

*I have extracted 23 pages of material from Symbiotics' North Eden Pumped Storage Draft Study Plan. The original document is about 142 pages and includes much more detail and maps. I would encourage you to review the entire Draft Study Plan which you can download from FERC or from [www.bearlakewatch.com](http://www.bearlakewatch.com).*

*Each proposed study has 9 subsections, so as you look at these excerpts, you can see that sometimes I cut and pasted the entire proposed study, sometimes skipped studies and other times just pasted certain parts to entice you to read the entire document. I've tried to select topics that we are getting questions about or know that some BLW members have concerns about.*

*Happy reading!*

*David*

# **Excerpts from North Eden Pumped Storage Hydroelectric Project FERC No. 13249 Draft Study Plan**

## **Cover Letter**

This draft study plan is intended to provide the FERC, resource agencies, and interested parties with a preliminary plan outlining the studies proposed by the applicant. The applicant intends for the methodology, scope, and schedules of these proposed studies to be reviewed and refined in consultation with all parties over the next several months.

The applicant invites all stakeholders to comment on this draft study plan within the 60-day comment period. **The final deadline for comments will be December 1, 2009.**

## **Draft Study Plan**

### **1.0 INTRODUCTION**

### **2.0 GEOTECHNICAL STUDY**

#### **2.1 Goals and Objectives**

The goal of the geotechnical study is to obtain subsurface geologic information that will aid in the design of major project features including dams and reservoirs, the powerhouse and tunnels. Information gathered from the study will be used to confirm the sites of proposed features and gather specific information regarding rock structure.

This study will investigate the suitability of the rock for mining activities, address safety issues associated with the underlying fault, and will inform the process of locating and mining suitable material for construction of project features.

The geotechnical investigation will include:

1. A review of existing information.
2. Field surveys consisting of geologic mapping, geophysical survey, rock coring and drilling, and related documentation.
3. A laboratory test program that will examine the engineering characteristics of the rock mass.
4. Preparation of the final report.

FERC mandates that newly constructed dams and associated features such as tunnels and spillways adhere to federal safety and engineering standards. Extensive geotechnical surveys are necessary for evaluation of soil, geologic and seismic conditions and selection of engineering approaches that will meet those standards. The information gathered for this study will also be necessary for obtaining a storage water right.

### ***2.3.1.3 Geological Hazards***

Two north-trending faults totaling 80 kilometers in length comprise the Bear Lake graben. The project site is located 2 miles from the East Bear Lake Fault line, which is a west-dipping, normal fault bounding the east side of the Bear Lake Valley in Utah and Idaho. This fault is part of a larger belt that forms a right-stepping, en-echelon pattern from the northern Wasatch Range in Utah to the Yellowstone area in Wyoming. This fault belt formed as displacement on the Wasatch Fault zone diminished and was supplanted by north-trending faults farther east, such as the East and West Cache and East Bear Lake fault zones (McCalpin 1990).

Fault rupture patterns, recentness of fault scarps and subsurface geophysical data suggest that the East Bear Lake Fault is separated into three sections. On the east side of Bear Lake, it is marked by multiple fault scarps in Quaternary deposits at the base of a steep escarpment of Mesozoic rocks. Seismic reflection data show that both the lake bed and reflectors within the Neogene sediments dip eastward into the East Bear Lake Fault (Skeen 1975). The fault has an average slip rate of 0.2 to 1.0 millimeters per year, based on an average displacement of 4.2 meters and a 5.3 ky minimum recurrence interval (McCalpin 1990; Hecker 1993). An additional fault, the Home Canyon Thrust Fault, is located at the proposed powerhouse area and cuts through North Eden Canyon.

Aerial photos and surficial geology maps have been used to identify surficial instability west of the project area in the form of slope wash and the accumulation of colluviums near the base of the Bear Lake escarpment. Given the steepness of the escarpment and the volume of alluvium and colluvium deposited, there is some potential for mass movement. However, aerial photographs showed no evidence of deep-seated landslides. The Utah Geological Survey (UGS) has developed a landslide map of Utah that includes the project area (Harty 1991). Though general in scope, the mapping is sufficiently detailed to suggest that the likelihood of negative project impacts due to falling rock is very low.

## **2.5 Methods**

A qualified engineering and geotechnical firm will complete this study in three phases.

### ***2.5.1 Phase I***

This will entail collecting and reviewing all readily available information relevant to the study area, including: (1) geological and seismic information, (2) soil maps, (3) boreholes and well logs, (4) aerial photographs or satellite imagery of the project area, and (5) study reports regarding geotechnical and geologic information.

Existing data will be collected from several sources, including the UGS, the Natural Resource Conservation Service (NRCS), the University of Utah and online sources. Following a review of collected data, information gaps will be identified. To fill these gaps and acquire additional information, the following may be necessary: (1) geophysical surveys to delineate the fault line along the escarpment, (2) collection of soil samples from the potential borrow soil area, and (3) collection of rock samples during boring and drilling activities.

The geophysical work in Phase I will be conducted or directed by experienced geophysicists using the Resistivity Mono-Pole Profiling and Sounding (RMPPS) method.

A backhoe will be used for soil sampling in the borrow soil area during Phase I. Soil samples will be classified using the Unified Soil Classification System (USCS) and may be analyzed for bulk density and permeability in a geotechnical laboratory during Phase II. Rock sampling during Phase I may be accomplished through outcrop inspection or drilling the rock structure.

### **2.5.2 Phase II**

Laboratory analysis will be conducted in Phase II to evaluate data collected during field investigations.

The following tests and analyses may be used: (1) measurements of uniaxial compressive strength, (2) static elastic constraints, (3) point load index, (4) punch penetration, (5) Brazilian tensile strength, (6) Cerchar Abrasivity Index, and (7) petrographic examination. Uniaxial compressive strength (UCS) is the basic analysis for rock strength. Shear strength tests may be conducted on the rock samples to determine resistance to breaking under shear forces. Density and specific gravity are also recorded in this analysis. Static elastic analysis is used to determine how well the rock returns to its original shape during loading and unloading.

### **2.5.3 Phase III**

A report will be prepared in Phase II by professional geologists and professional engineers specializing in geotechnical engineering. The analysis will include geologic features examined in the project area, rock composition, applicable nature of the rock, and an examination of the level of faulting activity within the area. Recommendations for construction and the placement of project features will be included within the final report.

## **2.7 Level of Effort and Cost**

The effort for the proposed studies is typical for the specified goals and objectives and the cost is estimated to be approximately \$250,000.

## **2.8 Schedule**

The geotechnical study schedule will be as follows:

Phase I: The first part of Phase I will require approximately three to four months and the second part will require about four months.

Phase II: Approximately two months.

Phase II: Approximately two months.

## **2.9 Progress Reports**

A draft final study report will be made available to the agencies and other stakeholders for comment on June 30, 2011 following the second study season. Stakeholders will have 60 days to comment and all comments will be incorporated into the Final Study Report to be filed on August 30, 2011.

## **3.0 Hydrology and Water Quality STUDY**

### **3.1 Goals and Objectives**

The major goals of this study are to gain a better understanding of water quality and availability so that a program can be developed that will manage project-related hydrology and water quality and protect existing hydrology and water quality for current uses.

The study will have the following main objectives:

1. Define the water budgets for the project reservoirs with respect to precipitation gains and evaporative losses.
2. Identify ownership, source and quantity of existing water uses in North Eden Creek.
3. Define the annual flow regime in North Eden Creek upstream and downstream of the proposed reservoir.
4. Define the existing groundwater hydrology at the North Eden delta.
5. Model predicted water quality parameters in the reservoirs over the long term.
6. Define water needs to offset net annual evaporative losses and maintain water quality in the reservoirs at acceptable levels during discharges into Bear Lake.
7. Define alternatives for obtaining the water necessary to fill and maintain the project reservoirs.
8. Quantify the potential environmental impacts of water delivery alternatives.
9. Quantify the potential impacts of project water use, reservoir construction and reservoir lining on groundwater recharge and existing water uses.
10. Identify potential protection and mitigation measures to address hydrologic and water quality concerns.

### **3.2 Relevant Resource Management Goals**

Within the project vicinity, state and federal agencies with jurisdiction regarding land use, water use and water quality include the Utah Division of Wildlife Resources (UDWR), Utah Department of Environmental Quality (UDEQ), Utah Division of Water Rights, Idaho Department of Environmental Quality, U.S. Army Corps of Engineers (USACE), USFWS, U.S. Environmental Protection Agency (EPA) and the Utah Schools and Institutional Trust Land Administration (SITLA).

### **3.3 Existing Information**

#### **3.3.1 Hydrology**

Average annual precipitation at Bear Lake State Park, located on the west side of the lake just north of Garden City, Utah, was approximately 14 inches between 1961 and 2008 (<http://www.wrcc.dri.edu/summary/Climsmut.html>). Most precipitation falls as snow in the winter. Rates of evaporation appear to have been measured less frequently. However, Dean et al. (2007, 2009) reported a range of about 24 to 40 inches per year using modeled versus pan estimates. Lake evaporation should be closer to the lower end of this range.

Approximately 11,000 acre-feet of water would be required for the initial fill of the project's reservoir, with an estimated 200 to 400 acre-feet needed annually to offset evaporative losses. Currently, the Bear River is judged to have the greatest potential as a water source for filling and maintaining the reservoirs. Under this scenario, Bear River water would be pumped westward via conduit from a point near Cokeville, Wyoming; about 6 miles over the mountains to the top of North Eden Canyon. At that point, the water could be released into the upper basin of North Eden Creek and be used to supply the reservoirs. Local sources in the canyon are

insufficient to be used for filling and most likely for maintaining the reservoirs, but have not yet been eliminated for the latter purpose.

Any potential sources, either in the Bear River or North Eden Creek, would utilize existing water rights and just compensation would be provided. No additional water right resulting in additional depletion of these systems would be pursued. The initial fill would require a onetime storage purchase, while supplies to offset net evaporative losses would require securing an existing, consumptive right.

Water rights associated with the North Eden Creek area are possessed by a number of local landowners. Water is used primarily for irrigation, stock watering and culinary supply. The applicant has identified three groundwater wells that are currently in use and water is diverted at two different locations below the old lower dam. In total, there are about 2,000 acre-feet in water rights held in the area.

Because project operation would affect flow management in North Eden Creek, its hydrology in the project vicinity must be better understood. Some limited discharge data were collected during intermittent water quality sampling in 1981 and 1982 (Table 1). These data showed an average discharge of 1.1 cfs in 1981 and 4.0 cfs throughout the runoff period of 1982 and are comparable to flows measured by Ecosystems Research Institute in 1995 and 1996 (Symbiotics 2009).

North Eden Canyon's aquifer is classified as a fractured, carbonate-rock aquifer and is considered part of the Great Basin Carbonate-Alluvial Aquifer System by the U.S. Geological Society (USGS) (<http://ut.water.usgs.gov/projects/greatbasin/>). A comprehensive study (2007 to 2010) is currently underway by the USGS to quantify current groundwater resources, determine how these resources have changed over time and to develop tools to evaluate responses of this aquifer to future demands and climate change. Little is known about the condition of the aquifer, although some local water rights holders contend that the groundwater supply is limited.

### **3.3.2 Water Quality**

As water is exchanged between the project reservoirs, levels of certain water quality parameters may become elevated over time or at certain times of the year. Critical parameters include, but are not limited to temperature, total dissolved solids and total phosphorus. This may have potentially undesirable effects on the water quality of Bear Lake which will receive this water. To predict potential effects on receiving waters, water quality of waters that may be used to fill or maintain the reservoirs must be understood so that water quality in the reservoirs can be modeled over the long term.

A considerable amount of water quality information exists on the Bear River for modeling purposes, should this water source option be selected. However, far less information exists for North Eden Creek and some of this is fairly dated (Kolluck 1983; Symbiotics 2009). Even if no water from North Eden is used by the project, the quality of its waters can still affect the quality of water stored by the project and vice versa when water is released. It is known that there are no impaired uses in North Eden Creek under Section 303(d) of the Clean Water Act at this time (UDEQ 2006), although there is some impairment in various portions of the Central Bear River Watershed, principally for nutrients and sediment due to both agricultural practices and point sources (EPA 2009).

### **3.4 Nexus Between Project and Proposal**

Water availability and the potential impacts of project water usage on groundwater, surface hydrology and water quality are critical issues to the applicant, the resource agencies and current water users. These issues must be evaluated thoroughly to provide the information necessary

for a complete and defensible license application.

### **3.5 Methods**

#### **3.5.1 Objective 1: Precipitation and Evaporative Loss**

As noted in Section 3.3.1, a considerable range has been reported in the literature with respect to rates of evaporation. Additional sources will be consulted to further refine estimates of both precipitation gains and evaporative losses so that annual water needs for the project can be anticipated with greater accuracy (Objective 6). However, it is anticipated that no additional field data will be required for this study.

#### **3.5.2 Objective 2: Existing Water Uses**

A record of existing water right holders and pending water right applications is available from the Utah Division of Water Rights (<http://nrwrt1.nr.state.ut.us/wrinfo/default.asp>). This will be used in compiling a comprehensive list of both private and public water right holders in North Eden Canyon and the quantities held. Records on water rights for the Bear River in Wyoming are available from the Wyoming State Engineer's Office ([http://seo.state.wy.us/wrdb/PS\\_Drainage\\_Facility.aspx](http://seo.state.wy.us/wrdb/PS_Drainage_Facility.aspx)).

Efforts will also be undertaken to obtain information on groundwater levels in existing wells in past years and the water quality thereof. Depending on the amount of available information, it may be necessary to collect additional data from existing wells. These data will be used to inform both the suitability of these sources for the maintenance of project reservoirs and the status of these wells as they may be affected by project construction and operation.

#### **3.5.3 Objective 3: North Eden Creek Flows**

Discharge in North Eden Creek would need to be gauged at two suitable sites located: (1) just upstream of the proposed reservoir to describe incoming hydrology, and (2) just downstream of the proposed reservoir and most likely downstream from existing irrigation diversions to describe the hydrology entering Bear Lake. The precise coordinates of each site would be established using a GPS.

To measure stream flow at each of these two sites, a staff gauge connected to a pressure transducer

would be secured to the stream bed to record the water level on at least an hourly basis.

These data would be transferred to a logger, which would be downloaded to an Internet uplink so that discharge could be monitored remotely and in real time. Cross-sectional discharge measurements would be taken as necessary at each site to establish the stage-discharge relationship.

Stream flow data will be collected beginning in late 2009 or early 2010 and continue at least through the summer of 2011.

#### **3.5.4 Objective 4: Groundwater Hydrology**

To describe groundwater hydrologic conditions, instruments would be installed in at least one and preferably two of the three existing wells to monitor daily groundwater levels continuously throughout the year. This could be achieved with the use of pressure transducers and automatic digital data loggers. Electric current is calibrated to pressure (pounds per square inch) which can be related to water levels by the equation: 1 psi = 2.31 feet of water. Monitoring would begin in late 2009 or early 2010 and continue at least through the summer of 2011.

Pump tests would be performed on multiple occasions, minimally once per year, to document recharge rates. Piezometers may also be used to measure hydraulic head in multiple wells, enabling inferences to be made regarding the direction of groundwater flow. In addition, any information that has already been gathered for any of the existing wells will also be compiled

and summarized to gain an improved understanding of inter-annual groundwater conditions. Generally, the goal will be to describe groundwater hydrology and determine whether and how it is linked to the surface water hydrology of North Eden Creek and Bear Lake. In so doing, informed judgments can be made regarding the potential effects of reservoir placement and water delivery alternatives on this resource.

### **3.5.5 Objective 5: Reservoir Water Quality Modeling**

Water quality data in North Eden Creek are judged to be inadequate for modeling purposes. Therefore, water samples will be collected from North Eden Creek on approximately a monthly basis, beginning in late 2009 or early 2010. Collections will occur in the vicinity of the proposed reservoir. Water samples will be analyzed for standard parameters including, but not necessarily limited to nitrogen and phosphorus, total suspended solids and total dissolved solids.

Field measurements of dissolved oxygen, pH and turbidity will also be performed as water samples are collected using a water quality probe such as a YSI®. Sampling would extend into 2011 to encompass a second runoff.

Onset HOBO® data loggers have already been deployed at two locations in North Eden Creek to monitor water temperature. One site is located near the old upper dam and will represent conditions entering the proposed reservoir. The second site is located downstream near the Cisco Road crossing. Data collection began in spring 2009 and will continue into the summer of 2011 or beyond if necessary.

All water samples will be collected, handled, stored and analyzed using protocols of the EPA. Analyses will be completed by laboratories which are state-certified for each parameter. Probes will be calibrated prior to use according to manufacturer's guidelines.

As stated previously, it is currently judged that the Bear River represents the best viable source of water to fill and possibly also to maintain the project reservoirs. Water quality has been studied extensively throughout much of the Bear River and is available from a number of sources including the EPA STORET database. Other potential sources would include the Wyoming Department of Environmental Quality (<http://deq.state.wy.us/wqd/>) and the Bear River Water Quality Task Force (<http://www.brwqtf.org/>). This organization is dedicated to understanding and improving Bear River water quality across state boundaries and is comprised of federal, state, local and tribal participants. Any and all sources will be compiled to develop a comprehensive database for water quality near any potentially proposed extraction point. These data will be used to model levels of various water quality parameters in the project reservoirs during long-term operations, considering the effects of precipitation and evaporative losses. Eventually, the results may be used to recommend the magnitude and timing of flushing regimes that may be necessary to maintain acceptable levels in the reservoirs.

A number of water quality models have been developed by the USACE that would be suitable for modeling levels of various water quality variables over time. The CE-QUAL-W2 model represents an excellent choice to accomplish these goals. It is a two-dimensional, laterally averaged, finite difference hydrodynamic and water quality model for lakes, reservoirs, estuaries and rivers. Water quality parameters that can be modeled include temperature, inorganic suspended sediments, total dissolved solids, alkalinity and phosphorus (USACE 2009).

### **3.5.6 Objective 6: Project Water Needs**

Results of the analysis under Objective 1 will be used to estimate more precisely the amount of water necessary to maintain the project reservoirs. Also, there will be further refinement of the amount of water that would be needed for the initial fill.

### **3.5.7 Objective 7: Water Delivery Alternatives**

A comprehensive evaluation will be undertaken to identify the various water supply alternatives to provide sufficient water to initially fill the reservoirs and to offset annual net losses due to evaporation. This analysis will address the source, quantity, timing and pathway of each alternative.

### **3.5.8 Objective 8: Environmental Impacts**

Potential impacts of each water supply alternative on vegetation, terrestrial and aquatic resources will be identified under this objective. For example, the transfer of water from the Bear River would involve the disturbance of vegetation and could potentially disturb wildlife such as sage grouse from the extraction point to the top of the North Eden Basin. From that point, there could be additional impacts on vegetation and wildlife as water falls down a drainage that is usually dry. This falling water would also likely cause erosion, which has implications for water quality downstream. In summary, the purpose of this task will be to identify any environmental issues, collect the necessary field data, evaluate potential impacts and identify potential mitigation measures.

### **3.5.9 Objective 9: Existing Water Use Impacts**

Potential impacts of each alternative on existing water uses, both of surface and groundwater, would be evaluated under this task.

### **3.5.10 Objective 10: Protection and Mitigation**

Results of the potential project impacts associated with the preceding objectives will be used to inform a plan to protect existing water quality and water uses or to propose mitigation for anticipated impacts.

## **3.6 Consistency With Accepted Practices**

The methods described are consistent with accepted and current methodologies to achieve a better understanding of local hydrology and water quality. The USACE water quality model CE-QUAL-W2 is an industry standard for reservoir modeling.

## **3.7 Level of Effort and Cost**

The total cost for this study is estimated to be \$439,000. It is anticipated that Symbiotics will perform all of the necessary work to address the study objectives, including the water quality modeling effort.

## **3.8 Schedule**

The study would begin in late 2009 or early 2010 and continue through August 2011.

## **3.9 Progress Reports**

A draft first year study report will be made available September 30, 2010 following the first year of studies. The applicant will allow 60 days for comment and will incorporate comments into the First Year Study Report to be filed on December 14, 2010. Based on comments received, study methods may be modified during the following year. A draft final study report will be made available June 30, 2011 following the second study season. The applicant will allow 60 days to comment and will incorporate comments into the Final Study Report to be filed on August 30, 2011.

# **4.0 NORTH EDEN CREEK CUTTHROAT TROUT STUDY**

## **4.1 Goals and Objectives**

Completion of the proposed North Eden Pumped Storage Hydroelectric Project would impact North Eden Creek through the inundation of approximately 3.5 miles of stream occupied by Bonneville cutthroat trout and the loss of connectivity to Bear Lake. The goals of this study are to develop a better understanding of the abundance, distribution and movements of Bonneville cutthroat in North Eden Creek. This information will help inform the development of plans to

mitigate for project impacts.

The study will have the following principal objectives:

1. Determine densities, size composition and spatial distribution of Bonneville cutthroat in North Eden Creek from the canyon mouth to its headwaters.
2. Estimate population size of Bonneville cutthroat in North Eden Creek upstream from the proposed reservoir.
3. Evaluate movements of Bonneville cutthroat trout in North Eden Creek.

## **4.5 Methods**

### **4.5.1 Study Area**

The proposed study area in North Eden Creek will extend upstream from its confluence with Bear Lake approximately 9.3 miles (13 kilometers) to its headwaters. Although the reservoir would not inundate the entire study area, stream habitat downstream or upstream of the proposed dam may be targets for future mitigation. Therefore, existing conditions need to be documented. In addition, cutthroat trout may move from the lake and into the lower stream reaches for spawning when conditions are favorable. Cutthroat may also migrate downstream from areas upstream from the proposed reservoir, potentially becoming entrained in the project pumps. It is in the headwater areas far upstream that habitat conditions are generally superior and cutthroat trout appear to be most numerous.

## **5.0 NORTH EDEN CREEK HABITAT STUDY**

### **5.1 Goals and Objectives**

The North Eden Pumped Storage Hydroelectric Project would inundate approximately 3.5 miles of stream occupied by Bonneville cutthroat trout and other fish species, as well as riparian and other wetland habitats used by wildlife. The objectives of this study are to describe the characteristics and spatial distribution of aquatic and riparian habitats in North Eden Creek. This information will help inform the development of plans to mitigate for project impacts to these habitats.

### **5.5 Methods**

The proposed study area in North Eden Creek will extend upstream from its confluence with Bear Lake approximately 9.3 miles (13 kilometers) to its headwaters. Although the reservoir would not inundate the entire study area, stream habitat downstream or upstream of the proposed dam may be targets for future mitigation. Therefore, existing conditions need to be documented. A stratified random sampling design (Johnson and Nielsen 1983) is proposed to select stream sections for the evaluation of aquatic and riparian habitat. The study area will be partitioned into four contiguous reaches (Figure 5).

## **6.0 Plant Community Characterization**

### **6.1 Goals and Objectives**

The goal of the vegetation characterization study is to document the existing vegetation within the project area. This study will enhance the efficacy of any rehabilitation and re-seeding efforts and provide quantitative and qualitative plant and wildlife habitat data for areas where project related ground disturbance or inundation may occur.

The objectives of the study are to:

1. Quantify plant species composition, structure and relative abundance within the proposed

reservoir sites and all areas where vegetation may be disturbed or eliminated by project construction.

2. Identify, map and describe vegetation types within affected project areas.

## **7.0 Weed Characterization Study**

### **7.1 Goals and Objectives**

The goals of this study are to establish baseline conditions of invasive and noxious weeds within the project area to facilitate the development of a comprehensive plan for controlling weeds in areas where ground disturbance may occur.

The specific objectives of this field survey are to:

1. Develop a list of weed species present.
2. Document the location and extent of weed infestations.

### **7.5 Methods**

Table 4 lists all species identified by the state, the BLM, and Rich County as noxious weeds of concern. Photographs, herbarium specimens, and reference populations will be used to develop a search image for all listed species. All project areas where ground disturbance may occur will be searched for weeds. Transects established for wildlife habitat surveys will facilitate systematic coverage during searches (see Sections 14.0 through 16.0). All weed species encountered will be recorded. Weed infestations will be mapped and the number and distribution of individuals and physical features of the area will be recorded. Surveys will occur in conjunction with vegetation characterization and sensitive plant surveys.

## **9.0 Wetlands Determination**

### **9.1 Goals and Objectives**

The goal of this study is to determine the amount and type of wetlands that may be displaced by construction of the proposed project. The objective of the study is to document the location and extent of jurisdictional wetlands within the project area.

### **9.5 Methods**

The study area will include areas proposed for inundation or other ground disturbance, and a minimum 50-foot buffer to either side of inundated or disturbed lands. Prior to field implementation of the study, local soil survey information from the NRCS will be used to determine whether listed hydric soils occur within the project boundaries. Aerial photographs and topographic maps will be used to discern likely vegetation patterns and hydrology throughout the project area. Sites where wetlands were known to occur in the past will be targeted, as will any potential wetland areas identified on maps or in the field.

Field surveys will follow guidelines and protocols for wetlands delineation described in the USACE Wetlands Delineation Manual and Western Regional Supplement (USACE 1987, 2008).

## **10.0 Western Toad and Northern Leopard Frog Breeding Surveys**

### **10.1 Goals and Objectives**

The goal of this study is to document breeding activity by western toads and northern leopard frogs within potentially affected breeding areas.

The objectives of the study are to:

1. Map any potential amphibian breeding habitats that may be displaced by construction of the proposed project.
2. Document actual breeding locations in the study area.
3. Provide a relative index of larval abundance within the areas surveyed.

## **11.0 Surveys for White-Tailed Prairie Dog Colonies and Black-Footed Ferret Habitat Evaluation**

### **11.1 Goals and Objectives**

The goals of these surveys are to:

1. Determine if active white-tailed prairie dog colonies exist in the project area.
2. Determine if white-tailed prairie dog colonies are of sufficient size to support blackfooted ferret reintroduction.

The objectives of this study are to:

1. Survey the proposed project site and surrounding area for white-tailed prairie dog colonies.
2. Map occupied or recently-active white-tailed prairie dog colonies and evaluate their potential to support black-footed ferret.

## **13.0 Pygmy Rabbit Surveys**

### **13.1 Goals and Objectives**

The applicant proposes to investigate pygmy rabbit use of the project area in order to inform the alignment of the transmission corridor and develop appropriate mitigation for occupied habitat. The goal of this study is to mitigate impacts of project-related activities to pygmy rabbits that may be present in the project area and vicinity.

The objectives of the study are to:

1. Determine and document if suitable habitat exists in the project area and vicinity, and whether it is occupied by pygmy rabbits.
2. Determine what measures might be taken to reduce impacts or offset displacement of habitat.

### **13.5 Methods**

The study area will include all lands proposed for inundation or other ground disturbance, with a 1-mile buffer around all major project features and a 0.5-mile buffer around access roads and transmission lines, as requested by the USFWS (Figure 6; Appendix B).

## **14.0 Burrowing Owl Surveys**

### **14.1 Goals and Objectives**

The applicant proposes to investigate western burrowing owl use of the project area in order to inform the alignment of the transmission corridor and develop appropriate mitigation for occupied habitat. The goal of this study is to mitigate impacts of project-related activities to burrowing owls that may be present in the project area and vicinity.

The objectives of the study are to:

1. Determine and document if suitable habitat exists in the project area and vicinity, and whether it is occupied by burrowing owls.

2. Determine what measures might be taken to reduce potential impacts or offset displacement of habitat.

## **15.0 Ferruginous Hawk Surveys**

### **15.1 Goals and Objectives**

The applicant proposes to study whether ferruginous hawks use the project area and vicinity as nesting habitat. The goal of this study is to mitigate the potential impacts of project-related activities on nesting ferruginous hawks that may be present in the project area and vicinity.

The objectives of the study are to:

1. Document any ferruginous hawk nests and nesting behavior in the project area or nearby vicinity.
2. Develop a Raptor Protection Plan that outlines actions to be taken should raptors nest in the vicinity of the project.

### **15.5 Methods**

The study area will include all lands proposed for inundation or other ground disturbance, with a 1-mile buffer around all major project features and a 0.5-mile buffer around access roads and transmission lines (Figure 6). An experienced field ornithologist will establish transects and traverse the area at intervals no greater than 0.5 mile (approximately 800 meters). The field ornithologist will pause frequently, for periods of at least two minutes and use binoculars to scan the surrounding area for signs of raptor activity.

## **17.0 Greater Sage-Grouse Studies**

### **17.1 Goals and Objectives**

Three studies are proposed to provide baseline information on greater sage-grouse use of areas that may be directly or indirectly affected by the proposed North Eden Pumped Storage Hydroelectric Project.

#### **17.1.1 Lek Surveys**

The goal of the greater sage-grouse lek surveys is to provide spatially-accurate information on lek locations throughout potentially affected areas.

The objectives of the lek surveys are:

1. To identify leks and associated nesting and brood-rearing habitat that may be directly affected by habitat loss or habitat disturbance associated with the proposed project.
2. To identify leks potentially disrupted by noise and activity related to project construction or operation.
3. To identify leks and nesting and brood-rearing habitat that may be exposed to increased risk of predation associated with proposed transmission features and road development.

#### **17.1.2 Lek Counts**

The goals of the greater sage-grouse lek counts are to provide standardized data on lek activity in areas that may be affected by the proposed project and assist in estimates of relative abundance.

The objectives of the lek counts are:

1. To determine the status of known leks as active or inactive within potentially affected areas.
2. To develop an index of breeding sage-grouse activity in affected areas through the use

of standardized counts on known and newly discovered leks.

### **17.1.3 Winter Surveys**

The goal of the greater sage-grouse winter use surveys is to characterize the use of the project vicinity by sage-grouse during the non-breeding season.

The objectives of the winter surveys are:

1. To identify the extent of sage-grouse use of potentially affected areas from November through February.
2. To map and describe locations of concentrated winter sage-grouse use.

The overarching goal of these studies is to mitigate the potential effects of project-related activities on greater sage-grouse that may be present in the project vicinity.

The objectives of the studies are to:

1. Determine what protection measures are appropriate and warranted, given known use of available habitat in the project vicinity, and documented sage-grouse responses to construction and other project-related human activities.
2. Identify opportunities to mitigate for habitat loss or degradation through habitat restoration or enhancement measures in the project vicinity.
3. Develop a comprehensive plan to protect sage-grouse and reduce potential effects to leks and breeding and winter habitat.

## **17.5 Methods**

The study area will include all lands proposed for inundation or other ground disturbance, with a 1-mile buffer around all major project features and a 0.5-mile buffer around access roads and transmission lines (Figure 6). The transmission corridor proposed in the Pre-Application Document (PAD) appears to run very close to known lek sites and associated nesting habitat. Potential pathways north through Idaho are equally difficult to discern given known lek sites and associated buffers. It is also unlikely that there are viable pathways to the west of the project area given concerns for visual resource impacts to the Bear Lake viewshed. Thus, the applicant will examine potential corridors to the south of the project area (Figure 6). Any potential corridor will likely head east through Utah to the Wyoming border where it would interconnect with the BLM-preferred option for the Gateway West project (Tetra Tech 2008). If the BLM-preferred option is not selected, the corridor will run along the Utah-Wyoming and Idaho-Wyoming borders to the PacifiCorp-preferred option just over 10 miles north of the Utah border.

## **18.0 AUDITORY STUDY**

### **18.1 Goals and Objectives**

The purpose of the auditory study is to obtain information relating to potential levels of noise from construction and operation of the North Eden Pumped Storage Hydroelectric Project. The information gathered from the study will be used to determine effects of noise on wildlife and recreation within the area.

The objectives of the auditory study are to:

1. Establish baseline levels of ambient noise.
2. Create a contoured model of construction noise levels throughout the project area.

### **18.2 Relevant Resource Management Goals**

There are no current zoning restrictions or management goals for the project area regarding noise. The Pocatello BLM RMP contains general management goals for wildlife north of the project area and more specific goals for sensitive species including greater sage-grouse and

nesting raptors (BLM 2006).

For example, the RMP establishes recommended spatial and temporal buffers which are areas and periods of restricted surface-disturbing activity for a number of raptor species, including the ferruginous hawk (Section 15.0). Spatial buffers range from 0.25 to 1 mile depending on the species. Temporal buffers begin as early as January, though they more commonly begin in March, and extend into August for most raptor species.

During a siting study for the proposed Gateway West Transmission Line Project, the Wyoming BLM indicated that the 0.25-mile radius could be increased to 0.65 mile. The siting study for the transmission line used a 0.65-mile radius to avoid any active, inactive, or historic leks during the siting process. Currently the BLM restricts land-disturbing activities within 0.5 mile of special status species (IP and RMP 2008).

UDWR is the agency responsible for greater sage-grouse management in Utah (UDWR 2002). The state's plan for sage-grouse includes stipulations for surface use and occupancy. Surface occupancy of any sort is prohibited within 0.5 mile of active leks, unless with explicit cause and after consultation with the state. On nesting grounds and early brood-rearing and wintering habitats within 0.5 to 2 miles of active leks, development may proceed when every reasonable effort has been made to avoid and reduce disturbance impacts.

1. All surface disturbing activities would be prohibited within 0.5 mile of greater sagegrouse leks on a year-round basis. Oil and gas leasing would be open subject to major constraints.
2. Allow no surface disturbing or otherwise disruptive activities within 2 miles of greater sage-grouse leks from March 15 to July 15 to protect nesting and brood rearing habitat.
3. Allow no surface disturbing or otherwise disrupting activities within greater sagegrouse winter habitat from December 15 to March 14.

### **18.3 Existing Information**

Noise is defined as unwanted or intrusive sound. Ambient noise or background sound is noise that typically occurs in an area. There are several ways to measure noise, the most common being decibels (dB). Sound is often measured in terms of A-weighted decibels (dBA). The A-weighted scale reflects the response of the human ear by filtering out some noise in the highest and lowest spectrum that the ear does not detect.

The project will be in a remote and sparsely populated location, with the lower reservoir area in North Eden Canyon and the upper reservoir on eastern flank of Black Mountain. The principal sources of background noise are occasional vehicle traffic, aircraft overflights, off-highway vehicle (OHV) operation and wind. Project construction will require sustained use of heavy machinery and equipment as well as increased vehicular traffic in the area. Construction equipment

produces noise levels between 84 and 96 decibels. For comparison, a normal conversation is 60 to 70 decibels and the loudest sound possible is 194 decibels (CPWR 2009).

and after consultation with the state. On nesting grounds and early brood-rearing and wintering habitats within 0.5 to 2 miles of active leks, development may proceed when every reasonable effort has been made to avoid and reduce disturbance impacts.

1. All surface disturbing activities would be prohibited within 0.5 mile of greater sagegrouse leks on a year-round basis. Oil and gas leasing would be open subject to major constraints.
2. Allow no surface disturbing or otherwise disruptive activities within 2 miles of greater sage-grouse leks from March 15 to July 15 to protect nesting and brood rearing habitat.

3. Allow no surface disturbing or otherwise disrupting activities within greater sagegrouse winter habitat from December 15 to March 14.

### **18.3 Existing Information**

Noise is defined as unwanted or intrusive sound. Ambient noise or background sound is noise that typically occurs in an area. There are several ways to measure noise, the most common being decibels (dB). Sound is often measured in terms of A-weighted decibels (dBA). The A-weighted scale reflects the response of the human ear by filtering out some noise in the highest and lowest spectrum that the ear does not detect.

The project will be in a remote and sparsely populated location, with the lower reservoir area in North Eden Canyon and the upper reservoir on eastern flank of Black Mountain. The principal sources of background noise are occasional vehicle traffic, aircraft overflights, off-highway vehicle (OHV) operation and wind. Project construction will require sustained use of heavy machinery and equipment as well as increased vehicular traffic in the area. Construction equipment produces noise levels between 84 and 96 decibels. For comparison, a normal conversation is 60 to 70 decibels and the loudest sound possible is 194 decibels (CPWR 2009).

### **18.5 Methods**

The study area will include all land within 0.5 mile of project features. Background noise will be monitored to determine baseline conditions in the project area and will be used to develop a base map. Noise recorded from heavy construction equipment will then be played at typical volumes from the sites of major project features and monitored at incremental distances. A noise level contour map will be developed with this data.

The distribution of any sensitive species as determined by existing information and sensitive species surveys (Studies 11.0 through 17.0) will be overlaid on the noise level contour map to determine potential effects on such species.

### **18.6 Consistency with Accepted Practices**

This type of auditory study is consistent with other auditory studies conducted during the licensing proceedings for hydroelectric projects that include ground disturbance.

### **18.7 Level of Effort and Cost**

The auditory study is expected to take two people three to five days to conduct and one analyst three to five days to map and report the findings. The cost is estimated to be approximately \$15,000.

### **18.8 Schedule**

The schedule will occur in two phases. Field work will take place in September or October of 2010 and will require approximately one week. Mapping and reporting will require approximately one week.

### **18.9 Progress Reports**

A draft final study report will be made available June 30, 2011 following the second study season. The applicant will allow 60 days to comment and will incorporate comments into the Final Study Report to be filed on August 30, 2011.

## **19.0 VISUAL RESOURCES STUDY**

### **19.1 Goals and Objectives**

The goal of the visual resources study is to document the existing visual characteristics of the Bear River Plateau and evaluate the potential visual effects of proposed project features. If visual impacts are identified which are not consistent with pertinent management plans, mitigation and enhancement measures will be proposed.

Specifically, the objectives of the study are to:

1. Assess the visual character of all above-ground project features, including night lighting and its effects on sensitive viewing locations.
2. Evaluate the visibility of project features within the area, including both reservoir sites, and determine effects on scenic quality.
3. Evaluate the consistency of project construction and operation with Rich County management goals.
4. Identify project features that disrupt the visual character of the local landscape
5. Identify reasonable mitigation measures to reduce impacts.

### **19.2 Relevant Resource Management Goals**

The project occurs within lands that are managed by SITLA and private land owners. Rich County does not have direct authority over SITLA lands; however Rich County has authority over the private lands where a portion of the lower reservoir is located. The county's ordinances generally encourage variety, excellence, and creativity in the design of new development, preservation

of critical open space areas, and preservation of the natural beauty of the area. The county's plans do not contain policies or guidelines specifically addressing the management of visual resources.

### **19.3 Existing Information**

Bear Lake is arguably the most scenic feature shared by southern Idaho and northern Utah. The lake is approximately 20 miles long and 8 miles wide, covering 112 square miles of the Utah-Idaho border vicinity. The lake is often referred to as the "Caribbean of the Rockies" due to its intense turquoise-blue water which is generated by high concentrations of calcium carbonate.

The eastern shoreline of Bear Lake and the adjacent Bear River Plateau in the vicinity of the proposed project consists of dry, open, and often rocky topography with sagebrush, perennial grasses, and juniper dominating the landscape. North Eden Canyon is located within this steep escarpment that rises rapidly from the eastern shoreline of Bear Lake.

Bear Lake is a summer recreation destination, with 34 percent of its tourists visiting during the month of July (UDPR 2005). Summer recreation includes camping, swimming, boating, picnicking, and wildlife viewing. Snowmobiling and ice-fishing do attract tourists during the winter months, but the majority of visitors come between the months of July and September (UDPR 2005). A survey completed at Bear Lake State Park between May 21 and September 2, 2002 found that Bear Lake was the only recreation destination for 69.3 percent of the respondents

interviewed (Palacios et al. 2007). There is no survey data available indicating the importance of local scenery in the choice of Bear Lake as a recreational destination nor is there data addressing the importance of scenery in visitor enjoyment of the Bear Lake area. However, opinions of local residents indicate that the aesthetic resources of Bear Lake should be considered

a primary reason for the area's popularity as a tourist destination.

Two new reservoirs and associated dams, a powerhouse, tunnels, transmission line support structures, a switchyard and associated access roads will be constructed for the project. To minimize potential visual impacts, the switchyard near the powerhouse will be located behind

a nearby topographic ridge. The impact the project will have on the aesthetic resources of the Bear River Plateau and any cumulative effects on the visual characteristics of the area will be dependent on how well this facility blends with the landscape.

#### **19.4 Nexus between Project and Proposal**

FERC requires the applicant to provide information describing the visual resources in the project area, potential impacts of the project on those resources and appropriate protection, mitigation, or enhancement measures. The project has the potential to be seen from locations in the Bear Lake Valley and could potentially alter views of the Bear River Plateau for residents and visitors recreating at Bear Lake. Therefore, a visual resources study will be necessary to address project impacts.

#### **19.5 Methods**

Study methods described below are designed to determine the visual impacts of the project and identify measures to mitigate those impacts.

##### ***19.5.1 Establishment of Observation Points***

The study focus will include the proposed footprints of the upper and lower reservoirs, the powerhouse access tunnel, transmission lines, access roads and substation. Observation points will be established to evaluate all features relative to the current landscape. Both reservoir sites will be evaluated for visual effects. Observation points will be used in combination with threedimensional modeling techniques and photo simulations to describe the extent to which project features will be visible from viewpoints in the Bear Lake area. This evaluation will be used to determine whether specific features could compromise the scenic quality of the area.

##### ***19.5.2 Photography and Field Documentation***

Photographs will be taken at all observation points in the spring, summer and fall of 2010. At each viewpoint, the camera will be mounted on a tripod and a handheld GPS with 3 meter accuracy will be used to ensure that photographs are taken at the same location each time. The center point of the proposed dam will be established by a surveyor and used as a bearing for the angle of the photographs. This angle will be field verified during each photo documentation event by using a handheld GPS. Photo documentation will be scheduled for days with clear forecasts and photos will be taken within three hours of noon to document the view of the project area during the highest levels of direct sunlight.

##### ***19.5.3 Preparation of Visual Simulations***

To illustrate visual changes associated with the impacted area, computer enhanced photographic simulations of the proposed project will be created from digital photos taken at each of the observation points.

##### ***19.5.4 Evaluation of Project Visual Effects***

The BLM's Visual Resource Contrast Rating System (CRS) will be used to evaluate the visual effects of the North Eden Pumped Storage Hydroelectric Project. The CRS is designed to analyze potential visual impacts of large scale projects and activities on public lands. The rating is completed by determining the amount of contrast for each of the proposed project features in comparison to the existing view at all observation points (Table 7). Ratings will be used to identify project features that disrupt the visual character of the local landscape and during the development of reasonable mitigation measures that will reduce those impacts.

**Table 7.** BLM's Contrast Rating System degree of contrast criteria.

#### **Degree of Contrast Criteria**

Class I - None The element contrast is not visible or perceived

Class II - Weak The element contrast can be seen but does not attract attention

Class II – Moderate The element contrast begins to attract attention and begins to dominate the characteristic landscape

Class IV - Strong The element contrast demands attention, will not be overlooked, and is dominant in the landscape

## **19.6 Consistency with Accepted Practices**

This type of analysis is consistent with other visual resource analyses completed during licensing proceedings for hydroelectric projects that have the potential to adversely affect visual resources.

## **19.7 Level of Effort and Cost**

The study will require five days of field work for one person with an estimated cost of \$4,800. ArcGIS analysis, three-dimensional modeling and associated reporting would entail another 12 to 20 days for a single analyst to complete, with an estimated cost of \$8,000 to \$14,000. Total cost for completing this study would be approximately \$12,800 to \$18,800.

## **19.8 Schedule**

The study will begin in July 2009 and continue through April 2010. Symbiotics will provide the results of this study to the stakeholders in the draft final study report.

## **19.9 Progress Reports**

A draft first year study report will be made available September 30, 2010. The applicant will allow 60 days for comment and will incorporate comments into the First Year Study Report to be filed on December 14, 2010. It will summarize findings from the season, and suggest protocol refinements if necessary. A draft final study report will be made available June 30, 2011 following the second study season. The applicant will allow 60 days to comment and will incorporate comments into the Final Study Report to be filed on August 30, 2011.

## **20.0 CULTURAL RESOURCES STUDY**

### **20.1 Purpose and Pertinent Issues**

The objective of this study is to identify the location of archaeological sites or traditional cultural properties that would be impacted by the North Eden Pumped Storage Hydroelectric Project. The goal of this study is to ensure that no archaeological sites or traditional cultural properties are negatively impacted by the hydroelectric project.

### **20.5 Methods**

The Section 106 process of the NHPA is being followed for this survey effort. Compliance under Section 106 will begin with North Eden Hydro LLC and the Utah SHPO reaching agreement on an established APE. Following this, an onsite comprehensive cultural resource assessment survey will be completed by local consulting archaeologists. The survey effort and subsequent reporting will be completed to ensure that there are no archaeological sites or traditional cultural properties that would be negatively impacted by the proposed project. The appropriate tribes will be consulted during the establishment of the APE and the drafting of the Inadvertent Discovery Action Plan (IDAP) to be included as part of the resource assessment survey.

## **21.0 SOCIOECONOMIC STUDY**

### **21.1 Goals and Objectives**

The socioeconomic study plan for the proposed North Eden Pumped Storage Hydroelectric Project is modeled after the Iowa Hill Pumped Storage Socioeconomic Study Plan (SMUD

2004a). It will consist of collecting construction and labor estimates and other project-related data to determine the socioeconomic benefits, costs, and other impacts that construction and operation of the project will have on the surrounding region and public services.

The overall objectives of the study plan will be to:

1. Determine the socioeconomic costs and benefits of the project to Rich County, Utah and Bear Lake County, Idaho
2. Determine the impacts that construction and operation of the project will have on Bear Lake tourism; including impacts from workers traveling to and from work sites, and trucks hauling materials from site to site and from outside sources.
3. Determine the impacts construction and operation activities would have on the lifestyle of occupants in nearby communities of Idaho and Utah.
4. Quantify the economic value of grazing land lost due to construction of the reservoirs.

The following questions will be addressed in the study:

1. What would the short-term effects of project construction be on local services and infrastructure (e.g., police, fire, health, schools, housing)?
2. How will operation and maintenance of the project affect local services and infrastructure in the long-term?
3. How will the project impact growth?
4. What are the potential impacts of a catastrophic failure?

## **21.2 Relevant Resource Management Goals**

Currently there are no existing management goals associated with large developments within Rich or Bear Lake counties. Rich County development codes are intended to promote the efficiency and economy of land development.

## **21.3 Existing Information**

The following sections summarize socioeconomic characteristics of Rich County and its residents.

### **County Workforce Summary**

One in five jobs in Rich County is attributed to the hospitality industry. Tourism and recreation also contribute strongly to the local economy. Livestock grazing, agriculture and feed crops are also important sources of employment, and government positions account for about one-third of the county's overall job market.

According to *Workforce News, Winter 2006*, a publication of the Utah Department of Workforce Services, Rich County has one of the lowest unemployment rates in Utah, reporting a rate of just 2 percent for September of 2006. Recent job growth was also reported to be quite high at 16.4 percent, with well over half of the increase attributed to the accommodations and food service industry. Although employment-based economic indicators revealed positive growth, spending was down by about 2 percent during the second quarter of 2006. Regardless, virtually all economic indicators point to a very positive, local economy (UDWS 2006).

### **Households**

The U.S. Census Bureau reported in 2000 that there were 645 households in Rich County, with an average of 3 persons per household. The median household income was reported to be \$43,077 in 2003.

### **Geographic Mobility**

Rich County's 2000 Census indicates that 65 percent of the population 5 years and older were living in the same residence in 1995. Of the remaining 35 percent, 13 percent had moved from

another residence in the same county, 12 percent from another county in the same state, 8 percent from another state, and 2 percent from “elsewhere.” The state of Utah projects an annual average rate of change for Rich County of 0.7 percent from 2000 to 2050 (Governor’s Office of Planning and Budget, 2005 Baseline Projections).

### **Education**

In 2000, 92 percent of Rich County residents 25 years and over had at least graduated from high school and 22 percent had a bachelor’s degree or higher. Total school enrollment in Rich County was 640 in 2000. Nursery school, preschool and kindergarten enrollment was at 84 with elementary and high school enrollment at 505. College or graduate school enrollment was 51.

### **Industries**

In 2000, for the employed population 16 years and older, the leading industries in Rich County were agriculture, forestry, fishing and hunting, and mining (28 percent); educational, health and social services (20 percent); and retail trade (9 percent).

### **Occupation and Type of Employer**

Among the most common occupations were: management, professional and related fields (38.8 percent); sales and office (18 percent); service (14 percent); construction, extraction and maintenance (13 percent); production, transportation and material moving (9 percent); and farming, fishing and forestry (6 percent). With regard to employer type, 64 percent of those employed earned private wages, 21 percent earned wages from federal, state or local government, and 12 percent were self employed.

### **Travel to Work**

Census figures show that 66 percent of Rich County workers drove to work alone in 2000, 19 percent carpooled and 6 percent walked. Most of the remaining individuals worked at home. Among commuters, the average commute time was 29 minutes.

### **Income**

In 2000, the median income of households in Rich County was \$39,766. Census figures show that 84 percent of the households received earnings and 32 percent received retirement income from Social Security. The average income from Social Security was \$11,522. These income sources were not mutually exclusive, with some households receiving income from more than one source.

### **Poverty**

In 2000, 10 percent of people were impoverished. Of related children under 18, 11 percent were below the poverty level, compared with 6 percent of people 65 years and older. Figures show that about 7 percent of all families and 10 percent of families with only a female householder had incomes below the poverty level.

### **Housing Characteristics**

In 2000, Rich County had a total of 2,408 housing units. Those described as “single-unit detached” accounted for 61 percent, 21 percent were mobile homes and 6 percent consisted of 20 or more units. Of the total housing units, 64 percent were in single unit structures and 21 percent were mobile homes. Nearly half of the units were built between 1970 and 1989.

### **Occupied Housing Unit Characteristics**

In 2000, Rich County had 645 occupied housing units. Of those housing units, 0.5 percent were lacking complete plumbing facilities, 2 percent did not have telephone service and 0.3 percent were lacking complete kitchen facilities. In addition, 3 percent of the households did not have access to a car, truck, or van for private use compared to over 75 percent having more than one vehicle available. Utility gas and bottled, tank or LP gas comprised 76 percent of heating fuel.

## **Housing Costs**

The median monthly cost for mortgaged owners was \$756, non-mortgaged owners \$195, and renters \$354. The median value of owner-occupied units was \$84,300 (U.S. Census Bureau 2000).

### **21.4 Nexus between Project and Proposal**

The project is located near a recreation site, Bear Lake, and also near communities of Utah and Idaho. Construction and operation of the project will have socioeconomic effects on these areas.

### **21.5 Methods**

The study area for the socioeconomic analysis includes Bear Lake County, Idaho and Rich County, Utah. Information for this study will be provided by Symbiotics, the U.S. Census Bureau, and other sources.

Information provided by Symbiotics:

1. Location of the project components
2. Length of construction phase
3. Cost of materials and supplies during construction
4. Approximate cost of materials and supplies during construction that will be spent locally, within Bear Lake and Rich counties, versus non-locally
5. Number of total workforce, including how many workers will be hired locally versus non-locally
6. Total number of construction workforce by month, or peak number of workers and when that peak would occur
7. Summary of construction workforce by craft, or discipline
8. Total construction wages or average construction pay, including benefits
9. Total number of workers required for operation and maintenance of the pumped storage project, and total wages including benefits
10. Approximate cost of materials, supplies, and services during operation that will be spent locally versus non-locally
11. For trucks that would be used: estimate number and size, number of trips per day and week to and from the project site, travel route, and capacity of the roads the trucks will be traveling on
12. Number of acres of grazing land that will be depleted
13. List of benefits the project will provide to Bear Lake and Rich counties

Information provided by U.S. Census Bureau and other sources:

1. Population and housing in Bear Lake and Rich counties
2. Employment by industry and occupation in Bear Lake and Rich counties to determine workforce
3. Local government revenues and expenditures over the last three years
4. Public services activity: enrollment in schools, hospital use and available hospital resources in project vicinity, number of calls to police and fire stations

The study results will focus on the direct, indirect and induced economic benefits to the Bear Lake area. The study will focus on benefits derived from employment opportunities, the infusion of temporary workers on the economy, and the economic benefits derived from construction and operation of the project.

In addition, the analysis will look at impacts associated with increased traffic along Cisco

Road, both during construction and operation. Impacts derived from loss of grazing lands from private landowners and SITLA lands will be examined. The analysis will also look at the impacts of a catastrophic failure on the community and the economy.

### **21.6 Consistency with Accepted Practices**

This type of survey is consistent with other socioeconomic study plans completed during the licensing proceedings for other hydroelectric projects.

### **21.7 Level of Effort and Cost**

The total costs of this study are anticipated to be \$117,000.

### **21.8 Schedule**

The study would begin in late 2009 or early 2010 and continue through August 2010.

### **21.9 Progress Reports**

A draft first year study report will be made available September 30, 2010 following the first year of studies. The applicant will allow 60 days for comment and will incorporate comments into the First Year Study Report to be filed on December 14, 2010. A draft final study report will be made available June 30, 2011. The applicant will allow 60 days to comment and will incorporate comments into the Final Study Report to be filed on August 30, 2011. The socioeconomic report will consist of tables and text demonstrating the economic and socioeconomic impact results of the project relating to fiscal resources, education, public services and public facilities.

## **22.0 PROPERTY VALUE STUDY**

### **22.1 Goals and Objectives**

The goal of the property value study plan is to determine short-term and long-term effects of the project, including the access roads, on the sale value of residential properties.

The overall objectives of the study plan are to:

1. Identify the privately-owned residential properties that are on, or in close proximity to the project area, including the access roads that will be improved or built.
2. Identify the degree to which the viewshed from the residential properties would change as a result of the project.
3. Identify the extent that local properties' sales value will change as a result of the change in viewshed.
4. Use literature to determine the length of time the project will impact property values.

### **22.2 Relevant Resource Management Goals**

The project occurs within lands that are managed by the SITLA and private land owners. Rich County does not have direct authority over SITLA lands; however Rich County has authority over the private lands where a portion of the lower reservoir is located. The county's ordinances generally encourage variety, excellence, and creativity in the design of new development, preservation

of critical open space areas, and preservation of the natural beauty of the area. The county's plans do not contain policies or guidelines specifically addressing the management of visual resources.

### **22.3 Existing Information**

The North Eden Pumped Storage Hydroelectric Project will be located in North Eden Canyon in Rich County, Utah. The project will consist of two dams and reservoirs, the upper on the eastern flank of Black Mountain and the lower in North Eden Canyon. The lower reservoir may

be accessed from State Route 30 by following North Cisco Road around Bear Lake to a privately owned access road. The upper reservoir may be accessed by a county gravel road from South Eden Canyon which degenerates to an unimproved road. Permanent access roads to the dams will be necessary. An access road will be constructed to the upper reservoir, and existing roads will require improvements to withstand heavy equipment traffic and facilitate access.

#### **22.4 Nexus between Project and Proposal**

The project is located on, and near private residential property and may have short-term and long-term effects on the adjacent properties' sale value.

#### **22.5 Methods**

The study area for the property value analysis is defined as all privately owned lands located within a 3-mile radius of the reservoir sites and the project-related transmission line, as well as privately owned properties that are adjacent to the roads that will be improved or built.

The applicant will:

1. Determine the locations of privately-owned parcels of land within 3 miles of the proposed project and roads that have current residents, or are zoned for residential use.
2. Use results from the visual resources study (Section 19.0) to establish the parcels of land from which the project facilities may be seen, and to what extent the project will alter the viewshed from each parcel.
3. Collect qualitative and quantitative data on recent real estate trends in the project area.
4. Find similar studies that have been completed on the impact of electric power generating facilities, substations, transmission lines, and comparable infrastructure facilities on property values.

A map will be created marking the locations of privately-owned residential, or zoned for residential parcels of land within 3 miles of the proposed project. This map will be overlaid with the results from the viewshed analysis to identify the properties from which project features could be visible. For the parcels of land from which the project may be seen, photographs will be taken to show where the project may be visible from the property site. The same assessment will be done for the properties adjacent to the roads that will be improved or built. The effects of access roads on the property value of adjacent properties will be determined based on research examining the effects of existing roads on the values of comparable properties in the local area. Current sales trends will be determined using information from the County Assessor's office, and current market trends will be ascertained through interviews with local real estate brokers.

The nature and degree to which the project may be seen from each individual property will be determined using the simulated views prepared in the visual resources study. Assessment of those views with respect to each of the residential properties in the project viewshed and their approximate distance to the various project features will be established. The short and longterm effects of the project on the sales value of each property will be estimated.

#### **22.6 Consistency with Accepted Practices**

This type of survey is consistent with property value study plans completed during the licensing proceedings for other hydroelectric projects.

#### **22.7 Level of Effort and Cost**

The cost for study is estimated at \$44,800 for data collection and reporting.

#### **22.8 Schedule**

The study will begin in January 2010 and continue through December 2010. Symbiotics will provide the results of this study to the stakeholders in the draft first year study report on June

30, 2010.

### **22.9 Progress Reports**

A draft final study report will be made available June 30, 2011. The applicant will allow 60 days to comment and will incorporate comments into the Final Study Report to be filed on August 30, 2011. The technical report will consist of maps showing the current views of the project site from the residential/potential residential parcels of land, and the stimulated views from the properties. Tables and text will be used to summarize these viewshed changes, and to cite and summarize literature that illustrates the extent to which the project will affect residential property values within the project vicinity. Based on research conducted on values of comparable properties in the local area that are located next to improved and unimproved roads, the report will also include an assessment of the implications of the access road improvements and construction.