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Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Health Impact Assessment Study
Study Plan Section 15.8

Final Study Plan

Alaska Energy Authority

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

July 2013

15.8. Health Impact Assessment Study

On December 14, 2012, Alaska Energy Authority (AEA) filed with the Federal Energy Regulatory Commission (FERC or Commission) its Revised Study Plan (RSP), which included 58 individual study plans (AEA 2012). Section 15.8 of the RSP described the Health Impact Assessment Study. This study focuses on analyzing the potential positive and negative impacts of programs, projects, and policies on the health of residents in impacted communities. RSP 15.8 provided goals, objectives, and proposed methods for data collection regarding health impacts.

On February 1, 2013, FERC staff issued its study plan determination (February 1 SPD) for 44 of the 58 studies, approving 31 studies as filed and 13 with modifications. RSP Section 15.8 was one of the 31 studies approved with no modifications. As such, in finalizing and issuing Final Study Plan Section 15.8, AEA has made no modifications to this study from its Revised Study Plan.

15.8.1. General Description of the Proposed Study

15.8.1.1. Study Goals and Objectives

Health Impact Assessment (HIA) is a structured planning and decision-making process for analyzing the potential positive and negative impacts of programs, projects, and policies on the health of residents in impacted communities. In particular, four aspects of the Project may impact community health:

- The large size of this Project will require a large influx of construction personnel over several seasons which could impact the residents in various Railbelt communities.
- The development of the Project could lead to increased rail traffic and possibly additional traffic on the Parks and Denali Highways, potentially impacting communities and individuals using these transportation resources.
- It is possible that the creation of a large reservoir on the Upper Susitna River could produce conditions that could lead to changes in subsistence harvest locations or quantities, possibly leading to changes in nutritional uptake of subsistence users. Also a new reservoir could increase the bioaccumulation of naturally occurring mercury at a level that potentially affects public health. If this scenario occurs, it could potentially lead to consequences for local individuals, and even communities harvesting (and ingesting) aquatic resources in the Susitna River.
- The Project could lead to potential emission reductions from Railbelt fossil-fuel utility plants if the Project is operating and this could potentially lead to a reduction in emissions that affect public health in Railbelt communities.

Potential health considerations for construction and operational staff are not typically evaluated in HIA as they will be addressed in the occupational medicine and safety component of the various plans and specifications for construction activities and operational manuals for the Project.

The comprehensive HIA will use the methods and guidelines in the Alaska Department of Health and Human Service's (DHSS's) "Technical Guidance for HIA in Alaska," July 2011 (www.epi.hss.state.ak.us/hia/AlaskaHIAToolkit.pdf).

As part of the goals and objectives of an HIA the following activities are important to undertake:

- Identify potentially affected communities (PACs) and establish a community engagement plan.
- Through a review of the FERC scoping meetings and ongoing community engagement, identify public issues and concerns about how community health might be affected during construction and operation of the Project.
- Collect baseline health data at the state level, borough, or census area level, tribal level, and at the potentially affected community level, as possible.
- Identify data gaps and determine the most efficient method to fill those gaps, through community consultation and coordination with other studies, such as subsistence (Section 14.5), socioeconomics (Sections 15.5 and 15.6), and recreation (Section 12.5).
- Evaluate the baseline data against the Project description to initially determine the nature and extent of potential impact pathways, both positive and negative.
- Prepare an HIA baseline data report document which is transparent, scientifically rigorous, and understandable to the public.

15.8.2. Existing Information and Need for Additional Information

A variety of existing information sources is available and potentially useful to the HIA analysis. These information sources include reports from various Alaska state agencies including:

- Alaska Department of Health and Social Services
  - Bureau of Vital Statistics
  - Alaska Behavioral Risk Factor Surveillance Survey (BRFSS)
  - Youth Risk Behavior Study (YRBS)
  - Section of Epidemiology bulletins
  - Alaska Trauma Registry (ATR)
  - Cancer Registry
- State of Alaska Department of Labor and Work Force Development
  - Employment reports
- Alaska Department of Transportation and Public Facilities
  - Highway traffic statistics, particularly on large loads vehicles
  - Alaska State Trooper annual reports
- Alaska Department of Fish & Game
  - Harvest studies
  - Community Information System

The Alaska Native Tribal Health Consortium (ANTHC) prepares health status reports on a statewide and regional basis. The AEA HIA team will use these reports as baseline data:

- Alaska Native Health Status Report, August 2009
- Regional Health Profile for Interior Alaska, July 2011
- Regional Health Profile for Anchorage and Matanuska-Susitna, December 2011

In addition, pertinent reports from the U.S. Centers for Disease Control and Prevention and annual reports, such as County Health Rankings, prepared by the University of Wisconsin, are important resources that will be reviewed.

Review of the above data sources allows identification of data gaps which require additional information.

15.8.3. Study Area

The proposed HIA study area includes those communities potentially affected by construction and operation of the Project, such as Cantwell and communities along the Alaska Railroad corridor, as well as those communities further away but potentially affected by the movement of workers, materials, and supplies by using the criteria available in the Technical Guidance for HIA in Alaska (DHSS 2011). The study would also include communities identified in the Regional Economic and Air Quality studies that would experience changes in emissions resulting from reductions in fossil-fuel utility plant outputs as a result of the Project. In addition to the communities along transportation corridors and those identified in the Regional Economic and Air Quality studies, the HIA study will initially consider all the communities being studied in the Subsistence Study. Together all these communities have been initially identified as PACs for the Project analysis to help facilitate collecting baseline information that could be used in the analysis of Project effects. Some sample analysis factors that could be used to evaluate a communities possible nexus to the Project effects the following criteria are examined:

- Close geographic proximity to the Project,
- High likelihood for worker influx,
- Intense work force recruitment potential,
- High likelihood for change in key subsistence resources,
- High likelihood for change in transportation infrastructure,
- Potential for economic change including regional staging centers, and
- Existing high level of exposure to an environmental hazard that would be potentially exacerbated or improved by Project development.

15.8.4. Study Methods

The HIA will be divided into the following phases to systematically address data gaps identified during the overview process.

15.8.4.1. Project Overview and Issues Summary

The Project overview process will:

- develop Project-specific criteria for establishing the PAC's analysis framework (PACs for health may not be the same as for other social sciences and must be established);

- coordinate through community engagement, other social study areas, and other AEA licensing participant engagement programs to gather enough of the appropriate information to meet HIA needs; and,
- identify potential health concerns and issues related to the Project.

The result of this effort will be a "Project Overview and Issues Summary" that will be included in the Initial Study Report and will include a set of the geographical, time scale, and population boundaries of the assessment. The report will generally follow the overall strategies and methodologies presented in the "Technical Guidance for HIA in Alaska." For example, the State of Alaska HIA Program has identified the following eight health effect categories (HECs) that should be used to categorize the issues and concerns:

1. Social Determinants of Health (SDH),
2. Accidents and Injuries,
3. Exposure to Potentially Hazardous Materials,
4. Food, Nutrition, and Subsistence Activity,
5. Infectious Disease,
6. Water and Sanitation,
7. Non-communicable and Chronic Diseases, and
8. Health Services Infrastructure and Capacity.

These HECs are fully described in the "Technical Guidance for HIA in Alaska." In addition, there may be community-level health concerns that are expressed holistically and do not fit this analytic structure. In addition, positive health benefits of a new renewable energy resource to the region will be identified. An HIA, however, cannot address every conceivable health effect or effects that are primarily nuisance impacts and rarely observed. Instead, the initial Project review process highlights health effects that have the possibility of producing intense impacts with persistent duration and broad geographical scope that are highly likely to occur. There must also be a clearly defined causal link between the Project and the anticipated health effect.

15.8.4.2. Phase 2: Baseline Data Collection

After the Project overview process is complete, it will be necessary to perform an analysis of available federal/state/regional/tribal/community/household level health data starting in the second half of 2013 and proceeding through 2014. Data collected by other Project studies will be included where such studies will produce baseline data that may be useful to the HIA. For example, AEA will use information from the Air Quality study concerning existing and future air quality levels, and from the socioeconomic studies for population projections and household characteristics, which have been shown to be key determinants of health. Coordination between studies will avoid unnecessary duplication of effort and community 'survey fatigue.'

Subsistence issues and existing available community / household consumption and nutritional data are often critical for local communities. AEA HIA team will integrate some efforts with the Subsistence Resources Study (Section 14.5) to address how subsistence issues interact with the proposed Project location, size, linear features, and PACs. Community input and baseline harvest data and traditional and local knowledge (TLK) documented in the Subsistence Resources Study (Section 14.5) will be used to identify those subsistence foods and practices that are vital to residents of the area. This information will be used to identify potential impacts to the quality

and quantity of, and access to, subsistence resources. Direct, indirect, and cumulative impacts to subsistence will be considered throughout HIA study.

Field studies are designed to fill data gaps. For example, 1) AEA will document community food sources in PACs during/in conjunction with the subsistence household harvest surveys 2) the AEA HIA practitioners will work alongside the AEA Subsistence Resource Study (Section 14.5) practitioners to document traditional and local knowledge regarding health in the subsistence TLK workshops. The AEA HIA team may conduct follow-up interviews regarding health with key respondents identified during TLK workshops and make observations on critical community services, such as water, sanitation, and health care facilities, including medical emergency services capabilities. Understanding capabilities and functionality of these services provides input to determining potential effects related to influx, construction activities, and roadway traffic. Field studies and community visits will be coordinated with Subsistence Resource Study efforts (Section 14.5) to provide the information in an efficient manner.

The Subsistence Resources Study (Section 14.5) will document TLK. The AEA HIA team will conduct follow-up interviews regarding health with key respondents identified during TLK workshops.

The AEA HIA team will perform data collection tasks within the "subsistence resource study communities" according to identified data gaps. The Subsistence Resources Study (Section 14.5) includes a list of study communities designed to adequately address potential impacts to those who use the study area for subsistence activities. This includes communities that are located outside the study area but have documented use within the study area. The Subsistence Resources Study (Section 14.5) developed these criteria for inclusion as a study community:

- the community is located within the Susitna River watershed;
- the community is located outside of the Susitna River watershed but has previously documented subsistence use areas that extend into the watershed; or
- the community is one of the communities preliminarily identified by ADF&G as needing updated harvest information.

Based on the above criteria, the Subsistence Resources Study (Section 14.5) has identified 37 study communities whose subsistence uses could potentially be affected by the proposed Project. The HIA study will work through the subsistence data collection efforts to gather information from a food security/nutrition perspective. As part of the subsistence household surveys, ADF&G survey tools include a food security/nutrition section to help identify potential nutrition related considerations most of the communities being surveyed. The survey tool to be administered can be found in the Draft Household Harvest Survey Instrument of the Subsistence Resource study plan. Depending on results from the baseline studies in 2013, some additional communities that have not been surveyed specifically for the food security/nutrition aspects may need to be surveyed in 2014. If that is the case, then the ISR will include the rationale and methods to gather additional information to supplement the baseline study information and this will be discussed with Licensing Participants in 2013-2014 TWG meetings.

The output of the baseline data review, data gaps analysis, and field studies will be a "Baseline Community Health Data Assessment" chapter in the HIA which will be included in the Updated Study Report.

15.8.4.3. Phase 3: Identification of Potential Impact Mechanisms and Effects

The specific health impacts for the Project will be identified when all components of the Project have been defined as AEAs proposal in its License Application to FERC. The HIA analysis in 2013 and 2014 therefore will not necessarily serve as a final HIA for the Project; however the analysis, as needed, can be updated and included in the FERC License Application once the AEA Project proposal is finalized. For this study, the AEA HIA team will rate and rank the health impacts using a semi-quantitative model described in detail in the HIA Toolkit. The purpose of rating and ranking impacts is to enable interested parties to construct a health impact management framework.

The HIA will consider impacts that have beneficial or detrimental consequences to communities or individuals. Each health impact has several different dimensions, listed below.

- Significance
- Nature
- Timing and duration
- Extent
- Magnitude (intensity)
- Frequency

The HIA process may include the following components:

- In-depth review of available state, regional, tribal, and local health data;
- Comparison of study area data to state and regional health data;
- Analysis of special at-risk subpopulations (such as children under the age of five years, pregnant women, elderly, or other previously defined vulnerable groups);
- Consideration of key Project-specific toxicology issues, e.g., mercury loading associated with reservoir development and impacts on subsistence resources;
- Field survey visit and consultation with local health representatives, particularly from tribal organizations, if present;
- Seasonality considerations, i.e., summer versus winter differences in subsistence practices, water use, and associated disease-transmission dynamics;
- Variability of existing health care infrastructure across different affected areas;
- Coordination and alignment with existing State disease-control programs and strategies (e.g., TB, HIV/AIDS, hypertension, diabetes, substance abuse, etc.); and
- Detailed consideration of impacts to tribal peoples through the presentation of tribal health data and inclusion of the results of tribal health consultations in the HIA.

The information developed in this study is intended to be sufficient to be able to prepare a Health Management Plan (HMP), if needed in the licensing process, which may include:

- Types of health protection processes that may be needed;
- Traditional knowledge, perspectives, and activities that may represent uniquely tribal approaches to human wellness;
- Strategies available to lessen impacts and the timescales relating to health impacts;
- Temporary measures which can be put in place; and

- Local capacity to put the proposed strategies into practice.

15.8.4.4. Phase 4: HIA Document Preparation

An HIA document, with technical appendices as needed, written in accordance with the DHHS HIA guidelines will be issued in the Updated Study Report. The HIA will be updated to include relevant results from 2014 field studies as reported in the Initial Study Reports.

15.8.5. Consistency with Generally Accepted Scientific Practice

The HIA will follow the ADHHS technical guidance for HIAs (ADHSS 2011). These guidelines are the standard to which HIA is performed in the State of Alaska.

15.8.6. Schedule

An Initial Study Report for the HIA will be completed by Q1 2014. This initial report will document the project overview, issues summary, and baseline data collected. Results from other studies (Subsistence (Section 14.5), Air Quality (Section 15.9), Social Conditions and Public Goods and Services (Section 15.6) and any additional information and analysis conducted in 2014 will be summarized in the Updated Study Report in Q1 2015 (see Table 15.8-1).

15.8.7. Relationship with Other Studies

The HIA is dependent upon results from several other studies and will require input from several other studies as shown in Figures 15.8-1 through 15.8-5, below. As shown in Figure 15.8-1, the HIA HEC3 Exposure to Potentially Hazardous Materials will use baseline data collected via the Mercury Assessment and potential for Bioaccumulation Study (Section 5.7) to establish a baseline of current levels of contaminants of human health concern present in fish and in water. These data will be compared to human health risk based screening levels. Similarly, the HIA will use data generated by the modeling exercise portion of these studies in order to assess potential project impacts on contaminant levels in fish and water. Mercury will be a specific area of focus for this HEC given its potential for: adverse effects on human health; its bioaccumulative properties; and given that reservoir construction can elevate levels of mercury in fish through the release of natural and anthropogenic-sourced inorganic mercury from flooded vegetation and soils.

As shown in Figure 15.8-2, the HIA HEC3 Exposure to Potentially Hazardous Materials will also utilize baseline emissions data collected by the Air Quality and Transportation Studies as a resource for determining baseline air quality in the PACs. Data generated by the modeling of future air emissions portion of the by Air Quality Study will inform the assessment of Project driven risks to human health due to potential change in air quality.

As shown in Figure 15.8-3, the HIA HEC2 Accidents and Injuries will utilize traffic levels data (Road, Air, Rail, River) generated by the Transportation Study as a resource for establishing a traffic safety baseline in the PACs. Data generated by the traffic forecasting portion of the study will inform the assessment of project driven accidents and injury risk posed by changes in baseline traffic.

As shown in Figure 15.8-4, the HIA HEC1 Social Determinants of Health will use the Social Goods and Public Services Study as a resource for establishing baseline social determinants of

health. Data regarding: hiring practices, cultural change; housing availability/inflation; economy, employment, and education; generated by the Engineering and Social Goods and Public Services Studies will be used inform the assessment of potential project driven changes in SDH.

As shown in Figure 15.8-5, the HIA HEC4 Food, Nutrition, and Subsistence section will use the Subsistence Resources Study to identify subsistence resources currently used in project area and as a resource to evaluate potential project impacts on identified subsistence uses in the PACs.

15.8.8. Level of Effort and Cost

Based on past HIA experiences in Alaska, the HIA study program is expected to cost approximately $200,000.

15.8.9. Literature Cited

AEA 2011. Railbelt Large Hydroelectric, Presentation to the Alaska Senate Resources Committee and the House Energy Committee, by the Alaska Energy Authority, January 25, 2011.

DHSS 2011. Technical Guidance for Health Impact Assessment in Alaska, Alaska Department of Health and Human Services, Section of Epidemiology, Health Impact Assessment Program, July 2011.

15.8.10. Tables

Table 15.8-1. Schedule for implementation of the HIA.

Activity	2012				2013				2014				2015
	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q
Project Overview and Issues Summary					——	——							
Baseline Data Collection					——	——	——	——	——	-----			
Initial Study Report								——	Δ				
Potential Impact Mechanisms & Effects									——	——	——		
Updated Study Report												——	▲

Legend:

—— Planned Activity
----- Follow up activity (as needed)
Δ Initial Study Report
▲ Updated Study Report

15.8.11. Figures

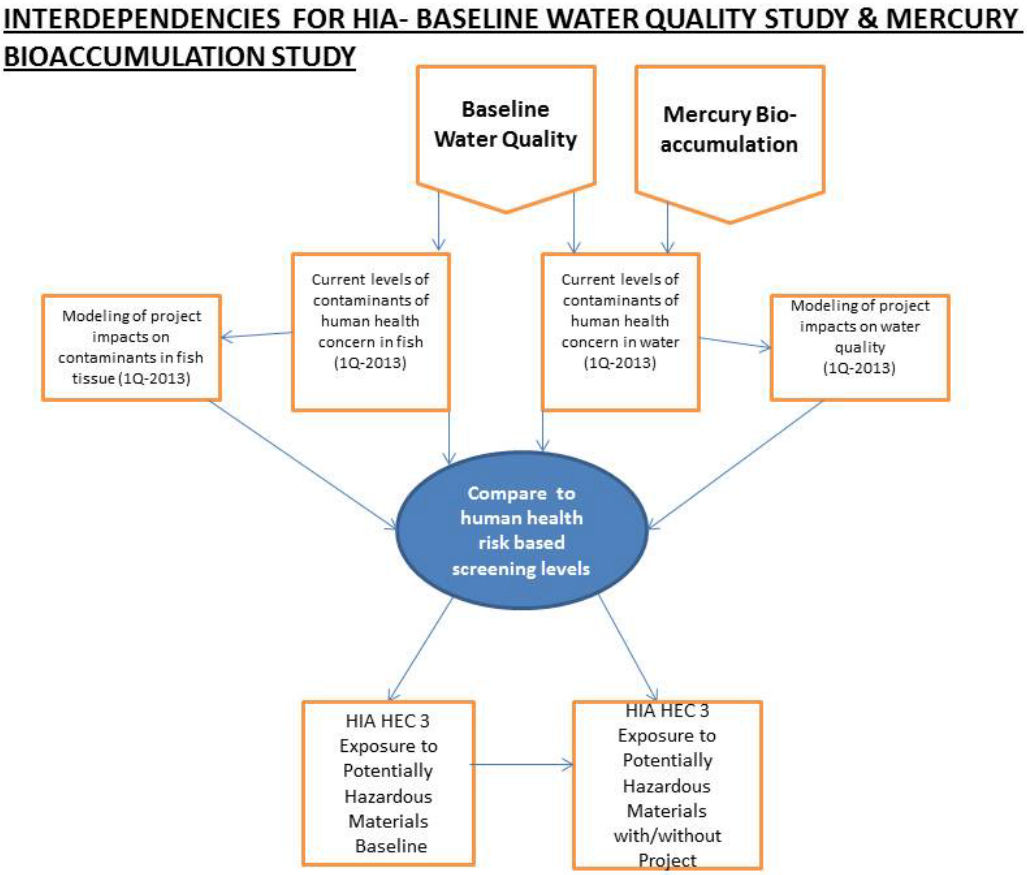

Figure 15.8-1. HIA Interdependencies for Baseline Water Quality and Mercury Bioaccumulation Studies.

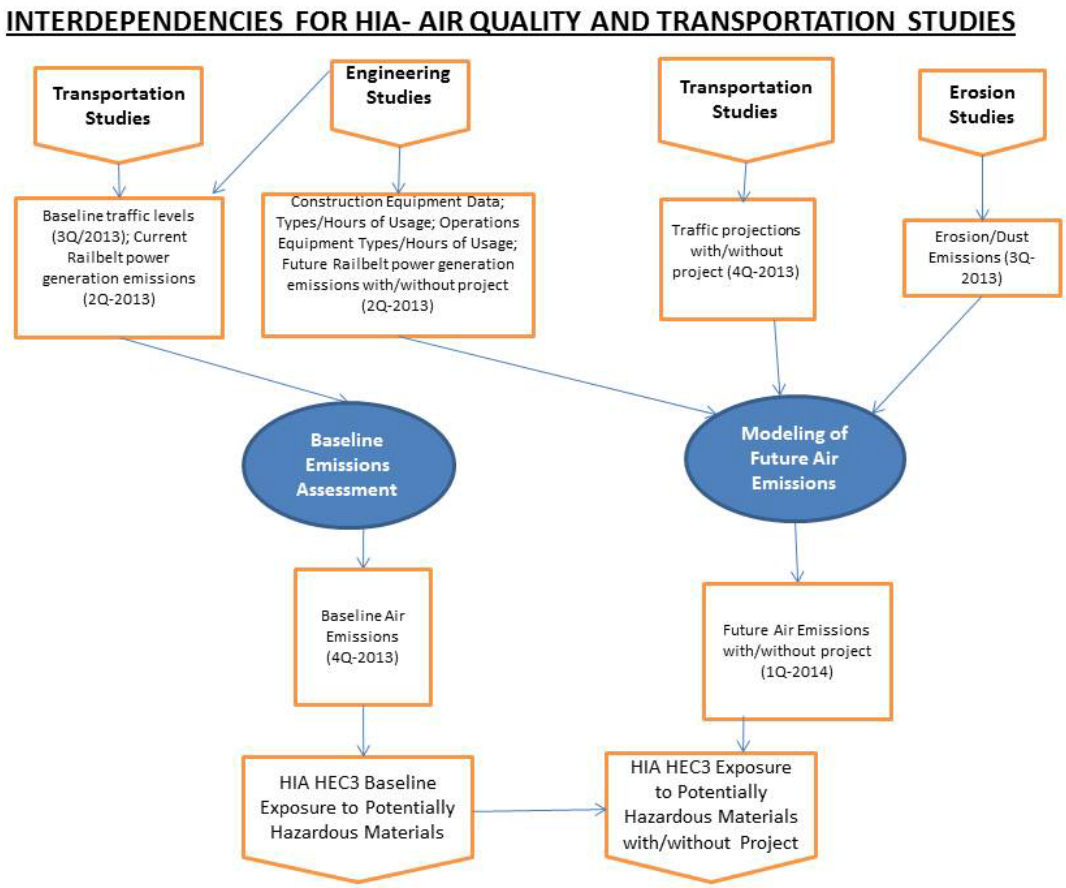

Figure 15.8-2. HIA Interdependencies with Air Quality and associated Transportation Study components.

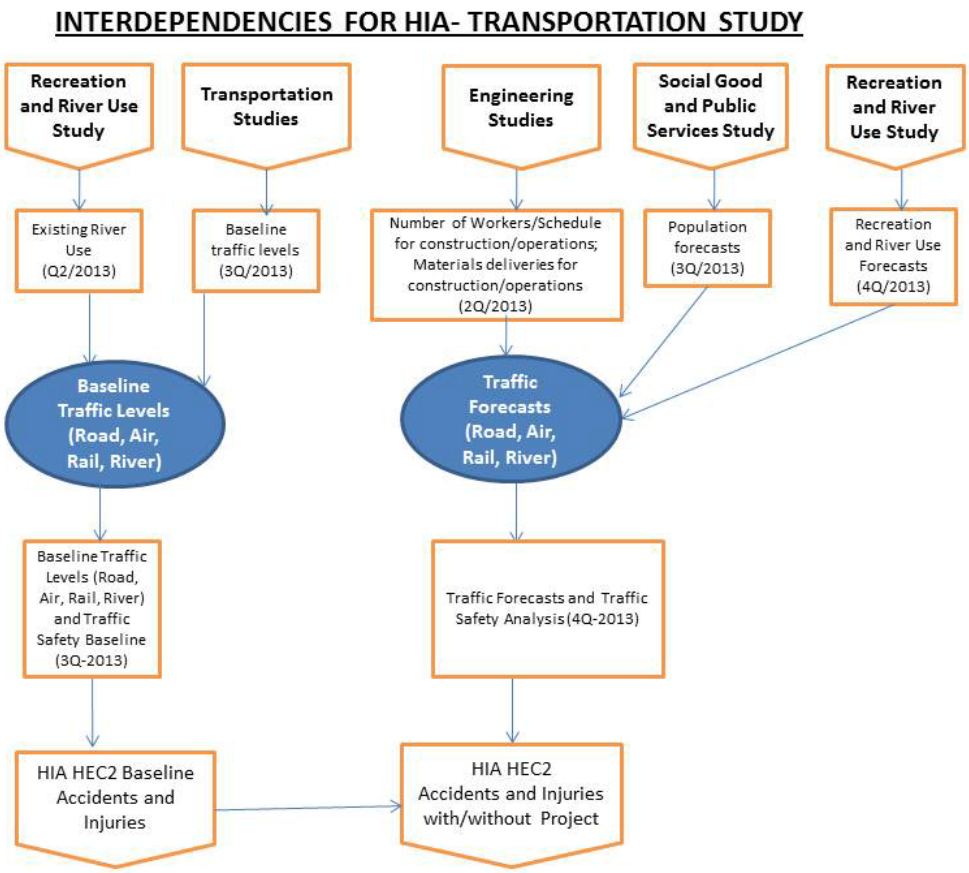

Figure 15.8-3. HIA Interdependencies with the Transportation Study.

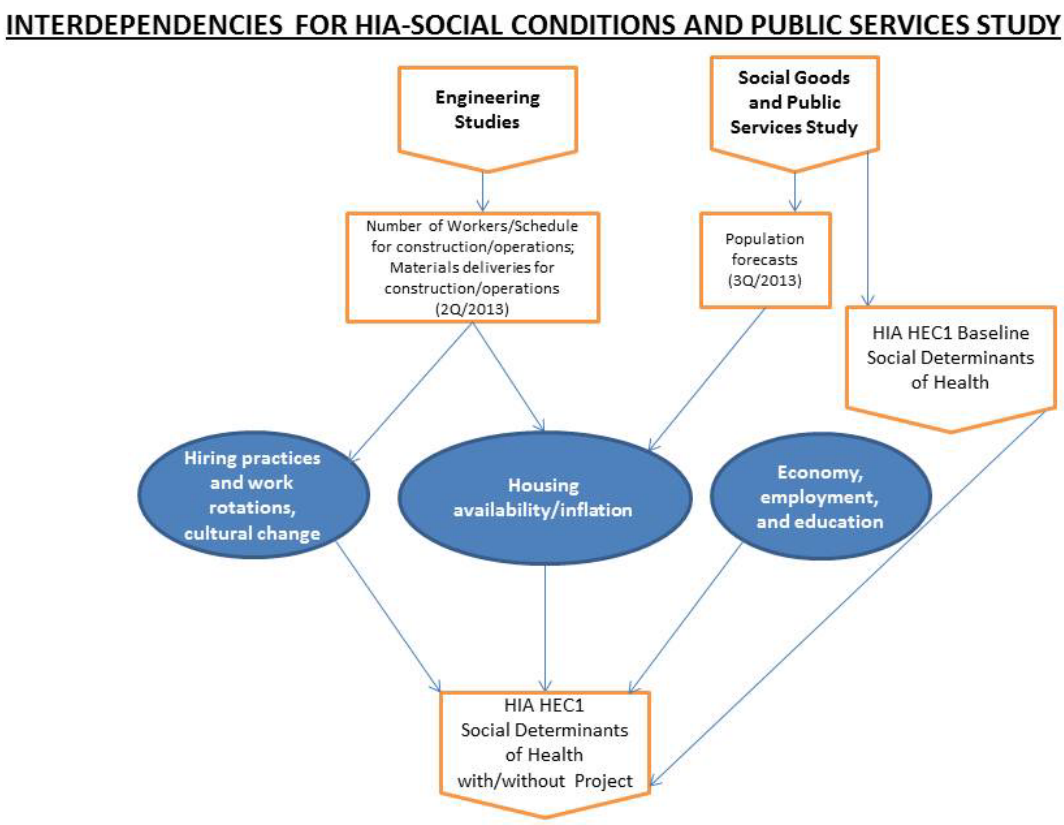

Figure 15.8-4. HIA Interdependencies with Social Conditions and Public Services Study.

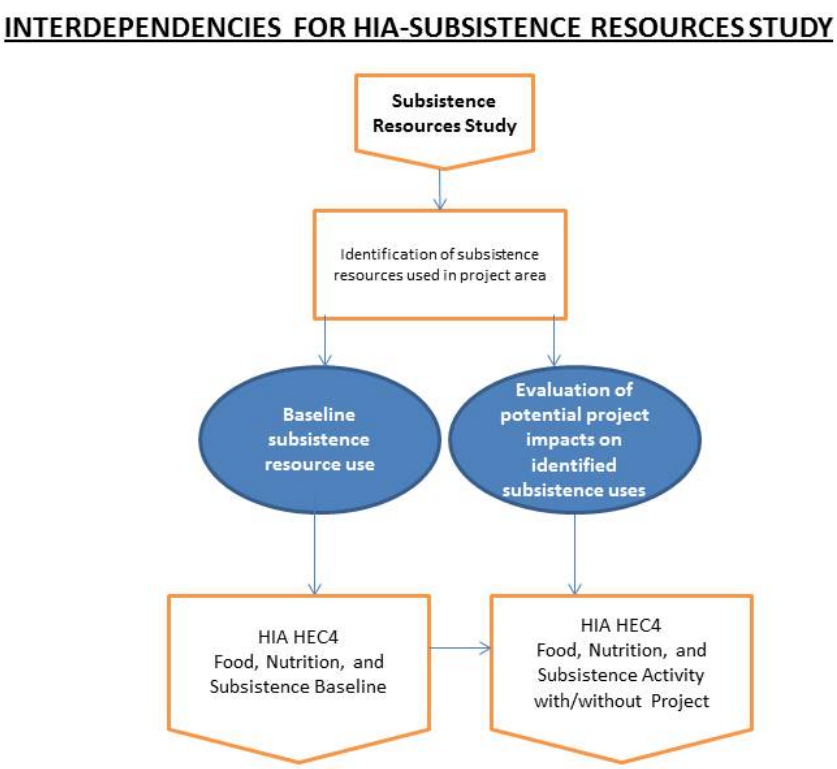

Figure 15.8-5. HIA Interdependencies with Subsistence Study.