

# Susitna-Watana Hydroelectric Project Document

## ARLIS Uniform Cover Page

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SUSITNA-WATANA HYDRO

# REPORT TO THE LEGISLATURE 2017

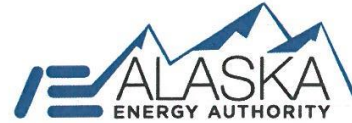


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# Susitna-Watana Hydro at a Glance

Licensing efforts started: 2011	Installed Capacity: 459 MW
Location: River mile 184, above Devils Canyon	Annual Energy: 2,800,000 MWh
Size: 705-foot-high dam	Licensing: Federal Energy Regulatory Commission (FERC)
Reservoir: ~42 miles long, average width of 1.25 miles	Anticipated Project Life: 100+ years, providing long-term, stable rates
Estimated Supply: About 50 percent of Railbelt electrical demand	Project closed down: 2016-2017
Estimated Cost: \$5.655 billion (2014\$)	



January 16, 2018

All work on the Susitna-Watana Hydroelectric Project had come to a full stop by the end of calendar year 2017. AEA closed out the project in a way that preserved the value of the State's investments and maintained the public value of the data collected through careful, thorough archiving. Additionally, FERC's updated Study Plan Determination (SPD) provides the State with certainty on what is needed to file a comprehensive FERC license application should the project be restarted. With its SPD, FERC reaffirmed the scope of studies necessary for determining impact assessment and developing protection, mitigation and enhancement measures, and FERC validated the quality and integrity of work completed to date. To the extent the project proposal does not change and the data gathered does not become stale, FERC ruled that AEA would not need to repeat the already-completed Integrated Licensing Process steps. If restarted, FERC may require additional scoping and/or modifications to the approved Study Plan.

- The completed engineering feasibility report contains information necessary for a license application. The report demonstrates that the project is technically feasible.
- The benefit cost and economic impact analysis concluded that if constructed, the project would generate billions of dollars in energy savings for the Railbelt and would provide a significant long term benefit to the economy.
- AEA investigated various financing models, some of which resulted in an estimated \$0.066/kWh 50-year average real price in 2014 dollars.
- AEA is approximately two thirds of the way through the Integrated Licensing Process. Had the project not been shut down following FERC's issuance of the updated SPD in June 2017, next steps for the project would have been implementation of the second study season, preparation of final reports and a license application.

The Susitna-Watana Hydro study effort has provided volumes of information and data about the Susitna basin, the indigenous cultures, fisheries, wildlife, and landscape. This vast, high quality data is of significant value to other resource development efforts and management of fish and wildlife resources. The information has been catalogued and stored online through AEA, ARLIS and GINA, and is publicly available.

Alaska Energy Authority is proud of the work done to date to advance the Susitna-Watana Hydroelectric Project. This effort yielded significant benefit in terms of the volume of knowledge produced and shared, and in terms of better understanding the potential of this resource to provide stable, low-cost power to Alaskans over the 100-year life of the project should it ever be restarted.

Janet Reiser  
Executive Director

[akenergyauthority.org](http://akenergyauthority.org)

813 West Northern Lights Boulevard Anchorage, Alaska 99503 T 907.771.3000 Toll Free (Alaska Only) 888.300.8534 F 907.771.3044



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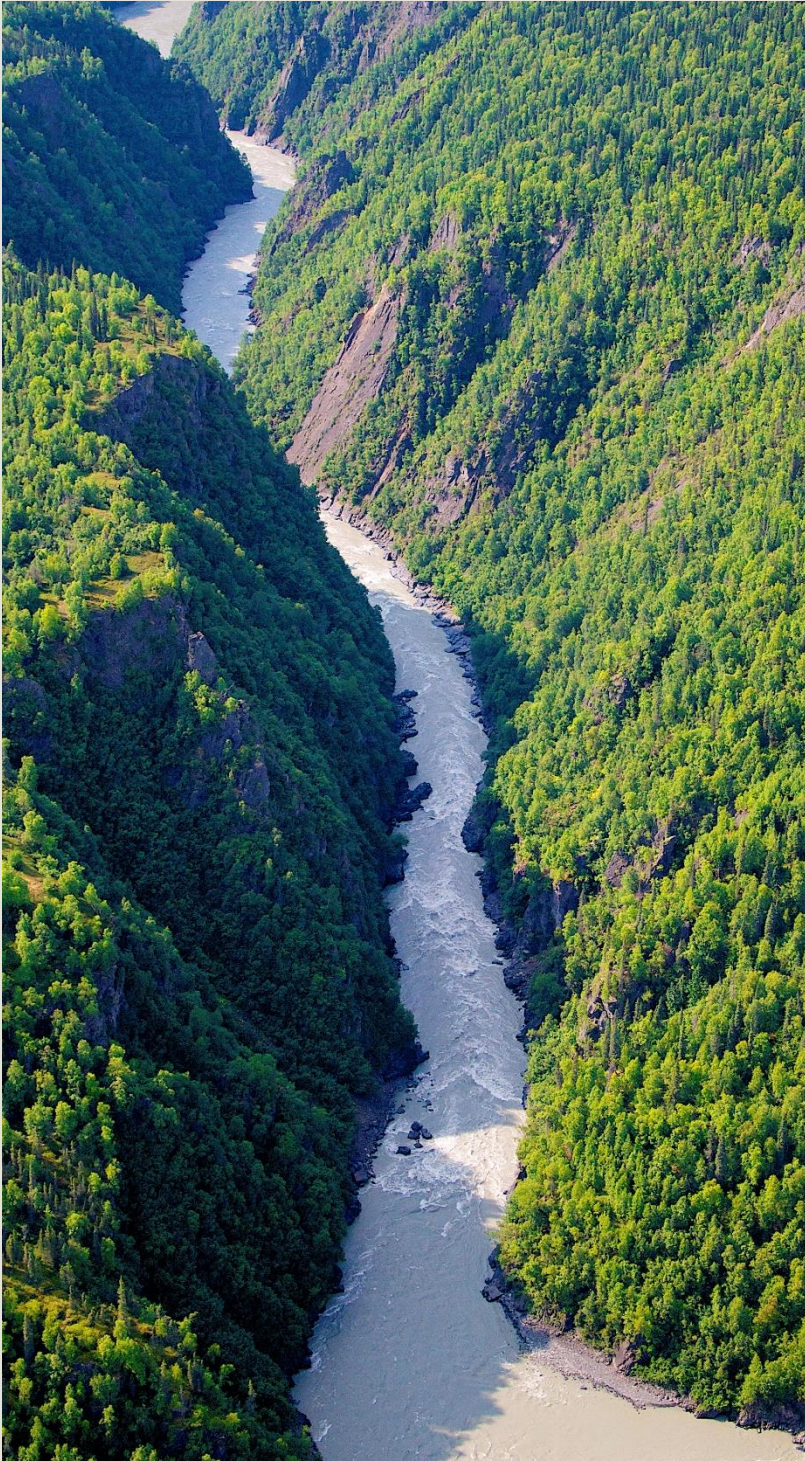
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# SUSITNA-WATANA HYDRO PROJECT STATUS SUMMARY



At the end of 2017 the project has been shut-down per Governor Walker's June 2016 directive.

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FERC issued its Study Plan Determination (SPD) June 22, 2017, followed by a licensing abeyance.

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The favorable FERC SPD, licensing abeyance, and careful cataloging of research, data, and reporting, will preserve the State's investment.

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The unobligated balance of project funds after June 30, 2018 is estimated to be approximately \$1.9 million.

# Project History

The hydroelectric potential of the Susitna River has been studied since the early 1950s. The first study was completed by the U.S. Bureau of Reclamation and subsequent reviews were completed by the U.S. Army Corps of Engineers in the 1970s. Many Alaskans remember the efforts of the Alaska Power Authority (APA)—now the Alaska Energy Authority—to develop a two-dam project on the Susitna River in the 1980s.

At that time, the APA submitted a license application to FERC in 1983 for the Watana-Devils Canyon Project on the Susitna River. The license application was withdrawn in 1986, largely due to the relatively low cost of gas-fired electricity in the Railbelt and the declining price of oil throughout the 1980s and its impact on the State budget. The APA concluded that the project's environmental impacts could be mitigated, but the project was not financially feasible at that time.

In 2011, recognizing the potential of a hydroelectric project on the Susitna River as a solution to the continued need for long-term, stable sources of energy, the Alaska Legislature authorized and funded the Alaska Energy Authority (AEA) to once again explore project feasibility and move through the FERC licensing process.

Over the last six years, AEA completed data gap analyses, building on the quality data from the 1980s, and completed several important milestones in the FERC Integrated Licensing Process. AEA's studies have shown the project is technically, and economically feasible. The 459-megawatt project would be capable of producing 2,800 gigawatt hours of energy annually, or about half of the Railbelt's energy needs.

With the updated FERC Study Plan Determination (SPD) issued in June 2017, the final licensing milestone in this 2011-2017 period was reached. State budget challenges prompted Governor Walker, in June 2016, to call for the project to be shut down, though in such a way as to ensure preservation of the State's investment made to-date. The updated SPD and licensing abeyance, followed by completion of final reporting and archiving of all project information, has done just that. All project activity has ceased.



# Engineering & Safety Milestones

In January 2015, AEA completed the Susitna-Watana Hydro [Engineering Feasibility Report](#), concluding the majority of engineering work necessary to file for a FERC hydropower license. This effort is the result of several years of collaboration among engineering contractors, dam-safety experts, utilities, FERC and AEA to design a safe and cost-effective project, as well as the results from: drilling and geotechnical investigations to test the quality of rock and measure bedrock for a solid foundation; studies and modeling for maximum probable flood and seismic events; and modeling to simulate the projected electrical generation to meet Railbelt demand.

The report is a critical milestone and concludes that the project is technically feasible. Noteworthy conclusions are summarized below.

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## SAFETY

Active faults have not been found within the dam site. Drilling conducted during the summer of 2014 confirmed that there is no “Watana lineament” along the Susitna River channel, supporting results from investigations conducted during the 1980s licensing effort. In addition, the Alaska Division of Geological and Geophysical Surveys (DGGs) conducted extensive geologic mapping in the Talkeetna Mountains and found no active faults directly in the project area. In addition, the current dam design, once constructed, would be able to withstand a 50-year flood without having to open spillway gates and would pass the 10,000-year flood with one spillway gate inoperable.

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## DESIGN

The structure is designed as a curved gravity dam, constructed using Roller Compacted Concrete (RCC) methodology with a straight gravity (thrust) section on each abutment. The height of the dam has been optimized to 705 feet above bedrock, lowered from approximately 730 feet. The nominal crest elevation is 2,065 feet and the crest length is approximately 2,810 feet. The reservoir would be approximately 42-miles long with an average width of 1.25 miles.

AEA worked with the Railbelt utilities to ensure that the generators are appropriately sized for Railbelt demand, modeling potential operations and integrating into the Railbelt system to ensure maximum long-term benefits to the Railbelt. As part of this effort, the overall nominal capacity rating of the three proposed turbines has been reduced to 459 megawatts while maintaining the same energy output of 2,800 gigawatt hours of annual power, or 50 percent of the Railbelt’s current demand.

The potential access and transmission routes were narrowed down to two alternative north-south routes that extend from the Denali Highway and the Gold Creek Route that runs east-west and would connect with the Alaska Railroad (unconnected to the state highway system).

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## COST

The anticipated project cost is estimated to be \$5.65 billion (2014\$ and based on oil prices at \$105 per barrel), including licensing, design and construction, but excluding escalation and interest during construction.

# Economic Milestones

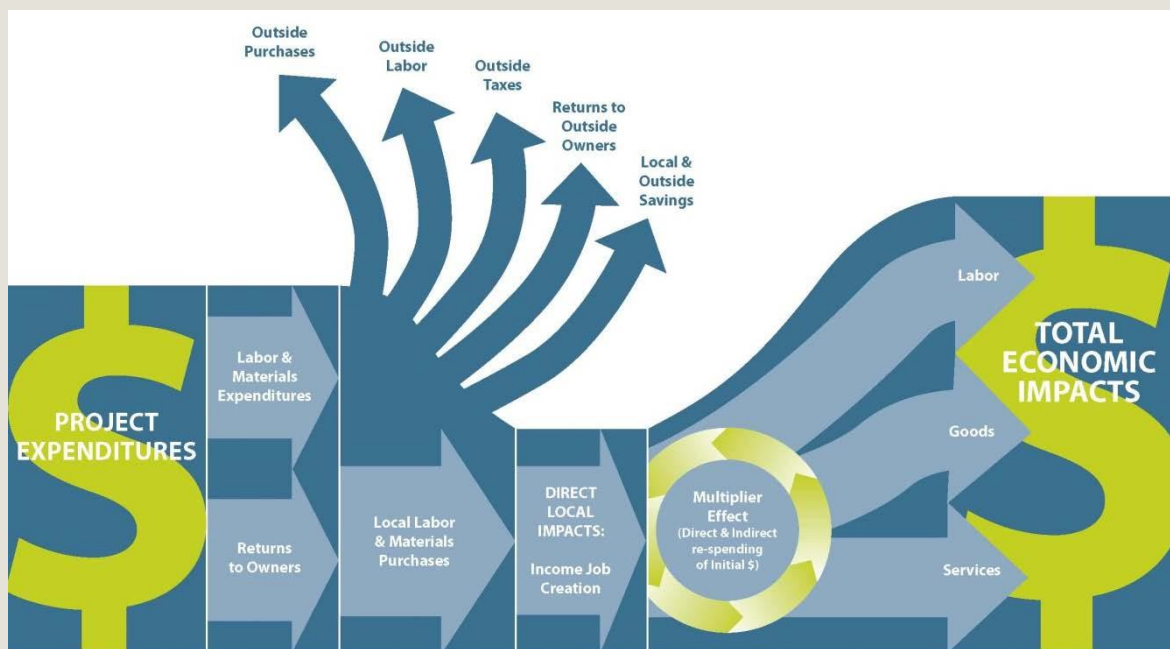
To understand the potential economic impacts from licensing, constructing and operating the Susitna-Watana Hydro and future workforce needs, AEA worked with Northern Economics on the [Benefit-Cost and Economic Impact Analysis](#). The report, published in March 2015, concluded that, if constructed, the project would generate billions of dollars in energy savings for the Railbelt and would be a significant, long-term benefit to the economy.

Based on the 2014 projection of natural gas prices, the analysis estimated a total energy savings of \$11.2 billion (2014\$) during the first 50 years of the project, an annual average of nearly \$225 million. When additional benefits of the dam were factored in, including the retirement of older generation facilities, reduction in greenhouse gas emissions and a reduction in the frequency of power outages, the energy cost savings surpassed \$14 billion. The benefit-cost ratio from the energy savings and retirement of older, unneeded generation facilities alone is 2.46.

Project Spending Category	Local Spending (million \$)	Multiplier Effects		
		Business Sales (million \$)	Jobs	Labor Income (million \$)
Licensing/Design; Other Program Costs	814.1	551.2	3,870	204.3
Construction	2,658.5	1,837.1	11,305	627.3
Operation	26.5	18.5	105	6.4

Table uses 2014 dollars

Construction of the Susitna-Watana Hydro Project would also provide thousands of direct and indirect jobs for many decades. The project would support an average of approximately 200 non-construction jobs annually during both pre-construction and construction phases as well as an annual construction workforce of approximately 1,200 people during construction of the project.



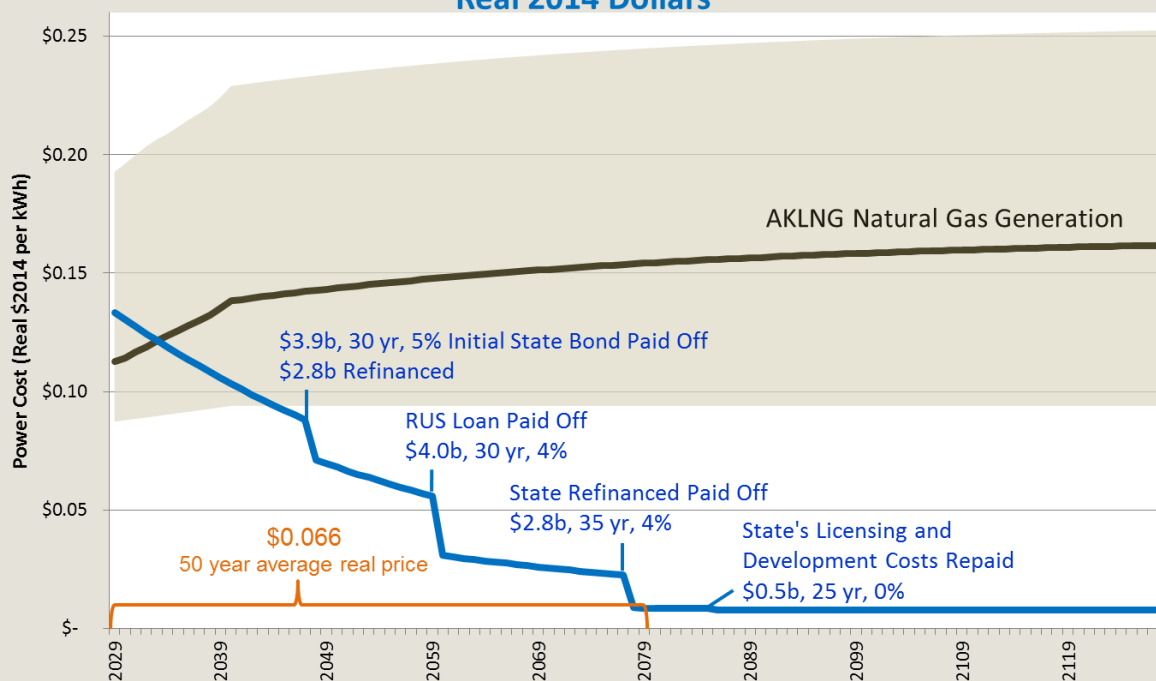
In addition, Susitna-Watana Hydro would generate more than \$800 million (2014\$) in local spending pre-construction and a projected \$2.6 billion (2014\$) in local spending during construction. During operation of the project, an estimated \$26.5 million (2014\$) would be spent annually for operations, boosting local and regional economies.

# Financing Milestones

In 2014, AEA worked with PFM, an international financial advisory firm, to develop financing models for Susitna-Watana Hydro. AEA received confirmation that Rural Utilities Service (RUS), a division of the U.S. Department of Agriculture that provides low-cost financing for infrastructure improvements, could provide financing for 50 percent of the project costs. AEA and PFM developed scenarios that included combinations of state investment, bonds and federal financing programs (RUS) and private financing. In developing the scenarios, AEA kept three goals in mind: 1) provide affordable power to Alaskans, 2) protect investments made by the State of Alaska and 3) investigate ways that the State would be repaid its initial investment.

The combination of AEA Revenue Bonds (30 years, 5% interest, refinanced) and RUS financing the remainder of construction (35 years, 4% interest) resulted in a \$0.066/kWh 50-year average real price (2014\$).

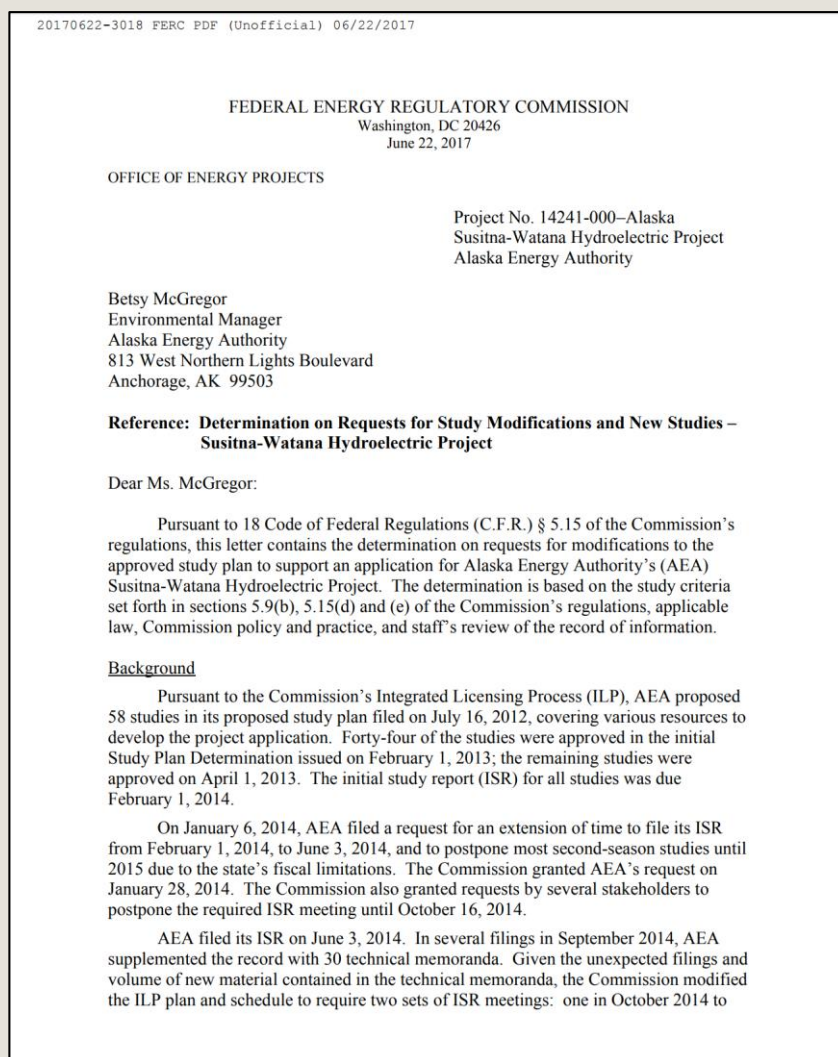
## Susitna-Watana vs. Natural Gas Power Costs Real 2014 Dollars



# Licensing Milestones & Timeline

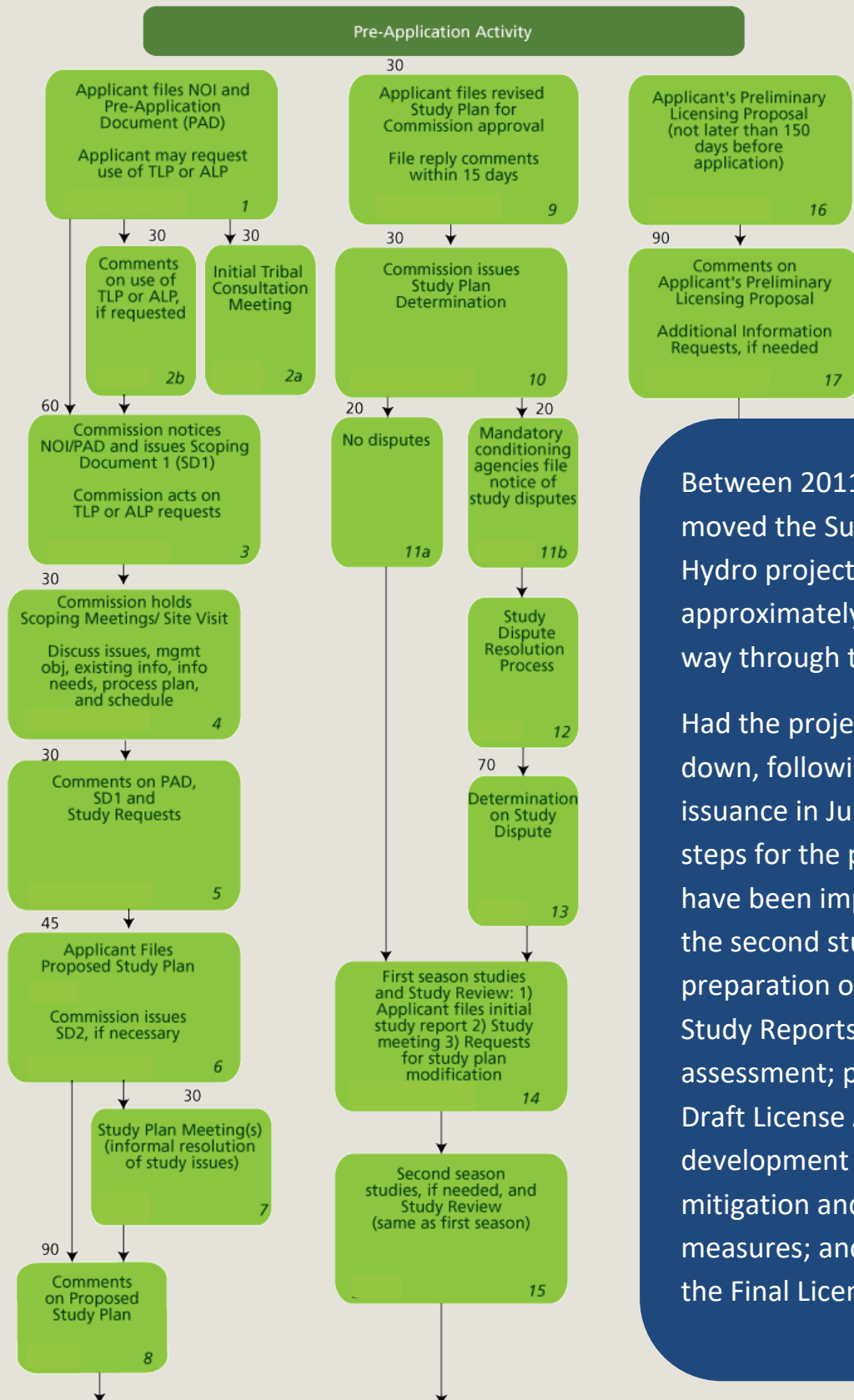
Following authorization in 2011 to advance the Susitna-Watana Hydroelectric Project, AEA pursued a FERC license application through the Integrated Licensing Process (ILP), FERC's default licensing process. The ILP is a front-loaded, iterative, milestone-driven process that provides a defined structure, including timeframes for licensing activities, study plan development, formal study plan determination, reporting on study implementation, stakeholder engagement and early National Environmental Policy Act (NEPA) scoping.

Final licensing activities between 2016 and 2017 effectively wrapped up the project as per Governor Walker's June 2016 directive. Following FERC's Study Plan Determination, issued in June 2017, the project was put into abeyance, allowing the State to preserve the investment already made, and no further movement toward licensing is planned at this time.



Page 1 of the 254 page FERC Study Plan Determination.  
The full document is available at [www.ferc.gov](http://www.ferc.gov).

# FERC Integrated Licensing Process (ILP)



Between 2011 and 2017 AEA moved the Susitna-Watana Hydro project through step 14, approximately two-thirds of the way through the ILP process.

Had the project not been shut down, following the SPD issuance in June 2017, next steps for the project would have been implementation of the second study season; preparation of the Updated Study Reports; impact assessment; preparation of the Draft License Application; development of protection, mitigation and enhancement measures; and preparation of the Final License Application.

# Susitna-Watana Licensing Activities 2011-2017

## 2011

AEA reviewed existing information, identified potential natural resource issues, performed data gap analyses and held preliminary discussions with agencies, Alaska Native entities and other stakeholders.

In October, AEA filed the Preliminary Permit Application (PPA) with FERC, which provided AEA priority status for licensing the project. The Integrated Licensing Process (ILP) was initiated with AEA filing the Notice of Intent (NOI) and the Preliminary Application Document (PAD) at the end of the year.

## 2012

Public scoping meetings were held in Anchorage, Wasilla, Glennallen, Talkeetna, Cantwell and Fairbanks.

AEA jumpstarted the licensing process by initiating 18 studies designed to gather critical environmental data, and to help inform the scope and methods of the proposed licensing studies.

A significant amount of the 2012 licensing effort was spent developing the study plan with stakeholders for FERC's approval. The study plan is a key part of the licensing process and outlines the studies that will be conducted to provide a better understanding of the Susitna Basin to assess potential impacts and develop protection, mitigation and enhancement measures.

AEA performed extensive public outreach with resource agencies, Alaska Native entities, non-governmental organizations and other stakeholders, holding 34 days of technical meetings to develop the study plan.

The Proposed Study Plan, consisting of 58 studies, was submitted to FERC in July. Following further collaboration with stakeholders, AEA submitted an Interim Revised Study Plan and finally, in December, a Revised Study Plan to FERC for approval.

## 2013

With a Study Plan Determination (SPD), FERC approved the Susitna-Watana Hydro Environmental Study Plan, which included 58 studies in resource areas such as geology and soils, water quality, geomorphology, groundwater, ice processes, instream flow, fish and aquatic, wildlife, botany, recreation, cultural, subsistence, socioeconomics, transportation, and safety. AEA consulted with stakeholders and prepared and provided all supplemental information as ordered by FERC in its SPD.

AEA filed 29 technical reports summarizing results from the 2012 studies and commenced the implementation of the Susitna-Watana Hydro Study Plan, an unprecedented environmental study of the Susitna Basin, with an estimated 350 biologists, engineers, hydrologists, archeologists, and scientists of many other disciplines in the field gathering data.

AEA held 22 days of technical meetings from June through December 2013, keeping licensing participants up-to-date on the results of the 2012 studies and the licensing studies as they were being implemented.

Licensing activities and all documents were made publicly available via the project website and more than 100 public meetings and presentations about Susitna-Watana Hydro were held, demonstrating the commitment of an open, accurate and collaborative approach to managing stakeholder expectations.

## 2014

An important milestone in the FERC ILP is the Initial Study Report (ISR), which serves as a progress report on the implementation of each of the 58 studies and accounts for any variances from the approved plan; describes plans and schedule for the second year of study; and describes AEA's proposed modifications of the FERC-approved plan. As part of the Initial Study Report process, a series of meetings are held to discuss the findings and requested modifications, by both AEA and other stakeholders, in order to lead to an updated Study Plan Determination by FERC.

However, budgetary constraints precluded AEA from being able to provide a schedule for completing the second year of study and finalizing AEA's proposed modifications to the Study Plan. Accordingly, AEA adhered to the existing FERC ILP schedule at the time, and filed a Draft ISR in February, which described the 2013 implementation of the FERC-approved Study Plan and any variances and presented results. Once the FY15 capital budget was approved, AEA was able to prepare and file the 8,600-page Final ISR in June, which included AEA's proposed study modifications and plans to complete the second year of study for each of the 58 studies, per the FERC regulations. In October, AEA held 6 days of ISR Meetings with stakeholders to review the ISR.

AEA reached a critical land-access agreement in spring 2014 with Cook Inlet Region Inc. and six Cook Inlet village corporations (CIRWG) to allow AEA access to land in order to further Susitna-Watana Hydro environmental studies.

2014 marked another year of intensive and specific research involving more than 200 field scientists. Data collection efforts were prioritized based on the level of funding received, relative importance of the study, sequencing of interrelated studies, and need for continuous data collection with the goals of preserving the value of the work completed to date and maintaining as tight a licensing timeline as possible. Prior to initiating field work, AEA held 12 days of technical meetings with stakeholders to describe AEA's plan for 2014 activities and to consult with resource agencies on AEA's proposed modifications to the FERC-approved Study Plan.

By the end of the 2014 season, data collection was completed for 13 of the FERC-approved studies. AEA filed 33 technical memoranda describing 2014 study implementation, proposed study modifications for consideration in FERC's updated Study Plan Determination, or additional information as requested during the October ISR Meetings.

In addition to technical meetings, AEA presented information gathered as part of the environmental field effort and provided updates on the licensing status during regular meetings with CIRWG; public meetings in the communities of Wasilla, Fairbanks, Glennallen, Kenai, Anchorage and Talkeetna; and to numerous professional groups, associations and NGOs.

## 2015

Administrative Order 271, issued by Gov. Walker in December 2014, halted discretionary spending on the Susitna-Watana Hydro Project, and to comply, AEA essentially pressed pause in the midst of the Initial Study Report process in early 2015. FERC granted AEA an abeyance from the licensing process. AEA received clarification on discretionary spending from the Office of Management and Budget director in July 2015 and was notified that the project was to use existing funds to advance to the next licensing milestone, the FERC Study Plan Determination.

In August, AEA filed a request with FERC to lift the licensing abeyance and to submit additional Initial Study Reports covering all work completed to-date for consideration in FERC's updated Study Plan Determination, and proposed a new schedule. AEA's plan was supported by members of CIRWG, Railbelt utilities, the Alaska Department of Fish and Game, Alaska Department of Natural Resources, and the Alaska Ratepayers.

Following public comments, FERC ultimately ordered that the vast amount of material filed from 2013 through 2015 in the form of numerous technical memoranda and Initial Study Reports met the ILP requirements for the Initial Study Report and that AEA satisfactorily provided a roadmap linking the reports for each study; and therefore, the reports would collectively be considered the Initial Study Report for purposes of the ILP and FERC's Study Plan Determination.

The 2015 study implementation was limited to finishing studies near completion; continuing surveys of collared moose, caribou and other animals; completing analysis of data already gathered; and removing field equipment installations where possible.

At the end of 2015, AEA filed more than 8,000 pages of reports summarizing implementation of the FERC-approved Study Plan during 2014 and 2015 in the form of Study Completion Reports for studies that had been completed or 2014-2015 Study Implementation Reports for incomplete studies. AEA also filed an Initial Study Report for each of the 58 studies, summarizing the status of implementation, all variances and AEA's proposed modifications to the Study Plan, and referencing/linking all related documents.

## 2016

The project emphasis in 2016 was to advance the licensing process to FERC's updated Study Plan Determination and shut down the project while preserving the State's investment thus far.

In March, AEA held 5 days of Initial Study Report meetings with FERC and stakeholders, reviewing all of the technical memoranda and Initial Study Reports filed by AEA between 2013 and 2015 for each of the 58 studies, describing implementation of the FERC-approved Study Plan, any variances, AEA's proposed modifications, and steps to complete each study.

In the next step of the ILP, stakeholders may file with FERC comments on the Initial Study Reports and can make recommendations for modifications to the FERC-approved Study Plan or request new studies. In June, nearly 1,600 pages of comments and recommendations for modifications to the Study Plan or requests for new studies were filed with FERC. Of note, the State of Alaska resource agencies supported the FERC-approved Study Plan, AEA's implementation of the Study Plan and AEA's proposed modifications to the Study Plan.

AEA responded to all commenters and on October 24, 2016 filed over 1,000 pages refuting nearly all of the Study Plan modifications and new study requests. The vast majority of the comments were either not appropriate at the ISR stage of the ILP or the requests did not meet the regulatory criteria for modification to the existing Study Plan or for new studies. For example, some modification requests were simply to complete the FERC-approved Study Plan. Other recommendations had been previously submitted to FERC during the 2012 study planning phase and FERC had already ruled in its 2013 determination that the requests were beyond what is necessary to evaluate project effects and develop FERC license conditions. Some recommended modifications would be extensive and costly, such as expanding studies downstream to Cook Inlet, extending the number of years of study, and modeling climate change to be considered as a future without-project scenario for impact assessment. The estimated cost of implementing all of the modifications and new studies requested by stakeholders would add between \$260 million and \$370 million to the cost of completing the environmental studies in the ILP process. AEA presented substantial evidence that these Study Plan modifications were unnecessary to support a license application.

Data collection in 2016 was limited to ice thickness and water surface elevation to fill data gaps for the ice processes model; final aerial surveys of collared moose, caribou and ptarmigan and aquatic furbearers to finish those nearly complete studies; and final data acquisition and maintenance/removal of hydrology equipment installations to support project shutdown. Analysis and final reporting of data already gathered continued during 2016.

All field equipment installations were removed from the field or transferred to other State agencies by October 2016. Removal of equipment adhered to all relevant permits, and where applicable, sites were restored to pre-installation conditions. Permit close-out reports were submitted for 16 of the 23 permits.

## 2017

FERC reviewed the ISR, stakeholders' comments to the ISR and AEA's responses and issued an updated Study Plan Determination (SPD) on June 22, 2017. FERC overwhelmingly endorsed the previously approved Study Plan, with minor modifications to 16 of the 58 studies, many of which were proposed by AEA. FERC did not adopt any of the study modifications as requested by stakeholders and rejected each of the four new study requests. Of note, FERC rejected nearly all of the recommendations to expand numerous studies farther downstream into the lower river. FERC rejected recommendations to add more years of data collection, agreeing with AEA's analysis showing that 2012 - 2015 environmental conditions were within the normal range of environmental variation. FERC also rejected recommendations for a comprehensive climate change study of the entire Susitna basin, endorsing AEA's proposed approach that capitalizes on FERC's conventional hydrological approach, the hydrologic climate change study conducted by DGGs for AEA in the upper Susitna basin above the proposed dam site, and an assessment of future trends based on planned sensitivity analyses and common sense.

By the end of calendar year 2017, all work on the Susitna-Watana Hydro Project had come to a full stop. Permit close-out reports were submitted for all field permits. All equipment was inventoried and stored at the AEA warehouse or transferred to other State agencies. All contracts were terminated. To preserve the value of the State's investment and provide the data in the most usable format for future licensing, as well as for resource managers, researchers, developers of other projects, and the public, analysis and final reporting of data already gathered was completed. Final reporting was completed for 8 FERC-approved wildlife and botanical studies, including those conducted by ADF&G (i.e., moose, caribou, and ptarmigan). Calibration and validation reports were prepared for each of the riverine physical process models, as well as a model integration report, to support the feasibility of the approach in the FERC-approved Study Plan for assessing project impacts and developing protection, mitigation and enhancement measures. All research and data was catalogued and stored in publicly accessible databases on AEA's project website, ARLIS and GINA.

FERC's SPD provides the State with certainty on what is needed to file a defensible FERC license application should the project be restarted. With its SPD, FERC reaffirmed the scope of studies necessary for determining impact assessment and developing protection, mitigation and enhancement measures, and FERC validated the quality and integrity of work completed to date.

As requested by Governor Walker in his August 4, 2016 letter to FERC, the licensing process was put into abeyance following FERC's SPD. To restart the project, FERC will need a firm commitment from the State to pursue a license. Of the 58 studies, 19 have been completed as required by FERC and significant progress has been made in completing the remaining 39 studies. To the extent the project proposal does not change and the data gathered does not become stale, FERC ruled that AEA would not need to repeat the already-completed ILP steps. If restarted, FERC may require additional scoping and/or modifications to the approved Study Plan.

# Summary of Project Funding

Below is a summary of project funding as of January 9, 2018 (\$ in thousands)

Authorized Funds - State of Alaska Appropriations		
	FY2009	\$1,528.1
	FY2011	\$9,644.7
	FY2012	\$65,700.0
	FY2014	\$95,200.0
	FY2015	\$20,000.0
Total Authorized Funds - State of Alaska Appropriations		\$192,072.8
Expenditures to Date, Encumbered and Committed Funds		(\$190,179.5)
<b>Estimated Balance of Authorized Funds</b>		<b>\$1,893.3</b>



Information about the Susitna-Watana Hydroelectric Project is archived and publicly available via the following:

[www.susitna-watanahydro.org](http://www.susitna-watanahydro.org)

[www.gis.suhydro.org](http://www.gis.suhydro.org)

[www.arlis.org/susitnadocfinder/](http://www.arlis.org/susitnadocfinder/)

This publication of the Susitna-Watana Hydroelectric Project status and financial condition is submitted by AEA in accordance to AS 44.83.085. This document was designed and created in-house and distributed in electronic format.