activities (ADNR 2009).

Ownership of outdoor equipment, an indication of the value that Alaskans place on various types of outdoor recreation, increased between 2004 and 2009, according to SCORP. Notably, ownership of ORV/ATV (28.5 percent increase), snow machine (21.3 percent), hunting (17.3 percent), and canoe and raft (14.2 percent) equipment showed the largest increases in ownership (ADNR 2009). Within the Southcentral region, access to recreation areas is primarily along the road system; facilities such as campgrounds, trails, trailheads, cabins, and boat launches are key links that provide access from the road system to more inaccessible lands and recreation areas.

Access to land for recreation is also provided by plane (float, wheeled, or ski) and boat. In addition to recreation by Alaska residents, outdoor recreation also plays a major role in attracting tourists to the state. The number of tourists visiting Alaska is expected to increase at a rate of 10 percent per year in the coming years (ADNR 2006). In the past, the majority of visitors to the Southcentral region and to the MSB, in particular, were independent travelers with interests in camping, fishing, and hiking. In recent years, however, the number of tourists who arrive in Southcentral Alaska on package commercial tours, such as cruise passengers, has been increasing (ADNR 2006). In the MSB this has been due in large part to the opening of 2 large lodges, the Mt. McKinley Princess Wilderness Lodge and the Talkeetna Alaskan Lodge, which opened in 1997 and 1999, respectively. These lodges cater primarily to cruise passengers and have resulted in a more than doubling of the borough's bed tax revenues between 1999 and 2004 (ADNR 2006). Through these lodges, many guests also participate in day "excursions" that include recreation activities such as sightseeing, tours, river rafting, hiking, and sportfishing.

Since the APA Project was first evaluated by FERC in the 1980s, Alaska's population has continued to increase. In 1980, the state had a population of 401,851. The population had increased to 710,231 by 2010. In general, the urbanized parts of the state are growing faster than rural areas, with some rural areas losing population. The MSB has been one of the fastest growing areas in the country in recent years. The 2010 population (88,995) is approximately 50 percent higher than the 2000 population (59,322). The increase in population of the Southcentral region and the MSB in particular has resulted in an increased demand for year-round recreation opportunities and facilities throughout the region (NPS 2006a).

Population growth has also spurred increasing development in the Southcentral region and in the MSB in particular. Land along the Parks Highway has experienced changes in land ownership and use as federal and state land is conveyed to the MSB government, the CIRI, the Mental Health Trust, the University of Alaska, and private landowners. The MSB believes that this growth may have significant impacts on the availability of recreational trails in the area, as few recreational trails have been formally designated and many currently cross private property. As the level of development on private parcels increases, access to many of these trails could be blocked.

The SCORP also evaluated potential recreation needs in the State of Alaska. About 74 percent of respondents were either very or somewhat satisfied with recreation facilities within an hour of their community. In addition, 84 percent of respondents felt that when allocating limited funds, that funds should be spent to maintain present facilities before developing new facilities. The desire to allocate funding toward existing facilities was also highlighted by the fact that the public rated maintaining existing trails, building roadside toilets, and improving the maintenance of existing facilities as the most important recreation needs in the state with 67, 63, and 58 percent, respectively, of respondents ranking these needs as very important. In contrast, just 39 percent of respondents felt that building new parks from existing state land was very important (ADNR 2009).

Despite the abundance of high value recreation lands, some wildland recreation opportunities are in short supply. Facilities such as campgrounds, trails, trailheads, cabins, boat launches, and other facilities are often the critical link between users and otherwise "wild" and inaccessible lands, especially along the road system and in the Southcentral region. In many parts of the state,

facilities, even if primitive or limited in number, make the difference between a potential outdoor experience and a reality (ADNR 2009).

In "Recreation and Tourism in South-Central Alaska: Patterns and Prospects" (USFS 2002a) the extent and nature of recreation and tourism activities in Southcentral Alaska were described. The study area extended east and south from the Alaska Range, through the Talkeetna and Chugach Mountains and Prince William Sound, and into the Wrangell-St. Elias Mountains ending at the Canadian border. It encompasses the following places: Kenai Peninsula Borough, Municipality of Anchorage, MSB, and the Valdez-Cordova Census Area. It also encompassed the Project area. The quantitative data sources used for the study included:

- Chugach National Forest recreation use data
- National Park Service use data
- Alaska State Parks use data
- Alaska Visitor Statistics Program reports
- Regional Convention and Visitors Bureau data and studies
- Alaska Department of Transportation traffic counts
- Alaska Department of Fish and Game angler surveys and license data
- Alaska Department of Community and Economic Development business license files
- Alaska Department of Safety vehicle registration records
- Alaska cities and boroughs with sales and bed taxes
- Previous surveys and special studies for specific purposes or clients
- Prince William Sound kayak use database

The Chugach National Forest was found to be heavily used as a scenic resource by motorists and waterborne passengers, and increasingly as a road-accessible playground for fishing, camping, and commercially mediated, motor-assisted recreation. More than half of the time (recreation visitor days) people spent on the Chugach National Forest was spent viewing scenery, wildlife, and fish. Viewing was the most popular activity in all Chugach National Forest ranger districts and had been increasing steadily since 1989. Hiking also seemed to be growing, whereas camping was roughly flat, consistent with capacity constraints. Active sports, such as mountain biking and whitewater rafting, seemed to be growing fastest among summer activities. Special use permit data showed that commercially mediated recreation was occurring increasingly on the forest. Although the overall numbers of clients in activities conducted under special use permits almost doubled between 1994 and 1998, the increase in camping, kayaking, and hiking grew much faster than the overall average. Much of the guided camping activity was linked to sea kayaking. Evidence, particularly from hunting and fishing license numbers, indicated that use of the forest by nonresidents was rising faster than use by Alaska residents. These data were consistent with the perception that nonresidents were "discovering" the forest and spending some of their time on guided land tours. It seemed that facilities built and maintained by the Forest Service operate at, or near, capacity. Although there were some lulls in usage, the facilities were in excess demand during peak months. Forest staff suggested that on some hiking trails and backcountry areas, increased use was displacing users seeking a wilderness experience. Quality of scenery was important to visitors. People surveyed in 1992 and 1995 overwhelmingly reported that they were satisfied with the quality of scenery and considered it essential for a high quality recreation visit.

Primary uses of Denali State Park are camping, hiking, fishing, viewing Denali, canoeing, rafting, river boating, hunting and trapping (ADNR 2006). The primary visitor contact station for Denali State Park is at Byers Lake where there is a visitor and interpretive center for the Alaska Veterans Memorial. Buses from package tour companies usually stop once in Denali State Park, either at one of the viewpoints or at the Veterans Memorial. In 2004, the Veterans Memorial received 54,110 visitors, up from 33,619 visitors in 2003. The number of buses stopping at the visitor center increased as well, going from 853 in 2003, to 1096 in 2004. These dramatic increases could be attributed to the fact that the Denali Viewpoint South was closed until late August 2004 for construction. However, the numbers of tour buses do not include Princess Tours buses. As in Denali National Park and Preserve, most park visitation occurs during the months of June, July, and August. During the winter months, only the two public use cabins at Byers Lake remain open. State Park staff attempt to collect visitor count data whenever possible; however, the numbers can vary widely due to factors such as construction closing a site, or employee/volunteer turnover (formula used to calculate visitor counts at a site changes). Visitor calculations take into consideration the number of vehicles parked at a site, average stay, and average number of people per vehicle. General trends and ranger reports indicate that visitor numbers are steadily increasing at popular state park sites such as the Veterans Memorial and the Kesugi Ridge Trail system, and visitor numbers are predicted to continue to rise as the cruise industry continues to increase their bus traffic into the area. Based on raw data visitor counts provided by the Alaska Division of Parks and Outdoor Recreation, visitation to Denali State Park increased from 399,607 in fiscal year 1990 to 474,699 in fiscal year 1995 for an average annual growth rate of 3.5 percent. From fiscal year 1996 through fiscal year 2003 visitation dropped from 357,472 to 280,262. A variety of factors are at play in accounting for this decline (NPS 2006b):

- There has been a drop in the numbers of independent travelers that drive to Alaska due to the rising cost of gasoline.
- Popular destinations in Denali State Park have had construction projects, resulting in their closing for all or part of the visitor season: Denali View North Campground, the Alaska Veterans Memorial, Byers Lake Campground, and Denali View South.
- Budget cuts reduced the ranger staff in the park from three to one, resulting in a greater dependence upon inconsistent visitor counting by volunteer staff.

While it should be noted that the Division of Parks and Outdoor Recreation considers the reliability of state park visitation data to be questionable except for purposes of providing rough orders of magnitude in regard to visitation levels as well as past trends, general information on Denali State Park visitation includes the following:

- Non-resident visitors to Denali State Park are at least 33 percent of the total visitation, based upon vehicle license plates. This figure does not capture non-residents that fly to Alaska and rent vehicles. This has remained remarkably constant over the last 10 years.
- Peak visitation typically occurs in July.
- Summer visitors (May-August) comprise about 80 percent of the annual visitation to Denali State Park.
- The two developed scenic viewpoints (Denali View South and Denali View North and the Alaska Veterans Memorial) account for about 42 percent of the park's visitation.

- The three campgrounds in the park account for about 42 percent of the park's visitation.
- Backcountry use accounts for at least three percent of the visitation, but lack of consistent backcountry visitor counts keep park managers from having accurate data.
- Backcountry users do not have to register to use Denali State Park.
- Most visitors stop along the Parks Highway within Denali State Park at various pullouts and undeveloped scenic views.

In 1972, when the George Parks Highway opened, visitor use at Denali National Park totaled 88,615. Over the next 12 years visitor use grew at an average rate of 25,000 visitor days per year to a total of 394,426 visits in 1984. Visitation for 2007, 2008, and 2009, respectively was 458,307; 432,301; and 358,040 (NPS 2010). Based on current trends it is expected that the demand for use of Denali will increase by another 250,000 people by the end of the 2007-2017 planning period (NPS 2007).

Because of the general accessibility and minimal regulatory limitations on lands under management of the BLM's Glennallen Field Office, local dependence on these lands has strong ties to utilization of the region's hunting and fishing resources and pursuit of OHV recreation opportunities (BLM 2006). In addition to the resident population, regional urban populations depend upon the planning area to pursue recreational activities. The priorities of the recreation program are public health and safety, resource protection, visitor services, and requests for information and use authorizations. With tourism as a leading industry in the planning area, demand for recreational opportunities and providers for those opportunities will continue to grow. Demand for additional infrastructure and facilities (including interpretation) and commercial recreation opportunities will be a direct result, increasing the need for active management of the recreation resource. Use numbers on the Gulkana and Delta Rivers rose from 736 and 5,979 visitors, respectively, in 1999, to 1,271 and 7,506 visitors, respectively, in 2004. The Glennallen Field Office administers special recreation permits for commercial use recreation activities occurring on BLM-managed lands. Approximately 60 special recreation permits were issued in 2003, a slight increase in the number of permits issued over the previous ten years. These permits were mostly for uses within the Delta and Gulkana National Wild and Scenic River (WSR) areas. Commercial use on the Gulkana River was mainly focused on fishing; use on the Delta River was mainly focused on wilderness camping and paddling. Other permits were issued for heli-ski operations, hunting guides, and competitive events. Areas of concentrated recreational use in the Glennallen Field Office Planning Area include: Delta WSR Corridor Area, Gulkana WSR Corridor Area, Tiekel Area (between Glennallen and Valdez on the Richardson Highway), and the Delta Range Area.

As previously noted, the Parks and Denali highways are recreational amenities. Both packaged tours and independent travelers often drive these roads for pleasure and to view scenery and wildlife. Mountaineering, hiking, dog mushing, snowmobiling, and bicycling are also popular. Travelers use the Alaska Railroad for similar purposes (HDR Alaska 2011).

Traffic volume along the Parks Highway tends to decrease from Wasilla to the entrance to Denali National Park and Preserve. From there, volume tends to increase as the road approaches Fairbanks. Traffic on the Parks Highway can vary significantly depending on time of year, with volumes being much higher during summer than winter (HDR Alaska 2011). As described in the Alaska Department of Transportation and Public Facilities Central Region "Annual Traffic

Volume Report" for 2007-2009 (ADOTPFCR 2010), the annual average daily traffic counts (AADTC) for locations on the Parks Highway in 2007, 2008, and 2009, respectively, were as follows:

- Junction with Palmer/Wasilla Highway – 32,398; 33,420; 34,471
- Junction with Talkeetna Spur Road – 1,680; 1,520; 1,479
- Junction with Denali Highway (Cantwell) – 2,279; 2,193; 1,306
- Junction with Denali National Park Road – 3,364; 3,094; 2,892
- Junction with 28th Avenue (Fairbanks) – 14,710; 14,283; 14,716

The Denali Highway is not maintained in the winter (October 1 to mid-May), and is used primarily to access adjacent lands during summer (mid-May to September 30). As described in the ADOTPF North Region "Annual Traffic Volume Report" for 2007-2009 (ADOTPFNR 2010), the AADTCs for locations along on the Denali Highway in 2007, 2008, and 2009, respectively, were as follows:

- Junction with Richardson Highway – 115; 110; 130
- At Tangle Lakes Campground – 75; 65; 65
- Junction with Parks Highway – 280; 200; 230

Boating on the lower Susitna River is a common recreational and commercial activity. Several companies from Talkeetna, such as Denali River Guides, Mahay's Riverboat Service, and Talkeetna River Guides, advertise boating and fishing tours up river as far as the entrance to Devils Canyon. However, few, if any, go past the entrance to Devils Canyon, as the river is considered non-navigable in this area (HDR Alaska 2011).

In 2010, the Alaska Railroad had a passenger ridership of 405,135 passengers and moved 6.33 million tons of freight. Based on previous trends, passenger and freight volumes are likely to increase in the future. Most of the Alaska Railroad's passenger trips are recreation/tourism-oriented (ARC 2010). Approximately 20 people take the "Hurricane Turn" from Talkeetna to Gold Creek on an average summer weekend. Recreational use of the "Hurricane Turn" is much higher in the summer than in the spring, fall, or winter. However, winter visits to the area are becoming increasingly popular, offering Northern Lights viewing, cross country skiing, dog sledding and snowmobiling trips (Talkeetna/Denali Visitors Center 2007).

4.10.2.2. Recreational Use in the Project Vicinity

Both guided and non-guided hunting occur in the Project vicinity, particularly near Stephan, Fog, Clarence, Watana, Deadman, Tsusena, and Big lakes, as well as many of the smaller lakes. Both lodges and cabins provide field bases for hunters. Big game hunting guides operate guide businesses which use the area. Generally, the businesses provide hunting as well as other activities, including fishing and boating (APA 1985a).

Fishing pressure is currently very light in the immediate vicinity of the Project, due to its remote location. Fishing occurs either as a separate pursuit or in close association with other activities, such as hunting and trapping. Considerable fishing for lake trout, grayling, and salmon occurs in

the Stephan Lake-Prairie Creek drainage. Salmon fishing occurs in lower Portage and Chunilna creeks, and in the Indian River. Fishing in Fog, Clarence, Watana, Tsusena, Deadman, Big, and High lakes appears to be associated with other activities, such as hunting, summer cabin use, and mining. There is little stream fishing elsewhere in the Project area (APA 1985a).

Trapping in the Project area occurs mostly on the south side of the Susitna River near Stephan and Fog lakes. Some trapping occurs near Tsusena Creek and Clarence and High lakes. Traps are also set using airplanes in the easternmost portions of the Susitna River valley (APA 1985a).

The ADF&G maintains harvest data and other information required for management of wildlife game species in the Nelchina Public Use Area. Available information for Management Unit 13 (Nelchina-Upper Susitna) and Subunit 13E (Upper Susitna River), which include the Susitna-Watana Project area, includes that pertaining to black bear, brown bear, caribou, Dall sheep, furbearers, moose, and wolf. This information is summarized below.

Black bears are numerous in portions of Unit 13 with suitable forest habitat. Field observations and harvest data indicate that black bears are abundant in large portions of Subunit 13E. There is no closed season in Unit 13, and the bag limit is three per year. Hunting of black bears over bait is allowed in spring. Harvest data have been available since 1973, when the sealing of black bears became mandatory. Black bear harvest in Unit 13 averaged 67 per year during the 1970s, 81 per year during the 1980s, and 93 per year during the 1990s. The reported harvest of black bears during the 2003-2004 season was 123 bears. The increasing harvest trend shows black bears are gaining in status as a desirable big game animal, and black bear hunting is more popular than in the past. Non-residents took 26 (21 percent) black bears in Unit 13 during 2003-2004. Successful black bear hunters spent an average of 4.5 days in the field in 2003-2004. Among successful 2003-2004 hunters in Unit 13, highway vehicles (32 percent) and boats (21 percent) were the most popular methods of transportation (ADF&G 2005a).

Density estimates for brown bears in the previous Susitna Hydroelectric Project study area of Subunit 13E in 1985 and 1995 were 18.75 and 23.31 independent bears/1,000 square kilometers, respectively. The average annual brown bear harvests in Unit 13 for the decades of the 1960s, 1970s, 1980s, and 1990s were 39, 59, 105, and 113, respectively. Interest in brown bear hunting and yearly harvest by recreational hunters increased over the years as seasons were lengthened and bag limits increased. Liberalization of brown bear hunting regulations started in 1980 with the initiation of a spring season. The bag limit in Unit 13 was increased to one bear a year between 1983 and 1988 and again starting in 1995. Brown bear harvests have been the highest in those years when the bag limit has been one bear per year and the resident tag fee waived. The reported 2005-2006 harvest of brown bears in Unit 13 and Subunit 13E was 135 and 54, respectively. More brown bears have been reported harvested from 13E over the years than any other subunit. Non-residents took 32 (24 percent) brown bears in Unit 13 during 2005-2006. The high cost of guided hunts appears to be limiting participation by most non-residents. Successful hunters average 4.4 days in the field in 2005-2006. Successful non-residents tend to spend about two more days in the field to take a bear than residents. The most important method of transportation for brown bear hunters in Unit 13 during 2005-2006 was four-wheelers (OHVs). Unit 13 has many far-reaching trail systems that are ideally suited to four-wheeler transportation during fall hunting season. Aircraft and highway vehicles are consistently

important, while snow machine use is highly variable and dependent on snow conditions during the spring season (ADF&G 2007a).

The Nelchina caribou herd has been important to hunters because of its proximity to Anchorage and Fairbanks. Accessibility to human population centers makes the herd particularly vulnerable to overharvesting. Starting in 1977, hunting the Nelchina herd was limited by a drawing permit system with a fall hunting season and since then, all hunting of Nelchina caribou has been controlled by permits. From 1959 (the first year of statehood) to 1971 there was an annual average of 4,233 hunters, and from 1972 through 1984, there was an annual average of 1,442 hunters. For 1972 through 1984, harvests by all Alaskans averaged 779 animals. Harvest gradually increased, along with herd size, especially in the late 1980s and early 1990s. From 1985-1987, harvests by all users (subsistence and non-subsistence) of Nelchina caribou averaged 3,127, with a low of 958 (1986) and a high of 5,628 (1996). From 1998-2009, the average annual harvest by all hunters was 1,795 caribou. The Nelchina caribou herd is probably the only herd in the state with over 30,000 animals that can have its upper population limit controlled solely by human harvests. If the herd can be stabilized at 35,000-40,000, the projected annual harvests are expected to be about 3,000-4,000 caribou each year (ADF&G 2010). For subsistence hunters between 2002 and 2004, four-wheelers were the predominant method of transportation, followed by highway vehicles, boats, and snow machines. Highway vehicles have been the most important transportation method in the Unit 13 federal subsistence hunt (ADF&G 2005b).

Dall sheep harvest in the Talkeetna Mountains and Chulitna-Watana Hills (TCW, which includes Subunit 13E) is limited to adult rams. Since 1989 hunters have been allowed to harvest only full-curl (horn) rams in the TCW area. The estimated population of Dall sheep in the TCW increased from 2,000-2,500 in 1994 to 2,500-3,000 in 1999. A severe winter in 1999-2000 decreased the sheep population about 40 percent. Surveys from 2000-20001 and 2003-2004 indicated the population was recovering. The hunting season in the TCW for regulatory years 2004 through 2006 was August 20-September 20. The bag limit was one ram with a full-curl horn or larger. Hunter harvest in the TCW averaged 55 rams during 2004-2007, lower than the average harvest of 65 rams during 2001-2003 and much lower than the average of 82 rams from 1990-2000. The total number of hunters has decreased steadily. Non-residents were more successful than residents. Non-residents accounted for 14 percent of hunters, but took 47 percent of sheep during 2004-2006. This higher success rate was because non-residents are required to have a guide, and they more often use aircraft to access remote areas than residents. Most successful hunters reported using aircraft or four-wheelers to access their hunting areas (ADF&G 2008a). The Jay Creek mineral lick is frequented by Dall sheep. Peak sheep use of this mineral lick is in May and June (APA 1985b).

Historic harvest data are limited for furbearers in units 11 and 13 (Nelchina and Upper Susitna Rivers, Wrangell Mountains) prior to the initiation of sealing requirements. Wolverine and beaver sealing became mandatory in 1971, followed by lynx and land otter in 1977. Beavers and land otter are considered relatively abundant in both units 11 and 13. Lynx numbers have rebounded from the low point in 2002-2003, following a ten-year cycle that mimics that for hares. Wolverines are considered common in the more remote mountainous regions of units 11 and 13, and remain relatively scarce at lower elevations. Marten numbers appeared to peak about 1988 and have been fluctuation annually since. Coyotes are relatively abundant

throughout units 11 and 13, and are commonly found in river bottoms and creek drainages. Fox and muskrat are found in both units. The beaver hunter/trapper harvest in Unit 13 from 2003 – 2006 was variable, and averaged 234 per year. Average annual land otter harvest was 39 in Unit 13 for this same period. Lynx harvest in Unit 13 increased annually between 2002 and 2006, suggesting that the population may peak again in 2008. The wolverine harvest in Unit 13 remained relatively stable between 1985 and 2006, averaging 35 per year. Harvest data for other species noted above are not available. The transport method most used by successful trappers during the 2003-2006 period was snow machine. Beaver trappers in Unit 13, however, used a wide variety of transportation methods. Other common transport methods were airplane, dog sleds, snowshoes, skis and highway vehicles. Trapping in Southcentral Alaska has become more of a weekend/recreational activity, compared to the long-line/commercial activity seen during the 1970s and 1980s. Much of the trapping (30 percent) occurs along the roadside. Many trappers in units 11 and 13 begin to pull sets by late January, as recreational snow machine activity increases (ADF&G 2007b).

Historically, Unit 13 has been an important area for moose hunting in Alaska. Annual harvests were large, averaging more than 1,200 bulls and 200 cows during the late 1960s and early 1970s. Hunting seasons were long, with both fall and winter hunter hunts. As moose number began to decline, harvests were reduced by eliminating hunts and changing bag limits. During the 1990s the harvest declined, and reached a low of 468 in 2001. Between 2002 and 2007 the population in Unit 13 steadily increased. The BLM implemented a subsistence moose hunt on federal land in 1990. This is a very popular hunt for Unit 13 and Delta Junction residents with more than 1,000 permits issued in most years. The amount of federal land open for this hunt is extremely limited, accounting for less than two percent of the moose habitat in Unit 13. The non-resident moose hunting season was closed in 2002. The success rate for moose hunters in the Unit 13 general hunt was 17 percent in 2006, up from 13 percent in 2001. Hunting effort remained steady in the general hunt during the 2005-2007 period, averaging 7.4 days per hunter for successful hunters and 7.6 days for unsuccessful hunters. The last two weeks of the season accounted for more than 60 percent of harvest between 2001 and 2007. This pattern is predictable, because moose are more vulnerable later in September. Leaf fall starts to occur at this time, bull movements increase, and onset of the rut increases the effectiveness of calling. Four-wheelers have been the most important method of transportation, accounting for 71 percent of the total moose harvest in 2006 (ADF&G, 2008b).

Wolf numbers in Unit 13 were low from about 1900 until the early 1930s, reflecting corresponding low prey densities. Wolf numbers increased after this period, and by the mid-1940s wolves were considered common. As a result of predator control between 1948 and 1953, wolf numbers declined dramatically. Following the cessation of wolf control, numbers increased rapidly. Beginning with statehood in 1959, the wolf season was closed in Unit 13 for a five-year period. In 1965, a short season was held. During the late 1960s, seasons were established that approximated current dates with no bag limits. In 1971, mandatory sealing was established and aerial shooting without a permit was prohibited. Between 1971 and 1991, an annual average of 91 wolves were sealed in Unit 13. Harvest increased through the mid-to-late 1990s, averaging 155 wolves per year. Wolves are harvested under trapping and hunting regulations. Trapping season runs from October 15 until April 30. Hunting season runs from August 10 until April 30 with a bag limit of 10 wolves per day. Hunters and trappers harvested 223 wolves in Unit 13 during the 2001-2002 season. Four non-residents took four wolves, 25 local residents took 84

wolves, and 41 non-local residents took 135 wolves. February had the highest reported wolf harvest, but there was little difference between all the mid-winter months. The change in harvest chronology between years probably reflects changes in snowfall and temperature, which influences access and trapping conditions. In recent years, use of snow machines has surpassed using aircraft as the most important method of transportation. This changes occurred not only because it became illegal to take wolves same-day-airborne, but because of improvements in snow machines. As a result, trappers and hunters are able to penetrate further into remote portions of Unit 13 (ADF&G 2003).

The Upper and Middle Susitna River has received attention for whitewater boating recreation. The rapids of Watana Canyon are rated as Class IV and are considered dangerous even for experienced boaters. The rapids of Devils Canyon have been called the "biggest whitewater on the continent and some of the biggest ever run in the world" and the "Mount Everest of kayaking". The rapids of Devils Canyon are rated as Class VI at water flows that have been successfully run; the first successful kayak run of Devils Canyon was recorded in 1976 (HDR Alaska 2011). Because of the extreme challenge that the rapids present, few kayakers are known to have attempted to run Devils Canyon.

No use information is currently available for Stephan Lake Lodge, for RS trails in the Susitna-Watana Project vicinity, or for CIRI lands.

4.10.3. Recreation-Related Goals and Needs

Recreation-related goals and objectives, contained in various state and local planning documents, are described below.

4.10.3.1. Alaska State Comprehensive Outdoor Recreation Plan

As part of its 2009-2014 SCORP planning effort, the ADNR Division of Parks and Outdoor Recreation (DPOR) posted an online survey for the general public, park professionals, and youth (ADNR 2009). Also, a telephone survey was conducted during April 2009. Information from a mail survey of recreation providers and the general public was collected in spring 2009. Five public meetings were held throughout the state. The online youth survey was taken by students at several different school districts. Through a contract with an Alaskan research firm, households throughout the state were contacted and surveyed by telephone. Respondents were questioned about their outdoor recreation activities and preferences, and their attitudes towards revenue generating programs to fund recreation facilities and programs. In addition to presenting the SCORP at public meetings, the ADNR DPOR mailed 165 surveys to many of Alaska local government's recreation professionals. The survey asked outdoor recreation providers to identify the most significant outdoor recreation needs of their community and regional area.

The biggest difference between regions is the level of satisfaction with facilities. Southeast residents registered the highest level of satisfaction, followed by Railbelt (where the Susitna-Watana Project area is located), then rural (all areas other than the Southeast and Railbelt). This is a shift from the last survey where the Railbelt residents had the highest level of satisfaction with southeast being second. The most common reason for dissatisfaction among rural residents

is the shortage or absence of recreation facilities within their community or within an hour's traveling time. However, before developing new facilities, all three regions overwhelmingly support improving the maintenance of existing facilities (Railbelt 72.5 percent, Rural 86.2 percent, and Southeast 74.4 percent).

Southeast residents are the strongest supporters of non-motorized trails, more picnic areas, and an expanded cabin system. Railbelt residents, which make up 73 percent of the state's population, are the strongest supporters of more trailheads, recreational vehicle (RV) campgrounds, new parks from private land and state land, and an increase in law enforcement in the parks. Rural residents were the strongest supporters of more facilities for the disabled, boat launches, off road vehicle trails, roadside toilets, RV dump stations, more recreation programs, more visitor centers, and improved maintenance of existing parks.

Rural residents stated that the facilities are crowded when they go to use them but they also stated that there are enough parks.

Rural residents are almost twice as likely as Railbelt residents to own powerboats and are more likely to own hunting equipment, fishing equipment, ORV/ATVs, and snow machines. Railbelt residents are considerably more likely than others to own bicycles and ski equipment and for the first time dog teams at an almost two to one ratio over the rural residents. Southeast residents have more sea kayaks than the Railbelt and rural areas combined. Sport fishing is the favorite activity of southeast and Railbelt residents. Sport hunting, also an important subsistence activity, is the favorite activity among rural community residents.

Issues, goals, and recommended strategies identified in the 2009-2014 SCORP are as follows:

- Lack of Adequate Funding
- Tourism and the Economy
- Improved Access to Outdoor Recreation Resources
- Opportunities to Meet Recreation Needs in Communities

4.10.3.2. Susitna Matanuska Area Plan, 2010 Public Review Draft

The following recreation-related goals and management guidelines are contained in the Susitna Matanuska Area Plan (SMAP) Public Review Draft (ADNR 2010b).

Recreation Opportunities Goal: Lands will be provided for accessible outdoor recreational opportunities with well-designed and conveniently located recreational facilities. In addition, undeveloped lands should be provided for recreation pursuits that do not require developed facilities.

Management guidelines to achieve the recreation opportunities goal are as follows:

- Coordinate with Other Landowners and Users of an Area.
- Identify Roles of Different Public Land Owners in Providing Public Recreational Opportunities.

- Public Use Sites. Uses that adversely affect public use sites or areas should not be authorized**.**
- Private Commercial Recreation Facilities and Operations on State Land. If authorized, these uses should be sited, constructed, and operated in a manner that minimizes conflicts with natural values and existing uses.
- Commercial Recreation Leasing Processes. Given the broad scope of the SMAP, the determination of particular sites is impractical, although such uses are generally appropriate within most plan designations.
- Permits, Easements, and Leases Adjacent to Recreation Facilities. May be issued, based upon manager's determination.
- Management of Recreation Use on State Lands. ADNR is to enable a variety of uses and vehicle types, while minimizing fish and wildlife impacts and avoiding user conflicts.
- Consultation with ADF&G. To take place where important species or habitats are likely to occur.

Public Access Goals: 1) Preserve, enhance, or provide adequate access to public and private lands and resources. Provide for future trail and access needs, and protect or establish trail corridors to ensure continued public access consistent with responsible wildlife and fish habitat conservation. 2) Ensure adequate opportunities for the public's use of public resources of local, regional, and statewide significance.

Management guidelines to achieve the public access goals are as follows:

- Reservation of Public Use Easements. Before disposing of land, ADNR will reserve easements pursuant to the requirements of Alaska Administrative Code.
- Retain Access where Appropriate. Improve or preserve access to areas with significant public resource values.
- Provide Access to Non-State Lands. Reasonable access will be provided across state lands to outer public and private land.
- Ensure Management of Alaska Native Claims Settlement Act (ANCSA) 17(b) Easements. The state will identify new 17(b) easements and ensure that public access is maintained to existing 17(b) easements.
- Provide Access for Development. When an access route is constructed over state land, public access should generally be maintained.
- Limit Access where Appropriate.
- Coordinate with Borough Recreational Trails Plan.
- Consult with ADNR South Central Regional Office (SCRO) and Division of Mining, Land, and Water.
- Site and Construct Temporary and Permanent Roads or Causeways to Avoid Environmental Impacts.
- Protection of the Environment.
- Joint Use and Consolidation of Surface Access.

4.10.3.3. Matanuska-Susitna Comprehensive Development Plan, 2005 Update

As described in the MSB Comprehensive Plan, 2005 Update (MSB 2005), the Borough maintains a large number and diversity of parks, campgrounds and recreational areas. As the Borough's population continues to grow, the demand for various year-round passive and active recreational opportunities increases. The Borough should accommodate such demand with the following goals and recommendations:

Goal (Parks and Open Space, PO-1): To acquire, develop, and redevelop a system of parks, recreation facilities, community centers, and open spaces that is safe, functional, and accessible to all segments of the population.

> Policy PO1-1: Acquire parks, community centers, recreation, and open space facilities in those areas of the Borough facing population growth, commercial development, and in areas where facilities are deficient.
>
> Policy PO1-2: Develop pedestrian and bicycle linkages between schools, public facilities, neighborhoods, parks and open spaces and population centers where feasible.
>
> Policy PO1-3: Ensure adequate maintenance and operation funding prior to development of parks and recreational facilities.
>
> Policy PO1-4: Ensure that parks and open spaces are provided using the following standards to determine the need for parks: 5 acres of neighborhood parks/1,000 persons; 10 acres of community parks/3,500 persons; 15 acres of nature and open space parks/5,000 persons.
>
> Policy PO1-5: Actively promote through various land use techniques the preservation of agricultural land.

Goal (PO-2): Protect and preserve natural resource areas.

> Policy PO2-1: Work cooperatively with numerous resource management agencies, community councils, and citizens to care for lakes, wetlands, streams, rivers, and wildlife habitat and corridors while providing public access for recreational opportunities that have minimal impacts to such areas.
>
> Policy PO2-2: Preserve opportunities for people to observe and enjoy wildlife and wildlife habitats.
>
> Policy PO2-3: Identify, through analysis, potential natural resource areas throughout the Borough that should be protected.

4.10.3.4. East Alaska Resource Management Plan

The East Alaska Resource Management Plan (EARMP) replaces the Southcentral Management Framework Plan approved in 1980 and is now the base land use plan for public lands

administered by the BLM Glennallen Field Office's EARMP Planning Area. The overall recreation goal for this planning area, which surrounds the Project area, is to "manage recreation to maintain a diversity of recreational opportunities" (BLM 2006).

Five Special Recreation Management Areas (SRMAs) are designated in the EARMP. These areas are managed with the specified recreational emphasis:

- Delta Wild and Scenic River Corridor Area.
- Gulkana Wild and Scenic River Corridor Area.
- Denali Highway Area.
- Tiekel Area.
- Delta Range Area.

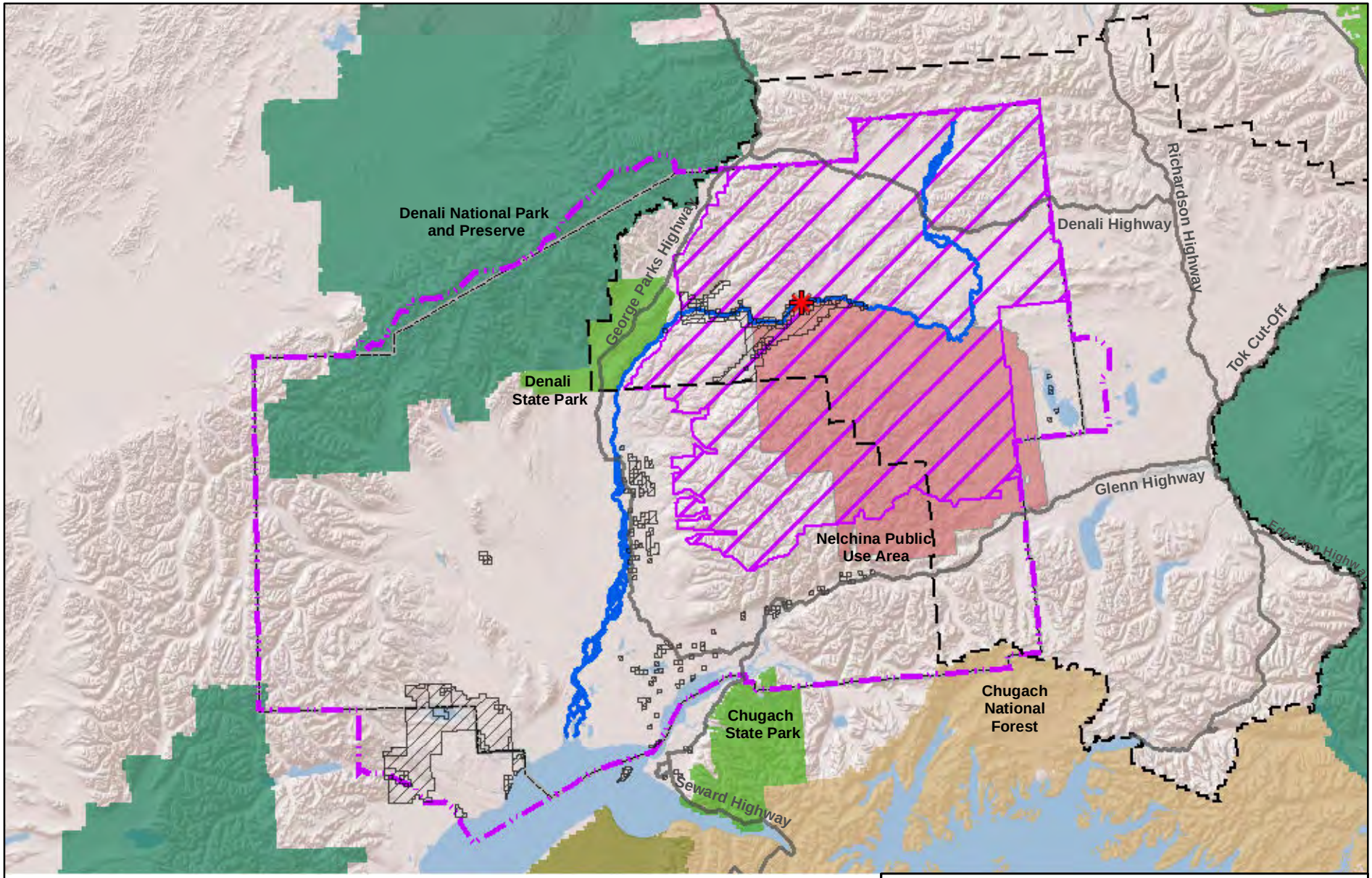
Areas outside those identified above are managed as Extensive Recreation Management Areas, with existing ROS classes maintained. Inventory and monitoring could occur and standards may be identified for trail density in these areas based on monitoring and inventory information. Some education/interpretation at trailheads may occur, particularly at 17(b) easement trailheads within these areas.

4.10.3.5. Susitna Area Plan

The Susitna Area Plan (ADNR 1985) is a land use plan for public lands in the Susitna Area. The plan designates the uses that are to occur on much of the public land within the Susitna Area (Figure 4.10-4), which covers approximately 15.8 million acres in Southcentral Alaska. Much of the land in the MSB is included in the planning area. The Project area is in the Susitna Area Plan's "Talkeetna Mountains" Subunit (11). This subunit encompasses roughly 6 million ac, the majority of which is publicly owned. The Nelchina Public Use Area (see below) lies within this subunit. Recreation goals and management guidelines included in the plan include:

- Resource protection;
- Economic development;
- The role of different public land owners in providing public recreation opportunities;
- Public use cabins;
- Private recreation facilities on public land; and
- Promotion of underutilized areas.

The Talkeetna Mountains portion of the Susitna Area Plan described recreational opportunities associated with the proposed Project.



ALASKA ENERGY AUTHORITY

Date: Nov 2011
Scale: As Noted

State of Alaska
Susitna-Watana Hydroelectric Project, FERC No.14241

Figure 4.10-4

Susitna Area Plan Boundaries

4.10.3.6. Nelchina Public Use Area

As described in the Nelchina Public Use Area Fact Sheet (ADNR 2000) the area is managed, in part, to:

- Protect fish and wildlife habitat, particularly caribou calving areas, trumpeter swan nesting areas, and other important habitats for moose, Dall sheep and brown bear so that traditional public uses of fish and wildlife populations may continue;
- Perpetuate and enhance public enjoyment of fish and wildlife and their habitat including fishing, hunting, trapping, viewing, photography;
- Perpetuate and enhance general public recreation in a quality environment;
- Perpetuate and enhance additional public uses described in the Susitna Area Plan; and
- Allow additional public uses of the area in a manner compatible with the purpose specified above.

4.10.3.7. Cook Inlet Region, Incorporated

Visitors may access and use CIRI land on a limited basis with written permission. Guides, hunters and anglers, campers, tour operators, photographers, scientists, dog mushers and other outdoor enthusiasts are encouraged to respect CIRI land and contact the CIRI Land and Resources Department to learn more about land use policies (CIRI 2011).

4.10.4. Protected River Segments

Twenty-five Alaskan rivers and over 3,200 river mi are protected under the National Wild and Scenic River designation. Additionally, there are six legislatively designated State Recreation Rivers, encompassing 460 river mi and 260,000 upland acres (ADNR 2009).

The Tangle Lakes and Tangle River area, accessible from the Denali Highway northeast of the Susitna-Watana Hydroelectric Project area, has been designated as part of the Delta National Wild and Scenic River.

The EARMP (BLM 2006) planning team conducted a wild and scenic river eligibility review for the planning area. The Susitna River from the headwaters to the confluence of Kosina Creek (which is located within the proposed Susitna-Watana Project boundaries) was considered. This is a glacial, free flowing river that is accessible from the Denali Highway. Jet boats go up through the East Fork. Boating occurs from the highway crossing downriver to the Maclaren River and upriver on the Maclaren to the Denali Highway. It is also possible to continue down the Susitna River to the Tyone River, upriver on the Tyone and out through Lake Louise. This river and adjacent lands provide a diversity of recreational opportunities. The river is road accessible and the potential exists for several different semi-primitive motorized experiences. In the vicinity of the Denali Highway, there are numerous opportunities to access the river for short day hikes or simply viewing the river from the highway for a roaded-natural experience. Opportunities certainly still exist for quality primitive experiences along the river corridor. This portion of the Susitna River was tentatively classified as “Scenic”. It is free of impoundments,

with shorelines still largely undeveloped. Exception in this segment is where the river is crossed by the Denali Highway. In the area of the Denali Highway crossing, the river is also paralleled for a short distance by the Valdez Creek road. South of the Denali Highway, the river is paralleled at a distance by the Susitna South OHV trail, but this trail does not access the river. Powerboat use occurs on the river and is a traditional and established use.

No designations or tentative classifications apply to the Susitna River in the vicinity of the Project area.

4.10.5. National Trails System and Wilderness Areas

The Iditarod Trail Sled Dog Race is run along or near the formal 418-mile long Iditarod National Historic Trail. Mushers and teams cover the 1,000-1,100 mi between Anchorage and Nome in 9-15 days. Beginning on the first Saturday in March, the race is the most popular sporting event in Alaska. The race crosses the lower Susitna River on the Historic Trail near the Town of Susitna.

Approximately 1.9 million acres of Denali National Park and Preserve were designated a wilderness area in 1980.

No national trails system or wilderness area lands are located in the vicinity of the Project area.

4.10.6. Shoreline Buffer Zones and Adjoining Land Uses

The shoreline of the Susitna River and its tributaries in the vicinity of the proposed Project is steep, rocky, and covered with mixed woods and tundra. Areas adjacent to the shoreline are owned by the CIRI. These lands, and those managed by the BLM's Glennallen Field Office and the ADF&G's Nelchina Public Use Area that surround it on the north and south, are undeveloped (covered with mixed woods and tundra) and suitable for use as a shoreline buffer zone.

4.10.7. Land Uses and Management

Recreational uses and management in the Southcentral region and Project area are detailed above. Additional uses and management of these lands are described below.

4.10.7.1. Regional Land Uses and Management

Land ownership in Alaska is complex and in transition. Under terms of the 1959 Alaska Statehood Act, the State of Alaska is authorized to receive over 103 million acres of land from the federal government. To date, the state has received about 89.5 million acres of this land (ADNR 2009).

Signed into law in 1971, the Alaska Native Claims Settlement Act (ANCSA) won a unique settlement from the United States for Alaska's Native population. The act extinguished aboriginal land claims, provided for formation of 13 regional, four urban, and 200 village ANSCA corporations, and transfer of 44 million acres of land from federal to Native corporation

ownership. State and ANCSA conveyances have not been completed. The federal government (Bureau of Land Management) owes ANCSA corporations about 9 million acres and owes the state about 16 million ac. Many of these remaining claims are in conflict and will require many years to resolve. Various selections cannot be completed until actual land surveys are done, which will also take many years. Upon completion of the conveyance process, the state's largest landowner will remain the federal government, with about 220 million acres or 60 percent of Alaska. The state will own 28 percent, ANSCA corporations 11 percent, private (non-ANCSA Corporation) one percent, and municipalities, less than one percent (ADNR 2009).

The Southcentral region extends from the hydrographic divide of the Alaska Range on the north to the MSB boundary on the west, Kodiak Island on the south, and the Alaska/Canada border on the east. It abounds with ocean shorelines, freshwater lakes, free-flowing rivers, massive mountains, wildlife, and glaciers. The diversity of landscapes and natural resources offer a wide variety of outdoor recreational opportunities. The Southcentral region contains a more developed transportation system than other portions of the state. Paved highways and gravel secondary roads provide access to many of the cities and villages in the region. Use of planes to reach areas not accessible by road is also prevalent. The Alaska Railroad and ferry systems also serve portions of the Southcentral region.

The Southcentral region includes the George Parks Highway, the Denali Highway, and the Alaska Railroad. The George Parks Highway (numbered Interstate A-4 and Alaska Route 3) runs 323 mi from the Glenn Highway 35 mi north of Anchorage to Fairbanks in the Alaska Interior. The highway was completed in 1971. The highway, which mostly parallels the Alaska Railroad, is one of the most important roads in Alaska. It is the main route between Anchorage and Fairbanks (Alaska's two largest metropolitan areas), the principal access to Denali National Park and Preserve and Denali State Park, and the main highway in the Matanuska-Susitna Valley.

Most residential, commercial, agricultural, transportation and utility land use development occurs in and around Parks Highway communities and along rural sections of the Parks Highway west of the Project area. That is, small towns such as Willow, Talkeetna, Cantwell, and Healy have a mix of residential and commercial land, and transportation lands for the highway, other roads, railroad, and airstrips. Other scattered residential lands occur in agricultural, homestead or other settlements along the highway, near the railroad or area rivers (APA 1985a).

The Denali Highway is about 135 mi long and connects the Cantwell junction (located just north of Broad Pass) on the Parks Highway with Paxson Lodge on the Richardson Highway. A loop trip originating and returning to Fairbanks is about 436 mi. A loop trip from Anchorage is close to 600 mi. The Denali Highway is generally open from mid-May to October 1.

The Alaska Railroad extends from Seward and Whittier, in the south, to Fairbanks (passing through Anchorage), and beyond to Eielson Air Force Base and Fort Wainwright in the interior of that state. The Alaska Railroad carries both freight and passengers throughout its system. The railroad has a mainline over 470 mi long, and is well over 500 mi long when branch lines and sidings are included. It is currently owned by the State of Alaska.

The Chugach National Forest, located south and east of Anchorage, surrounds Prince William Sound. This 5.4 million acre forest includes the Kenai Peninsula, the Russian River, and the delta of the Copper River. The Chugach National Forest Revised Land and Resource Management Plan (USFS 2002b) sets forth the direction the Chugach National Forest will follow in the future management of lands and resources within its boundaries.

Denali State Park is approximately 324,240 acres in size. The State Recreation Areas include an additional 1,470 ac. Although much smaller than Denali National Park and Preserve to the north (6,028,203 ac), Denali State Park and its associated State Recreation Areas are very diverse area. They afford tremendous views of Denali; contains three major rivers, the Susitna, Chulitna, and Tokositna; and have three glaciers adjacent to or within its boundaries, the Ruth, Eldridge and Tokositna. Vegetation ranges from lowland spruce and hardwood forests to alpine tundra. The George Parks Highway transects the park and opens its scenery, wildlife and other natural resources to the public.

Primary uses of the park are camping, hiking, fishing, viewing Mt. McKinley, canoeing, rafting, riverboating, hunting and trapping.

The proposed Project is within the northwest corner of the BLM's Glennallen Field Office Planning Area. The planning area includes approximately 7.1 million acres in east Alaska, including approximately 5.5 million acres of lands that are selected by the State of Alaska or Alaska Natives. The BLM is responsible for management of selected lands until conveyance occurs or until the selections are relinquished back to the BLM because of over selection. The planning area also includes private land (including Native Corporation land), state land, and lands managed by other federal agencies. Management measures outlined in the BLM's EARMP (BLM 2006) apply only to BLM-managed land in the planning area; no measures have been developed for private, state, or other federal agency lands. The BLM prepared this Resource Management Plan and Final Environmental Impact Statement (EIS) to provide direction for managing public lands within the Glennallen Field Office boundaries.

4.10.7.2. Project Area Land Use and Management

The Susitna Area Plan (ADNR 1985) is a land use plan for public lands in the Susitna Area. The plan designates the uses that are to occur on much of the public land with the Susitna Area (Figure 4.10-4), which covers approximately 15.8 million acres in Southcentral Alaska. Much of the land in the MSB is included in the planning area.

The Project area is in the Susitna Area Plan's "Talkeetna Mountains" Subunit (11). This subunit encompasses roughly six million ac, the majority of which is publicly owned. The Nelchina Public Use Area (see below) lies within this subunit. In addition to private lands held by ANSCA corporations there are also numerous, scattered small parcels owned by private individuals. These holdings are generally of two types: state offered open-to-entry sites adjacent to recreational fly-in lakes; and federal, patented mining claims. The Talkeetna Mountains Subunit is managed as a multiple use area emphasizing recreation (including hunting and fishing), protection of fish and wildlife habitat, and mining. Most of this rugged, mountainous area is to remain remote and very sparsely developed. Additional road access and concentrated settlement on public lands will be contingent on a demonstrated need for such development in

order to facilitate activities such as mining or dam construction. The Talkeetna Mountains portion of the Susitna Area Plan described the recreational opportunities associated with the proposed Susitna Hydroelectric Project.

The Nelchina Public Use Area covers about 2.5 million acres in the Talkeetna Mountains of Southcentral Alaska. The Public Use Area was established by the Alaska legislature in 1985 and is managed by the ADNR Division of Mining, Land, & Water. The Nelchina Public Use area is the biggest legislatively designated area on state land in Alaska. It is an outstanding area for hunting, fishing, recreation, and mining. The vast area is home for the Nelchina Caribou herd, the third largest caribou herd in Alaska. It also supports important populations of trumpeter swans, moose, Dall sheep, and brown bear. The Susitna River forms the northern boundary of the Nelchina Public Use Area, and portions of the Susitna-Watana Project area located south of the river are within its boundaries. These areas are located within the Susitna Area Plan's Talkeetna Mountains Subunit (11).

The Nelchina Public Use Area is managed for multiple uses. The broad array of activities that have taken place on these lands continues to be allowed. Guidelines were adopted in the ADNR's Susitna Area Plan (see discussion above) to maintain or enhance the special values of this area and to ensure that the variety of public uses occur compatibly. The guidelines set by the area plan cover mineral exploration and development in caribou calving areas during the calving season (May 1 to June 15). Guidelines also address road construction throughout the area.

The SMAP Public Review Draft (ADNR 2010b) establishes the land use designation for state land within the Susitna Matanuska Area and describes their intended uses. The plan directs which state lands will be retained by the state and which should be sold to private citizens, used for public recreation, or used for other purposes. It also identifies general management guidelines for major resources and land uses within the planning area, as well as guidelines for the development and use of resources for specific parcels. The Project area is located within the SMAP "Talkeetna Mountains" Region. Most lands in this region are managed for wildlife habitat, water resource, and public recreation values. All state land within this region is to be retained. This region is not considered appropriate for grazing, commercial timber harvest, or remote settlement – given its inaccessibility and unsuitable terrain. Locatable mineral exploration and development is appropriate within general domain land as well as within the Nelchina PUA, but any such activity must ensure that the numerous mineral licks are avoided or proper mitigation is provided.

The MSB Comprehensive Plan, 2005 Update (MSB 2005) provides general goals and policy recommendations to help guide future development in order to enhance our quality of life and the public health, safety, and welfare.

Land use goals and policies contained in the 2005 Update are as follows:

Goal (LU-1): Protect and enhance the public safety, health, and welfare of MSB residents.

Goal (LU-2): Protect residential neighborhoods and associated property values.

Goal (LU-3): Encourage commercial and industrial development that is compatible with residential development and local community desires.

Goal (LU-4): Protect and enhance the MSB's natural resources including watersheds, groundwater supplies and air quality.

Goal (LU-5): Recognize and protect the diversity of the MSB's land use development patterns including agricultural, residential, commercial, industrial and cultural resources, while limiting sprawl.

Goal (LU-6): New developments greater than five units per acre should incorporate design standards that will protect and enhance the existing built and natural environment.

Goal (LU-7): The MSB should actively limit sprawl through setting appropriate density standards and encouraging residential and commercial development to occur in areas that are centrally located and within close proximity to public and private services.

4.10.7.3. Project Area Wetlands and Floodplains

The Project area is characterized by an isolated subarctic environment comprised primarily of coniferous and mixed forests and low shrubs. Numerous creeks flow into the Susitna River and occasional lakes dot this remote region. Wetland mapping of much of the Alaska was completed as part of the National Wetlands Inventory, conducted by the U.S. Fish and Wildlife Service (USFWS). Federal regulations define wetlands as areas that, under normal circumstances, would support vegetation typically adapted to saturated soils. By this definition approximately one-third of Alaska is wetlands. In the Project vicinity, wetland areas include Brushkana and Upper Deadman creeks, the area between Deadman and Tsusena creeks, the Fog lakes area, the Stephan Lake area, Swimming Bear Lake, and Jack Long Creek (APA 1985a).

The U.S. Army Corps of Engineers (USACE) conducts hydraulic analyses to determine floodplains for the Federal Insurance Program of the Federal Emergency Management Agency (FEMA). Floodplains of interest to the Federal Insurance Program are defined as "the lowland and relatively flat areas adjoining inland and coastal waters, including at a minimum, that area subject to a one percent or greater chance of flooding in a given year". Due to the remote nature of the state, floodplain studies and mapping have occurred only in communities and populated regions. No floodplain studies have been prepared in the middle Susitna basin.

The USACE has mapped the 100-year flood elevation on the Nenana River at the community of Nenana and at Chulitna-on Pass-Creek, a tributary of the Chulitna River. The 100-year floodplain of the Ta1keetna, Susitna, and Chulitna Rivers has been mapped within the townsite of Talkeetna, where flooding has occurred in the past. The floodplain of the Talkeetna River at Talkeetna is wide and developed only on the south side at the mouth of the river. Open spaces in the floodplain are extensive and may come under pressure for future development (APA 1985a).

The Floodplain Information Report for Talkeetna, Alaska, is a basis for the adoption of land use controls to guide floodplain development and prevent loss and damage. Peak discharge for the Intermediate Regional Flood, or the 100-year flood, at Talkeetna is estimated to be 268,000 cfs. Peak discharge for the Standard Project Flood was estimated to be 315,000 cfs. These estimates are for the Susitna River downstream of the confluences with the Chulitna and Talkeetna Rivers (APA 1985a).

Additional information concerning wetlands and riparian areas is contained in Section 4.7 of this document.

4.10.8. Potential Adverse and Positive Impacts

Potential impacts to recreation, land use and land management are described below.

4.10.8.1. Recreation

The potential recreation impacts described below are based on the Project as currently envisioned. Access routes and transmission facility alignments have yet to be finalized. Figure 1-1 depicts the locations of three potential corridors. These corridors have been labeled “Denali”, “Chulitna,” and “Gold Creek." Development of the Project facilities would change the recreational character of portions of the Project area from an undeveloped, remote setting to an area characterized by development and increased human activity. Portions of the Susitna River and adjacent lands would be altered.

Temporary recreation impacts could be generated by construction personnel, traffic, materials, staging areas, the worker camp, and noise. The Project would also have positive recreation impacts. The proposed access roads and transmission line corridors, reservoir, and recreational facilities would provide new recreational opportunities to the public.

As described in the 1985 FERC License Application (APA 1985a), hydroelectric development would have both direct and indirect impacts on existing recreation patterns. Direct impacts are those that result from physical changes to the existing recreation settings. Impacts to these settings might either increase or decrease the desirability and probability of continued recreation use. They may also make new types of activity possible. Indirect impacts are those resulting from changes in recreation use of the Project area, including increased demand associated with construction workers and the general public.

Construction and operation of the Project would impact recreation resources by increasing activity, altering portions of the Susitna River and adjacent land, and restricting or increasing access. These activities would result in changes in the nature of the recreation experience, changes in hunting or fishing opportunities, and/or changes in other recreation opportunities.

Increased activity in the area would affect fishing and hunting activities by disturbing fish and wildlife and by changing the perceived image of the area from “pristine” to “developed." Increased activity from Project construction and operation could include the presence of workers and their families, the transportation of personnel and materials to and from the site, and the disruption caused by operating heavy equipment in the area. Streams near the construction camp could receive increased fishing pressure from construction workers and their families. Streams such as Deadman Creek could be overfished unless additional management restrictions are instituted. The effects of such activities on fish and wildlife are discussed in more detail in sections 4.5 and 4.6 of this document.

The direct impacts of construction activities extend beyond the areas being physically disturbed. A substantial change would result as the remote character of portions of the area changes to one of heavy construction. This is an unavoidable impact only partially mitigated by careful management of remaining lands.

The development of a temporary construction camp near the proposed dam (a site near the north abutment is currently proposed) would cause short-term and long-term visual impacts. The dam would alter the river for about 39 mi upstream, changing its character from wild, with challenging rapids at Vee Canyon, to a large lake with reduced current.

Improved access would benefit many recreationists by increasing hunting, fishing, hiking, camping, and other opportunities.

Direct impacts that are unmitigatable are the loss of remote character in portions of the Project area and inundation of Class IV rapids at Vee Canyon.

Impacts on fishing would result from creation of the reservoir. Inundation of the lower reaches of clear-water tributaries in the impoundment zone would eliminate existing grayling habitat. Affected tributaries would include Deadman, Watana, Kosina, and Jay Creeks (APA 1985a). The existing level of boating activity in Devils Canyon, downstream from Devils Canyon to Talkeetna, and upstream from the dam site would be largely unaffected during construction. When reservoir filling begins, water levels downstream would decrease slightly during those one or two summer recreation seasons. Based on river navigability studies completed in 1985, this reduction in flow is not expected to appreciably affect river boating or packrafting downstream of the dam.

The dam and reservoir would change existing boating and packrafting patterns on the Susitna River. The reservoir would inundate 39 mi of the 125-mile route between the Denali Highway and the Stephan Lake Portage. During much of the year, the Vee Canyon rapids would be inundated.

The inundated portion of the Susitna River would change in character from a remote and undisturbed river environment with occasional rapids to a flatwater condition. With a loss of current, boaters and packrafters would need manual or mechanical propulsion to navigate the reservoir. Devils Canyon rapids, located downstream, would remain runnable to experts during construction, since flows would be similar to those under natural conditions. These rapids would also remain runnable during Project operation. Boaters desiring to kayak these rapids during construction would need to fly in and hike to the river below the dam site, or, if floating the river, be allowed to portage via the construction area.

Following construction, portions of the land areas associated with the Project would be used for operations. Land not required for operations would be rehabilitated. Rehabilitated areas could be used for recreation.

Once operation of the Project begins, the public may gain access to the area via road. This would increase recreation opportunities.

During operation, the reservoir drawdown would reach its low point in April and May. The reservoir would fill from June through August, reaching its highest point in early September. Lake shorelines exposed during low water would have large silt flats, steep banks, tree stumps, and slumping soils. This would limit the development of the reservoir as a major recreational attraction. Safety would be a concern to boaters or packrafters, since the reservoir's large size may lead to hazardous conditions during periods of high wind (APA 1985a).

Vee Canyon, a notable natural feature located about 38 mi upstream of the dam, would have its Class III rapids inundated seasonally. During typical water years, these rapids, located at approximately elevation 1,950 ft, would be exposed from January through June, approximately 1 month longer than in drier years. As a result, Vee Canyon rapids could still be runnable by boaters in June (APA 1985a).

The impoundment would inundate wildlife habitat. Dall sheep and caribou populations may be affected by construction of Project facilities, but not as much by the reservoir filling (APA 1985a).

New access roads could provide vehicular access into a large area previously open only to ORVs and hikers. The roads would be maintained year-round. If the Denali Corridor is chosen for the permanent access road, this could allow increased access opportunities along the Denali Highway segment which is currently closed each winter by snow.

Road improvements and access into new areas could change existing recreational patterns and recreational resources in several ways. Winter snowplowing along the Denali Highway could cause an increase in winter recreationists using the area for cross-country skiing, snowmobiling, dog sledding, and other winter sports. Denali Highway improvements could also make the area adjacent to the highway more attractive to recreationists during the summer months than it is at present. Increased Denali Highway traffic associated with commuters, truck drivers, and new local residents would introduce other potential users to the recreational opportunities adjacent to the road. Increased recreational activity would likely follow existing patterns and take the form of increased roadside camping in old gravel pits along the road, as well as hunting, fishing, and hiking (APA 1985a).

Access roads and transmission lines would pass through areas that presently have very low levels of recreational activity. Access road and transmission construction activities would affect hunting, fishing, and hiking activities that might have occurred in those areas, and users would be displaced into the surrounding areas.

The presence of transmission towers and cleared corridors would reduce the area's appeal as a remote area. The impacts of the transmission corridors on existing recreation patterns are primarily visual, as discussed previously. Positive impacts would also result, since cleared transmission corridors are commonly used by hunters and hikers.

Indirect impacts would result from the Project as access to and recreational use of the area increase. Recreational use of the Project area would begin rising once the Project is complete. Once the reservoir is filled, obstacles to boat and packraft access such as the Vee Canyon rapids would be inundated, allowing access from upstream via the Denali Highway. Currently, most

boaters and packrafters travel only to the Tyone River or to Goose Creek above Vee Canyon, with the exception of the occasional whitewater boaters that continue through the Vee Canyon rapids.

Indirect impacts resulting from increased use would consist of two types: change in the general character and image of the area, and impacts from fishing, hunting, and other recreation activities (APA, 1985a).

An influx of hunters, anglers, hikers, campers, and sightseers could change the character and image of the area from primitive and remote to more accessible and well-used, especially near the access roads and dam site. Entry patterns near Project facilities would change from primarily fly-in to trips dominated by roads and vehicles. The Project would enhance the experience for the user group that accesses fishing and hunting sites via roads. The experience would be adversely affected for the user group that desires a remote fly-in experience. The enhancement of opportunities to users by opening a new area to vehicular access would be greater in magnitude than the adverse impact of the Project to the few existing fly-in users (APA 1985a).

Improved access would increase pressure on some existing fish populations. Fishing pressure on creeks in the vicinity of access roads could increase. Access roads would also provide easier access to and increase fishing pressure in nearby lakes.

Improved access would also increase pressure on game populations. Road access would increase hunting and trapping in areas that were previously accessible, for the most part, only by air. This would substantially increase pressure on species that are not heavily regulated. The Project reservoir would increase access for hunting and trapping, particularly in drainages above the dam such as Watana Creek, Kosina Creek, and Jay Creek. When public access to the reservoir is provided, hunting and trapping via boat and packraft would occur. Float planes would use the reservoir to gain access to adjacent areas for hunting.

Non-consumptive activities might increase a result of the Project. These include camping, hiking, and sightseeing, and could result in minor disruptions to wildlife populations or lead to possibly more needs for emergency services and possibly lead to some conflicts between user groups depending on seasonal use patterns. Disturbances would be greatest near Project recreation facilities, along the access roads and transmission line, and near the dam site. Over time, some wildlife would likely avoid these areas of increased human presence.

4.10.8.2. Land Uses and Management

Land use impacts would result from the construction of the following Project facilities: dams and impoundments, construction camps, recreation facilities, access roads, railhead and permanent transmission line. Some impacts would be temporary, such as with borrow sites which can be reclaimed. Other impacts, such as the inundation of lands covered by the reservoir, would be permanent.

Direct land use impacts would occur on those lands converted from current uses to Project uses. The Project reservoir would inundate approximately 20,000 ac, changing land from forest used for dispersed recreation to reservoir used for hydropower generation and potential recreation.

Additional forest and low shrub land would be temporarily or permanently disturbed for borrow and quarry sites. Placement of construction camps would convert low shrub and mixed forest land to developed community use. In addition, land would be permanently disturbed by road, transmission line corridor and recreation facilities.

Provision of access into the Susitna River basin, an otherwise remote, unroaded area, could result in changes in land uses on surrounding lands. A new, temporary population center would be established at the construction camp (and at the railhead facility). The public could access the area via a road/transmission line route, navigable river routes leading into the reservoir, and by floatplanes landing on the reservoir. New opportunities through use of the reservoir for access to surrounding lands would be opened. An increase in numbers of people would in turn increase recreational and other activity levels and put new harvest, extraction, and development pressures on fish, wildlife, and other natural resources. Current activity patterns would change, and displacement of a small number of resource users such as guides and trappers would follow. As more people are attracted to this area, peripheral commercial and other development would occur, thus stimulating the regional economy. The opportunities for additional roads extending off the access road could encourage mineral and other resource extraction. Land values may be affected. Also, an impetus for more active land management and cooperative agreements between landowners would be created to address such issues as trespassing on private land (APA 1985a).

The Project area has been relatively undeveloped, because of limited access and unfavorable economic feasibility. Without the Project, little change is likely to occur in existing land use or activity patterns. However, in the past, the CIRI and Native Villages have expressed a desire to develop the timber, mineral, and recreational potential of their lands south of the Project area with or without the Project (APA 1985a).

Within the approximate boundaries of the dam and impoundment, there are wetlands of various types, including riverine. The dam, powerhouse, borrow sites, impoundment, and appurtenant facilities would occupy some of these wetlands. The construction camp, access road/transmission line corridor, and airstrip could occupy additional wetland acreage. Potential Project impacts on wetlands are discussed in Section 4.7.2 of this document. Project impacts on designated floodplains cannot be ascertained at this time, because of the lack of data for the Middle Susitna basin. However, extensive Project-related data for the previous APA Project showed that floods up to the 50-year event would be diminished in magnitude on the middle reach of the Susitna River from Devils Canyon Dam to Talkeetna (APA 1985a).

4.10.9. Potential Protection, Mitigation, and Enhancement

Potential PM&E measures for recreation, land use, and land management are described below.

4.10.9.1. Recreation

AEA anticipates preparing a Recreation Plan for the Project in consultation with resource agencies and other interested parties. The following elements may be included in this plan:

- Existing recreation facilities
- Current and future use
- Proposed recreation facilities
- Implementation schedule and estimated costs
- Operations and maintenance
- Future recreation needs
- Consultation

Proposed recreation facilities may include: roads and parking lots, scenic overlooks, directional and informational signage, boat launches, picnic areas, campgrounds, hiking trails, and interpretive exhibits.

Borrow areas created during Project construction would be adaptively reused to create roadside pull-offs, scenic overlooks, picnic areas, and other recreational facilities.

The alignment chosen for the roads and transmission lines would avoid areas of environmental sensitivity to the maximum extent practicable and, therefore, avoid placing undesirable recreation pressure on these areas. Final alignments would also attempt to avoid disrupting areas that are known to be popular existing and potential recreational settings. (APA 1985a).

Access roads, and transmission lines would not be open to the public during construction and may be restricted or limited access after construction. Control points and/or physical barriers would prohibit access during construction to ensure public safety and site security.

Portions of the Denali Highway would possibly be upgraded as part of the Susitna-Watana Project, if the Denali Corridor is selected for road access. These upgrades would benefit recreationists.

4.10.9.2. Land Uses and Management

Potential mitigation measures associated with fish, wildlife, and botanical resources and wetlands affected by the impoundment and other Project-related activities are discussed in Sections 4.5, 4.6, and 4.7 of this document. Sections 4.3 and 4.9 describe reclamation and/or stabilization of disturbances at borrow and quarry sites.

Potential mitigation measures for indirect land use impacts are discussed in other chapters of this document. For example, potential mitigation for the influx of people into the Project area and impacts on special population/occupation groups (i.e., guides, lodge and air taxi operators) are discussed under Socioeconomic Impacts, Section 4.12. Increases in recreation opportunities and mitigation measures for increased activity levels are discussed in Recreational Resources, immediately above. Potential aesthetic resource mitigation measures are discussed above in Section 4.9. Potential mitigation measures for cultural, subsistence, and tribal resources are discussed in Sections 4.11 and 4.13.

4.10.10. References

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4.11. Cultural and Subsistence Resources

The following sections describe cultural resources, subsistence activities, potential impacts related to the Project and potential protection, mitigation, and enhancement (PM&E) measures.

4.11.1. Cultural Resources

For cultural resources, the Project study area encompasses the Watana Reservoir site, the potential transmission lines, and road corridors (Chulitna, Denali and Gold Creek corridors), including portions of the Nenana River valley to the north and the Chulitna River valley to the west of the Watana Reservoir area. As so defined, and within five mi of each of these features, the Project area contains 260 known prehistoric and historic sites that relate to human land use and settlement of the region. Archaeological research in the Project area began in 1953 with Irving and Skarland's reconnaissance surveys associated with proposed dam sites along the upper Susitna River Skarland's (Irving 1957). Nearly 25 years later, archaeological and cultural resources studies resumed with investigations associated with the proposed development of dam sites at Devils Canyon and Watana (Bacon 1978a, 1978b, 1975). A vast majority of our knowledge on the prehistory of the region stems from cultural resources investigations conducted between 1978 and 1986 associated with the APA Project, (Greiser et al. 1986; Dixon 1985; Dixon et al. 1985; Bacon 1978a, 1978b).

The Project area contains some of the earliest known sites in interior Southcentral Alaska (Railbelt) and demonstrates human land use in the region back to at least 11,000 Before Present (BP). The area lies within the traditional territories of three ethnographically-documented Alaska Native groups: the Ahtna, Dena'ina (previously called the Tanaina) and Lower Tanana Athabascans (Nenana-Toklat band). A generalized regional prehistory for the interior regions of Southcentral Alaska can be divided into four broad archaeological cultural traditions: the American Paleoarctic, Northern Paleoindian, Northern Archaic, and Athabascan traditions. Archaeological cultural "traditions" imply cultural continuity and consistent regional patterns over broad areas and time periods. The framework of Southcentral Alaskan prehistory given here differs from a standard cultural chronology which was derived in large part from the early Susitna studies (Dixon 1985); this reflects the considerable advances in archaeological methods, theory, data accumulation and synthesis that have taken place over the past three decades.

Several sites in the region have American Paleoarctic tradition components that date 11,000 to 6,000 BP, marking the earliest recognizable tradition in interior Alaska (Holmes 2001, West 1981). These early human populations were terrestrial foragers, exploiting both upland and lowland areas, focusing on bison, wapiti (elk) and sheep, but utilizing a broad range of animals including other large and small mammals, fish and birds, especially waterfowl (Potter 2008a, 2008b; Powers et al. 1983; Bowers 1980). Stone artifact types that define American Paleoarctic tradition assemblages include microblades, bifacial points; large bifacial cores and tools; burins made on flakes, endscrapers and other expedient tools made on macroblades. The American Paleoarctic tradition relates stone tool technologies observed from Alaskan sites to terminal Pleistocene stone technologies from Northeast Eurasia (Anderson 1970).

In the Nenana River valley, several sites have components that lack microblade technology (i.e., microblade cores/blades) and are dated to about 11,000 BP (Hamilton and Goebel 1999). Stone

artifacts from these components include large uniface chopper-like artifacts and flake tools, and bifacially-worked projectile points or pointed-tools. Powers and Hoffecker (1989) initially proposed that the "Nenana Complex" was a precursor to the microblade-defined Denali Complex (West 1967), however, a 12,000-year old microcore-bearing component at the Swan Point site, located in the Middle Tanana Valley, now casts doubt on the exclusivity of the Nenana and Denali complexes (Holmes 2001). Some archaeologists consider the Nenana Complex to be the technological precursor to the Clovis Complex of mid-latitude North America (Goebel et al. 1992, Powers and Hoffecker 1989).

The Northern Paleoindian tradition is one of the most recently-defined archaeological traditions, and one of the least clearly defined in interior Alaskan prehistory (Kunz and Reanier 1994). Sites in interior Alaska that may contain occupations attributable to this tradition including the bifacial occupation in Component II at the Dry Creek site (Hoffecker 2008, 2005), and the lowest component at a Susitna River Valley site known as the Jay Creek Ridge site (Dixon 1999). Northern Paleoindian sites are some of the oldest, well-documented sites in Alaska, dating as old as 11,600 to 11,200 BP, with most ages clustering around 10,000 BP (Bever 2001). The stone tool assemblages from Northern Paleoindian sites show similarities in artifact forms, especially between large lanceolate projectile points, spurred gravers, and end and thumbnail scrapers. Subsistence practices within this tradition likely focused on big game such as bison, musk ox, sheep, caribou and moose (Hedman 2010, Kunz et al. 2003). Hoffecker (2005) views the Mesa Complex of the Northern Paleoindian tradition as primarily focused on bison hunting. Some archaeologists interpret the unique characteristics of the Northern Paleoindian lithic assemblages to imply temporal and cultural connections with early sites in more temperate latitudes such as the Great Plains and the American Southwest (Hoffecker 2008, 2005; Kunz and Reanier 1995).

After 6,000 BP, new technologies, including side-notched projectile point forms, begin to appear in interior Alaskan archaeological assemblages. Archaeologists generally have designated these side-notched biface assemblages as part of the Northern Archaic tradition (Workman 1978, Anderson 1968). This tradition dates to between about 6,000 and 1,000 BP in interior Alaska. The broad occurrence of the side-notched point type throughout interior Alaska and southwestern Yukon may represent the spread of a new boreal forest-oriented cultural tradition (Dixon 1985, Anderson 1968). Conversely, it may also reflect the possible diffusion of a trait or type rather than a separate archaeological tradition (Cook and Gillispie 1986). The continuity of microblade and other technologies through this period suggests that the Paleoarctic and Northern Archaic traditions may be related (Potter 2008c). Regardless of the differing interpretations of the cultural history of this period, the middle Holocene saw a shift in foraging economies of the region, from broad-based exploitation of both lowland and upland fauna to more pronounced hunting of caribou in upland areas, though a broad spectrum of animals were acquired, including large and small game, birds and fish. Bison hunting still occurred in lowland settings, though apparently at lesser frequencies (Potter 2008a, 2008b, 2008c).

The Athabascan tradition is a prehistoric culture attributed to the ancestors of northern Athabascans of Alaska (Dixon 1985; Cook 1970, 1968). Aspects of this archaeological tradition appear around 1,000 BP and continue into the historic period to about AD 1880. Aspects of this tradition continue into the historic period in the late nineteenth century up to the present time, as influences of non-native cultures increased. Early prehistoric Athabascan tradition sites are characterized by the presence of housepit and subsurface cache features associated with a variety

of flaked and ground stone, bone and antler artifacts. Proto-historic (or late prehistoric) Athabascan sites include those artifact assemblages predominately characterized by Native-made items (with an increased occurrence of organic and copper tools), and a smaller amount of non-Native trade goods, such as iron and glass beads obtained through indirect contact, but datable to Hudson's Bay Company and Russian American Company fur trade and to prospector and missionary influence (AD 1740 through 1850). Faunal materials found at Athabascan tradition sites consist of a broad spectrum of boreal forest wildlife including moose, caribou, beaver, hare, small rodents, fish and birds (Reuther et al. 2008, Plaskett 1977, Rainey 1935).

The Project area is situated in the traditional territories of the Ahtna, Dena'ina and Lower Tanana Athabascans. The western territorial boundary for the Western Ahtna and northeastern boundary of Upper Inlet Dena'ina speaking groups overlap within the Project area, where several Ahtna and Dena'ina place names have been recorded (Kari 2008, Kari and Fall 2003). Within the Project area, contacts between the Lower Tanana, the Ahtna and Dena'ina were likely confined to a few traversable passes in the Alaska Range, such as the Chulitna and Nenana River valleys.

In general, protohistoric and early historic land use and settlement patterns in the Project area were associated with seasonal movements related to the distribution of subsistence resources. The timing of annual subsistence cycles and land use patterns depended on the terrain and accessibility to resources (de Laguna and McClellan 1981). Before historic contact, these Athabascan groups had semi-permanent winter and fishing villages (McKennan 1981, Townsend 1981, Osgood 1937). Temporary camps were utilized during hunting trips for large game and the trapping of small mammals. Hunting was associated with seasonal movements along trails and frozen rivers between lowland and upland regions. De Laguna and McClellan (1981: 646) give a general description of a protohistoric and early historic Ahtna seasonal round:

> "*In spring and summer people lived first in the salmon camps, after which they moved upland to meat camps, hunting small game along the way. In fall they descended once more to the rivers, trapping and hunting, until the several families gathered in the winter houses. These were usually near summer fish camps where salmon were stored. By late January or February, families again were scattering to secure what game or freshwater fish they could.*"

In areas of the Upper Susitna River, where salmon were not as abundant, whitefish, ling cod and trout were important subsistence resources (de Laguna and McClellan 1981, Irving 1957). Caribou, moose, Dall sheep, bear and small mammals were taken periodically throughout the year outside of villages (Irving 1957: 39). In late summer to fall, hunting excursions focused more on caribou. Interior Dena'ina groups appear to have had similar seasonal rounds as Ahtna groups (Townsend 1981). Lower Tanana bands used the Nenana River and other drainages in their seasonal movements from summer salmon fishing camps along the Tanana River to spring and fall moose, caribou and Dall sheep hunting grounds in the northern foothills of the Alaska Range (Schneider et al. 1984, Gudgel-Holmes 1979). Seasonal rounds and settlement patterns likely changed during the fur trading period (AD 1740 through 1850) as late fall and winter fur trapping became more of a focus than it had been during the protohistoric period.

The first documented European presence in southern Alaska was the Russians in AD 1741 and 1742, with the Bering and Chirikov expeditions who mapped the coastlines (Black 2004). Their

initial settlement and exploration focused on coastal zones, but later moved into the interior regions along the easiest transportation routes; wide rivers and valleys. Subsequent European and American expeditions followed the Russian example, moving first into the coastal regions and soon after into the interior.

By the nineteenth century, the Russians had long been active in the Cook Inlet area, but it was not until 1834 that Russian explorer, Malakoff, first navigated the Susitna River (Cole 1979, Bacon 1975, Brooks 1973). After the Russians initial exploration, the Upper Susitna River was left virtually unexplored until the 1896 gold rush when hundreds of prospectors explored the Knik and Susitna River valleys. William Dickey's party became one of the first well-documented trips up the Susitna. Dickey and his men made it upstream to what is now known as Devils Canyon where they were forced to turn back, being unable to portage their boats around the canyon and continue on (Marsh 2002, Cole 1979). Very little was known about the Upper Susitna, above Devils Canyon, until the summer of 1897 when a party of nine men traveling in small boats made the first recorded trip to the headwaters, reaching that area on July 29, 1897 (Cole 1979, Bacon 1975, Eldridge 1900).

Military and scientific parties began to come into the region in 1898 to explore the areas mineral deposits and to scout routes to the interior. W.J. Jack guided George Eldridge and his team of geologists up the Susitna to Indian Creek and then up as far as the Nenana River (Cole 1979, Bacon 1975). The route up Indian Creek was used later by other scientists, geologists, prospectors and military explorers and was eventually chosen as the route for the Alaska Railroad.

In 1903, a group of gold seekers headed out from Valdez toward the Upper Susitna River. In late summer of that year, after prospecting every tributary along the Upper Susitna, they struck gold along Valdez Creek (Cole 1979, Bacon 1975). Over the next several years, miners traveled to Valdez Creek and put in claims along the creek and its tributaries, from the Susitna River to Grogg Creek. By the mid 1930s, an estimated $700,000 in gold was produced from the claims that were worked in the Upper Susitna (Bacon 1975). Valdez Creek became a prominent mining district in Alaska (VanderHoek 2011, Dessauer and Harvey 1980).

The discovery of major coal fields in the Matanuska Valley led to the construction of the Alaska Central Railroad, later renamed the Alaska Railroad, which began in Seward, Alaska, in 1903 (Fall 1987: 22). As railroad construction progressed, construction camps sprang up along the way and were quickly abandoned after use. Towns that were established at major river crossings, such as Nenana and Talkeetna, at division or section points, such as Curry and Cantwell, and at coal mining centers, such as Healy, survived beyond the construction era (Brown 1991). The Alaska Railroad connected Alaska's interior with the ice-free port at Seward, and by ship to Seattle and the rest of the world. It became an invaluable resource to the territory by generating new towns and agricultural enterprises, providing low cost freighting for mining and construction operation (Brown 1991).

After the Alaska Railroad was completed all the way to Fairbanks in 1923, Cantwell became the center for the resupply route to Valdez Creek. In the early 1920s the Alaska Road Commission (ARC) established a sled route to provide a route between Cantwell and the mining district at Valdez Creek. By the mid 1930s, the ARC improved this trail and upgraded it to a gravel road.

This road would later become the Denali Highway (completed in 1957) that followed the old routes to Valdez Creek from Paxson at the east, and Cantwell at the west (Bacon 1975). The George Parks Highway was completed in 1971. This provided a much shorter road route between Anchorage and Fairbanks, as well as Denali National Park, Healy and Cantwell.

4.11.2. Subsistence Resources

When Alaska became a state in 1959, it gained authority from the federal government for the management of fish and wildlife and the responsibility for managing subsistence. Since before statehood, Alaska's regulatory system had managed subsistence separately from recreational and commercial harvesting. In 1978, the State legislature established its first subsistence law defining subsistence as "customary and traditional uses" (AS 16.05.940 (33)) of fish and wildlife, thereby highlighting the continuing role of subsistence fishing and hunting in sustaining long-established ways of life in the state. Under this law, subsistence was established as the priority consumptive use of fish and wildlife resources (AS 16.05.258).

Subsistence surfaced as an issue for the United States federal government in 1971 when Congress passed the Alaska Native Claims Settlement Act (ANCSA). ANCSA extinguished aboriginal hunting and fishing rights in Alaska in exchange for almost $1 billion in cash and 44 million acres of land transferred to Alaska ANSCA corporations. In 1980, Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). ANILCA mandated that the state maintain subsistence hunting and fishing preference for rural residents statewide or forfeit its management of subsistence uses by rural Alaska residents on federal lands. Title VIII of ANILCA contains the rural preference provision (*see also,* Code of Federal Regulations (CFR) Title 36, Part 242 or Title 50, Part 100 (36 CFR 242.1 or 50 CFR 100.1)). Section 810 of ANILCA also requires that an evaluation of subsistence uses and needs be completed for any federal determination to "withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands."

In 1986 the state amended its statutes to match ANILCA by limiting subsistence uses to rural residents. However, the Alaska Supreme Court ruled in McDowell v. Alaska (785 P.2d 1 (Alaska 1989)) that the rural preference violated the equal access clauses of the Alaska Constitution. This meant that the state could not provide the rural preference for rural residents required by ANILCA.

Because Alaska law no longer provided for the"rural" resident preference required by ANILCA, the federal government moved to take over management of subsistence hunting on federal public lands on July 1, 1990 (USFWS 1992). Management of subsistence fishing was complicated by a separate question involving whether the state or federal government would manage subsistence fishing on navigable waterways. The Ninth Circuit Court of Appeals ruled in Katie John. v. United States that federal agencies have jurisdiction under ANILCA to manage subsistence fishing in navigable waters in which the federal government has reserved water rights, in addition to waters running over federally-owned submerged lands.

4.11.3. Applicable Laws and Regulations

The term "cultural resources" is often used as a synonym for the legal term "historic properties" defined in the National Historic Preservation Act (NHPA) and its accompanying regulations (36 CFR 800). Historic properties include prehistoric or historic sites, buildings, structures, objects or districts eligible for listing on the National Register of Historic Places (NRHP) (36 CFR 800, 36 CFR 60). These may be resources such as prehistoric and historic sites, cultural landscapes, traditional cultural properties (TCPs) and paleontological sites. A number of laws and regulations apply to the treatment of historic properties in the vicinity of the Susitna-Watana Project.

Federal legislation includes:

- Historic Sites Act of 1935 (16 U.S.C. § 1982)
- National Historic Preservation Act of 1966 (as amended in 2006) (16 U.S.C. § 470)
- National Environmental Policy Act of 1969 (42 U.S.C. § 4321-4347)
- Archaeological Data Preservation Act of 1974 (16 U.S.C. § 469)
- American Indian Religious Freedom Act of 1978 (42 U.S.C. § 1996)
- Archaeological Resources Protection Act of 1979 (16 U.S.C. § 470aa-470ll)
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. § 3001 et seq.)
- Paleontological Resources Preservation Act of 2009 (16 U.S.C § 470aaa)

Federal regulations include:

- 18 CFR 5: Federal Energy Regulatory Commission (FERC) Licensing, Permits, Exemptions, and Determination of Project Costs
- 18 CFR 380: Regulations Implementing the National Environmental Policy Act
- 36 CFR 60: National Register of Historic Places
- 36 CFR 79: Curation of Federally Owned and Administered Archaeological Collections
- 36 CFR 800: Protection of Historic Properties
- 43 CFR 7: Protection of Archaeological Resources
- 43 CFR 10: Native American Graves and Repatriation Act

Federal Executive Orders (EO) include:

- EO 11593: Protection and Enhancement of the Cultural Environment (1971)
- EO 12898: Environmental Justice
- EO 13007: Indian Sacred Sites (1996)

State legislation includes:

- Alaska Historic Preservation Act (Alaska Statute 41.35)

A number of ordinances, resolutions and preservation plans may affect cultural resources at the local level, including Matanuska-Susitna Borough Ordinance 87-007 and Historic Preservation

Plan (adopted 1987) and the state's Cultural Resource Management Plan for the Denali Highway Lands (VanderHoek 2011). This review does not include tribal or village council resolutions that may exist in the records of various Native organizations. Private lands are directly affected by federal cultural resources legislation, especially the NHPA and implementing regulations (36 CFR 800), as long as any aspect of the proposed action has federal involvement. Thus the Project will fall under the Section 106 review process regardless of land status within the Project area (federal, state, municipal or private). If any aspect of a project is affected by a federal undertaking (permit, license or funding), then the federal review process applies to the entire Project area.

Several publications provide guidance on cultural resources investigations, in relation to federal and state laws and regulations, including:

- Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects. Federal Energy Regulatory Commission, Washington D.C. (2002).
- National Register Bulletin Series, National Park Service, U.S. Department of Interior. (Available on-line at: http://www.NPS.gov/history/nr/publications/#bulletins)
- Historic Preservation Series, Alaska Office of History and Archaeology, Division of Parks and Outdoor Recreation, Alaska Department of Natural Resources. (Available on-line at: http://dnr.alaska.gov/parks/oha/hpseries/hpseries.htm)
- Human Remains and Cultural Resource Management in Alaska: State Laws and Guidelines. (Dale and McMahan 2007)

Under Alaska State law, subsistence refers to the practice of taking wild fish or game for subsistence uses (AS 16.05.258). Defined in Alaska State law as the "noncommercial customary and traditional uses" of fish and wildlife, subsistence uses include the following:

- Food
- Customary trade, barter, and sharing
- Homes and other buildings
- Fuel
- Clothing
- Tools and home goods
- Transportation
- Handicrafts

State law protects customary and traditional uses of fish and game resources, and the state must provide a reasonable opportunity for those uses before providing for recreational or commercial uses. To decide if a fish stock or game population is associated with customary and traditional uses, state regulation directs the Board of Game and the Board of Fish to consider eight factors, called the Eight Criteria (5 Alaska Administrative Code (AAC) 99.010(b) Boards of fisheries and game subsistence procedures). The Eight Criteria are summarized as follows:

- The length and consistency of use of the resource;
- A pattern of use that occurs on a regular seasonal basis;
- A pattern of use that is characterized by efficiency and economy of effort and cost;

- An area in which the pattern of use occurs;
- Traditional methods of handling, preparing, preserving, and storing used in the past, but not excluding recent advances;
- A pattern that includes the handing down of knowledge, skills, and values and lore from generation to generation;
- Traditional patterns of distribution and exchange including customary trade, barter, and gift-giving; and
- A pattern that includes the use of, and reliance upon, a wide diversity of fish and game that provides substantial economic, cultural, social, and nutritional elements of the subsistence way of life.

Under federal law, the term "subsistence uses" is defined as the customary and traditional uses by rural Alaska residents of fish and wildlife and other renewable resources for food, clothing, shelter and handicrafts (§803 Definitions in ANILCA P.L. 96-487, as amended). The Federal Subsistence Board determines which fish stocks and wildlife populations have been customarily and traditionally used for subsistence. These determinations identify a specific community's or area's use of specific fish stocks and wildlife populations. For areas managed by the U.S. National Park Service (USNPS) where subsistence uses are allowed, the determinations may be made on an individual basis. Like the state, the Federal Subsistence Program uses eight factors to determine customary and traditional use, which are similar to those used by the state (USFWS 2007).

Both federal and state governments have a mechanism for establishing preferences among subsistence users when a fish or wildlife population is not large enough to support harvest by all those who are eligible for subsistence uses. Under the federal program, this narrowing process is based on: customary and direct dependence upon the populations as the mainstay of livelihood; local residency; and availability of alternative resources. This is sometimes called a "Section 804" process, named for the section of ANILCA's Title VIII that establishes it as a means of reducing the number of eligible subsistence users.

Under state management, the narrowing process is called the "Tier II" process. Tier II is an allocation system to distinguish and identify those individuals most dependent on a particular fish stock or wildlife population among all subsistence users. Tier II gives priority to users based on: customary and direct dependence; and availability of alternative resources. The state has managed several Tier II hunts, including moose and the Nelchina caribou herd in Game Management Unit (GMU) 13.

Alaska is divided into 26 GMUs, allowing the Alaska Department of Fish and Game (ADF&G) to more efficiently manage and control hunting within the state. GMU 13 consists of that area westerly of the east bank of the Copper River, and drained by all tributaries into the west bank of the Copper River from Mi Glacier and including the Slana River drainages north of Suslota Creek; the drainages into the Delta River upstream from Falls Creek and Black Rapids Glacier; the drainages into the Nenana River upstream from the southeast corner of Denali National Park at Windy; the drainage into the Susitna River upstream from its junction with the Chulitna River; the drainage into the east bank of the Chulitna River upstream to its confluence with the Tokositna River; the drainages of the Chulitna River (south of Denali National Park) upstream from its confluence with the Tokositna River; the drainages into the north bank of the Tokositna

River upstream to the base of the Tokositna Glacier; the drainages into the Tokositna Glacier; the drainages into the east bank of the Susitna River between its confluences with the Talkeetna and Chulitna Rivers; the drainages into the north and east bank of the Talkeetna River, including the Talkeetna River to its confluence with Clear Creek, the eastside drainages of a line up the south bank of Clear Creek to the first unnamed creek on the south, then up that unnamed creek to lake 4408, along the northeast shore of lake 4408, then southeast in a straight line to the northernmost fork of the Chickaloon River; the drainages into the east bank of the Chickaloon River below the line from lake 4408; the drainages of the Matanuska River above its confluence with the Chickaloon River (ADF&G 2011). GMU 13 is divided into five subsections (GMU 13A, GMU 13B, GMU 13C, GMU 13D, and GMU 13E).

In GMU 13, the state has made customary and traditional use findings for all major game resources: Dall's sheep (*Ovis dalli dalli*); black bears (*Ursus americanus*); grizzly bears (*Ursus arctos*); caribou (*Rangifer tarandus granti*); and moose (*Alces alces*) (5 AAC 99.025). Of these resources, caribou and moose are the most popular. Salmon and other fresh water fish in the Copper River, except for the Chitina Subdistrict, have also been found to be customarily and traditionally taken and used for subsistence (5 AAC 01.616). This means that all of these resources are classified as subsistence resources.

The state has also managed subsistence use of game in GMU 13 under Tier I and Community Subsistence Harvest (CSH) hunts. Under Tier I, one person from a household may obtain a permit to hunt caribou. Under CSH hunts, the Alaska Board of Game may establish community-based subsistence harvest hunt areas. If the board has established a community harvest hunt area for a big game population, residents of the community or members of a group may elect to participate in a community harvest permit hunt. Among other conditions, a person representing a group of 25 or more residents or members may apply to the department for a community harvest permit by identifying the community harvest hunt area and the species to be hunted, and by requesting that the department distribute community harvest reports to the individuals who subscribe to the community harvest permit. Community harvest hunt areas for caribou and moose have been established for Gulkana, Cantwell, Chistochina, Gakona, Mentasta, Tazlina, Chitna, and Kluti-Khah (Copper Center), collectively called the Copper Basin CSH area.

Current hunting regulations are listed in Table 4.11-1.

Table 4.11-1. GMU 13 big game regulations.

Regulations	Harvest Limits	Season
Federal Regulations, GMU 13E		
Caribou, all rural residents of Units 11, 2, 13 and Chickaloon	2 bulls	Aug. 10–Sept. 30 and Oct. 21–Mar. 31
Moose, all rural residents of Unit 13, Chickaloon, Slana and area between mileposts 216–239 Parks Highway	1 antlered bull	Aug. 1–Sept. 20
Dall sheep, all rural residents	1 ram	Aug. 10–Sept. 20
Black Bear, all rural residents	3 bears	July 1–June 30

Regulations	Harvest Limits	Season
Brown bear, all rural residents	1 bear	Aug. 10–May 31
State of Alaska Regulations		
Caribou – all of GMU 13, all Alaska residents	1 caribou	Aug. 10–Sept. 20 and Oct. 21–Mar. 31
Registration hunt	1 moose	Aug. 10–Sept. 20 and Oct. 21–Mar. 31
Community hunt	1 moose	Aug. 10–Sept. 20 and Oct. 21–Mar. 31
Drawing hunt	1 moose	Aug. 10–Sept. 20 and Oct. 21–Mar. 31
Moose, all of GMU 13, all Alaska residents		
Community hunt		Aug. 10–Sept. 20
Harvest ticket		Sept. 1–Sept. 20
Two drawing hunts		Sept. 1–Sept. 20
Dall sheep, Unit 13E, open to all Alaska residents	1 full curl ram	Aug. 20–Sept. 20
Black bear, all Alaska residents	3 bears	No closed season
Brown bear, all Alaska residents		
Unit 13E within Denali State Park	1 bear	Aug. 10–June 15
Remainder of Unit 13	1 bear	No closed season

Note(s): Table prepared by NLUR from State and Federal big game regulations, 2010–2012.
Source(s): ADF&G 2011; USFWS 2010.

Additionally, beluga whales are an important subsistence resource for Alaska Natives living on and around Cook Inlet, including Tyonek residents, who hunt for belugas near the mouth of the Sustina River. Declining populations of belugas throughout the 1990s led to co-management agreements between the Native Village of Tyonek and other Alaska Natives and National Marine Fisheries Service (NMFS) allocating harvest and identifying harvest practices. Populations continued to decline, and in 2007 Tyonek subsistence hunters voluntarily stepped down from a hunt to further support recovery of the beluga population. NMFS released a record of decision for the supplemental Environmental Impact Statement (EIS) for the Cook Inlet Beluga Whale Subsistence Harvest in 2008, which resulted in the Cook Inlet Beluga Whale Subsistence Harvest Management Plan.

The ADF&G's Joint Board of Fisheries and Game designated five nonsubsistence areas in the state of Alaska. Relevant to the proposed Project, the area north of Cantwell and Paxson is in the Fairbanks Nonsubsistence Use Area, and the areas east and south of Talkeetna (including a portion of the Nelchina Public Use Area) are in the Anchorage-Mat Su-Kenai Peninsula Nonsubsistence Use Area. Nonsubsistence areas are defined as areas where dependence on subsistence (i.e., customary and traditional uses of fish and wildlife) is not a principal

characteristic of the economy, culture and way of life (AS 16.05.258(c)). In nonsubsistence areas, the Joint Board of Fisheries and Game may not authorize subsistence fishing or hunting, and the subsistence priority does not apply.

4.11.4. Potential Adverse and Positive Impacts

The potential impacts of the Project on cultural resources and subsistence activities are described below.

4.11.4.1. Cultural Resources

The study area currently encompasses the areas of potential impacts that include the dam site, Project construction site, and three potential road and transmission corridors (Chulitna, Denali and Gold Creek corridors). A total of 260 cultural resources sites presently recorded in the Alaska Heritage Resources Survey (AHRS 2011) database are situated in the Project area. Many of these sites were documented during surveys conducted between 1978 and 1986 associated with the previous Susitna Project. Two hundred and twenty-six of these sites (86.9 percent) have prehistoric remains present. Four sites (1.5 percent) have protohistoric remains, 27 sites (10.4 percent) have historic and modern remains and one site (0.4 percent) has paleontological remains. Two sites (0.8 percent) do not have an accompanying description to the AHRS database entry.

Two hundred and fifty-seven (98.8 percent) of these 260 cultural resources sites have not been evaluated for their eligibility for listing on the NRHP (AHRS 2011). This includes all of the prehistoric sites. The Susitna River Railroad Bridge (49-TLM-00006), located near the proposed Gold Creek Corridor, is listed on the NRHP. The Alaska Railroad Corporation Timber Bridge at Mile Post (MP) 267.7 (49-TLM-00265) of the Alaska Railroad, located within five mi of the proposed Chulitna and Gold Creek corridors, was determined eligible for listing on the NRHP, but has yet to be listed. The Seattle Creek Bridge (49-HEA-00353), located at MP 112.2 of the Denali Highway and within five mi of the proposed Denali Corridor, was determined not eligible for inclusion on the NRHP. Table 4.11-2 summarizes the known cultural resources within each of the Project's potential areas of impact by the period of remains present, and by status of eligibility to the NRHP as designated in the AHRS (2011) database.

Ahtna and Dena'ina place names also have been recorded in and near the Project area; these provide valuable sources of geographic information pertaining to past human land use. Simeone et al. (2011) note that over 350 Athna and 50 Dena'ina place names occur within or near the Project area. Ahtna place names are more prevalent toward the northern portion of the Project area, north of Devils Canyon, the traditional boundary of the Ahtna and Dena'ina people. Devils Canyon has both Ahtna and Dena'ina place names, and Dena'ina place names are more prevalent to the south of the canyon. Lower Tanana place names are less well-documented than Athna and Dena'ina place names, but also may be present in the northern portion of the Project area. TCPs have not yet been identified within the Project area. However, the identification of TCPs within the NRHP framework began after the formerly proposed Susitna Hydroelectric Project, and these property types may be identified through further cultural resources investigations.

Potential impacts of the currently proposed Project to historic properties may include disturbance during construction of the dam and associated facilities, access routes, and transmission lines. Additionally, those sites inundated by rising water levels at the reservoir will also be impacted. Inadvertent disturbance or vandalism to historic properties could occur due to increased land-based access for recreational activities. Aesthetic changes to a surrounding historic landscape may also affect the historic and cultural significance of a property.

Table 4.11-2. Summary of the number of known cultural resources and NRHP eligible sites within five mi of each potential area of impact.

AHRS Site Totals	NRHP Eligibility Status
Watana Dam Site	
Total # of Known Cultural Resources: 177 ▪ Prehistoric – 160 ▪ Historic – 9 ▪ Prehistoric/Historic – 2 ▪ Historic/Modern – 1 ▪ Protohistoric – 4 ▪ Paleontological – 1	# of Resources with Evaluations of NRHP Eligibility Incomplete – 177
Watana Construction Camp	
Total # of Known Cultural Resources: 40 ▪ Prehistoric – 38 ▪ Historic – 2	# of Resources with Evaluations of NRHP Eligibility Incomplete – 40
Proposed Chulitna Corridor	
Total # of Known Cultural Resources: 82 ▪ Prehistoric – 71 ▪ Historic – 7 ▪ Historic/Modern – 4	# of Resources with Evaluations of NRHP Eligibility Incomplete – 81 # of Resources Determined Eligible for Inclusion to the NRHP, But Not Currently Listed – 1
Proposed Denali Corridor	
Total # of Known Cultural Resources: 86 ▪ Prehistoric – 77 ▪ Historic – 7 ▪ Undefined – 2	# of Resources with Evaluations of NRHP Eligibility Incomplete – 85 # of Resources Determined Not Eligible for Inclusion on the NRHP – 1
Proposed Gold Creek Corridor	
Total # of Known Cultural Resources: 50 ▪ Prehistoric – 39 ▪ Historic – 8 ▪ Historic/Modern – 3	# of Resources with Evaluations of NRHP Eligibility Incomplete – 48 # of Resources Listed on NRHP – 1 # of Resources Determined Eligible for Inclusion to the NRHP, But Not Currently Listed – 1

4.11.4.2. Subsistence Resources

The proposed Project area is remote and accessible only by airplane, boat or all-terrain vehicles. The area is not close to any established communities, and construction of the dam would likely have little direct effect on subsistence. Subsistence activities would be affected if there was a decline in animal populations, a change in the distribution of animals, if the Project reduced access to subsistence resources or if the Project disrupted traditional subsistence activities.

The Project may affect the population of local species, such as small animals that live in the reservoir area. The level of impact on moose and caribou populations is debatable. The area directly affected by the Project had low use levels in the past; current data are needed. The Nelchina caribou herd is a major resource for Tier II subsistence harvests, so any adverse effects on caribou would impact subsistence users.

There is a potential for the Project to change wildlife migration patterns because of the Watana Dam, the Watana reservoir and infrastructure development such as the Denali corridor. The presence of humans and machinery during and after construction could negatively affect the distribution of animals. The construction of the access road within the Denali corridor, if open to the public, would increase access to the area and opportunities for hunting. This would increase competition for resources.

There is a potential for reduced access to resources if the proposed Chulitna corridor, Gold Creek corridor, or Denali corridor have restricted access.

4.11.5. Existing Discovery Measures

Existing discovery measures for cultural resources for cultural and subsistence resources are detailed below.

4.11.5.1. Cultural Resources

Cultural resources investigations associated with the Project area have been periodically conducted since 1953. With increased understanding of the prehistory of interior Alaska, the methods used to identify and evaluate resources also have changed over this 58 year period. Cultural resources field surveys in Alaska commonly employ site location models to stratify the study area into field survey segments. Within the survey segments, researchers identify higher and lower potential areas for the presence of prehistoric, protohistoric and early historic (before AD 1880) cultural resources (Reuther et al. 2010, 2011; Potter 2005; Gerlach et al. 1996; Mason et al. 1994; Dixon et al. 1985; Greiser et al. 1985). These models vary in approach and relative success in site discovery; they can be judgmental and intuitive-based, or more statistically oriented and less subjective. The basic premise behind many of the site location models is that prehistoric, protohistoric and early historic land use patterns are highly dependent on local natural resources, such as subsistence resources and raw materials for making tools, equipment, housing and clothing. The distributions of many of these resources are constrained by environmental variables such as topography, elevation, vegetation and surficial geology.

The 1953 field study methods consisted of an initial aerial and pedestrian reconnaissance of the then proposed Devils Canyon Dam site area, demarcating areas with a high likelihood for the location of archaeological remains (Skarland 1953). An intensive on-the-ground survey was conducted along the shores of Lake Susitna, Tyone Lake and the Tyone River, and the hills on the southwest side of Lake Louise (Irving 1953). This intensive on-the-ground survey consisted of subsurface testing at high potential landforms, and documentation of the cultural resources that were identified. Details of the methods, depth and specific locations of subsurface testing during the 1953 survey are minimal (Irving 1953).

The majority of the previous cultural resources investigations took place between 1978 and 1985 (Greiser et al. 1985, 1986; Dixon et al. 1985; Bacon 1978a, 1978b). In 1978, Bacon (1978a, 1978b) developed an initial site location model for the previously proposed Devils Canyon and Watana Dam site areas. Bacon (1978a) conducted an aerial reconnaissance to refine the model with field data from the Project area, prior to on-the-ground survey. The majority of the 1978 on-the-ground surveys concentrated on an area between Tsusena and Deadman creeks, north of the Susitna River (Bacon 1978a, 1978b). An on-the-ground survey was also conducted at the then-proposed locations for the left abutment, right abutment and spillway for the Watana Dam, along with proposed locations for an airstrip, camp pad, two material sites, access roads and a portion of a the proposed dam site at Devils Canyon (Bacon 1978a, b). This survey consisted of subsurface testing and the documentation of identified cultural resources. Subsurface testing consisted of small tests dug with entrenching tools and hand trowels. The test locations were placed throughout high potential areas at non-systematic intervals. The subsurface tests were not mapped.

Field studies conducted between 1980 and 1984, lead by the University of Alaska Museum, also focused on the Watana and Devils Canyon Dam sites and associated ancillary impacts (Dixon et al. 1985). The ancillary impacts surveyed and tested during the early to mid-1980s field studies include three transmission corridors (Healy-to-Fairbanks, Healy-to-Willow and Willow-to-Anchorage) and 12 borrow pits (Borrows A through L) that were designated as potential material sources. Alternative access routes (Corridor 1 North, Corridor 2 South and Corridor 3 Denali-North) were preliminarily surveyed. Researchers developed a site location model primarily based on environmental variables including the local geomorphology, elevation and vegetation. Landforms such as overlooks, lake margins, stream/river margins, quarry sites; caves and rock shelters, constrictions and mineral licks were considered to have a high potential for association with archaeological sites. Localized survey segments that were considered to have a high potential for sites were designated as “survey locales” (Dixon et al. 1985). One-hundred and eighty-two locations were intensively surveyed and subsurface tested during the field studies conducted between 1980 and 1984 (Dixon et al. 1985: D-1). The locations of these survey locales and sites were mapped on 1:63,360 scale U.S. Geological Survey (USGS) topographic maps (Dixon et al. 1985: 6–10). Survey locales appear to have been walked over (Dixon et al. 1984); however, written details in survey reports are minimal pertaining to the methods employed during the surface reconnaissance.

The distance between subsurface tests at each survey locale was discretionary (i.e., at the discretion of individual field crew leaders. Subsurface tests at survey locales and sites that were not chosen for systematic testing typically consisted of round shovel tests approximately 30 centimeters (cm) in diameter (12 inches (in)) and not deeper than 50 cm (20 in) (Dixon et al.

1985: 6–10). If artifacts were found in a buried context, at least one 40 by 40 cm (16 by 16 in) square test pit was excavated to acquire additional information on the stratigraphy and number of cultural components present at the locality. Tests excavated at survey locales and sites were plotted on sketch maps.

A total of 253 archaeological sites, covering an area broader than the present study area, were documented during field studies conducted between 1980 and 1984 (Dixon et al. 1985: D-1). Sixty-three of these sites were chosen for systematic testing to determine the size of each site, and gather additional field data on the types of and relative density of artifacts and features, physical integrity of the archaeological context of cultural deposits at each site, and the number and age of components. Systematic testing consisted of excavating subsurface tests along grids that were placed at the periphery of, and excavated towards, the observed cultural materials. Systematically tested sites were mapped using a transit and stadia rod. Sediment was screened through one-quarter-inch to one-eighth-inch mesh. The provenience of artifacts was recorded according to their association with natural stratigraphic units or by 5 cm (2 in) arbitrary levels. Site sizes at systematically tested sites were determined by the observed horizontal distribution of cultural remains, while sizes of non-systematically tested sites were estimated based on the local topography of landforms on which the sites were located. It is unclear how many sites within the study area have had enough information collected from which a determination of eligibility to the NRHP could be made (a part of the Section 106 process and a necessary step in site evaluation; 36 CR 800).

An important part of the 1980s Susitna studies was the application of a variety of geoarchaeological techniques. In addition to studies of regional sediment stratigraphy, some 83 radiocarbon dates were obtained in an attempt to place archaeological discoveries in chronological context. Tephrochronology (using petrographic and other methods to characterize and compare the widespread volcanic ash layers in the area) was used to provide relative dating of some sites (Dixon and Smith 1990).

In 1985, the Alaska Power Authority (APA) contracted with Historical Research Associates (HRA) to develop a predictive site location model and survey strategy for several proposed linear features, including transmission lines, access roads and railroad corridors (Greiser et al. 1985). Three transmission lines were designated as the Gold Creek–Watana (36.2 mi in length), Healy–Fairbanks (94.4 mi in length), and Willow–Anchorage (64.4 mi in length) lines which tied into existing transmission lines along the railbelt. The proposed railroad access consisted of 10.2 mi of rail from Gold Creek to Devils Canyon. Approximately 76 mi of access road was proposed between the Denali Highway and the construction site for the previously proposed Watana Dam site and Devils Canyon.

The Greiser et al. (1985) survey model assessed potential relationships between known archaeological site locations from all time periods and the characteristics of the vegetation and terrain in the Project area. About 280 linear mi of survey area were gridded into about 550 square plots, each one-half square mile in size, superimposed over the linear survey path of the proposed transmission lines and road and railroad access corridors. Eighty-nine (16 percent) of these plots were completely surveyed and five (0.9 percent) plots were partially surveyed (Greiser et al. 1986: 2–4). The survey plots were chosen to represent the variation in vegetation and terrain across the survey area.

The field survey method used during 1985 was for one or more archaeologist(s) to walk transects across each selected plot with transects spaced 30 meters (m) (98 ft (ft)) apart (Greiser et al. 1986: 2–14). Subsurface tests were systematically placed every 20 cm (8 in) to 50 m (164 ft) along each transect in a given square survey plot. Additional tests were placed at the field archaeologist's discretion on higher potential landforms. The depth of the subsurface testing varied between 30 cm (12 in) to not more than 50 cm (20 in) below the surface and sediments were screened through one-quarter inch mesh.

A total of 40 cultural resources were documented during the 1985 season, including seven prehistoric, two ethnohistoric, 15 historic and 16 recent sites (Greiser et al. 1986: 3–16, 3–22). Prehistoric site sizes were determined by systematic shovel testing along grids that radiated from the observed cultural materials. Tests were excavated at 10 cm (4 in) intervals along these grids. The recordation protocols closely followed those of Dixon et al. (1985).

In 2011, AEA drilled four geotechnical boreholes using a helicopter-carried drill rig in the vicinity of the currently proposed Watana Dam site, within an area designated as Material Site "A" in the 1979 to 1985 Susitna studies program. A cultural resources field survey was carried out by Northern Land Use Research (NLUR) in June 2011. Based on the NLUR survey, no cultural resources were encountered at any of the four localities, nor were cultural materials reported for this general area by previous investigators (e.g., Dixon et al. 1985: E-273). NLUR recommended a finding of *no historic properties affected* (36 CFR 800.4(d)(1)) (Bowers 2011).

Alaska Native place names have been documented in the Project area since at least 1953 (Kari 2008, Kari and Fall 2003, Greiser et al. 1986, Irving 1953). These names often document aspects of the way people view, use and relate to a particular landscape. Ahtna, Dena'ina and Lower Tanana place names often relate to the surrounding natural environment such as description of landforms, hydrology, vegetation, fauna and aspects of the local weather. Place names can also refer to past human history and activities such as gathering places, areas of trading, territorial boundaries and spiritual places. Thus, place names can be very useful in archaeological studies. The understanding of how people relate and use local landscapes and resources can provide a framework to understand continuity and change in past land use systems in the archaeological record. Place names and the archaeological record can often provide information pertinent to the identification and understanding of the potential significance of TCPs. Place names and TCPs are often identified and documented through archival research and oral interviews.

4.11.5.2. Subsistence Resources

The ADF&G's Division of Subsistence conducted baseline harvest surveys for Copper basin communities, including Cantwell. Two of these studies were conducted in the 1980s (McMillan and Cuccarese 1988, Stratton and Georgette 1984), while a more recent baseline survey was conducted in Cantwell from 1999 to 2000 (Simeone 2002). The USNPS has conducted recent community subsistence studies in Mentasta, Slana, Tazlina and Copper Center (results have not yet been published), and plans to conduct further studies in 2012 and 2013.

The Division of Subsistence conducted resource issue studies related to the Copper River subsistence salmon fishery (Simeone and Fall 2003, Fall and Stratton 1984, Stanek 1981,

Stickney and Cunningham 1980), and Nelchina caribou (Fall and Simeone 2010, Stratton 1983, Stanek 1981). The division also produced non-issue related reports concerning different aspects of subsistence within the Copper River basin (Simeone and McCall-Valentine 2007, Simeone and Kari 2005, Simeone and Kari 2002). Reports produced by other entities include Haley and Nemeth (2002) and Reckord (1983).

The Division of Subsistence conducted baseline harvest surveys in the communities of Trapper Creek, Chase, Gold Creek and the Hurricane–Broad Pass area (Stanek and Foster 1988, Fall and Foster 1987).

Table 4.11-3 presents summary information for all resources harvested by Project area communities. Project area residents show high percentages of using wildlife resources and attempting to harvest wildlife resources during the study year. In addition, the communities have a pattern of sharing wildlife resources, with high percentages of respondents reporting giving away subsistence harvests as well as receiving harvests into their households. The average pounds harvested per household and per capita are higher in the communities listed in the table compared to harvests in Alaska's urban centers, such as Anchorage, Fairbanks or Juneau. The last Copper River Basin-wide household survey, in 1987-1988, estimated the overall per capita harvest of wild foods at 140 pounds per person. The rural harvest contrasts with the urban area per person annual average of about 22 pounds per year (Wolfe and Bosworth 1994).

Table 4.11-3. Summary data for all resources harvested by Project area communities.

Community (Year) Note 1	Percent Using (percent)	Percent Attempting to Harvest (percent)	Percent Harvesting (percent)	Percent Giving Away (percent)	Percent Receiving (percent)	Reported Harvest (lbs)	Average Lbs Harvested per Household	Per Capita Lbs Harvested
Cantwell (1999)	97.4	97.4	97.4	61.8	90.8	21,727.26	293.61	135.24
Cheesh-Na (1987) [Chistochina]	100	100	100	64.3	75	19,873.76	709.78	261.52
Chickaloon (1982)	100	--	88.9	--	--	9389.85	521.66	223.57
Chitina (1987	94.4	88.9	88.9	50	72.2	11,297.33	627.63	342.38
Gakona (1987)	92.7	100	85.5	52.1	82.6	--	284.51	95.33
Glennallen (1987)	100	91.8	91.8	64	86	--	274.61	99.49
Gold Creek (1986)	100	100	100	40	100	1,739.5	347.9	173.92
Gulkana (1987)	95	100	90	40	80	9,305.98	465.3	152.56
Hurricane–Broad Pass (1986)	100	100	100	62.5	75	4,804.3	600.54	177.93
Lake Louise (1987)	100	100	100	47.1	82.4	6,271.49	368.91	179.17
Matanuska Glacier (1982)	100	--	96.7	--	--	8,553.9	285.13	96.11
Mentasta (1987)	95.8	91.7	91.7	58.3	83.3	9,284.9	386.87	125.48
Mentasta Pass (1987)	100	100	100	70	80	4,510.81	451.08	187.95
Northway	91.7	88.3	88.3	10	31.7	7,129	798.9	243.3

Community (Year) Note 1	Percent Using (percent)	Percent Attempting to Harvest (percent)	Percent Harvesting (percent)	Percent Giving Away (percent)	Percent Receiving (percent)	Reported Harvest (lbs)	Average Lbs Harvested per Household	Per Capita Lbs Harvested
(2004)								
North Wrangell Mtns (1982)	100	--	100	--	--	2,411.3	482.26	219.24
Parks Highway (1985–1986)	86.7	90.0	83.3	33.3	56.7	--	162.7	58.1
Talkeetna (1985–1986)	94.1	91.2	85.3	50.0	69.1	--	156.3	55.05
Trapper Creek (1985–1986)	100.0	100.0	100.0	63.2	89.5	--	107.3	65.64
Upper Petersville Road (1986–1986)	100.0	94.1	94.1	29.4	76.5	--	423.1	167.26
Paxson (1987)	92.9	100	92.9	57.1	71.4	9,252.94	660.92	289.14
Paxson–Sourdough (1982)	100	--	100	--	--	3,100.9	310.09	124.04
Sourdough (1987)	100	100	88.9	44.4	77.8	2,713.25	301.47	117.96
West Glenn Highway (1987)	100	92.5	92.5	54.7	96.5	--	243.07	91.8

Note(s): Information in this table is summarized from data available online at the Alaska Department of Fish and Game, Community Subsistence Information System (CSIS) website, http://www.adfg.alaska.gov/sb/CSIS/ (accessed September 8, 2011). The community name is the one used by the CSIS. The year is the most recent community-wide information available. Updates for some resource categories are available for some, but not all communities (for example, subsistence harvests of birds or fish). The updated information is not included in this table.

4.11.6. Affected Tribes and Populations

Cultural resources and subsistence resources associated with Tribes are described below.

4.11.6.1. Cultural Resources

The communities potentially affected by the Project have different histories and cultures, but are characterized by strong ties to the land and its resources and, in some cases, through strong kinship connections. The successful completion of the Consultation and Coordination phase of the Section 106 process will require the development of an efficient and effective consultation process that addresses the letter of the laws and regulations within the context of local custom and practice. Several Alaska Native tribal entities recognized by the U.S. Department of Interior (USDOI), and established through the Alaska Native Claims Settlement Act (ANCSA) of 1971, are broadly located near the study area (HDR 2011). In Alaska, consultation typically occurs with the 229 federally-recognized tribes, the 13 Alaska Native Regional Corporations and some 200 Alaska Native Village Corporations created by the ANCSA. (The Regional and Village Corporations are recognized as "Indians tribes" for NHPA purposes).

Twenty-two tribes recognized by the USDOI's Bureau of Indian Affairs under 25 CFR 83.6(b) are located within or near the study area include:

- Cheesh-Na Tribal Council
- Chickaloon Village Traditional Council
- Chitina Traditional Village Indian Council
- Gulkana Village
- Healy Lake Village
- Kenaitze Indian Tribe
- Knik Tribal Council
- Mentasta Traditional Council
- Native Village of Cantwell
- Native Village of Eklutna
- Native Village of Gakona
- Native Village of Kluti-Kaah
- Native Village of Tazlina
- Native Village of Tetlin
- Native Village of Tyonek
- Nenana Native Association
- Ninilchik Traditional Council
- Northway Village
- Seldovia Village Tribe
- Tanacross Village Council
- Village of Dot Lake
- Village of Salamatoff

Regional Native Alaskan corporations that have interests within or near the Project area include:

- Ahtna, Incorporated (Ahtna)
- Cook Inlet Region Incorporated (CIRI)
- Doyon, Ltd. (Doyon)

In addition, ANCSA recognized and non-recognized village; group and urban corporations; as well as village organizations are located and may have interests near the Project area. These entities include:

- Alexander Creek, Incorporated
- Caswell Native Association
- Chitna Native Corporation
- Chickaloon Moose Creek Native Association
- Dot Lake Native Corporation
- Eklutna, Incorporated
- Gold Creek-Susitna NCI
- Knikatnu, Incorporated
- Little Lake Louise Corporation
- Lower Tonsina Corporation
- Kenai Natives Association, Inc.
- Nebesna Native Group, Inc.
- Menda Cha-ag Native Corporation
- Montana Creek Native Association
- Ninilchik Natives Association, Incorporated
- Northway Natives, Incorporated
- Point Possession, Incorporated
- Salamatkof Native Association, Incorporated
- Slana Native Corporation
- Seldovia Native Association, Incorporated
- Tanacross, Incorporated
- Tetlin Native Corporation
- Toghotthele Corporation
- Twin Lake Native Group, Incorporated
- Tyonek Native Corporation

4.11.6.2. Subsistence Resources

Several federally-recognized Tribes were identified as having potential interests within the Project region that may be affected by the proposed Project, based on the location of traditional tribal territories. Federally-recognized Tribes with lands or historical use that may be affected by the Project do not have a signed treaty with the U.S. Government identifying the rights of the Tribes. None of the identified Tribes has a reservation or trust lands directly within or adjacent to the proposed Project boundary. The Project area has been used by Tribes for subsistence for thousands of years. Tribes in the Project area are listed in Table 4.11-4.

Table 4.11-4. List of Tribes and populations in Project area.

Affected Tribes	Total Population	Estimated Tribal Population
Native Village of Mentasta	112	85
Native Village of Cheesh Na' (Chistochina)	93	50
Native Village of Gulkana	119	91
Native Village of Gakona	218	43
Native Village of Tazlina	297	100
Native Village of Kluti-Kaah (Copper Center)	328	159
Native Village of Chitina	126	25
Native Village of Cantwell	219	34
Native Village of Chickaloon	272	17
TOTALS	1784	604

Because the State of Alaska recognizes all residents of the state as subsistence users, there are other communities or populations which may have a potential interest within the Project region. These communities are listed in Table 4.11-5. The total population figure represents the minimum number of people with subsistence interests in the Project region.

Table 4.11-5. Total potential subsistence population in Project area.

Community	Total Population
Wasilla	7,831
Willow	2,102
Houston	1,912
Talkeetna	876
Trapper Creek	481
Petersville Road dispersed households	4
Chase	34
Palmer	5,937
Sutton–Alpine	1,447
Glennallen	483
Paxson	40
Slana	147
Silver Springs	114
McCarthy	28
Nelchina	59
Mendaltna	39
Lake Louise	46
Kenny Lake	355
TOTAL	21,935

Source of population figures: DCCED n.d.

4.11.7. Potential Protection, Mitigation and Enhancement

Potential PM&E measures for cultural resources and subsistence resources are described below.

4.11.7.1. Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites

Cultural resource protection, mitigation and enhancement measures will be developed in consultation with the appropriate agencies and entities. Measures concerning archaeology will be developed in accordance with the basic principles contained in the Advisory Council on Historic Preservation's (ACHP's) "Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites" (ACHP 2010):

- The pursuit of knowledge about the past is in the public interest.
- An archaeological site may have important values for living communities and cultural descendants in addition to its significance as a resource for learning about the past; its appropriate treatment depends on its research significance, weighed against these other public values.
- Not all information about the past is equally important; therefore, not all archeological sites are equally important for research purposes.
- Methods for recovering information from archaeological sites, particularly large-scale excavation, are by their nature destructive. The site is destroyed as it is excavated. Therefore management of archeological sites should be conducted in a spirit of stewardship for future generations, with full recognition of their non-renewable nature and their potential multiple uses and public values.
- Given the non-renewable nature of archeological sites, it follows that if an archeological site can be practically preserved in place for future study or use, it usually should be (although there are exceptions). However, a simple avoidance of a site is not the same as preservation.
- Recovery of significant archeological information through controlled excavation and other scientific recording methods, as well as destruction without data recovery, may both be appropriate treatment for certain archeological sites.
- Once a decision has been made to recover archeological information through the naturally destructive methods of excavation, a research design and data recovery plan based on firm background data, sound planning, and accepted archeological methods should be formulated and implemented. Data recovery and analysis should be accomplished in a thorough, efficient manner, using the most cost-effective techniques practicable. A responsible archeological data recovery plan should provide for reporting and dissemination of results, as well as interpretation of what has been learned so that it is understandable and accessible to the public. Appropriate arrangements for curation of archeological materials and records should be made. Adequate time and fund should be budgeted for fulfillment of the overall plan.
- Archeological data recovery plans and their research designs should be grounded in and related to the priorities established in regional, state, and local historic preservation plans, the needs of land and resource managers, academic research interests, and other legitimate public interests.
- Human remains and funerary objects deserve respect and should be treated appropriately. The presence of human remains is an archeological site usually gives the site an added importance as a burial site or cemetery, and the values associated with burial sites need to be fully considered in the consultation process.

Large-scale, long-term archeological identification and management programs require careful consideration of management needs, appreciation for the range of archeological values represented, periodic synthesis of research and other program results, and professional peer review and oversight.

4.11.7.2. Multi-Phase Program for Cultural Resources

For the previously proposed hydroelectric project in the 1980s, a multi-phase program was developed to ensure compliance with laws and regulations relating to the consideration of cultural resource issues in project planning and development. The three principal phases of the program included: data collection and analysis; impact assessment; and mitigation planning and implementation. For the currently proposed Project, it is likely that a similar multi-phase program will be developed to address cultural resource issues and concerns.

4.11.7.3. Mitigation Plan for Cultural Resources

As presently envisioned, the mitigation plan for the Project includes: avoidance; preservation in place; data recovery; monitoring; and a public interpretation and education program. These components are discussed further below. In consultation with the appropriate agencies and entities, the mitigation plan would also include a procedure for identifying, evaluating and treating cultural resources discovered after the issuance of the Project license.

4.11.7.3.1. Avoidance

Avoidance, the preferred mitigation technique, would normally be feasible only for those sites located in direct impact areas, other than impoundments and associated erosion areas and the Project dam site. Access to cultural resource sites within or in close proximity to construction laydown areas would, wherever possible, be restricted during Project construction.

4.11.7.3.2. Data Recovery (Excavation)

Data recovery (excavation) would be the principal mitigation technique employed. Based on the Susitna Project proposed in the 1980s, it is believed that the nature of the known archeological data base suggests that there are a large number of redundant site components (according to age and function). For this reason, it is anticipated that data recovery would be undertaken at a sample of sites likely to be directly impacted by the Project. The selection of sites for data recovery would be determined by a number of site factors, including but not limited to: site condition; the nature and degree of impact to the site; and the site's ability to contribute to the solution of important research questions.

Sites which would be destroyed by ground-disturbing activities associated with construction would be given priority, followed by sites which are located within the Project reservoir drawdown area. The latter would be subjected to steady erosion. Sites within the permanent pool will then be selected to fill any remaining requirements of the site selection sample procedure.

Some sites located along reservoir margins in close proximity to construction activities or within the permanent reservoir pool may be selected for preservation in place. This may take the form of the construction of protective barriers to minimize erosion, controlled burial or fencing of the site to restrict access.

4.11.7.3.3. Monitoring Program

The monitoring program for the Project would include several components. Limited monitoring of construction activities would be implemented to ensure that compliance with the mitigation program occurs. Long-term monitoring involving regularly scheduled inspections of sites along reservoir margins would be undertaken to ascertain if these sites are being adversely affected.

4.11.7.3.4. Interpretation and Education Program

In addition, a public interpretation and education program about the Project area's cultural resources would be developed for the benefit of site visitors and the public in general.

An adjunct to the education program would include an orientation for all construction and supervisory personnel to inform them about: reasons for the presence of restricted areas; restrictions on the vandalism of archeological or historic sites and on the collecting of artifacts; the nature of cultural resources sites in the Project area and how to recognize them; and procedures to be followed in the event that cultural resources are discovered or disturbed during construction.

4.11.7.4. Pre-Construction Cultural Resource Surveys

Pre-construction cultural resources surveys will be conducted along the rights-of-way for the Project's transmission lines and access roads, as part of the overall mitigation plan. AEA would, in consultation with the SHPO, determine which portions of these areas are likely to contain cultural resources. The selection of areas would be based upon the tested model of cultural resources distribution (Greiser et al. 1985). If cultural resources are located in any survey area, appropriate mitigation will be considered. The latter may include things such as changes in tower placement or movement of Project centerlines. If neither of these procedures is feasible, data recovery would be undertaken. The scope of any data recovery activities conducted in such circumstances would be developed in consultation with the SHPO.

4.11.7.5. Cultural Resource Field Study Permits

All required state and federal permits will be obtained prior to each year's field studies. The SHPO, the Alaska State Archeologist, as well as archeologists with the National Park Service and the Bureau of Land Management, will be consulted throughout the development and execution of a cultural resources program for the Project. Copies of annual field reports and reports on other aspects of the cultural resources program will be provided to these agencies on a regular basis. Consultation with these agencies will be on a continual basis regarding: the evaluation of the significance of sites in the Project area; the development, testing and

implementation of a model to assess the archeological sensitivity of unsurveyed areas of the corridors associated with Project transmission lines, access roads and the railroad; and the details of the proposed mitigation plan.

4.11.7.6. Proposed Potential Subsistence Mitigation and Enhancement Measures

Proposed PM&E measures will be developed in consultation with interested parties during the licensing process.

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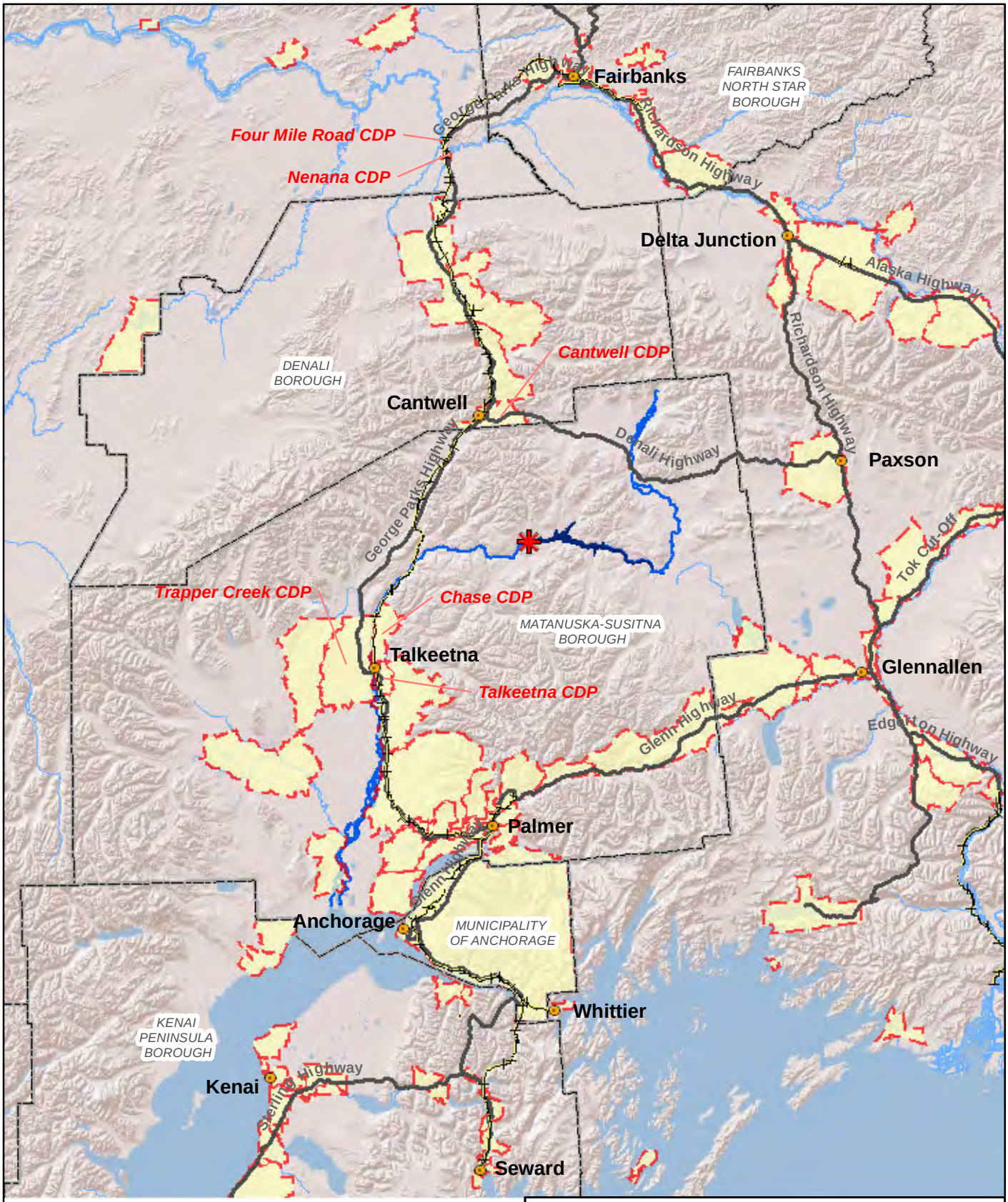
4.12. Socioeconomic Resources

4.12.1. Introduction

The Project is located within Matanuska-Susitna Borough (MSB) (see Figure 4.12-1). The nearest community is Cantwell, which is approximately 41 mi north of Watana. Cantwell is an unincorporated community with an estimated population of 219 in 2010 (U.S. Census Bureau (USCB) 2010). The nearest major town is Wasilla, with a 2010 population of 7,831 (USCB 2010). Wasilla is located approximately 91 mi south-west of Watana and approximately 130 mi south of Cantwell (distances are "as the crow flies").

Based on the current Project description, the principal areas being considered as part of this analysis are the Denali Borough and the MSB. Within the Denali Borough, the principal area under consideration is Cantwell as this is the closest community to the proposed Project. In the MSB, the Trapper Creek, Chase, and Talkeetna community council areas will be documented in greater detail due to their proximity to the proposed Project.

Information for the Railbelt has also been included to provide a regional context. For the purposes of this analysis, the Railbelt is defined as the Kenai Peninsula Borough, Municipality of Anchorage, MSB, Denali Borough, Fairbanks North Star Borough, Four Mile Road census-designated place (CDP) and Nenana CDP. When the Project description has been finalized, including the identification of the transmission line and access corridors, the areas being considered for analysis will be re-evaluated. In addition, if a transmission line is built on a new alignment, these areas being considered for analysis might also change.



Legend

- Proposed Watana Dam and Powerhouse
- Proposed Watana Reservoir
- Susitna River
- Major Streams
- Highway
- Alaska Railroad
- Selected Populated Place
- Borough
- Census Designated Place (CDP)

N

0 5 10 20

Miles

ALASKA ENERGY AUTHORITY

Date: Nov 2011
Scale: As Noted

State of Alaska
Susitna-Watana Hydroelectric Project, FERC No.14241

Figure 4.12-1

Project Area

4.12.2. Land Use and Real Estate

The MSB is comprised of over 24,000 square mi and contains urbanized, suburban, rural and remote areas (Mat-Su BPLUD 2005). There are 26 recognized communities, each distinguished with unique lifestyles and community values (Mat-Su BPLUD 2005). The U.S. Census Bureau (USCB) identifies the MSB as a metro area of Anchorage, Alaska (USCB 2011).

Since the first MSB-wide Comprehensive Plan was developed and adopted in 1970, the Borough has dramatically changed in terms of its economy, population and built/natural environment. For instance, in 1970 the MSB had an agricultural-based economy, a population of approximately 7,500 and limited infrastructure (Mat-Su BPLUD 2005). By 2005, retail, finance and real estate services became the primary sectors of the MSB's economy, the population increased to almost 75,000, and both public and private infrastructure grew significantly (Mat-Su BPLUD 2005).

The new growth has also brought new industries and technologies to the MSB. Some of these new industries and technologies, such as communication towers, waste incinerators, and oil and gas development, have created compatibility issues in residential neighborhoods and recreational areas (Mat-Su BPLUD 2005). Managing these and other land uses to enhance the quality of life of Borough residents, while also improving and diversifying the local economy, is one task of comprehensive planning (Mat-Su BPLUD 2005). According to the Mat-Su Comprehensive Development Plan (2005), the borough has become distinguished by its diversity in land patterns and communities.

Additional information regarding recreation land use can be found in section 4.10 of this PAD.

4.12.2.1. Parks and Open Spaces

Parks and other open spaces make a distinct contribution to the landscape and quality of life in the MSB (Mat-Su BPLUD 2005). The Mat-Su Comprehensive Development Plan (2005) notes that as the borough experiences additional growth pressures, the protection of parks and spaces is needed, and the equitable dispersion of parks and open spaces needs to be addressed. The MSB faces challenges including (Mat-Su BPLUD 2005):

- Acquiring and developing additional parkland, campgrounds and recreational areas in sections of the borough where these amenities are deficient, by providing additional neighborhood parks, community parks, campgrounds, recreational areas and open spaces;
- Providing additional pedestrian and bicycle trails and linkages, between parks, open spaces, water bodies and neighborhoods; acquiring additional pubic greenways to enhance such trails and linkages;
- Developing facilities such as restrooms and additional benches in new and existing parks and recreational areas;
- Providing ongoing renovation and maintenance of parks and recreational areas associated facilities; and
- Promoting habitat conservation through acquisition and preservation of important natural areas, including farms and open spaces.

The MSB maintains a large number and diversity of parks, campgrounds and recreational areas (Mat-Su BPLUD 2005). As the Borough's population continues to grow, the demand for various year-round passive and active recreational opportunities increases. The Mat-Su Comprehensive Development Plan (2005) includes a policy aimed at ensuring that parks and open spaces are provided using the specific standards to determine the need for parks. This policy is shown below on Table 4.12-1.

Table 4.12-1. Policy PO1-4; Park and open space levels of service.

Facility	Standard
Neighborhood Parks	5 ac / 1,000 persons
Community Parks	10 ac / 3,500 persons
Nature / Open Space Parks	15 ac / 5,000 persons

Source(s): Mat-Su BPLUD 2005

4.12.2.2. Natural Areas and Conservation

Natural areas and open spaces are noted as vital components "of the health and well being of the [b]orough" in the Mat-Su Comprehensive Development Plan (2005). In surveys and workshops, MSB citizens have consistently identified natural areas as being a key component of the borough's life quality (Mat-Su BPLUD 2005). The Mat-Su Comprehensive Development Plan (2005) asserts that the conservation and enhancement of the ecological resources found within the borough should be a primary component of the borough's land use and park planning.

The MSB has hundreds of lakes, streams and rivers that provide valuable habitat for fish and wildlife, contribute to water quality and provide recreational opportunities (Mat-Su BPLUD 2005). Open space corridors serve many important functions, including recreation, fish and wildlife habitat, and the connection of individual features that comprise a natural system (Mat-Su BPLUD 2005).

4.12.2.3. Natural Water Systems

The Mat-Su Comprehensive Development Plan (2005) indicates that the Borough has been embarking on a study/plan to address the past, current and future impacts, as well as to evaluate and record the primary functions, existing problems and future opportunities, within the Big Lake Watershed natural system. This effort is indicative of the importance of planning efforts have when addressing borough-wide watershed issues (Mat-Su BPLUD 2005). The Mat-Su Comprehensive Development Plan (2005) encourages preserving the natural drainage system to the greatest extent feasible, and discourages non-essential structures, land modifications or impervious surfaces in the drainage system to "assist in ensuring optimal natural functioning within the drainage area."

4.12.2.4. Land Use Regulations

The MSB uses both borough-wide and special use district (SpUD) zoning ordinances (Mat-Su BPLUD 2005).

4.12.2.5. Real Estate

The USCB (2011) reports that in 2009 there were 28,744 housing units in the MSB. Between 2005 and 2009, 10.2 percent of housing units were in multi-unit structures in the borough (USCB 2011). During this time period, the homeownership rate in the MSB was 79.9 percent; above the homeownership rate for Alaska overall (63.8 percent) (USCB 2011). The median value of owner-occupied housing units for 2005 through 2009 was $205,000 (USCB 2011).

4.12.3. Demographics

In the Denali Borough, the population is centered around the Parks Highway. The population of the Borough has remained relatively unchanged since it was formed (see Table 4.12-2). However, in the past 30 years the population of Cantwell has increased by almost 150 percent (from 89 to 219).

In the MSB, while a substantial amount of development is focused along the Parks and Glenn highway corridors, development is more dispersed. The MSB has grown dramatically (by almost 400 percent) in the past 30 years. Much of this growth has been in the MSB's core area, which includes Wasilla and Palmer. The northern portion of the Borough near the proposed Project, has also experienced growth but at a lower rate. These areas are less densely populated than the core area.

Tables 4.12-2 through 4.12-6 below summarize demographic characteristics, including race, gender, age, and occupation, of the Denali Borough, the MSB, and the Trapper Creek, Chase, Talkeetna, and Cantwell CDPs. (The 2010 Census does not provide information on a community council basis. For the purposes of this analysis, the CDP will be used.) Demographic characteristics for the Railbelt are also summarized in Tables 4.12-2 through 4.12-6. The MSB and Denali Borough boundaries, as well as the CDP boundaries, are illustrated in Figure 4.12-1.

Table 4.12-2. Populations of the CDPs, Boroughs and Railbelt in the Project study area.

	Trapper Creek CDP	Chase CDP	Talkeetna CDP	MSB	Cantwell CDP	Denali Borough	Railbelt
1980	No data	No data	264	17,816	89	No data	271,982
1990	296	38	250	39,683	147	1,797	386,733
2000	423	41	772	59,322	222	1,893	454,469
2010	481	34	876	88,995	219	1,826	536,049

Source(s): 2010 U.S. Census Bureau

According to the 2010 Census, the racial composition of the MSB and the Denali Borough is predominantly white (see Table 4.12-3). The highest proportion of minority residents is found in the Cantwell CDP, where approximately 23 percent of the residents are considered a minority (primarily American Indian/Alaska Native). Overall, the Denali Borough and the MSB are less racially diverse than the Railbelt population.

Table 4.12-3. Populations of the CDPs, Boroughs and Railbelt in the Project study area, by race and ethnicity.

	Trapper Creek CDP		Chase CDP		Talkeetna CDP		MSB		Cantwell CDP		Denali Borough		Railbelt	
	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent
White	416	86 percent	34	100 percent	801	91 percent	75,540	85 percent	169	77 percent	1,637	90 percent	391,942	73 percent
Black or African American	2	0 percent	0	0 percent	3	0 percent	856	1 percent	1	0 percent	10	1 percent	21,785	4 percent
American Indian and Alaska Native	31	6 percent	0	0 percent	32	4 percent	4,901	6 percent	34	16 percent	65	4 percent	39,211	7 percent
Asian	5	1 percent	0	0 percent	4	0 percent	1,096	1 percent	0	0 percent	19	1 percent	27,919	5 percent
Pacific Islander	0	0 percent	0	0 percent	4	0 percent	221	0 percent	0	0 percent	1	0 percent	6,638	1 percent
Other	0	0 percent	0	0 percent	2	0 percent	640	1 percent	4	2 percent	14	1 percent	9,283	2 percent
Two or More Races	27	6 percent	0	0 percent	30	3 percent	5,741	6 percent	11	5 percent	80	4 percent	39,271	7 percent
Hispanic Origin (any race)	5	1 percent	0	0 percent	16	2 percent	3,301	4 percent	3	1 percent	42	2 percent	32,698	6 percent
Not Hispanic (any race)	476	99 percent	34	100 percent	860	98 percent	85,694	96 percent	216	99 percent	1,784	98 percent	503,351	94 percent

Source(s): 2010 U.S. Census.

The gender distribution in the Denali Borough and the MSB is similar to that of the Railbelt, with slightly more than half the population being male (see Table 4.12-4). The percentage of males is highest in Chase and Cantwell (64.7 and 58.4 percent, respectively).

The median age in the Denali Borough and the Cantwell, Trapper Creek, Chase and Talkeetna CDPs is higher than that of the MSB and the Railbelt (see Table 4.12-4). This is not due to significantly higher numbers of people aged 65 and over in these areas. Rather, it is due to a relatively high percentage (26 to 53 percent) of the residents in these areas who were between the ages of 45 and 59, according to the 2010 Census.

Table 4.12-4. Populations of the CDPs, Boroughs and Railbelt in the Project study area, by gender and age.

	Trapper Creek CDP		Chase CDP		Talkeetna CDP		MSB		Cantwell CDP		Denali Borough		Railbelt	
	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent
Gender														
Male	253	52.6 percent	22	64.7 percent	453	51.7 percent	46,040	52 percent	128	58.4 percent	1,002	54.9 percent	276,035	51.5 percent
Female	228	47.4 percent	12	35.3 percent	423	48.3 percent	42,955	48 percent	91	41.6 percent	824	45.1 percent	260,014	48.5 percent
Age														
Under 5 years	32	6.7 percent	0	0.0 percent	47	5.4 percent	6,900	8 percent	12	5.5 percent	114	6.2 percent	40,386	7.5 percent
5 –9 years	22	4.6 percent	0	0.0 percent	48	5.5 percent	7,082	8 percent	13	5.9 percent	114	6.2 percent	38,262	7.1 percent
10 –14 years	20	4.2 percent	0	0.0 percent	44	5.0 percent	7,189	8 percent	11	5.0 percent	118	6.5 percent	37,839	7.1 percent
15– 19 years	28	5.8 percent	3	8.8 percent	34	3.9 percent	6,985	8 percent	16	7.3 percent	97	5.3 percent	39,028	7.3 percent
20– 24 years	18	3.7 percent	0	0.0 percent	18	2.1 percent	5,009	6 percent	5	2.3 percent	49	2.7 percent	42,615	7.9 percent
25– 29 years	18	3.7 percent	1	2.9 percent	34	3.9 percent	5,849	7 percent	8	3.7 percent	96	5.3 percent	43,063	8.0 percent
30– 34 years	17	3.5 percent	3	8.8 percent	72	8.2 percent	5,738	6 percent	16	7.3 percent	136	7.4 percent	36,761	6.9 percent

	Trapper Creek CDP		Chase CDP		Talkeetna CDP		MSB		Cantwell CDP		Denali Borough		Railbelt	
	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent
35– 39 years	27	5.6 percent	0	0.0 percent	53	6.1 percent	5,946	7 percent	18	8.2 percent	138	7.6 percent	35,474	6.6 percent
40– 44 years	30	6.2 percent	4	11.8 percent	82	9.4 percent	6,234	7 percent	19	8.7 percent	131	7.2 percent	35,392	6.6 percent
45– 49 years	50	10.4 percent	2	5.9 percent	79	9.0 percent	7,067	8 percent	13	5.9 percent	189	10.4 percent	40,693	7.6 percent
50– 54 years	65	13.5 percent	9	26.5 percent	101	11.5 percent	7,279	8 percent	28	12.8 percent	191	10.5 percent	41,760	7.8 percent
55– 59 years	45	9.4 percent	7	20.6 percent	103	11.8 percent	6,364	7 percent	16	7.3 percent	198	10.8 percent	37,055	6.9 percent
60– 64 years	47	9.8 percent	3	8.8 percent	72	8.2 percent	4,284	5 percent	14	6.4 percent	118	6.5 percent	26,668	5.0 percent
65– 69 years	32	6.7 percent	1	2.9 percent	43	4.9 percent	2,913	3 percent	16	7.3 percent	73	4.0 percent	16,574	3.1 percent
70– 74 years	12	2.5 percent	0	0.0 percent	20	2.3 percent	1,712	2 percent	7	3.2 percent	37	2.0 percent	9,736	1.8 percent
75 –79 years	13	2.7 percent	0	0.0 percent	17	1.9 percent	1,188	1 percent	5	2.3 percent	19	1.0 percent	6,701	1.3 percent
80– 84 years	5	1.0 percent	0	0.0 percent	4	0.5 percent	730	1 percent	2	0.9 percent	5	0.3 percent	4,493	0.8 percent
85 years and over	0	0.0 percent	1	2.9 percent	5	0.6 percent	526	1 percent	0	0.0 percent	3	0.2 percent	3,549	0.7 percent
Median age	48		52		45.4		34.8		42.7		41.5		32.0[1]	

	Trapper Creek CDP		Chase CDP		Talkeetna CDP		MSB		Cantwell CDP		Denali Borough		Railbelt	
	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent
Population 18 years and over	385	80.0 percent	32	94.1 percent	709	80.9 percent	63,276	71 percent	173	79.0 percent	1,415	77.5 percent	395,920	73.9 percent
Population 65 years and over	62	12.9 percent	2	5.9 percent	89	10.2 percent	7,069	8 percent	30	13.7 percent	137	7.5 percent	41,053	7.7 percent

Note(s):

[1] The median age for the Railbelt was calculated based on the census age range information as more detailed information was not available. The actual median age for the Railbelt may vary.

Source(s): 2010 U.S. Census.

Per capita and median household incomes are lower in the Trapper Creek and Cantwell CDPs than in the Denali Borough, MSB or the Railbelt as a whole (see Table 4.12-5). This is expected as these areas tend to have more people who live a subsistence lifestyle rather than holding a wage and salary job.

Table 4.12-5. Incomes in the CDPs, Boroughs and Railbelt in the Project study area.

	Trapper Creek CDP	Chase CDP[1]	Talkeetna CDP	MSB	Cantwell CDP	Denali Borough	Railbelt
Per Capita Income:	$18,247	No data	$21,737	$24,906	$22,359	$44,689	N/A
Median Household Income:	$27,031	No data	$56,538	$75,052	$51,875	$91,875	$62,500[2]

Note(s):

[1] Information is not available for the Chase CDP because the reference population was too small to protect the anonymity of the data.

[2] The median household income for the Railbelt was calculated based on the median household income range information as more detailed information was not available. The actual median household income may vary.

Source(s): 2005–2009 ACS.

According to the 2005–2009 American Community Survey (ACS), approximately one-third of the workforce in the MSB and the Denali Borough work in management, professional and related fields; a percent that is similar to the Railbelt as a whole (see Table 4.12-6). In Trapper Creek the occupation with the highest number of people is production, transportation and material moving, while the occupation with the largest number of people in Talkeetna and Cantwell is construction, extraction, maintenance and repair.

Table 4.12-6. Employment in the CDPs, Boroughs and Railbelt in the Project study area, by occupation.

	Trapper Creek CDP		Chase CDP[1]		Talkeetna CDP		MSB		Cantwell CDP		Denali Borough		Railbelt	
	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent
Management, Professional and Related	21	16.8 percent	No data		86	21.1 percent	10,589	29.8 percent	14	25.0 percent	320	34.4 percent	86,292	35.0 percent
Service	6	4.8 percent	No data		101	24.8 percent	6,278	17.7 percent	10	17.9 percent	154	16.6 percent	43,024	17.4 percent
Sales and Office	33	26.4 percent	No data		60	14.7 percent	8,179	23.0 percent	9	16.1 percent	171	18.4 percent	61,598	25.0 percent
Farming, Fishing, and Forestry	0	0.0 percent	No data		0	0.0 percent	317	0.9 percent	0	0.0 percent	0	0.0 percent	1,517	0.6 percent
Construction, Extraction, Maintenance and Repair	15	12.0 percent	No data		92	22.5 percent	6,647	18.7 percent	15	26.8 percent	175	18.8 percent	31,636	12.8 percent
Production, Transportation and Material Moving	50	40.0 percent	No data		69	16.9 percent	3,530	9.9 percent	8	14.3 percent	109	11.7 percent	22,790	9.2 percent

Note(s):

[1] Information is not available for the Chase CDP because the reference population was too small to protect the anonymity of the data.

Source(s): 2005–2009 ACS.

4.12.3.1. Industry and Employment

Most employment in the Denali Borough is driven by Clear Air Force Base, Denali National Park and Preserve, Usibelli Coal Mine, and Golden Valley Electric Association. Employment dramatically increases during the summer months (from 1,000 in the winter to approximately 4,000) due to employment in tourism-related fields. A large number of these workers come from outside the borough. Residents tend to work in less seasonal industries such as government (including schools and national park personnel) and power generation (Fried 2009).

The economy of the MSB is more diverse than the Denali Borough economy. In general, employment has been growing faster than the population and the MSB now offers more employment opportunities than in the past. Two areas that have seen large increases in employment are health care and retail. Increases in these sectors mean residents can meet more of their needs without having to go into Anchorage or Fairbanks. While employment in the MSB is increasing, many MSB residents commute outside the borough for employment. A substantial number of these commuters travel to Anchorage, but many commute to places even further such as the North Slope (Fried 2010).

Table 4.12-7 and Table 4.12-8 list employment statistics for MSB and the Denali Borough as well as the Trapper Creek, Talkeetna and Cantwell CDPs, and the Railbelt.

Table 4.12-7. Employment in the CDPs, Boroughs and Railbelt in the Project study area.

	Trapper Creek CDP	Chase CDP[1]	Talkeetna CDP	MSB	Cantwell CDP	Denali Borough	Railbelt
Total Potential Work Force (Age 16 years and over)	291	No data	705	62,046	94	1,259	394,750
Total Employment:	125	No data	496	40,787	66	1,062	282,857
Civilian Employment	125	No data	408	40,300	66	948	268,470
Military Employment	0	No data	47	487	0	114	14,387
Civilian Unemployed (and seeking work)	11	No data	41	4,760	10	19	21,613
Population 16 and over not in Labor Force	155	No data	209	21,259	28	197	111,893
Class of Worker							
Private wage and salary workers	71	No data	307	25,691	27	596	174,272
Government Workers	29	No data	33	6,373	6	262	53,360
Self-employed in own not incorporated business workers	25	No data	68	3,268	23	71	18,403
Unpaid Family Workers	0	No data	0	208	0	0	822

Note(s):

[1] Information is not available for the Chase CDP because the reference population was too small to protect the anonymity of the data.

Source(s): 2005-2009 ACS.

Table 4.12-8. Employment in the CDPs, Boroughs and Railbelt in the Project study area, by industry.

	Trapper Creek CDP		Chase CDP[1]		Talkeetna CDP		MSB		Cantwell CDP		Denali Borough		Railbelt	
	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent
Agricultural, Forestry, Fishing and Hunting, and Mining	20	16.0 percent	No data		32	7.8 percent	1,846	5.2 percent	1	1.8 percent	48	5.2 percent	10,659	4.3 percent
Construction	15	12.0 percent	No data		69	16.9 percent	5,192	14.6 percent	10	17.9 percent	27	2.9 percent	23,599	9.6 percent
Manufacturing	9	7.2 percent	No data		0	0.0 percent	779	2.2 percent	0	0.0 percent	0	0.0 percent	5,691	2.3 percent
Wholesale Trade	0	0.0 percent	No data		0	0.0 percent	685	1.9 percent	5	8.9 percent	9	1.0 percent	6,126	2.5 percent
Retail Trade	0	0.0 percent	No data		160	39.2 percent	4,848	13.6 percent	7	12.5 percent	99	10.7 percent	29,409	11.9 percent
Transportation and warehousing, and utilities	14	11.2 percent	No data		10	2.5 percent	2,341	6.6 percent	5	8.9 percent	71	7.6 percent	19,330	7.8 percent
Information	6	4.8 percent	No data		10	2.5 percent	1,021	2.9 percent	2	3.6 percent	5	0.5 percent	6,301	2.6 percent
Finance and insurance, and real estate and rental and leasing	0	0.0 percent	No data		19	4.7 percent	1,195	3.4 percent	0	0.0 percent	4	0.4 percent	12,422	5.0 percent
Professional, scientific, and management and waste management service	0	0.0 percent	No data		48	11.8 percent	2,821	7.9 percent	3	5.4 percent	265	28.5 percent	23,074	9.3 percent
Educational services, and health care and social assistance	12	9.6 percent	No data		30	7.4 percent	7,422	20.9 percent	3	5.4 percent	49	5.3 percent	53,056	21.5 percent
Arts, entertainment, and recreation and accommodation and food services	22	17.6 percent	No data		20	4.9 percent	3,250	9.1 percent	18	32.1 percent	154	16.6 percent	21,868	8.9 percent

	Trapper Creek CDP		Chase CDP[1]		Talkeetna CDP		MSB		Cantwell CDP		Denali Borough		Railbelt	
	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent	#	percent
Other services except public administration	13	10.4 percent	No data		10	2.5 percent	1,952	5.5 percent	0	0.0 percent	41	4.4 percent	12,323	5.0 percent
Public administration	14	11.2 percent	No data		0	0.0 percent	2,188	6.2 percent	2	3.6 percent	157	16.9 percent	22,999	9.3 percent

Note(s):
[1]Information is not available for the Chase CDP because the reference population was too small to protect the anonymity of the data.
Source(s): 2005-2009 ACS.

4.12.3.2. Community Identity and Quality of Life

The Mat-Su Comprehensive Development Plan (2005) states that the MSB's natural environment, with its abundant supplies of clean water, aesthetics and other natural resources, has attracted people to the community for generations. Natural systems serve many essential biological, hydrological and geological functions that significantly affect life and property in the borough (Mat-Su BPLUD 2005). The Mat-Su Comprehensive Development Plan (2005) also recognizes that the borough's natural environment provides other valuable amenities, such as scenic landscape, community identity, open space and opportunities for recreation, culture and education.

The Mat-Su Comprehensive Development Plan (2005) indicates that the Borough is a "place to work and play;" an image the community projects which attracts businesses and industries. The tourism and recreational industries have capitalized on the MSB's quality of life in recent decades (Mat-Su BPLUD 2005). The Mat-Su Comprehensive Development Plan (2005) further notes that the Borough's citizens recognize and often comment upon the important role of the natural environment plays in their quality of life; and that the Borough's challenge for the future will be accommodating new and infill growth while protecting and enhancing natural systems on public and private lands.

4.12.3.3. Education

Between 2005 and 2009 the USCB reports that 90.6 percent of MSB residents (age 25 or greater) had graduated from high school. This is close to percentage of high school graduates for the state of Alaska overall (90.7 percent) during the same time period.

Between 2005 and 2009 the USCB (2011) reports that 19.9 percent of MSB residents (age 25 or greater) had a bachelor's degree or higher. This is lower than the percentage of Alaskan residents with a bachelor's degree or higher (26.5 percent) (USCB 2011).

4.12.3.4. Commuting

From 2005 through 2009, the mean travel time to work (for workers age 16 and above) for MSB residents was 33.6 minutes; which was above the mean travel time to work for Alaskans overall (17.9 minutes) (USCB 2011).

4.12.3.5. Households, Income and Poverty

Between 2005 and 2009 the USCB (2011) reports that there were 21,956 households in the MSB, with an average of 3.86 persons per household. In 2009 the median household income was $70,442; which was higher than the median household income for Alaskan residents overall ($66,712) (USCB 2011).

The USCB (2011) states that in 2009, 8.7 percent of MSB residents lived below the poverty level. This percentage is lower than that of Alaskan residents overall living below the poverty level in 2009 (9.1 percent) (USCB 2011).

4.12.4. Public Sector (Taxes and Services)

The following section describes existing public services and facilities in the Denali Borough and the MSB.

4.12.4.1. Local Government

The Denali Borough was formed in 1990. It includes four communities (Anderson, Clear, Cantwell and Healy) and includes a number of smaller settlements. The borough includes approximately 12,750 square mi of land and 25 square mi of water. Approximately 70 percent of the borough is the Denali National Park and Preserve.

The MSB was established in 1964. The MSB includes the incorporated cities of Palmer, Wasilla and Houston. In addition, there are numerous smaller unincorporated communities such as Willow and Big Lake. The MSB consists of approximately 24,680 square mi of land and 580 square mi of water.

4.12.4.2. Water and Wastewater

In the Denali Borough, most residents and businesses use individual wells and septic systems to meet their water and wastewater needs. Both the Usibelli Mine and Healy Clean Coal Project have individual water well systems. The Clear Air Force Station provides piped water and sewer for base facilities.

According to the Draft MSB Public Facilities Plan Revision, approximately 83 percent of households in the MSB are on private well and septic systems (MSB 2009). There are more than 20,000 active septic tanks in the MSB (MSB 2009). As much of the future residential growth is expected to occur on larger lots, the MSB anticipates approximately 56,000 active septic tanks

by 2030 (this forecast is based on an estimated 2030 MSB population of 137,682) (MSB 2009). There is no regional septage handling facility in the MSB. In addition, some residents rely on hauling water and outhouses, while the more densely developed areas near Wasilla, Palmer, and Talkeetna have piped systems.

4.12.4.3. Solid Waste

The Denali Borough operates a landfill at Milepost (MP) 282.2 of the Parks Highway (approximately two mi southeast of the Clear Air Force Station). It is estimated that the landfill will reach capacity around 2023 (Denali Borough 2007). The Denali Borough also operates the Cantwell Transfer Station, located at mile 213.2 Parks Highway.

Currently, The MSB Solid Waste Management Division operates several solid waste disposal facilities including (MSB 2009):

- One permitted Class I landfill near Palmer
- One unattended trench fill near Skwentna
- Twelve waste drop-off sites (waste transfer stations and dumpsters)
- One recycling facility

As of 2002, the lifespan of the landfill was estimated to exceed 70 years (MSB 2009).

In each borough, some residents dispose of their solid waste on their own property, either by burning it or by burying it.

4.12.4.4. Police

The Alaska State Troopers (AST) provide police services within the Denali Borough. There are AST posts in Cantwell and Healy. In addition, the northern portion of the Denali Borough may receive police service from the AST post in Nenana.

Within the MSB, police services are provided by the AST, the Wasilla Police Department, and the Palmer Police Department. The Houston Police Department is currently not staffed, and emergency calls are being handled by the AST (City of Houston n.d.).

4.12.4.5. Fire

Fire protection in the Denali Borough is provided by volunteer fire departments (VFD) including:

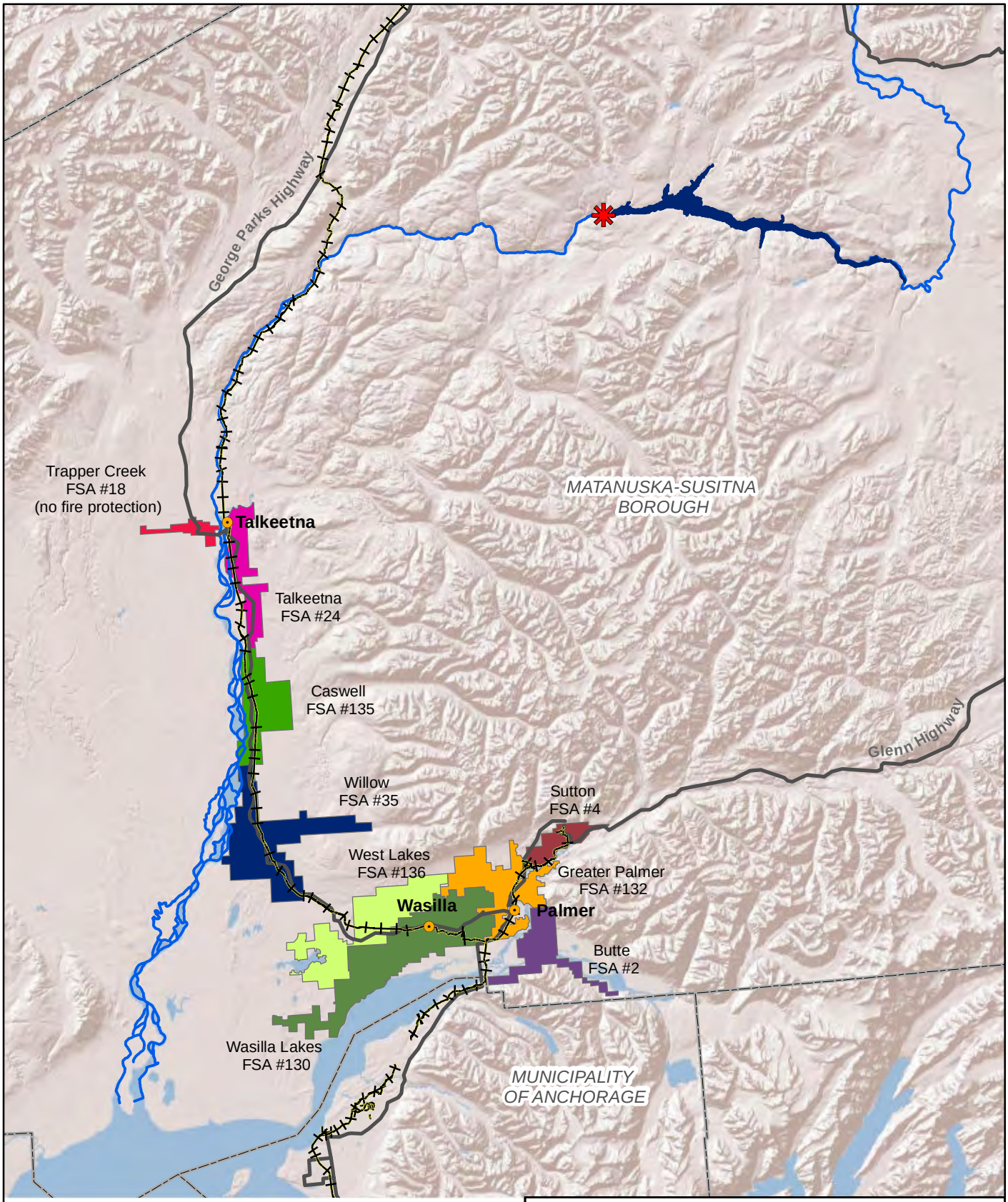
- Cantwell VFD
- McKinley VFD
- Tri-Valley VFD
- Anderson City Fire Department

The MSB Department of Emergency Services, the City of Palmer and the City of Houston provide fire department services within the MSB (MSB 2009). The MSB Department of Emergency Services provides fire coverage for areas within a Fire Service Area, but not all property in the MSB in covered by a Fire Service Area (areas outside a Fire Service Area rely on their own resources for fire protection) (see Figure 4.12-2). The MSB Fire Service is primarily a volunteer department.

Fire protection in the City of Palmer is provided by Palmer Fire and Rescue. Palmer Fire and Rescue is staffed by paid on-call volunteers who live in the City of Palmer or the Greater Palmer Fire Service Area. It operates out of six stations:

- Station 3-1; 717 S. Cobb St. (downtown Palmer)
- Station 3-2; 3 mi north of Palmer at 5955 N. Glenn Hwy (Mile 51)
- Station 3-3; 15855 E. Clark Rd. (Lazy Mountain)
- Station 3-4; 901 S. Airport Rd. (Palmer Airport)
- Station 3-5; 8200 E. Turner Rd. (Palmer Fishhook Rd.)
- Station 3-6; 645 E. Cope Industrial Way in Palmer
- Station 3-6 also functions as the Palmer Fire and Rescue Training Center.

The Houston Fire Department is housed in the Houston Emergency Services building at mile 57.3 on the Parks Highway.



Legend

- Proposed Watana Dam and Powerhouse
- Proposed Watana Reservoir
- Susitna River
- Selected Populated Place
- Alaska Railroad
- Highway
- Borough

MSB Fire Service Area

- Butte FSA #2
- Caswell FSA #135
- Greater Palmer FSA #132
- Sutton FSA #4
- Talkeetna FSA #24
- Trapper Creek FSA #18 (no fire protection)
- Wasilla Lakes FSA #130
- West Lakes FSA #136
- Willow FSA #35

0 4 8 16
Miles

N

ALASKA ENERGY AUTHORITY

Date: Nov 2011
Scale: As Noted

State of Alaska
Susitna-Watana Hydroelectric Project, FERC No.14241

Figure 4.12-2

Matanuska-Susitna Borough
Fire Service Areas

4.12.4.6. Health Care

In the Denali Borough, health care is available through the Cantwell Clinic, Anderson Health Clinic and the Tri-Valley Community Center. The Cantwell Clinic is operated by the Copper River Native Association and is a primary health care facility. The Anderson Health Clinic is a part of the Interior Emergency Medical Services (EMS) Region. Tri-Valley Community Center in Healy is a Community Health Center operated by the Interior Community Health Center. It is funded by a federal grant under Section 330 of the Public Health Service Act (DHHS 2009). Community Health Centers are required to treat all patients, regardless of their ability to pay.

In addition, there is the seasonally operated Canyon Health Clinic at Denali Park. These Denali Borough facilities are usually staffed by health aides. The government also operates the Clear Air Force Station (AFS) Medical Clinic. For more advanced health care, residents must go to facilities in the MSB, Anchorage and Fairbanks.

In the MSB, the largest health care facility is the Mat-Su Regional Medical Center. Opened in 2006, it has 74 beds and offers a wide variety of specialties and services. However, some patients still need to travel to Anchorage or to facilities outside Alaska for their medical care. The Sunshine Community Clinic, a Community Health Center in Talkeetna, is an emergency care clinic. There are numerous other clinics and private medical facilities in the MSB. The MSB Department of Emergency Services provides emergency medical care to the entire MSB.

4.12.4.7. Schools

The Denali Borough School District (DBSD) operates three schools (Anderson School, Cantwell School and Tri-Valley School) and a statewide correspondence school (Denali-PEAK), employing 27 teachers (State of Alaska 2010). According to the Alaska Department of Education and Early Development (DEED), as of October 1, 2010, there were a total of 768 students enrolled within the DBSD: Anderson School had 39 students between Kindergarten and Grade 12 (K-12), Cantwell School had 32, Tri-Valley School had 179 and Denali-PEAK had 491. An additional 27 students were enrolled in Pre-Elementary programs (DEED 2010).

In 2010, the MSB School District had a total of 17,079 students and employed 1,004 teachers at 44 schools, including 20 elementary schools, five middle schools, six high schools, four K-12 schools, a home school, six charter schools and three alternative education schools (MSB 2011; State of Alaska 2010). In the north-west part of the school district (closest to the Project location), there are three schools: Talkeetna Elementary, Trapper Creek Elementary and Su-Valley Jr./Sr. High (see Table 4.12-9).

Table 4.12-9. Schools in the MSB school district near the Project site.

School Name	Grades	Enrollment as of October 1, 2010
Talkeetna Elementary	Pre-Kindergarten to Grade 6	113 (Pre-Kindergarten students not reported)
Trapper Creek Elementary	Kindergarten to Grade 6	23
Su Valley Jr./Sr. High	Grades 7 through 12	190

Source(s): DEED 2010

4.12.4.8. Taxes/Municipal Finances

The Denali Borough is a Home Rule Borough. A Home Rule Borough has its powers and duties established through its adopted charter ratified by the voters. It can exercise any powers except those prohibited by federal or state law or by the home rule charter (DCCED 2003). The Denali Borough operates the schools and the landfill. Most other public services are not provided in the borough. The school district is the Denali Borough's biggest expense followed by the Assembly (approximately 2.1 million and 1.3 million dollars, respectively). Taxes are the borough's largest revenue source (approximately 2.3 million dollars). Table 4.12-10 summarizes the finances for the Denali Borough in fiscal year (FY) 2012.

Table 4.12-10. Denali Borough budget for fiscal year 2012.

General Fund

	Estimated Revenues	Expenditures
Taxes	$2,290,000	
Intergovernmental, Federal	$289,387	
Intergovernmental, State	$569,068	
Other	$11,500	
Assembly		$1,272,237
Mayor		$856,794
School District		$2,069,720
Deposits to Borough Fund Accounts		$441,481
Matching Grants		$30,588
Total	**$3,159,955**	**$4,334,754**
Enterprise Funds		
Land Management Fund	$4,000	$277,420
Solid Waste Fund	$437, 652	$818,771

Source(s): Denali Borough 2011.

The MSB is incorporated as a second class borough and can levy fees and taxes which fund borough government and services. (General law boroughs obtain their powers and duties through established law. A first class general law borough can exercise powers not prohibited by law on a non-areawide basis by adopting an ordinance, while a second class borough must have voter approval to exercise non-areawide powers (DCCED 2003).) The MSB manages its school district as well as solid waste, fire protection (the MSB only organizes fire protection within a fire service area) and emergency medical services. Many other services such as water, sewer and law enforcement are managed locally by the cities of Palmer, Wasilla and Houston. Similar to the Denali Borough, the school district is the MSB's biggest expenditure (approximately 256.9 million dollars) and taxes are their largest revenue source (approximately 103.6 million dollars). Borough operations are the second highest expenditure (45.2 million dollars). Estimated expenditures and revenues for FY 2011 are shown in Table 4.12-11 and Table 4.12-12.

Table 4.12-11. MSB estimated expenditures for federal year 2011.

	FY 2011 Expenditures (in millions)
School Operations	$256.9
Debt Service	19.9
Borough operations	$45.2
Fire Service Area operations	$6.5
Road service area operations	$10.3
Enterprise operations	$11.5
Capital Projects	$12.8
Dust control program	$1.2
Miscellaneous grants	$2.6
Other service areas and E-911 operations	$1.3
Total Expenditures: $368.2 million	

Source(s): MSB 2010a.

Table 4.12-12. MSB estimated revenues for federal year 2011.

	FY 2011 Revenues (in millions)
Taxes	$103.6
Interest	$0.5
Fees	$15.1
State	$193.3
Federal	$31.5
Other	$4.1
Total Revenues: $348.1 million	

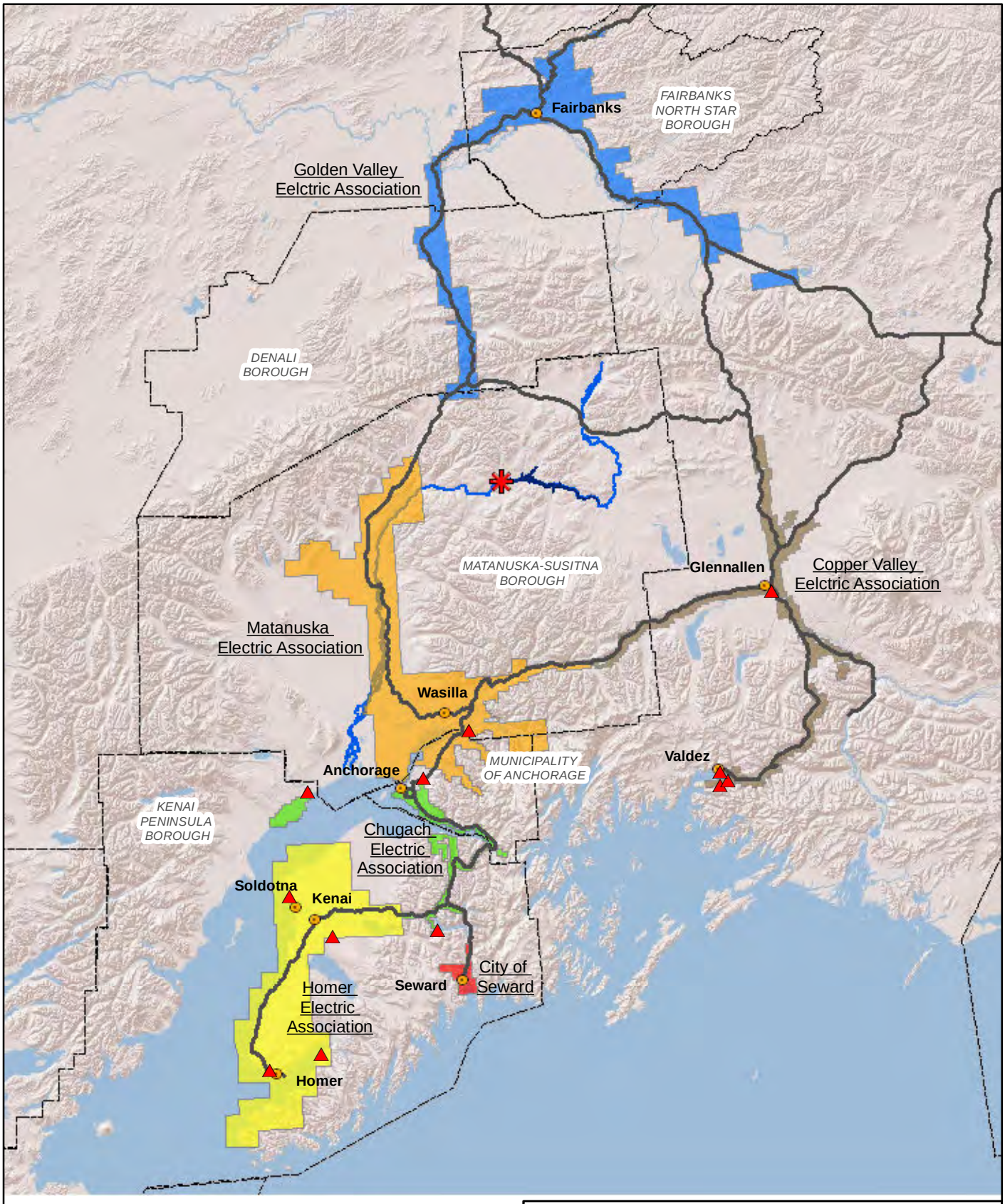
Source(s): MSB 2010a.

4.12.5. Electricity

The following electric utility companies are interconnected within the Railbelt electrical system:

- Matanuska Electric Association, Inc.
- Homer Electric Association
- Chugach Electric Association
- Seward Electrical Association
- Municipal Light and Power (ML&P)
- Golden Valley Electric Association

The service area for each utility is shown in Figure 4.12-3.



ALASKA ENERGY AUTHORITY

Date: Nov 2011
Scale: As Noted

State of Alaska
Susitna-Watana Hydroelectric Project, FERC No.14241

Figure 4.12-3

Electrical Utility Service Areas

4.12.6. Potential Adverse and Positive Impacts

The area in the immediate vicinity of the proposed Project is relatively isolated and unpopulated. Many of the Project's potential adverse impacts are related to the potential change in the location of the population. Once this has been quantified, a more detailed assessment of the socioeconomic impacts of the Project will be done.

Potential adverse impacts resulting from the construction and operation of the proposed Project are listed below. As stated previously, these impacts need to be quantified to better determine the actual impact to socioeconomic resources.

- Changes in subsistence harvesting opportunities would impact fish and wildlife populations and resources in the Susitna River watershed.
- Influxes in population would impact lifestyles in area communities, change the local real estate market, increase area traffic, alter employment opportunities, affect community identities and reputations, and increase demands on public services and facilities.
- Commercial fishing, hunting, trapping, etc., opportunities could be negatively impacted by activities associated with the proposed Project.
- Secondary development impacts on Native corporation undeveloped lands may occur.

4.12.6.1. Air Quality

Because of its remote location far from human activity, the existing air quality of the Project area is expected to be generally pristine. Only natural events such as forest fires and volcanoes could be expected to measurably impact air quality in the Project area, given the current low levels of human developments in the region. Therefore, it is not anticipated that the proposed Project would significantly alter area air quality.

4.12.6.1.1. Prevention of Significant Deterioration

The previous APA Project License Application from the 1980s provides some useful estimates of emissions from point sources and fugitive sources that would exist for portions of the projected six-year construction period for the currently proposed Project.

4.12.6.1.2. Total Suspended Particulate Matter

Information in the previously proposed APA Project license application from the 1980s indicates that ambient monitoring was conducted near a field camp in the project vicinity for total suspended particulate matter (TSP), which was previously the regulated form of Particular Matter (PM). Maximum 24-hour average TSP concentrations are cited in the previous application as being less than 10 micrograms per cubic meter ($\mu g/m^3$), based on the monitoring. The currently regulated forms of PM are particles under 10 microns (PM10) and particles under 2.5 microns (PM2.5). Since PM10 and PM2.5 represent the finer fractions of TSP, the concentrations of these regulated forms of PM are expected to be even lower than the TSP values

measured earlier. Given the remoteness of the Watana site from human development, and the lack of any new emission sources in the Project area since the earlier measurements, it is expected that all size fractions of PM in the Project area would currently have concentrations less than 10 $\mu g/m^3$.

4.12.6.1.3. Regional Monitoring

The only recent regional monitoring data identified has been collected in the northeast corner of Denali National Park, approximately one mile west of the McKinley National Park Airport. This site is just over 60 mi north of the currently proposed Project location. Between 2000 and 2003, PM2.5 was monitored at this location and showed values generally far below the 24-hour average and annual average National Ambient Air Quality Standards (NAAQS). Two 24-hour concentrations over the 35 $\mu g/m^3$ NAAQS level occurred in August 2002, but these may have been of local origin, as most other 24-hour samples from the four-year period show values in the single digits, and typically a fraction of a $\mu g/m^3$ in the winter period. Notably, these high levels did not constitute a measured violation of the NAAQS, because the standard is based on the average of the 98^{th} percentile value of measured concentrations over a three-year period.

Ozone data have also been collected for more than ten years, including up to the present, at the same Denali location where PM2.5 data were collected. These data have generally shown concentrations well below the current eight-hour ozone NAAQS of 75 parts per billion (ppb). However, for a one-week stretch in April 2008, ozone concentrations at the Denali monitor remained significantly elevated with the maximum eight-hour value on one day equaling 76 ppb. This did not constitute a measured violation because the standard is based on a three-year average of the annual 99^{th} percentile of daily maximum eight-hour concentrations. Also, review of the meteorological data for the week of elevated ozone values in 2008 indicates that the ozone may have come from the stratosphere. A strong storm system followed by high pressure can mix some of the high ozone concentrations from the stratosphere down to ground elevation. Thus, this event was most likely due to such a natural occurrence, as opposed to manmade pollution.

4.12.6.1.4. Immediate Project Vicinity

While only TSP concentrations data have been collected in the immediate Project vicinity, expectations are that other pollutant levels in the Project vicinity are near background/natural levels, considering the lack of nearby human activity. Data from the prior 1980s Susitna Project-area TSP monitoring, and more recent data from the Denali monitoring site, will be summarized in the Project License Application.

4.12.7. Potential Protection, Mitigation, and Enhancement

PM&E measures proposed in the 1984 Project license application are listed below. These measures will likely be applied to the currently proposed Project.

- Avoiding large and rapid population influxes into communities, especially small communities. This will help prevent substantial shortages of housing, community facilities and services, cost of living increases and changes in lifestyle.
- Avoiding large traffic increases on the Denali and Parks Highways. This will help prevent increases in traffic accidents and animal road kills.
- Minimize, reduce or eliminate overtime, or compensate for significant adverse impacts resulting from Project construction worker-related population influxes and effluxes.
- Having a leave, shift and shift-change rotation schedules. This would result in different amounts and patterns of residence relocation and commuting by Project workers. Additionally, there would be different costs for transportation programs since more frequent rotations increase the number of trips per worker.
- Considering providing housing and related facilities for Project workers located near the Project construction site. To avoid large population influxes into nearby communities, single status accommodations at the Project site could be constructed for shift workers. Family accommodations and related facilities could be provided for Project workers who would be at the work site on a more permanent basis. These arrangements, together with appropriate leave and other schedules, would reduce resettlement by workers in nearby communities.
- Having a transportation program for Project workers. The presence of a transportation program in the early construction phases should have the general effect of decreasing population influxes into small communities located nearest to the Project site. These employees and their families, who would otherwise in-migrate to small communities, could retain their residences (which may be in Anchorage or Fairbanks). The type of transportation program instituted (i.e.; air, bus and/or van transportation) will affect the degree to which the Project-related population is shifted.
- Implement Project-community interaction between AEA, local agencies, state agencies and affected communities.
- Develop and implement an Impact Management Program to reduce adverse socioeconomic impacts caused by the Project.
- Providing updated information about Project features, labor needs, schedules, and Project impacts on communities to all concerned parties.
- Monitoring the socioeconomic conditions in communities affected by the Project, including the availability of housing, facilities and services.
- Developing an interdisciplinary task force to refine and implement Project mitigation measures.

The Project will comply with management plans for the state and federal lands, as well as the boroughs, in the Project area. Camps for workers will be considered during construction to avoid impacts and conflicts with area residents. Alternatively, construction workers could be bused into the site from a centralized meeting point. Mitigation measures for air emissions may be needed during the construction period. During any periods when roads or non-vegetated areas become dry and dusty, watering or other fugitive dust suppression measures will be employed to minimize migration of dust off-site.

Additional measures will be identified at a later date to address ongoing socioeconomic impacts of the Project associated with its construction and long-term operation.

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4.13. Alaska Native Resources

4.13.1. Introduction

The Susitna River basin has been a source for subsistence hunting, fishing, and gathering, travel to other areas and settlement. It is an area with a long traditional history and cultural importance to Alaska Natives in the region.

Alaska Native resources as an analysis category encompasses many resources, including (but not limited to): fish and aquatic resources, wildlife and botanical resources, subsistence resources, cultural resources, recreation and land use. As such, Alaska Native resources are discussed in general terms, acknowledging these other studies and their applicability where appropriate.

This analysis focuses on summarizing and analyzing information relating to land and other resources of interest to identified Alaska Native entities that may be affected by the Project. In order to account for the range of Alaska Native entities recognized in federal statute under the Alaska Native Claims Settlement Act (ANCSA), as well as Tribes recognized by the U.S. Department of the Interior, two main types of Alaska Native entities were reviewed for this document: Alaska Native tribes federally-recognized by the Bureau of Indian Affairs pursuant to 25 CFR 83.6(b); and Alaska Native entities defined under ANCSA (43 USC §1602; i.e., Regional Corporations, Village Corporations, Group Corporations and Urban Corporations).

The study area for Alaska Native resources encompasses a broad area, and includes the Susitna basin and Upper Cook Inlet. Because of the potential for resources within this area to be of interest to Alaska Native entities elsewhere in the state, baseline information was reviewed for all Alaska Native entities within the Cook Inlet Region, Inc. (CIRI) and Ahtna Inc. regions, as well as Alaska Native entities in the Doyon, Ltd. region with lands or interests near the northern boundary of the Susitna basin.

Of the over 229 Alaska Native groups federally-recognized as Indian tribes in Alaska, 22 are located within or in close proximity to the Project area, and may have interests in the Project (see Table 4.13-1). Additionally, there are three Regional Corporations with interests in areas that may be affected by the Project. There are also 14 Village Corporations, five Group Corporations, and one Urban Corporation with land and/or other resource interests that may be affected by the Project. These Alaska Native entities are identified in the following pages. To understand the specific nature of their respective interests, further consultation with these entities should occur, in a manner consistent with government-to-government and public involvement consultation policies, as appropriate.

4.13.2. Alaskan Native Consultation

Identified Alaska Native communities, governments, corporations, and other resources are described below.

4.13.2.1. Identified Communities and Alaska Native Tribal Governments

Historically, in what is now the lower-48 United States, tribal governments made nation-to-nation agreements with the federal government, or treaties, in which Indian tribes agreed to relinquish ownership rights to vast amounts of their traditional territories in exchange for smaller areas over which they would exercise exclusive possession and control. Many of these agreements also recognized hunting and fishing rights in areas outside "reserved" areas. These agreements created what has been described as a "trust relationship," in which the U.S. government and all agencies have a duty to protect tribal rights and resources. Despite some erosion of tribal rights by statute and judicial interpretation, courts continue to recognize Indian tribes as "domestic dependent nations," with inherent sovereignty over their own affairs. United States policy is thus predicated on an interaction with Indian tribes on a government-to-government basis. Although, with a few exceptions, the indigenous peoples in Alaska did not enter into treaties with the U.S., there are 229 Alaska Native groups within the State of Alaska that have been listed as tribal governments by the Department of the Interior.

Based on this history, the Federal Power Act, which delineates the licensing process for hydroelectric projects, defines an Indian Tribe as that:

> "*which is recognized by treaty with the United States, by federal statute, or by the U.S. Department of the Interior in its periodic listing of tribal governments in the Federal Register in accordance with 25 CFR 83.6(b), and whose legal rights as a tribe may be affected by the development and operation of the hydropower project proposed (as where the operation of the proposed project could interfere with the management and harvest of anadromous fish or where the project works would be located within the tribe's reservation).*"

Identified tribal governments with potential interests in land and other resources that may be affected by the Project are listed in Table 4.13-1.

Table 4.13-1. Federally-recognized Tribes (25 CFR §86) within the Project impact area by region.

CIRI Region	Ahtna Region	Doyon Region
Chickaloon Native Village	Cheesh-Na Tribe (formerly the Native Village of Chistochina)	Village of Dot Lake
Eklutna Native Village	Native Village of Gakona	Healy Lake Village
Kenaitze Indian Tribe	Gulkana Village	Nenana Native Association
Ninilchik Village	Native Village of Kluti-Kaah (also known as Copper Center)	Northway Village
Village of Salamatof (Kenai)	Mentasta Traditional Council	Native Village of Tanacross
Seldovia Village Tribe	Native Village of Tazlina	Native Village of Tetlin
Native Village of Tyonek	Native Village of Cantwell	
Knik Tribe	Native Village of Chitina	

4.13.2.2. Regional Corporations

The Alaska Statehood Act, enacted in 1958, authorized the new State to select approximately 104 million acres of vacant, unappropriated, unreserved federal land in the Alaska territory. Soon after passage of the Act, the State began its land selections, in some cases selecting prime lands around Native villages or lands that were important to Alaska Natives for hunting and fishing. Alaska Natives successfully challenged many of the State selections, complicating the State's selection process. In an attempt to settle the aboriginal claims of Alaska Natives, Congress passed the Alaska Native Claims Settlement Act (ANCSA) in 1971. ANCSA authorized the transfer of over 45 million acres of land and the payment of nearly $1 billion to Alaska Natives.

In contrast to the federal policy implemented with respect to Indian tribes in the lower-48 states, ANCSA uniquely relies on the establishment of State-chartered corporations. ANCSA created two tiers of Native Corporations to manage the lands transferred to the Alaska Natives and to help promote and undertake economic development: 13 Regional Corporations; and over 200 Village Corporations. ANCSA provided for Village Corporations to file applications for land selections with BLM. Upon approval of an application, the Village Corporation is conveyed title to the surface estate, and the Regional Corporation generally is conveyed title to the subsurface estate.

4.13.2.2.1. Cook Inlet Region, Incorporated (CIRI)

CIRI was founded for Alaska Natives with ties to the Cook Inlet region. CIRI has over 7,300 shareholders, approximately 1.25 million acres of surface estate entitlements and 2.25 million acres of subsurface entitlement lands within and around the Susitna basin. CIRI holdings within the Susitna basin are a mixture of selected, interim conveyance and patented land.

CIRI actively is pursuing alternative energy development through projects in Cook Inlet, near the mouth of the Susitna. CIRI projects include Fire Island Wind and Stonehorn Ridge Underground Coal Gasification (UCG). CIRI also maintains an oil and gas leasing program for much of its land holdings around Cook Inlet, including lands adjacent to the Susitna basin.

CIRI Alaska Tourism (CATC), a subsidiary of CIRI, owns and operates the Talkeetna Majestic Lodge in Talkeetna.

4.13.2.2.2. Ahtna, Incorporated (Ahtna)

Ahtna, Inc. owns approximately 1,528,000 acres from an entitlement of 1,770,000 ac, primarily in the Copper River basin. Ahtna land holdings within the Susitna basin are all interim conveyances. Ahtna has over 1,600 shareholders, most of which reside in the Copper River basin.

In 1980, seven of the eight village corporations in the Ahtna region merged with Ahtna, Inc. Consequently, Ahtna acquired surface estate rights to the seven village corporations' lands.

However, the merger agreement allowed the seven villages to maintain shareholder committees known as Successor Village Organizations (SVO), who reserve the right to withhold consent to any new development within former village lands.

Ahtna has 15 subsidiaries, including one involved in forestry and gravel sales, and one tasked with developing a tourism program and business opportunities within the Ahtna region. The Ahtna Land Department manages surface estate and gravel (excluding timber); Ahtna Minerals Company, Inc. manages subsurface estate, and Ahtna Forest Products, Inc. manages timber.

4.13.2.2.3. Doyon, Ltd. (Doyon)

Doyon has over 17,550 shareholders and 11.4 million acres of surface, subsurface estate and mixed estate land holdings. None of these holdings are located within the Susitna basin.

The nearest conveyed or selected lands are northeast of the Susitna basin, near the communities of Dot Lake, Tanacross and Northway, north of the basin, near Nenana, and northwest of the basin, near Telida, Nikolai, McGrath and Takotna. Each of these areas, however, is geographically separated from the Susitna basin by the Alaska Range.

Doyon Tourism operates the Kantishna Roadhouse in Kantishna, the Denali River Cabins and the Cedars Lodge near the entrance to Denali National Park, as well as Kantishna Wilderness Trails, which offers day trips around Kantishna. Through a joint venture with ARAMARK (a provider of food services and facilities management), Doyon Tourism is the authorized concessioner for various tours, activities and other services offered within Denali National Park and Preserve.

4.13.2.2.4. Village Corporations

Village corporations within the CIRI Region include:

- Chickaloon Moose Creek Native Association
- Eklutna, Inc.
- Knikatnu, Inc.
- Ninilchik Natives Association, Inc.
- Salamatof Native Association, Inc.
- Seldovia Native Association, Inc.
- Tyonek Native Corporation

The only remaining village corporation within the Ahtna region is Chitina Native Corporation. However, Successor Village Organizations exist for Cantwell, Chistochina, Gakona, Gulkana, Kluti-Kaah (Copper Center), Mentasta and Tazlina.

Village corporations within the Doyon Region include:

- Dot Lake Native Corporation
- Menda Cha-ag Native Corporation (Healy Lake)

- Northway Natives, Inc.
- Tanacross, Inc.
- Toghotthele Corporation (Nenana)

The Tetlin Native Corporation was originally identified by Alaska Energy Authority (AEA) for this analysis; however, during this review, its land holdings could not be verified. While Tetlin Native Corporation likely does not hold lands within the Susitna basin, its status will be verified for consultation on other resources, such as subsistence and cultural resources.

4.13.2.3. Group Corporations

ANCSA provided for the establishment of Group Corporations to hold, invest, manage and/or distribute lands, property, funds, and other rights and assets for and on behalf of members of certain small Native communities of less than 25 members. Group Corporations include:

- In the CIRI Region:
  - Alexander Creek, Inc.
  - Caswell Native Association
  - Gold Creek-Susitna NCI
  - Montana Creek Native Association
  - Point Possession, Inc.

4.13.2.4. Urban Corporations

ANCSA also provided for the establishment of Urban Corporations to hold, invest, manage and/or distribute lands, property, funds, and other rights and assets for and on behalf of members of urban communities of Natives. Four urban communities were identified as having significant Native Alaskan populations and were allowed to develop Urban Corporations. Of these four communities, only Kenai may be potentially affected by the Project. The Urban Corporation for Kenai is Kenai Natives Association, Inc.

4.13.2.5. Alaska Native Allotments

In addition to the land and other interests of the Alaska Native entities, there are 98 individual Native allotments within the Susitna basin in various stages of the adjudication and conveyance process. Native allotments are lands selected by individuals under the Alaska Native Allotment Act. The land claims applications were submitted to the U.S. Bureau of Land Management (USBLM) and are in various stages of adjudication or conveyance. Once conveyed, title to the land can be shared by any number of individuals through inheritance. An accompanying geo-database has been prepared that delineates the allotments; the owners will be identified and consulted regarding their specific interests. There are two categories of Alaska Native allotments: restricted and unrestricted. Restricted allotments are held in fee, but are subject to statutory restrictions against alienation; therefore, any land use agreements or other alienation of interests in restricted allotments must be authorized by the Bureau of Indian Affairs (BIA).

Unrestricted allotments are allotments that are no longer subject to restrictions against alienation, for instance as a result of a petition for unrestricted status by the allotee.

4.13.2.6. Subsistence Resources

The Alaska Native people that are represented by the Alaska Native entities discussed in this document consider wildlife and fish populations, particularly moose, caribou and salmon, to be important subsistence resources and central to their cultural identity. Subsistence resource information is summarized and analyzed in section 4.11 of the PAD (Cultural and Subsistence Resources). Specific information regarding subsistence resources and use areas within the Project area, as well as access routes to these resources, will need to be updated.

As discussed in section 4.11 of this PAD, beluga whales are an important subsistence resource for Alaska Natives living on and around Cook Inlet, including Tyonek residents, who hunt for belugas near the mouth of the Sustina River. Declining populations of belugas throughout the 1990s led to co-management agreements between the Native Village of Tyonek and other Alaska Natives and the National Marine Fisheries Service (NMFS) allocating harvest and identifying harvest practices. Populations continued to decline, and in 2007 Tyonek subsistence hunters voluntarily stepped down from a hunt to further support recovery of the beluga population. The National Oceanic and Atmospheric Administration (NOAA) and NMFS released a record of decision for the supplemental Environmental Impact Statement (EIS) for the Cook Inlet Beluga Whale Subsistence Harvest in 2008, which resulted in the Cook Inlet Beluga Whale Subsistence Harvest Management Plan. In October 2008, NMFS listed the Cook Inlet population of beluga whales as endangered under the Endangered Species Act.

4.13.2.7. Cultural Resources

In addition to subsistence resources, cultural resources are also of vital interest to Alaska Natives. Cultural resource information is summarized and analyzed in section 4.11 of the PAD; however, in light of their particular importance to Alaska Natives, two classes of cultural resources are identified here: ANCSA section 14(h)(1) [43 USC §1613(h)(1)] sites and National Historic Preservation Act (NHPA) sites.

The importance of cultural resources to Alaska Natives is reflected in section 14(h)(1) of ANCSA, which specifically authorized the conveyance of cemeteries and historical sites to the appropriate regional corporations. Conveyances or selections made under ANCSA 14(h)(1) within the Susitna basin will be identified. Additionally, section 106 of the NHPA requires special consideration of historic properties of traditional religious and cultural significance to "Indian Tribes," statutorily defined to include ANCSA Native villages, Regional Corporations and Village Corporations. Any properties of traditional cultural and religious significance that may be affected by the Project will be identified and evaluated for listing in the National Register of Historic Places (NRHP), in consultation with the appropriate Alaska Native entities.

4.13.3. Potential Impacts

Impacts to Alaska Native resources specifically were not evaluated during the 1980s licensing effort. However, the draft EIS for the 1980s Alaska Power Authority (APA) hydroelectric project determined that potential environmental impacts may occur to a number of other resource categories as a consequence of the development. As previously identified in this section, Alaska Native resources as an analysis category encompasses many resources, including (but not limited to): fish and aquatic resources, wildlife and botanical resources, subsistence resources, cultural resources, recreation and land use. Consequently, previously identified environmental impacts to these classes of resources also may affect Alaska Native resources. Discussions of the impacts to these resource classes are presented elsewhere within this document and may be appropriate in identifying potential adverse impacts to Alaska Native resources but are not restated here. Instead, basic impact mechanisms are identified and discussed within the context of generally identified Alaska Native resources.

Project impact mechanisms that could affect Alaska Native resources include construction and operation of the dam and reservoir, access roads, ancillary facilities and transmission lines, and the resulting environmental impacts, such as variations in water conditions downstream of the facility during operation, direct ground disturbance during construction and operation, and the introduction of audio and/or visual elements during construction and operation.

In general, impacts to Alaska Native resources may include environmental impacts to the terrestrial and aquatic habitats of plants and animals that are of interest and/or significance to Alaska Native individuals and entities with respect to access to and use of subsistence resources; acquisition or use of individual, tribal and corporation lands for Project construction and operation; disturbance to archaeological, historic and traditional cultural sites of interest and/or significance to Alaska Native entities; impacts to Alaska Native entity financial resources, such as corporation-owned recreation and tourism businesses or natural resource development areas; and other socioeconomic impacts.

Construction and operation of the Project dam and reservoir, access roads, ancillary facilities and transmission lines could affect subsistence interests by limiting, increasing or otherwise changing access to subsistence use areas and resources, or increasing competition for such resources. The same impact mechanism may also affect Alaska Native resources by limiting, increasing or otherwise changing access to Alaska Native-owned lands, including individual allotments.

Specific potential impacts of the currently proposed Project are unknown at this time and will require comprehensive consultation and analysis. While the design and operation of the currently proposed Project may differ from the previously evaluated project, the types of impacts are likely to be similar.

4.13.4. Potential Protection, Mitigation, and Enhancement

4.13.4.1. Alaska Native Consultation Procedures and Guidelines

With the issuance of Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments*, the President emphasized the trust relationship with federally-recognized tribal governments, while also recognizing the right of Indian tribes to self-government and the federal government's support for tribal sovereignty and self-determination. EO 13175 requires federal agencies to support the policy of tribal self-determination by implementing an effective process to ensure meaningful and timely consultation with tribes during the development of policies that may have tribal implications. Tribal consultation is intended to assure meaningful tribal participation in planning and decision making processes for actions with the potential to affect tribal interests. The mandates of EO 13175 apply whenever regulations, legislative comments or proposed legislation, and other policy statements or actions have substantial direct effects on Indian tribes, on the relationship between the federal government and Indian tribes, or on the distribution of power and responsibilities between the federal government and Indian tribes. Although EO 13175's mandates apply only to policymaking activities and are not binding on independent regulatory agencies like the Federal Energy Regulatory Commission (FERC), the EO does reiterate the policy of government-to-government interactions with tribes. Moreover, while EO 13175 itself applies specifically to federally-recognized tribal governments, pursuant to Pub. L. 108-199, 118 Stat. 452, as amended by Pub. L. 108-447, 118 Stat. 3267, the Office of Management and Budget (OMB) and other Federal agencies are required to "consult with Alaska Native corporations on the same basis as Indian tribes under Executive Order No. 13175."

Alaska tribal government-to-government (G2G) consultation is thus a relationship that is distinct and separate from engagement with the general public. By definition, G2G consultation requires a higher level of engagement, logistical planning and investment toward relationship building—which will be critical for the success of the Project's development. To this end, a Project-specific consultation program is being developed to identify interested tribal entities, Alaska Native corporations and communities, as well as strategies for the effective involvement of tribal governments, Alaska Native entities and rural communities within the proposed Project's study area.

Maintaining G2G relationships and proper protocols is essential to consultation under Section 106 of the NHPA, the National Environmental Policy Act (NEPA) and in FERC licensing procedures. Tribal and Alaska Native entity consultation is inherently a multifaceted process involving parties with diverse cultural backgrounds, regulatory experiences, practical needs, political realities and long-term goals. Such consultation associated with large-scale projects poses a unique set of challenges that require an understanding of a myriad of federal and state laws as they apply particularly to the FERC licensing process.

4.13.4.2. Consultation Plan

Identified Alaska Native entities listed in this document will be contacted and invited to attend regularly scheduled meetings to discuss Alaska Native resources and interests, and any concerns

regarding potential Project effects to resources and land interests. Specifically, consultation will be conducted at varying levels of involvement, based on the G2G relationship between federally-recognized tribal governments and the federal government, and with Regional and Village Corporations accordingly:

- G2G consultation will be conducted, with initial contact made by FERC officials together with AEA representatives, and follow-up from AEA project managers, as delegated as appropriate by FERC.
- Meetings also will be initiated with Regional and Village Corporations. Consultation meetings with federally-recognized tribal governments will be separate from meetings with Regional and Village Corporations and other Alaska Native organizations, to recognize the unique nature of the G2G relationship and to acknowledge the potentially varying interests of tribal governments and Native Corporations.
- Confirmation of each entity's interest in the proposed Project will be assessed, as well as the mode of communication each entity would like to utilize (e.g., quarterly update meetings, e-mail communication, conference calls, etc.).
- Whenever possible, face-to-face meetings will be conducted with interested Alaska Native entities to help establish constructive, long-term relationships with Alaska Native stakeholders during the licensing process and Project development.

It is anticipated that consultation meetings will occur at varying phases of the FERC licensing process and Project development, and will overlap with consultation requirements under Section 106, NEPA and FERC licensing procedures. Meetings will occur with either smaller, focused groups or large groups as the situation requires.

4.13.4.3. Alaska Native Land Interests and Resource Database

As discussed above, a standard query language (SQL) server-based web database application has been developed to document and track Alaska Native entity status, contact information, and any documents associated with Alaska Native resource interests that may be impacted by the Project. This database will be updated periodically by Project staff as a result of further consultation and investigation during licensing and Project development, as a tool for continued and comprehensive understanding of Alaska Native resources and land interests. The database will be updated as potential impacts and proposed protection, mitigation and enhancement measures are identified and can be shared with Project stakeholders and G2G partners, to demonstrate how the Project is collating Alaska Native resource interests for understanding throughout the duration of the FERC licensing and Project development processes.

4.14. Transportation

4.14.1. Introduction

In the Railbelt region, the public transportation system is dominated by road, rail and aviation. This analysis provides additional information to characterize the current baseline conditions of the public transportation system in the Railbelt area, especially around the middle and upper Susitna River system.

In coastal communities, water-based transportation systems are important, especially the ports of Anchorage and Seward. In other communities, marine is used mostly for fishing and recreational purposes as opposed to a primary means of transportation. As a result, water-based transportation is not included in this analysis.

4.14.2. Roads

The primary road near the Project site is the George Parks Highway. The highway was completed in 1971 and is approximately 323 mi long. The Parks Highway connects the Glenn Highway to Fairbanks, providing the primary access to the MSB, Denali Borough, Denali National Park and Preserve and Denali State Park along the way. The Parks Highway is mostly a two lane highway but some segments are built to a higher standard (four lanes, divided controlled access, etc.) (ADOT&PF 2008). The section between Mile Post (MP) 132 and 248 is designated as an Alaska State Scenic Byway. (Along the Glenn Highway, mileposts do not begin with 0. Instead, they begin at MP 35 because they continue the milepost numbering of the Glenn Highway which starts at MP 0 in Anchorage.)

Also near the Project is the Denali Highway (also known as Route 8). The Denali Highway connects the Parks Highway (near Cantwell) to the Richardson Highway (near Paxton). It was opened in 1957 and is approximately 135 mi in length. It is a gravel highway but small portions of the highway (eastern 21.3 mi and western 2.6 mi) are paved. The Denali Highway is not maintained in the winter (i.e., October 1 through mid-May). The Denali Highway is used primarily to access adjacent lands for hunting, harvesting or recreational purposes.

Other than the Parks Highway, the Denali Borough has a relatively limited road network, with most roads providing local circulation and property access. By comparison, the MSB has a fairly extensive road network of arterial, collector and local roads.

Additional information regarding road use and road maps can be found in section 4.10 (Recreation and Land Use) of this PAD.

4.14.3. Rail

The Alaska Railroad Corporation (ARRC) is the only railroad in the Railbelt region (see Figure 4.14-1). Since 1985, the ARRC has been owned and operated by the State of Alaska. The

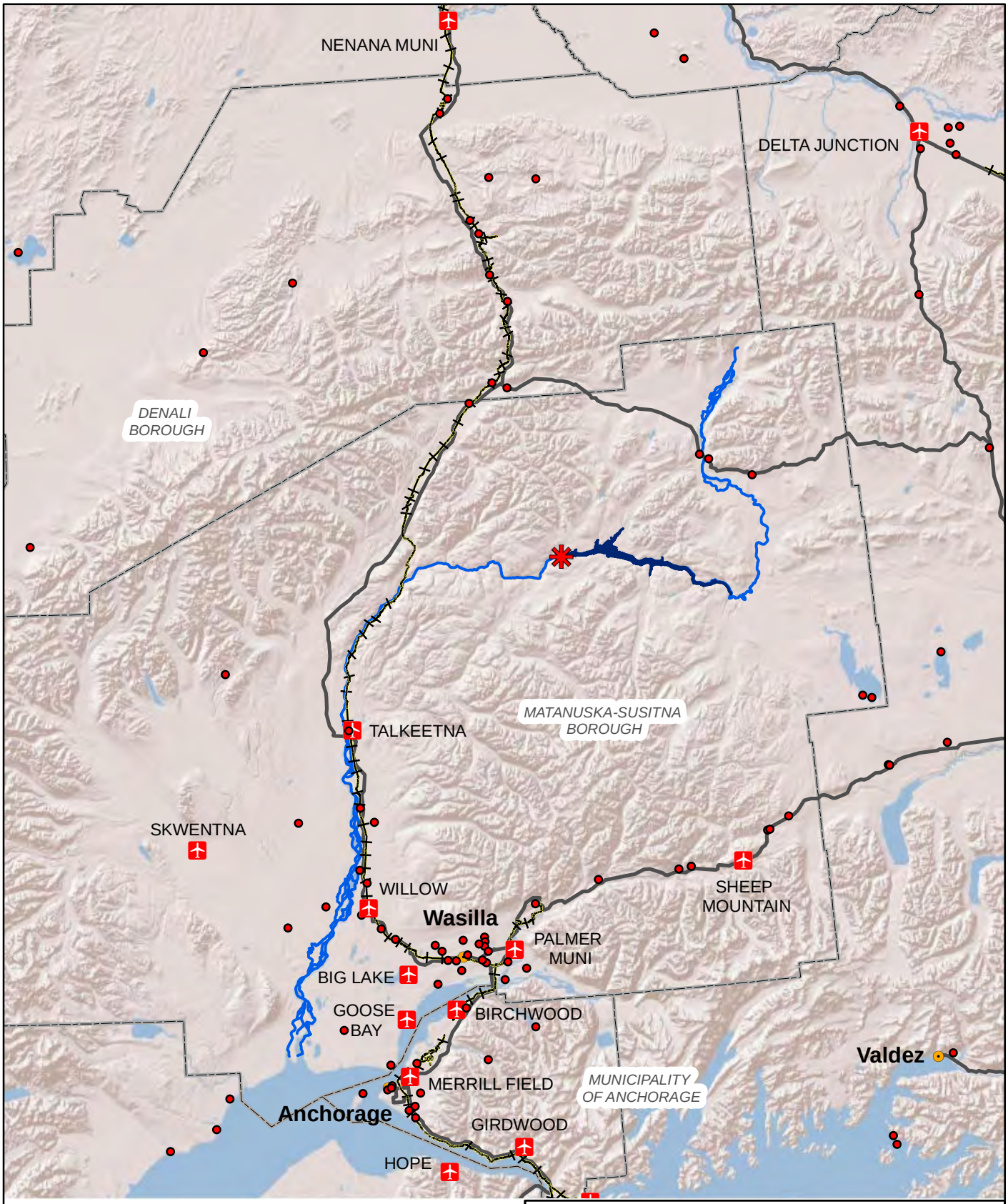
southern terminus of the ARRC mainline is in Seward and the northern terminus is Eielson Air Force Base (AFB). In addition, there are several spur lines including one in the Denali Borough that connects the ARRC mainline to the Usibelli Coal Mine. The ARRC is currently pursuing a rail extension within the MSB (Port MacKenzie Rail Extension). The Port MacKenzie Rail Extension involves the construction of 30 to 45 mi, depending on the route, of new rail line connecting the existing rail system to the MSB's Port MacKenzie. This Project is estimated to be completed in 2014.

Additional information regarding railroad use can be found in section 4.10 (Recreation and Land Use) of this PAD.

4.14.4. Aviation

The largest airport in Alaska is the Ted Stevens Anchorage International Airport followed by the Fairbanks International Airport. Both airports have large volumes of passenger and cargo service. These two airports also provide the main links between Alaska and other states and countries.

In addition to two international airports, there are numerous other public airports, private airports, private landing strips and floatplane lakes throughout the Denali Borough and the MSB (see Figure 4.14-1). Many of these are private-use, privately owned airports, seaplane bases and heliports, and will not be discussed here because they are not available for public use. In addition, many lakes, rivers, gravel bars and backcountry strips exist in the study area. As these are used mainly for access to property or for recreational purposes, such as hunting or fishing, they will not be discussed further in this report.



Legend

- Proposed Watana Dam and Powerhouse
- Proposed Watana Reservoir
- Susitna River
- Borough
- Selected Populated Place
- Alaska Railroad
- Highway
- Public Airport or Seaplane Base
- Private Airport or Seaplane Base

N

0 10 20 40

Miles

ALASKA ENERGY AUTHORITY

Date: Nov 2011
Scale: As Noted

State of Alaska
Susitna-Watana Hydroelectric Project, FERC No.14241

Figure 4.14-1

Public Use Airports

Within the Denali Borough, the following publically owned airports are available for public use:

- Healy River
- Kantishna
- Clear
- Stampede
- McKinley National Park (commercial and business use of the McKinley National Park airport is not allowed unless authorized by the NPS)

The airport in Cantwell is privately owned but public use is allowed.

Within the MSB, the following publically owned airports are available for public use:

- Wasilla
- Palmer Municipal
- Big Lake
- Goose Bay
- Skwentna
- Talkeetna
- Willow
- Lake Louise (Lake Louise airport is currently closed due to safety concerns; there are plans to reconstruct the runway and re-open the airport in the future)
- Sheep Mountain
- Summit

No major improvements have been identified for airports within the Denali Borough. Within the MSB, most of the major improvements will be for the Wasilla and Palmer Municipal airports.

4.14.5. Potential Adverse and Positive Impacts

It is assumed that the majority of the impacts to the transportation network would be associated with construction. Impacts to the transportation system during the operation of the Project are not expected to be substantial based on existing information.

4.14.6. Potential Protection, Mitigation and Enhancement

Protection, mitigation and enhancement (PM&E) measures will be identified following the completion of the study process. If the Denali Corriodor is chosen for road acess, then some potential PM&Es include:

- Limiting the number of construction vehicles on the Parks Highway during peak traffic times;
- Limiting traffic on access roads to Project-related traffic;
- Establishing a flight path for Project related air traffic;
- Limiting Project-related traffic near residential properties during nighttime hours; and

- Paving the Denali Highway from Cantwell to the Denali Access Road Junction.

4.14.7. References

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