WETLAND MAPPING STUDY 2012 – DRAFT FINAL

INTRODUCTION

The Alaska Energy Authority (AEA) is preparing a License Application that will be submitted to the Federal Energy Regulatory Commission (FERC) for the Susitna-Watana Hydroelectric Project (Project) using the Integrated Licensing Process (ILP). The Project is located on the Susitna River, an approximately 300 mile long river in the Southcentral region of Alaska. The Project's dam site will be located at River Mile (RM) 184. The results of this study and of other proposed studies will provide information needed to support the FERC's National Environmental Policy Act (NEPA) analysis for the Project license.

Construction and operation of the Susitna-Watana Hydroelectric Project as described in the Pre-application Document (PAD, AEA 2011) will affect wetlands primarily upstream from the proposed dam site, and along access and transmission line routes. This study plan outlines the objectives and methods for characterizing the existing Project area wetlands in order to evaluate potential Project-related effects. This study is initiation of a multi-year effort, which will include data collection beginning in 2012.

STUDY OBJECTIVES

The overall, multi-year objectives of the Wetlands Mapping Study are to:

- Characterize wetlands in the Project area;
- Quantify the potential impact to wetlands and wetland function from Project construction;
- Evaluate potential changes to wetlands and wetland functions from Project maintenance and operations and related activities;
- Develop potential avoidance, minimization, and mitigation measures to address Project-related impacts to wetlands and wetland functions; and

A complete assessment of the Project area wetlands and wetland functions will be completed as aerial imagery becomes available and the Project area is refined (e.g. preferred alternative access and transmission corridors). The study objective for 2012 is to develop a wetland map using existing habitat delineations, current aerial imagery, and field verification.

STUDY AREA

The study area includes all areas that will be directly altered or disturbed by Project construction and operations, including the reservoir inundation zone up to an elevation of 2,200 feet above mean sea level (msl) facility site locations, one of three potential access corridors, and two of three potential transmission corridors. The study area also includes all temporary disturbance areas, borrow areas, and the area surrounding proposed facilities, access roads, and transmission line corridors as shown in Figure 1-1 from the PAD and provided below (AEA 2011).

EXISTING INFORMATION

Wetlands were mapped for the Alaska Power Authority (APA) Susitna Hydroelectric Project (SHP) through a cooperative agreement between U.S. Fish and Wildlife Service (USFWS) and the APA to produce a preliminary wetland map for the 1980s project area at a scale of 1:63,360.

These data are now a part of the National Wetlands Inventory (NWI) (USFWS 1984); however they are currently unavailable to the public in digital format. The NWI maps were based on the vegetation mapping completed by McKendrick et al. (1982), with some additional modification using stereoscopic photo interpretation. The original Alaska Vegetation Classification (AVC) (Viereck and Dyrness 1980) vegetation classes were cross-referenced and converted into wetland classes using the classification scheme of Cowardin et al. (1979). Mapping was not finalized by the original report publication date, but a preliminary table of wetland classes and acreages impacted by SHP components was developed (AEA 2011). NWI data for the Project area has recently been digitized, but only digital data for proposed transmission corridors and access routes has been released by the USFWS for spatial analysis purposes to date. Digital NWI data for the current Project area is expected to be available by early 2012.

A key assumption for the 2012 scope of work is that suitable imagery will be available to begin delineation of wetlands within the FERC Project area (Figure 2) in early 2012. SPOT 2.5-meter resolution imagery, gathered as part of the Statewide Digital Mapping Initiative (www.AlaskaMapped.org), is available for a portion of the Lower Susitna basin. Imagery covering the middle and upper Susitna basin will not be acquired until 2012 and will likely not be available until late 2012 or early 2013. In addition, the 2.5-meter resolution of this imagery was determined to be insufficient for delineation of vegetation and wetlands within the FERC Project area (Figure 1-1). This imagery, however, will be useful if a need is identified for basin-wide wetland mapping.

Aerial imagery (1-meter resolution) that may be suitable for vegetation and wetland mapping covers part of the potential areas of impact including the FERC Project area along the Denali Highway to Cantwell (Misc.Census.DenaliHealy, 5/9 to 9/29/2006) and for most of the lower Susitna River from Talkeetna to the Susitna River delta (MOQQ.USDA.NRCS.MatSu, 6/26 to 6/27/2004). This imagery, however, is taken from different years and seasons, which reduces its suitability.

New aerial imagery was acquired during Light Detection and Ranging (LiDAR) contour mapping for the Project (Figure 2). This 1-foot resolution imagery will likely be available in early 2012. This imagery covers the impoundment zone and most of the Project facilities, but does not include the proposed transmission and road corridors on both the north and south sides of the Susitna River. In addition, because the focus of the LiDAR was to produce contours, the data was compiled over a number of dates, some of which were flown late in the season after the foliage had begun to senesce and fall.

Complete orthophoto imagery may not be available for wetland delineations of the FERC Project area during early 2012. If new aerial photography for the entire Project area is flown in summer 2012, it will likely be available in late 2012. Complete SPOT 2.5-meter resolution imagery for the upper and middle Susitna River basin also may be available in late 2012.

METHODS

Wetland delineation and mapping methods for this study will be consistent with guidance in the Alaska Regional Supplement (USACE 2007), the U.S. Army Corps of Engineers (USACE) Manual (Environmental Laboratory 1987), and Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979). At a minimum, the 2012 study will include the following study components:

- Determine appropriate scales and areal extents for wetland delineations in consultation with USACE and compile available wetland mapping at various scales for development of wetland delineations based on current aerial photography.
- Incorporate data from the Vegetation and Wildlife Habitat Mapping Study and available data on natural fire patterns along the reservoir reach of the Susitna River.
- Identify wetland delineation field sites and data from the 1980s studies for potential resampling, if possible.
- Identify sample locations and conduct initial field surveys.
- Report study results, including reporting that is coordinated with other pertinent studies.

TASK 1: REVIEW AND COMPILE EXISTING INFORMATION

A number of wetland and vegetation mapping resources for the project area were identified as part of the preparation of the PAD, which was prepared to identify data gaps and prioritize the field effort. Of particular value is the availability of National Wetland Inventory (NWI) digital wetlands mapping for the study area. Although this mapping is more than 20 years old, it still will be a useful resource for planning the 2012 field effort. Other data sources that will be used (where available) include soil surveys, digital elevation data, the National Hydrography Dataset (USGS and EPA 1999), and any map products that may have been produced for other studies in the region. These data will be compiled and reviewed and where possible, included as a map layer in ArcGIS® (ESRI, Redlands, California) to assist the current mapping effort. Aerial photography that is available for the project area will be acquired and evaluated for quality and geodetic control. If high-resolution aerial photography is not available for some portions of the study area, lower-quality imagery can still be used to support the field effort, with the understanding that detailed wetlands mapping as needed will be performed when higher-quality imagery is acquired.

The methodology for evaluating the functional importance of wetlands in the study area will be developed in consultation with resource agencies, but will be based on based on HGM (Hydrogeomorphic) principles. Draft guidebooks prepared for the Cook Inlet Basin (Hall et al. 2003) and Interior Alaska (ADEC and USACE 1999) will be reviewed for their applicability to the Susitna Basin, but it is likely that a new model will need to be developed for assessing the wetland functional characteristics unique to this region. Given the lack of comprehensive quantitative data on wetland soil chemistry, hydrology, water quality, and other wetland ecosystem parameters in the study area, the methodology chosen will need to include measurements and observations that are relatively easy to document, have criteria applicable to the Susitna Basin, and can be consistently evaluated for the range of wetland habitats likely to be encountered in the study area. Incorporating important habitat information to support wildlife habitat use and availability analyses also will be an important selection criterion.

TASK 2: COMPLETE PRELIMINARY MAPPING

Prior to the 2012 field season, preliminary wetland and upland boundaries will be digitized on-screen using ArcGIS® 10.0, for areas where NWI mapping is lacking and suitable aerial photography is available. The magnitude and scale of the mapping effort will depend on the quality of the imagery available, which currently is unknown, and the extent of NWI mapping. Classification and mapping of the Project area will follow the protocols for preparing wetland

maps that have been developed by the USFWS National Wetland Inventory (NWI) program (National Wetlands Inventory Center 1995, Dahl et al. 2009). These protocols describe requirements for boundary delineation, polygon size, classification, and NWI annotation. The minimum mapping polygon size for most upland and wetland habitats will be 0.5 acres, with smaller polygons (0.1 acre) delineated for water bodies and other wetlands of ecological importance.

Wetland and upland boundaries will be delineated based on color signature, plant canopy, and surface relief, along with hydrological indicators such as drainage patterns and surface water connections. To some extent, mapping codes will follow Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979) guidelines, but will be modified based on the wetland classification system developed by the Kenai Watershed Council for the Cook Inlet region (Gracz 2011). This system improves on the Cowardin system by incorporating region-specific landscape features into the classification. Wetlands will be classified in the Project area consistent with the Cook Inlet methodology, but wetland classes unique to the landscape characteristics of the Susitna Basin will be developed. Wetlands also will be classified into Alaska Vegetation Classification (AVC) Level IV vegetation types, where practicable (Viereck et al. 1992), which includes canopy classes for shrub, dwarf tree, and tree lifeforms. To assist the wetland functional assessment, polygons also will be assigned HGM classes (e.g., slope, flats, depressional).

TASK 3: COMPLETE GROUND VERIFICATION

The wetland field surveys will be organized to capture data from as many wetland habitats as possible in a way that maximizes safety and efficiency. The preliminary mapping effort will be used to preselect sample transects and plots to the extent possible, although additional plots will be established in the field when additional field data are needed for a given area. Field plots will be sampled primarily along transects located within major physiographic environments, including riverine, lacustrine, lowland, and upland areas. If possible, plots where vegetation data were collected in the 1980s will be resampled. These data will be valuable for assessing the extent to which landscape characteristics have changed in the intervening 25 years.

Wetland determinations will be made using the standard three-parameter approach described in the 1987 Corps of Engineers Wetlands Delineation Manual (Environment Laboratory 1987) and 2007 Regional Supplement (USACE 2007). To be classified as a wetland, a site must be dominated by hydrophytic plants, have hydric soils, and show evidence of a wetland hydrologic regime. At each wetland determination plot, percent areal cover of plant species within each stratum (herb, shrub, and tree) will be visually estimated, generally within a 10-meter (30-foot) radius of relatively homogeneous vegetation as specified in the 1987 Wetland Delineation Manual. The size and dimensions of the plot may be modified, however, depending on the site characteristics of the plant community (e.g., narrower plot in riparian fringe). Additional documentation will include observations of wildlife use (stick nests, dens) and other site characteristics that reflect habitat quality and wetland function.

In addition to wetland determination plots, we will establish field verification plots for improving the accuracy of the overall mapping effort. At these plots, the dominant plant species will be recorded, and wetland and AVC Level IV vegetation classes assigned. These assessments will be performed in habitats where the wetland or upland status has been well documented in determination plots elsewhere; the verification plots provide additional vegetation field data to improve map accuracy.

A mobile Trimble® Nomad™ series handheld computer/Global Positioning System (GPS) unit will be used to record the wetlands data (using WetForm [Ecotone Corporation, Boulder, Colorado]), record GPS location (as back-up to handheld devices), and provide ready access to aerial imagery and preliminary mapping performed prior to the field survey. WetForm is a proprietary software program for entering site data onto the USACE 2007 Regional Supplement data form electronically in the field.

ANALYSIS AND REPORTING

This study plan may need to be revised after further evaluation of the adequacy of existing imagery is complete (13 April 2012). Primarily, the results of the imagery assessment will affect the extent to which detailed preliminary mapping can be completed prior to the 2012 field survey. The 2013–2014 study plans will include:

- a description of preliminary mapping and field efforts, including the estimated number of plots and preliminary field schedule;
- approved wetland functional assessment methodology;
- QA/QC map and field data collection protocols; and
- a description of the interim wetlands map, including scale and layout.

The Final Technical Memorandum (9 November 2012) will summarize the results of the 2012 Wetlands Mapping Study, including a summary table (acreages) of the wetland and upland habitats in the preliminary map; a description of the vegetation, hydrology, and soils of the wetland functional groups; the model to be used for the functional assessment; and recommendations for the 2013 field survey effort. The report will include all supporting field documentation, including preliminary wetland maps, field data forms, and soil and ground photographs. The results of the preliminary mapping will be provided as ArcGIS® spatial data, along with supporting metadata documentation.

LOGISTICAL SUPPORT AND HEALTH AND SAFETY

The wetland field survey will be coordinated with the Vegetation and Wildlife Habitat Mapping Study using the following schedule, transportation, and personnel:

- 2 (2-person) field crews will perform each field survey;
- two 12-day field surveys (24 days total, including travel time) will be conducted starting approximately 15 June 2012 and ending 15 August 2012; and
- field logistics will require a 4 passenger helicopter with approximately 4 hours of flight time required each day.

A Health, Safety, and Environmental Plan will be prepared prior to the field effort that will include:

- Project Safety Risk Assessment and Plan: This consists of a matrix that describes specific potential hazard/risk categories; the methods to be used to minimize risks; and responses to hazards.
- Field Communication Plan: This plan identifies the field personnel, the physical location of the field party, and contact information (telephone, fax, email, satellite phone, cell phone, or radio).

- Emergency Contact form and Emergency Medical form: All field personnel complete (or update) these forms prior to beginning field work.

All field personnel will have, at a minimum, CPR and Basic First Aid training prior to commencing fieldwork. Discussions regarding safety concerns raised by field personnel will be documented on a Safety Concerns or Minor Safety Incident Report. Should a minor safety incident occur, a Safety Concerns or Minor Safety Incident Report will be filled out by the staff member(s) involved in the incident and reviewed by the Field Project Leader (FPL) and Project Manager (PM). After returning from the field, all forms will be submitted to the Safety Group for review and a copy will be stored in the project's safety folder. A post-field safety review will be conducted to review all safety concerns or minor incidents, identify any problems areas where safety training or planning can be improved, and those resolutions will be communicated to the PM/FPL and the staff involved in the incident.

A major safety incident (defined as an accident that required removal of the staff member from the field, hospitalization, or other responses that would initiate an OSHA or Workman's Compensation report) will be reported immediately to their PM/FPL, Contracts Manager, and AEA. A detailed report on the safety incident, the response, and any actions required will be prepared by the PM and submitted to the Safety Group for review. As with the minor incident reports, this report will be reviewed during the post-field audit and any appropriate changes in planning, training, or response will be undertaken and documented with a follow-up addendum to the original report.

NEXUS BETWEEN PROJECT AND RESOURCE TO BE STUDIED AND HOW THE RESULTS WILL BE USED

Project construction, facilities, and operation and maintenance may affect wetlands upstream from the dam site, and along access and transmission line routes. Upon a complete assessment of wetlands in the Project area, avoidance, minimization, and mitigation alternatives will be developed in consultation with the USACE through the FERC ILP process to address adverse Project-induced impacts identified in the PAD (AEA 2011). The construction and maintenance of the Susitna-Watana Hydroelectric Project will affect wetland resources in the following ways including:

- direct wetland loss from fill placement for constructing roads, power plants, and other support structures;
- conversion of palustrine wetland systems to a lacustrine system by damming the Susitna River to create a reservoir;
- loss of wetland function, including changes in wetland canopy structure, soil biological productivity, water storage, and flood control; and
- indirect impacts from erosion, dust, permafrost degradation, landslides, and off-road vehicle use.

A thorough understanding of how project activities will affect wetland resources in the study area will be critical for developing best management practices, rehabilitation options for promoting recovery of wetlands exposed to short term impacts, and compensatory mitigation for permanent wetland losses. Wildlife use is related to the impact of Project activities on wetlands; therefore, the results of this study will be necessary to evaluate baseline and future wildlife use

of the Project area. The results of the Wetlands Mapping Study will also be used to supplement the Vegetation and Wildlife Habitat, Riparian, Rare Plant, and Invasive Plant studies.

PRODUCTS

Study products to be delivered in 2012 will include:

Summary of extent and adequacy of existing aerial imagery. The current aerial imagery does not cover the entire Project area, and the existing imagery may not represent the appropriate time of year or resolution for vegetation mapping. The data gaps will be refined so that additional aerial imagery can be obtained in 2012.

Draft Technical Memoranda. Draft technical memoranda will be prepared for each work group meeting. The topics for the draft memoranda will be developed in coordination with AEA, the Botanical Resources Program Lead, the USACE and other licensing participants to meet the needs for developing the 2013–2014 Wetlands Mapping Study Plan. Each memo will summarize progress, identify data gaps, and indicate coordination efforts with other studies.

Geospatially-referenced wetland site data. A geospatially-referenced relational database of historic data used in the analysis and data collected during 2012 field season, including representative photographs of vegetation communities will be prepared. This database will form the basis for additional data collection in 2013-2014. All field data will be associated with location information collected using a GPS receiver in unprojected geographic coordinates (latitude/longitude) and the World Geodetic System 1984 (WGS 84) datum. Naming conventions of files and data fields, spatial resolution, and metadata descriptions will meet the Alaska Department of Natural Resources (ADNR) standards established for the Susitna-Watana Hydroelectric Project.

Wetland maps in ArcGIS® software. Wetland maps will be developed and delivered periodically according to the schedule indicated below. The map will continue to be developed during the 2013-2014 field season. Naming conventions of files and data fields and metadata will meet the ADNR standards established for the Susitna-Watana Hydroelectric Project.

Summary of interim results. A brief interim report, including the database and wetland map will be prepared and presented to AEA and the licensing participants to provide the status of the study, identify any issues that have occurred and allow for further refinement of the 2013–2014 component of the study.

Final Technical Memorandum. A final technical memo summarizing the 2012 results will be presented to resource agency personnel and other licensing participants, along with spatial data products. All map and spatial data products will be delivered in the two-dimensional Alaska Albers Conical Equal Area projection, and North American Datum of 1983 (NAD 83) horizontal datum consistent with ADNR standards.

SCHEDULE

This is a multi-year study. The following schedule is for the 2012 scope of work. The schedule for the 2013–2014 components will be developed with the AEA during the final 2013–2014 study planning process.

- Evaluation of existing aerial imagery and identification of areas without adequate coverage – April 13, 2012
- Draft Technical Memorandum – June 29, 2012

- Summary of Interim Results – September 10, 2012
    1) Preliminary wetlands map in ArcGIS® software
    2) Geospatially-referenced relational database
    3) Brief summary
- Draft wetlands map in ArcGIS® software – November 9, 2012
- Original QC'd Data – November 9, 2012
- QC'd geospatially-referenced relational database – November 9, 2012
- Final Technical Memorandum on 2012 Activity – November 9, 2012.

REFERENCES

ADEC and USACE (Alaska Department of Environmental Conservation/U. S. Army Corps of Engineers). 1999. Waterways Experiment Station Technical Report Number: WRP-DE-____1999. Operational draft guidebook for reference based assessment of the functions of precipitation-driven wetlands on discontinuous permafrost in Interior Alaska. Anchorage, AK.

AEA (Alaska Energy Authority). 2011. Pre-Application Document: Susitna-Watana Hydroelectric Project FERC Project No. 14241. December 2011. Prepared for the Federal Energy Regulatory Commission by the Alaska Energy Authority, Anchorage, Alaska.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. Northern Prairie Publication 0421, U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC. 131 pp.

Dahl, T.E., J. Dick, J. Swords and B.O. Wilen. 2009. Data collection requirements and procedures for mapping wetland, deepwater and related habitats of the united states. Division of Habitat and Resource Conservation, National Standards and Support Team, Madison, WI. 85 p. (http://www.fws.gov/wetlands/_documents/gNSDI/DataCollectionRequirementsProcedures.pdf)

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station. (http://el.erdc.usace.army.mil/wetlands/pdfs/wlman87.pdf)

Gracz, M. 2011. Cook Inlet Wetlands. Kenai Watershed Forum. (http://cookinletwetlands.info).

Hall, J. V., J. E. Powell, S. Carrack, T. Rockwell, G. Hollands, T. Walter, and J. White. 2003. Wetland functional assessment guidebook, operational draft guidebook for assessing the functions of slope/flat wetland complexes in the Cook Inlet Basin Ecoregion Alaska, using the HGM approach. ADEC and/ USACE Waterways Experiment Station Technical Report: WRP-DE-__. 160 pp.

National Wetlands Inventory Center. 1995. Photointerpretation conventions for the National Wetlands Inventory, U.S. Fish and Wildlife Service. St. Petersburg, FL. 60 pp.

McKendrick, J. D., W. Collins, D. Helm, J. McMullen, and J. Koranda. 1982. Susitna Hydroelectric Project environmental studies, Phase I final report, Subtask 7.12—Plant ecology studies. Report prepared by University of Alaska, Agricultural Experiment Station, Palmer, for Alaska Power Authority, Anchorage. 124 pp. + appendix. [APA Doc. No. 1321]

USACE (U.S. Army Corps of Engineers). 2007. Regional supplement to the corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0). ERDC/EL TR-07-24. September 2007. Wetlands Regulatory Assistance Program. U.S. Army Engineer Research and Development Center, Vicksburg, MS. 130 pp.

USFWS (U.S. Fish and Wildlife Service). 1984. Wetlands mapping [no title page]. Report section prepared for Harza–Ebasco Susitna Joint Venture, Anchorage. 29 pp. [APA Doc. No. 2376].

USGS and EPA (U. S. Geological Survey in cooperation with the U.S. Environmental Protection Agency). 1999. National Hydrography Dataset—Medium resolution. Reston, Virginia. U.S. Geological Survey. Online Linkage: http://nhd.usgs.gov. Accessed 15 June 2006.

Viereck, L. A., and C. T. Dyrness. 1980. A preliminary classification for the vegetation of Alaska. General Technical Report PNW-106, Portland, OR. U.S. Forest Service, Pacific Northwest Forest and Range Experiment Station, 38 pp.

Viereck, L. A.; Dyrness, C. T.; Batten, A. R.; Wenzlick, K. J. 1992. The Alaska vegetation classification. Gen. Tech. Rep. PNW-GTR-286. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 278 pp.

Steese Highway
Taylor Highway
Alaska Highway
Richardson Highway
Denali Highway
Project Area
Glenn Highway
Cantwell
Denali Highway
George Parks Highway
Denali Corridor
Deadman Mountain
Chulitna Corridor
Proposed Camp and Airstrip
Proposed Reservoir Study Area Boundary el. 2,200 ft.
Proposed Watana Reservoir el. 2000 ft.
Proposed Dam and Powerhouse
Gold Creek Corridor
Tsusena Creek
Deadman Creek
Devil Creek
Portage Creek
LEGEND:
Proposed Reservoir Study Area Boundary
Proposed Transmission and Road Corridor
Proposed Transmission Corridor
Proposed Road Corridor
Proposed Reservoir
General Land Status Description
Federal BLM
Private Land
State Lands
Existing Transmission Intertie
PLS Meridian
Alaska Railroad
N
0 2.5 5 10 Miles
ALASKA ENERGY AUTHORITY
Date: Dec. 2011
Scale: As Noted
State of Alaska
Susitna-Watana Hydroelectric Project Ferc No.14241
Figure 1-1
Susitna-Watana Project Area

Figure 2.

Extent of Vegetation Mapping and Current Aerial Photography for the Susitna-Watana Hydroelectric Project