

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter evaluates the environmental consequences that would result from implementation of the Proposed Action, Alternative 1, or No Action. The impact analysis for environmental consequences focuses on potential direct, indirect, and cumulative effects on resources described in Chapter 3.0 - Affected Environment. In most cases, impacts are categorized and described in general terms without reference to facility type or location.

Direct effects are impacts that are caused by the Proposed Action or Alternative 1 and occur at the same time and place. Direct effects are those impacts resulting from the granting of the ROW by the BLM and subsequent construction and operation of facilities under the Proposed Action or Alternative 1. Indirect effects are those impacts that are caused by the Proposed Action or Alternative 1 and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include the effects of the withdrawal of groundwater, growth-inducing effects, and other effects related to induced changes in the pattern of land use, changes to the population density or growth rate, and related effects on the physical attributes of associated ecosystems.

The cumulative effects analysis is focused on the potential effects (direct and indirect) of construction, operation, and maintenance of the Proposed Action or Alternative 1 combined with other past, present, and reasonably foreseeable future actions that could have effects in the ROI. As described in Chapter 3.0, the ROI varies depending on the resource being analyzed and the predicted locations of direct and indirect impacts from the Proposed Action or Alternative 1.

Assumptions for Analysis

Certain assumptions were considered when analyzing effects of the Proposed Action and Alternative 1 on the environment. For example, the BLM has no jurisdictional authority over water rights, pumping rates, distribution, use, and volume of water to be pumped and conveyed through the Lincoln County Groundwater Development Project.

The NSE has addressed issues pertaining to groundwater withdrawal from the Tule Desert Hydrographic Area in 2002 (Ruling #5181 presented in **Appendix A1**). While the NSE has granted an appropriation of 2,100 AFY to the LCWD for groundwater withdrawal within the Tule Desert Hydrographic Area, LCWD's ROW application to the BLM is for a project designed to develop and convey groundwater from the Tule Desert and Clover Valley to the proposed LCLA development in the Virgin River Valley. The exact amount of groundwater granted to the LCWD in the future will be determined through the separate process established by the NSE. Therefore, the analysis in this EIS is reflective of how environmental, social, and economic resources would be affected as a result of the Proposed Action or Alternative 1 as described in Chapter 2.

It is also important to note that project features described in Chapter 2.0 were designed only to the feasibility level, which represents reasonable approximations for assessing potential project impacts. When engineering designs are complete, the Applicant will submit a final POD that incorporates site-specific stipulations, and terms and conditions associated with the BLM ROW grant and any other agency approvals.

Incomplete and Unavailable Information

The CEQ (1502.22) requires agencies to obtain information if it is “relevant to reasonably foreseeable significant adverse impacts,” if it is “essential to a reasoned choice among alternatives,” and if, “the overall costs of obtaining it are not exorbitant.” The costs are measured not only in money but also in time.

Environmental resource data were collected and analyzed to the level of detail necessary to understand potential impacts and to distinguish project effects (both beneficial and adverse) among the Proposed Action and alternatives. The data analyzed in this EIS are the best available representation of current and predicted conditions at this time. However, there is a level of uncertainty associated with any set of data in terms of predicting impacts, especially where natural systems are involved.

Due to the uncertainties related to hydrogeological systems, there exist differences of opinion among scientists, hydrologists and other interested parties regarding groundwater flow and availability within a given region. Very little hydrological information is available for Clover Valley due to its remoteness and lack of development. The current understanding is thus based on analogy with similar flow systems and recent data from a well siting investigation by the Applicant (LCWD and Vidler 2008). For the Tule Desert area, general studies began in 1915 (Carpenter 1915, as cited in BLM 2003). More recently, extensive subsurface investigations have been performed over the last few years and various aquifer characterization studies have been performed (CH2MHill, 2002a, LCWD and Vidler 2008). Due to the inherent hydrogeologic complexity of the basin, there is still insufficient information for complete agreement among investigators on the details of the flow system. Therefore, the analysis in this EIS relies on the synthesis of the best available data at this time.

4.1 GEOLOGIC RESOURCES

This section presents discussions of the potential impacts associated with the Proposed Action, Alternative 1, and No Action Alternative as they affect geological resources within the project area.

4.1.1 Methods

The environmental consequences resulting from implementation of the Proposed Action and the alternatives were analyzed by comparing the current conditions described in Chapter 3.0 to the conditions that would be expected after implementation of the Proposed Action. Two categories of impacts on geology were evaluated: 1) direct and indirect impacts resulting from project construction and 2) direct and indirect impacts resulting from project operation and maintenance. Impacts from naturally occurring seismic activity on the project components are also analyzed in this section.

4.1.2 Proposed Action

4.1.2.1 Geology

Construction activities would be limited to shallow trenching (up to 6 feet) within the permitted

ROW located primarily adjacent to existing dirt and gravel roads, or adjacent to previously disturbed utility corridors. Final facility locations would be based on additional geologic and hydrogeologic investigations, and would be included in the Applicant's Final POD.

Any blasting activities, if necessary, would be conducted in accordance with applicable state and federal permits and authorizations, as well as the stipulations of local ordinances as outlined in the Applicant's Blasting Plan.

Up to 30 groundwater wells may be constructed under the Proposed Action. The Applicant is required to adhere to Nevada rules and regulations (e.g., NRS Chapter 534) and applicable industry standards regarding drilling, testing, and completion procedures during well construction.

Groundwater withdrawal from the proposed wells and use of water for development is not expected to affect geological features in the project area. It is anticipated that the groundwater pumping would occur in the deep fractured-rock aquifer rather than valley fill deposits. Potential impacts from such activity would not be expected to contribute to regional land subsidence in the area. No direct or indirect impacts to geologic resources from project construction, operation, or maintenance are expected to occur under the Proposed Action.

4.1.2.2 Seismicity

Seismic activity has historically occurred in the project area and would be expected to occur in the future in response to natural processes. Construction, operation, and maintenance of the Proposed Action would have no direct or indirect impacts on seismic activity in the area. However, seismic activity may potentially impact project components.

All project components would be constructed and operated in accordance with applicable regulations and engineering protocols and safety standards to minimize potential impacts to structures (including water and natural gas pipelines) from seismic activity. Environmental consequences related to pipeline breaks or leaks (such as those resulting from seismic activities) are addressed in Chapter 2.

4.1.3 Alternative 1

Impacts to geologic resources under Alternative 1 would be the same as those described under the Proposed Action.

4.1.4 No Action Alternative

Under the No Action Alternative, the ROW on federal lands would not be granted. No ground disturbance associated with the project would occur, and no facilities would be constructed on BLM-managed lands. The LCWD would still be authorized to utilize any groundwater resources permitted by the NSE for pumping in Clover and Tule Desert basins. No project-related impacts to geologic resources would occur under this alternative.

4.1.5 Mitigation

No mitigation is required.

4.2 SOIL RESOURCES

4.2.1 Methods

The environmental consequences resulting from implementation of the Proposed Action and the alternatives were analyzed by comparing the existing soils conditions described in Chapter 3.0 to the conditions that would be expected after implementation of the Proposed Action. Impacts to soil resources are characterized by description of the impact and quantification of the impacted disturbance where applicable. Two categories of impacts were evaluated – temporary or short-term impacts resulting primarily from disturbance related to project construction and long-term impacts. Risk of land subsidence was analyzed based on results from field testing conducted by CH2MHill (2002a).

4.2.2 Proposed Action

4.2.2.1 Soils

Approximately 1,878 acres of land would be temporarily disturbed by the Proposed Action during construction. Approximately 240 acres would remain permanently impacted by aboveground project components.

Short-term direct impacts that would result from construction activities include increased soil compaction and erosion potential from wind and water and chemical changes resulting from mixing surface soils with subsoil during salvage activities. These effects would be influenced by the extent of disturbance, surface soil texture, soil cover, slope steepness, and intensity of storm events.

Soils would exhibit an increased susceptibility to erosion after construction until vegetation can reestablish. This increased susceptibility to erosion would be compounded within the area that was burned in 2005. Higher erosion rates after fires can result from 1) the decrease in vegetative litter and cover, 2) changes in soil properties including the loss of organic matter and formation of a water-repellent layer, and 3) increased erosion due to the increase in overland flow.

Shallow excavations may pose certain construction challenges depending on the depth to bedrock, slope, presence of cemented pans, and presence of cutbanks that may collapse. Special construction procedures may be required in these areas.

Soil stabilization measures would be initiated after construction ceases. Topsoil would be evenly distributed across areas from where it was salvaged and seeded with native, drought-tolerant species of plants as directed by the BLM. The contractor(s) would be responsible for replacement of lost or degraded (mixed) topsoil with topsoil imported from a weed-free source approved by the BLM. Restored topsoil will be left in a roughened condition to discourage erosion and enhance the quality of the seedbed.

During construction, the selected erosion and sediment control BMPs would be based on the type

of disturbance expected, soil type, and the location of the site in relation to sensitive resources. Detailed applicant proposed environmental protection measures specific to soil resources can be found in Appendix C - Standard Construction and Operation Procedures (Reference Numbers ESC-1 thru ESC-7, PUCC-1 thru PUCC-3, V-3).

4.2.2.2 Landslides and Subsidence

Within the Tule Desert, slopes are primarily level to gently sloping. The risk of landslides in this area should not be increased by the construction of the Proposed Action. However, in the Clover Mountains, particularly in the East Pass area, construction would accommodate more than 4,000 vertical feet of elevation change along the proposed route. The risk of landslides in this area would be increased by the Proposed Action.

No caves or sinkholes have been identified in the ROI.

Land subsidence can occur from compaction of the aquifer system, dissolution, and collapse of rocks following groundwater withdrawal and dewatering of organic soils. Subsidence primarily occurs where groundwater drawdown occurs in unconsolidated sediments, namely valley fill deposits. In 2002, CH2MHill (2002a) evaluated the potential for land subsidence in two areas of the basin-fill deposits within the Tule Desert. The first location is in the vicinity of well MW-2, and the second is in the vicinity of PW-1 and MW-4. In both cases, they found that site conditions allowed for a maximum amount of settlement of 0.3 and 0.6 inch based on a reduction in porosity of less than 1 percent. The Proposed Action is not expected to have an impact on valley fill deposits or contribute to land subsidence in the ROI.

4.2.3 Alternative 1

Impacts to soil resources under Alternative 1 would be the same as those described under the Proposed Action. The Proposed Action and Alternative 1 differ primarily in the location of the proposed ROW alignment in the Tule Desert (see **Figure 2-1**). The acreages of particular soil types disturbed under Alternative 1 would vary slightly from those of the Proposed Action; however, the impacts would be the same.

4.2.4 No Action Alternative

Soil resources on federal lands would not be disturbed by implementation of the project under the No Action Alternative.

4.2.5 Mitigation

No additional mitigation is required.

4.3 WATER RESOURCES

Impacts to water resources are discussed in terms of potential impacts resulting from project construction and project operation. Direct and indirect impacts resulting from project construction are discussed in Section 4.3.1.1. Direct and indirect impacts resulting from project operation are discussed into two sections: impacts to surface water resources (Section 4.3.1.2) and impacts to groundwater resources (Section 4.3.1.3). Analysis of impacts also includes the potential for interaction between groundwater and surface water, which is discussed in all three sections.

As mentioned previously, it should be emphasized that the BLM has no jurisdictional authority over water rights, pumping rates, distribution, use, and volume of water to be pumped and conveyed as part of the Proposed Action. However, the BLM acknowledges that granting of a ROW for a pipeline to transport water across BLM land might influence the use of the water and hence is including discussion of groundwater impacts in this document. The NSE has addressed issues pertaining to groundwater withdrawal from the Tule Desert Hydrographic Area and so far has granted an appropriation of 2,100 AFY to the LCWD in 2002 (Ruling #5181). The exact amount of groundwater granted to the LCWD in the future will be determined through the process established by the NSE. Ruling #5181 also contained a provision that no additional water would be granted until the Applicant submitted additional studies which include the amount of underground water available, recharge and the direction of groundwater flow. The ruling also required that the Stipulated Agreement for Dismissal of Protests between the NPS and the Applicant be submitted to the NSE for review and approval, but would not be binding upon the NSE (Appendix A). The stipulation is for Monitoring, Management and Mitigation for Future Permitted Groundwater Development in Tule Desert. Among other things, the agreement calls for a Technical Review Panel (TRP) to provide a forum for review of hydrogeologic data and develop mitigation plans, if necessary. A similar Water Resource Monitoring and Management Plan has been proposed for Clover Valley (Appendix B).

4.3.1 Proposed Action

Under the Proposed Action, LCWD is proposing to construct infrastructure required to pump and convey groundwater resources in the Clover Valley and Tule Desert Hydrographic Areas to the proposed LCLA development area, north of Mesquite. The Proposed Action would enable construction of project components resulting in disturbance of federal lands and in groundwater pumping from proposed well fields in Clover Valley and Tule Desert. Impacts from the Proposed Action are described in the following sections.

4.3.1.1 *Impacts from Construction*

4.3.1.1.1 Methods

The environmental impacts on water resources resulting from construction phase of the Proposed Action were analyzed by comparing the current conditions described in Chapter 3.0 to the conditions that would be expected to result from construction as described under the Proposed Action.

4.3.1.1.2 Impacts to Water Resources from Construction

Potential impacts to water resources during construction would be primarily associated with surface disturbing activities, but could also be a result of accidental spills, handling and storage of hazardous chemicals, and discharge of hydrostatic testing water.

Use of heavy construction equipment would cause compaction of near surface soils that could result in increased runoff and, subsequently, increased sedimentation. Clearing and grading during construction would expose the soils to erosion. Construction activities could also temporarily alter the overland flow and consequently the groundwater recharge patterns. The alteration of the natural soils strata by earthworks could reduce the soils' ability to absorb water resulting in ponding and/or alter existing groundwater pathways for groundwater. These effects, if they occurred, would be temporary and minor. No records are available on depth to local groundwater in the Clover Valley, but domestic and stock wells have been drilled to between 38 and 499 feet below grade. In the Tule Desert, groundwater is generally more than 380 ft bgs. Water levels within the basin-fill in lower Meadow Valley Wash are relatively shallow; however, no construction activities would occur in Meadow Valley Wash Hydrographic Area. Due to the greater depths to groundwater in the vicinity of the proposed ROW, no impacts to groundwater resulting from construction activities are anticipated. Additionally, the Applicant would implement site-specific BMPs, as presented in *Appendix C – Standard Construction and Operation Procedures*, to minimize erosion and sedimentation during construction. Measures that would minimize impacts on water resources from sedimentation and erosion include ESC 1 - 7, LP 1-7, and WP 3-5.

The proposed ROW would cross numerous ephemeral washes including Pine Wash in Clover Valley and Toquop Wash in Tule Desert area. These washes are generally dry and only carry water during periods of heavy rainfall, most often associated with summer thunderstorms or during the spring snowmelt. Potential impacts might result from suspension of sediment caused by in-stream construction and erosion of cleared stream banks and ROWs. Construction activities within these drainages would be localized and short-term. All the drainage crossings would be restored at the completion of pipeline construction, and no changes in drainage patterns would be anticipated to occur.

Water quality in the washes could be degraded by the addition of suspended solids from increased erosion during precipitation events. The Proposed Action would be permitted under the NPDES General Permit for construction projects and would implement a SWPPP. Because the original drainages would be restored, and the surface would be stabilized after construction, sedimentation would not exceed current levels typical of desert wash systems (*Appendix C*, WP 5 and 6). Storage, handling, and disposal of fluids from drilling boreholes also present potential for contamination. However, all the drilling fluids would be stored and handled according to environmental protection measures outlined in the Spill Prevention Containment and Countermeasure (SPCC) Plan developed for the Proposed Action.

The potential for accidental spills and leaks of equipment fluids, such as gasoline and oil, increases during construction activities. Vehicle refueling, equipment failure, and storage of hazardous substances create potential for surface contamination if a spill were to occur. The SPCC Plan developed for the Proposed Action also outlines spill prevention practices, emergency response and cleanup procedures, and storage protocols. All contractors involved

with the construction of the Proposed Action would be required to adhere to the protocols outlined in the SPCC and environmental protection measures described in **Appendix C**. Impacts from accidental spills and leaks would be minimized by measures LP-5, WP-7, and HM-1 thru HM-12 (**Appendix C**).

Potential impacts to water quality and quantity could also result from withdrawal and discharge of water used for hydrostatic testing. Approximately 32 million gallons of water would be required for testing the transmission pipelines, and up to 300,000 gallons would be required to test the natural gas pipelines. The primary source of the water would be from production wells. The nature of potential impacts would be the same as with those from withdrawals during operations, but significantly lower in magnitude. The amount of water required for hydrostatic testing represents approximately 0.4 percent of the proposed maximum annual pumping rate of 23,820 AFY during operation and approximately 4 percent of the 2,100 AFY already approved by the NSE. This volume is, therefore, considered negligible when compared to that required for the Proposed Action.

Water used for hydrostatic testing of the water and natural gas pipelines would be surface discharged within the ROW and has the potential to result in increased erosion and sedimentation. These discharges would be localized, and the discharge rates would be controlled to minimize impacts. The LCWD would obtain a temporary NPDES permit prior to construction (**Appendix C**, WP-5). In addition, LCWD has developed a Hydrostatic Test Dewatering Plan that describes appropriate measures to minimize environmental impacts. No impacts to water quality would be anticipated because all of the discharged water would have to meet the regulatory water quality discharge criteria.

The installation of water and gas pipelines in or near drainage features may increase the potential for pipeline scour during heavy rainfall events. All transmission pipelines would be buried to a depth of three times the scour thickness to prevent scour and degradation.

No direct or indirect impacts to water resources resulting from project construction are anticipated to occur under the Proposed Action.

4.3.1.2 Impacts to Surface Water Resources from Operation

4.3.1.2.1 Methods

The environmental consequences to surface water resources resulting from implementation of the Proposed Action were analyzed by comparing the current conditions described in Chapter 3.0 to the conditions that would be expected after implementation of the Proposed Action. There is a level of uncertainty associated with limited data availability and resulting differing scientific opinions regarding the groundwater/surface water interaction within the ROI; thus, this analysis was based on the best available representation of current and predicted conditions at this time.

4.3.1.2.2 Clover Valley and Lower Meadow Valley Wash Hydrographic Areas

Potential impacts during the operation and maintenance phase would be primarily associated with effects related to groundwater pumping. In situations where pumped groundwater is connected to surface water, surface water quantity and/or quality could be affected and could have an adverse impact on surface water users.

Available information on local surface water/groundwater interaction in the Clover Valley is limited. To date, no studies have been conducted to identify the recharge and discharge from the deep fractured aquifer and its interconnection with surface water in the Clover Valley.

A conceptual stratigraphic column that illustrates the geologic units and their hydrologic significance was developed to aid in understanding the regional groundwater flow system and its relationship to local surface water features in the Clover Valley (**Figure 3-9**). For illustration, this figure also shows a proposed production well completed in the Tertiary intrusive rocks and local springs.

This stratigraphic column shows that there is significant amount (more than 3,000 feet) of volcanic material overlying the anticipated fractured-rock aquifer. The overlying tuffs, ash flows, and other extrusive volcanics appear to form a highly extensive confining unit above targeted aquifer zone thought to be either the Tertiary intrusives of the caldera or the Paleozoic carbonate rocks. Should future local drill holes verify these stratigraphic relationships, they would confirm that the confining unit would serve as a hydraulic barrier between the surficial and the deep fractured flow system. This project intends to only install groundwater extraction wells in the deep aquifer.

Surface water features in the Clover Valley are mostly ephemeral or man-made. Clover Creek becomes intermittent just downstream of Big Spring, which provides the majority of water to the creek (MVCCTRT 2000). A hydrogeochemical survey in the Clover Mountains by the USGS found 31 springs, which “at times dry up in the summer” (McHugh and Ficklin 1984). These local sources of water are likely confined to younger alluvium or where the ash flow tuffs have been eroded, and where precipitation and snow melt infiltrates locally and then discharges more slowly over time (LCWD and Vidler 2008).

Isotope analysis used for tracing the origin of water discharging from local water features in the Clover Valley also suggests that these surface water features are not hydraulically connected to the deep regional fractured flow system in Clover Valley (CH2MHill 2002a, 2002b). Thus, based on the best available current data, it is unlikely that pumping from the fractured rock would affect the surface water resources in the Clover Valley.

Similarly, no site-specific studies are currently available on interaction between the fractured-rock groundwater in the Clover Valley and surface water in the lower Meadow Valley Wash Hydrographic Area. However, based on isotope studies by CH2MHill (2002b), deuterium abundances from one surface water sample (Cottonwood Creek) and one spring sample (Mudhole Spring), located in the northeastern part of the Meadow Valley Wash Hydrographic Area, do not correspond to values in deep, regionally flowing groundwater. Accordingly, the data suggest that surface water at this part of the lower Meadow Valley Wash is not connected with the deep regional aquifer and, therefore, impacts to surface water flows in Meadow Valley Wash are not anticipated.

Although impacts in the Clover Valley and Meadow Valley Wash are not anticipated, there is some uncertainty because of the limited availability of data. Forthcoming data associated with the monitoring requirements established in the Water Resources Monitoring and Management Plan for Future Pumping in Clover Valley (**Appendix B**) are expected to reduce these uncertainties.

4.3.1.2.3 Tule Desert and Virgin River Valley Hydrographic Areas

There are no perennial expressions of surface water within the Tule Desert Hydrographic Area. All surface water features (including local springs) in the Tule Desert are ephemeral and do not appear to be recharged by regional groundwater. Impacts to local springs are further discussed below. The water for the project would be pumped from the deep carbonate aquifer which, based on the isotope data discussed in Section 3.3, does not have a significant direct or indirect connection to surface water resources (LCWD and Vidler 2008); therefore, no impacts to surface water resources in the Tule Desert Hydrographic Area are anticipated.

Current information on discharge rates and chemical composition indicates that there is no connection between the flows in the Virgin River and the deep groundwater in the Tule Desert. Additionally, it has been demonstrated that the Virgin River naturally loses flow through infiltration and evaporation along this area (BLM 2003). Therefore, the flow in the downstream Virgin River is not expected to be affected by pumping in the Tule Desert.

Although no impacts to the Virgin River are anticipated from proposed pumping in the Tule Desert, the NPS, in cooperation with the USGS, has agreed to operate and maintain a stream gaging station on the Virgin River within the Lake Mead NRA as part of the Stipulation Agreement between NPS and LCWD (**Appendix A2**). This gaging station will detect changes in streamflows in the Virgin River. BLM would continue to coordinate with LCWD and NPS to ensure that the Proposed Action would not adversely impact Virgin River flows.

4.3.1.3 *Impacts to Groundwater Resources from Operation*

Potential impacts related to project operation and maintenance would be related to groundwater withdrawals. The project ROI encompasses two distinct hydrographic basins with differing hydrogeologic conditions. The Proposed Action would include removal of groundwater from the regional fractured-rock aquifer at two well field locations and transferring this water to the proposed LCLA development area. Impacts from groundwater withdrawals are analyzed herein in terms of potential adverse effects on aquifer levels (drawdown) and water quality. Potential project-induced effects on local and regional springs and water users are also discussed.

4.3.1.3.1 Methods

Impacts on groundwater resources are characterized by a description of the impact and how the resource would be affected. Generally, impacts to groundwater can be measured by changes in aquifer levels and water quality as determined from monitor wells. To date, two such wells have been installed in Tule Desert (FF-1 and FF2B). Additional wells may be installed in the future as part of the Monitoring and Mitigation Plans discussed in section 4.3.4 and included in Appendices A and B. The current impact analysis is based on the best available representations of current and predicted conditions at this time. However, as discussed above, there is currently a level of uncertainty associated with the limited data available which will only be rectified as future measurements are conducted.

It is currently recognized that there is a lack of data in three principal areas associated with the assessment of the environmental consequences to groundwater resources:

- The amount and movement of groundwater in the basin-filled deposits within the ROI

- The amount and movement of groundwater in the deeper carbonate and fractured-rock aquifer underlying the ROI (Future discussion will not differentiate between the carbonate and fractured-rock areas of the deep aquifer and will simply refer to the deep flow as occurring in the fractured-rock aquifer)
- The location and amount of groundwater discharge and recharge from/to the carbonate aquifer underlying the ROI.

This lack of data may lead to a lack of assurance on the degree of potential environmental consequences as a result of implementation of any of the alternatives.

The analysis of potential effects from the Proposed Action is based primarily on five reports specific to the area. These reports include "*Focused Hydrologic Assessment of the Tule Desert Hydrographic Area Including Relevant Aspects of the Virgin River Hydrographic Area in Southern Nevada*" prepared by CH2MHill (2002a), three reports by Vidler (2007b, 2007c, and 2007d) titled: "*Tule Desert Spring Impacts*", "*Clover Valley Impact Analysis*", and "*Tule Desert Impact Analysis*" and most recently a report by Peter Mock Groundwater Consulting, Inc. (Mock, 2008) entitled "*Projection of Groundwater Impacts in Response to Proposed Pumping from Beneath the Tule Desert in Southeastern Nevada Using MODFLOW-2000*". These reports contain a more detailed discussion and analysis of many of the groundwater-related topics presented in this EIS. Additional sources of information have been cited where they were used to disclose the potential impacts associated with the Proposed Action.

4.3.1.3.2 Drawdown and Depletion on Groundwater Resources

Clover Valley Hydrographic Area

In the Clover Valley, impacts to groundwater quantity would consist of removal of 14,480 AFY from the fractured-rock aquifer. Proposed groundwater withdrawals would occur from up to 15 production wells located between Clover Creek and the Clover Mountains in the southern part of the Clover Valley Hydrographic Area.

Available information on local hydrogeology of the Clover Valley is limited. To date, no studies have been conducted to identify the location and amount of groundwater recharge and discharge from the fractured-rock aquifer or its interconnection with overlying basin-fill in the area. In the absence of these data, it was not feasible to conduct groundwater modeling to predict the impacts. Rather, the analysis presented here relies on a conceptual evaluation of potential impacts based on a synthesis of known geologic and hydrogeologic information.

To determine potential impacts from groundwater withdrawals in Clover Valley, a conceptual geologic model of what is known about the geology with respect to the regional groundwater flow system was developed by Vidler (2007c). The criteria used to conceptualize the regional groundwater flow system within Clover Valley include the following:

- Presence of fractured rock represented by either the Paleozoic carbonate formation or the Tertiary intrusive volcanic rock that forms the interior of the multiple calderas within Clover Valley.

- Secondary porosity of the fractured rock that would provide conduits for groundwater flow. This groundwater flow would have to be in such volume and sustainability that it is economically viable to sustain production from wells drilled into the fractured-rock aquifer. Groundwater has been demonstrated to be economically produced from the deep large-diameter wells in the nearby Tule Desert, Kane Springs Valley, and Coyote Spring Valley.
- Presence of a confining unit represented by more than 3,000 feet of volcanic material which could serve as a hydraulic barrier between the local and the fractured-rock aquifers.
- Acceptable groundwater quality as judged from isotope and other geochemical analysis of water from test wells completed in the fractured-rock aquifers beneath Tule Desert and Kane Springs Valley.. Generally, such data can be used to determine if a recharge source is far away and from a high elevation or from an alluvial or spring system where isotope and other geochemical analysis would indicate a locally derived source (CH2MHill 2002; Vidler 2007c).

The conceptual flow system and stratigraphic column presented in **Figures 3-8 and 3-9** illustrate the geologic units and their hydrologic significance with respect to the regional groundwater flow system and their relationship to local springs and surface water in the Clover Valley.

The conceptual regional flow system depicted in **Figure 3-8** and discussed in Section 3.3.2.3 is similar to that found at the project area with the regional flow system represented by the fractured-rock aquifer that is believed to exist beneath the Clover Valley and observed in bore holes beneath the Tule Desert areas. The fine-grained impermeable consolidated rock is represented by the tuff and ash flows expected beneath Clover Valley. **Figure 3-9** shows that the overlying tuffs, ash flows, and other extrusive volcanics form an extensive unit above either the Tertiary intrusives of the caldera, and therefore could serve as a hydraulic confining barrier between the local and the fractured-rock aquifers. Beneath the confining units, the volcanic intrusives are anticipated to be highly fractured and faulted and would form the basis of the regional fracture flow system in Clover Valley.

While there is insufficient information to confirm the presence of the regional flow system beneath Clover Valley, groundwater levels can be mapped as a continuum from the White Pine County boundary (80 miles north of Caliente) to the Virgin River (south of the project area) (**Map 3-6**). The regularity of the contours is caused by a constant gradient which indicates uniform flow conditions across the area of influence. Until test wells are installed to determine the local hydraulic parameters, it is not possible to quantify the predicted drawdown from pumping in the Clover Valley; however, based on the conceptual model defined above, it can be hypothesized that any drawdown related to pumping would occur at considerable depths and would most likely be independent of surface hydrologic conditions.

Furthermore, local wells in the Clover Valley are completed in the younger alluvium or in one of the extrusive volcanic units that are relatively shallow. Therefore, impacts to local users resulting from pumping at planned depths between 1,200 and 1,500 ft bgs are not anticipated. However, the possibility that some degree of communication may exist cannot be ruled out based on the currently available data.

The LCWD intends to monitor the groundwater levels in two exploration wells (CMW-1 and CMW-2) and several private and/or BLM-managed wells, as described in Attachment A of the Water Resources Monitoring and Management Plan for Future Pumping in Clover Valley (**Appendix B**).

Tule Desert Hydrographic Area

The potential impacts to water resources from withdrawals in the Tule Desert well field were previously evaluated by utilizing the results from the report titled “*Focused Hydrologic Assessment of the Tule Desert Hydrographic Area Including Relevant Aspects of the Virgin River Hydrographic Area in Southern Nevada*” prepared by CH2MHill (2002a) for Toquop Energy, Inc. Pursuant to Ruling No. 5181 (November 26, 2002), the NSE ruled that application 64692 be held in abeyance until further water resources studies in the Tule Desert are conducted. As outlined by the ruling, the additional studies of Tule Desert must include the determination of the amount of groundwater available in the basin, groundwater recharge to the basin, and direction of groundwater flow.

As part of its continuing effort to secure new water rights within the Tule Desert Basin, the LCWD has continued to acquire new hydrogeologic information which was recently presented to the NSE and peer reviewed by the USGS (Berger 2008). The USGS, in cooperation with the NDWR and the NPS, provided a thorough technical peer review that primarily focused on the scientific merit of the methodologies and interpretations presented in the following five reports prepared for LCWD and Vidler.

1. Tule Desert Groundwater Resources Study, Additional Data Submitted, prepared by Vidler Water Company, January 16, 2008.
2. Technical Memorandum Supplement to Groundwater Chemistry of the Tule Desert and Surrounding Hydrographic Areas in Southeastern Nevada and Potential Groundwater Interflow Between Basins, prepared by CH2MHill, December 24, 2007.
3. Mean Annual Recharge for the Tule Desert Hydrographic Basin, Lincoln County, Nevada, prepared by DBS&A, January 8, 2008.
4. Addendum to Mean Annual Recharge for the Tule Desert Hydrographic Basin, Lincoln County, Nevada, prepared by DBS&A, April 14, 2008.
5. Tule Desert and Surrounding Areas Numerical Groundwater Flow Model Report, prepared by Peter Mock Groundwater Consulting, Inc., June 24, 2008.

The USGS found that the scientific conclusions presented in the five reports were generally well document and for the most part, appropriate measures were used. The three major criticisms of the studies are the use of precipitation data, inappropriate application of the Maxey-Eakin method for estimating groundwater recharge, and the lack of calibration of the ground water flow model (Berger et al. 2008).

It was determined as part of the EIS for the Toquop Energy Project, that pumping water from the fractured-rock (carbonate) aquifer in the Tule Desert in the amount and rates requested, would

not result in a substantial decline of groundwater levels or reduction in groundwater resources (BLM 2003). The model used predicted that groundwater levels in the Tule Desert would be lowered as a result of the projected pumping, but not to the extent that a significant reduction in the amount of available groundwater resources would occur (CH2MHill 2002a). Since then, new observational data has been obtained from a second production well and a new groundwater flow model has been developed (Mock 2008).

The recent studies cited above indicate that the withdrawal of groundwater would create a cone of depression (zone of influence) around the pumping wells, whereby the water table is lowered, establishing a larger hydraulic gradient that allows groundwater to flow toward the wells. The magnitude and extent (vertical and lateral) of this cone of depression depends on each well's pumping rate and hydraulic characteristics of the aquifer, including hydraulic conductivity, transmissivity, storativity, recharge and discharge locations, confining zones, and other geologic bounding conditions. A groundwater cone of depression would expand in time after startup and increase with pumping until a balance is reached between recharge and discharge within the radius of influence.

Table 3-8, in Chapter 3, summarizes the aquifer tests that have been performed to date and the resulting hydrogeologic properties. The data used for the Toquop EIS were obtained primarily from the testing conducted on well PW-1 (Hydrosystems, Inc. 2002, as cited in Vidler 2007d and CH2MHill 2002a). More recently, six additional wells have been installed and tested (LCWD and Vidler 2008). The new data from the testing of wells PW-1, PW-2, FF-1 and FF2b, which are completed in the fractured-rock aquifer, indicate that the transmissivity ranges from approximately 3,500 to 27,000 gpd/ft. These new results are similar to the value of 14,500 gpd/ft used by CH2MHill for the Toquop EIS (CH2MHill 2002a).

The regional flow in the carbonate aquifer was discussed in Section 3.3.2.2 and is shown in **Map 3-6**. The data for this map was compiled by LCWD and Vidler (2008) and presented to the NSE in January 2008. Direct observations of the amount of drawdown were also summarized in Section 3.3.2.3.2 and showed that:

- While pumping at test well PW-1 at 1,000 gpm for nine days; no effect was seen in the Tule Desert well (located 2.11 miles away), well MW-2 (at 3.85 miles) nor MW-3 (at 6.17 miles).
- In a separate test, following pumping of well PW-1 for 25 hours at 600 gpm; well MW-4 which is located 345.5 feet away and screened in the deep aquifer showed a drawdown of approximately 5 feet, and MW-5 which is located 320.5 feet away and screened in the alluvial aquifer showed a drawdown of approximately 3 ft.
- A second test well, PW-2 was installed in July 2007. It was tested for 7 days at 1,000 gpm. The nearest alluvial well, the Tule Desert Well located 0.25 miles to the southwest, showed no response to the pumping.

As a result, it appears that there is slight hydraulic interconnection between the two aquifers at the local scale, but that this effect becomes unmeasurable at greater distances. Two numerical flow models have been constructed to predict the effect at greater distances.

Impact analyses conducted for the proposed Toquop Energy Project used a single layer numerical model (MODFLOW), four extraction wells pumping at 1,100 gpm each, homogeneous geologic layers for the hydraulic properties and a regional gradient set by boundary conditions across the model domain (CH2MHill 2002a). Pumping was assumed to be continuous for 42 years. The results indicated that the proposed groundwater withdrawal would:

- Lower the water levels in the carbonate aquifer by approximately 45 feet within a radius of approximately 1,000 feet from the edge of the proposed well field;
- Result in the maximum drawdown on the production well remaining above the top of the fractured-rock aquifer and that no dewatering of the aquifer would occur;
- Cause an approximate 5-foot drawdown (at the pumping depth) at a distance of 4,300 feet from the well field; and
- Result in an approximate water level decline of 0.5 feet (at the pumping depth) at a distance of roughly 1.5 miles. Beyond this distance, the drawdown at pumping depth would be less than unmeasurable (<0.5 feet).

A more detailed impact analysis for the Tule Desert region was recently completed and submitted to the NSE (Mock, 2008). The main improvement of this modeling effort over previous efforts was to incorporate recent geologic mapping of this area by the USGS (Page et al, 2005a, 2005b, 2006). Geologic structures that were interpreted to control ground water flow in the carbonate aquifer were used in the model to evaluate ground water flow patterns and estimate drawdown. The incorporation of geologic structures into the numerical model allowed the direct simulation of groundwater movement throughout the geologic complexity of the regional fractured-rock aquifer system. The model was used to estimate the net change in groundwater levels, in response to pumping that may spread out to areas of interest such as Muddy River Springs, Blue Point and Rogers Springs, Virgin Valley Water District, and other areas outside of Tule Desert.

All geologic units described by Page and others (2005a, 2005b; 2006) above the pre-Cambrian crystalline basement were included in the most recent model analysis (Mock, 2008) by employing the USGS MODFLOW code with thirteen layers representing geology (hydrostratigraphic units) and a total pumpage of 9,340 AFY. The extents of this model were selected to include the following hydrographic basins: Tule Desert Basin, Virgin River Valley, Lower Moapa Valley, Lower Meadow Valley Wash, Clover Valley, California Wash, Kane Springs Valley, and Muddy River Springs Area. In addition, parts of the Black Mountain Area and Panaca Valley were included. The inclusion of the additional basins allowed projection of impacts out to springs on the Overton Arm of Lake Mead and along the Muddy River.

The resulting model analysis indicate that the Paleozoic carbonate system beneath the Tule Desert appears to be adequate for producing the amount of groundwater applied for in the water right application submitted to the NSE (Mock, 2008). However, because few wells exist to provide water levels data for calibration of this model, the BLM was unable to rely upon the uncalibrated model for predictive drawdown analysis, and it has been used only in a qualitative sense for the impact analysis in this EIS. The probable impacts due to the Proposed Action are

based on existing well data, aquifer tests, known ground water gradients and flow directions, and interpretation of the role of geologic controls (rock type, number and alignment of faults and fractures) on ground water occurrence and movement in this area.

Due to uncertainties regarding the hydraulic connection between the carbonate aquifer and the shallow alluvial aquifer, the impacts of groundwater pumping associated with the Proposed Action may include lowering of water levels within the alluvial aquifer in Tule Desert. Such water level drawdown could affect shallow stock wells completed in the alluvial aquifer that may exist in the area. The magnitude of the hydraulic connection is uncertain, and the hydraulic connection may be locally controlled by geology, so that some areas might be affected while other areas would not be affected, or effects would be minimal. Based upon the current understanding of the hydrogeology in the Tule Desert, water level declines would be expected to be greater in close proximity to the production wells, but would be minimal at greater distances from the wells. As part of the Monitoring Plan for Groundwater Development in the Tule Desert (**Appendix A3**), the shallow alluvial aquifer would be monitored during pumping operations and any future allocation of new water rights by the NSE may include additional MWs.

Uncertainty exists in any attempt to predict future effects in a large-scale geologically complex flow system. Such uncertainty can be diminished through the acquisition of more detailed hydrologic data, such as additional water level data and geologic information that could be obtained by conducting additional subsurface investigation. However, the costs and timeframe to obtain this information to support predictive modeling can be quite expensive and time consuming. Uncertainty can also be reduced by observing the effects (if any) of pumping the water right allocated by the NSE, which would be done via a monitoring program that would be implemented as part of the BLM's ROW grant approval process.

Based on the currently available hydrogeologic and chemical data provided for this analysis, and the detailed geological mapping recently conducted by the USGS, the BLM believes it is highly likely that the Proposed Action would not appreciably affect surface water resources in Muddy River/Warm Springs, Rogers/Blue Point Springs or the Virgin River near Mesquite.

As part of the Proposed Action, the LCWD would monitor groundwater elevations in the production and MWs in the Tule Desert Hydrographic Area as outlined in the Stipulation Agreement between NPS and LCWD (**Appendix A2**). The BLM would continue to coordinate with LCWD and NPS to implement prompt mitigation measures and ensure that the Proposed Action would not adversely impact the groundwater levels in the area. Additional MWs could be developed based on the current monitoring and mitigation program. During the site specific development of production wells and collection lines, additional environmental analysis and modeling will occur and as a result additional mitigation and monitoring could be established.

4.3.1.3.3 Impacts to Groundwater Quality

Potential impacts to groundwater quality may be associated with movement of groundwater induced by pumping. No information on water quality was available from deep wells in the Clover Valley Hydrographic Area. However, the water quality from local springs and stock wells appears to be good. Based on previous conclusions that the pumping of groundwater from the deep fractured rock aquifer would not affect shallow wells, no adverse impacts to groundwater

quality resulting from the proposed pumping in Clover Valley are anticipated.

The LCWD intends to monitor the groundwater quality in the Clover Valley, as described in Attachment A of the Water Resources Monitoring and Management Plan for Future Pumping in Clover Valley (**Appendix B**). Water quality samples would be analyzed for major ions, trace elements, and isotopes at all production and MWs used as part of this plan.

Based on the groundwater data available for the Tule Desert Hydrographic Area water quality of the basin-fill deposits and the fractured rock appears to be generally good and acceptable for domestic use. In addition, as for Clover Valley, shallow wells are not expected to be influenced by pumping from the deep fractured-rock aquifer. However, water quality from monitoring wells MW-6 through MW-8, and well FF-2B (screened in the fractured-rock aquifer) showed significantly different chemistry and higher TDS concentration compared to other wells screened in the fractured-rock aquifer (see **Table 3-7**). Potential changes in chemistry of the water pumped, however, would not necessarily imply a degradation of water quality (fitness for domestic use) in the aquifer. No available data indicate any areas of groundwater quality problems present in the vicinity of the proposed Tule Desert well field. As a result, there is little potential for adverse impacts to either deep or shallow groundwater quality resulting from proposed pumping in Tule Desert.

The LCWD has agreed to monitor the quality of water from the production and MWs in the Tule Desert Hydrographic Area as a part of the Stipulation Agreement between the NPS and the LCWD (**Appendix A2**). The BLM would continue to coordinate with LCWD and NPS to ensure that the Proposed Action would not adversely impact the water quality in the area.

4.3.1.3.4 Impacts to Local Springs

Based on the isotope studies by CH2MHill (2002b) and a hydrogeochemical survey report by McHugh and Ficklin (1984), springs in the Clover Valley are recharged locally from the surrounding hills and mountains and are not representative of deep water sources. These springs only discharge small volumes and depend on local climatic conditions (LCWD and Vidler 2008). Consequently, based on the limited existing data, impacts to local springs in the Clover Valley are not anticipated from the proposed pumping (DBS&A, 2008).

Several springs are located in Clover and Mormon Mountains within the Lower Meadow Valley Wash Hydrographic Area. Available information on these local springs is limited. Based on isotope studies by CH2MHill (2002b), the deuterium abundance in Mudhole Spring located in the northeastern part of the Meadow Valley Wash (in Clover mountains) and from two springs in the Mormon Mountains (Davies and Horse Springs) suggests that their source of water is local recharge. Accordingly, the available data suggest that the local springs in the Lower Meadow Valley Wash are locally recharged and, therefore, impacts from groundwater pumping in the Clover Valley are not anticipated.

The LCWD also intends to monitor three springs in the Clover Valley (Big Spring, East Setting Spring, and Sheep Spring), as described in Attachment A of the Water Resources Monitoring and Management Plan for Future Pumping in Clover Valley (**Appendix B**). This additional monitoring is expected to provide the data necessary to reduce the uncertainty associated with the currently limited availability of existing data.

Results of geochemical and isotope analyses conducted in 2002 indicate the source of the water to springs in the hills that rim Tule Desert is local recharge (CH2MHill 2002a and 2002b). The elevations of these springs are several hundred feet above the projected local and regional groundwater levels, and the current data indicate that the discharge from these springs is independent of groundwater in both the basin-fill and fractured rock. Accordingly, impacts to local springs associated with pumping from the carbonate aquifer are not anticipated in Tule Desert Hydrographic Area.

4.3.1.3.5 Impacts to Regional Springs

Considerable effort has been made by the LCWD, BLM, and the NPS to understand the relationship between the regional fractured-rock aquifer system and the source of water for the Rogers and Blue Point Springs, which are located in the Overton Arm of Lake Mead.

Current data indicate that the probability is extremely low that groundwater pumping associated with the Proposed Action will affect spring flow at Rogers and Blue Point Springs. These springs are related to “sub-regional” groundwater and not regional fractured-rock groundwater. The contribution of groundwater to these springs is from a flow path that likely does not originate in the Tule Desert, and the most probable source of recharge to Rogers and Blue Point Springs is from the Lower Virgin Valley (CH2MHill 2002a, 2002b, and Vidler 2008).

No impacts to Muddy Springs, located approximately 20 miles west of the proposed LCLA development, are anticipated. Studies suggest that the source of water for Muddy River Springs is supplied primarily from a regional carbonate aquifer via the White River Flow System, which is separate from that of Meadow Valley Wash and Virgin River Flow systems (Burbey 1997; CH2MHill 2006).

Although impacts to regional springs are not anticipated from proposed pumping in the Tule Desert, uncertainty would be managed pursuant to the Stipulation Agreement between NPS and LCWD (**Appendix A2**). Under the Stipulation Agreement, LCWD agreed to monitor, manage, and mitigate unanticipated impacts due to development of groundwater resources in the Tule Desert Hydrographic Area. The BLM would continue to coordinate with the LCWD and the NPS to ensure that the Proposed Action would not adversely impact the regional springs.

4.3.1.3.6 Impacts to Local Water Users

Based on the records of 39 wells obtained from the NDWR well log database, the local wells in Clover Valley are between 38 and 499 ft deep (NDWR 2007) and are likely completed in the younger alluvium or in one of the extrusive volcanic units. No current users of groundwater from the fractured-rock aquifer have been identified in the vicinity of the proposed production wells; therefore, no impacts to local users resulting from pumping at planned depths between 1,200 and 1,500 ft bgs in Clover Valley are anticipated.

Additionally, the LCWD intends to monitor the groundwater levels and water quality in two exploration wells (CMW-1 and CMW-2) and several private and/or BLM-managed wells, as described in Attachment A of the Water Resources Monitoring and Management Plan for Future Pumping in Clover Valley (**Appendix B**).

Wells located in the Meadow Valley Wash area are not expected to be affected by groundwater

pumping associated with the Proposed Action. These wells, used for domestic, municipal, and industrial purposes, have been constructed in shallower alluvial sediments associated with the younger alluvium of Meadow Valley Wash. Isotopic studies indicate lack of connection between the local aquifers in the Meadow Valley Wash and deep fractured rock flow in the Clover Valley and Tule Desert (CH2MHill 2002b). In addition, the 100-year drawdown model for the Tule Desert indicates only a minor influence (approximately 5 ft drawdown) at 15 miles from the wellfield. Therefore, based on the best available data, impacts to groundwater users in the Meadow Valley Wash are not anticipated.

Based on the State of Nevada water rights database, currently permitted groundwater rights within the Tule Desert Hydrographic Area are limited to one LCWD well and the Tule Desert well. No current users of groundwater from the fractured-rock aquifer have been identified within the Tule Desert Hydrographic Area.

The primary potential impacts to water users would be increased depth to groundwater within the zone of influence. Based on the analysis performed, the maximum predicted water level change would be a lowering of approximately 5 ft (at a pumping depth of 700 feet or more) at a radial distance of 4,300 feet from the edge of the well field. Because there are no current fractured-rock aquifer users, no impacts to local users in the Tule Desert are anticipated.

Currently, the only permitted well that taps basin-fill groundwater in the area is the Tule Desert well, which is only capable of pumping approximately 8 gpm. During aquifer testing of production well PW-1, the Tule Desert well was “not influenced by discharge from PW-1” during the 8-day aquifer test (HydroSystems, Inc. 2002, as cited in Vidler 2007d). This well is currently used by ranchers in the Tule Desert for stock watering purposes. In addition to the aquifer testing of production well PW-1, the Tule Desert well was monitored during the 7-day aquifer test of production well PW-2. Well PW-2 is located approximately 200 yards to the northwest of the Tule Desert well. There was no discernable effect of pumping well PW-2 at a rate of 1,000 gpm on the Tule Desert well (Feast Geosciences 2007, as cited in Vidler 2007d). Therefore, future groundwater pumpage from the regional fractured-rock aquifer should not impact the Tule Desert stock well.

Two other wells associated with agricultural use were identified from the NDWR Well Driller’s Log Database. These wells are 566 and 605 ft deep and likely completed in the local perched aquifer system; however, it has not been determined if these wells are currently being used.

One other stock well is located in the upper portion of Sam’s Camp Wash in the northern Tule Desert. This is a shallow well operated by wind power that is no longer used. If it were in use today, groundwater pumpage from the regional fractured-rock aquifer would have no impact on it due to the fact that any groundwater produced from this well is most likely sustained by surface water flow and sub-flow within Sam’s Camp Wash.

Potential impacts to water users in the downstream Virgin River Valley have also been evaluated, as the groundwater represents a vital source of water to municipalities and agriculture in this region. In addition to the drawdown analysis, which indicates that the impacts from pumping would be limited to a radius of less than 15 miles from the edge of the Tule Desert well field, a few additional arguments supporting a limited influence are presented below.

- The available perennial yield in the lower Virgin River Valley was estimated by Katzer et al. (2002) to be approximately 40,000 AFY, taking into account the current local pumping in the Virgin River Valley, which is reported to be about 5,000 AFY. This implies that, even if the entire project demand was to be withdrawn from the lower Virgin River Valley, there would still be more than 30,000 AFY of perennial yield available within the Virgin River Valley (CH2MHill 2002a).
- Based on the chemical and stable isotope analysis, the water from the fractured-rock aquifer in the Tule Desert and from municipal wells in the Virgin River Valley are from different sources. The data also reveal that the groundwater from the Virgin River Valley wells is younger than the groundwater from Tule Desert, and the age of the groundwater from the Virgin River Valley wells increases in a downstream direction along the Virgin River. Both of these observations support the occurrence of independent groundwater flow paths between the proposed well field area in the Tule Desert and the existing municipal wells in the Virgin River Valley. Pumping in the Tule Desert, therefore, would not affect the existing municipal and agricultural wells in the Virgin River Valley because they have independent sources of groundwater (CH2MHill 2002a).

4.3.2 Alternative 1

Impacts to surface water and groundwater resources under this alternative would be the same as those under the Proposed Action Alternative.

4.3.3 No Action Alternative

Under the No Action Alternative, there would be no disturbance of federal lands associated with the project, as the ROW would not be granted. No ground disturbance would occur, and no facilities would be constructed on BLM-administered lands in support of this project. No project-related impacts to water resources would occur under this alternative. LCWD would still be authorized to utilize any groundwater resources authorized by the NSE for pumping in the Clover Valley and Tule Desert Hydrographic Areas.

4.3.4 Mitigation

In Clover Valley, groundwater levels and well water quality, as well as flow and quality of local springs will be monitored as outlined in the Monitoring and Management Plan for Future Pumping in Clover Valley (**Appendix B**) to confirm that no impacts to local water resources result from the Proposed Action or Alternative 1. Similarly, groundwater levels, springflow, streamflow, and water quality will be monitored in Tule Desert as part of the Monitoring Plan for Groundwater Development in Tule Desert and the Stipulation Agreement between the NPS and the LCWD (**Appendices A2 and A3**). Simultaneous with delivery to the NSE and the NPS, the LCWD will provide to BLM results of groundwater level, pumping, and spring flow monitoring data. The BLM will use these data to effectively coordinate with the LCWD, the NSE, and the NPS to ensure that the Proposed Action would not adversely impact the local water resources as well as regional springs and flows in the Virgin River. Any future analysis will be included in the Department of the Interior calibrated groundwater model scheduled to be released in 2009.

In addition to new MWs that will be installed as discussed in the monitoring plans above, a series of existing wells would be utilized to monitor potential impacts to local water users related to increased depth to groundwater from proposed pumping. Even though no impacts on shallow water users are anticipated, water levels in the shallow aquifers would be monitored to better understand the degree of hydraulic connection or isolation from the fractured-rock (carbonate) aquifer. Provided that existing shallow wells are not suitable for this purpose, new wells would have to be installed to satisfy monitoring requirements. BLM will utilize these monitoring data to work collaboratively with other state and federal agencies to ensure that any unanticipated adverse impacts associated with the Proposed Action or Alternative 1 are identified and appropriately mitigated.

4.4 VEGETATION RESOURCES

4.4.1 Methods

This section and Section 4.5 present discussions of the potential impacts associated with the Proposed Action, Alternative 1, and No Action Alternative as they affect biological resources within the project area. In most cases, impacts are categorized and described in general terms without reference to facility type or any site-specific resources. An impact on biological resources would occur if construction and/or operation of the proposed facilities would cause substantial changes to the existing abundance, diversity, distribution, or habitat value of existing plant or animal populations.

4.4.2 Proposed Action

Construction of project facilities would result in direct impacts to Mountain Shrub, Piñon-Juniper (including ponderosa pine), Sagebrush/Perennial Grasses, Blackbrush, Mojave Creosote Bush Scrub, and Mojave Desert Wash Scrub communities within the granted ROW. These impacts would include removal of vegetation during clearing and grading activities and compaction of soils from construction equipment. Construction would result in approximately 240 acres of permanent disturbance and approximately 1,878 acres of temporary disturbance. Acreages of disturbance for each vegetation community are included in **Table 4-1**. Impacts to ponderosa pine in the project area are expected to be minimal. All disturbances in the Ponderosa Pine community would occur along the existing roads. All efforts would be made to reduce the numbers of ponderosa pine that would be damaged during project activities.

Community	Permanent (acres)	Temporary (acres)
Mountain Shrub	18	145
Piñon –Juniper	71	556
Ponderosa Pine	1	8
Sagebrush/Perennial Grasses	22	169
Blackbrush	35	274
Riparian	0	0
Mojave Creosote Bush Scrub	92	726
Mojave Desert Wash Scrub	<1	<7
Total (acres)	240	1,878

Any disturbance of existing vegetation would increase the potential for invasive non-native plant species and noxious weeds to establish within the project area, which would facilitate their spread into adjacent undisturbed areas. In addition, dust generated during construction activities in areas adjacent to or downwind from dust sources may temporarily reduce plant photosynthesis and water use efficiency for the affected plants (Sharifi et al. 1997). The construction phase of this project would last 18 to 24 months, so these habitats would not experience any long-term declines in productivity.

Vegetation in the project area is dominated by shrubs, trees, or succulents, and these communities take up to several decades to fully redevelop following disturbance. Consequently, the composition and diversity of vegetation that becomes established following completion of the project would differ from the existing vegetation for up to several decades. Grasses and forbs would likely dominate the vegetation community on reclaimed and disturbed areas for at least several years. The potential increase of invasive species, and particularly of non-native grasses, would increase the susceptibility of these areas to wildland fires.

Reclamation of disturbed areas would begin immediately following construction. Reclamation would consist of reestablishing existing contours, planting approved plant species, and monitoring the success of revegetation. Success criteria, rehabilitation standards, and monitoring time frames would also be developed by the BLM. These protocols are outlined in the Revegetation Plan prepared by the LCWD, and would be updated prior to construction. Specific Applicant Proposed Environmental Protection Measures are outlined in **Appendix C - Standard Construction and Operation Procedures** (Reference Numbers LP-1, ESC-1, PUCC-2, BR-5, BR-7, BR-9, BR-10, BR-14, BR-17, BR-19, BR-21, BR-22, BR-24, NA-3, R-1 thru 10, R-13, and R-15).

The objectives of the Revegetation Plan include:

- Control erosion and sedimentation.
- Provide a self-perpetuating, drought-tolerant vegetative cover that is compatible with post-construction land use.
- Use adapted native species for revegetation that are beneficial to wildlife and that would reduce the visual effect of the ROW and other project components.
- Encourage native plant reinvasion by avoiding the use of highly competitive introduced species.
- Salvage and restoration activities could include containering, storage in a nursery and replanting of cacti and yucca in ROW, reseeding with a native seed mix and/or restoration monitoring to ensure that reclamation activities are successful.
- Limit the introduction and spread of noxious and other annual weeds through prompt revegetation.
- Return disturbed land to a level of productivity comparable to pre-construction levels.
- Reestablish desert tortoise critical habitat (refer to section 4.5.2.1).

4.4.2.1 Tule Desert Hydrographic Area

Operation and maintenance of the Proposed Action (e.g., groundwater pumping) are not anticipated to result in indirect impacts to vegetation resources within the project area or in the ROI. As described in the previous water resources section, water discharge and chemical analysis data indicate no connection between the Virgin River and groundwater in the Tule Desert. Therefore, surface flows in the downstream Virgin River would not be affected by groundwater pumping in the Tule Desert. Additionally, the NPS, in cooperation with USGS, agree to operate and maintain a stream gaging station on the Virgin River within Lake Mead NRA as part of the Stipulation Agreement between NPS and LCWD (**Appendix A2**). This gaging station will detect changes in streamflows in the Virgin River. The BLM would continue to coordinate with LCWD and NPS to ensure that the Proposed Action would not adversely impact Virgin River flows. Because no effects to springs and surface flows are anticipated, no impacts to vegetation resources are expected (including riparian areas along the Virgin River) as a result of groundwater pumping associated with the Proposed Action.

4.4.2.2 Clover Valley Hydrographic Area

Groundwater pumping in the Clover Valley Hydrographic Area associated with the Proposed Action is not anticipated to impact springs or flow rates in the Meadow Valley Wash system (Clover Creek or Meadow Valley Wash). Pumping in the Clover Valley, which is downgradient from the springs that feed Clover Creek (a tributary to Meadow Valley Wash) and east of the Meadow Valley Wash, would not likely impact surface water flows or springs (such as Big Springs) contributing to surface flows in Clover Creek and the Meadow Valley Wash. There is some uncertainty regarding impacts to surface water flows and springs in these areas because of limited availability of data. Forthcoming data associated with the monitoring requirements established in the Clover Valley Water Resources Monitoring and Management Plan (**Appendix B**), including data collected from stream gaging, selected springs, and riparian areas, are expected to reduce these uncertainties.

The goal of the Clover Valley Water Resources Monitoring and Management Plan is to establish monitoring requirements to ensure that the Proposed Action would not adversely impact vegetation resources in the Meadow Valley Wash system, specifically riparian habitats.

4.4.2.3 Non-Native Invasive Species and Noxious Weeds

Areas disturbed by implementation of the Proposed Action would be more susceptible to infestation by non-native invasive and noxious weed species, such as red brome, cheatgrass, Sahara mustard, and others, that are present in surrounding vegetation communities. The creation of new access roads may result in new habitat fragmentation and may increase the likelihood of OHV traffic, which could facilitate the spread of invasive species of plants and noxious weeds.

Invasive and noxious weed invasion would hinder establishment of desirable vegetation. Additionally, any new areas of invasive or noxious weed occurrence within the granted ROW may act as a source for invasion of adjacent areas. Non-native annual grass species respond poorly to treatment programs, so proper management of disturbed soils is the best method of control. Non-native invasive and noxious weed species are most likely to establish and spread along roadways and other disturbed areas that act as corridors for the transport of weed seeds.

Invasive and noxious weeds also decrease habitat suitability for wildlife species because they provide little forage value for native wildlife. Additionally, invasive species and noxious weed species often out-compete native species and decrease habitat suitability for federally listed and special status plant species (Whitson et. al 2000). An increase in the fine, flashy fuels associated with several of the non-native invasive weed species found in the project area (red brome, cheatgrass, Mediterranean grass) could also alter the fire regime in the area.

A Risk Assessment for Noxious and Invasive Weeds will be completed prior to construction of the project. A site-specific weed inventory would also be completed prior to construction of this project to identify noxious weed and invasive species infestations. This inventory will enable avoidance of these areas during construction or pre-treatment and will facilitate reduction or elimination of the spread of these species. Specific environmental protection measures to control the spread of noxious weeds are outlined in **Appendix C – Standard Construction and Operation Procedures** (Reference Number BR-22).

4.4.2.4 *Special Status Plant Species*

Because none of the special status plant species occur in washes or riparian areas that depend on springs or surface water flows, there would be no indirect impacts to special status plant species from groundwater pumping associated with the Proposed Action. A detailed discussion of potential impacts to special status plant species follows.

4.4.2.4.1 Federally Threatened, Endangered, and Candidate Plant Species

There is no potential habitat for federally listed threatened or endangered plant species within the Proposed Action ROW or ROI. The federally threatened Ute-ladies' tresses orchid was identified during Section 7 consultation as potentially occurring near the ROI for the project. However, no habitat for this species occurs within the ROI, and no individuals were identified in the proposed ROW (ARCADIS 2006a). Potential habitat for this species is not known to exist within the ROI, and there are no known populations of this species within the ROI. Construction, operation, and maintenance activities associated with the Proposed Action will not impact known populations or potential habitat for this species.

The Las Vegas buckwheat, a federally listed candidate species, is not known to occur within the project area; therefore, impacts to this species are not anticipated. Because this species does not occur in washes or riparian areas that depend on springs or surface water flows, there would be no indirect impacts to Las Vegas buckwheat from groundwater pumping associated with the Proposed Action.

4.4.2.4.2 BLM Sensitive Species

The BLM identified 24 Sensitive plants as potentially occurring within the project area (see **Table 3-16**). Four of these were identified within the project area: Needle Mountain milkvetch, sticky buckwheat, Parry's sandpaper plant, and Palmer's phacelia (ARCADIS 2006a).

Needle Mountain milkvetch was identified in the Clover Mountains. Individual plants will likely be destroyed based on the proximity to the road; however, surveys conducted in the mid-1980s indicate that the population is large (more than 6,273 individuals; NNHP 2001), and the ROW traverses a small portion of it. Avoidance measures that would be implemented during construction will assure that these activities will not adversely impact the Needle Mountain

milkvech population in proximity to the ROW. A small number of plants may be impacted in the short term; however, the long-term viability of the population would not be affected.

Sticky buckwheat was found occasionally from Toquop Wash to the east following the existing transmission lines. Removal of individuals should be easily avoided by construction activities because individuals identified in or near the ROW were widely spaced from each other. As an annual, this species depends on a seed bank and not a permanent root system for reproduction and survival. As such, the removal of individual plants in one year would not affect the reproductive potential of the population in subsequent years because the seed bank would remain unaffected. Additionally, NNHP reports the statewide population of sticky buckwheat to be more than 25,000 individuals (NNHP 2001). A small number of plants may be impacted in the short term; however, because of the large number of individuals, the long-term viability of the population would not be affected. The State of Nevada has listed this species as critically endangered. A permit would be required prior to removing any plants.

Parry's sandpaper plant and Palmer's phacelia both occur on the gypsum soils within the Toquop Wash. Both species were extremely common on the gypsum soils of the surrounding area. Because both of these species were abundant in or near the ROW, and populations will be avoided where possible, it is not likely that the removal of a small number of individuals during construction activities would affect the viability of these populations. Construction activities may result in the destruction of individuals as well as indirect impacts to individuals such as reduced photosynthetic potential resulting from increased dust; however, the large population size will ensure the continued existence of these populations.

4.4.2.4.3 State of Nevada Protected Species

All species of cactus and yucca that are native to the State of Nevada are protected by regulation (NRS 527.060-120). Surveys conducted during the spring and fall of 2006 identified eight protected species of cactus and yucca in and adjacent to the Proposed Action ROW (ARCADIS 2006a). Construction activities would result in the removal of cactus and yucca within the permitted ROW. Salvage and restoration of cactus and yucca species would be implemented as part of the Proposed Action. Salvage and restoration protocols are described in the Applicant's Reclamation Plan, and would be updated prior to construction. Salvage and restoration activities could include containing, storing in a nursery, and replanting of cacti and yucca in ROW; reseeding with a native seed mix; and/or restoration monitoring to ensure that reclamation activities are successful.

4.4.3 Alternative 1

The types of impacts resulting from implementation of Alternative 1 would be similar to those described for the Proposed Action. Potential impacts associated with non-native invasive species and noxious weeds would be the same as those described for the Proposed Action. Impacts to special status plant species would be less than those described for the Proposed Action because Alternative 1 does not cross Toquop Wash where Parry's sandpaper plant and Palmer's phacelia are known to occur.

While both alternatives would in part follow existing utility corridors, the Proposed Action would result in slightly more new disturbance when compared to Alternative 1. As a result, acreages of disturbance to vegetation communities associated with Alternative 1 would be

slightly less than those with the Proposed Action. **Table 4-2** lists acreages of disturbance to vegetation communities under Alternative 1. Approximately 581 acres of Mojave Creosote Bush Scrub would be temporarily impacted (145 acres less than the Proposed Action) and 74 acres would be permanently impacted (18 acres less than the Proposed Action). Because the alternative would not cross Toquop Wash, Mojave Desert Wash Scrub would experience lower impacts (less than 5 acres temporary and less than 0.7 acre permanent). Disturbance in the other vegetation communities would remain the same as under the Proposed Action.

Community	Permanent (Acres)	Temporary (Acres)
Mountain Shrub	18	145
Piñon –Juniper	71	556
Ponderosa Pine	1	8
Sagebrush/Perennial Grasses	22	169
Blackbrush	35	274
Riparian	0	0
Mojave Creosote Bush Scrub	74	581
Mojave Desert Wash Scrub	<0.7	<5
Total (Acres)	221	1,733

Note: The alternative (from its deviation from the proposed) is roughly 80 percent as long as the proposed. A factor of 0.8 was used to calculate estimated impacts for the alternative in the Mojave Desert biome only.

4.4.4 No Action Alternative

Under the No Action Alternative, the ROW would not be granted. No disturbance of federally managed lands associated with the Proposed Action or Alternative 1 would occur.

4.4.5 Mitigation

The Applicant will be required to minimize, to the extent possible, disturbances to ponderosa pine where they occur in the Clover Mountains. Populations of Nevada BLM Sensitive plant species will be surveyed and flagged prior to project initiation in order to avoid sensitive plant populations to the extent practical. Monitoring of the effectiveness of revegetation activities will also be required.

4.5 WILDLIFE RESOURCES

4.5.1 Proposed Action

Impacts to wildlife resources, including threatened, endangered, and candidate species, result from ground disturbance caused by construction-related activities. Ground disturbance can impact wildlife habitat by removing vegetation, altering plant composition or structure, and/or altering soil characteristics. Loss of vegetative cover would adversely affect sensitive wildlife species that depend on that vegetation for food or cover.

Approximately 1,878 acres of habitat would be temporarily disturbed in order to construct access roads and other project facilities, and approximately 240 acres of habitat would be permanently removed in order to construct access roads and other facilities. Wildlife species could also be temporarily displaced from areas of human activity during operation and maintenance activities.

The potential for wildfire ignition will increase as a result of the increased presence of humans and vehicles in the project area. Environmental protection measures proposed by LCWD, LCPD, and LCT as part of the Proposed Action, which will avoid or minimize these impacts, are listed in **Appendix C** (Reference Numbers LP-1 thru LP-3, PUCC-1, BR-5, BR-9, BR-11 thru 21, and BR-23 thru BR-30).

The Proposed Action ROW would parallel existing disturbance corridors (e.g., roads, two-track roads, utility corridors) where possible, limiting the amount of disturbance to and new fragmentation of existing wildlife habitat. The large expanses of undisturbed habitat surrounding the ROW would provide adequate refuge for many wildlife species in the area. Additionally, all construction within the permitted ROW would occur in phases, allowing adequate time and space for large mammals to move freely throughout the area.

Small mammal species may be impacted by the Proposed Action as a result of increased human traffic in the area as well as increased noise levels during project construction. Construction activities may create fall and entrapment hazards if mammals fall into holes or other excavations and cannot escape. Additional direct impacts could include degradation of soil due to fuel contamination, harassment from human presence, increased levels of noise and vibration due to construction, and direct mortality or injury from crushing by construction equipment and from being trapped in burrows during project construction. An additional impact could result from the increased perching opportunities for raptors and ravens, which could lead to increased predation within the project area.

Impacts to reptile and amphibian species in the project area would be similar to those previously described for small mammals. These impacts would be limited to direct mortality from vehicle collisions or entombment in burrows and the permanent removal of habitats that would result from project construction.

4.5.1.1 Clover Valley Hydrographic Area

Groundwater pumping in the Clover Valley Hydrographic Area associated with the Proposed Action is not anticipated to impact flow rates in the Meadow Valley Wash system, which includes Clover Creek and the Meadow Valley Wash. As described in the previous water resources section, pumping in the Clover Valley is not anticipated to impact surface water flows or springs (such as Big Springs) that contribute to surface flows in Clover Creek and the Meadow Valley Wash. As such, impacts to riparian habitats supported by these water sources are not anticipated. Furthermore, riparian vegetation, such as that along this system, is phreatophytic, meaning that it is deep-rooted and it absorbs water from the water table or soil above it. Therefore, slight decreases in flow are not expected to impact riparian vegetation. More significant decreases in flow may have the potential to impact riparian vegetation; however, these are not anticipated.

Additionally, the Clover Valley Water Resources Monitoring and Management Plan (**Appendix B**) describes measures to be implemented by the Applicant to address uncertainties from groundwater pumping in the Clover Valley Hydrographic Area. The Plan includes construction of MWs at selected springs and associated riparian areas, and would ensure that the Proposed Action would not adversely impact riparian and aquatic habitats in the Meadow Valley Wash system.

Therefore, the Proposed Action would not result in direct or indirect impacts to wildlife species dependent on this riparian habitat.

This discussion of the Clover Valley Hydrographic Area with respect to wildlife resources has direct bearing on the impact analysis for the southwestern willow flycatcher and the western yellow-billed cuckoo.

4.5.1.2 Tule Desert Hydrographic Area

Operation of the Proposed Action involves withdrawals of groundwater from the fractured-rock aquifer. However, as described in the previous water resources section, impacts to surface water and/or spring discharges related to groundwater pumping are not expected in the Tule Desert area (including downstream in the Virgin River) because of a lack of a substantive connection between groundwater and surface water resources. Additionally, it has been shown that the Virgin River near Mesquite loses water to infiltration to groundwater and evaporation and, as such, constitutes a losing reach (from Littlefield to Lake Mead). Because of this, any reduction in groundwater flow from the Proposed Action, would not affect the Virgin River. Because impacts to surface water and/or spring discharges are not anticipated, wildlife habitats that depend on these resources are not expected to be impacted; therefore, indirect impacts related to groundwater pumping on wildlife resources in the Tule Desert area are not anticipated. Additionally, under the Stipulation Agreement, the LCWD agreed to monitor, manage, and mitigate unanticipated impacts to flows in the Virgin River due to development of groundwater resources in the Tule Desert Hydrographic Area. The BLM would continue to coordinate with the LCWD and the NPS to ensure that the Proposed Action would not adversely impact surface water flows.

This discussion of the Tule Desert Hydrographic Area with respect to wildlife resources has direct bearing on the impact analysis for the southwestern willow flycatcher, Yuma clapper rail, western yellow-billed cuckoo, Virgin River chub, and woundfin.

4.5.2 Federally Threatened, Endangered, and Candidate Wildlife Species

4.5.2.1 Desert Tortoise

The desert tortoise is the only federally listed species that occurs within the Proposed Action ROW. Construction and operation of the Proposed Action will impact desert tortoise and desert tortoise habitat. Using data from desert tortoise strip-transect surveys conducted during the fall of 2006, biologists estimated a density of 0 to 10 desert tortoises per square mile in the project area. Based on the acreage of temporary disturbance to desert tortoise habitat, construction of the Proposed Action may result in the take of between 0 and 18 tortoises.

Desert tortoises may be subject to direct mortality or injury from crushing by construction equipment, being entombed in burrows during initial site grading, vehicle strikes, and/or falling into open trenches during construction. The magnitude of the impacts would depend on conditions such as the type and duration of the disturbance, time of year, and density of tortoises within and adjacent to the affected area. Environmental protection measures agreed upon by LCWD as BMPs (**Appendix C**) designed to reduce impacts to desert tortoises include imposing a project personnel speed limit, designing trenches and open pits with sloped sides for escape,

and conducting a desert tortoise clearance survey prior to construction activities to safely remove tortoises from the ROW.

As shown in **Table 4-3**, approximately 108 acres of desert tortoise habitat would be permanently disturbed by construction of the Proposed Action. Approximately 848.5 acres would be temporarily disturbed. Of these totals, 32.3 acres (BLM lands) of permanent disturbance and approximately 253.7 acres of temporary disturbance would occur in the Beaver Dam Slope Critical Habitat Unit. Permanent and temporary disturbance make up 0.04 and 0.3 percent of the Beaver Dam Slope Critical Habitat Unit in Nevada (87,400 acres), respectively. All critical habitat that would be disturbed is located on federal land.

Table 4-3 Desert Tortoise Habitat Disturbed by the Proposed Action		
	Permanent Impacts (acres)	Temporary Impacts (acres)
Public Land		
Desert Tortoise Critical Habitat	32.3	253.7
Desert Tortoise Habitat (non-critical)	75.7	594.8
Project Total Disturbance	108	848.5

Other potential effects to desert tortoise and desert tortoise habitat from construction activities include degradation of soil due to fuel contamination, harassment from human presence, increased levels of noise and vibration due to construction equipment movement or blasting (which could collapse burrows), being attracted to project areas where water is being applied to reduce dust and/or areas where water is being discharged from testing, and loss of cover and forage due to vegetation removal and changed vegetation composition. Increased predation of desert tortoise from ravens and other species could potentially occur as a result of predators being attracted to the area by any garbage accumulation associated with human presence; however, construction crews would be required to remove refuse on a daily basis. The overhead transmission lines may also provide new perching opportunities for raptors and ravens which could lead to increased predation; however, anti-perching devices would be installed as part of the Proposed Action to avoid/minimize these impacts. The potential for wildfire ignition will increase as a result of the increased presence of humans and vehicles in the project area.

In consultation with the USFWS and BLM biologists, the LCWD, LCPD, and LCT and their contractors would incorporate desert tortoise protections measures to reduce the potential for effects associated with the Proposed Action. Specific measures to reduce impacts are discussed in **Appendix C** (Reference Numbers LP-1 thru LP-3, PUCC-1, BR-5, BR-9, BR-11, BR-12, BR-14, BR-16, BR-18 thru BR-21, BR-23, and BR-25 thru BR-30). Additional mitigation measures may also be required by the USFWS through Section 7 and/or Section 10 consultation.

Habitat restoration would be conducted for all federal lands disturbed by construction of the Proposed Action with the exception of about 139.9 acres (BLM lands) that would be permanently impacted by the project footprint. Additional measures to minimize and/or mitigate incidental take of desert tortoise will be determined through consultation with the USFWS through Section 7 of the ESA for public lands and Section 10 of the ESA for private lands, as appropriate. The Southeastern Lincoln County HCP is in draft form at the time of publication of

this Final EIS. The HCP describes potential impacts to endangered and threatened species within the LCLA development area. Mitigation will be required for any adverse impacts to habitat on private land as a result of the Proposed Action, and initial funds for mitigation would come from a land disturbance fee assessed at the time of construction permitting.

Prior to issuance of any federal permit, lease, or authorization for any surface disturbing activity on public lands, the LCWD and/or the other utility agencies would be required to pay a remuneration fee for each acre of surface disturbance to desert tortoise habitat. The amount of the fee would be calculated by the USFWS and BLM and would be used to fund conservation measures benefiting the desert tortoise.

Implementation of the Proposed Action “may affect, is likely to adversely affect” the desert tortoise in the project area. During Section 7 consultation, the USFWS will evaluate the data to determine if the Proposed Action will jeopardize the continued existence of the desert tortoise. The project is anticipated to directly affect habitats within the Beaver Dam Slope Critical Habitat Unit. However, because linear features will not be fenced and all areas not needed for operation and maintenance activities will be revegetated, it is expected that habitat conditions and movement corridors will primarily be affected during the construction phase of the project.

4.5.2.2 *Southwestern Willow Flycatcher*

There is no suitable habitat for the southwestern willow flycatcher in the project area; however, the southwestern willow flycatcher and its riparian habitat have been documented in the ROI. Suitable habitat for this species occurs within the Meadow Valley Wash (including Clover Creek drainage), and occurrences of this species have been documented within Meadow Valley Wash as well. Designated Critical Habitat for this species occurs along the Virgin River within the ROI. The riparian habitat that the southwestern willow flycatcher depends on is supported by surface water flows.

Construction, operation, and maintenance of the Proposed Action will not directly impact the southwestern willow flycatcher or its habitat or Designated Critical Habitat. The following is a discussion of potential indirect impacts.

4.5.2.2.1 Tule Desert Hydrographic Area

Operation and maintenance of the Proposed Action (e.g., groundwater pumping) are not anticipated to result in indirect impacts to riparian habitats within the project area or in the Virgin River within the ROI. However, due to uncertainties related to groundwater pumping in the Tule Desert, the Biological Assessment for this project found that the Proposed Action, “may affect, but is unlikely to adversely affect” the southwest willow flycatcher or its habitat.

4.5.2.2.2 Clover Valley Hydrographic Area

Construction of the Proposed Action will not directly impact the southwestern willow flycatcher or its habitat. Implementation of the Clover Valley Monitoring and Mitigation Plan will reduce uncertainties from groundwater pumping associated with the Proposed Action. However, due to the minimal amount of hydrological information available for the Clover Valley Hydrographic Area at this time, the Biological Assessment for this project found that the Proposed Action, “may affect, but is unlikely to adversely affect” the southwest willow flycatcher or its habitat.

4.5.2.3 *Yuma Clapper Rail*

There is no suitable habitat for the Yuma Clapper rail within the project area. The closest habitat historically occupied by the species, are riparian areas along the Virgin River near Mesquite, Nevada, approximately 3 miles south of the southern reach of the project area. The BLM does not expect the Proposed Action to reduce surface water flows or impact riparian habitat associated with the Virgin River. However, due to uncertainties related to groundwater pumping in the Tule Desert, the Biological Assessment for this project found that the Proposed Action, “may affect, but is unlikely to adversely affect” the Yuma Clapper rail.

4.5.2.4 *Western Yellow-billed Cuckoo*

There is no habitat for the western yellow-billed cuckoo within the project area. Suitable riparian habitat for the western yellow-billed cuckoo occurs within the ROI in the Meadow Valley Wash and along the Virgin River. This species has also been documented within Meadow Valley Wash. The riparian habitat that the western yellow-billed cuckoo depends on is supported by surface water flows. Construction of the Proposed Action will not directly impact the western yellow-billed cuckoo or its habitat. The following is a discussion of potential indirect impacts.

4.5.2.4.1 Tule Desert Hydrographic Area

Operation and maintenance of the Proposed Action (e.g., groundwater pumping) are not anticipated to result in indirect impacts to vegetation resources within the project area or in the Virgin River within the ROI. However, due to uncertainties related to groundwater pumping in the Tule Desert, the Biological Assessment for this project found that the Proposed Action, “would not contribute to the need to list” the western yellow-billed cuckoo.

4.5.2.4.2 Clover Valley Hydrographic Area

As described in section 4.5.1.2, impacts to riparian vegetation along the Meadow Valley Wash are not anticipated. However, due to the minimal amount of hydrological information available for the Clover Valley Hydrographic Area at this time, the Biological Assessment for this project found that the Proposed Action, “may affect, but is unlikely to adversely affect the western yellow-billed cuckoo.

4.5.2.5 *Virgin River Chub and Woundfin*

There is no suitable habitat for the Virgin River chub or woundfin within the project area. The closest waterway that may be occupied by these species is the Virgin River near Mesquite, Nevada, approximately 3 miles south of the southern reach of the project area. Construction of the Proposed Action will not directly impact the species or their habitat. The BLM does not expect the Proposed Action to reduce surface water flows or impact riparian habitat associated with the Virgin River. However, due to uncertainties related to groundwater pumping in the Tule Desert, the Biological Assessment for this project found that the Proposed Action, “may affect, but is unlikely to adversely affect” either the Virgin River chub or woundfin.

4.5.3 Special Status Wildlife Species

4.5.3.1 Mammals

Construction activities within the ROW may temporarily disrupt movement of large mammals, including desert bighorn sheep, in the area. The ROW would be restored at the completion of construction, and there would be no long-term impacts (e.g., fencing of the pipeline corridor) that would restrict movement of wildlife within the area.

Ground-dwelling mammal species may be impacted by the Proposed Action as a result of increased human traffic in the area as well as increased noise levels during project construction. Construction would create fall and entrapment hazards if mammals fall into holes or other excavations and cannot escape. Additional direct impacts could include degradation of soil due to fuel contamination, harassment from human presence, increased levels of noise and vibration due to construction, and direct mortality or injury from crushing by construction equipment and from being trapped in burrows during project construction. An additional impact could result from the increased perching opportunities for raptors and ravens, which could lead to increased predation within the project area.

Environmental protection measures outlined in **Appendix C** would serve to avoid or minimize any potential impacts to special status mammals (Reference Numbers BR-9, BR-10, BR-12, BR-13 thru BR-18, BR-20, and BR-23). The Applicant would coordinate with BLM wildlife resource staff to ensure site specific protection measures are appropriate for each area of disturbance.

No maternal roost, colonial roosting habitats, or winter roosts for bats are known to occur within the Proposed Action ROW. No direct impacts to individual bats are expected to occur from destruction of cracks and crevices during project construction. There is a potential for impacts to bats and other small mammals that could be harmed by entering substations and coming in contact with electrical systems. Operation and maintenance of the Proposed Action (e.g., groundwater pumping) are not anticipated to result in indirect impacts to surface water flows, spring discharges, or riparian habitats within the project area or in the Clover Creek, Meadow Valley Wash, or Virgin River within the ROI. Consequently, riparian foraging habitats for bats would not be impacted.

4.5.3.2 Reptiles and Amphibians

During field surveys for desert tortoise and rare plants conducted in the spring and fall of 2006, no populations of banded Gila monsters or chuckwallas were found within the proposed ROW (ARCADIS 2006a and 2006b); however, banded Gila monsters have historically been observed within the ROI. The project area contains suitable reptile habitat, which includes deep, dissected washes along with natural cavities that may provide shelter for banded Gila monsters as well as boulders that may provide habitat for chuckwallas.

Potential effects to banded Gila monsters, chuckwallas, and other reptiles include direct mortality or injury from vehicle strikes, crushing by construction equipment, and being trapped in burrows during project construction. The magnitude of impacts would depend on conditions such as the frequency of the maintenance, time of year, and density of reptiles within and adjacent to the

operations. Implementation of the environmental protection measures outlined in **Appendix C** (Reference Numbers BR-3, BR-4, BR-9, BR-10, BR-12, BR-14, BR-15, BR-21, and BR-23 thru BR-25) would help to limit the extent of direct impacts to reptile species. Additional impacts which affect banded Gila monsters, chuckwallas, and other reptiles during construction activity include degradation of soil due to fuel contamination, harassment from human presence, increased levels of noise and vibration due to construction equipment movement or blasting, increased predation from ravens, and the potential to fall into open trenches and pits. Specific environmental protection measures for these species are included in **Appendix C** (Reference Numbers BR-11, BR-16, BR-18, BR-20, BR-23, BR-24, and BR-25). These measures would reduce the potential for indirect impacts from raptor predation, fall and entrapment hazards, and soil contamination.

As described in section 4.5.1.2, impacts to surface water flows and spring discharges, and therefore habitat for Arizona toad, along the Clover Creek and Meadow Valley Wash are not anticipated. Any uncertainty associated with that conclusion would be addressed through the adoption of the Clover Valley Water Resources Monitoring and Management Plan (**Appendix B**). Consequently, aquatic Arizona toad habitat along Clover Creek and Meadow Valley Wash would not likely be impacted.

4.5.3.3 *Migratory Birds*

The majority of bird species that occur within the project area are protected by the MBTA. Impacts to birds in the project area could include direct mortality from increased human traffic in the area; direct disturbance of nests as a result of construction, operation, and maintenance activities destroying a nest; and nest abandonment as a result of construction, operation, and maintenance noise. If construction of the project occurs during the breeding season, a migratory bird nesting survey would be conducted prior to construction in order to identify any active migratory bird nests. Any occupied nests would be monitored and avoided until the fledglings have left the nest. Undertaking environmental protection measures outlined in **Appendix C**, including BR-1, would limit the potential for impacts to migratory bird species by identifying, monitoring, and avoiding known nests if construction occurs during the breeding season. Therefore, the MBTA would not be violated as a result of construction of the Proposed Action, and impacts to migratory birds and their nests would be avoided or minimized.

Riparian habitat along the Clover Creek, Meadow Valley Wash, and the Virgin River supports populations of riparian bird species including gray flycatcher, blue grosbeak, summer tanager, vermilion flycatcher, Arizona Bell's vireo, and others. Impacts to riparian bird species in the Clover Mountains may occur as a result of project construction near Pine Wash. No riparian habitat would be impacted directly as a result of construction; however, individual birds may be impacted from construction noise along Pine Wash. Adherence to environmental protection measures outlined in **Appendix C** (reference number BR-1, BR-2, and BR-31) would limit the potential for impacts on nesting birds. Additionally, if construction occurs outside of the breeding times for bird species (i.e., September to February) then no impacts would be anticipated to riparian bird species.

As described in Sections 4.5.1.1 and 4.5.1.2, indirect impacts to riparian vegetation are not anticipated as a result of groundwater pumping; therefore, riparian bird species would not be indirectly impacted.

Suitable habitat for the western burrowing owl occurs throughout the Tule Desert region including the project area. During field surveys conducted in the spring and fall of 2006, no burrowing owls were found in the project area (ARCADIS 2006b). Direct effects to western burrowing owl resulting from construction activities include degradation of soil due to fuel contamination, harassment, potential nest abandonment from human presence, increased levels of noise and vibration due to construction equipment movement or blasting, and temporary loss of prey base as a result of direct mortality of small mammals and reptiles. Undertaking environmental protection measures outlined in **Appendix C** (Reference Number BR-1, BR-2, and BR-31) would limit the potential for impacts to burrowing owls by identifying, monitoring, and avoiding known nests if construction occurs within the breeding season. Therefore, the MBTA would not be violated as a result of constructing the Proposed Action, and impacts to western burrowing owl and their nests would be avoided or minimized.

Raptors, including prairie falcons and golden eagles, and other large aerial perching birds (as opposed to ground perching birds) are most susceptible to electrocution when coming in contact with power line structures because of their size, distribution, and behavior (Olendorff et al. 1981; APLIC 1996). Because raptors and other large aerial perching birds often perch on tall structures that offer optimal views of potential prey, the design characteristics of transmission poles appear to be a major factor in raptor electrocutions (APLIC 1996). Electrocution occurs only when a bird simultaneously contacts two energized phase conductors or an energized conductor and grounded hardware. This happens most frequently when a bird attempts to perch on a transmission pole with insufficient clearance between these elements. As described in Chapter 2.0, any transmission structures constructed for the Proposed Action would have clearances between phase conductors or between phase conductors and grounded hardware, as recommended by APLIC (1996), that are sufficient to protect even the largest birds, and therefore would present little to no risk of bird electrocution. With the application of appropriate construction designs for all transmission lines and their towers, impacts associated with bird electrocution should be avoided or minimized.

There would also be an increased potential for collisions with transmission lines and poles. If bird collisions become an issue with the new transmission line, strike indicators (visual markers for birds) could be installed to help reduce impacts (as recommended by APLIC [1994]; Avery et al. [1978]; Brown [1993]).

4.5.3.4 Fisheries

There are no perennial waters within or in the immediate vicinity of the project area. In the ROI, Clover Creek (intermittent), the Meadow Valley Wash (perennial and intermittent), and the Virgin River (perennial) support populations of Meadow Valley Wash desert suckers, flannelmouth suckers, Virgin River spine dace, and Meadow Valley Wash speckled dace. Clover Creek also supports a non-native rainbow trout fishery.

4.5.3.4.1 Tule Desert Hydrographic Area

Operation and maintenance of the Proposed Action (e.g., groundwater pumping) are not anticipated to result in indirect impacts to surface water and/or spring discharges within the project area or in the Virgin River within the ROI. Consequently, aquatic flannelmouth sucker, Virgin River chub, and Virgin River spine dace habitats along the Virgin River would not be impacted. Refer to Section 4.5.1.1 for more details.

4.5.3.4.2 Clover Valley Hydrographic Area

As described in section 4.5.1.2, impacts to surface water and/or spring discharges along Clover Creek and the Meadow Valley Wash are not anticipated. Any uncertainty associated with that conclusion would be addressed through the adoption of the Clover Valley Water Resources Monitoring and Management Plan (**Appendix B**). Consequently, aquatic Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace, and rainbow trout habitats along Clover Creek and the Meadow Valley Wash would not likely be impacted.

There would be no direct or indirect impacts to the BLM Sensitive or state protected fish species related to construction, operation, and maintenance activities within the immediate project area.

4.5.3.5 *Invertebrates*

There are no special status invertebrates in the project area or ROI; therefore, no impacts are anticipated.

4.5.3.6 *Wild Horses*

Two HMAs would be crossed by the Proposed Action and five are adjacent to the project area. The proposed ROW would be restored at the completion of construction, and there would be no long-term impacts (e.g., fencing of the pipeline corridor) that would restrict movement of wild horses. No impacts to wild horse populations are anticipated as a result of the Proposed Action.

4.5.4 **Alternative 1**

Under Alternative 1, the proposed ROW alignment would be the same as that for the Proposed Action from the Clover Valley to MW-2. From MW-2, the Alternative 1 ROW alignment would deviate from the Proposed Action alignment and would remain in the LCCRDA corridor, continuing generally south-southeast, where it would terminate at the northwest corner of the LCLA development area. Alternative 1 is shorter than the Proposed Action and would result in less temporary and permanent disturbance in the Tule Desert but the same disturbance in the Clover Valley. All construction would occur within the construction easement, which would result in the temporary disturbance of approximately 1,733 acres of wildlife habitat and approximately 221 acres of permanent disturbance (see **Table 4-1**). Disturbed areas would be reclaimed to pre-construction conditions following the end of construction activities except for permanent access roads and other permanent project features.

Disturbance to desert tortoise habitat under Alternative 1 would be slightly lower than that under the Proposed Action. Approximately 88.9 acres (19.1 acres less than the Proposed Action) of desert tortoise habitat would be permanently disturbed by construction of Alternative 1. Approximately 696.8 acres would be temporarily disturbed (151.7 acres less than the proposed

action). Of these totals, 30.2 acres (BLM lands) of permanent disturbance would occur in the Beaver Dam Slope Critical Habitat Unit (2.1 acres less than the Proposed Action). Approximately 236.6 acres of temporary disturbance would occur in the Beaver Dam Slope Critical Habitat Unit (17.1 acres less than the Proposed Action). Permanent and temporary disturbance for Alternative 1 make up 0.03 and 0.3 percent of the Beaver Dam Slope Critical Habitat Unit in Nevada, respectively. As described for the Proposed Action, the environmental protection measures that would be implemented as part of this alternative would reduce potential direct impacts to fish and wildlife species.

Alternative 1, although shorter than the Proposed Action, would cross more undisturbed desert land than the Proposed Action south and east of the Toquop Energy Project area. The creation of a new access road may result in new habitat fragmentation and may increase the likelihood of OHV traffic, which could increase the chances of collisions with wildlife.

Increased predation from raptors as a result of increased perching opportunities created by development of a slightly longer transmission line away from the existing transmission line in the utility corridor would constitute an indirect impact associated with Alternative 1. This indirect impact would be minimized with the adoption and implementation of environmental protection measures outlined in **Appendix C** (reference number BR-18).

Because the location and volume of groundwater pumping under the Alternative 1 would be the same as that for the Proposed Action, potential indirect effects to federally listed and other species of concern in the ROI would be the same as those described for the Proposed Action. As described for the Proposed Action, the Water Resources Monitoring and Management Plan (**Appendix B**) would reduce potential indirect impacts from groundwater pumping in Clover Creek and Meadow Valley Wash to federally listed and other special status species.

4.5.5 No Action Alternative

Under the No Action Alternative, the BLM would not grant ROWs allowing construction and operation of the Proposed Action or Alternative 1, and the impacts described above would not occur as a result of this project. The No Action Alternative would not affect the biological viability of local, regional, or national populations of wildlife species of concern/interest. The No Action Alternative would have no impact on endangered, threatened, candidate, and other sensitive species.

4.5.6 Mitigation

No additional mitigation is required; however, additional mitigation measures may be required by the USFWS through Section 7 and/or Section 10 consultation.

4.6 LAND USE

4.6.1 Proposed Action

Construction of the Proposed Action would temporarily disturb approximately 1,878 acres. Following construction, approximately 240 acres would be maintained as permanent ROW and aboveground facilities. The remaining 1,638 acres would be restored and allowed to revert to

former use. Most of the ROW would be located within the designated LCCRDA utility corridor or along existing roads or other utility corridors. While land ownership would remain unchanged, grazing and public use along certain roads may be disrupted for short durations during construction.

Operation and maintenance of the Proposed Action would not conflict with existing federal, state, or county land use plans, policies, or regulations applicable to the project area. All future land use changes associated with urban growth in the LCLA area would be required to comply with applicable Lincoln County land use plans and development requirements. Implementation of the Proposed Action would not result in the inability of the BLM to accommodate additional infrastructure demands within the LCCRDA corridor or other land uses in the project area.

4.6.1.1 Rangeland and Livestock Grazing

Grazing allotments in the southern reach of the project area were affected by wildfires in 2005. Many of these areas are currently closed to livestock grazing (Johnson 2008). The proposed water and natural gas pipelines would be buried and would not permanently restrict movement of cattle between pastures. Implementation of the Proposed Action, and the resultant groundwater pumping activities, would not reduce forage levels in the project area that would lead to a decrease in permitted AUMs within any active allotment.

4.6.1.2 Mineral Resources

There are no active mining claims or oil and gas leases within the project area. The Proposed Action would not affect access to, or availability or development of, oil and gas or any locatable/saleable mineral resources in the project area.

4.6.1.3 Transportation

Construction activities among the various utilities may not be concurrent and may result in intermittent impacts to local traffic. These activities would be spaced over time, and the impacts to public travel, traffic flow, and road conditions would be temporary and localized.

The influx of construction personnel and transportation of material and equipment to the project area would have a minimal impact on traffic along I-15 and Highway 93. Existing dirt and gravel roads would be used to access portions of the project area. Some off-road travel may be required to access portions of the project alignment; however, all off-road traffic would remain within the permitted ROW. Where construction of spur roads is needed to access the well sites, the access roads would be approximately 16 feet wide and would be constructed in accordance with BLM and/or county standards or specifications.

Construction activity could contribute to increased levels of dust, which is generated from travel on gravel and dirt roads. All construction and operation activities within the region are required to comply with local, state, or federal policies regarding dust control and air quality standards. The Applicant has prepared a Fugitive Dust Control Plan as part of their POD. Measures to minimize dust, including dust suppression through watering, would be implemented during construction and operation of the Proposed Action. Additional measures are described in **Appendix C – Standard Construction and Operations Procedures**.

All permanent access roads would be surfaced with gravel and would be constructed in accordance with BLM and/or county standards or specifications. Construction impacts would cease at the end of construction activities. After construction, field operations personnel would conduct periodic maintenance of project facilities. During these visits, field personnel would inspect facilities and conduct routine maintenance in conformance with established procedures and industry standards.

The Proposed Action would have no impacts on the UPRR, located east of the project area, or any local or municipal airports in the regional area.

4.6.2 Alternative 1

Under Alternative 1, the proposed ROW alignment would be the same as that for the Proposed Action from the Clover Valley to MW-2. From MW-2, the Alternative 1 ROW alignment would deviate from the Proposed Action alignment and would remain in the LCCRDA corridor, continuing generally south-southeast, where it would terminate at the northwest corner of the LCLA development area. The portion of the LCCRDA corridor between the permitted utility corridor near the proposed Toquop Energy power plant site to the northwest corner of the LCLA development area is undeveloped. Under Alternative 1, a new access road, up to five miles in length, would be constructed. The new access road would result in direct impacts to previously undisturbed desert land within the Beaver Dam Slope ACEC. Any new access road through an ACEC would be constructed to meet BLM stipulations for road construction within an ACEC, including preconstruction biological and cultural clearances prior to any ground-disturbing activities.

All construction would occur within the construction easement, which would result in the temporary disturbance of approximately 1,733 acres of BLM-administered lands and approximately 221 acres of permanent disturbance. Disturbed areas would be reclaimed to pre-construction conditions following the end of construction activities except for permanent access roads and other permanent project features.

4.6.3 No Action Alternative

Under the No Action Alternative, there would be no project-associated impacts to federal land use or grazing activities within the project area.

4.6.4 Mitigation

No mitigation is required.

4.7 AREAS OF CRITICAL ENVIRONMENTAL CONCERN, WILDERNESS, AND OTHER SPECIAL USE AREAS

4.7.1 Proposed Action

Under the Proposed Action, the majority of the proposed ROW would parallel existing roads or existing electrical and natural gas utility corridors. However, the segment between the existing utility corridor east of the proposed Toquop Energy power plant site and the north end of the

LCLA development area would cross undisturbed lands within the Beaver Dam Slope ACEC. A new access road, up to three miles in length, would be constructed. The road would result in direct impacts to previously undisturbed desert land within the Beaver Dam Slope ACEC. Any new access road through an ACEC would be constructed to meet BLM stipulations for road construction within an ACEC. Preconstruction biological and cultural clearances would occur prior to any ground-disturbing activities within the ACEC.

The Proposed Action would be located east of the Mormon Mountain and Clover Mountain Wildernesses. In accordance with BLM Manual 8560 – Section 19, no project component would be located closer than 100 feet from a Wilderness boundary. Project facilities located on private lands in the LCLA development area would be subject to the current Lincoln County Master Plan (2006), or any future GID service plans.

As described in Chapter 4.6 – Land Use, construction activities may temporarily restrict access roads into the surrounding Wildernesses. However, these impacts would be localized and short-term. Operation of the Proposed Action would not, in and of itself, increase recreation use in the area. However, construction of approximately 3 miles of new road would increase access to the Beaver Dam Slope ACEC and impacts associated with increased access would occur. Permanent project facilities would not restrict access to the surrounding Wildernesses.

Increased noise, dust, odors, and increased traffic from construction activities may be noticed from within nearby Wilderness, ACECs, or other special use areas during construction. However, these impacts would be temporary and localized.

4.7.2 Alternative 1

Under Alternative 1, direct and indirect impacts to ACECs, Wildernesses, and Special Use Areas would be similar to those described under the Proposed Action, with the exception of the southern end of the project area. Under Alternative 1, the pipeline segment at the southern end of the project area would be located entirely within the designated LCCRDA utility corridor. This portion of the LCCRDA corridor crosses undeveloped lands between the permitted utility corridor near the proposed Toquop Energy power plant site to the northwest corner of the LCLA development area. A new access road, up to five miles in length, would be constructed under Alternative 1. The road would result in direct impacts to previously undisturbed desert land within the Beaver Dam Slope ACEC. Any new access road through an ACEC would be constructed to meet BLM stipulations for road construction within an ACEC, including preconstruction biological and cultural clearances prior to any ground-disturbing activities.

All construction would occur within the construction easement, which would result in the temporary disturbance of approximately 1,733 acres of BLM-administered lands and approximately 221 acres of permanent disturbance. Disturbed areas would be reclaimed to pre-construction conditions following the end of construction activities except for access roads and other permanent project features.

4.7.3 No Action Alternative

Under the No Action Alternative, there would be no impacts to ACECs, Wildernesses, or other special use areas on federal lands within the project area associated with the Proposed Action or

Alternative 1.

4.7.4 Mitigation

No mitigation measures are required.

4.8 RECREATION

4.8.1 Proposed Action

Due to its remoteness, the project area currently does not experience a high level of recreation use, although the BLM reports that usage has increased over the last several years (BLM 2005). There are no existing campgrounds or designated hiking or OHV trails in the project area. The surrounding mountains and desert provide dispersed recreation activities such as hiking, sightseeing, camping, and hunting. Construction activities along portions of existing dirt and gravel roadways may temporarily restrict access into these areas. The Proposed Action would not preclude the use of these areas, but rather would require recreational users to temporarily relocate to surrounding recreation areas if access roads are restricted due to construction.

After construction is complete, disturbed areas, with the exception of permanent aboveground facilities and roads, would be reclaimed and revegetated to pre-construction conditions. Implementation of the Proposed Action would not, in and of itself, increase recreation use in the area. However, the construction of new and improved access roads would result in easier vehicular access to areas adjacent to the proposed ROW, including ACECs and Wildernesses. This could lead to increases in the number of visitors to these areas.

4.8.2 Alternative 1

Impacts resulting from implementation of Alternative 1 would be similar to those described for the Proposed Action.

4.8.3 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be constructed or operated, and the impacts described above would not occur.

4.8.4 Mitigation

No mitigation is required.

4.9 AIR QUALITY

The ROI evaluated for direct effects to air quality includes the project area and those areas immediately adjacent to the project area that may be subject to disturbance from project construction. Indirect effects are evaluated for air quality in the area as a result of the implementation of the Proposed Action or Alternative 1.

4.9.1 Proposed Action

Nearly all air emissions and air quality impacts associated with the Proposed Action would be temporary and would occur as the result of project construction. Construction activities can be grouped into those occurring on site and off site. Air pollutant emissions during on-site construction would principally consist of fugitive particulate matter (dust) generated from travel on unpaved surfaces and material handling and exhaust emissions from mobile diesel and gasoline-powered construction equipment. Off-site exhaust emissions would result from the workers commuting to staging areas, transporting workers from staging areas to the work sites, trucks hauling materials to the work sites, and dump trucks hauling away construction debris.

Diesel-fired portable engines and equipment would likely be used to provide temporary power during construction. Any stationary internal combustion engine that has a rating for output greater than 250 horsepower would require an operating permit from the NDEP. Diesel-fired electrical generators would be subject to regulation through state and local air quality permitting programs. Permitted equipment would be required to meet applicable emission standards and control requirements.

Construction of pipelines and associated facilities would result in temporary emissions of fugitive dust containing PM₁₀ and PM_{2.5}. These emissions would dissipate following completion of construction. Particulate matter from construction would be emitted at ambient temperature and at ground level. Fugitive dust emissions from construction activities would be minimized through common construction practices. Specific dust suppression measures, NA-1 through NA-10, would be used to reduce air quality impacts. These Applicant proposed measures are provided in **Appendix C**.

Dust would have little buoyancy and would not be expected to travel great distances from the generation site. Emissions from construction activities would not likely impact measurements at ambient PM₁₀ and PM_{2.5} monitors located in Las Vegas and surrounding suburban areas nor travel far enough to impact Zion National Park (nearest Class I airshed).

Temporary gaseous emissions would be generated during construction, including SO₂, CO, NO_x, and VOCs from diesel-powered well-drilling and construction equipment. SO₂ emissions would be limited by state and federal regulations which control the amount of sulfur in diesel fuel. Other gaseous emissions from diesel engines would be minimized through proper operation and maintenance. If blasting is used for pipeline construction, ammonium nitrate and fuel oil (ANFO) would be a source of gaseous pollutants. ANFO blasting can cause fugitive emissions of NO_x, CO, and SO₂. Emissions from blasting agents would be limited by restricting its use to the smallest area possible. The EPA emission estimating software NONROAD2005 was used to estimate emissions from the construction equipment. **Table 4-4** presents the estimated annual emissions.

Fugitive PM₁₀ emissions from construction activities are estimated to be 4.8 tons monthly and 14.3 tons annually. This is based on the number of acres under construction on a monthly basis (15.3 acres) and an annual basis (45.9 acres).

Operation and maintenance of project pipeline and power transmission facilities may generate small amounts of fugitive dust from travel on unpaved surfaces by maintenance and inspection crews as well as associated vehicle emissions. This would occur infrequently and for a very short duration.

Phase	Equipment	Emissions per Unit (ton/yr)				
		VOC	CO	NO _x	SO ₂	PM
Site Preparation	Bulldozer	0.02	0.17	0.39	0.06	0.03
	5-yard Dump Truck	0.04	0.48	0.93	0.17	0.06
	Front-end Loader	0.02	0.15	0.34	0.05	0.02
	Backhoe	0.01	0.05	0.07	0.01	0.01
Site Excavation (in areas where ripping or trenching are required)	Bulldozer	0.02	0.17	0.39	0.06	0.03
	Backhoe	0.01	0.05	0.07	0.01	0.01
	Trencher	0.01	0.06	0.15	0.02	0.01
	5-Yard Dump Truck	0.04	0.48	0.93	0.17	0.06
	Jackhammer/Rock Saw	0.00	0.02	0.02	0.00	0.00
Plowing	Bulldozer	0.02	0.17	0.39	0.06	0.03
	Backhoe	0.01	0.05	0.07	0.01	0.01
	Tractor-Trailer	0.04	0.48	0.93	0.17	0.06
Backfilling, Grading, and Restoration	Bulldozer	0.02	0.17	0.39	0.06	0.03
	Backhoe	0.01	0.05	0.07	0.01	0.01
All Operations	Pick-up Trucks (4)	0.09	0.38	1.18	0.23	0.09
	Refueling Truck	0.04	0.48	0.93	0.17	0.06
	Water Truck	0.04	0.48	0.93	0.17	0.06
Total		0.44	3.86	8.22	1.40	0.56

Fugitive PM₁₀ emissions were estimated using the following emission factor from EPA’s AP-42 Chapter 13.2.3, Heavy Construction Operations:

Emissions = 1.2 tons/acre-month of activity

VOC – volatile organic compound

CO – carbon monoxide

NO_x – oxides of nitrogen

SO₂ – sulfur dioxide

PM – particulate matter

The projected annual power needs of the Proposed Action are estimated at approximately 30 megawatts for wells in the Tule Desert and Clover Valley Hydrographic Areas pumping a combined 23,820 AFY. Assuming that all electrical energy required by the project wells was derived from a coal fired power plant (although most of the LCWD’s current supply allocation is hydroelectric from Hoover Dam), the energy requirements for the project equate to the emission of an estimated 225,000 tons of carbon dioxide (CO₂) (a “greenhouse” gas) per year (Intergovernmental Panel on Climate Change [IPCC] 2007). Because CO₂ emissions are evaluated on a global scale, the direct and indirect additions of CO₂ would be added to the global total. The IPCC estimate CO₂ global total emissions from the land and ocean at approximately 855 billion tons per year and existing CO₂ global totals from fossil fuels at approximately 29 billion tons per year (IPCC 2007). The electrical energy demand associated with the Proposed Action could represent 225,000 tons of CO₂ per year, or .0000263 percent of the total global CO₂ emissions.

During scoping, comments were received about the potential for mobilization of radioactive dust during construction activities. The presence or absence of radioactive particulates in the soil substrate within the project area is unknown. During construction, the Applicant would implement site-specific BMPs, including dust suppression measures, to minimize fugitive dust. Applicant-proposed environmental protection measures referenced in Chapter 2 (Applicant Proposed Environmental Protection Measures) and provided in **Appendix C** (Standard Construction and Operation Procedures) would be applied during all phases of construction.

4.9.2 Alternative 1

Impacts resulting from implementation of Alternative 1 would be similar to those described for the Proposed Action.

4.9.3 No Action Alternative

The No Action Alternative would have no air quality impacts associated with public land use.

4.9.4 Mitigation

No mitigation is required.

4.10 NOISE

The ROI evaluated for noise includes the project area and those areas immediately adjacent to the project area that may be subject to disturbance from project construction and operation.

4.10.1 Proposed Action

Ambient noise levels would temporarily increase in the immediate vicinity as a result of project construction activities. The ambient sound level of a region is defined by the total noise generated within the specific environment, and is usually composed of natural and artificial sounds. The EPA has determined that noise levels in an area should not exceed 55 dBA Ldn. This is the level that the EPA has found protects the public from interference with indoor and outdoor activities. Long-term noise levels associated with wellhead, pump station, and pipeline operations would generally be steady and continuous, and predicted to be at lower levels than construction noise. Noise levels from field pumps and the pump station would be approximately 15 dBA (at a distance of 50 feet) lower than typical background in rural areas and estimated project noise levels from construction.

Equipment used during construction activities would include standard construction and earth-moving equipment (scrapers, excavators, backhoes, graders, trenchers, bulldozers, rock drills, and dump trucks) and well development equipment such as drill rigs. Assuming all equipment operates concurrently at the same location, the combined construction noise level would be approximately 92 dBA at a distance of 50 feet from the equipment. Standard sound level calculations predict that sound levels would decrease 6 dBA for every doubling of distance from the source. Beyond 4,000 feet from the construction, this noise level would be below 55 dBA.

If blasting is employed during construction, the estimated sound level at 50 feet would be 94

dBa. This sound level would be an impulse (short-term peak), and this level would drop below 55 dBA at distances beyond 4,500 feet. Most of the sound pressure generated by blasting is absorbed by the formations being blasted (i.e., it is not like an open air explosion). Unlike a charge placed in the ground or in rock, an open air explosion, such as a bomb being exploded above the earth's surface, has less immediate surrounding material to absorb the sound.

There are no established guidelines or standards to predict long-term effects of elevated sound levels on wildlife. It can be assumed that any wildlife in the area have habituated to existing sound levels generated by low-flying military aircraft and OHVs in the project area. However, wildlife may be affected by construction activity noise, causing wildlife to temporarily avoid the area during construction. Nonetheless, noise from construction activities would be intermittent and short-term.

Operation of the well field pumps and the pump station would cause lower sound levels compared to those powered by diesel generators. The production wells operating on electric power would have a sound level of approximately 77 dBA at a distance of 50 feet. For these wells, the EPA Ldn 55 dBA guidelines would be met at a radius of 645 feet. Maximum sound levels generated by transmission line corona discharge would only be perceptible in the immediate vicinity of the transmission lines. Elevated sound levels from maintenance vehicles or activities would be no higher than those predicted for the construction activities.

4.10.2 Alternative 1

Noise impacts resulting from implementation of Alternative 1 would be similar to those described for the Proposed Action.

4.10.3 No Action Alternative

Under the No Action Alternative, the ROW would not be granted on federal lands, thereby eliminating the potential for noise impacts from the Proposed Action.

4.10.4 Mitigation

No mitigation is required.

4.11 VISUAL RESOURCES

The ROI for visual resources includes the project area and those areas immediately adjacent to the project area that may be visible by viewers at sensitive viewing areas within the ROI.

4.11.1 Proposed Action

Proposed groundwater development wells and associated facilities would be located on public lands managed with VRM Class IV objectives. The proposed project facilities would result in a moderate level of change to the characteristic landscape as viewed from the KOPs and public roads located in close proximity to proposed facilities, depending on the occurrence of existing human modification in the visible landscape. The proposed project facilities would meet BLM VRM Class IV objectives, which provide for major modifications of the existing character of the

landscape.

Short-term effects to the visual character of the landscape from the Proposed Action would result from well pad construction, well drilling, and associated construction of ancillary facilities, such as aboveground transmission lines, access roads, and water transmission and lateral pipelines, and the natural gas metering station. Following construction, with the exception of the aboveground facilities, temporary disturbance areas would be reclaimed to pre-construction conditions. Temporary disturbances would not conflict with VRM objectives, which address modifications to the landscape from long-term facilities.

Construction activities would be evident to people using roads near project components. Visitors would be affected by the sight and dust of construction activities. In addition, the transport of equipment and materials to the various construction sites would be evident to travelers on public roads used to access the project area.

Under the Proposed Action, the potential long-term effect on scenic resources would be from the installation and operation of project facilities and the removal of vegetation within the construction corridors. The addition of the proposed facilities to the existing landscape could alter existing line, form, color, and texture as viewed from sensitive viewing areas. Most of the project area is screened from sensitive viewing areas by intervening terrain. Effects from long-term activities would occur over the life of the project. In addition, there would be cumulative effects to the visual quality of the landscape from the proposed project as seen from the KOPs, as existing water production facilities are located in the Tule Desert and aboveground transmission lines cross through the area.

Water Production Wells

The clearing and grading activities would be visible in foreground-middle ground distance zones due to contrasts in color and texture with the surrounding vegetation. The water production wells would have a low profile, and would not be easily visible in the foreground to background distance zones from most of the ROI. In general, at distances greater than 1.5 miles, facilities such as the well enclosures and fences would be too distant from the KOPs or any other location on public roads to be easily visible to viewers, because the scale of the facilities would be small relative to the surrounding landscape. Graded areas would be difficult to discern from the surrounding landscape in middle ground views of more than 0.5 mile from viewpoints. This is because the existing characteristic vegetation of the project area consists of sparse, low-growing vegetation, so that longer views are dominated by the light tan colors of the desert soils.

Pipelines

Impacts from pipeline construction activities would occur primarily along existing two-track roads. The installation of project components next to existing roads would result in an increased area of disturbance, so that the affected roads would be more visible in the landscape.

Aboveground facilities would be small in scale and visible primarily in the immediate foreground distance zones of public roads and KOPs.

Storage Tanks

The five proposed water storage tanks would be the most easily visible of the proposed facilities, as the large, blocky structures would provide form, line, scale, and color contrasts with surrounding natural landscape features. Three of the tanks (ST-2, ST-4, ST-5, and ST-6) would be within the foreground views of existing roads along the LCWD ROW. Tank ST-4 would be visible from the summit of East Pass Road, which provides panoramic views to the south of the Tule Desert and surrounding mountain ranges and to the north of the Clover Valley. The storage tank would not block panoramic views to the north and south, but would be an obvious human modification of the existing natural landscape.

Electric Power lines

Several effects to visual resources can result from the introduction of electric facilities into the landscape. The transmission and distribution poles introduce straight, vertical lines and color contrasts. There may also be a glare when sunlight is reflected from the conductors. The impacts from the introduction of these elements into the landscape can be significant when viewed from sensitive viewpoints. Impacts are also significant when structures are visible in scenic landscapes and when structures are skylined.

The overhead lines would be constructed on single wood poles approximately 35 feet tall (22.8 kV and 4.16 kV distribution lines) and 65 feet tall (138 kV transmission line). The brown color of the wood poles would harmonize with the colors of the surrounding soil and vegetation, so that color contrasts would be low. The span between the poles would be determined by the topography. While the addition of the electric transmission and distribution power lines into the predominantly natural-appearing landscape would constitute a visual intrusion, the wood poles would not be a significant element of the landscape, as they are similar in appearance to power lines on wood poles that are located throughout rural areas of Nevada.

The proposed overhead transmission and distributions line would be within the foreground distance zone of public roads located in close proximity to the LCCRDA utility corridor. In general, the single wood pole structures would be difficult to see at distances of greater than 0.5 mile, particularly if there is a backdrop that provides some variety in texture and color that would screen the poles to some extent.

The greatest degree of visual intrusion from overhead power lines would be in locations where the power lines would cross ridge tops, which would result in the skylined poles on some segments of the line as viewed from public roads. Skylined pole structures would also occur on East Pass as seen from some locations on East Pass Road.

Tule Desert Substation

The Tule Desert Substation is blocked from the views of any sensitive viewing areas by surrounding mountain terrain. The substation would be visible to motorists from some of the numerous unimproved and two-track public roads that cross the ROW; however, public use of the roads is low. In general, glare effects would be reduced because project facilities would be constructed with non-reflective materials. The overall visual change is low, primarily because existing electric transmission lines that cross have added an industrial element to the landscape. In addition, public use of the ROI is low.

4.11.1.1 Sensitive Viewing Areas

Visual simulations prepared from photographs of the existing landscape as seen from the KOPs are shown in **Figures 4-1** and **4-2**. Proposed facilities within the LCCRDA corridor would be obvious in the immediate foreground distance zone to viewers on East Pass Road, and numerous unimproved and two-track public roads that cross through the Tule Desert and the Clover Valley.

Key Observation Points (KOPs)

KOP 1 (**Figure 4-1**) provides a view of the proposed water storage tank (ST-2) to be sited near the proposed Toquop Energy power plant, and the proposed 138 kV transmission line to be located parallel to the existing 550 kV, 500 kV, and 345 kV transmission lines that extend to the west of the Toquop site. The geometric form and straight edges of ST-2 would provide an obvious contrast with the surrounding landscape. The proposed single wood poles would be approximately 30 feet tall and would be located parallel to the existing high voltage transmission lines, minimizing the incremental impact of the new 138 kV transmission line. The wood poles of the proposed transmission line provide a lesser contrast in form, line, and color than do the existing steel lattice structures of the 550 kV and 500 kV lines, and would be dominated by the stronger contrast of the larger structures supporting the existing lines. Because the existing landscape has been modified by the existing transmission lines, the project area landscape would not change in character with the addition of the proposed ST-2 and the 138 kV transmission line as viewed from KOP 1 or any location in the ROI.

KOP 2 (**Figure 4-2**) provides a view of the proposed distribution line adjacent to the ROW for the Proposed Action and the revegetated permanent and construction pipeline ROWs. The wood poles of the proposed transmission line would modify the existing, predominantly natural landscape with vertical forms and straight lines that would be a noticeable contrast with the surrounding flat to rolling landforms, and irregular shapes and textures of desert vegetation as seen in the immediate foreground distance zone (less than 0.5 mile). At distances of greater than 0.5 mile, the distribution poles would be visible in the landscape, but difficult to discern from the surrounding landscape because of the small scale of the poles relative to surrounding features, and because the brown color of the poles would harmonize to some degree with the tan colors of desert rock and soils.

4.11.2 Alternative 1

Impacts to visual resources under Alternative 1 would be similar to those described for the Proposed Action.

4.11.3 No Action Alternative

Under the No Action alternative, the proposed water development facilities would not be installed and operated within the project area. There would be no effect on the existing visual condition from the proposed facilities. Existing management activities and land use of the area would continue, and the project area would be managed to protect and maintain existing improvements and uses.



KOP 1 – Existing Condition: KOP-1 is located on an unimproved public road about 0.5 miles north of a utility corridor that contains three electric transmission lines; the 550-kV DC Southern Transmission Line, the 500-kV AC Navajo Project, and the 345 Harry Allen-Red Butte Transmission Line. The view faces west-southwest to the East Mormon Mountains.



KOP 1 – Photographic Simulation: ST-2 is visible in the foreground distance zone approximately 2 miles west of the KOP. The proposed 138-kV transmission line facilities in the foreground-middleground distance zone are located in close proximity to the existing overhead transmission lines.

Figure 4-1



KOP 2 – Existing Condition: KOP-2 is located southeast of Toquop Gap at the intersection of the LCWD ROW and a public road that provides access to the Mormon Mountains and the Tule Desert. The KOP provides a view to the northwest of the LCCLA corridor in the immediate foreground distance zone.



KOP 2 – Photographic Simulation: The proposed 22.8-kV double circuit distribution line is located along the proposed pipeline ROW in the LCCLA corridor in the immediate foreground distance zone. The simulation provides a view of the revegetated construction and permanent ROWs, and a new access road.

Figure 4-2

4.11.4 Mitigation

No additional mitigation beyond those implemented as part of the Proposed Action would be required.

4.12 SOCIOECONOMICS

The ROI for the socioeconomic analysis is Lincoln and Clark Counties, in Nevada and Washington County in Utah because social and economic effects occur in community and county jurisdictions rather than resource-based areas of influence. Population and labor data are provided for communities located closest to the project area because project construction and operation workforce would be based in the nearby cities of Caliente and Mesquite in Nevada and St. George in Utah. Mesquite would provide the bulk of the rental housing and lodging for the project due to its size relative to Caliente. Demographic data for Nevada and Utah are included to set the proposed project in a regional context.

4.12.1 Proposed Action

Implementation of the Proposed Action would have a direct effect on the social and economic resources from the increase in the level of economic activity that would result from increased payroll earnings during project construction, which would be spent on items such as housing, food, goods, and services. These social and economic effects would occur where the proposed project workforce would reside, primarily in the communities nearest the construction site. The construction site extends approximately 47 miles from about 10 miles northwest of Mesquite, Nevada in Clark County to about 15 miles southeast of Caliente, Nevada in Lincoln County. Construction would take up to 18 to 24 months to complete and involve up to 160 workers. Direct impacts from the construction would end at that time. Direct effects to social and economic resources from operation and maintenance of the project would be minimal. These effects would be concentrated in Caliente in Lincoln County, Nevada; Mesquite in Clark County, Nevada; and St. George in Washington County, Utah.

4.12.1.1 Population and Housing

While some of the construction workers required for constructing the Proposed Action facilities might come from as far as the Las Vegas area (more than 80 miles to the southwest of the southern terminus of the project on I-15) the majority would come from the Mesquite, Nevada and the St. George, Utah area. Mesquite is near the southern terminus of the project, and St. George is 39 miles to the northeast on I-15. Construction of the Proposed Action would not result in an influx of new residents into the region because only 160 construction workers will be required and there are an estimated 7,979 construction workers in the Mesquite and St. George area (Nevada Department of Employment, Training, and Rehabilitation 2006 and Utah Department of Workforce Services 2005). The 160 construction workers required for this project is approximately half of the number of existing unemployed construction workers in the Mesquite and St. George area. The workforce would come from the local construction workforce, and there would be no direct local or regional population impacts and no increase in demand for permanent or temporary housing. The populations of Mesquite, Nevada and St. George, Utah were 13,523 and 64,201, respectively, for a combined population of 77,724 in

2005 (U.S. Census Bureau 2007c and 2007e). With the estimated number of construction workers being 160, even if they all moved into the area accompanied by a spouse and child, they would account for less than a 1 percent increase in the population of the Mesquite and St. George areas.

Caliente, Nevada near the northern end of the project area had a population of 1,015 in 2005 (U.S. Census Bureau 2007c and 2007e). If 80 workers, or half of the estimated construction workforce of 160, were to obtain temporary housing in Caliente, the direct impact to the population would be less than a 10 percent increase for the 2-year construction period.

Direct effects on housing would be limited to Caliente, Mesquite, and St. George. Some of the workforce would occupy rental housing and lodging nearer the actual construction site because construction is expected to last 18 to 24 months. Temporary housing in Caliente includes approximately 72 motel rooms at four motels. There are two RV parks with 54 hookups (City of Caliente 2007). The direct impact to the availability of rental housing and lodging in Caliente would be significant, but temporary. At the other end of the project, Mesquite has more than 2,900 rooms and suites at 11 hotels/motels and 95 hookups at two RV parks. St. George has more than 3,180 rooms and suites at more than 30 hotels/motels and an unknown number of hookups at three RV parks (St. George Area Chamber of Commerce and SEARCHUS 2007). Therefore, construction of the Proposed Action facilities would have no measurable effect on temporary housing in the Mesquite and St. George area.

Alamo is 55 miles from Caliente, which is another 15 miles from the northern terminus of the project construction site, and Las Vegas and North Las Vegas are more than 80 miles from Mesquite, the nearest access to the project construction site location. Therefore no direct impacts would be experienced in these communities.

The indirect effects on population and housing that would stem from the withdrawal of groundwater (operation of the project) would be substantial and concentrated in Lincoln County. The provision of water to the LCLA development area would result in development of approximately 24,000 dwelling units. This would result in Lincoln County's population increasing by approximately 60,000 residents over a 30-year period. This indirect effect of the project on the county's population would represent over fourteen fold increase above the population in 2005. Assuming that the build-out of the planned residential development occurred in equal increments during the 30-year period, the indirect impact to Lincoln County's population would be an increase of more than 2,000 residents each year. That would represent a population increase of 50 percent of the estimated 2005 total population each year for the next 30 years. The indirect effects on housing would parallel the indirect effects on population in Lincoln County and show a near fourteen fold increase over the 30-year planned build-out of the LCLA planned development.

Lincoln County has a Master Plan that was updated in 2006. The Master Plan for Lincoln County, Nevada, Amended December 4, 2006, was developed to "guide the county's growth, management of natural resources, provision of public services and facilities and the protection of the public's health, safety and welfare." The Master Plan for Lincoln County, Nevada has a planning horizon of 20 years. "However, frequent updates (paid for by the proposed development) must be considered every two years." The Master Plan contains policies and goals which form the basis of the county's plans for considering alternatives and evaluating results.

The policies are the implementation tools for the county's Master Plan and are intended to ensure orderly and sustained growth. Providing that the Master Plan is a living document with updates considered every 2 years as required in the plan, the impacts to population growth and housing in Lincoln County should be orderly and manageable.

4.12.1.2 Economy and Employment

In 2005, there were 17 construction workers in Lincoln County. There were an estimated 7,979 construction workers in the Mesquite and St. George areas in 2005 (Nevada Department of Employment, Training, and Rehabilitation 2006 and Utah Department of Workforce Services 2005). The 160 construction workers required for this project is approximately half the number of existing unemployed construction workers in the Mesquite and St. George areas. Therefore, there would be more than an ample construction labor force in the area to meet the requirements of the Proposed Action. There would be no significant direct impact to the economy or employment with the exception of a possible 50 percent reduction in the unemployment rate for construction workers in the Mesquite/St. George area. Some of the construction workers would be transitioning from a job coming to an end to a new one starting up, so the actual reduction in the unemployment rate among construction workers would be hard to predict, but should be less than 50 percent.

Applying the multiplier of 1.75 from the IMPLAN economic impact model for Sector 50 New Utility construction to the average annual direct employment of 160 for the two year construction period generates an estimate of total employment of 280. The 280 jobs come from adding the direct employment of 160 jobs plus the indirect employment of 56 jobs and induced employment of 64 jobs. The employment generated through the provision of the goods and services necessary to construct and operate the Proposed Action is indirect employment. Induced employment is generated through household spending, including goods and services purchased by employees of the Proposed Action (BLM 2007b).

The Applicant has estimated the construction costs to be around \$260 million and that the annual construction payroll would be approximately \$21 million. Applying the combined Lincoln and Clark County region Type SAM labor income multiplier for IMPLAN Sector 50: New Utility Construction of 1.46 to indicates that indirect and induced labor income within the two county region would be approximately \$31 million (BLM 2003).

4.12.1.3 Public Utilities and Services

Construction of the Proposed Action would have minimal direct effects on the public utilities and services in the ROI because the construction workforce would come from existing resources. Some solid wastes would be generated by construction, but the limited amount of wastes generated would not affect the life expectancy of the municipal solid waste facilities currently operating in the area. Any hazardous materials would be disposed at an EPA approved hazardous waste facility.

Operation of the Proposed Action would make the groundwater resources of the Clover Valley and Tule Desert Hydrographic Areas available for use within the LCLA planned development area. The indirect effects of the operation of the project (withdrawal and transport of groundwater) would be the build-out of the LCLA planned development, as described in Section

4.12.1.2. This would result in a population increase of approximately 60,000 people over a 30-year period. In accordance with the Lincoln County Master Plan, impacts of the planned growth within the county should be orderly and manageable.

4.12.2 Alternative 1

The socioeconomic characteristics and potential impacts of Alternative 1 are similar to those of the Proposed Action.

4.12.3 No Action Alternative

Under the No Action Alternative, the ROW on federal lands would not be granted to the LCWD. No ground disturbance would occur from the Proposed Action, and there would be no associated direct or indirect impacts.

4.12.4 Mitigation

No mitigation is required.

4.13 ENVIRONMENTAL JUSTICE

Executive Order 12898 requires an analysis of impacts of a federal action on disproportional minority and low income population. There are no such populations in or near the project area.

4.13.1 Proposed Action

Potential direct and indirect impacts associated with the Proposed Action would not have a disproportionate effect on low-income or minority populations, because these populations are not present in the vicinity of the project area. Based on the information gathered from the U.S. Census Bureau, minority populations comprise less than 5 percent of the population in Lincoln County (U.S. Census Bureau 2000). This is 1) less than the 50 percent definition of a minority population and 2) not a meaningfully greater percentage than the minority population of the county or state, as cited in the CEQ's *Environmental Justice Guidance under the National Environmental Policy Act* (CEQ 1997). Therefore, implementation of the Proposed Action would have no impact on environmental justice issues.

4.13.2 Alternative 1

The environmental justice characteristics and potential impacts of Alternative 1 are similar to those of the Proposed Action.

4.13.3 No Action Alternative

Under the No Action Alternative, the ROW would not be granted. No project-associated impacts would occur to minority or low-income populations under the No Action Alternative.

4.13.4 Mitigation

No mitigation is required.

4.14 HAZARDOUS MATERIALS AND SOLID WASTES

4.14.1 Proposed Action

Hazardous and toxic materials, such as fuels and solvents, would be transported, used, and stored in the project area during both the construction and operational phases of the Proposed Action. Accidental release of hazardous and toxic materials could cause harm to human health and the environment if not handled properly. Measures to minimize potential for accidental spills or hazardous materials are outlined in the Environmental Management Plan and SPCC Plan prepared by the LCWD. The LCWD, LCPD, Southwest Gas, and LCT would each employ on-site Construction and Environmental Inspectors who would ensure compliance with all regulatory requirements.

Solid wastes would be generated primarily by construction activities. Disposal of wastes generated from construction and operation would not affect the life expectancy of the municipal solid waste facilities currently operating in the region. Any hazardous materials would be disposed at an EPA-approved hazardous waste facility. Therefore, there would be no impact from the Proposed Action on existing waste facilities in the region.

4.14.2 Alternative 1

The impacts of hazardous materials and solid waste potential under the Alternative 1 are expected to be similar to the Proposed Action for both construction and operation activities.

4.14.3 No Action Alternative

Under the No Action Alternative, the ROW would not be granted and the potential impacts described above would not occur.

4.14.4 Mitigation

No mitigation is required.

4.15 PALEONTOLOGICAL RESOURCES

4.15.1 Proposed Action

Impacts to paleontological resources would be measured by physical damage to fossil-bearing formations through excavation or surface disturbance (BLM 2005). Construction activities (e.g., excavation of the pipeline trenches) may result in unanticipated exposure of paleontological resources in late Pleistocene and Holocene deposits in the Tule Desert and Miocene-Pliocene deposits near the Lincoln County Land Area.

4.15.2 Alternative 1

There are no known impacts to paleontological resources that would result from construction, operation, and maintenance of Alternative 1. However, construction activities (e.g., excavation of the pipeline trenches) may result in unanticipated exposure of paleontological resources in Miocene-Pliocene deposits near the LCLA development area.

4.15.3 No Action Alternative

No paleontological resources located on federal lands would be disturbed by project activities under the No Action Alternative.

4.15.4 Mitigation

If paleontological resources are discovered during construction, the appropriate BLM staff would be contacted, according to the standard operating procedures presented in **Appendix C (CR-8) – Standard Construction and Operation Procedures**, to determine steps necessary to evaluate the need to preserve the resource. In consultation with the BLM, the Applicant would implement environmental protection measures for unanticipated discoveries of paleontological resources, as presented in **Appendix C**, in addition to supplemental plans referenced in that section. No mitigation beyond the environmental protection measures proposed by the Applicant to be implemented as part of the Proposed Action is required.

4.16 CULTURAL AND HISTORIC RESOURCES

This section discusses potential project-related direct and indirect effects on historic properties. Historic properties include prehistoric and historic archaeological deposits, and historic-era sites and structures that are eligible for the NRHP. Historic properties also include TCPs. TCPs are identified and addressed through consultation with interested Native American tribes and are not discussed in this section. Only historic properties are discussed, and cultural resources that are not considered eligible for the NRHP will not be addressed. This section also describes the criteria for determining adverse effects, defines the APE, and describes the criteria for evaluating historic properties.

As defined under 36 CFR Section 800.9(b), a direct or indirect adverse effect would occur “on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the National Register” in a manner that would diminish the integrity of the property’s location, design, setting, material, workmanship, feeling, or association. Adverse effects to historic properties may result from direct ground disturbance associated with construction or maintenance, from indirect audible or visual intrusion on the setting of the property, or later in time as a result of increased access to the location of the property.

Compliance with Section 106 of the NHPA requires definition of an APE specific to the proposed undertaking and specific to the nature of the historic properties that may be affected. Both direct and indirect effects are considered, and the APE may be different for each class of effects. Direct effects include physical damage to the historic properties, and indirect effects may occur farther away in space or time and include diminished integrity of the setting which

contributed to the significance of a historic property.

The APE for the Proposed Action and the Alternative is a 300-foot wide corridor that includes: 1) the 60-foot wide permanent ROW, 2) the 75-foot wide temporary construction ROW, and 3) an area of approximately 100 feet by 200 feet that would be needed during construction for equipment storage and ancillary features.

4.16.1 Evaluation of Effects on Historic Properties

The National Register Criteria for Evaluation (36 CFR 60.4) lists criteria that need to be considered when evaluating the eligibility of a site, district, building, structure, or object. If a resource possesses integrity of location, design, setting, materials, workmanship, feeling, and association, it would be eligible to the NRHP if any one of the following criteria applies:

- A. It is associated with significant events or patterns in history or prehistory;
- B. It is associated with the specific contributions of individuals significant in our past;
- C. It has engineering, artistic, or architectural values or is representative of a distinctive type or style; or
- D. It has yielded or is likely to yield information important in history or prehistory.

Normally, resources less than 50 years old are not eligible for the NRHP.

4.16.2 Proposed Action

There are 25 historic properties documented within the APE of the Proposed Action. The 25 historic properties are all prehistoric sites, two of which also contain historic-era materials. All but one of the sites are recommended eligible for the NRHP under Criterion D, for the presence of archaeological deposits that may have the potential to yield information important in the history or prehistory of the region. For example, many of the prehistoric sites in the Clover Mountains contain obsidian tools and may produce data useful for studying temporal and spatial patterns of obsidian toolstone procurement and use through obsidian sourcing and hydration dating analyses. These data can then be used to further address research questions regarding trade routes or networks, socioeconomic relationships among groups or tribes, and settlement patterns. The one site not recommended eligible under Criterion D, is a rock art site that is recommended eligible under Criterion C as an example of a distinctive style of prehistoric Native American rock art in this region. This rock art panel is in good condition with no evidence of vandalism or intentional damage.

Direct effects to historic properties would occur as a result of ground-disturbing activities associated with the construction of pipelines, electrical distribution lines, well fields, substations, road improvements, storage tanks, and other ancillary features. Most impacts would most likely occur during construction; however, access road maintenance following construction may result in additional impacts.

Indirect effects associated with the project would include potential impacts to archaeological resources as a result of increased visitation to archaeological sites due to improved public access.

Increased visitation may diminish the integrity of a historic property by artifact removal, feature damage, or the destruction of intact archaeological deposits. Indirect effects would also include temporary visual and auditory intrusion to the setting and feeling of the eligible rock art site. After construction, there will be no above-ground project features in the area of the site, and the setting will be returned to its pre-construction condition.

4.16.3 Alternative 1

No historic properties have been documented south of the Proposed Action along the Alternative 1 corridor. Alternative 1 shares the northern corridor segments with the Proposed Action. All but one of the historic properties were recorded in this portion of the project area. Potential adverse effects to historic properties under Alternative 1 would be similar to those under the Proposed Action. However, the eligible rock art site is not within the APE of Alternative 1. Consequently, Alternative 1 has the same potential for direct and indirect adverse effects as the Proposed Action to the 24 historic properties that are archaeological sites eligible for the NRHP under Criterion D.

No Action Alternative

No archaeological resources or historic properties would be affected by the project under the No Action Alternative.

4.16.4 Mitigation

There are 24 historic properties that are eligible for the NRHP under Criterion D as archaeological sites that are within the APEs of both the Proposed Action and Alternative 1. The Proposed Action may also adversely affect a prehistoric rock art site. Treatment plans will be prepared for each of these historic properties in consultation with the BLM and the SHPO. The preferred treatment is avoidance and protection of the sites. These sites have all been recommended eligible to the NRHP under Criterion D. A treatment plan will also be prepared, in consultation with the BLM and SHPO, for the avoidance and protection of the rock art site eligible under Criterion C that may be indirectly affected by the Proposed Action. This treatment plan will also be prepared in consultation with concerned Native American tribes. Site protection may include identification and fencing of a sensitive area during construction, and monitoring of construction in that area by a qualified cultural specialist.

Treatment for potential adverse effects to historic properties from project activities would be guided by the State Protocol Agreement between the BLM and the Nevada SHPO (BLM 2005). Avoidance and protection measures may include, but not be limited to local changes to the project design, constraints on construction activities in sensitive areas, and fencing of sensitive areas to avoid inadvertent damage.

The State Protocol Agreement also contains procedures for handling unanticipated discoveries, and the BLM would assure that any human remains, grave goods, items of cultural patrimony, or sacred objects encountered during the undertaking are treated with respect and in accordance with the State Protocol Agreement and the Native American Graves Protection and Repatriation Act and its implementing regulations (43 CFR 10). No mitigation or avoidance is required for ineligible cultural resources sites or isolated artifacts. Unavoidable effects to historic properties

would be mitigated through the development and implementation of an approved treatment plan in accordance with the Historic Properties Treatment Plan (HPTP).

If previously unidentified cultural resources (including human remains) are discovered, the procedures outlined in State Protocol Agreement, Section VIII (Discovery Situations) would be implemented. Under the agreement, all related construction activities would cease within 328 feet of the discovery, the discovery would be protected, and the LCWD representative would notify the BLM Authorized Officer. All activities within 328 feet of the discovery will remain halted until the BLM Authorized Officer issues a Notice to Proceed.

If mitigation is required, the BLM would notify the LCWD of the need for mitigation, and mitigation measures identified in the State Protocol Agreement, HPTP, and the Discovery Plan would be implemented. The BLM would ensure that reports of mitigation efforts for discovery situations are completed in a timely manner.

4.17 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

Unavoidable impacts are those that would occur after implementation of all committed and recommended mitigation. Unavoidable impacts do not include temporary or permanent impacts which would be mitigated. They also do not include impacts from speculative events such as hazardous waste spills which are not cleaned up promptly in accordance with accepted industry standards or regulatory requirements.

The LCWD, LCPD, Southwest Gas, and LCT have committed to implementing environmental protection measures in their project design to avoid or minimize potential impacts from construction and operation of the Proposed Action. Adverse impacts to resources analyzed were not identified after application of Applicant proposed environmental protection measures or other mitigation was considered. Therefore, if all Applicant committed environmental protection measures and additional mitigation measures are implemented, the Proposed Action is anticipated to have no unavoidable adverse impacts on the human and natural environment.

If additional mitigation requirements are identified through the ESA Section 7; Corps 404; or NSE water right permitting processes, the Applicant would develop appropriate measures in consultation with the requesting agency (e.g., USFWS, Corps, NSE) and include these in their project design. The USFWS may identify additional measures (“terms and conditions”) to minimize the incidental take of listed species during the Section 7 consultation process; the Applicant would be required to implement these to be in compliance with the incidental take permit.

4.18 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

This section describes the irreversible and irretrievable commitments of resources associated with implementing the Proposed Action. A commitment of resources is irreversible when primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the lost production or use of a resource that would cause the resource to be unavailable for use by future generations. Examples of these types of resources include

nonrenewable resources, such as minerals and cultural resources, and renewable resources that would be unavailable for the use of future generations such as loss of production, harvest, or habitat.

Constructing, operating, and maintaining the Proposed Action would require committing land, soil, and vegetation to place aboveground facilities including well yards, access roads, and overhead electric power lines. While it is possible that these components could be removed and the natural landscape restored, it is unlikely in the foreseeable future. Therefore, these structures would constitute an irretrievable commitment of land. The proposed alternative would require the use of similar amounts of land, soil, and vegetation.

The areas occupied by permanent aboveground features would be irreversibly removed from the natural landscape including the loss of potential habitat for the desert tortoise. However, implementation of environmental protection measures would make it unlikely that individual tortoises would be destroyed.

Cultural resources are nonrenewable resources. Any impact to an NRHP-eligible cultural resource (historic property) is irreversible and will be mitigated in accordance with the HPTP.

Construction of the project would require an irretrievable and irreversible commitment of building materials and fuel for construction equipment. Materials used for constructing the components of the Proposed Action are ultimately recyclable but would remain an irreversible commitment of resources. Implementation of the Proposed Action would require an irreversible commitment of sand and gravel resources extracted from local sources, the amount of which has not been determined.

Small quantities of fossil fuels would be irretrievably consumed during the construction and operation of the project.

4.19 SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

This section discusses the short-term use of the local environment and the maintenance and enhancement of long-term productivity as a result of implementation of the Proposed Action. For the purposes of this discussion, “short-term” is defined as the period from the onset of construction activities through the initiation of project operation. “Long-term” is defined as the entire operational life of the Proposed Action, which is anticipated to be indefinite. Facilities associated with the Proposed Action are expected to be in place for long-term use to move groundwater to the LCWD service territory and may be replaced or upgraded in the future.

4.19.1 Short-Term Uses

During construction, up to 1,878 acres would be temporarily disturbed. Short-term effects on the natural environment would result from land-clearing and construction activities. These would be related primarily to soil disturbance within the construction ROWs, which would result in increased erosion potential and increased potential for the spread of invasive species or noxious weeds. Also, personnel and equipment moving around the project area would disperse wildlife and temporarily eliminate habitats. Effects to air quality and ambient noise would be short-term

and localized during construction. Up to 32.3 million gallons of water would be required for hydrostatic testing of the water and natural gas pipelines. The primary source of water for hydrostatic testing would be from the production well. Test water would be transferred between pipeline segments, where possible, to minimize the amount of water required. The use of groundwater would not result in a substantial decline in groundwater levels or a substantial depletion of groundwater resources.

Impacts to social and economic resources would be primarily short-term (18 to 24 months) effects to the local economy. During construction activities, revenue would likely increase for some local businesses such as construction suppliers, hotels, restaurants, gas stations, and grocery stores.

4.19.2 Long-Term Uses

Approximately 240 acres would be permanently disturbed by utility-related uses. The remaining acreage would be reclaimed to pre-construction levels. Although the Proposed Action would not require a major amount of land to be taken out of production, construction-related disturbances of previously undisturbed biological habitats could result in long-term reductions in the biological productivity of the area, as biological communities in arid regions tend to recover very slowly from disturbances.

4.20 CUMULATIVE IMPACTS

4.20.1 Regulations and Guidance

The CEQ (40 CFR 1508.7) defines cumulative impacts as:

“...the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.”

These actions include current and projected area development, management activities and authorizations on public lands, land use trends, and applicable industrial/infrastructure components. Although the individual impacts of each separate project may not be significant, the additive effects of multiple projects could be. These past, present, and reasonably foreseeable future actions are analyzed to the extent that “they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have an additive and significant relationship to those effects.”

4.20.2 Methodology for Assessing Cumulative Impacts

While there is not a universally accepted framework for cumulative effects analysis, the principles identified by the CEQ - *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997) have gained acceptance. These principles are based on the premise that resources, ecosystems, and the human community each can experience effects. For each of these, there are thresholds, or levels, of stress beyond which their desired conditions degrade.

Each affected resource, ecosystem, or human community must be analyzed in terms of its capacity to accommodate additional effects, based on its own time and space parameters. The most effective cumulative effects analysis focuses on what is needed to ensure long-term productivity or sustainability of the resource.

The extent of the cumulative impacts study area varies with each resource, based on the geographic or biologic limit of that resource. For the purposes of this analysis, the cumulative impact ROI includes the following areas:

- The area adjacent to the proposed ROW, nearby off-site areas subject to disturbance from the Proposed Action or alternatives, and those areas beneath new facilities that would remain inaccessible for the life of the project (these areas are primarily located within or near the designated LCCRDA utility corridor); and
- As appropriate, the affected watersheds including Clover Valley, Tule Desert, Virgin River, and the Lower Meadow Valley Wash Hydrographic Areas.

In addition, the length of time for cumulative effects analysis varies according to the duration of impacts from the Proposed Action on the particular resource. The timeframe for the cumulative impact analysis begins at the time of project construction (assume 2010) and extends sufficiently forward in time with consideration of past trends and activities on current and reasonably foreseeable future actions and trends that may affect the sustainability of the resource.

Information about past, present, and reasonably foreseeable future activities in the cumulative resource ROI were gathered from the BLM, USFWS, Lincoln and Clark Counties, and other agencies; adopted plans; environmental documents; and personal communications with public agencies and utility companies. Project-related actions that were considered include the following:

- Applications that have been submitted to the BLM or other agencies and are in various stages of the approval or permitting process as of January 2009;
- Actions that have been approved or are currently discussed in the public realm and have a reasonable likelihood of being implemented;
- Actions included in an adopted capital improvement program, general plan, regional transportation plan, or similar plan;
- Actions anticipated as later phases of approved activities; or
- Actions funded by money budgeted by a public agency.

When analyzing the cumulative effects of each of the interrelated projects or actions, the BLM considered mitigation measures required by other authorizing federal, state, or local agencies as a condition of approval. For example, Lincoln County and the developers of the Coyote Spring Investment project are both developing HCPs in response to their request for an incidental take permit. An HCP is intended to be a comprehensive document, providing for regional species conservation and habitat planning, while allowing the developers to better manage growth. It is also intended to provide a coordinated process for permitting and mitigating the take of covered

species as an alternative to a project-by-project approach. Activities covered under the HCPs may include, but are not limited to, residential, commercial, and industrial development.

4.20.3 Interrelated Projects or Actions to be Analyzed

The BLM identified the following past, present, or reasonably foreseeable interrelated projects, BLM activities, or environmental condition whose cumulative impacts may extend across a broad range of the resource categories being assessed in this EIS.

Utilities, Industry, and Public Service Projects

- Toquop Energy Project (Proposed Coal Fired Power Plant) – *Future*
- Holly Energy Partners (Proposed Petroleum Products Pipeline) – *Future*
- Kern River Gas Transmission Company Expansion Pipeline – *Past*
- Mesquite Replacement Airport – *Future*
- Interstate 15 - Exit 109 Interchange – *Future*
- Navajo Electric 500 kV Transmission Lines – *Past*
 - 500 kVAC transmission line (Navajo)
 - 500 kVDC transmission line (IPP)
- Nevada Power 345 kV Electric Transmission Line (Harry Allen/Red Butte) – *Past*
- FTV System Fiber Optic Communication Cable – *Past*

Water Projects

- Current and future groundwater pumping in the Clover Valley, Tule Desert, Virgin River, and Lower Meadow Valley Wash Hydrographic Areas – *Past, Present, Future*

Residential Development Projects

- Build-Out of the LCLA Area (Toquop Township) – *Future*
- Build-Out of the Mesquite Lands Act Property (Mesquite Continuity Parcel) – *Future*
- Coyote Spring Investment development – *Future*

BLM and Other Agency Activities

- Lincoln County Conservation, Recreation, and Development Act – *Past (P.L. 108-424, enacted November 30, 2004), Current (environmental analysis of proposed activities within the designated corridor), Future (development activities within the designated corridor)*
- Grazing Activities – *Future*
- Wind and Solar Energy Development on BLM Lands - *Future*
- Mineral Development and Mining – *Future*
- Approval of the Ely Proposed RMP/Final EIS – *Past*
- Southeastern Lincoln County HCP – *Future*

- OHV Special Recreation Permits (SRPs) on BLM-administered lands – *Past, Present, Future*
- Wilderness Plans – *Future*

Environmental Conditions

- Drought (Climate Change) – *Past, Present, Future*
- Wildland Fire – *Past, Present, Future*
- Localized Flooding – *Past, Future*

Each of the projects, BLM activities, or environmental condition listed above was evaluated to determine if it is sufficiently defined (reasonably foreseeable) to be: 1) relevant to potential impacts, 2) within the project area of influence, and 3) of a magnitude that could potentially result in a cumulative impact. The locations of specific projects relative to the project area for the Proposed Action are depicted on **Map 4-1**.

4.20.3.1 Past Actions

Past actions in the project area include livestock grazing; isolated mining exploration in the surrounding desert and mountains, construction and maintenance of dirt and gravel roads, recreational uses including OHV activities and hunting, construction and operation of electric transmission and natural gas infrastructure within designated utility corridors in the southern portion of the project area, and the passage of the LCCRDA and related activities associated with its implementation.

Existing utility facilities in the southern portion of the project area include two Kern River natural gas pipelines (constructed in 1990 and 2003); the Navajo electric transmission lines: one 500 kVAC transmission line (Navajo) constructed in 1972, and one 500 kVDC transmission line (IPP) constructed in 1981, a Nevada Power Company 345 kV electric transmission line (Harry Allen/Red Butte transmission line) constructed in 1984, and a buried 0.83-inch diameter fiber optic communication cable constructed in 1994.

Most of the land in the cumulative impact ROI is considered rangeland and is actively used for grazing. In recent years, livestock grazing activities within the Ely District have been limited due to the 2005 fire events and drought conditions. However, some grazing continues at a reduced stocking rate. Stocking rates are coordinated between the BLM and lease holders to maintain a sustainable forage level.

Deposits of locatable minerals, including metallic minerals, non-metallic minerals, and salable mineral materials, are located in the cumulative impact ROI. Isolated mining claims have been filed on BLM designated lands adjacent to the proposed ROW. These claims are primarily associated with oil and gas exploration and are isolated placer deposit claims. There are isolated claims for mining of gypsum deposits; however, these claims are currently not being mined.

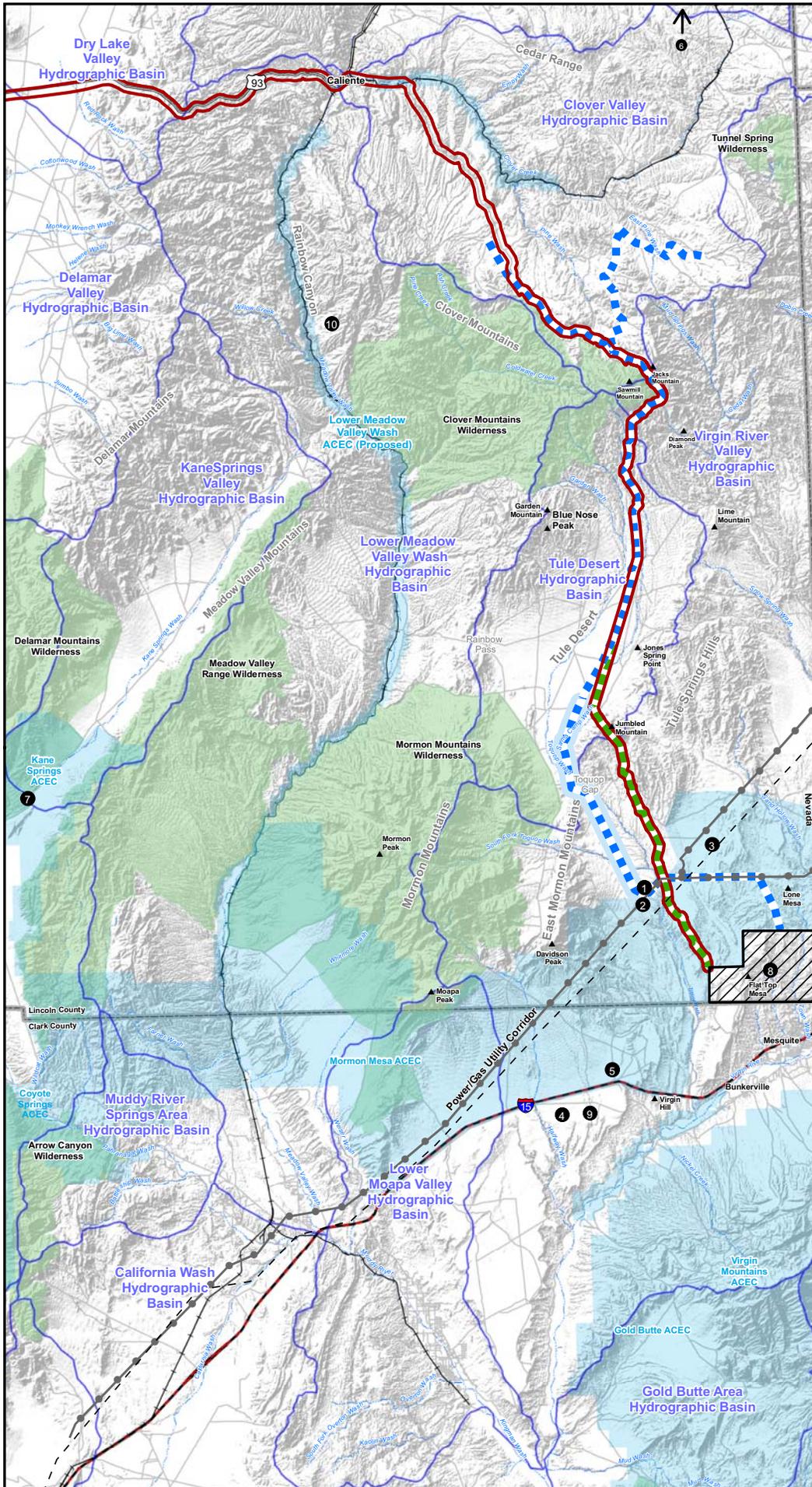
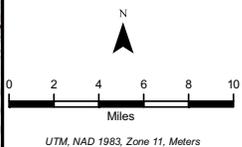
Past and ongoing natural processes in the project area include wildland fires, flooding, drought, and the spread of invasive species and noxious weeds. In June 2005, a total of 739,000 acres of land in southern Nevada burned over 19 days, with approximately 281,000 acres of the fire

Legend

- ▲ Mountain Peak
- Interstate
- US Highway
- Road
- Railroad
- Existing Transmission Line
- - Existing Natural Gas Pipeline
- Stream or Wash
- Proposed Action
- Alternative 1
- Toqoop Energy Plant ROW
- ▨ Lincoln County Land Act Area
- LCCRDA Corridor
- Hydrographic Basin
- Wilderness Area
- Area of Critical Environmental Concern (ACEC)

- 1 - Toqoop Energy Project
- 2 - Holly Energy Partners
- 3 - Kern River Expansion Pipeline
- 4 - Mesquite Replacement Airport
- 5 - Interstate 15 - Exit 109 Interchange
- 6 - Clark, Lincoln, and White Pine Counties Groundwater Development
- 7 - Kane Springs Groundwater Development
- 8 - Build-Out of the Lincoln County Land Act Area
- 9 - Build-Out of the Mesquite Lands Act Property
- 10 - Proposed Lower Meadow Valley Wash Area of Critical Environmental Concern

Sources: ESRI Datasets 2006; BLM Ely District Datasets; LCWD/Wilder Water Company.



**Cumulative
Impacts
Analysis**

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occurring in the Halfway and Duzac portions of the complex, located in the southern half of the project area. Wildland fire events are expected to occur in the area due to the increased incidence of invasive and noxious weed species. In addition, flash flood runoff from high-magnitude rain events would be exacerbated by existing land cover conditions and any future wildland fires in the area.

Intense flooding occurred in the area in January 2005 and July 2006. As a result of the Southern Nevada Complex fires in 2005 and ongoing drought conditions in the western United States, flood intensities in the region have increased due to loss of vegetative cover from these events. A consequence of wildfires is the increased potential for flash flood runoff from surrounding mountain ranges. Until vegetative cover is established, post-fire erosion rates are expected to increase. In addition, these burn areas represent an area of disturbance that favors the spread and establishment of noxious and invasive weed species (Wagonner 2007). Without proper treatment, the proliferation of these species will increase the risk of wildland fire events in the future.

Global climate change, commonly referred to as global warming, has been cited for these changes in the regional area. Ongoing scientific research into global climate change correlates increasing atmospheric concentrations of greenhouse gases (including CO₂, methane, nitrous oxide, water vapor, and several trace compounds) with observed trends of increasing temperatures and changes in the amount and seasonal variability precipitation. The assessment of greenhouse gas emissions and climate change is in its formative phase, and the net impact to climate cannot yet be determined with an acceptable degree of certainty. Predicting regional changes in streamflow and groundwater recharge due to climate change remains challenging, particularly because of uncertainty in regional projections of how precipitation changes (IPCC 2007).

Although uncertainty exists as to whether observed climate changes reflect natural variations or may be caused by increasing emissions of greenhouse gases, there is consensus that global temperatures have been increasing and will continue to increase in the future. As global warming trends continue into the foreseeable future, Chambers (2006) indicates that the following changes may be expected to occur within the Great Basin, which includes the project area.

Due to complex interactions of changes in the hydrologic cycle with global circulation patterns and local weather patterns, an increase in energy in the hydrologic cycle does not necessarily translate into an increase in precipitation in all geographic regions. The IPCC (2001) climate model scenarios indicate that, by 2100, precipitation will increase about 10 percent in summer, about 30 percent in fall, and 40 percent in winter. Less snowfall will accumulate in higher elevations, more precipitation will occur as rain, and snowmelt will occur earlier in the spring because of higher temperatures. The IPCC predicts the following climate changes in the near future.

- Temperature is predicted to rise in most areas, but is generally expected to increase more in inland areas and at higher latitudes. Higher temperatures will increase loss of water through evaporation.

- Streamflow patterns will change in response to reduced snowpacks and increasing precipitation. Peak flows in spring are expected to occur earlier and be of lower magnitude because of snowpack changes. Runoff from greater amounts of winter rainfall will cause higher winter flows. Summer flows will be lower, but with higher variability depending on the severity of storm events.
- Some populations of native plants, invasive species, and pests will expand. Increasing amounts of atmospheric CO₂ and precipitation during the growing season provide favorable growth conditions for native grasses, perennial forbs, woody species, and invasive annuals such as cheatgrass. Insect populations also will likely increase because milder winter temperatures will improve reproduction and survival rates.
- Fire frequency, severity, and extent will increase because of the increased availability of fine fuels (grasses, forbs, and invasives) and accumulation of fuels from previous growing seasons. Higher temperatures will extend the length of fire seasons. Expansion of piñon-juniper species and increasing tree densities could increase the number of high-severity crown fires. Higher rates of insect damage and disease also may increase fuel accumulations.

Sensitive species and overall biodiversity will be reduced. High-elevation habitats will shrink in area or disappear as lower-elevation plant communities expand. It is probable that some mammalian, avian, and other species that currently inhabit these high-elevation habitats may become extinct. Higher rates of disease and insect damage also may pose threats to other sensitive plant and animal species.

4.20.3.2 Present Actions, Including the Proposed Action

Dispersed recreational activities, such as OHV use and hunting, are ongoing in the project area. Multiple dirt and gravel roads traverse the project area between the Clover Mountain on the north and I-15 to the south, providing access to the surrounding mountains and desert. The Lincoln County Transportation Department conducts periodic maintenance (grading and leveling) as needed. There are no paved roads within the project area. The Final RMP/EIS for the Ely District describes construction of a paved road from Caliente to Mesquite. According to the Lincoln County Planning Department, the county has not allocated funds, nor do they anticipate future funding for this action (Dixon 2006).

Current livestock grazing activities have been limited due to the 2005 fire events and drought conditions. However, some grazing continues at a reduced stocking rate. Stocking rates are coordinated between the BLM and lease holders to maintain a sustainable forage level.

Wildland fire events are expected to occur in the area due to the increased incidence of invasive and noxious weed species. In addition, flash flood runoff from high-magnitude rain events would be exacerbated by existing land cover conditions and any future wildland fires in the area.

The BLM Ely District ROD and Approved RMP was finalized in August 2008. The RMP/Final EIS provides the framework for the future management of BLM-administered public lands by the Ely District.

4.20.3.3 Reasonably Foreseeable Future Actions

According to a article published by the Intergovernmental Panel on Climate Change (IPCC), the future of climate change on water resources will depend on trends in both climatic and non-climatic factors including increased demands for water caused by population growth, economic changes, the development of new technologies, and changes in watershed characteristics and water management policies (IPCC 2001). Human activities and natural processes that are expected to occur in the project area in the future include increased OHV use, livestock grazing based on sustainable conditions, wildland fires, drought, and flooding of local watercourses during high magnitude rain events.

The U.S. Department of the Interior and, more specifically, the BLM is seeking opportunities to develop renewable energy resources on federal lands. The BLM's policy is to encourage development of renewable energy projects on BLM lands consistent with the National Energy Policy of 2001 and the Energy Policy Act of 2005. In furtherance of that goal, the BLM completed a Programmatic EIS assuring a common direction and policy for permitting wind facilities on public land. As of January 2009, no ROW applications for wind or solar facilities on lands adjacent to the project area have been filed in the Ely District Office.

Reasonably foreseeable future projects within the cumulative impacts ROI are described in the following section. Project-specific analysis of the environmental impacts associated with each of the proposed infrastructure or development projects has either been completed, is underway, or is planned by an agency.

4.20.3.4 Toquop Energy Project

Toquop Energy, LLC (a subsidiary of Sithe Global Power, LLC), a privately held, independent power company, is proposing to construct a 750 MW coal-fired power plant in southeastern Lincoln County on lands administered by the BLM Ely District Office. The power plant would be constructed on the same site as and instead of a natural gas-fired power plant for which a ROW was approved by the BLM in 2003. In April 2003, the BLM issued a ROD on the Final EIS for the Toquop Energy Project, which was to include construction and operation of a 1,100 MW natural gas-fired electric power generation plant and associated facilities. The ROD accompanying the Final EIS approved the following ROW:

- 100 acres for the power plant site and access road to the power plant from the main access road plus additional temporary ROW during construction;
- 87 acres of improvements to the existing access road from I-15 to the power plant site boundary, plus additional temporary ROW during construction; and
- 45 acres for a 24-inch buried water pipeline and buried electric line between the power plant and the Tule Desert well field, plus additional temporary ROW during construction and 6 acres for storage sites.

Subsequently, the price of natural gas led to the decision by the developer to construct a 750 MW coal-fired power plant in the same location. The new project differs from the original in the following key respects:

- Plant capacity would decrease from 1,100 to 750 MW.
- The plant site would require use of more surface area to accommodate the storage and handling of coal and the disposal of ash.
- A rail line to transport coal to the site would need to be constructed.

The Toquop plant site would be located on 640 acres of public land currently managed by the BLM Ely District. The annual water requirement for power generation using coal technology would total 2,500 AFY. On November 26, 2006, the NSE granted 2,100 AFY to the LCWD to be used for municipal purposes within their service territory including the Toquop Energy Project. If the Toquop Energy Project is approved, certain components of the Proposed Action may be developed in conjunction with plant construction. The Proposed Action includes construction of a separate water pipeline and related facilities within the previously permitted corridor between the Tule Desert and Toquop plant site. Approval of the Proposed Action would eliminate the need for a separate water pipeline for the Toquop Energy Project and would allow for water from either the Clover Valley or Tule Desert Hydrographic Areas to serve the power plant.

The current Toquop Energy Project Draft EIS, issued for public comment on October 12, 2007, assesses the potential impacts of a ROW for the proposed coal-fired facility and a new railroad line to transport coal to the facility. Comments were received through December 11, 2007. The BLM is currently reviewing all comments received and intends to issue a Final EIS in 2008.

4.20.3.5 Holly Energy Partners

Holly Energy Partners and Sinclair Transportation Company are proposing to jointly build a new petroleum products pipeline that would originate near refining complexes in Salt Lake City, Utah to the north end of Las Vegas, Nevada. The proposed project would include product terminals near Cedar City, Utah and Las Vegas, Nevada. The project is expected to be completed sometime near the end of 2008 at a cost of \$300 million for both the pipeline and terminals. Permit work on the project commenced in June 2006, and it is anticipated that all required permits for the construction of the pipeline would be received by 2008. The pipeline system would be a 12-inch line with an initial capacity of 62,000 barrels per day, expandable to 120,000 barrels per day. The proposed project would be located adjacent to the Kern River Natural Gas pipeline, at the southern end of the project area.

4.20.3.6 Mesquite Replacement Airport

The City of Mesquite is proposing to design and develop a new replacement general aviation airport on the Mormon Mesa that would relocate the existing general aviation facilities and services. The project would include the following actions:

- Acquisition of approximately 2,560 acres of land to accommodate the proposed replacement airport, airport access road, and Runway Protection Zones;
- Construction and operation of a new Runway 3/21 (7,500 feet by 100 feet);
- Construction and operation of Full Length Parallel Taxiway and Taxiway Connectors (35 feet wide);

- Aircraft parking apron, access road, and other associated aviation support; and
- New interchange for the airport access road and I-15.

The Federal Aviation Administration has prepared an administrative draft EIS for the project; however, as of the writing of this Final EIS, the document is not available for public review. The City of Mesquite anticipates a 2-year design/build period after all federal, state, and local approvals have been obtained.

4.20.3.7 Interstate 15 - Exit 109 Interchange

The USDOT has earmarked \$8 million for transportation improvements to I-15 associated with the construction and operation of the expanded Mesquite Airport access at the Exit 109 interchange on I-15 west of Mesquite (Public Law 109-59).

4.20.3.8 Build-Out of the Lincoln County Land Act Area (LCLA Development Area)

The LCLA of 2000 was finalized through provisions in the LCCRDA of 2004. In February 2005, the BLM sold 13,300 acres of land in eight parcels in southeastern Lincoln County for \$47.5 million. The parcels varied in size from 666 to 4,257 acres. Lands are currently undeveloped but are being planned by Lincoln County as a Planned Unit Development referred to as the LCLA Development Area (Lincoln County Planning Commission 2006). The LCLA Development Area “will be developed in village settings to maximize the scenic attributes of the area, provide for a connected transportation system and become self sufficient through its provisions of services” (Lincoln County Planning Commission 2006).

Development and Conveyance Agreements among the developers and Lincoln County will require development plans outlining proposed uses of the acquired property. Preliminary build-out density for the LCLA development area is expected at 3.3 dwellings per gross acre, for a total build-out estimated at 44,000 dwelling units. The build-out is expected to proceed over a 30-year period.

4.20.3.9 Build-Out of the Mesquite Land Act Area

The Mesquite Lands Act of 1988 (Public Law 99-549) was amended by Public Law 104-208 on September 30, 1996 and signed into law by President Clinton. The Act was further amended by Public Law 106-113 in 1999. These federal laws give the City of Mesquite, Nevada the exclusive right to purchase a total of 10,000 +/- acres of public land managed by the BLM. The legislation also provided for the City of Mesquite to acquire, at no cost, 2,560 acres to be used for the city’s relocated municipal airport.

In May 1999, the City of Mesquite acquired 7,700 acres from the BLM. Approximately 3,100 acres of the 7,700 acres was purchased by Mesquite Vista’s LLC, a local land development company, with 4,600 acres remaining under the ownership of the city. The Mesquite Vista’s development extends to the Lincoln County line, and abuts the LCLA development area. Development of the Mesquite Lands Act area must conform to measures and objectives outlined in the City of Mesquite’s Long-Range Comprehensive Master Plan (PBS&J 2002). Because of the character of the terrain in the Mesquite Lands Act area, the city does not anticipate average densities to exceed three units per acre, and that most of the area would be zoned as mixed use

including residential, business/industrial parks, parks and recreations, and significant open space (City of Mesquite 2007).

4.20.4 Evaluation of Potential Cumulative Impacts

The following sections provide an analysis of potential cumulative impacts related to the Proposed Action when viewed in conjunction with other past, present, and reasonably foreseeable actions in the cumulative impact study area. This analysis considers the anticipated additive effect that the Proposed Action would have to cumulative impacts after the Applicant proposed environmental protection measures and any mitigation measures are implemented. **Table 4-5** identifies the potential interactions among the interrelated projects and the resource programs.

The Proposed Action, when viewed with other past, present, and reasonably foreseeable actions, would not have an additive effect on geologic resources, environmental justice, and known cultural and historic resources within the cumulative impact study area. The potential adverse impacts of the Proposed Action to known historic properties have been discussed above. The potential for additive adverse impacts from the reasonably foreseeable future actions that have been identified is outside the areas in which historic properties have been identified, and consequently the potential for an appreciable additive effect is unknown. The degree to which the Proposed Action would impact paleontological resources is unknown, as many of these resources are only discovered through grading or excavation activities during construction. Primarily, additive effects to other resources (e.g. soils, vegetation, air quality, and noise) would be realized during construction and would be temporary in nature. The implementation of BMPs and stringent environmental protection measures during construction would limit additive impacts to the surrounding environment.

Table 4-5 Interaction Between Resources and Interrelated Projects														
○ Short-term Impact ■ Long-term Impact ? Level of impact unknown Interrelated Projects	Soils	Water Resources	Vegetation	Wildlife	Land Use	ACEC, Wilderness	Recreation	Air Quality	Noise	Visual Resources	Socioeconomic	HazMat	Paleontological	Cultural Resources
	Navajo Electric 500 kV Transmission Lines	○												
Nevada Power 345 kV Electric Transmission Line (Harry Allen/Red Butte)	○													
FTV System Fiber Optic Communication Cable	○													
Kern River Gas Transmission Pipeline	○													
Toquop Energy Project (Proposed Coal Fired Power Plant)	○	■	○	■	■	■	○	○	○	■	■	○		?
Holly Energy Partners (Proposed Petroleum Products Pipeline)	○	○	○	■	■	■	○	○	○	■	○	○		
Mesquite Replacement Airport			○	■	■	■	○							
I-15 - Exit 109 Interchange					■	■					■			

Table 4-5 Interaction Between Resources and Interrelated Projects														
○ Short-term Impact ■ Long-term Impact ? Level of impact unknown Interrelated Projects	Soils	Water Resources	Vegetation	Wildlife	Land Use	ACEC, Wilderness	Recreation	Air Quality	Noise	Visual Resources	Socioeconomic	HazMat	Paleontological	Cultural Resources
	Current and future groundwater pumping in the Clover Valley, Tule Desert, Virgin River, and Lower Meadow Valley Wash Hydrographic Areas		■	?	?									
Build-Out of the Lincoln County Land Act Area (Toquop Township)	○	■	■	■	■	■	■	○	○	■	■	■	■	■
Build-Out of the Mesquite Lands Act Property	○	■	■	■	■	■	■	○	○	■	■	■	■	■
Coyote Springs Investment Development				■	■						■			
Lincoln County Conservation, Recreation, and Development Act	○	■	○	○	■	■	■	○	○	■	■			
Grazing Activities	○		○	○	○									?
Wind and Solar Energy Development	○		○	■	■		■			■			?	?
Mineral Development and Mining					○									
Southeastern Lincoln County Habitat Conservation Plan			■	■	■									
Drought (Climate Change)	?	?	?	?	?	?	?	?		?	?			
Wildland Fire	?	?	?	?	?	?	?	?		?				
Localized Flooding	?	?	?	?	?									

4.20.4.1 Soil Resources

The ROI for the cumulative resource analysis for soil resources is the area adjacent to the proposed ROW, including the designated LCCRDA utility corridor, nearby off-site areas subject to disturbance from the Proposed Action or Alternative, and those areas beneath new facilities that would remain inaccessible for the life of the project. The cumulative area of previous disturbance includes the existing utility corridor at the southern end of the project area, which includes the existing electric transmission lines, natural gas pipeline, fiber optic line, and existing BLM and county-maintained utility maintenance roads.

Past actions associated with OHV use, livestock grazing, wildland fire, drought, and flooding have caused impacts to the soils within the cumulative impact ROI. In June 2005, the Halfway and Duzac portion of the Southern Complex Fire burned approximately 281,000 acres in the southern half of the project area. Construction activities occurring at the same time, and within the same drainage in this area, have the potential to cumulatively increase the amount of disturbed land subject to erosion and sedimentation.

Reasonable foreseeable future actions or projects evaluated for soil resources include future development activities in the LCCRDA corridor, construction and operation of the Toquop Energy Project power plant, the Holly Energy petroleum product pipeline, and the build-out of the LCLA development area; and the Mesquite Lands Act development area.

Cumulative impacts where the proposed ROW parallels existing utility corridors and roads would be minimized by erosion and sediment control measures incorporated in their respective development designs and construction methods. Potential cumulative impacts could occur where these disturbances overlap. These impacts would be highly localized and primarily limited to the time of construction and 3 to 5 years following construction with successful reclamation. Cumulative impacts would be minimized with the effective implementation of erosion control and restoration measures. Site restoration would be enforced through federal, state, and local permits.

Cumulative impacts to soils resources would be the same under both the Proposed Action and Alternative 1.

4.20.4.2 Water Resources

The cumulative resource analysis area is delineated into two separate areas based on the potential for direct or indirect impacts from the Proposed Action.

Direct Impacts

Direct impacts from the Proposed Action include surface disturbance from project construction. The cumulative impact study area for direct impacts includes the proposed ROW corridor within the Clover Valley (#204), Tule Desert (#221), and the Virgin River Valley (#222) Hydrographic Areas. The interrelated projects with potential cumulative effects include the build-out of the LCLA development area, the Holly Energy Project, and the Toquop Energy Project.

Direct cumulative effects to water resources would be primarily related to construction activities including clearing and grading, vegetation removal, topsoil stockpiling, and shallow excavations. Cumulative effects on surface water resources would be highest shortly after construction begins and would decrease over time in response to reclamation efforts. Environmental conditions, such as continuing drought, wildland fire, and localized flooding, may limit reclamation efforts in the area.

Indirect Impacts

Cumulative indirect effects from groundwater pumping in the regional flow system may result in a decline in local and regional groundwater levels and flows at downgradient locations. The cumulative impact study area for indirect impacts of the Proposed Action includes the Clover Valley (#204), Tule Desert (#221), Virgin River Valley (#222), and Lower Meadow Valley Wash Hydrographic Areas (#205). The interrelated projects and activities with potential effects on groundwater resources include the proposed Virgin and Muddy Rivers Surface Water Development Project, and existing and future groundwater pumping rights in Clover Valley, Tule Desert, Lower Meadow Valley Wash, and Virgin River Valley Hydrographic Areas.

The annual water requirement for the Toquop Energy Project using coal technology would total 2,500 AFY. If the Toquop Energy Project is approved, certain components of the LCLA Groundwater Development Project (Proposed Action) may be developed in conjunction with construction of the Toquop project. The Proposed Action includes construction of a separate water pipeline and related facilities within the previously permitted corridor between the Tule

Desert and Toquop plant site. Approval of the Proposed Action would eliminate the need for a separate water pipeline for the Toquop Energy Project and would allow for water from either the Clover Valley or Tule Desert Hydrographic Areas to serve the power plant. Because the source of groundwater for the Toquop Energy Project would be from the same groundwater allocation as that for the Proposed Action, there would be no additional impacts from groundwater pumping resulting from this project’s water use.

The Clark, Lincoln, and White Pine Counties Groundwater Development Project proposed by the Southern Nevada Water Authority and the Kane Springs Valley Groundwater Project proposed by the LCWD are not located within the cumulative impact study area. Groundwater withdrawals associated with these projects would occur in hydrologic basins located in separate groundwater flow systems (White River Flow System and Great Salt Lake Desert Flow System). Therefore, these projects are not considered in the cumulative impacts analysis.

A summary of existing water rights and applications within the cumulative impacts study area is provided in **Table 4-6**.

Hydrographic Area	Perennial Yield¹ (AFY)	NDWR Permitted Annual Duty² (AFY)	Water Rights Pending³ (cfs)
Clover Valley	1,000	3,787	20
Tule Desert	1,000	2,104	58
Virgin River Valley	3,600*	12,343	325
Lower Meadow Valley Wash	5,000	23,480	29

¹Based on Recharge

²NDWR 1992

³ Permitted Water Rights Reported as Annual Duty in AFY

³ Pending Water Rights Reported as Diversion Rates in cfs

Source: NDWR 2007 unless otherwise noted.

The NSE has granted a total of 41,714 AFY of annual duty within the cumulative analysis study area. If all the pending water rights are permitted, up to an additional 403 cfs could be withdrawn from the cumulative analysis area. Most of these requested water rights are associated primarily with increased municipal water use requirements.

To date, no detailed cumulative analysis involving a modeling effort has been completed for the Proposed Action or other groundwater development projects in the ROI. However, groundwater modeling is currently being performed by the NPS to evaluate the regional flow systems and to determine if groundwater pumping in the regional area would influence spring flows in the Virgin River Hydrographic Area.

Groundwater withdrawals in the Tule Desert under the Proposed Action are subject to the Stipulation Agreement between the NPS and the LCWD (**Appendix A1**). Under this agreement, the LCWD agrees to monitor, manage, and mitigate unanticipated impacts due to development of groundwater resources in the Tule Desert Hydrographic Area. The BLM proposes to continue to coordinate with the LCWD and NPS to ensure that the Proposed Action would not adversely impact the regional springs and the Virgin River flows.

Cumulative impacts to water resources would be the same under both the Proposed Action and Alternative 1.

4.20.4.3 Vegetation Resources

Delineation of the cumulative resource analysis area for vegetation resources includes two areas based on the potential to be impacted by projects or activities related to surface disturbance or those involving groundwater withdrawals. Direct impacts would be related to surface disturbance activities; therefore, the cumulative analysis area for direct impacts includes the Clover Valley Hydrographic Area, Tule Desert Hydrographic Area, and Virgin River Valley Hydrographic Area, where the project components are proposed to be located. Indirect impacts would result from projects and activities related to groundwater withdrawals. The cumulative analysis area for indirect impacts includes the Clover Valley, Tule Desert, Virgin River Valley, and Lower Meadow Valley Wash Hydrographic Areas.

Analysis of existing levels of surface disturbance from available sources of geographic information system data was conducted at a gross scale for the cumulative analysis area. The analysis does not include detailed, finer-level data for surface disturbances such as individual homesteads, two-track roads, or OHV use; therefore, it provides a minimum estimate of the amount of existing disturbance in the area. Based on this analysis, an estimated 10,717.7 acres (0.2 percent) of land within the cumulative analysis area (4,653,087 total acres are in the four watersheds) have been disturbed or eliminated as a result of past and ongoing development activities. **Table 4-7** summarizes existing disturbance by type within each watershed.

The extent of existing disturbance within the cumulative analysis area has reduced the total acreage of vegetation cover types by approximately 0.2 percent. Under the Proposed Action alternative, an estimated 1,878 acres and 240 acres of vegetation would be modified or eliminated over the short term and long term, respectively. These figures include all temporary disturbance areas that would be reclaimed following construction. This represents a 0.04 percent and 0.005 percent reduction in vegetation cover types within the cumulative analysis area. Together with existing disturbances, this raises the cumulative total to 12,834.7 acres under the Proposed Action alternative.

Disturbance Type	Lower Meadow Valley Wash	Clover Valley	Tule Desert	Virgin River Valley	Total Area of Disturbance
Interstate	13.3	-	-	622.9	636.2
State Highways	157.9	-	-	44.0	201.9
Other Roads	621.5	618.4	371.7	1,052.4	2,664.0
Agriculture	822.3	-	-	1,756.6	2,578.9
Urban Development	61.3	1,022.0	-	3,553.4	4,636.7
Subtotal	1,676.3	1,640.4	371.7	7,029.3	10,717.7

Source: Draft EIS for the Toquop Energy Project (BLM 2007b);

Construction of the interrelated projects analyzed in this EIS would also result in the loss of native vegetation, potential loss of special status species, and the increased potential for the spread of invasive and noxious weeds. For projects located on federal lands, specific mitigation measures to minimize these impacts would be a requirement of their approval. Projects located on private lands would be subject to the approved Southeastern Lincoln County HCP.

Future projects would remove large areas of vegetation. The actual disturbance acreage resulting

from those planned or proposed projects shown on **Map 4-1** is not known at this time. Additional areas of vegetation would be lost from other future projects whose areal extent is not known.

Cumulative impacts of groundwater pumping on vegetation resources include potential impacts to riparian vegetation in the Clover Valley and Meadow Valley Wash area. These potential effects are minimized, however, by the monitoring and mitigation commitments, such as the Clover Valley Water Resources Monitoring and Management Plan (**Appendix B**). The BLM will work collaboratively with other agencies under existing agreements to ensure that there would be no cumulative impacts on vegetation resources from the Proposed Action or that actions would be taken to minimize/mitigate cumulative impacts.

Lincoln County is preparing a separate HCP that would address cumulative effects on biological resources for development and construction activities within Lincoln County. The Southeastern Lincoln County HCP (Board of Lincoln County Planning Commissioners 2007) would address sensitive and protected biological resources on private and public lands in Lincoln County. In addition, the BLM and USFWS are responsible for the management of critical and sensitive habitats under their jurisdiction. Through a cooperative agreement, the federal, state, and local agencies are working to ensure conformance of any action that would impact the biological viability of the region.

Overall, contributions to cumulative impacts on vegetation by the LCLA groundwater development project would be minimal.

Cumulative impacts to vegetation resources would be the same under both the Proposed Action and Alternative 1.

4.20.4.4 Wildlife Resources

The cumulative resource analysis area for wildlife resources (with the exception of the desert tortoise) includes the Clover Valley Hydrographic Area, Tule Desert Hydrographic Area, Virgin River Valley Hydrographic Area, and Lower Meadow Valley Wash Hydrographic Areas. As described in the previous section, cumulative impacts on biological resources are generally additive and proportionate to the amount of ground disturbance within specific habitat areas. The Southeastern Lincoln County HCP (Board of Lincoln County Commissioners 2007) would address sensitive and protected wildlife resources on private and public lands in Lincoln County.

The extent of existing wildlife habitat disturbance within the cumulative analysis area has reduced the total acreage of wildlife habitat by approximately 0.2 percent. Under the Proposed Action alternative, an estimated 1,878 acres and 240 acres of habitat would be modified or eliminated over the short term and long term, respectively. These figures include all temporary disturbance areas that would be reclaimed following construction. This represents a 0.04 percent and 0.005 percent reduction in wildlife habitat within the cumulative analysis area. Together with existing disturbances, this raises the cumulative total to 12,834.7 acres under the Proposed Action alternative.

Potential cumulative impacts from construction of interrelated projects analyzed in this EIS include loss and fragmentation of wildlife habitat and disturbance to special status wildlife species. Because impacts to sensitive biological resources are regulated by the USFWS, NDOW,

and other resource management agencies, potential impacts resulting from project development would require consultation with responsible agencies and implementation of mitigation measures. The evaluation of project impacts would take into account the cumulative nature of impacts to wildlife resources through loss of habitat, severance of wildlife corridors, and disturbance by human activities. Implementation of mitigation measures for impacts to these resources would be required for each project as a condition of approval.

Future projects would remove large areas of wildlife habitat. The actual disturbance acreage resulting from those planned or proposed projects shown on **Map 4-2** is not known at this time. Additional areas of habitat would be lost from other future projects whose areal extent is not known. Future water development in the area may lead to modification or elimination of some aquatic and riparian habitats from groundwater pumping and surface water diversion. Overall, contributions to cumulative impacts on general wildlife habitat by the LCLA groundwater development project would be minimal. The following section addresses potential cumulative impacts to sensitive species known to occur in the ROI.

Desert Tortoise

The cumulative resource analysis area for the desert tortoise is the portion of the Beaver Dam Slope Critical Habitat Unit that occurs in Nevada. Interrelated projects that could have cumulative effects on desert tortoise include those which would be developed within desert tortoise critical habitat, which includes a portion of southern Lincoln County. Of the interrelated projects, only the build-out of the LCLA Area and a small portion of the Holly Energy Partners project are located within the Beaver Dam Slope Critical Habitat Unit. It is estimated that up to 13,520 acres of designated critical habitat would be affected by the LCLA build-out. This development is subject to the Southeastern Lincoln County HCP and is currently undergoing consultation with the USFWS to implement site-specific desert tortoise protection measures. Specific acreages of impact to desert tortoise critical habitat resulting from cumulative actions within the Beaver Dam Slope Critical Habitat Unit are estimated to be 13,552.3 acres (13,520 plus 32.3 for the Proposed Action). For future projects on federal lands, any disturbance would be required to undergo consultation under Section 7 of the ESA. Projects on private lands would undergo Section 10 or Section 7 consultation as appropriate.

In addition to the projects occurring within the Beaver Dam Slope Critical Habitat Unit and the other interrelated projects analyzed in this EIS, there are other land development projects occurring within Lincoln County that may affect available desert tortoise habitat. These projects include development projects near the Clark and Lincoln County borders near Highway 93 (Coyote Spring Investment development) and the Alamo Industrial Park and Community Expansion Land Sale near Alamo. These projects are located in the Mormon Mesa Critical Habitat Unit and subject to the CSI Multi-Species HCP and Southeastern Lincoln County HCP, respectively. Development activities will require consultation with the appropriate resource management agency (e.g. BLM, USFWS, NDOW) to implement site-specific desert tortoise protection measures.

Special Status Species

Construction of the interrelated projects analyzed in this EIS would result in the loss of habitat

occupied by special status species including the western burrowing owl, the banded Gila monster, and the chuckwalla. Cumulative loss of wildlife habitat in the region would affect the special status species that utilize that habitat. In addition, within the region, the interrelated projects will result in increased habitation and associated activities that could result in direct as well as indirect impacts to special status species. For projects located on federal lands, specific mitigation measures to minimize these impacts would be a requirement of their approval. Projects located on private lands would be subject to the protection measures directed by the Southeastern Lincoln County HCP.

Cumulative groundwater pumping could affect habitat for special status fish and aquatic species or special status species that rely on riparian habitats in the Clover Creek or Lower Meadow Valley Wash. These potential effects are offset, however, by the conservation commitments, such as the Water Resources Monitoring and Management Plan (**Appendix B**). The BLM will continue to work collaboratively with other agencies under existing agreements to ensure there would be no cumulative impacts from the Proposed Action. The cumulative effect of these projects should be no greater than the individual effect of the Proposed Action.

Migratory Birds

Construction of the interrelated projects analyzed in this EIS has the potential to disturb or destroy migratory bird nests and fledglings. In addition, the proliferation of overhead transmission lines in the region increases the potential for transmission line collisions and electrocution to migratory birds. For projects located on federal lands, specific mitigation measures to minimize these impacts would be a requirement of their approval. Projects located on private lands would be subject to the Southeastern Lincoln County HCP.

Cumulative impacts to wildlife resources would be the same under both the Proposed Action and Alternative 1.

4.20.4.5 Land Use

The federal government administers approximately 98 percent of the land in Lincoln County, with the BLM managing approximately 83 percent of total Lincoln County acreage. Because most private parcels are located adjacent to, or near federal lands, it is anticipated that future development projects would be likely to affect land use on both private and public lands. Previously undeveloped lands would be converted from uninhabited desert space to multi-use residential / commercial / industrial uses with the build-out of the LCLA development property, Mesquite Lands Act parcels, Toquop Energy Project, the Holly Energy Project, and potentially renewable energy projects such as wind or solar facilities.

The LCLA development area would convert approximately 13,300 acres of similar habitat to multi-use residential / commercial uses in southeastern Lincoln County. Increased population and economic growth would likely result in an increased number of projects on adjacent federal lands including water development projects, recreation and non-recreation special uses, utility corridors and infrastructure, road improvements, travel management plans, rangeland management and grazing, and additional recreation/tourism facilities. Any future action on federal land would require compliance with applicable federal laws and regulations.

Lincoln County planning agencies, in cooperation with federal resource managers (e.g., BLM, USFWS, Corps) and newly formed municipal agencies (e.g., LCLA GIDs) would be responsible for long-range planning of future development and resource management within Lincoln County.

Cumulative impacts to land use would be the same under both the Proposed Action and Alternative 1.

4.20.4.6 Areas of Critical Environmental Concern, Wilderness, and Other Special Use Areas

Wilderness and special management areas, such as ACECs, would experience increased visitation and use as more residents move into the LCLA development area and the Mesquite Lands Act parcels. Utility developments are expected to be co-located within previously permitting utility corridors; however, future development in the vicinity of the Clover Mountain and Mormon Mesa Wildernesses and the Beaver Dam Slope ACEC would alter the viewshed and recreational experiences in these areas.

The BLM has designated approximately 25,000 acres of riparian habitat along the Lower Meadow Valley Wash as an ACEC. The area is designated for the protection of federally endangered, threatened, and candidate species such as the southwestern willow flycatcher (endangered), western yellow-billed cuckoo (candidate), Meadow Valley Wash desert sucker (sensitive), Meadow Valley Wash speckled dace (sensitive), and Arizona southwestern toad (sensitive).

Cumulative impacts to ACEC's, Wilderness, and other Special Use areas would be the same under both the Proposed Action and Alternative 1.

4.20.4.7 Recreation

The cumulative resource analysis ROI for recreation is the area adjacent to the proposed ROW, nearby off-site areas subject to disturbance from the Proposed Action or alternatives, and those areas beneath new facilities that would remain inaccessible for the life of the project.

The Proposed Action or Alternative would not result in direct impacts to recreation in the project area. Indirect impacts may result from the Proposed Action or Alternative, combined with the cumulative impacts of other reasonable, foreseeable actions, particularly the build-out of the LCLA and Mesquite Lands Act parcels. The influx of workers during construction, and ultimately, the increased population in southern Lincoln County, would increase dispersed recreational activities in the surrounding area. Increased recreational use may result in trail cutting and destruction of vegetation and wildlife habitat. Other indirect impacts during construction would include impacts to the recreational experience as a result of reduced visual value; increased noise, traffic, dust, and emissions; or other effects during construction. Each project sponsor would be required to comply with permitting and regulatory guidelines mandated by the local, state, and federal agency responsible for the particular resources.

The demand for outdoor recreational opportunities on BLM-managed lands is increasing (BLM 2006c). As populations increase in the area, additional pressures on the natural landscape emerge. The increased population and economic growth in the regional area is likely to result in

an increased number of projects on federal lands including water development projects, recreation and non-recreation special uses, utility corridors and infrastructure, road improvements, travel management plans, rangeland management and grazing, and additional recreation/tourism facilities.

Cumulative impacts to recreation resources would be the same under both the Proposed Action and Alternative 1.

4.20.4.8 Air Quality

The area for cumulative resource analysis for air quality is the Clover Mountain, Tule Desert, and Virgin River Valley airsheds. Anticipated cumulative effects to air quality from past, present, and reasonably foreseeable future actions in conjunction with the Proposed Action or Alternative would be incremental and temporary. A temporary increase in emissions of PM₁₀/PM_{2.5} would be expected to occur from initial land surface disturbance activities. Incremental increases in emissions of NO_x, SO₂, CO, and VOCs would be expected to occur in the short term from mobile combustion sources associated with construction equipment and the temporary increase in vehicle traffic.

All construction and operation activities within the region are required to comply with local, state, or federal policies including the implementation of a Fugitive Dust Control Plan. As such, cumulative air quality impacts would not be anticipated to exceed state or federal ambient air quality standards.

Cumulative impacts to air quality would be the same under both the Proposed Action and Alternative 1.

4.20.4.9 Noise

The cumulative resource analysis for noise is the area adjacent to the proposed ROW and nearby off-site areas subject to disturbance from the Proposed Action or alternatives.

Noise impacts are cumulative if the sources of noise being considered are audible to a sensitive receptor at the same time and combine to exceed an established threshold. Lincoln County currently does not have a noise ordinance. No planned or existing projects have been identified that would generate a significant amount of noise in the project area. Overall, noise impacts are additive. Projects constructed and operating in proximity to each other during the same period would have a higher cumulative impact. At this time, timing for construction of other projects in the immediate area is unknown.

Cumulative impacts for noise would be the same under both the Proposed Action and Alternative 1.

4.20.4.10 Visual Resources

The cumulative impact analysis area for scenic resources is the ROI, which includes the project area and areas that would be affected by the Proposed Action or Alternative that would be visible from off-site viewpoints. Potential cumulative impacts to visual resources would result from other planned or foreseeable development activities which could occur within the ROI. The ROI

is limited in a real extent to the Clover Mountains and Tule Desert because the corridor is surrounded by mountain ranges that block views of the corridor from sensitive viewing areas located outside of the proposed ROW.

Historically, the project area has been managed for grazing and recreational use. Other management activities that have occurred within the ROI include road construction, water development facilities, and power line and utility corridors (water and gas lines). Concurrent management activities, which are taking place at the present time, are a continuation of existing uses.

Anticipated economic and population growth would increase recreational uses of public lands in Lincoln County. Residential and commercial construction is expected to occur throughout southern Lincoln County and northern Clark County, which would increase the evidence of human activity in the project area and the surrounding region. Growth would also increase the number of residents and recreational users who have a concern for scenic resources.

Visual impacts would result from the construction of visible aboveground project components (e.g., overhead transmission lines, buildings, and metering stations), installation of buried pipelines, and other ancillary facilities associated with the Proposed Action or Alternative 1. The facilities would be located in a rural desert setting, primarily along existing dirt roadways. The cumulative visual quality impacts of the Proposed Action or Alternative with the build-out of the LCLA property and Mesquite Lands Act parcels, or development of solar or wind energy facilities adjacent to the project area would have the potential to create substantial visual contrasts with their settings.

Development of the Mesquite Lands Act area must conform to measures and objectives outlined in the City of Mesquite's Long-Range Comprehensive Master Plan (City of Mesquite 2007). Because of the character of the terrain in the Mesquite Lands Act area, the city does not anticipate average densities to exceed three units per acre, and that most of the area would be zoned as mixed use including residential, business/industrial parks, parks and recreations, and significant open space (City of Mesquite 2007).

Cumulative impacts on visual resources would be the same under both the Proposed Action and Alternative 1.

4.20.4.11 Social and Economic Resources

There would be minimal cumulative impacts in Washington County, Utah because the indirect impacts associated with the operation of the Proposed Action and the resulting LCLA planned development is confined to Lincoln County. The majority of the cumulative impacts to social and economic resources would occur in Lincoln County and, to a lesser extent, Clark County in Nevada. The cumulative impacts that would result from the population increases associated with the planned build-out of the LCLA and the Mesquite Land Act Area would be substantial. Combined, the developments would result in a population increase of more than 500,000 during the 30-year period. Assuming the build-out is evenly spread over the 30-year period the population increase would average almost 17,000 a year. Most of the impact would occur in Lincoln County which, in 2000, had a total population of 4,165 and would increase to more than 345,000 by 2040. The population increase in Lincoln County would be more than 11,000 per

year during the 30-year build-out period. The population increase in Clark County would increase by more than 163,000 during the 30-year period, representing an annual increase of more than 5,400 or less than 1 percent per year compared to the 2000 population of Clark County of 1,375,765.

The cumulative effects of past, ongoing, and reasonably foreseeable development to the social and economic structure of Lincoln County would be remarkable for the historically rural county. Social conflict and lifestyle changes would occur as the long-term residential and commercial developments expand the newly available private land in Lincoln County. This would result in dramatic additional demands on police protection, fire protection, emergency medical services, educational systems, and housing in Lincoln County. The cumulative effects to the social and economic structure of Clark County would barely be noticeable with a total population increase of less than 12 percent over the 30-year period. This would result in only minimal additional demand on police protection, fire protection, emergency medical services, educational systems, and housing. The Proposed Action, when combined with the other projects planned in the two counties, would result in cumulative socioeconomic impacts (both beneficial and adverse) with the most dramatic impacts experienced in Lincoln County.

Increased development in Lincoln County would generate employment, income, and increases in the Lincoln County tax base. With an assumed value per dwelling unit of \$250,000 and 144,000 new residences, (44,000 at LCLA and 100,000 at CSI) total new residential valuation could exceed \$36 billion after the 30-year build-out. This would represent taxable or assessed value of more than \$12 billion (35 percent of appraised value) for property tax purposes. Using the statutory maximum of \$3.64 per \$100 of assessed valuation, additional property taxes of more than \$426 million would accrue to Lincoln County each year from residential properties alone. This would accumulate to annual property tax revenue to Lincoln County of more than \$458 million by the end of the 30-year build-out. Increases to the Clark County property tax revenue would grow by almost \$9 million per year reaching a total of over \$260 million by the end of the 30 year build out.

The estimated annual property tax attributed to the Toquop Energy Project would add approximately \$7 million based on project capital costs (\$695 million), the assessment rate (35 percent), and the average property tax rate (3 percent). If the project is centrally assessed, the disbursement of this tax to Lincoln and Clark Counties would be governed by rules established by the Nevada Tax Commission and would be based on factors that are unknown at this time. Any increase in the Lincoln county tax base would be beneficial because of the county's historically low tax base. Total property tax collections were projected at \$2.3 million between 1999 and 2000 (BLM 2007b).

Cumulative effects to the social and economic structure of Lincoln County would be substantial. Most projects on federal lands, such as recreation activities, individually or collectively, would produce no noticeable or measurable effects on the economic or social structure of Lincoln or Clark Counties. However, because most private land parcels are located adjacent to or near federal lands, it is anticipated that future activities on federal lands would likely affect the local social structure even if they are too small to affect the economy. Conversely, increased population and economic growth in the counties are likely to result in an increased number of projects on federal lands, including water development projects, recreation and non-recreation

special uses, utility corridors and infrastructure, road improvements, travel management plans, rangeland management and grazing, and additional recreation/tourism facilities.

Other planned and foreseeable projects with a potential effect to the social and economic structure of Lincoln and Clark Counties are being developed in response to the rapidly growing population and economy of Las Vegas and the surrounding metropolitan area. Community services and infrastructure would need to be increased as a result of ongoing residential and commercial development in the region.

Cumulative impacts on socioeconomic resources would be the same under both the Proposed Action and Alternative 1.