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Walker Ranch Energy Geothermal Development Project

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CHAPTER 1-PURPOSE AND NEED FOR ACTION

BACKGROUND

In February 2009, Agua Caliente, LLC submitted a drilling program, operations plan and five (5) Geothermal Drilling Permit applications (GDPs) to the Bureau of Land Management (BLM), Burley Field Office to conduct deep exploratory drilling on Federal geothermal lease IDI-35786, located in Cassia County, Idaho. An Environmental Assessment (EA) titled, "Raft River Geothermal Drilling Project" (No. ID-220-2009-EA-3709) was prepared and a Finding of No Significant Impact (FONSI) determination was made. The decision record for the project was signed January 22, 2010. Agua Caliente, LLC later transferred lease IDI-35786 and the five GDPs to Walker Ranch Energy (WRE); the lease was assigned number IDI-37087.

The five GDPs approved in 2010 were issued for two years. In 2012, the five GDPs were extended for two years, and expired in January 2014.

On June 23, 2014, WRE submitted five new GDPs for full sized wells, and one GDP application for an exploratory "slim hole" (and a related operations plan and drilling program) to conduct drilling operations in the exact same locations as the five permits that were issued in 2010. The BLM prepared two separate Determinations of NEPA Adequacy (DNAs), the first for the slim hole GDP, and the second for the five full sized GDP applications. The GDPs for those wells as described in the DNAs (with the Conditions of Approval) were approved on August 8, 2014 (slim hole) and January 8, 2015 (full size GDPs). WRE initiated exploratory drilling shortly after receiving approval; exploration activities are ongoing.

SUMMARY AND LOCATION OF PROPOSED ACTION

Based on the results of successful geothermal exploration drilling to date, WRE believes that the geothermal resource is capable of commercial production. Accordingly, WRE is proposing the Walker Ranch Energy Geothermal Development Project (Project or Proposed Action) on public lands managed by the BLM, and on private lands in the Raft River Valley of Cassia County, Idaho (see Figure 1 on page 22).

The public land portions of the Project, described more fully in Chapter 2 of this EA and analyzed in Chapter 3, would include the construction and operation of geothermal production and injection well pads and wells, production and injection pipelines, power lines and access roads. These components are located within federal geothermal leases IDI-35789, IDI-35786, IDI-37027, IDI-37087 and IDI-36373.

The private land portions of the Project would include the construction and operation of geothermal production and injection well pads and wells, geothermal production and injection pipelines, power lines, access roads and a geothermal power plant. Private land activities are identified as a "cumulative activity" and the effects analyzed in Chapter 3 of this EA.

PURPOSE AND NEED FOR ACTION

The BLM's purpose for the Proposed Action is to respond to the Operations Plan, Utilization Plan and GDP applications submitted by the proponent to construct and operate the Project. This Proposed Action would, if approved, assist the BLM in addressing the management objectives in the Energy Policy Act (EPA) of 2005 (Title II, Section 211) that establish a goal for the Secretary of the Interior to approve 10,000 megawatts (MWs) of electricity from non-

hydropower renewable energy projects located on public lands. Approval would also further the purpose of Secretarial Order 3285A1 (March 11, 2009) that establishes the development of environmentally responsible renewable energy as a priority for the Department of the Interior.

The BLM's need for the Proposed Action is established in accordance with the Federal Land Policy and Management Act of 1976 and its implementing regulations, as public lands are to be managed for multiple use that considers the long-term needs of future generations for renewable and non-renewable resources. Taking into account the BLM's multiple use mandate, and under the terms of the Geothermal Steam Act, its revisions of 2007, its implementing regulations (including 43 CFR 3200), the Programmatic Geothermal Environmental Impact Statement (EIS) for Geothermal Leasing in the Western United States (BLM 2008) and its Record of Decision of December 2008, BLM must respond to the proposed plans and applications submitted by the federal geothermal lessee.

Decision To Be Made

This EA will assist the BLM authorized officer in a determination to approve the Proposed Action, require modification or deny the Proposed Action. At the conclusion of the EA process, the BLM must determine if the Proposed Action and/or any modifications of the Proposed Action would cause significant impacts to the human environment. If no such impact would occur, then a FONSI would be prepared, and the BLM would make a decision whether or not to approve the submitted Operations Plan, Utilization Plan and GDP applications. If at any time during the analysis a determination of significant impacts is made that could not be mitigated appropriately, an EIS would be required.

CONFORMANCE WITH APPLICABLE LAND USE PLAN

The applicable Land Use Plan (LUP) for the Proposed Project area is the 1985 Cassia Resource Management Plan (RMP) (USDI BLM 1985), as amended, and is accompanied by a Final EIS and Record of Decision (ROD). These documents are available for review at the BLM Burley Field Office (15 East 200 South, Burley, ID 83318).

The "Geology, Energy and Minerals Management" guidelines within the Cassia RMP state, "BLM will manage geological, energy and minerals resources on the public lands. Geologic resources will be managed so that significant scientific, recreational and educational values will be maintained or enhanced. Generally, the public lands are available for exploration and development, subject to applicable regulations and federal and State law (pg. 6)."

Specifically, the Proposed Action is located within Management Area 10 (Jim Sage) of the Cassia RMP. The "Energy Resources" section of that Management Area states that the area is, "open to leasing subject to the following stipulations: No exploration/development in crucial deer winter range December 1st through March 31st and in sage grouse nesting/brood-rearing areas April 1st to June 15th. Protect ferruginous hawks between March 1st and July 15th by prohibiting activity within the shorter of the following two distances – 2,000 feet or the visible range of active nest sites (pg. 37)."

The Cassia RMP was amended by the Geothermal PEIS (BLM and USFS 2008a). The PEIS Record of Decision (BLM 2008) amended the Geology, Energy and Minerals Management portion of the Cassia RMP to identify lands, including those in the Project Area, as being available for geothermal leasing.

Federal geothermal leases IDI-35789, IDI-35786, IDI-37027, IDI-37087 and IDI-36373 were issued, and lease stipulations attached which include the above seasonal restrictions. As the Project would adhere to the lease stipulations, the Proposed Action is in conformance with the Cassia RMP.

2015 Approved Resource Management Plan Amendment for the Greater Sage-Grouse Sub-Region of Idaho and Southwest Montana (ARMPA)

The Cassia RMP has been amended by the Idaho and Southwestern Montana Greater Sage-Grouse Land Use Plan Amendment (USDI, BLM 2015b). The ROD for this planning effort was signed September 21, 2015 (USDI, BLM 2015a). The RMP decisions include management direction to conserve, enhance and restore Greater sage-grouse and their habitat by reducing, eliminating or minimizing threats to their habitat. The Project Area has been mapped as a General Habitat Management Area.

The ARMPA identifies threats to Greater Sage-grouse (GRSG), and presents actions to mitigate these threats using goals, objectives, and Management Decisions (MDs). The following is a summary of the actions that apply to this Project. There is also a list of all Recommended Design Features (RDFs) in Appendix C of the ARMPA, the applicable RDFs are also listed below. Some of the actions and RDFs have already been addressed as design features of the Proposed Action or the Conservation Alternative, these features are summarized below in italics. The mitigation measures that are not included in the Proposed Action or the Conservation Alternative would be added as Conditions of Approval (COAs) to the Conservation Alternative.

MD SSS 7: GRSG habitat within the project area will be assessed during project-level National Environmental Policy Act analysis within the management area designations (PHMA, IHMA, GHMA). Project proposals and their effects will be evaluated based on the habitat and values affected.

- *GRSG habitat is assessed and is summarized, and impacts from the Proposed Action and Alternatives are analyzed in the wildlife section of Chapter 3 of this EA.*

MD SSS 31: Co-locating new infrastructure within existing Right Of Ways and maintaining and upgrading ROWs is preferred over the creation of new ROWs or the construction of new facilities in all management area. Colocation for various activities is defined as:

Electrical Lines – Installation of new ROWs adjacent to current ROWs boundaries, not necessarily placed on the same power poles.

- *According to the Proposed Action, power lines would be co-located with pipelines and also with roads whenever possible.*

MD SSS 32: Incorporate RDFs as described in **Appendix C** in the development of project or proposal implementation, reauthorizations or new authorizations and suppression activities, as COAs into any post-lease activities and as best management practices for locatable minerals activities, to the extent allowable by law, unless at least one of the following conditions can be demonstrated and documented in the NEPA analysis associated with the specific project:

a. A specific RDF is not applicable to the site-specific conditions of the project or activity;
b. A proposed design feature or BMP is determined to provide equal or better protection for GRSG or its habitat; or
c. Analysis concludes that following a specific RDF will provide no more protection to GRSG or its habitat than not following it, for the project being proposed.

- *The RDFs that were deemed applicable are summarized in the RDF section below.*

MD SSS 33: Conduct implementation and project activities, including construction and short-term anthropogenic disturbances consistent with seasonal habitat restrictions described in **Appendix C**.

- *In the Conservation Alternative, a mitigation measure that meets this MD is included that states: Potentially disruptive construction activities (e.g., pad clearing, well drilling), shall be avoided within 3.1 miles of occupied sage-grouse leks from March 1 to June 30 to reduce disturbance to lekking or nesting sage-grouse (and/or hens with early broods). If this period cannot be avoided, apply noise buffering shields to minimize disturbance. (See RDFs 74, 75, 76, 77)*

- *The Proposed Action includes the following lease stipulations:*

  - *The Proposed Action includes lease stipulations for leases IDI-35789, 35788, 35786, 37087, 36373*

    - No exploration/development work in sage grouse strutting/brood rearing habitat from April 1-June 15.

  - *The Proposed Action includes a lease stipulation for lease IDI-37027*

    - Controlled surface and timing limitation use near sage-grouse leks and/or nesting/early brood rearing habitat: Potentially disruptive construction activities (e.g., pad clearing, well drilling), shall be avoided within 6.4 km (~4 miles) of occupied or undetermined status sage-grouse leks from March 1 to June 30 to reduce disturbance to lekking or nesting grouse (and/or hens with early broods). Specific dates may be earlier or later, depending on local breeding chronology. The spatial buffer may be increased or decreased based on site-specific factors analyzed and documented in an EA or EIS and authorized via the appropriate Decision document. For smaller-scale disturbances, (e.g., facility maintenance) a 1.0 km (0.62 mile) lek disturbance buffer will apply between approximately March 15 and May 1 from 6:00 PM to 9:00 AM in a specific area to minimize disturbance to lekking grouse (Idaho Sage-grouse Advisory Committee 2006, p. 4-70). Specific dates may be earlier or later, depending on local breeding chronology.

MD SSS 35: In undertaking BLM management actions, and consistent with valid and existing rights and applicable law in authorizing third-party actions, the BLM will apply the lek buffer-distances identified in the United States Geological Survey Report Conservation Buffer Distance Estimates for Greater Sage-Grouse – A Review (Open File Report 2014-1239) in accordance with **Appendix B**.

> *This Project cannot be relocated because the geothermal resource is limited to this locale; however, the Project has been sited so that the majority of wells and infrastructure fall outside of the 3.1 mile buffer. The Project is also sited so that roads, pipelines, and power lines are co-located to the extent possible.*
>
> *WRE's leases were issued prior to the ARMPA, and their lease grants them rights to develop the geothermal resource. A 3.1 mile buffer around the lek to the northwest of the project area overlaps portions of their leases and portions of the project area. Walker Ranches' lease stipulations did not include any major constraints (No Surface Occupancy) that would limit the development of this lease. So, in accordance with their existing right, BLM has worked with the proponent in development of the conservation alternative, which would utilize the 3.1 mile buffer as a trigger to implement timing restrictions (controlled surface use/Minor constraint), instead of a buffer that would limit development. Furthermore, the company has sited wells pads and infrastructure outside the adjacent Important Habitat Management Area (IHMA), within the least suitable General Habitat Management Area (GHMA) within the buffer area. Impacts have also been mitigated through placing power distribution lines in cable trays running along pipelines instead of overhead within the 3.1 mile buffer. Impacts to GRSG and its habitat have been minimized as described above, such that the project will cause only minor, if any disturbance to GRSG.*
>
> *Residual impacts within the lek buffer distances are unexpected because the site specific area of impact does not contain suitable habitat for GRSG.*
>
> *The Proposed Action does not limit development or include seasonal timing restrictions within a 3.1 mile buffer, however lease IDI-37027 includes a lease stipulation that limits controlled <u>surface and timing limitation use near sage-grouse leks and/or nesting/early brood rearing habitat</u>: Potentially disruptive construction activities (e.g., pad clearing, well drilling), shall be avoided within 6.4 km (~4 miles) of occupied or undetermined status sage-grouse leks from March 1 to June 30 to reduce disturbance to lekking or nesting grouse (and/or hens with early broods).*

MD MR 1: Idaho and Montana: Areas within Sagebrush Focal Area (SFA) will be open to fluid mineral leasing and development and geophysical exploration subject to NSO without waiver, exception, or modification. Areas within Priority Habitat Management Area (PHMA) outside SFA) and IHMA will be open to mineral leasing and development and geophysical exploration subject to NSO with a limited exception (MD MR 3). GHMA will be open to mineral leasing and development and geophysical exploration subject to Controlled Surface Use which includes buffers and standard stipulations.

- *See SSS 32 above.*

MD VEG 3: Require use of native seeds for restoration based on availability, adaptation (ecological site potential), and probability of success (Richards et al. 1998). Non-native seeds may be used as long as they support GRSG habitat objectives (Pyke 2011) to increase probability of success, when adapted seed availability is low or to compete with invasive species especially on harsher sites.

- *The seed mix on page 42 of this EA was selected based on probability of success. It contains native as well as non-native perennial seed including sagebrush seed. The project area is a harsh site, with high alkalinity, low precipitation, and is known to support invasive annual grasses. The selected seed mix is expected to have the capabilities to establish on this site and compete with invasives while mimicking the historic native vegetation.*

MD VEG 12: Require project proponent (projects described in MD SSS 27 and which are included in the anthropogenic disturbance cap evaluation) to ensure that noxious weeds and invasive species caused as a result of the project are treated to eliminate establishment on the disturbed project construction areas for at least 3 years and monitored and treated during the life of the Project.

- *The project proponent, as stated in Chapter 2, is responsible for the control of noxious weeds due to project construction and maintenance. Additional mitigation measures for the control of noxious weeds are included in the Conservation Alternative. See comments on RDF 71.*

Objective MR 1: Priority will be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMA, IHMA, and GHMA. When analyzing leasing and authorizing development of fluid mineral resources, including geothermal, in PHMA, IHMA, and GHMA, and subject to applicable stipulations for the conservation of GRSG, priority will be given to development in non-habitat areas first and then in the least suitable habitat for GRSG. The implementation of these priorities will be subject to valid existing rights and any applicable law or regulation, including, but not limited to, 30 USC 226(p) and 43 CFR 3162.3-1(h).

- *As stated under MD SSS 35 the company has sited wells pads and infrastructure outside the adjacent IHMA, within the least suitable GHMA within Walker Ranches leases.*

Objective MR 2: Where a proposed fluid mineral development project on an existing lease can adversely affect GRSG populations or habitat, the BLM will work with the lessees, operators, or other project proponents to avoid, minimize and apply compensatory mitigation to the extent compatible with lessees' rights to drill and produce fluid mineral resources. The BLM will work with the lessee, operator, or project proponent in developing an APD (Application for Permit to Drill) or GDP for the lease to avoid, minimize, and apply compensatory mitigation to impacts on GRSG or its habitat and will ensure that the best information about the GRSG and its habitat informs and helps to guide development of such Federal leases.

- *The Proposed Action may adversely affect GRSG populations by increasing noise (temporarily) and tall structure density within the 3.1 mile GRSG lek buffer. The project siting does avoid all adjacent IHMA habitats and has limited siting in GHMA close to other existing anthropogenic sources of disturbance. Since the proposed action does not mitigate noise or tall structures it would not be consistent with ARMPA.*

- *The BLM has worked with the lessee to analyze a Conservation Alternative which mitigates noise through timing restrictions or noise shielding requirements and which mitigates the tall structures by requiring power distribution lines run alongside pipelines in cable trays. Residual impacts remaining after mitigation measures are applied would be compensated for and are discussed below in the compensatory mitigation section.*

MD MR 1: Idaho and Montana: Areas within SFA will be open to fluid mineral leasing and development and geophysical exploration subject to NSO without waiver, exception, or modification. Areas within PHMA (outside SFA) and IHMA will be open to mineral leasing and development and geophysical exploration subject to NSO with a limited exception (MD MR 3). GHMA will be open to mineral leasing and development and geophysical exploration subject to CSU which includes buffers and standard stipulations.

- *WRE holds existing leases that grant them rights to develop the geothermal resource in accordance with the lease stipulations attached to their lease. BLM has worked with the company to site the project outside of IHMA and PHMA, and to apply mitigation measures through the conservation alternative.*

MD MR 4: Incorporate required design features and best management practices appropriate to the management area as COAs when post leasing activity is proposed into any post-lease authorizations.

- *The Proposed Action would not be consistent with this MD, as it does not include the specific design features and Best Management Practices (BMPs) outlined in appendix C of ARMPA. The conservation alternative applies Recommended Design Features (RDFs) from Appendix C of ARMPA, see the RDF section below for the RDFs that would be included as COAs for this Project.*

MD TTM 5: Conduct road construction, upgrades, and maintenance activities to avoid disturbance during the lekking season – see **Appendix C**.

- *There is a mitigation measure in the Conservation Alternative that limits construction timing from March 1 through June 30. The recommended buffer area for road maintenance as described in RDF 2 is 2 miles. None of the proposed construction is within 2 miles of an existing lek.*

Recommended Design Features (RDFs)

The following RDFs from the list in Appendix C of the ARMPA were deemed applicable. Additional discussion follows each RDF (As numbered in Appendix C), and if not already addressed as a project design feature, RDFs will be applied as a mitigation measure in the Conservation Alternative.

1. Solicit and consider expertise and ideas from local landowners, working groups, and other federal, state, county, and private organizations during development of projects.

- *See the section in Chapter 1 on public involvement; this project was scoped multiple times to landowners, multiple agencies with the State of Idaho, Cassia County, and private organizations.*

3. Avoid mechanized anthropogenic disturbance, in nesting habitat during the nesting season when implementing: 1) fuels/vegetation/habitat restoration management projects, 2) infrastructure construction or maintenance, 3) geophysical exploration activities; 4) organized motorized recreational events.

- *The Project Area is not suitable for nesting but does include some areas having suitable sagebrush cover. The Conservation Alternative includes a mitigation measure that states, "potentially disruptive construction activities (e.g., pad clearing, well drilling), shall be avoided within 3.1 miles of occupied sage-grouse leks from March 1 to June 30 to reduce disturbance to lekking or nesting sage-grouse (and/or hens with early broods). If this period cannot be avoided, apply noise buffering shields to minimize disturbance." It is expected that this design feature would prevent anthropogenic disturbance from affecting nesting sage-grouse in other areas where suitable habitat does occur.*

40. Utilize available plant species based on their adaptation to the site when developing seed mixes. (Lambert 2005; VegSpec).

- *The seed mix listed in the Conservation Alternative on page 42 of this EA was selected based on probability of success. It contains native as well as non-native seeds. The Project Area is a harsh site, with high alkalinity, low precipitation, and is known to support high concentrations of invasive annual grasses. The selected seed mix is expected to have the capabilities to establish on this site and compete with invasive plants while mimicking the historic native vegetation.*

44. Utilize techniques to introduce desired species to the site such as drill seeding, broadcast seeding followed by a seed coverage technique, such as harrowing, chaining or livestock trampling, and transplanting container or bare-root seedlings.

- *The Conservation Alternative describes a process that would be used for planting seed.*

52. Where technically and financially feasible, bury distribution powerlines and communication lines within existing disturbance.

- *The Proposed Action has no provisions for burial or other management of power distribution lines due to the financial cost associated with their construction and maintenance. The Conservation Alternative includes a mitigation measure that*

would have all power distribution lines run in cable trays alongside pipelines within 3.1 miles of leks.

53. Above-ground disturbance areas would be seeded with perennial vegetation as per vegetation management.

- *The Proposed Action includes a perennial seed mix and method to plant it.*

54. Place infrastructure in already disturbed locations where the habitat has not been fully restored.

- *The Project is located in close proximity to existing roads, transmission lines, agricultural uses of private land, and an existing geothermal power production facility. To the extent possible, existing roads and utilities would be used. Habitat quality is generally not suitable for sage-grouse where the project is currently sited.*

56. Co-locate linear facilities within one mile of existing linear facilities.

- *The entire Project is already located within one mile of existing linear facilities. To the extent possible, existing roads have been used, and the shortest route to connect well sites to pipelines and other infrastructure would be used.*

57. Micro-site linear facilities to reduce impacts to sage-grouse habitats.

- *The Project is located in general habitat, the suitability of the habitat is discussed in Chapter 3 of this EA. See comments on RFD 54 and RDF 52.*

58. Locate staging areas outside the PHMA to the extent possible.

- *Staging areas would be located entirely on private lands, and not in PHMA.*

59. Consider co-locating powerlines, flowlines and pipelines under or immediately adjacent to a road or adjacent to other pipelines first, before considering co-locating with other ROW.

- *Chapter 2 describes the location of facilities; they would be placed adjacent to existing roads and new roads, pipelines, and power lines would be co-located. Geothermal pipelines cannot be located underground, as the pipe needs the ability to flex and move with variations of temperature.*

60. Restrict the construction of tall facilities and fences to the minimum number and amount needed.

- *BLM has worked with Walker Ranch to site the Project with the minimum amount of power lines and fences. Power lines would be co-located with other facilities, and the fences constructed would be temporary to exclude livestock, wildlife, and people from sumps.*

62. Place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.

- *See comments for RDF # 59.*

63. Construction and development activities should conform to seasonal restrictions.

- *The Conservation Alternative includes seasonal restrictions including:*

- Potentially disruptive construction activities (e.g., pad clearing, well drilling), shall be avoided within 3.1 miles of occupied sage-grouse leks from March 1 to June 30 to reduce disturbance to lekking or nesting sage-grouse (and/or hens with early broods). If this period cannot be avoided, apply noise buffering shields to minimize disturbance.
- Restrict vegetation removal activities associated with construction from March 1 through July 15 to avoid potentially disturbing nesting migratory birds. If this period cannot be avoided, an avian survey can be completed and activities may proceed as long as nesting migratory birds are documented and avoided.

▪ *The Proposed Action includes lease stipulations for leases IDI-35789, 35788, 35786, 37087, 36373*
  - No exploration/development work in sage grouse strutting/brood rearing habitat from April 1-June 15.

68. Site and/or minimize linear ROWs or Special Use Authorizations to reduce disturbance to sagebrush habitats.

▪ *See comments for RDF #59*

70. Equip tanks and other above-ground facilities with structures or devices that discourage nesting of raptors and corvids.

▪ *Under the Conservation Alternative, power lines would be placed within cable trays (within 3.1 miles of leks) and outside of this area would be designed to deter perching/nesting.*
▪ *Under the Proposed Action, there are no specific design features to preclude perching or nesting.*

71. Control the spread and effects of non-native plant species (Gelbard and Belnap 2003, Bergquist et al. 2007, Evangelista et al. 2011). (E.g. by washing vehicles and equipment.)

▪ *The Project Proponent, as stated in chapter 2, is responsible for the control of noxious weeds due to project construction and maintenance. The following mitigation measures are included as mitigation measures in the conservation alternative:*
  - *The drilling rig and any construction-related equipment would be required to be cleaned and washed prior to entering each site.*
  - *Fill materials and road surfacing materials that originate from areas with known noxious weeds or invasive plants will not be used.*
  - *Re-vegetation, habitat restoration and weed control activities will be initiated as soon as possible after construction activities are completed.*
  - *An intensive weed monitoring and control program would be implemented prior to site preparation for planting and would continue until interim or final reclamation is approved by the BLM Authorized Officer.*
  - *Monitoring would be conducted at least annually during the growing season to determine the presence of any invasive plants or noxious weeds. Invasive plants and noxious weeds that have been identified during monitoring would be promptly treated and controlled.*

- *The use of certified, weed-free mulch would be required when stabilizing areas of disturbed soil.*
- *Seeding would be conducted no more than 24 hours following completion of final seedbed preparation. A certified weed-free seed mix designed by BLM, as identified below, to meet reclamation standards would be used to revegetate all disturbed areas.*

72. Restrict pit and impoundment construction to reduce or eliminate threats from West Nile virus (Doherty 2007).

- *The sumps constructed for drilling are temporary, lined with impermeable PVC, would not be habitat conducive to the species of mosquito that is a carrier of west Nile virus, and would be reclaimed during interim reclamation.*

73. Remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues, use the following steps for reservoir design to limit favorable mosquito habitat:

- Overbuild size of ponds for muddy and non-vegetated shorelines.
- Build steep shorelines to decrease vegetation and increase wave actions.
- Avoid flooding terrestrial vegetation in flat terrain or low lying areas.
- Construct dams or impoundments that restrict down slope seepage or overflow.
- Line the channel where discharge water flows into the pond with crushed rock.
- Construct spillway with steep sides and line it with crushed rock.
- Treat waters with larvicides to reduce mosquito production where water occurs on the surface
  - *See comments on RDF #72.*

74. Require noise shields when drilling during the lek, nesting, brood-rearing, or wintering season.

- *See comments for RDF # 63.*

75. The BLM/Forest Service would work with proponents to limit project related noise where it would be expected to reduce functionality of habitats in PHMAs and IHMAs..

- *The Burley Field Office has worked closely with the Project Proponent in the siting of the Project, and it has been sited entirely outside of PHMA and IHMA. The Conservation Alternative restricts construction activities and drilling during the lekking and nesting seasons.*

76. The BLM/Forest Service would evaluate the potential for limitation of new noise sources on a case-by-case basis as appropriate.

- *See comment on RDF #75.*

77. Limit noise sources that would be expected to negatively impact populations in PHMAs and IHMAs and continue to support the establishment of ambient baseline noise levels for occupied leks in PHMAs.

- *See comment on RDF #75.*

80. Fit transmission towers with anti-perch devices (Lammers and Collopy 2007).

- *Under the Conservation Alternative, within 3.1 miles of leks, all power would be required to be run in cable trays. Outside of 3.1 miles a COA states "construct transmission lines in a manner which minimizes or prevents raven nesting throughout the Project Area."*
- *The Proposed Action has no design features that would fit transmission towers with anti-perch devices.*

81. Require sage-grouse-safe fences.

- *The only fences to be constructed would be temporary, around the sump areas. These would also be netted if standing water is present. The size and location of these fences, greater than 2 km from leks, would have only minimal if any risk to sage-grouse.*

83. Clean up refuse (Bui et al. 2011).

- *According to the Proposed Action, "similar to construction wastes, the operations waste would be removed from the site by a local waste contractor and deposited in an offsite disposal facility authorized to accept the wastes."*

86. Use only closed-loop systems for drilling operations and no reserve pits.

- *Closed loop systems are much more expensive, and were not determined to be economical for this project, due to the amount of water that is produced during drilling and flow testing. There would also be no benefit to sage grouse because sumps would be temporary, fenced and netted when standing water is present, and they do not provide habitat to the mosquitos that are a vector for west Nile virus.*

87. Cover (e.g., fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce sage-grouse mortality.

- *All sumps are constructed for temporary use and would be reclaimed as part of interim reclamation. When standing water exists in the sumps they would be required to be netted, as per the proposed action.*

88. Utilize existing roads, or realignments of existing routes to the extent possible.

- *See comment on RDF # 54.*

89. Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.

- *Roads would be constructed to the standard necessary to safely support the intended use. Roads would be built to BLM Gold Book Standards.*

94. Use dust abatement on roads and pads.

- *As per the Proposed Action, dust abatement would be performed on roads.*

99. Include objectives for ensuring habitat restoration to meet sage-grouse habitat needs in reclamation practices/sites (Pyke 2011).

- *Under the Conservation Alternative, the use of drought tolerant native and non-native perennial grass and sagebrush seed during reclamation is expected to improve conditions for sage-grouse in reclaimed areas over current habitat condition. However, the small area where reclamation would occur is not expected to support sage-grouse amidst the surrounding degraded habitat. Therefore, additional objectives for ensuring habitat restoration are not expected to provide additional benefits to sage-grouse.*

100. Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve sage-grouse habitat needs.

- *See comments on RDF 99.*

101. Maximize the area of interim reclamation on long-term access roads and well pads, including reshaping, topsoiling and revegetating cut-and-fill slopes.

- *Interim reclamation is discussed in the proposed action, and states, the shoulders of the well pads could be reclaimed, but the majority of the pad must be kept clear for ongoing operations and the potential need to work on or re drill the well. The portions of the cleared well sites not needed for operational and safety purposes would be re-contoured to a final or intermediate contour that would blend with the surrounding topography as much as possible. Areas able to be reclaimed would be ripped, tilled, or disked and contoured, as necessary and reseeded with BLM approved certified weed-free grasses and sagebrush seed mixes. The stockpiled topsoil would also be spread on the area to aid in revegetation. In addition, after the Project has been operational for six months, the well reserve pits would be reclaimed.*

102. Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community

- *All features would be re-contoured back to the original landform, and seeded with the BLM prescribed seed mix.*

104. Utilize mulching techniques to expedite reclamation and to protect soils

- *Under the Conservation Alternative, Walker Ranch would seed by first contouring, and ripping the soil, as well as seedbed preparation. This is a proven technique in the BFO and should expedite reclamation and protect soils.*

Compensatory Mitigation

In addition, Appendix F of the ARMPA requires that BLM require and ensure mitigation that provides a net conservation gain to GSG including accounting for any uncertainty associated with the effectiveness of such mitigation. This will be achieved by avoiding, minimizing, and compensating for impacts through application of beneficial mitigation actions. To determine the total residual direct and indirect effects to sage grouse habitat after the above mitigation measures are implemented, the BLM Idaho State Office, with input from the Burley Field Office (BFO), developed the Idaho BLM Interim Habitat Quantification Tool (HQT).

This tool quantified habitat effectiveness, or function, using four input parameters: 1) sage-grouse Habitat Management Area delineation, 2) sage-grouse habitat suitability, 3) distance to

nearest lek, and 4) existing anthropogenic disturbance. The HQT first calculated the current functionality of the habitat in and adjacent to the project area, based on the four factors described above, described as the total functional acres in the area (pre-project functional acres). Next, the full build out of the project was added into the model and the functionality of the habitat was again calculated (post-project functional acres). Lastly, the post-project functional acres were subtracted from the pre-project functional acres to determine the direct and indirect impacts from implementing the project. Using this HQT, the BFO determined total residual direct and indirect effect to sage grouse habitat remaining after implementation of mitigation measures. The BFO has been working with WRE to develop options for completing necessary compensatory mitigation (see Chapter 2, Alternative 2 discussion).

RELATIONSHIP TO STATUTES, REGULATIONS OR OTHER PLANS

National Environmental Protection Act: This EA has been prepared in compliance with the NEPA of 1969. The EA analyzes the potential environmental effects that may be associated with the proposed activities detailed in the Operations Plan, Utilization Plan and GDP applications submitted to the BLM.

Federal Land Policy and Management Act of 1976: Section 302 of the Federal Land Policy and Management Act (FLPMA) provides the authority for BLM to manage the use, occupancy and development of public lands under the principles of multiple use in accordance with LUPs.

Geothermal Steam Act and Implementing Regulations: The Geothermal Steam Act of 1970 (30 US Code 1001-1025) gives the Secretary of the Interior the responsibility and authority to manage geothermal operations on lands leased for geothermal development. The Secretary of the Interior has delegated this authority to the BLM. Pursuant to the implementing regulations (43 CFR 3261.20), the BLM will review the applications submitted and approve if the programs: comply with the Act, the regulations adopted pursuant to the Act, other directives issued by the BLM (i.e. Geothermal Resource Orders), any special lease stipulations, and any other applicable laws and regulations. All operations conducted on a federal geothermal lease by the lessee are subject to approval by the BLM under the Act.

Energy Policy Act of 2005: The Energy Policy Act of 2005 encourages the leasing and development of geothermal resources on Federal lands. Section 211 of the Act provides a 10-year goal for the Secretary of the Interior to seek approval of non-hydropower renewable energy projects located on public lands with a generation capacity of at least 10,000 MW of electricity, which includes geothermal resources.

Secretarial Order 3283: Secretarial Order 3286 facilitates the Department of the Interior's efforts to achieve the goal Congress established in Section 211 of the EPA.

Section 7 of the Endangered Species Act (ESA) of 1973: Section 7 outlines the procedures for Federal interagency cooperation to conserve federally listed species and designated habitat. Section 7(a) (2) provides that each Federal agency shall, in consultation with the Secretary of Interior, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of their habitats. No ESA Threatened or Endangered species occur in the vicinity of the Project or would be affected by the proposals included in this EA

BLM Manual 6840 – Special Status Species Management: This Manual (BLM 2008) provides specific guidance regarding the BLM's responsibilities to conserve ESA listed and candidate

species. The objectives of the BLM Special Status Species policy is to conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer needed for these species, and to initiate proactive conservation measures that reduce or eliminate threats to Bureau sensitive species to minimize the likelihood of and need for listing of these species under the ESA. To comply with this policy, the Idaho list of BLM Special Status Species was reviewed for potentially affected species.

Sage-grouse may be affected by either alternative, however, the Proposed Project would only have a small footprint in the GHMA and design features have been selected to reduce indirect effects outside the project area. The Affected Environment and Environmental Consequences Section (Chapter 3) on Special Status Species contain more information about the effects of the proposed action and alternatives on Special Status Species.

Migratory Bird Treaty Act: The Proposed Action is in accordance with the Migratory Bird Treaty Act, as amended and the BLM/FWS 2010 MOU. This EA includes an evaluation the effects of the BLM's actions on migratory birds during the NEPA process. No harm to migratory bird populations are expected to result from the alternatives because design features excluding construction activities during nesting seasons and subsequent habitat is expected to be sufficient for the sustainability of a diverse assemblage of avian species.

Executive Order 13186: The Proposed Action is also in accordance with Executive Order 13186, dated January 11, 2001, which directs federal agencies to work with the U.S. Fish and Wildlife Service (FWS) to develop an agreement to conserve migrating birds. The Affected Environment and Environmental Consequences Section on Special Status Species contains more information about the effects of the Proposed Action and alternative on migratory birds.

State Requirements: For well drilling on public and private lands, permits would be required from the State of Idaho, including the Idaho Department of Water Resources (IDWR) and injection permits also required from Idaho Department of Environmental Quality. The Idaho Department of Fish and Game (IDFG) has statutory responsibility to manage wildlife in Idaho. The IDWR will consider IDFG concerns regarding wildlife and habitat when issuing permits for the geothermal wells.

County Requirements: The Project is located in Cassia County, Idaho. Cassia County manages its lands under the Cassia County Comprehensive Plan, revised in 2006 (Cassia County 2006). In the County Plan, the Project Area is identified as "BLM-managed land," therefore the Proposed Action is consistent with the Cassia County Comprehensive Plan.

SCOPING, PUBLIC INVOLVEMENT, AND ISSUES

On March 30, 2015, the Proposed Project was listed in the Idaho NEPA Database. Also on March 30, 2015, scoping packages detailing the Proposed Action, the purpose and need for the action, preliminary issues and surveys needed were mailed to the public for comment. Eighty-five (85) scoping packages were delivered to the Shoshone-Bannock and Shoshone Paiute Tribes, individuals, organizations and federal, state and county agencies. In addition, the scoping package was made available on the Idaho BLM web site.

Scoping comments were submitted to the Burley Field Office via mail or email. Seven letters or emails were received from six entities following issuance of the scoping packet: two from individuals, two from an organization (one organization submitted two emails), one from a state agency, and one from a county agency.

Each comment was reviewed and identified as substantive or non-substantive. Non-substantive comments include, but are not limited to, comments such as open ended questions, opinions without supporting rationale, or comments about other projects or activities that are not relevant to the currently Proposed Project. These were not utilized in development of the alternatives, nor considered in the analysis.

Of the substantive comments, several issues were identified, and are summarized below. Those issues which were determined to be important for analysis of impacts, were incorporated as Project design features, or were utilized in development of the alternatives.

One organization expressed concern over the Project's impact on water quality, and another individual expressed concern that the Project would negatively impact the free flowing water well that the individual utilizes. BLM water right records indicate that the well is drilled to 430 feet. The WRE geothermal wells would be cased to a depth much deeper than this, and are not expected to interfere with the existing free-flowing well. Further, WRE would meet all federal and state requirements for casing design and well completion. The Project's direct, indirect and cumulative impacts on water quality are be identified and analyzed in the Water Quality section of this EA.

Cassia County provided comment requesting that, for the public land portions of the Project, the BLM apply standards similar to those the County would apply (County Code 9-13-3). The BLM requires proponents to follow all applicable Federal, State and County laws and regulations.

Two organizations requested the preparation of an EIS. Determination of the need to prepare an EIS is based on significance of impacts. The decision maker will determine whether an EIS is necessary based on the analysis of the direct, indirect and cumulative effects disclosed in this EA. If a FONSI cannot be reached, an EIS would be prepared.

The IDFG and two organizations expressed concerns regarding greater sage-grouse and requested that all direct and indirect impacts be analyzed. Additional concerns include proximity of the Project to existing sage-grouse leks, construction of the Project resulting in fragmentation of sagebrush habitat, and appropriately mitigating for any impacts to greater sage-grouse. Direct, indirect and cumulative impacts to greater sage-grouse and habitat, and any needed mitigation are identified and analyzed in the Special Status Species and Vegetation sections of this EA. Further, project design features which should reduce potential impacts to sensitive species are identified in Chapter 2.

The IDFG and two organizations expressed concern about direct, indirect and cumulative impacts to wildlife species, especially pygmy rabbit and mule deer; sensitive wildlife species; and, reptile populations and habitat, particularly hibernacula. Concerns were also raised regarding migratory birds as the Raft River area has been designated an Important Bird Area in Idaho. Direct, indirect and cumulative impacts to general wildlife, special status species, migratory birds and vegetation are identified and analyzed in the respective sections in Chapter 3 of this EA.

The IDFG and one organization expressed concern that the proposed construction would result in the spread of noxious weeds. Analysis of potential indirect, direct and cumulative impacts related to the spread of noxious weeds are identified and analyzed in the Invasive Plants and Noxious Weeds section of the EA. Further, project design features which should prevent the spread of noxious weeds are identified in Chapter 2.

One organization requested mitigation to reduce noise impacts, specifically, that temporary structures be erected, sound control devices installed, noise producing activities be co-scheduled, and the Project utilize whisper quiet light plants. Project design features which should reduce noise impacts are identified in Chapter 2. Further, potential indirect noise related impacts on special status species and general wildlife are identified and analyzed in the respective sections in Chapter 3 of this EA.

One organization requested that the Project be constructed in Burley due to the existing disturbance already present, and that the power lines be buried. For reasons explained in Chapter 2, these alternatives were considered, but not analyzed in detail for this EA.

Subsequent to the close of the scoping period, WRE revised the Project slightly. It was determined that the public should be notified of the changes to the Project, and should have the ability to offer comment. On Monday, August 10, 2015, the BLM mailed 85 updated scoping information to the Tribes, individuals, organizations and Federal, State and County agencies. In addition, the updated scoping information was made available on the Idaho BLM web site.

The BLM received two responses to the updated Scoping Information: a letter from the Idaho IDEQ and a letter from the Idaho Conservation League (ICL). The IDEQ letter provided references to administrative rule citations and requested that regional representatives be contacted should compliance questions arise. The applicant will contact the appropriate representative, as necessary. The comments received from the ICL largely duplicate those received in response to the original scoping package.

Figure 1: Project Vicinity Map

CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES

PROPOSED ACTION

Walker Ranch Energy, LLC (Walker Ranch or WRE) is proposing to construct, operate and maintain the Walker Ranch Geothermal Development Project (Development Project or Project) within federal geothermal leases IDI-35789, IDI-35786, IDI-37027, IDI-37087 and IDI-36373, and on private lands in Cassia County, Idaho (see Figure 1).

The public land portions of the Project would include the construction and operation of geothermal production and injection well pads and wells, production and injection pipelines, power lines and access roads. These actions comprise the Proposed Action of this EA and are described in this Chapter (see also Figure 2).

Overview and Location

Wells

Production wells produce geothermal fluid to the surface for the extraction of heat by the power plant. Injection wells are used to inject geothermal fluid from the power plant back into the geothermal reservoir. Injection ensures the longevity and renewability of the geothermal reservoir. The number of geothermal production and injection wells required for the Project is principally dependent on the productivity (or injectivity) of the wells and the temperature and pressure of the produced geothermal fluid.

Within the federal geothermal leases, Walker Ranch anticipates that a maximum of 22 production and injection wells could be constructed, although it is expected that fewer wells may be sufficient to complete the project as currently planned. These sites are comprised of five previously approved sites as identified in the Raft River GDP EA (ID-220-2009-EA-3709) and newly proposed sites (see Table 1 and Figure 2).

Table 1: Proposed Production and Injection Wells

Kettleman No.	Township/Range	Legal Description	BLM Lease
Production Wells			
27-30	T.15S., R.27E.	Lot 4, Section 30	IDI-35786
87-15	T.15S., R.26E.	SESE, Section 15	IDI-35789
42-30	T.15S., R.27E.	NENW, Section 30	IDI-35786
87-30	T.15S., R.27E.	SESE, Section 30	IDI-35786
63-31	T.15S., R.27E.	SWNE, Section 31	IDI-36373
65-14	T.15S., R.26E.	NWSE, Section 14	IDI-37087
32-23	T.15S., R.26E.	NENW, Section 23	IDI-37087
72-22	T.15S., R.26E.	SWNE, Section 22	IDI-37087
48(52-31)-30	T.15S., R.27E.	SESW, Section 30	IDI-35786/private
27-14	T.15S., R.26E.	SWSW, Section 14	IDI-37087
36-15	T.15S., R.26E.	NESW, Section 15	IDI-35789
25-29	T.15S., R.27E.	NWSW, Section 29	IDI-37027
Injection Wells			
58-29	T.15S., R.27E.	SWSE, Section 29	IDI-37027
32-32	T.15S., R.27E.	NENW, Section 32	IDI-37027
74-30	T.15S., R.27E.	SENE, Section 30	IDI-35786

Kettleman No.	Township/Range	Legal Description	BLM Lease
58-12	T.15S., R.26E.	SWSW, Section 12	IDI-35789
28-12	T.15S., R.26E.	SWSW, Section 12	IDI-35789
77-11	T.15S., R.26E.	SESE, Section 11	IDI-35789
72-14	T.15S., R.26E.	NENE, Section 14	IDI-37087
23-13	T.15S., R.26E.	SWNW, Section 13	IDI-37087
21-14	T.15S., R.26E.	NWNW, Section 14	IDI-37087
24-31	T.15S., R.27E.	SWSW, Section 31	IDI-36373

The production and injection well site locations identified in Figure 2 and Table 1 may need to be relocated prior to construction as a result of new geologic, geophysical and geothermal reservoir information obtained during the course of development.

To provide for the flexibility to relocate well sites, and realign pipelines and access roads should future conditions warrant, "analysis boxes" have been established (see Figure 2). Wells could be moved anywhere within their analysis box, subject to BLM conditions of approval. Boxes were sited to avoid potential resource conflicts and are not all the same shape and size. On average, each analysis box is ± 100 acres. Multiple wells could be drilled within each analysis box, though no more than 22 wells in entirety would be constructed on public lands.

Pipelines

Geothermal production pipelines collect the geothermal fluid from each of the production wells and deliver it to the power plant. Geothermal injection pipelines distribute the used and cooled geothermal fluid from the power plant to the injection wells.

The production and injection pipeline routes generally follow the shortest distance from each well pad to the next well pad or the power plant in order to minimize the amount of pipe required, reduce heat losses, reduce the energy required to move the fluids, and to minimize the amount of ground disturbance. Where consistent with the shortest distance design criteria, the proposed pipeline routes also follow existing or proposed roads to facilitate construction, ongoing monitoring and future maintenance.

The final alignment of the pipeline routes would be dictated by the specific wells completed for the Project and the need to match fluid characteristics and balance fluid volumes in these pipelines. However, it is assumed that between 13.5 miles and 18.5 miles of pipeline could be constructed on public lands managed by the BLM (see Figure 2).

Power Lines

The electricity to power the wellhead pump motors would be supplied via overhead 12 kV electric power lines installed from the power plant to the wellheads.

As with the geothermal pipelines, the specific overhead power line alignment would be dictated by the specific wells completed for the Project. However, it is assumed that between 6.5 miles and 12.8 miles of overhead power lines could be constructed on public lands managed by the BLM.

Roads

As with the geothermal pipelines and power lines, the final roadway routes would be dictated by the specific wells completed for the Project. However, it is assumed that between 19,925 feet

(~3.8 miles) and 46,450 feet (~8.8 miles) of new access roads could be constructed on public lands managed by the BLM. Also, approximately19,945 feet (~3.78 miles) of existing access roads may need to be improved (i.e. widened, graded or bladed) to maintain a drivable roadbed (see Figure 2).

Construction and Surface Disturbance

Project construction could require up to 100 workers, although substantially fewer would be on site most of the time during construction, as the construction activities would be staged. Construction of the Project would take approximately 1 to 3 years to complete once all permits are obtained and equipment orders are scheduled. A general description of Project construction activities and surface disturbance is provided below.

Wells

Each drill site would be prepared to create a level pad for the drill rig and a graded surface for the support equipment. Drill pad preparation activities would include clearing, earthwork, drainage and other improvements necessary for efficient and safe operation and for fire prevention. Clearing would include removal of organic material, stumps, brush and slash. Topsoil would be stripped (typically to the rooting depth) and salvaged during the construction of all pads, as feasible. Salvaged topsoil (and cleared organic material, stumps, brush and slash) would be stockpiled on the pads for use during subsequent reclamation of the disturbed areas. The site would be graded with the addition of a 1' tall berm constructed around the outer edge to prevent the movement of storm water from the pad off of the constructed site.

Reserve pits would be constructed within each well pad for the containment and temporary storage of water, drill cuttings and circulating drilling mud during drilling operations. Geothermal fluid produced from the well during flow testing would also drain to the reserve pit (see Photo 2). The reserve pit would be approximately 250 ft. x 100 ft. and subdivided into two equally sized sub-basins. The basin margins would have a slope of 2:1, and would be lined with a 60 mil PVC liner to protect against infiltration into groundwater. The reserve pits would be fenced with an exclosure fence on three sides and then fenced on the fourth side once drilling has been completed, consistent with the Gold Book standards (USDI and USDA 2007). Fencing would remain in place until pit reclamation begins (See Photo 1).

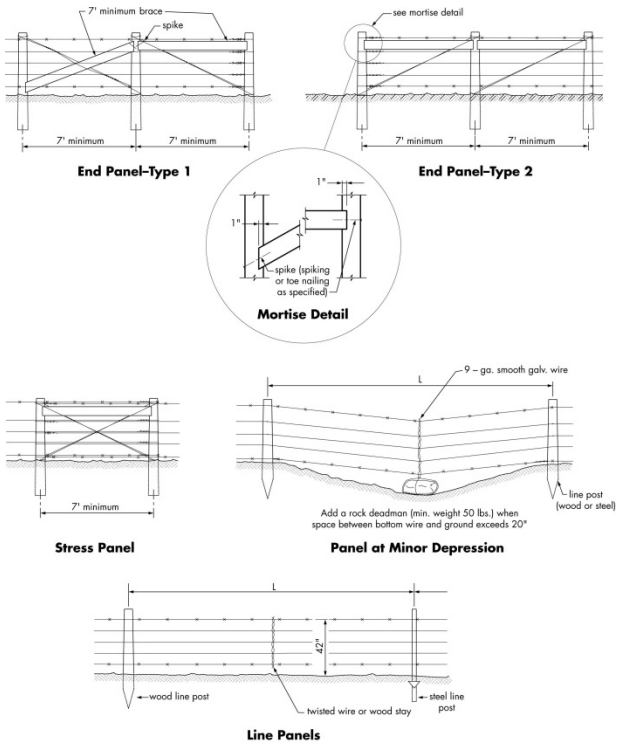

Photo 1: Exclosure Fencing

Each well pad would be about 450 ft. x 450 ft. though actual dimensions of the well pad would be modified to best match the specific physical and environmental characteristics of the site and to minimize grading (cut and fill). Once drilling is complete, the shoulders of the pad could be reclaimed, but most of the pad and sump must be kept clear and intact for ongoing operations and the potential need to work on or re drill the well. Six months following operation of the well, the reserve pit would be reclaimed (an additional 0.6 acres of disturbance reclaimed per well). Short term surface disturbance related to well pad construction is assumed to be 4.6 acres per pad; permanent surface disturbance is assumed to be 3.4 acres per pad.

Should all 22 wells be constructed, short term and long term surface disturbance acreages associated with geothermal production and injection wells on public lands would be 101.2 acres and 74.8 acres, respectively.

Photo 2: Geothermal Drilling Rig and Reserve Pit

Pipelines

The geothermal fluid pipelines would be constructed from seamless, welded steel pipe. They are expected to range in diameter from 8 inches to 36 inches. Two to three inches of insulation and a protective aluminum sheath would jacket the steel production pipes, increasing the outside diameter of the finished production pipelines by up to six inches.

Horizontal and/or vertical expansion loops (a square bend in the pipeline approximately 30 feet in length by 40 feet in width) may be constructed about every 300 to 600 feet along the production pipelines (see Photo 3). Expansion loops allow the pipeline to flex as it lengthens and shortens due to heating and cooling. Fewer expansion loops are needed along the injection pipelines, as the injection pipelines are subject to less heating and cooling.

Photo 3: Example of Geothermal Pipelines and Supports, Expansion Loops and Overhead Power Lines

Pipeline supports would be installed at approximately 30 foot intervals along the pipeline route (see Photo 3). Pipeline support construction would begin by vertically auguring 24 to 36 inch diameter holes into the ground about eight to ten feet deep. Soil and rock removed from the holes would be cast on the ground adjacent to each hole. The steel pipe support, known as a "sleeper," would be placed in the hole and concrete poured to fill the hole slightly above the ground surface. The steel pipe sleeper would extend above the concrete from approximately one to four foot above ground surface.

While the concrete is curing, the approximately 40 foot long steel pipe sections would be delivered and placed along the construction corridor. A small crane would lift the pipe sections onto the pipe supports and temporary pipe jacks so that they could be welded together into a solid pipeline. Once welded and the welds tested, the pipe would be jacketed with insulation and an aluminum sheath. When completed, the top of the pipelines would average less than three feet above the ground surface, and would provide adequate clearance for high-flow events, floating debris, wildlife or livestock (USDI and USDA 2007). Additionally, the top of some sections of the pipelines could be as high as six feet above the ground surface to accommodate terrain undulations and to facilitate movement of wildlife and livestock through the wellfield.

The pipelines would be constructed across roads in a manner that allows continued vehicle access. This would typically use the cut and fill method, where a trench would be cut through the road, a prefabricated, "U" shaped, oversized pipe sleeve (containing the fabricated geothermal fluid pipeline with the insulation and metal cladding in place) installed in the trench, the excavated soil and rock backfilled and compacted around and above the oversize pipe sleeve, and the roadbed material repaired or replaced. Alternatively, the pipelines could be constructed

across the roads on sleepers and the roadbed run up and over the pipeline. This would entail constructing a concrete or steel conduit over a pipeline where it crosses a road, then compacting soil on either side of the conduit sufficient to ramp the roadbed up and over the conduit to allow traffic to travel over the pipeline.

Photo 4: Example of Geothermal Pipelines, Overhead Power Lines and Road Overbuild

The pipelines may require drains which would be used to divert unwanted fluids to a lined sump or concrete basin. Any necessary drains would be located near to existing well pads with sumps such that any drained fluid can flow back to a lined sump or concrete basin, and no new or additional catchment basins outside of well pad disturbance areas would be required. On average, one drain would be needed per well. These drains (typically less than two inch diameter pipes) would only be needed for startup or shutdown operations of pipelines or wells. Fluid collected in these sumps and basins would be reinjected into the geothermal reservoir or left to evaporate.

A 50-foot wide construction corridor would be needed along the length of the pipeline. Between 13.5 miles and 18.5 miles of pipeline could be constructed on public lands within the analysis boxes. Short term surface disturbance associated with pipeline construction would be between approximately 81.8 acres and 112.1 acres.

Long term disturbance associated with pipeline operation assumes a 20-foot width along the length of the pipeline, as some of the short term construction disturbance would be reclaimed following completion of construction. Long term surface disturbance associated with pipeline operation would be between approximately 32.7 acres and 44.8 acres.

Power Lines
The power poles would be single support, and would average approximately 30 to 45 feet high. The overhead power lines would be constructed within the pipeline corridor and no additional disturbance is assumed for construction of the power poles.

Roads
New access roads would be constructed using a dozer and/or road grader. For any road sections longer than ½-mile, a 30-foot wide, 50-foot long pull out may be constructed, to allow for safe vehicle passing, as recommended in Chapter 4 of the Gold Book, but to the lowest level of disturbance required to provide access for completion of the well. Constructed access roads crossing existing drainages may require the installation of culverts. Culvert installation would follow BLM design criteria and would be constructed pursuant to standards established in the Gold Book (USDI and USDA 2007).

New roads are assumed to have a 20 foot wide area of disturbance (14 foot wide travel way and 6 foot shoulders). Between 19,925 feet and 46,450 feet of new road could be constructed on public lands managed by the BLM within the analysis boxes (see Table 2). Total surface disturbance associated with new road construction would be between approximately 9.2 acres and 21.3 acres.

Table 2: New Access Road Construction Lengths

	Minimum New Road Length (ft.)[1]	**Potential Additional New Road Disturbance (ft.)[2]**
27-30	1,325	1,700
87-15	1,600	1,900
42-30	1,200	2,600
87-30	555	2,750
63-31	2,640	1,500
65-14	260	1,500
32-23	345	2,300
72-22	755	2,700
48(52-31)-30	310	n/a
27-14	1,685	1,800
36-15	n/a	2,200
25-29	365	2,000
58-29	2,865	1,500
32-32	1,440	2,350
74-30	310	2,500
58-12	300	2,100

Analysis Block	Minimum New Road Length (ft.)[1]	Potential Additional New Road Disturbance (ft.)[2]
28-12	475	1,600
77-11	1,210	3,950
72-14	1,250	2,150
23-13	705	2,700
21-14	n/a	2,350
24-31	330	2,300
TOTAL	**~19,925 ft. (~3.8 mi)**	**~46,450 ft. (~8.8 mi)**

[1] Minimum road length refers to the roads as depicted on Figure 2.
[2] Potential additional new road disturbance refers to the maximum additional surface disturbance that could occur within the respective analysis box. For example, within "analysis block 24-31," 330 feet of new road would be constructed, as depicted on Figure 2. However, should well 24-31 relocate elsewhere within the analysis block, the maximum amount of new road that would be required would be 2,300 feet.

Also, up to 19,945 feet of existing access roads may need to be improved (i.e. widened, graded or bladed) to maintain a drivable roadbed (see Figure 2). Assuming an additional 5 foot additional disturbance width along the length of the road, the total estimated area of surface disturbance associated with road improvement activities would be about 2.3 acres.

Aggregate Needs

As much as possible, native materials (derived from grading to balance cut and fill) would be used for site and road building materials. Any additional gravel required would be obtained commercially from a local aggregate supplier. All off site aggregate used would be certified weed free. In addition to the approximately 45,000 cubic yards of surfacing material which may be needed for well site and access road construction, approximately 160,000 cubic yards may be needed for construction of the pipelines and power plant.

Water Needs

Water would be obtained from a well and agricultural water rights Agua Caliente, LLC has on land that it owns adjacent to and east of Geothermal Lease No. IDI-35786, in Section 24, T15S, R26E. A total of up to 1.5 acre-ft (~ 500,000 gallons) may be used in the construction and drilling of any single well. If the drill site is close enough to the water source, the water would be pumped to the rig via temporary pipeline on the ground. Otherwise, the water would be hauled by truck on an as-needed basis. Water required for construction of the power plant and associated pipelines (including earthwork, erosion control and concrete) would be substantially less than the water required for well drilling operations.

Alternatively, water necessary for construction activities could be obtained from shallow water well(s) drilled from one or more of the proposed drill sites as approved by the BLM. Each water well would be temporary, drilled by a licensed water well driller and cemented with ~7 inch or larger casing to provide a sanitary seal at the surface. The well would be drilled down to a

productive interval of sands, gravels or fractures. A submersible electric pump on 4 inch column pipe would then be run to below the producing interval. When no longer needed, the well would be plugged and abandoned with cement plugs across the bottom of the casing and, if needed, with additional plugs to isolate individual producing zones if identified as present. No additional surface disturbance would be associated with the drilling of each temporary water well, as they would be constructed on the existing disturbed well pad.

Portable toilets would be provided throughout the site, office and travel trailers and would connect to temporary septic holding systems.

Summary of Surface Disturbance

Based on the information provided above, Table 3 identifies the short and long term surface disturbance acreages associated with Project construction and operation.

Table 3: Summary of Surface Disturbance

	Minimum Scenario[1]		**Maximum Scenario[2]**	
	Short Term Disturbance (ac.)	**Long Term Disturbance (ac.)**	**Short Term Disturbance (ac.)**	**Long Term Disturbance (ac.)**
Well Pads	101.2	74.8	101.2	74.8
Pipelines	81.8	32.7	112.1	44.8
Access Roads	11.4	11.4	23.6	23.6
Power Lines	0	0	0	0
TOTAL	194.4	118.9	236.9	143.2

[1] Minimum Scenario refers to the surface disturbance for Project components, as depicted on Figure 2.
[2] Maximum Scenario refers to the maximum amount of surface disturbance that could be constructed within each analysis box.

Operation and Maintenance

The Project would be operated 24 hours per day, 365 days per year, and would require approximately 15 workers. Commercial operations are anticipated to commence in the first quarter of 2017. A general description of Project operation and maintenance activities is provided below.

Wells

Once a well is drilled and well head completed, an industrial grate would be placed over the hole to prevent humans and wildlife from falling into the cellar. See Photo 5 for a typical production well, and Photo 6 for a typical injection well.

Photo 5: Typical Production Well with Motor Control Building

Photo 6: Typical Injection Well

Each of the production wells would be equipped with a lineshaft pump to bring the geothermal fluid to the surface under pressure. Wellhead dimensions for the production wells are not

expected to exceed a height of fifteen feet above the ground surface or four feet in diameter. Wellhead dimensions for the injection wells would be smaller (approximately 6 ft. in height) since they would not have wellhead pump motors.

An approximately 15 foot by 15 foot by 10 foot high motor control building would be located on the well pad within approximately 50 feet of each production well to house and protect: 1) the auxiliary well control systems; 2) motor switch gear controls and sensors; 3) transmitters; 4) electric transformers and 5) geothermal fluid treatment systems. The well control systems, data transmitters and geothermal fluid treatment systems used for the injection wells would be placed inside a smaller structure located on the injection well pads.

Sensors would collect key temperature, pressure and flow rate data from each well, and transmit the data (via wireless or cable) to the control room in the power plant where it can be viewed and archived. This data would be measured for purposes of process control, resource data acquisition, safety and environmental protection. Metering would be sufficient to quantify the flow rates from or into each individual well, as well as to allow quantification of flow rates for each specific property lease, whether federal or private. Plant operation crews would visit each well site multiple times daily (approximately 4 times) in order to inspect each site for mechanical integrity and normal operating conditions to ensure a high level of safety, as well as to confirm that data instrumentation is working properly and make redundant written records of production and injection data. Physical access to each site would remain uninhibited to plant personnel throughout the life of the project.

Wells would be maintained over the life of the project. Occasionally, activities such as installing, removing or repairing pumps, or other activities that are unexpected or cannot be delayed due to safety or operating concerns may be necessary. These activities would be conducted infrequently, and only as the need arises. Major maintenance also may be necessary. Major maintenance may involve “working over,” or re-drilling the well, as necessary to increase or optimize production. In these instances, a drill rig and associated equipment is required. Major maintenance are activities expected to last up to or longer than a week.

Pipelines

During normal operations, the pipelines would be inspected three to four times per day for leak detection, safety and vandalism. The pipelines also would be subject to periodic ultrasonic thickness testing to detect any substantial thinning of the pipe wall.

Power Lines

Operations and maintenance personnel would maintain the power lines by monitoring, testing, and repairing equipment. If conductor failure occurs, power would be automatically removed from the line. Lightning protection is provided by shield wires along the line.

Maintenance would include power line and pole repair and/or replacement. WRE would inspect the power line from a light, off road vehicle and make repairs and/or facility replacement, as necessary. Equipment damaged by vandals would be replaced immediately. Emergency maintenance, such as repairing downed wires during storms and correcting unexpected outages, would be performed by WRE or licensed maintenance contractors.

Roads

Maintenance activities would include blading, surface replacement, dust abatement, spot repairs, slide removal, ditch cleaning (if ditches are needed), culvert cleaning (if culverts are necessary),

litter cleanup and noxious weed control, as needed and per Gold Book standards (USDI and USDA 2007).

Reclamation

The estimated life of the Project is 40 years. A general description of Project reclamation activities is provided below.

Wells

Once drilling is complete, the shoulders of the well pads would be reclaimed, but the majority of the pad must be kept clear for ongoing operations and the potential need to work on or re drill the well. The portions of the cleared well sites not needed for operational and safety purposes would be re-contoured to a final or intermediate contour that would blend with the surrounding topography as much as possible. Areas able to be reclaimed would be ripped, tilled, or disked and contoured, as necessary and reseeded with BLM approved certified weed-free grasses and forb seed mixes. The stockpiled topsoil would also be spread on the area to aid in revegetation. This would include re-contouring, ripping and seeding the area.

For well testing purposes, all reserve pits would be left open until 6 months after the Project is operational. While open and containing fluid, the reserve pits would be fenced and netted. Pit reclamation activities would include evaporating any liquids; any solids would be mixed with excavated material and buried under backfill in the reserve pit. Any material that is determined to be hazardous or toxic would be excavated and disposed of at an approved landfill.

At the end of Project operations the wells would be plugged and abandoned. Abandonment typically involves filling the well bore with clean, heavy abandonment mud and cement at specific depth intervals until the top of the cement is at ground level, which is designed to ensure that there is no inter-aquifer contamination or fluid migration. The well head (and any other equipment) would then be removed, the casing cut off well below ground surface and the hole backfilled to the surface. Well pads would be contoured to match surrounding topography, ripped and seeded.

Pipelines

Pipeline reclamation would include placing fill in the trench, compacting the fill, re-grading cut and fill slopes to restore the original contour, replacing topsoil and re-vegetating in accordance with the reclamation plan.

Power Lines

Should the Project be decommissioned and the power lines no longer needed, the power lines, including support structures, would be removed and all disturbed areas would be reclaimed, re-contoured, and seeded with a BLM approved seed mixture.

Roads

Reclamation of the roads would include re-contouring the road back to the original contour, seeding and controlling noxious weeds. Reclamation would include other techniques to improve reclamation success, such as ripping, scarifying, replacing topsoil, pitting and mulching if necessary.

Design Features

WRE would comply with all stipulations that are applicable to the proposed Project operations on the specific federal geothermal leases (see Table **4**).

Table 4: Federal Geothermal Lease Stipulations

Lease ID #	Lease Stipulation/Notice
35789, 35788, 35786, 37087, 36373	Protect ferruginous hawks between March 1 and July 15, prohibiting activity within the shorter of 2,000 feet or visible range of active nest sites.
35789, 35788, 35786, 37087, 36373	No exploration/development work in sage grouse strutting/brood rearing habitat from April 1-June 15.
35789, 35786, 37087, 36373	No exploration/development in crucial deer winter range December 1-March 31.
35789, 35788, 35786, 37087, 36373, 37027	Control surface disturbing activities in areas with soils that have high erosion potential.
35789, 35788, 35786, 37087, 36373, 37027	The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 USC 1531 et seq., including completion of any required procedure for conference or consultation.
35789, 35788, 35786, 37087, 36373, 37027	This lease may be found to contain previously unknown historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, Executive Order 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated.
37027	Bald eagles (Haliaeetus leucocephalus) and/or golden eagles (Aquila chrysaetos) may now or hereafter be found to utilize the project area. The BLM will not issue a notice to proceed for any project that is likely to result in take of bald eagles and/or golden eagles until the applicant completes its obligation under applicable requirements of the Eagle Act,

Lease ID #	Lease Stipulation/Notice
	including completion of any required procedure for coordination with the U.S. Fish and Wildlife Service or any required permit. The BLM hereby notifies the applicant that compliance with the Eagle Act is a dynamic and adaptable process which may require the applicant to conduct further analysis and mitigation following assessment of operational impacts. Any additional analysis or mitigation required to comply with the Eagle Act will be developed with the U.S. Fish and Wildlife Service and coordinated with the BLM.
37027	During project planning, the BLM and applicant/lessee will need to work closely with the U.S. Fish and Wildlife Service to incorporate appropriate provisions and protocols found in Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and other Recommendations in Support of Golden Eagle Management and Permit Issuance (Pagel et al. 2010) or more recent supplemental guidance.
37027	Controlled surface and timing limitation use near sage-grouse leks and/or nesting/early brood rearing habitat: Potentially disruptive construction activities (e.g., pad clearing, well drilling), shall be avoided within 6.4 km (~4 miles) of occupied or undetermined status sage-grouse leks from March 1 to June 30 to reduce disturbance to lekking or nesting grouse (and/or hens with early broods). Specific dates may be earlier or later, depending on local breeding chronology. The spatial buffer may be increased or decreased based on site-specific factors analyzed and documented in an Environmental Assessment (EA) or Environmental Impact Statement (EIS) and authorized via the appropriate Decision document. For smaller-scale disturbances, (e.g., facility maintenance) a 1.0 km (0.62 mile) lek disturbance buffer will apply between approximately March 15 and May 1 from 6:00 PM to 9:00 AM in a specific area to minimize disturbance to lekking grouse (Idaho Sage-grouse Advisory Committee 2006, p. 4-70). Specific dates may be earlier or later, depending on local breeding chronology.
37027	There are a variety of BLM special status species, such as pygmy rabbit and cliff chipmunk, which may now or hereafter be found to utilize the project area. Project specific studies may be required to inventory special status species prior to any project development. Timing limitations, best management practices, and mitigation criteria may be necessary to avoid impacts to special status species. Timing limitations, best management practices, and mitigation criteria would be identified during project-specific NEPA documentation.
37027	Lands adjacent to this lease contain existing water wells. As exploration and development activities commence, the lessee may be required to institute a hydrologic monitoring program commensurate with the level of activity to protect water quality and quantity.
37027	The Cassia RMP and BLM policy indicate that disturbance in proximity to raptor nests should be avoided during certain times of the year. Nest management guidelines are currently under revision by the U.S. Fish

Lease ID #	Lease Stipulation/Notice
	and Wildlife Service. Until these guidelines are finalized, protective buffers described in the February 2008 draft version of "*Guidelines for Raptor Conservation in the Western United States*" (Whittington and Allen 2008) will be used to avoid adverse effects to nesting raptors. While the draft Service guidelines provide recommended disturbance buffers for a comprehensive list of raptor species, species that are most likely to occur in or near the lease parcel are summarized below for convenience. **Species** — **Spatial Buffer in Non-Urban Areas** Bald eagle[a] — 0.5 to 1.0 miles Northern goshawk — 0.5 mile Ferruginous hawk — 1.0 mile Golden eagle — 0.5 mile Peregrine falcon — 1.0 mile Red-tailed hawk — 0.33 mile Prairie falcon — 0.5 mile Swainson's hawk — 0.25 mile Burrowing owl — 0.25 mile [a] For winter roosts, a 0.25 to 1 mile buffer is recommended, depending on the degree of screening provided by vegetation or topographic features. - Seasonal restrictions for potentially disruptive construction or other human activities will generally apply for raptors from February 1 through July 31 unless an exception is granted by the BLM authorized officer.
37027	LN-1. This lease area lies within the Eastern Snake River Plain Moratorium and the Raft River Critical Ground Water Area. New consumptive uses of water are not available, which may impact geothermal exploration and development activities. Water used for drilling or development activities would likely require a temporary water appropriation and possibly the use of existing water rights. Future geothermal exploration and development drilling will require permitting through Idaho Department of Water Resources and must be done in a manner that is protective of ground water and geothermal resources in the area.
37027	LN-2. The lease area includes an existing mining Notice of Intent (NOI), filed by Hydrothermal Metals LLC, for the drilling of up to 12 exploration boreholes (3 of which were completed within this geothermal lease nomination). The NOI has expired and the case will be closed pending final reclamation.

Additionally, WRE would incorporate the following design features into the Project:

Soil Erosion
To minimize erosion from storm water runoff, access roads would be maintained consistent with the best management practices as identified in the Gold Book (USDI and USDA 2007). BLM best management practices for storm water would be followed, as applicable, on public lands. Prompt re-vegetation of stockpiled topsoil would assist with erosion control. Placement of hay (straw bales) and erosion control silt fence(s) in low points would be utilized to collect sediment that may run off the site(s). If this proves ineffective, Walker Ranch would investigate hydro-mulching as a way to stabilize exposed soils. Additionally, specific lease stipulations exist which pertain to controlling soil erosion (see Table **4**).

Wildlife
Some disturbed areas can begin to be reclaimed almost immediately after construction is completed. Erosion control measures after construction would include revegetation and periodic maintenance. Disturbed areas that would not be used after construction would be revegetated with the proper seed mixture and planting procedures prescribed by the BLM. Any topsoil enriched in organic material may be stockpiled on previously disturbed areas and applied to enhance areas to be reclaimed by revegetation.

To prevent undue degradation and removal of habitat, cover and food, existing roads would be used whenever possible and cross country travel would be restricted to designated construction areas. Speed limits of 20 - 25 mph would be observed on all unpaved roads in the project area in order to minimize dust and avoid collision and incidental death of local wildlife. Furthermore, the power plant site would be fenced to prevent wildlife from entering. Heavily travelled dirt roads may be treated with magnesium chloride solutions to control dust.

The power line would also provide raptor protection in compliance with the standards described in the "Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 2006" (APLIC 2006).

Additionally, numerous lease stipulations exist which pertain to the protection of wildlife and sensitive species, including ferruginous hawks, greater sage grouse, mule deer, bald and golden eagles, pygmy rabbits, cliff chipmunks and raptors (see Table **4**).

Water Quality
Geothermal fluids would not be discharged to the ground under normal operating conditions. Accidental discharges of geothermal fluids are unlikely because of frequent inspections, ultrasonic testing of the pipeline, flow and pressure monitoring and well pump and pipeline valve shutdown features. Further, geothermal wells are cased to prevent co-mingling of the geothermal fluids with underground aquifers. Minor discharges of geothermal fluids may occur during testing and well start up events.

Additionally, numerous lease stipulations exist which pertain to the protection of water quality and water quantity (see Table **4**).

Cultural and Historic Resources
A Class III cultural resource inventory was conducted within the Area of Potential Effect (APE) and consultation with the Idaho State Historic Preservation Office (SHPO) and affected Tribal governments has been finalized. No historic properties are located within the APE. However, any cultural resources, regardless of National Register eligibility, would be avoided by ground disturbing activities.

If cultural resources, Native American remains, funerary items, scared items, or objects of cultural patrimony are discovered, WRE would cease operations in the vicinity of the discovery immediately, ensure adequate protection to the discovery, then notify the BLM. No activity in the vicinity of the discovery should resume until WRE has been issued a Notice to Proceed (NTP) by the Authorized Officer.

Additionally, lease stipulations exist which for the protection of cultural resources (see Table **4**).

Visual Resources
Above ground facilities (i.e. pipelines, wellheads, pump motors and motor control buildings) would each be painted an appropriate "earth tone" color to blend with the area and minimize visibility. The fence constructed around each of the production well sites would also be painted an appropriate color to blend with the area.

Air Pollution
Watering the ground would be used to reduce dust emissions during construction. State of the art equipment and design would be used to ensure minimal emissions of the working fluid (isopentane, or similar). The power plant would have minor air emissions during normal operation associated with the cooling tower operation.

There would be no non-condensable gas emissions during normal operations. However, small amounts of the binary working fluid would be released to the atmosphere from rotating seals and flanges and from the process to purge the buildup of air leaking into the binary turbine condenser.

Noise
To abate noise pollution, mufflers would be used on all drilling rig engines. Each well pad would, as necessary, have one drilling and testing muffler or separator. The mufflers are approximately 30 feet tall with a diameter of about 10 feet and are used to separate produced water from stream, and attenuate steam venting noise during well testing.

Fire Prevention and Control
All Federal, state, and county laws, ordinances, rules, and regulations, which pertain to prevention, pre-suppression, and suppression of fires, would be strictly adhered to. All personnel would be advised of their responsibilities under the applicable fire laws and regulations.

All construction and operating equipment would be equipped with applicable exhaust spark arresters. Fire extinguishers would be in all vehicles/equipment, and would be available on the site. In addition to requirements, water that is used for construction and dust control would be available for fire-fighting. Personnel would be allowed to smoke only in designated areas. A water tank would also be onsite and the water would be used to fight fires, should it be necessary to do so. The facility would also have a fire monitor onsite and would have water storage associated with the back-up diesel generators which could also be used to fight fires.

Safety
Industry standard safety protocols would be implemented. Hydrogen sulfide (H_2S) gas has not been detected in any previous drilling operations, and is not expected.

Hazards to Public Health

Only authorized individuals would be allowed to access the construction areas, during the construction period. During Project operations, the power plant and production well heads would be fenced and public access would be restricted. The power plant site would be occupied 24/7 by WRE and their contractors. During construction, signs would be posted notifying the general public that this is a construction work site and providing contact information if they wish to contact site personnel or WRE management. During any shut-down, all equipment and supplies would be locked and/or removed to a secure location. WRE would notify agency officials or surface land owners of any planned shut down and provide contact numbers where management can be reached if there is an issue warranting notification. If necessary, security would be hired to limit access to the project/equipment, if needed during construction. WRE would adhere to all emergency preparedness and accident/injury prevention guidelines

ALTERNATIVES TO THE PROPOSED ACTION

This section describes alternatives to the Proposed Action. Management actions and design features that are common to all alternatives are described as "same as the Proposed Action."

Alternative 1 – No Action

Under this alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts identified would not occur.

Alternative 2 – Conservation

Alternative 2 differs from the Proposed Action with regards to mitigation measures that were developed through internal and external scoping and analysis of the project to further mitigate impacts to resources (see Figure 2). Under the Conservation Alternative, the project would be developed as described in the Proposed Action, and the following mitigation measures would be added as conditions of approval (COAs) to the Utilization Plan and GDPs.

Water Quality

1. During initial well pad and road construction and prior to completion of the final well on the well pad, pre-interim reclamation storm water management actions would be taken to ensure disturbed areas are quickly stabilized to control surface water flow and to protect both the disturbed and adjacent areas from erosion and siltation. This may involve construction and maintenance of temporary silt ponds, silt fences, berms, ditches, and mulching.
2. Any water bars built during construction or reclamation to divert water from ditches or roads would be placed as follows :

Grade	Spacing
2%	Every 200 feet
2-4%	Every 100 feet
4-5%	Every 75 feet
5+%	Every 50 feet

3. Drainage control shall be ensured over the entire road through the use of borrow ditches, outsloping, insloping, natural rolling topography, lead-off (turnout) ditches, culverts, and/or drainage dips.

4. The reserve pit shall be located in cut material, with at least 50% of the pit constructed below original ground level to prevent failure of the pit dike. Any fill dikes shall be compacted in lifts.
5. Walker Ranch would develop and implement a storm water pollution prevention plan during construction and operation of the project.

Vegetation, Including Noxious Weeds and Invasive Plants Impacts

1. The drilling rig and any construction-related equipment would be required to be cleaned and washed prior to entering each site.
2. Fill materials and road surfacing materials that originate from areas with known noxious weeds or invasive plants would not be used.
3. Re-vegetation, habitat restoration and weed control activities would be initiated as soon as possible after construction activities are completed.
4. A weed monitoring and control program would be implemented prior to site preparation for planting and would continue until interim or final reclamation is approved by the BLM AO.
5. Monitoring would be conducted at least annually during the growing season to determine the presence of any invasive plants or noxious weeds. Invasive plants and noxious weeds that have been identified during monitoring should be promptly treated and controlled.
6. If necessary, the use of certified, weed-free mulch would be required when stabilizing areas of disturbed soil.
7. Interim reclamation should be initiated as soon as possible following well completion.
8. Seeding would be conducted no later than 24 hours following completion of final seedbed preparation. A certified weed-free seed mix specified by BLM, is identified below, to meet reclamation standards would be used to revegetate all disturbed areas. BLM may request a different mix bases on site specific conditions or other considerations.

   Table 5: Seed Mix

Species	Pounds/Acre – Pure Live Seed
Siberian Wheatgrass (P27)	5.00
Russian Wildrye (Bozoisky)	5.00
Sandberg bluegrass	2.00
Wyoming big sagebrush	0.50
Total	12.50

9. Fall seeding is preferred and should be conducted after September 15 and prior to ground freezing for best chances of success (Shrub species should be seeded separately and would be seeded during the winter). Spring seeding should be conducted after the frost leaves the ground and no later than April 30.
10. Initial seedbed preparation would consist of re-contouring the well pads to the appropriate interim or final reclamation standard. All compacted areas to be seeded would be ripped to a minimum depth of 18 inches with a minimum furrow spacing of 2 feet, followed by re-contouring the surface and then evenly spreading the topsoil. Prior to seeding, the seedbed would be scarified and left with a rough surface.
11. If broadcast seeding is to be used, final seedbed preparation would consist of contour cultivating to a depth of 4 to 6 inches within 24 hours prior to seeding and dozer tracking

or another imprinting method would be used in order to loosen up the soil and create seed germination micro-sites.

Soils

1. Weed-free mulch, silt fencing, waddles, hay bales, and other erosion control devices would be used on areas at risk of soil movement from wind and water erosion.
2. Mulch would be used, if necessary, to control erosion, create vegetation micro-sites, and retain soil moisture and may include hay, small-grain straw, wood fiber, live mulch, cotton, jute, or synthetic netting. Mulch would be free from mold, fungi, and would be certified free of noxious or invasive weed seeds.
3. If straw mulch is used, it would contain fibers long enough to facilitate crimping and provide the greatest cover.
4. All site grading would balance cut and fill to the extent practicable to minimize potential effects from erosion.

Wildlife

The following design features were developed as a result of scoping, wildlife surveys and analysis of the project, to mitigate impacts to wildlife.

1. Avoid active pygmy rabbit burrow sites by a minimum of 100 meters.
2. Conduct pre-construction surveys for pygmy rabbits in loamy sagebrush habitats to ensure new burrow sites are avoided.
3. Use cable trays within 3.1 miles of occupied sage-grouse leks.
4. Potentially disruptive construction activities (e.g., pad clearing, well drilling), shall be avoided within 3.1 miles of occupied sage-grouse leks from March 1 to June 30 to reduce disturbance to lekking or nesting sage-grouse (and/or hens with early broods). If this period cannot be avoided, apply noise buffering shields to minimize disturbance.
5. Construct power distribution lines in a manner which minimizes or prevents raven nesting throughout the project area.
6. Minimize construction footprint in sagebrush habitats.
7. Restrict vegetation removal activities associated with construction from March 1 through July 15 to avoid potentially disturbing nesting migratory birds. If this period cannot be avoided, an avian survey can be completed and activities may proceed as long as nesting migratory birds are documented and avoided.
8. Ensure portions of pipelines are passable by both big and small game to facilitate natural wildlife movement through the project area.
9. When standing water is present in pits, pits would be required to be fenced and netted.

Minimum Netting Requirements:

The Operator will:

a. Construct a rigid structure made of steel tubing or wooden posts with cable strung across the pit at no more than 7-foot intervals along the X- and Y-axes to form a grid of 7-foot squares.
b. Suspend netting a minimum of 4 to 5 feet above the pit surface.
c. Use a maximum netting mesh size of 1½ inches to allow for snow loading while excluding most birds in accordance with FWS recommendations. Refer to:

http://www.fws.gov/mountainprairie/contaminants/contaminants1c.html

d. Cover the top and sides of the netting support frame with netting and secure the netting at the ground surface around the entire pit to prevent wildlife entry at the netting edges.
   Note: Hog wire panels or other wire mesh panels or fencing used on the sides of the netting support frame is ineffective in excluding small wildlife and songbirds unless covered by smaller meshed netting.
e. Monitor and maintain the netting sufficiently to ensure the netting is functioning as intended, has not entrapped wildlife, and is free of holes and gaps greater than 1½ inches.

10. The operator will construct and maintain pits, cellars, open-top tanks, and trenches, that are not otherwise fenced, screened, or netted, to exclude livestock, wildlife, and humans (for example, lined, clean water pits; well cellars; or utility trenches) to prevent livestock, wildlife, and humans from becoming entrapped. At a minimum, the operator will construct and maintain escape ramps, ladders, or other methods of avian and terrestrial wildlife escape in pits, cellars, open-top tanks, or at frequent intervals along trenches where entrapment hazards may exist.
11. Under Alternative 2, the location of the wells, pipelines and roads remain unchanged. However, all or portions of 9 analysis boxes (36-15, 87-15, 27-14, 21-14, 72-14, 77-11, 28-12, 65-14 and 23-13) are within 5 kilometers (3.1 miles) of a greater sage-grouse lek. Within this 5 kilometer (3.1 mile) buffer area, power trays would be utilized instead of overhead power lines. Power cables would be placed in trays and co-located along the geothermal pipelines (see Photo **7**). Approximately 2.5 miles to 5 miles of power cables would be placed in cable trays, and approximately 3.9 miles to 7.9 miles of power lines would be overhead (this represents an approximately 40% reduction in overhead power lines as compared to the Proposed Action).
12. Any production well operated within the 5 kilometer (3.1 mile) buffer area would be required to utilize an electric submersible pump (ESP) instead of line shaft pump. As the motor of a submersible pump is below ground, potential noise impacts would be reduced.

Photo 7: Typical Geothermal Pipeline with Power Cable Tray

13. Apply the protective buffers described in the February 2008 draft version of "Guidelines for Raptor Conservation in the Western United States" (Whittington and Allen 2008) to avoid adverse effects to nesting raptors. Any activities other than routine daily maintenance or field visits would be required to follow procedures for processing request for exceptions on public lands in Idaho (BLM IB No. ID-2010-039).

Species	Spatial Buffer in Non-Urban Areas
Bald eagle[a]	0.5 to 1.0 mile
Northern goshawk	0.5 mile
Ferruginous hawk	1.0 mile
Golden eagle	0.5 mile
Peregrine falcon	1.0 mile
Red-tailed hawk	0.33 mile
Prairie falcon	0.5 mile
Swainson's hawk	0.25 mile
Burrowing owl	0.25 mile

[a] For winter roosts, a 0.25 to 1 mile buffer is recommended, depending on the degree of screening provided by vegetation or topographic features.

Seasonal restrictions for potentially disruptive construction or other human activities, will generally apply for raptors from February 1 through July 31 unless an exception is granted by the BLM authorized officer.

The following design features were added from the ARMPA because they were applicable to this project. They are discussed in further detail in the Conformance with Applicable Land Use Plan Section in Chapter 1.

1. Equip tanks and other above-ground facilities with structures or devices that discourage nesting of raptors and corvids.
2. Fit transmission towers with anti-perch devices (Lammers and Collopy 2007).

Livestock Grazing

1. After the design and prior to the construction of pipelines, consult with BLM and grazing permittees to plan the placement of ramps and raised sections of pipe to facilitate livestock movement through the project area.
2.

Safety

1. Construct pipeline road crossings in a manner that would not limit visibility on maintained roads.

Visual Resources

1. All permanent [Onsite for six (6) months or longer] structures constructed or installed (including pumping facilities) shall be painted a flat, non-reflective earth tone color. All facilities shall be painted within six months of installation. Facilities which are required to be in compliance with Occupational Safety and Health Act (OSHA) shall be excluded. The required paint color is "Covert Green" from the Standard Environmental Colors Chart CC-001: June 2008.
2. All drill rig and well test facility lights would be limited to those required to safely conduct the operations, and would be shielded and/or directed in a manner that focuses direct light to the immediate work area.
3. To minimize visual disturbance, facility perimeter lighting, including lighting used to illuminate walkways, roadways, staging areas and parking areas, would be shielded so that the light would be cast in a downward direction. Low-pressure sodium lighting (or an improved technology, if readily available) could be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.

Compensatory Mitigation

In addition to the above mitigation, to provide for a net conservation gain to the greater sage grouse, the BFO (using the HQT described in Chapter 1) determined that the total residual direct and indirect effect to sage grouse habitat remaining after implementation of mitigation measures would be 106 acres, and that a mitigation of 110 acres would represent a net conservation gain to the species.

The BFO, in coordination with WRE, have developed options for completing necessary compensatory mitigation. WRE was concerned that the number of acres of direct disturbance analyzed in the EA represents the maximum build out scenario, and the real acreage disturbed by the project could be much less than the projected maximum. Additionally, the project may take multiple years to completely drill and build out. Because of the uncertainty in final disturbance acres, BLM would require 10 acres of mitigation to be in place or under way prior to any ground disturbance occurring. This approach would "bank" credits, so that the company could do work

initially. After the first year, and every year subsequent, BLM would re-calculate the functional acres of disturbance due to additional project construction and make a determination of how much additional compensatory mitigation would be required before further disturbance would be authorized.

Initial compensatory mitigation project ideas ranged from fence marking and retrofitting power lines with perch/nest deterrents, to juniper removal and sagebrush planting. Three options emerged as technically feasible, as well as higher priority for sage-grouse, and are described in greater detail below. Any one or a combination of these compensatory mitigation options could be utilized to earn credit.

Sagebrush Planting – The Cottonwood Fire burned in 1999 adjacent to the Project Area. The burned area was rehabilitated by drill seeding grasses, as well as aerially seeding sagebrush. The grass seeding was successful, and primary species currently on the ground include crested wheatgrass and Russian wildrye. The sagebrush seeding was unsuccessful, and it is unlikely that sagebrush will quickly spread into the seeding due to the high density of grasses. This area (or another similar area) will likely remain grassland for quite some time unless sagebrush seedlings are planted in the area.

The BFO would recommend a prescription for hand planting sagebrush seedlings within the Cottonwood burn area or other similar areas lacking sagebrush cover (see also, Burley Shrub Planting EA, EA #ID220-2009-3555). The planting would be monitored as per the Twin Falls District Fuels Monitoring Protocol, and success would be determined 1 year post planting. If successful, the planting would also be monitored as necessary to help guide future plantings. Monitoring could be contracted by WRE or conducted by BLM on a cost recoverable basis. Based on the HQT used to calculate functional acres, a fully successful sagebrush planting (survival of 100 or more plants per acre after 1 year) would qualify for a credit of 0.33 acres per acre treated. If the seeding was successful at 50-100 plants per acre after 1 year, it would net 0.22 credit acres/acre. If the seeding was successful at 25-50 plants per acre after 1 year, it would net 0.11 credit acres/acre.

Habitat Restoration Partnership - This option would entail partnering with the Natural Resources Conservation Service and Pheasants Forever to contribute funding to local Sage Grouse Initiative (SGI) projects on private and/or state lands. These projects typically include chainsaw cutting or masticating juniper trees in sagebrush steppe habitat, although recently some sagebrush planting projects have been implemented through the partnership.

It may be difficult to track mitigation through contribution to SGI, however BLM could decide what kinds of projects the mitigation dollars would be used for. In coordination with the BLM Idaho State Office, the BFO decided that juniper treatment projects as well as sagebrush planting projects would both qualify as acceptable compensatory mitigation.

Since WRE would be contributing funding for this program instead of conducting the mitigation project themselves, a dollar amount per credit acre would be calculated based on the type of treatments, benefit of the mitigation (functional acres), and the costs of the treatments. That dollar amount would then be deposited into an account accessible by Pheasants Forever to complete habitat restoration projects. The table below summarizes the types of treatments and credited functional acres for each treatment (see Table 6).

Table 6: Treatment Types and Functionality

Treatment Type	Credit per Acre of Treatment (Functionality)
Juniper Mastication (Phase 2)	1 Acre
Juniper Lop and Scatter (Phase 1)	.75 Acres
Sagebrush Planting (200 Plants per Acre)	.33

Acquisition or Conservation Easement

BLM would also consider accepting a property acquisition or a conservation easement on private lands for compensatory mitigation if the following criteria are met:

1. The acquisition or conservation easement is to be established in an area that is important to sage grouse for lekking, nesting, or brood rearing.
2. The area is threatened by development.
3. The acquisition or easement would need to be in place for the entire life of the project, ensuring that the subject lands are held for the conservation of sage grouse for the life of the project until final reclamation is complete.

The value of an acquisition or conservation easement would be determined by the functionality of the habitat, and would be measured using the Idaho BLM Interim HQT.

ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

Burial of Power Line

An alternative was considered that included the burial of power lines. This alternative would have some environmental advantages when compared to the proposed action, such as reduced perching opportunities for various birds that prey on sage-grouse and reduced visual impacts. It was determined that this alternative would increase surface disturbance over that of the Proposed Action as a wider construction corridor would be necessary to fully bury the power lines. Repairs to the power lines would involve re-excavation and additional site disturbance over the life of the project.

Under the proposed action, the power lines would provide raptor protection in compliance with the standards described in the “Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 2006” (APLIC 2006).

Additionally, the mitigation measures proposed in the Conservation Alternative include the construction of distribution lines in a manner which minimizes or prevents raven nesting throughout the project area and using cable trays within 3.1 miles of existing leks would mitigate impacts to Sage Grouse and other wildlife.
Based on the mitigation measures presented above, the burial of power lines is unnecessary and this alternative was dropped from further consideration.

Alternative Site Location

An alternative was considered that included construction of the Project on previously disturbed land, perhaps in Burley, Idaho as suggested in the scoping comments received. Geothermal

facilities be located proximal to the resource. Further, WRE has worked closely with the BLM in siting the Project components and has minimized the Project footprint to the extent feasible. Thus, this alternative was dropped from further consideration.

Figure 2: Proposed Action and Conservation Alternative Map

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

After reviewing the Proposed Action and alternatives, the Interdisciplinary Team determined that several elements of the human environment could potentially be affected. These elements and the expected direct and indirect impacts to the environment are discussed below. A direct impact is caused by the action and occurs at the same time or place, whereas an indirect impact is caused by the action but occurs later in time or is further removed in distance, but is reasonably foreseeable.

The following elements of the human environment are either not present in the Proposed Project area, or would not be affected by enacting the Proposed Action or Alternative; therefore, they will not be addressed further in this document. They are: Native American religious concerns; threatened or endangered species; wild and scenic rivers, wilderness, wilderness study areas or lands with wilderness characteristics; prime and unique farmlands; floodplains; areas of critical environmental concern; paleontology; cultural resources; environmental justice; wetlands and riparian zones; wild horse and burros; recreation; and, land use authorizations.

The following elements of the human environment are present in the area and may be affected by the Proposed Action or Alternative, therefore, they will be addressed further in this document. They are: air quality; water quality; geology and minerals; vegetation, including noxious weeds and invasive plants; soils; wildlife; special status species, including migratory birds; livestock grazing; visual resources; hazardous and solid wastes; socio-economics; and, public safety (road traffic).

For the purposes of the analysis in this EA, the impacts of past activities greater than 10 years in the past within the Proposed Project Area were considered to be reflected in existing resource conditions (i.e., the affected environment). The impacts of any specific past action may be difficult or impossible to individually quantify and disclose due to issues like inconsistent data collection methodology in the past, data that have become lost or missing over time.

CUMULATIVE EFFECTS

The CEQ regulations for implementing NEPA (40 CFR 1508.7) define cumulative impacts as:

"... the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Cumulative Effects Study Areas

The Cumulative Effects Study Area (CESA) for vegetation, noxious weeds and invasive plants, soils and hazardous materials (hereafter, "Multiple Resources CESA") is the Project Area and private lands in the vicinity of the Project Area, and covers approximately 9,500 acres. The CESA for visual resources, determined largely on a topographic basis representing the potential range of visual impacts covers approximately 325,270 acres. The CESA for wildlife resources (wildlife, special status species and migratory birds) includes the Raft River Valley which includes a significantly dense population of ferruginous hawks, covering approximately 820,850

acres. The CESA for air quality and socioeconomics is Cassia County, approximately 1,651,200 acres.

Figure 3: Cumulative Effects Study Areas

Past, Present and Reasonably Foreseeable Future Actions

Cumulative effects describe impacts of the Proposed Action and Alternatives when added with other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). Past, present, and reasonably foreseeable future actions that may contribute to cumulative effects are identified below within each CESA.

Multiple Resources CESA

Past and present actions within the Multiple Resources CESA consist primarily of WRE's ongoing geothermal exploration activities, including seismic surveys; U.S. Geothermal development activities; livestock grazing; dispersed recreational activities; transportation and access; agricultural activities; and ROW authorizations, including for transmission and distribution lines. These actions are expected to persist in the same manner and to the same degree as they have been conducted in the present and recent past, and are discussed below.

Geothermal exploration – Several geothermal exploration wells have been drilled on private lands in the Multiple Resources CESA, and access roads constructed as necessary. Additionally, WRE conducted geophysical (seismic) surveys on approximately 5,000 acres of public lands and some private lands within the Multiple Resources CESA. This involved the placement of geophones connected via seismic lines. Vibroseis trucks vibrated the ground at pre-determined surface locations to generate seismic signals, which were recorded by the geophones.

Walker Ranch has completed 3 full sized geothermal wells on private lands, as well as 2 smaller diameter monitoring wells, one on private and one on BLM land. Walker Ranch completed a full sized well on BLM lands in December 2015. The small diameter monitoring well, and the full sized well that were constructed on BLM managed lands were located on the same pad. Surface disturbance on private land is approximately 15 acres, and the public land surface disturbance is ~ 4 acres.

Geothermal development – U.S. Geothermal Inc. currently operates an approximately 13 MW (net) geothermal power plant and related infrastructure including production and injection wells, access roads and ancillary facilities on private lands approximately 1 mile south of the proposed Project. US Geothermal acquired the project in 2002; construction of the power plant began in June 2006, and commercial power generation was achieved on January 3, 2008. The power is being purchased by Idaho Power Company under the terms of a 25 year Power Purchase Agreement (PPA).

Livestock grazing – Portions of three BLM-managed grazing allotments are within the public land portions of the Multiple Resources CESA: Jim Sage Allotment, Clear Creek Allotment and Strevell Allotment. In order to support the management of these grazing lands, a variety of range improvement projects have been implemented through the years, including fences, cattle guards, pipelines and troughs.

Recreation activities – There are no developed recreation sites within the Multiple Resources CESA and all recreation is of a dispersed nature. Past and present recreation activities include sightseeing, pleasure driving, hunting, wildlife viewing and hiking.

Transportation and access – Past and present actions within the Multiple Resources CESA are supported by a transportation system which includes State Highway 81, County-maintained unpaved roads (i.e. E-Y Road) and numerous dirt roads or "two-tracks" on public and private lands. Few of these two track roads are regularly maintained.

Agricultural activities – In the east and southeast of the Multiple Resources CESA, on private land, there are sprinkler irrigated fields in rotation with alfalfa, small grains, potatoes, and sugar beets as well as housing.

ROW and other land use authorizations – The Raft River substation and BPA switching station, in addition to two 138kV transmission lines and numerous distribution lines traverse the Project Area and private lands in the vicinity. Other land use authorizations in the Multiple Resources CESA include issuance of Federal geothermal leases, authorization of roads, and water pipelines.

Reasonably foreseeable future actions within the Multiple Resources CESA include construction of the private land portions of the proposed Project. Specifically, within T. 15 S., R. 26 E., Section 13, and T. 15 S., R. 27 E., Sections 18, 19 and 29-32, WRE would construct and operate up to 8 production and injection wells, up to 9.1 miles of production and injection pipelines; and up to 5 miles of new access roads. Also, within 20 acres of Section 13 or 14, T. 15 S., R. 26 E. a 32 MW (gross), 25 MW (net) binary geothermal power plant would be constructed (see Figure 2). Total short term surface disturbance associated with construction of the private land portions of the Project would be 123.8 acres, and total long term disturbance would be 86 acres. All construction procedures and surface disturbance assumptions would be identical to that described for the Proposed Action.

Visual CESA

In addition to the actions identified above, the following past, present and reasonably foreseeable future actions are also within the Visual CESA.

Fuels management – The Burley Integrated Hazardous Fuels Management Project (BIHFMP) is a proposal is located in portions of Twin Falls, Cassia, Minidoka, Blaine and Power counties. The BIHFMP creates fuel breaks within ½ mile of the BLM – private land boundaries and along roads located on public land within the Burley Field Office management area. Potential methods to create the fuelbreaks may include mowing, disking, bulldozing, chaining, harrowing, chemical mastication or hand-cutting trees, road maintenance or improvement, biological methods and seeding.

Wildfire and Fire Rehab Activities – Three wildfires burned a combined 21,546 acres within the Visual CESA. The Jim Sage fire burned 5,257 acres on the east flank of Jim Sage mountain in 2007. The Black Pine 2 fire burned approximately 10,000 acres in the Visual CESA in 2007. Where ground seeding efforts occurred to rehabilitate burned areas from these two fires, they were successful. The Naf fire burned 6,829 acres south of the project area in 2000. The rehab efforts for the Naf fire are described below as the Clear Creek Restoration Project.

Clear Creek Restoration Project – The Clear Creek Restoration area is located south of Malta. A portion of the Clear Creek Allotment burned during the summer of 2000 in the Naf Fire. Though portions of the burned area were treated for restoration, the remaining portion that was left to naturally recover has been invaded with cheatgrass and other weedy species such as tumble mustard. The objective of the Clear Creek Restoration Project was to restore the remaining untreated portion of the burned area to improve its condition for wildlife and improve its fuel characteristics to reduce the potential for high fire severity and spread.

Noxious weed and invasive plant treatments – The proposed Twin Falls District Noxious Weed and Invasive Plant Treatment Plan would allow the treatment of current and foreseeable future infestations of noxious weeds and invasive plants to promote land health. This would be

accomplished through an integrated noxious weed and invasive plant management program on public lands within the BLM Twin Falls District.

Gravel Pits/minerals sites – Within the visual CESA, past and present actions include 25 acres of disturbance related to construction and operation of 5 gravel pits and mineral sites.

Agricultural activities and Private Land Development – Most of the private land development, including housing and irrigated farmland occurs in the central portion of the Raft River Valley.

Transmission Lines and Distribution Lines – In addition to the Transmission Lines identified above, numerous additional distribution lines occur in the Visual CESA. These are primarily located on the private lands in the center of the Visual CESA.

ROW Authorizations – In addition to ROW authorizations identified above, additional ROW's have been issued and will continue to be issued as they are applied for in the Visual CESA.

Wildlife CESA

In addition to the actions identified above, the following past, present and reasonably foreseeable future actions are also within the Wildlife CESA.

Programmatic Emergency Stabilization and Rehabilitation Plan (PERSP) – The PERSP is a programmatic emergency and rehabilitation plan which is developed at the landscape level prior to wildfire occurrence. The PERSP contains a description of Emergency Stabilization and Rehabilitation (ESR) treatments that would be implemented under normal conditions in the event of a wildfire. ESR treatments are needed to stabilize soils, repair or construct physical improvements, improve lands damaged by wildfire, and restore healthy ecosystems. Treatment methods include ground and aerial seedings, temporary fencing, erosion control structure, repair of fire damaged structures and area closures. A PESRP promotes timely and cost-effective implementation of post-fire recovery treatments within time frames that are consistent with the urgent recovery of important resources.

Burley Landscape Sage Grouse Restoration Project – This Project was designed to improve sage-grouse habitat by removing encroaching juniper from sage-brush steppe habitats. Within the Wildlife CESA, 430 acres have been completed on State lands; 11,754 acres have been completed on BLM lands; and 5,895 acres are uncompleted.

Gravel Pits/minerals sites – Within the Wildlife CESA, past and present actions include 102 acres of disturbance related to construction and operation of 12 gravel pits and mineral sites.

Agricultural activities and Private Land Development – Most of the private land development, including housing and irrigated farmland occurs in the Raft River Valley and along Conner Creek, near the towns of Malta, Almo, and Elba.

Transmission Lines and Distribution Lines – In addition to the Transmission Lines identified above, numerous additional distribution lines occur in the Wildlife CESA. These are primarily located on the private lands.

ROW Authorizations – In addition to ROW authorizations identified above, additional ROW's have been issued and would continue to be issued as they are applied for and processed in the Wildlife CESA.

Wildfire – Approximately 70,000 acres have been burned by wildfire within the Wildlife CESA since the year 2000. The majority of these fires were started by lightning.

Air Quality CESA
In addition to the actions identified above, the following past, present and reasonably foreseeable future actions are also within the Air Quality CESA.

Transportation and Access – Interstate 84 and 86; U.S. Highway 30; State Highways 27, 77 and 81; and numerous paved and unpaved roads exist within the Air Quality CESA.

Development – Burley, Malta, Oakley, Declo and Albion are cities located within the Air Quality CESA. Within the Raft River Valley, there are a number of dairies and feed lots. North of Malta there is a mink farm.

Wildfire- Impacts to air quality from wildfire vary from year to year depending on a number of factors and range from minor to severe during summer and early fall.

GENERAL SETTING

The Project is located in the Northern Basin and Range Ecoregion within rural Raft River Valley on public lands managed by the BLM. The Project is accessed by proceeding on paved Highway 81 south out of Malta, Idaho about 9 miles, then along county and local access roads. The Project Area is traversed by numerous existing roads.

Although WRE has proposed localized areas of disturbance around wells and related infrastructure, analysis block areas were established to provide for the flexibility to relocate well sites, and realign pipelines and access roads should future conditions warrant. Each analysis box is ± 100 acres (though not all boxes are the same size and have been configured to minimize resource conflicts); 12 boxes have been established northwest of the Raft River, and 9 have been established southeast of the Raft River (Project Area).

The Project Area ranges in elevation from approximately 4,800 to 5,100 feet, and slopes downward to the east-southeast. The Project Area is bordered by agricultural fields to the east and southeast, and the Jim Sage Mountains to the west. Surrounding land uses include rangeland and agriculture.

The closest weather monitoring station to the Project Area is in the town of Malta. Annual and seasonal precipitation and temperature data from the Malta, ID monitoring station is presented below in Table 7.

Table 7: Annual and Seasonal Precipitation and Temperature Data

	Precipitation (in.)	**Minimum Temperature (°F)**	**Average Temperature (°F)**	**Maximum Temperature (°F)**
Annual	9.73	33.3	48.0	62.6
Winter	1.65	18.7	29.2	39.7
Summer	2.38	48.3	66.7	85.1
Spring	3.33	32.9	47.2	61.5
Autumn	2.37	33.2	48.5	63.8
Source: NOAA 2015				

Baseline noise levels were recorded at three locations in the Project Area: within analysis boxes 24-31, 27-14 and 65-14. Maximum and minimum noise levels at these locations were recorded and the results measured in A-weighted decibels (dBA) (see Table 8). The higher sound recordings were due to instantaneous wind gust noise. No human caused noises were detected other than occasional vehicular travel noise. Noise sources in the Project Area are limited to wind, dispersed recreation use, traffic from roads traversing the area, wildlife and geothermal exploration activities. An existing geothermal power plant, Raft River Unit 1, is a noise source located approximately 1 mile from the southern portion of the Project Area.

Table 8: Baseline Noise Levels

Sampling Location	Maximum Noise (dBA)	Minimum Noise (dBA)
Within Analysis Block 24-31	60.1	37.1
Within Analysis Block 27-14	61.5	40.8
Within Analysis Block 65-14	47.2	31.5
Source: Tetra Tech 2015		

AIR QUALITY

The U.S. Environmental Protection Agency (EPA) has developed the National Ambient Air Quality Standards (NAAQS) for criteria pollutants, which include nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, particulate matter less than 10 microns (PM_{10}), fine particulate matter ($PM_{2.5}$), lead and hydrogen sulfide. The NAAQS specify the concentration and duration for which pollutants may cause adverse health effects. The Idaho Department of Environmental Quality, Air Quality Division has been delegated authority by the EPA to issue air quality permits and enforce air quality regulations throughout the State.

Air quality in Cassia County has been designated as “attainment/unclassified” for all criteria pollutants, which means that the County either meets, or is generally assumed to meet, the applicable federal ambient air quality standards (U.S. EPA 2015).

Proposed Action - Air Quality Impacts

The primary pollutant of concern during construction and operation of the Project would be particulates in the form of fugitive dust, which would be generated from earth-moving and travel on unpaved roads. Based on the implementation of the Design Features adopted by WRE (see Chapter 2), water and gravel would be applied to the ground as necessary to control dust. Also, project personnel and contractors would be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions, (e.g., 25 mph) to ensure safe and efficient traffic. These actions would minimize fugitive dust emissions during construction and operation of the Project.

Combustion emissions of criteria air pollutants, criteria air pollutant precursors (volatile organic compounds), and air toxics (diesel PM, acetaldehyde, benzene, and formaldehyde) would be released in small amounts during well drilling and construction activities from the diesel engines used. Given the generally low background concentrations of criteria air pollutants in the area as

the County is in attainment, the limited emissions from construction and operational activities would not result in any violations of state or federal air quality standards.

Small quantities of naturally occurring non-condensable gases, such as carbon dioxide, hydrogen sulfide, nitrogen, and methane, would be emitted to the air during geothermal well testing. Carbon dioxide is a greenhouse gas. Although the Proposed Action would contribute an increase in greenhouse gases in the atmosphere, these emissions would be extremely small relative to state, national and global greenhouse gas emissions. Any resultant effects would also be extremely small and cannot be reliably estimated.

Alternative 1 (No Action) - Air Quality Impacts

Under the No Action Alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) - Air Quality Impacts

The potential air quality impacts from construction, operation and reclamation of Alternative 2 would be the same as those described for the Proposed Action as the footprint and surface disturbance assumptions of Alternative 2 are the same as the Proposed Action.

Cumulative Impacts - Air Quality

The cumulative effects study area for air quality (i.e. Air Quality CESA) is Cassia County.

Although minimized by the Design Features, the Proposed Action would generate particulates in the form of fugitive dust from earth moving activities and travel on unpaved roads. Diesel engines used (primarily during earth moving and well drilling, and on a limited basis during Project operations when the grid is down) would create combustion emissions, criteria air pollutant precursors and greenhouse gas emissions. Past and present actions (including the 19 acres of disturbance associated with geothermal exploration activities, and construction activities related to establishment of existing roads and transmission line systems) have generated combustion emissions, criteria air pollutant precursors, greenhouse gas emissions and fugitive dust, principally from surface disturbing activities and travel on unpaved roads.

Reasonably foreseeable future actions include construction and operation of up to 8 production and injection wells, up to 9.1 miles of production and injection pipelines; up to 5 miles of new access roads and a 32 MW (gross), 25 MW (net) binary geothermal power plant. During Project operations, with a binary geothermal power plant, some of the binary working fluid (hereafter, isopentane, though similar may be used) would be released to the atmosphere from gaskets, rotating seals, and flanges during operations. Also during normal operations, a small quantity of air would enter the isopentane loop in the air cooled condenser. This air leaked into the isopentane loop would be discharged back to the atmosphere through a stack along with a small quantity of isopentane. During major maintenance activities on the isopentane side of the binary power plant unit, the liquid isopentane would be transferred to the isopentane storage tank. However, not all of the isopentane can be removed in this manner, and the residual isopentane would escape to the atmosphere when the binary power plant unit is opened for repair.

As a result of the Project's Design Features, ambient air quality in the Project Area would be maintained. Any increases in fugitive dust, combustion emissions, criteria air pollutant precursors or greenhouse gas emissions would be minimal. Similar air pollutants generated by

past, present and reasonably foreseeable future actions are expected to be sporadic and dispersed across the Air Quality CESA. Cumulative impacts to air quality are anticipated to be negligible.

WATER QUALITY

The Project is located in the Raft River Subbasin. The Raft River Subbasin includes subbasin aquifers, artesian springs, and various irrigation wells. Groundwater in the Raft River Subbasin occurs in valley fill deposits, including the Pleistocene Raft Formation, the Holocene alluvium, and the upper part of the Pliocene Salt Lake Formation. The main source of water to the valley is runoff due to precipitation, mainly snow, on the surrounding highlands (USGS 1966).

Prior to development and land use, the basin contributed an estimated 100,000 acre-feet of surface and subsurface flow to Snake River annually. Recent studies showed that the flow declined to 80,000 acre-feet per year, and that pumping in excess of 150,000 acre-feet per year was endangering this flow. This pumping has caused declining water tables and resulted in the establishment of the Raft River Ground Water Quality Area of July 1977, which is still in place today (IDEQ 2004). Groundwater levels in the southern portion of the basin have remained more stable than levels in the northern part of the basin, where most of the agriculture in the basin takes place (IDWR 1994).

The Project Area is within IDWR Administrative Basin 5 and Administrative Region S. There are no groundwater concern areas within 5 miles of the Project Area. The closest water level monitoring well (well number 14S27E-33CDD1) is an irrigation well located northeast of the Project Area (IDWR 2007).

The Raft River is located between the eastern and western portions of the Project Area. The Raft River originates on U.S. Forest Service lands in the Raft River Mountain Range, which lies just south of the Idaho-Utah border, and flows in a northeasterly direction for approximately 81 miles from its headwaters in Utah, terminating at Lake Walcott on the Snake River (IDEQ 2004).

Two perennial streams exist in the western portion of the area: Eightmile Creek and Sixmile Creek, though neither reach the Raft River. Two streams (North and South Cottonwood) are a few miles north of the Project Area. North Cottonwood may occasionally reach the Raft River during springtime runoff (IDEQ 2004). Five drainages cross the Project Area, with headwaters in the mountains to the west-northwest, and flow to the east-southeast toward the Raft River. These drainages have intermittent flow as a result of precipitation and snowmelt in the Jim Sage Mountains.

A groundwater well is located within the project area in T15S R26E Section 23, also sometimes referred to as Bridge or Frazier Hot Spring, and is the only recorded surface manifestation of geothermal resources within the Project Area, with a recorded temperature of approximately 190 F at the well head. The spring is a naturally occurring surface expression of geothermal waters. A well has been drilled to a depth of approximately 430 feet to tap into the shallow hot-water geothermal reservoir to bring heated waters to the surface in a controlled manner. The hot artesian spring flows freely to the surface through the well head and flows down a ditch to the east and onto private property across E-Y Road. Additionally, a 2-inch diameter buried pipeline diverts water directly from the well head to the private residence on the east side of E-Y Road. Water rights for 0.34 cubic feet per second (cfs) of the well/spring waters are held by the owner of the private property onto which the water flows via the aforementioned ditch and pipeline. The private resident has a right-of-way with the BLM for the ditch and the pipeline. The waters

carried through the pipeline are used to heat the private residence and for other domestic uses. Waters from the ditch and the heating system drain into a pond on the private property where they cool. The cooled waters are then used by the private resident for watering stock, for recreation, and for irrigating farmland.

Chemical properties of the Raft River geothermal fluids found in the U.S. Geothermal Raft River Unit 1 wells are provided below (see Table 9).

Table 9: Chemical Properties of Raft River Geothermal Fluids Compared to Drinking Water Standards

Name	Sulfate (SO4)	Chloride (Cl)	Fluoride (F)	Iron (Fe)	Arsenic (As)
RRGE-1[1]	59.3	797.0	7.37		
RRGE-1[1]	59.7	798.0	7.31		
RRGE-2[1]	49.9	639.0	9.98		
RRGE-2[1]	51.1	674.0	9.61		
RRGE-3[1]	58.4	2560.0	4.74		
RRGE-3[1]	67.8	2600.0	4.68	-0.31	0.01
RRGE-4[1]	80.1	879.0	6.94		
RRGE-5[1]	59.2	714.0	7.70		
RRGE-5[1]	68.6	721.0	7.62	-0.31	0.00
EPA Standard[2] – MCL(4)/MRDL(5)	250[3]	4.0[4]	4.0[5]	0.3[3]	0.010[3]

1 Source: US DOE 2004
2 Source: US EPA 2009
3 Maximum contaminant level
4 Maximum residual disinfectant level
5 National Secondary Drinking Water Regulation

Proposed Action - Water Quality Impacts

The Project could affect water quality if it would degrade the quality of surface water by increasing erosion or sedimentation, or contaminate surface or groundwater due to materials and/or practices used.

Construction of the Proposed Action would involve removal of vegetation. Lack of vegetation and periodic disturbance for maintenance in the areas of permanent disturbance would potentially increase sedimentation and decrease infiltration and groundwater recharge. To minimize erosion and stream channel sedimentation, grading or clearing of the surface for construction would occur only as needed, and only within the approved construction corridors. Further, water and/or aggregate would be applied on disturbed areas to control dust and stabilize erosive soils, which would reduce the potential for erosion. Disturbed areas that would not be used after construction would be revegetated with an approved seed mixture and planting

procedures. Any topsoil enriched in organic material stockpiled on previously disturbed areas would be applied to enhance the opportunity for successful revegetation. Given these practices, degraded water quality due to increased erosion or sedimentation is unlikely.

Access roads would also be constructed and maintained consistent with the best management practices for road construction applicable to the intended use (temporary or permanent) of the road.

The geothermal wells would be drilled using nontoxic drilling mud to prevent the loss of drilling fluids into the rock and the risk of contamination to any aquifers from the drilling fluid. Reserve pits would be constructed at each well site for the containment and temporary storage of drilling mud, drill cuttings, geothermal fluid and storm water runoff from each constructed well pad. The pits would be lined with 60 mil PVC liner to protect against infiltration into groundwater. Therefore, contamination of the local ground water aquifers as a result of the temporary discharges into the reserve pits is unlikely.

Also, the geothermal wells would be cased with steel to a depth well below any shallower ground water reservoirs. The casing would be cemented into the ground to prevent the loss of any geothermal resource into, and prevent the contamination or mixing of, any shallow ground waters by the geothermal production or injection fluid.

Over the operational life of the project, accidental discharges of geothermal fluids could contaminate surface or ground waters. These are unlikely because of the frequent inspections and ultrasonic testing of the geothermal pipelines, the pipeline flow and pressure monitoring and the well pump and pipeline valve shutdown features. Contamination of surface or ground waters from spills of petroleum products (such as diesel fuel or lubricants) could also occur. However, this is also unlikely because the well pads would be bermed to contain and control any spills. Further, the containment structures would be lined with an approved liner to prevent surface and ground water contamination.

Alternative 1 (No Action) - Water Quality Impacts

Under the No Action Alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) - Water Quality Impacts

The potential water quality impacts from construction, operation and reclamation of Alternative 2 would be the similar as those described for the Proposed Action, as the footprint of Alternative 2 is the same as the Proposed Action. Construction of water bars on sloped roads and drainage control on all roads would reduce the amount of erosion to roads and potential for deposition of sediment in waterways. Ensuring that reserve pits are located where at least 50% of the pit is constructed below original ground level would decrease the odds of a pit failure and potential contamination of groundwater.

Developing and implementing a storm water prevention plan for the construction and operation of the project would ensure that adequate measures are taken to mitigate any storm water runoff.

Cumulative Impacts - Water Quality

Due to adoption of Design Features and implementation of best management practices as identified above, the Proposed Action is not expected to have any measurable impacts to water quality, thus there would be no cumulative effects to water quality.

Pursuant to the Clean Water Act, the Raft River from the Utah Border to Malta, Idaho, is a 303(d) listed stream for temperature, bacteria and sediment (Idaho Department of Environmental Quality 2014), which documents that water quality in that segment of Raft River does not support beneficial uses and/or contains exceeded water quality standards.

Past and present actions on private lands include 19 acres of geothermal exploration, agricultural activities (sprinkler irrigated fields in rotation with alfalfa, small grains, potatoes, and sugar beets), transmission and distribution lines and residential structures. Construction and operation of the private land portions of the Project (an additional 123.8 acres of short term disturbance, and 86 acres of long term disturbance), in addition to the above activities, could minimally impact water quality. Impacts to water quality would likely continue to occur at a similar level to current impacts.

GEOLOGY AND MINERAL RESOURCES

Geology

The Project Area is located within the Raft River Basin on the southeastern edge of the Jim Sage Mountains. The Raft River Basin is a north-trending structure that lies in the Great Basin area of the Basin and Range geologic province south of the Snake River Plain.

The Basin and Range geologic province, characterized by steep, elongated mountain ranges alternating with long expanses of flat, dry desert, extends from eastern California to central Utah, and from southern Idaho into the state of Sonora in Mexico. Within the Basin and Range province, the earth's crust and upper mantle have been stretched up to 100 percent of its original width. The entire region has been, and continues to be, subjected to extension that thinned and cracked the crust as it pulled apart, creating large, north-south trending faults (USGS 2004).

Within the Project Area, the Raft River Valley is bounded by the Black Pine Mountains (east), the Jim Sage Mountains (west), and the Raft River Range (south). The Black Pine Mountains are composed primarily of Late Paleozoic marine sediments and minor Tertiary volcanic and Quaternary alluvial and colluvial sediments. The range exhibits high-angle Basin-and-Range normal faulting superimposed on older folds and low-angle thrust faults (Thurow and Cahn 1982).

The basin stratigraphy consists of the Precambrian adamellite and metasediments mapped in the Raft River Range overlain by the Tertiary Salt Lake Formation, the Pleistocene Raft Formation, and the Holocene alluvium and colluvium. The sediments overlying the Precambrian basement are approximately 5,900 feet (1.1 mile) thick (Thurow and Cahn 1982).

The Precambrian adamellite basement rock is thought to be partially older than the overlying metasediments and partially remobilized and intruded. The Precambrian metamorphic sequence overlying the adamellite is approximately 490 feet thick. (Thurow and Cahn 1982).

The Tertiary Salt Lake Formation is a lacustrine, poorly consolidated deposit up to 5,250 feet (1 mile) thick. The formation consists of tuffaceous siltstone and sandstone with minor conglomerate derived from the surrounding mountain ranges. Deformational structures in the

Salt Lake Formation indicate rapid deposition and deformation of water-saturated sediments. Volcanic shocks may have produced sufficient force to cause rapid slumping and turbidity currents (Thurow and Cahn 1982).

There are no known geologic hazards in the Project Area.

Mineral Resources

There are no active, pending or expired mining claims within the analysis boxes (BLM 2015). One gravel pit is identified on the USGS topographic quadrangle within the Project Area; another gravel pit is identified approximately half mile south of the Project Area (see Figure 2).

Geoscientific data collected from the Raft River geothermal field indicates the existence of a large, moderate temperature geothermal resource. In a 1985 study undertaken on behalf of the Bonneville Power Administration, Raft River was rated first in the "Final High Temperature Ranking: Pacific Northwest" of geothermal sites in the four state Pacific Northwest Region. Measured temperatures vary between 275°F to 300°F at depths between 4,500 to 6,000 feet. Fluids encountered in the wells drilled to date are clean, of low salinity and have low non-condensable gas content.

The Raft River Project operated by U.S. Geothermal, Inc. is approximately 1 mile south of the Project Area, and is at the site of a former U.S. Department of Energy geothermal demonstration project that operated from 1974 to 1982. U.S. Geothermal acquired the Project in 2002; construction of a 13MW net capacity power plant began in June 2006, and commercial power generation began in January 2008. The power is being purchased by Idaho Power Company under the terms of a 25 year Power Purchase Agreement (PPA) (U.S. Geothermal 2015).

Proposed Action – Geology and Mineral Resources Impacts

As there are no known geologic hazards within the Project Area, no impacts are anticipated.

As there are no mining claims within the analysis areas, surface conflicts between WRE and a claimant are not anticipated. BLM manages the land consistent with the Multiple Minerals Development Act (43 CFR 3740s), and operations on leased or claimed public lands may not proceed without notice to the BLM. Should operations be proposed which would result in potential conflict, BLM would attempt to assist the two parties to reduce or eliminate the conflict, consistent with the Multiple Mineral Development Act. No impacts are anticipated.

Geothermal resources are a leasable mineral and given that the resource is not consumed during operations, geothermal resources should not be affected.

Alternative 1 (No Action) – Geology and Mineral Resources Impacts

Under the No Action Alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) – Geology and Mineral Resource Impacts

The potential geology and minerals impacts from construction, operation and reclamation of Alternative 2 would be the same as those described for the Proposed Action as the footprint of Alternative 2 is the same as the Proposed Action.

Cumulative Impacts – Geology and Mineral Resources

The Proposed Action is not expected to have direct impacts to geology and minerals, thus there would be no cumulative effects to geology and mineral resources.

VEGETATION, INCLUDING NOXIOUS WEEDS AND INVASIVE PLANTS

Vegetation

The Project is located in the Northern Basin and Range Ecoregion, within rural Raft River Valley. Vegetation communities in the Project Area are dominated by sagebrush (*Artemisia tridentate*), shadscale (*Atriplex confertifolia)* and greasewood (*Sarcobatus vermiculatus*), with understory species including prickly pear cactus (*Opuntia* spp.) and cheatgrass (*Bromus tectorum*) and a variety of annual and perennial forbs.

Tetra Tech conducted a vegetation habitat assessment which followed the *Sage Grouse Habitat Assessment Framework* (Stiver et al. 2010). Twenty-one transects were established (one in each analysis box): twelve in the northwest survey area and nine in the southeast survey area.

Within the analysis boxes, primary ecological sites included: Loamy 8-12 ARTRT (*Artemisia tridentata* subsp. *tridentata*)/PSSPS (*Pseudoroegneria spicata* subsp. *spicata*) (R028AY024ID), and Alkali Flat 8-12 ATCO (*Atriplex confertifolia*)/ELEL5 (*Elymus elymoides*) (R028AY011ID). Five land cover types were ground-truthed across the 21 transect locations: intermountain basin big sagebrush shrubland, intermountain basin mixed salt desert scrub, invasive annual grassland, intermountain basin semi-desert grassland, and nonnative perennial grassland. See Table 10 below for site specific vegetation information.

Table 10: Vegetation Information within Analysis Boxes

Analysis Box	Ecological Site	Ecological System	Condition notes
72-22	Loamy 8-12 ARTRT/PSSPS	Intermountain Basin Big Sagebrush Shrubland	Good sagebrush cover with a sparse native grass component. Invasive annual forb present.
36-15	Loamy 8-12 ARTRT/PSSPS	Intermountain Basin Big Sagebrush Shrubland	Good sagebrush cover but limited understory.
87-15	Loamy 8-12 ARTRT/PSSPS	Intermountain Basin Big Sagebrush Shrubland	Moderate sagebrush cover with a cheatgrass dominated understory. Preferred forb spiny phlox (*Phlox longifolia*) present.
32-23	Loamy 8-12 ARTRT/PSSPS	Intermountain Basin Big Sagebrush Shrubland	Good sagebrush cover with a cheatgrass dominated understory.
65-14	Loamy 8-12 ARTRT/PSSPS	Intermountain Basin Big Sagebrush Shrubland	Moderate sagebrush cover with a cheatgrass dominated understory. Invasive annual forb present.

Analysis Box	Ecological Site	Ecological System	Condition notes
27-14	Alkali Flat 8-12 ATCO/ELEL5	Intermountain Basin Mixed Salt Desert Scrub	Greasewood and cheatgrass dominated site.
21-14	Loamy 8-12 ARTRT/PSSPS	Intermountain Basin Big Sagebrush Shrubland	Good sagebrush cover with a cheatgrass dominated understory. Invasive annual forb present.
72-14	Loamy 8-12 ARTRT/PSSPS	Intermountain Basin Big Sagebrush Shrubland	Moderate sagebrush cover with a cheatgrass dominated understory. Invasive annual forb present.
23-13	NA	Intermountain Basin Semi-desert Grassland	Alkali sacaton (*Sporobolus airoides*) dominated grassland adjacent to barren alkali flat.
58-12	Loamy 8-12 ARTRT/PSSPS	Intermountain Basin Big Sagebrush Shrubland	Low sagebrush cover with a cheatgrass dominated understory. Limited perennial forb and invasive annual forb component.
28-12	Loamy 8-12 ARTRT/PSSPS	Invasive Annual Grassland	Disturbed cheatgrass dominated site. Invasive annual forb present.
77-11	Loamy 8-12 ARTRT/PSSPS	Invasive Annual Grassland	Disturbed cheatgrass dominated site. Invasive annual forb present.
27-30	Alkali Flat 8-12 ATCO/ELEL5	Invasive Annual Grassland	Disturbed cheatgrass dominated site. Invasive species present.
24-31	Alkali Flat 8-12 ATCO/ELEL5	Invasive Annual Grassland	Disturbed cheatgrass dominated site. Invasive annual forb present.
63-31	Alkali Flat 8-12 ATCO/ELEL5	Non-native Perennial Grassland	Seeded crested wheatgrass (*Agropyron cristatum*) site with weedy forb component. Invasive species present.
32-32	Alkali Flat 8-12 ATCO/ELEL5	Intermountain Basin Mixed Salt Desert Scrub	Greasewood dominated site lacking understory species. Preferred perennial daisy (*Erigeron*) species present.
58-29	Alkali Flat 8-12	Intermountain Basin	Greasewood dominated site

Analysis Box	Ecological Site	Ecological System	Condition notes
	ATCO/ELEL5	Mixed Salt Desert Scrub	with a sparse native grass understory.
25-29	Alkali Flat 8-12 ATCO/ELEL5	Intermountain Basin Mixed Salt Desert Scrub	Greasewood and cheatgrass dominated site.
87-30	Alkali Flat 8-12 ATCO/ELEL5	Intermountain Basin Mixed Salt Desert Scrub	Greasewood and cheatgrass dominated site.
74-30	Alkali Flat 8-12 ATCO/ELEL5	Intermountain Basin Mixed Salt Desert Scrub	Greasewood and cheatgrass dominated site with a limited sagebrush component.
32-30	Alkali Flat 8-12 ATCO/ELEL5	Intermountain Basin Mixed Salt Desert Scrub	Greasewood and cheatgrass dominated site.

Source: Tetra Tech 2015

The following ecological systems identified in Table 10 are described below.

Inter-Mountain Basins Big Sagebrush Shrubland

This ecological system is present at 8 of the 21 analysis boxes (~38.1%): 72-22, 36-15, 87-15, 32-23, 65-14, 21-14, 72-14 and 58-12. At all sites, sagebrush meets habitat suitability criteria for breeding habitat as cover, height and shape; however, a native understory of suitable forbs and grasses is missing. Past disturbance has resulted in an understory conversion to cheatgrass with little to no native forbs.

Inter-mountain Basins Mixed Salt Desert Scrub

This ecological system is present at 7 of the 21 analysis boxes (~33.3%): 27-14, 32-32, 58-29, 25-29, 87-30, 74-30 and 32-30. At all sites, sagebrush is a minor to absent component of these systems. As with the sites in inter-mountain basin big sagebrush shrubland, past disturbance has resulted in an understory conversion to cheatgrass with little to no native forbs.

Inter-mountain Basins Semi-desert Grassland

This ecological system is present at 1 of the 21 analysis boxes (~4.7%): 23-13. This site had 64% percent grass cover, no forbs recorded and 8% shrub cover. This site is located on in a swale, adjacent to a barren saline flat and has a limited extent, surrounded on three sides by intermountain basin big mixed salt desert scrub. This system is not representative of the larger area.

Invasive Annual Grassland

These are areas that are dominated by introduced annual grass species such as cheatgrass (*Bromus* spp.).

This ecological system is present at 4 of the 21 analysis boxes (~19.2%): 28-12, 77-11, 27-30 and 24-31. Mean cover at these locations is 5.3%. Disturbed cheatgrass dominates the site. This

is a cheatgrass dominated site with invasive annual forbs present. These sites are highly disturbed.

Nonnative Perennial Grassland

These are areas that are dominated by nonnative perennial grass species such as seeded crested wheatgrass (*Agropyron cristatum*).

This ecological system is present at 1 of the 21 analysis boxes (~4.7%): 63-31. Total grass canopy cover is 44%. Seeded crested wheatgrass is dominant with a weedy forb component. Invasive annual forbs are also present. This site is highly disturbed.

Noxious Weeds and Invasive Plants

Noxious weeds and invasive plants are typically nonnative plants that infest and/or invade areas of fresh soil/ground disturbance. Idaho has 67 different species of weeds which are designated noxious by state law. These weeds are designated into three levels of concern (Statewide EDRR, statewide control and statewide containment). There were no noxious weeds observed in the project area during surveys, however they may be present in isolated areas.

The spread of noxious weeds and the damage they do to Idaho agriculture can be lessened through proper identification and handling. Noxious weed species typically have attributes which allow them to rapidly out-compete native vegetation for vital natural resources. Noxious weeds and invasive plants impact native ecosystems by reducing overall biodiversity, by altering local hydrologic and soil characteristics and can immediately increase fire intensity. On a smaller scale, noxious weeds interfere with native plant successional pathways by competing for pollinators, being prolific seed producers and inundating the surrounding soil with weed seed, displacing rare plant species, serving as reservoirs of plant pathogens and converting complex plant communities into simple plant communities. Noxious weed and invasive plant seed or vegetative plant parts are carried, transported or deposited into and infest weed-free areas by people, equipment, livestock/wildlife or by abiotic means (wind, water).

Invasive plant species recorded within the survey area included Russian thistle (*Salsola kali*) and kochia (*Kochia scoparia*). Invasive annuals included saltlover (*Halogeton glomeratus*), clasping pepperweed (*Lepidium perfoliatum*), herb sophia (*Descurainia sophia*), and stickseed species (*Lappula* spp.) (Tetra Tech 2015).

Proposed Action – Vegetation, Including Noxious Weeds and Invasive Plants Impacts

Vegetation

Surface disturbance associated with the Project activities would result in the loss of vegetation. Implementation of the Proposed Action would result in the short term disturbance of 194.4 acres (minimum scenario) or up to 236.9 acres (maximum scenario) (see Table 3).

As part of the Project's design features, following Project construction some of the surface disturbance would be reclaimed (Interim Reclamation). During interim reclamation, disturbed areas would be reseeded and once seeding is established, would compete with invasive species such as cheatgrass and noxious weeds. Approximately 118.9 acres (minimum scenario) or 143.2 acres (maximum scenario) of proposed disturbance within the Project Area is permanent (see Table 5) and would remain disturbed during the life of the Project, undergoing final reclamation

once the Project has been decommissioned. Final reclamation, including contouring, ripping, and seeding disturbed areas, would result in a maximum of 118.9 acres restored and returned to previous or better condition. Existing conditions for the majority of the project area include a poor understory component comprised of invasive annual grass. The reclamation and seeding, once successful, will establish desirable grass species and a shrub component.

Noxious Weeds and Invasive Plants

The Project could contribute to the spread of noxious weeds and invasive plants through the proposed surface disturbing activities and the number of construction and drilling vehicles involved. Interim reclamation, including seeding of disturbed areas, would establish perennial vegetation that could compete with noxious weeds and invasive plants.

Alternative 1 (No Action) - Vegetation, Including Noxious Weeds and Invasive Plants Impacts

Under the No Action Alternative, the project would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) - Vegetation, Including Noxious Weeds and Invasive Plants Impacts

Vegetation

Initiating re-vegetation, habitat restoration and weed control activities as soon as possible after construction activities are completed would limit the amount of time that the disturbed areas remain disturbed and susceptible to invasive species colonization. Weed treatment would ensure there would be limited competition for the desired vegetation to establish.

Proper preparation of the seed bed would increase the likelihood of seeding success by providing micro-sites where the seed can germinate. Ripping compacted areas would facilitate penetration of moisture and discourage runoff, allowing the soil to better absorb precipitation and snowmelt. If mulch is used, it would create micro sites for seed, as well as facilitating soil moisture retention, increasing the likelihood of seeding success.

Seeding in the fall, winter or early spring would give seeding efforts the best chance for success, allowing the seed to be in contact with the soil as snow melts and spring rains occur. Seeding within 24 hours of seed bed preparation would ensure the soil would not settle and generally provide the best opportunity for seed to penetrate the soil surface.

Compensatory Mitigation

Potential impacts from implementation of the compensatory mitigation plan are expected to be minor, and are explained below. Any one or a combination of these mitigation options could be utilized to earn credit.

Sagebrush Planting – Sagebrush planting would disturb small amounts of soil in the areas planted (to dig holes), and may require the removal of small amounts of vegetation. Should ATV's be utilized for access, some vegetation may be crushed, though would be expected to recover over time. Temporary impacts, however, would be offset by planting shrubs and adding to vegetation diversity.

Habitat Restoration Partnership – Entering into a partnership would enable the Natural Resources Conservation Service and Pheasants Forever to implement local SGI projects, largely through the chainsaw cutting or masticating juniper trees in sage steppe habitat (or the less likely option of planting sagebrush). Juniper removal is expected to result in increased shrub cover and diversity, and grasses and forbs are also expected to become more diverse and abundant. Some vegetation may be crushed during the removal process, but would be expected to regenerate.

Conservation Easement – Impacts from a conservation easement are difficult to determine as the location of the easement is unknown. However, as a conservation easement would restrict development (and human access) within the easement area, it is assumed that impacts to vegetation from adoption and implementation of a conservation easement would be negligible.

Noxious Weeds and Invasive Plants

In addition to measures described in the proposed action, the Conservation Alternative would require Walker Ranch to develop an intensive weed monitoring and control program, and be required to monitor weeds at least once annually. This would facilitate discovery and treatment of any new noxious weed populations in the project area. Drill rigs and construction equipment would be required to be washed prior to entering the site, reducing the likelihood of transporting invasive species seed onto the project area. Using clean fill material from areas that are not known to harbor invasive species, and using certified weed free mulch to stabilize slopes would also reduce the likelihood of transporting invasive species seed into the project area.

Compensatory Mitigation

Impacts from implementation of the compensatory mitigation plan are expected to be minor, and explained below. Any one or a combination of these mitigation options could be utilized to earn credit.

Sagebrush Planting –Should ATV's be utilized for the sagebrush planting there is potential for transport of noxious weeds to the site. Washing and cleaning equipment prior to entering the site would reduce this risk. Walker Ranch would be required to monitor and treat any noxious weed infestations that result from any portion of this project.

Habitat Restoration Partnership – Entering into a partnership would enable the Natural Resources Conservation Service and Pheasants Forever to implement local SGI projects, largely through the chainsaw cutting or masticating juniper trees in sage steppe habitat (or the less likely option of planting sagebrush). Juniper removal techniques (i.e. prescribed fire to burn piles, etc.) could increase bare soil, which could make these sites more susceptible to noxious weeds and invasive plants. Reseeding and timing restrictions would minimize the risk.

Conservation Easement – Impacts from a conservation easement are difficult to determine as the location of the easement is unknown. However, as a conservation easement would restrict development within the easement area, it is assumed that impacts to noxious weeds and invasive plants from adoption and implementation of a conservation easement would be negligible.

Cumulative Impacts – Vegetation, Including Noxious Weeds and Invasive Plants

Vegetation

The cumulative effects study area for vegetation (i.e. Multiple Resources CESA) is the Project Area and adjacent private lands in the vicinity of the Proposed Project.

Within the Multiple Resources CESA, past and present actions have resulted in the loss or alteration of vegetation. Geothermal exploration activities have resulted in the disturbance of approximately 15 acres on private lands for the construction of 3 full size wells and 1 small diameter well, and approximately 4 acres in sagebrush on public lands for the construction of 1 full size well and 1 small diameter well (these wells were constructed on the same pad). Surface disturbance from existing geothermal development activities is assumed to be approximately 100 acres, also on private land. ROW and other land use activities are assumed to have disturbed approximately 5 acres, largely from construction of the Raft River substation and BPA switching station. Surface disturbance from other past and present actions are primarily from ongoing agricultural and other private land activities and livestock grazing. Agricultural activities on private lands including farming, irrigation, and vegetation treatments have removed and altered native vegetation on approximately 1,500 acres. Livestock grazing occurs on BLM and private lands, and affects vegetation by annually removing a portion of it on approximately 8,000 acres.

Additional impacts to vegetation would be expected from construction and operation of the private land portions of the Project (an additional 123.8 acres of short term disturbance, and 86 acres of long term disturbance), and from the continuation of ongoing activities such as agriculture, livestock grazing and dispersed recreation.

The long term direct disturbance of approximately 132 acres (minimum scenario) or up to approximately 156 acres (maximum scenario) associated with the Proposed Action would result in the removal of vegetation. T hese effects would be cumulative with the approximately 125 acres of existing disturbance, dispersed activities (such as recreation, etc.) and the approximately 86 long term disturbance acres associated with construction of the private land portions of the geothermal development Project. Total long term disturbance to vegetation from the public and private land portions of the Project would be approximately 214 acres (minimum scenario) and 242 acres (maximum scenario). However, as Project reclamation would limit effects to relatively small areas and short periods of time, no cumulative impacts to vegetation are anticipated.

Noxious Weeds and Invasive Plants

The cumulative effects study area for noxious weeds and invasive plants (i.e. Multiple Resources CESA) is the Project Area and adjacent private lands in the vicinity of the proposed Project.

Although the Proposed Action and Alternative 2 would include measures to help prevent the introduction and minimize the spread of noxious weeds and invasive plants, and would include reclamation of disturbed areas, the project would result in the potential for the spread of noxious weeds and invasive plants within the Project Area.

Reasonably foreseeable future actions including construction and operation of the private land portions of the Project (i.e. power plant, well field, pipelines and access roads) have the potential to introduce and contribute to the spread of noxious weeds and invasive plants. The number and size of construction vehicles and construction activities could lend themselves to transporting noxious weeds and invasive plants to areas where they had not previously existed. Agricultural activities including livestock grazing and dispersed recreation could also introduce and spread weeds.

Construction and operation activities and surface disturbance associated with the Proposed Action would also provide opportunities for noxious weed and invasive plant introduction and

proliferation. These effects would be cumulative with those of the other past, present and reasonably foreseeable future actions. Given the Project's small footprint (118.9 acres, minimum scenario, or up to 143.2 acres, maximum scenario) and the mitigation measures applied to the Project, the potential for the spread of noxious weeds and invasive plants within the Project Area is small, and any resultant cumulative impacts are expected to be minor. Additionally, both BLM and Cassia County have noxious weed control programs that actively monitor and treat noxious weed infestations in the Multiple Resources CESA.

SOILS

Soil types in the Project Area were identified using the "Cassia County, Idaho, Eastern Part" soil survey prepared by the U.S. Department of Agriculture Natural Resource Conservation Service (NRCS). Within the analysis blocks, there are 12 mapped soil associations (see Table 11): Darkbull loam, 1 to 4 percent slopes (38); Darkbull loam, saline, 1 to 3 percent slopes (39); Declo silt loam, 3 to 8 percent slopes (48); Declo silt loam, saline, 0 to 1 percent slopes (49); Declo silt loam, saline, 1 to 3 percent slopes (50); Genola silt loam, 0 to 1 percent slopes (61); Genola silt loam, saline, 0 to 1 percent slopes (62); Idahome silt loam, 1 to 3 percent slopes (79); Jett silt loam, 0 to 1 percent slopes (85); Manassa silt loam, 0 to 1 percent slopes (95); Nibbs gravello silt loam, 2 to 8 percent slopes (100); and Strevell silt loam, 1 to 3 percent slopes (140) (NRDC 2015a and 2015b).

Table 11: Soil Map Units Within Analysis Boxes

Map Unit #	Amt. within Analysis Blocks	% within Analysis Blocks	Analysis Boxes Effected
38	188.9 ac.	13.4%	77-22, 38-15, 27-14, 21-14, 22-14, 77-11, 58-12, 28-12
39	72.1 ac.	5.1%	77-22, 87-15, 32-23
48	1.0 ac.	<1%	77-22
49	222.5 ac.	15.8%	77-22, 32-32, 27-30, 87-30, 42-30, 74-30, 25-29, 58-29
50	604.9 ac.	42.9%	38-15, 87-15, 27-14, 32-23, 65-14, 21-14, 22-14, 77-11, 23-13, 58-12, 28-12
61	1.3 ac.	<1%	23-13, 42-30, 25-29
62	25.3 ac.	1.8%	32-32, 25-29, 58-29
79	251.4 ac.	17.9%	63-13, 24-31, 27-30, 87-30, 42-30, 74-30, 25-29
85	5.1 ac.	<1%	58-29
95	5.0 ac.	<1%	58-29
100	8.7 ac.	<1%	77-11
140	22.2 ac.	1.6%	77-22, 38-15
	~1408.4 acres	~100%	
Source: NRCS 2015a and 2015b			

Soils within the analysis boxes tend to be finer textured loams and silt loams. They are typically well drained with no frequency of ponding or flooding (NRCS 2015a and 2015b). Additional soil characteristic data is found below (see Table 12).

Table 12: Soil Map Unit Information

Map Unit #	Wind Erosion Hazard	Water Erosion Hazard	Fugitive Dust Resistance	Soil Compaction Resistance	Soil Restoration Potential
38	5	Slight	low	low	low
39	5	Slight	low	moderate	low
48	4L	Slight	moderate	moderate	moderate
49	4L	Slight	low	moderate	low
50	4L	Slight	low	moderate	low
61	4L	Slight	low	low	moderate
62	4L	Slight	low	moderate	low
79	4L	Slight	low	moderate	moderate
85	4L	Slight	moderate	low	moderate
95	4L	Slight	moderate	moderate	low
100	6	Slight	low	low	moderate
140	4L	Slight	low	moderate	low
Source: NRCS 2015a and 2015b					

Soil Erosion by Wind

The soils within the Project Area have been rated by the NRCS for soil erosion susceptibility by wind (see Table 12). A wind erodibility group consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. Approximately 80.9% of the soils within the analysis boxes are rated 4L, approximately 18.5% are rated 5, and less than 1% is rated 6 (see Table 11 and Table 12).

The Cassia RMP indicates soil map unit 79, Idahome silt loam, as having a high erosion potential, and indicates that surface disturbing activities must be controlled in these areas.

Soil Erosion by Water

The soils within the Project Area have also been rated by the NRCS for soil erosion susceptibility by water (see Table 12). The hazard is described as "slight," "moderate," "severe," or "very severe." All of the soils within the analysis boxes area have a slight water erosion

hazard (see Table 11 and Table 12). A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions.

The Cassia RMP indicates soil map unit 79, Idahome silt loam, as having a high erosion potential, and indicates that surface disturbing activities must be controlled in these areas.

Fugitive Dust Potential

The soils within the Project Area have been rated by the NRCS for their ability to resist the formation of fugitive dust emissions (see Table 12). This interpretation rates the vulnerability of a soil for eroded soil particles to go into suspension during a windstorm. Approximately 99% of the soils within the analysis boxes are rated “low resistance,” and approximately 1% is rated “moderate resistance” (see Table 11 and Table 12). “Low resistance” indicates the soil has features very favorable for the formation of dust, and “moderate resistance” indicates the soil has features favorable for the formation of dust.

Soil Compaction Resistance

The soils within the Project Area have been rated by the NRCS for resistance to soil compaction (see Table 12). Compaction tends to reduce water infiltration which affects plant production and composition, increases runoff which generally increased erosion rates, and affects organisms living within the soil. Compaction is predominantly influenced by moisture content; depth to saturation; percent of sand, silt, and clay; soil structure; organic matter content; and content of coarse fragments. Approximately 85.5% of the soils within the analysis boxes are rated as having a “moderate” resistance to soil compaction, and 14.5% are rated “low” (see Table 11 and Table 12). "Moderate resistance" indicates that the soil has features that are favorable to resisting compaction. "Low resistance" indicates that the soil has one or more features that favor the formation of a compacted layer.

Soil Restoration Potential

The soils within the Project Area have been rated by the NRCS for the soil restoration potential (see Table 12). This interpretation rates each soil for its inherent ability to recover from degradation, which is often referred to as soil resilience. The ability to recover from degradation means the ability to restore functional and structural integrity after a disturbance. Rating class terms indicate the extent to which the soils are made suitable by all of the soil features that affect the soil's ability to recover. Approximately 81% of the soils within the analysis boxes are rated as having a “low potential” for soil restoration, and approximately 19% are rated as having a “moderate potential” (see Table 11 and Table 12). "Low potential" indicates that the soil has one or more features that are unfavorable for recovery, and poor performance can be expected. "Moderate potential" indicates that the soil has features that are generally favorable for recovery, and fair performance can be expected.

Proposed Action - Soils Impacts

The Proposed Action could result in effects on soils by increasing erosion rates from grading and clearing of the site, and/or reducing soil productivity and potential restoration success by compacting the soil to a level which prevents successful rehabilitation and eventual reestablishment of vegetative cover.

There are 12 soil associations with the analysis box areas (see Table 11). Each association has been classified by the NRCS for: 1) soil erosion susceptibility by wind or water, 2) ability to

resist the formation of fugitive dust emissions, 3) ability to resist compaction, and 4) ability to recover from degradation (see Table 12).

As indicated in Table 12, ratings of soils within the analysis boxes suggest a moderate susceptibility to wind erosion as nearly all (>99%) of the soils are rated 4L or 5. Also, the susceptibility to erosion by water is slight for all soils within the analysis boxes, and water erosion is unlikely under ordinary climactic conditions.

As also indicated in Table 12, nearly all (>99%) of the soils within the analysis boxes are very favorable for the formation of dust. Most (~85.5%) of the soils within the analysis boxes have features that are favorable to resisting compaction, and the balance of the soils within the analysis boxes have features that favor the formation of a compacted layer. Further, most (~81%) of the soils within the analysis boxes are rated as having features that are unfavorable for restoration, and the balance of the have features generally favorable for recovery.

Implementation of the Proposed Action would result in the short term disturbance of 194.4 acres and long term disturbance of 118.9 acres in the minimum scenario (see Table 3), and the short term disturbance of 236.9 acres and long term disturbance of 118.9 acres in the maximum scenario (see Table 3). Construction of the Project would require the removal of vegetation and topsoil material for clearance purposes, which would increase the potential for water and wind erosion through exposure to denuded surfaces. Additionally, soil would be compacted during construction activities due to heavy vehicle travel and heavy equipment use.

Based on implementation of design features specified by WRE, water and/or aggregate would be applied on disturbed areas to control dust and stabilize erosive soils, which would reduce the impacts of the Proposed Action on soils in the analysis area. Disturbed areas that would not be used after construction would be revegetated with an approved seed mixture and planting procedures. Any topsoil enriched in organic material stockpiled on previously disturbed areas would be applied to enhance the opportunity for successful revegetation.

To minimize erosion from storm water runoff, access roads would be maintained consistent with best management practices. Storm water would be intercepted and channeled to dissipate energy as necessary to minimize erosion around the power plant (USDI and USDA 2007).

Alternative 1 (No Action) - Soil Impacts

Under the No Action Alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) - Soils Impacts

The potential soils impacts from construction, operation and reclamation of Alternative 2 would be the similar as those described for the Proposed Action as the surface disturbance associated with Alternative 2 is the same as the Proposed Action.

The utilization of mulch, silt fencing, waddles, hay bales, and other erosion control devices on areas at risk of soil movement from wind and water erosion would reduce the amount of soil transported off site. Grading the construction sites to balance cut and fill to the extent practicable would reduce the amount of loose soil that would be available and exposed to erosion, as well as leaving the greatest amount of soil in place.

Compensatory Mitigation

Impacts from implementation of the compensatory mitigation plan are expected to be minor, and explained below. Any one or a combination of these mitigation options could be utilized to earn credit.

Sagebrush Planting – Sagebrush planting would disturb small amounts of soil in the areas planted (to dig holes). These impacts are expected to be minor, and would be offset by the beneficial impact of shrub establishment and reduction in soil erosion.

Habitat Restoration Partnership – Entering into a partnership would enable the Natural Resources Conservation Service and Pheasants Forever to implement local SGI projects, largely through the chainsaw cutting or masticating juniper trees in sage steppe habitat (or the less likely option of planting sagebrush). Soils could be impacted by pile burning or mastication treatments by temporarily exposing soil to erosion after the vegetation is removed. Reseeding, mulching and timing restrictions would mitigate these impacts and stabilize soils by increasing the cover of perennial grasses and shrubs over time.

Conservation Easement – Impacts from a conservation easement are difficult to determine as the location of the easement is unknown. However, as a conservation easement would restrict development within the easement area, it is assumed that impacts to soil from adoption and implementation of a conservation easement would be negligible.

Cumulative Impacts - Soils

The cumulative effects study area for soils (i.e. Multiple Resources CESA) is the Project Area and adjacent private lands in the vicinity of the Proposed Project.

Ground disturbing activities associated with the construction and operation of the Proposed Action would result in impacts to soils.

Within the Multiple Resources CESA, past and present actions have resulted in disturbance to soils. Geothermal exploration activities have resulted in the disturbance of approximately 15 acres on private lands for the construction of 3 full size wells and 1 small diameter well, and approximately 4 acres on public lands for the construction of 1 full size well and 1 small diameter well (these wells were constructed on the same pad). Surface disturbance from existing geothermal development activities is assumed to be approximately 100 acres, also on private land. ROW and other land use activities have disturbed land for the construction of power lines, roads, theRaft River substation and BPA switching station. Current surface disturbance acreages for other past and present actions, primarily ongoing agricultural activities, livestock grazing and dispersed recreation, cannot be easily quantified. Livestock grazing occurs on approximately 8,000 acres in the Multiple Resources CESA, and private lands agricultural activities occur on approximately 1,500 acres within the Multiple Resources CESA. Recreation activities occur primarily on existing roads and trails.

Additional impacts to soils would be expected from construction and operation of the private land portions of the Project (an additional 123.8 acres of short term disturbance, and 86 acres of long term disturbance), in addition to the other reasonably foreseeable future actions. Construction of private land portions of the Project would increase the potential for down gradient soil loss through wind and water driven erosion.

When combined with the private land portions of the Project and the other reasonably foreseeable future actions, the Proposed Action would result in an incremental addition to soil

resource related impacts. It is assumed all reasonably foreseeable development on BLM lands near the Project would be subject to similar design considerations and site-specific environmental analysis to reduce the potential cumulative impacts to soil resources.

WILDLIFE

Primary habitat types include basin big sagebrush shrublands and mixed salt desert scrub.

Tetra Tech conducted general wildlife and special status species surveys from June 10-14 and June 22-26, 2015. The survey included 2 "block" areas plus buffers which, in some instances, extended beyond the block area boundaries. Table 13 below provides a list of all wildlife species encountered during the 2015 surveys. Twenty-five avian species, eight mammalian species, and three reptilian species were observed within the survey area. Of these, several (mostly birds) are BLM Burley Special Status Species. These species are discussed in the "Special Status Species, Including Migratory Birds" section of this EA.

Table 13: Wildlife Species Observed in the Survey Area

Common Name	Scientific Name	Common Name	Scientific Name
BIRDS			
American Kestral	*Falco sparverius*	Long-eared Owl[2]	*Asio otus*
Black-billed Magpie[2]	*Pica hudsonia*	Mourning Dove	*Zenaida macroura*
Brewer's Sparrow[1,2]	*Spizella breweri*	Northern Harrier	*Circus cyaneus*
Cliff Swallow	*Petrochelidon pyrrhonota*	Prairie Falcon	*Falco mexicanus*
Common Raven	*Corvus corax*	Red-tailed Hawk	*Buteo jamaicensis*
Common Nighthawk	*Chordeiles minor*	Sage Sparrow[1]	*Amphispiza belli*
European Starling	*Sturnus vulgaris*	Sage Thrasher[1]	*Oreoscoptes montanus*
Ferruginous Hawk[1]	*Buteo regalis*	Short-eared Owl[1]	*Asio flammeus*
Golden Eagle[1]	*Aquila chrysaetos*	Swainson's Hawk[2]	*Buteo swainsoni*
Greater Sage-Grouse	*Centrocercus urophasianus*	Turkey Vulture	*Cathartes aura*
Horned Lark	*Eremophila alpestris*	Western Kingbird	*Tyrannus verticalis*
Loggerhead Shrike[1,2]	*Lanius ludovicianus*	Western Meadowlark	*Sturnella neglecta*
Long Billed Curlew[1]	*Numenius americanus*		
MAMMALS			
American Badger	*Taxidea taxus*	Mule Deer	*Odocoileus hemionus*
Black-tailed Jackrabbit	*Lepus californicus*	Pronghorn Antelope	*Antilocapra americana*
Coyote	*Canis latrans*	Pygmy Rabbit[1]	*Brachylagus*

Common Name	Scientific Name	Common Name	Scientific Name
			idahoensis
Mountain Cottontail	*Sylvilagus nuttallii*	Red Fox	*Vulpes vulpes*
REPTILES			
Great Basin Gophersnake	*Pituophis catenifer deserticola*	Western Whiptail	*Aspidoscelis tigris*
Sagebrush Lizard	*Sceloporus graciosus*		
[1] BLM Burley Field Office Sensitive Species. [2] Nest also observed.			

Source: Tetra Tech 2015

In addition to the species identified in Table 13 above, the survey area is suitable for the kit fox and burrowing owl. Abundant shrub habitat types also provide suitable habitat for nesting songbirds. Raptor and corvid species, which use a variety of habitats, are found to be common in the survey area and vicinity. Please see the "Special Status Species, Including Migratory Birds" section of the EA for a discussion of the aforementioned species.

Mule deer (*Odocoileus hemionus*) winter habitat is present in the westernmost portions of the Project Area, though no surface disturbing activities are proposed in this area. Also, based on recent telemetry data, mule deer summering in Utah's Raft River Range annually migrate north to winter habitat on Jim Sage Mountain. Though the extent and exact locations of this occurrence has not been quantified, it is estimated that several hundred mule deer annually migrate across the Raft River Valley (IDFG 2015). Mule deer were observed during the 2015 surveys.

Proposed Action - Wildlife Impacts

Implementation of the Proposed Action would result in the short term disturbance of 194.4 acres and long term disturbance of 118.9 acres in the minimum scenario. Under the maximum scenario, the short term disturbance would be up to 236.9 acres and long term disturbance would be up to 118.9 acres (see Table 3).

Surface disturbance required for construction of the Proposed Action would result in the loss of wildlife habitat, primarily within the basin big sagebrush shrublands and mixed salt desert scrub habitats present in 15 of the 21 analysis boxes; 6 of the 21 analysis boxes are highly disturbed, are dominated with either cheatgrass or crested wheatgrass, and have minimal habitat value. Impacts would also include the direct displacement of wildlife. Further, wildlife utilizing the location would likely be temporarily displaced during the construction phase of the project and would utilize adjacent habitat. After construction is completed, wildlife would gradually acclimate to the disturbance and utilize much of the project area. As there is comparable habitat in the Project vicinity, these impacts are expected to affect individuals and would not impact local or regional wildlife populations.

Increased vehicular traffic, especially during construction, is expected. Vehicles could crush or collide with a variety of wildlife, especially less mobile species, such as rodents, small mammals, and lizards, resulting in increased wildlife mortality and injury. These impacts are expected to

affect individuals and are not expected to impact species at a local or regional population level. These impacts would be minimized by the 20-25 mph Project Area speed limit agreed to by WRE.

It is also expected that Project generated noise and human activity would deter some wildlife from using the area surrounding the Project. This noise and human activity would result in the disruption of normal behavioral patterns of some wildlife. This effect is expected to be greatest during construction and when drilling is peaking in activity. This heightened effect is expected to be temporary, primarily lasting for the duration of construction or drilling. Wildlife may also avoid or tolerate habitat affected by the longer-term noise generated by the production wellheads, as low level noise would be continually generated by the line shaft pumps on the production wells. These effects may displace individuals or reduce breeding success of species sensitive to noise and human activity. These impacts are expected to affect individuals and would not impact local or regional wildlife populations.

Permanent structures associated with the Project (wells, pipelines, power poles and access roads) could impact wildlife utilizing the habitat around the Project features. Also, some avian species may have an increased predation risk due to the improved perching locations of raptors and corvids on the power line structures. Avian species could also be injured or killed as a result of electrocution and collisions (see discussion in the "Special Status Species, including Migratory Birds). The power line would also provide raptor protection in compliance with the standards described in the "Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 2006" (APLIC 2006), which would minimize bird electrocutions and reduce bird mortality.

Habitat fragmentation is expected and effects from Project development are expected to be greatest near the wells, as this is the area with the most concentrated surface disturbance, and from linear features such as the pipeline corridors and access roads. Some species, such as lizards and rodents, may be able to go under sections of the raised pipeline. Larger species, including big game species (such as mule deer), may be most impacted by fragmentation caused by Project development. These effects are expected to be minimal and affect individuals and local groups of animals using or migrating through the area. Species are expected to respond primarily by avoiding the area of development and fragmented habitat. As the Project footprint is small in relation to the amount of mule deer habitat affected, it is unlikely that there would be a significant impact to mule deer. Additionally, the top of some sections of the pipelines could be as high as six feet above the ground surface to accommodate terrain undulations and to facilitate movement of wildlife and livestock through the wellfield. This would facilitate wildlife movement across pipelines.

Alternative 1 (No Action) - Wildlife Impacts

Under the No Action Alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) – Wildlife Impacts

The potential wildlife impacts from construction, operation and reclamation of Alternative 2 would be the less than those described for the Proposed Action. Under Alternative 2, approximately 2.5 to 5 miles of power cables would be placed in cable trays, and approximately 3.9 to 7.9 miles of power lines would be overhead (this represents an approximately 40% reduction in overhead power lines as compared to the Proposed Action). As few power poles

would be used and because of the reduced perching opportunities in Alternative 2, potential impacts to various wildlife species would be reduced.

Also, any production well operated within analysis boxes 36-15, 87-15, 27-14, 21-14, 72-14, 77-11, 28-12, 65-14 and 23-13 would be required to utilize a submersible pump instead of line shaft pump. As the motor of a submersible pump is below ground, potential noise impacts would be reduced.

Constructing power lines in a manner which minimizes or prevents raven nesting would eliminate the potential for ravens to establish new nests on poles constructed for this project. This would reduce expansion of the species into new areas and mitigate the risk for increased predation on small game species.

Minimizing the project footprint in sagebrush habitats would reduce impacts to species that utilize sagebrush for forage and cover.

Ensuring that pipelines are passable by both big and small game would reduce the impact of the project due to habitat fragmentation.

Alternative 2 also includes a series of design features which are intended to reduce potential impacts to wildlife and wildlife habitat. This is discussed and analyzed more fully in the "Alternative 2 – Special Status Species, Including Migratory Birds, Impacts" section of the EA.

Compensatory Mitigation

Direct impacts from implementation of the compensatory mitigation plan are expected to be minor, and explained below. Any one or a combination of these mitigation options could be utilized to earn credit. Indirectly, the long-term effect of compensatory mitigation is expected to improve overall conditions for sagebrush obligate wildlife species.

Sagebrush Planting – Sagebrush planting is expected to improve habitat conditions for wildlife species, as adding shrubs to the landscape is expected to provide additional food and cover. Wildlife species may be temporarily impacted by increased human disturbance during the planting activities, though these impacts would be temporary.

Habitat Restoration Partnership – Entering into a partnership would enable the Natural Resources Conservation Service and Pheasants Forever to implement local SGI projects, largely through the chainsaw cutting or masticating juniper trees in sage steppe habitat (or the less likely option of planting sagebrush). Wildlife species could be affected by human disturbance during removal activities, though are expected to access adjacent lands. Indirectly, wildlife species are expected to benefit from suitable habitat maintenance.

Conservation Easement – No direct effects to wildlife are expected as a result of the implementation of a conservation easement. However, as a conservation easement would restrict development within the easement area, it is assumed that wildlife would benefit from adoption and implementation of a conservation easement.

Cumulative Impacts - Wildlife

The cumulative effects study area for wildlife resources is the range of potential wildlife territory, covering approximately 820,850 acres. The cumulative impacts identified would be similar for general wildlife and special status species, including migratory birds.

The Proposed Action would result in the long term loss of either 118.9 acres (minimum scenario) or up to 118.9 acres (maximum scenario) of wildlife habitat and direct displacement of wildlife over the life of the Project Construction and operation of the private land portions of the Project (an additional 123.8 acres of short term disturbance, and 86 acres of long term disturbance), in addition to other past, present and reasonably foreseeable future actions would result in the disturbance to, loss of and fragmentation of wildlife habitat when combined with the disturbance associated with the Proposed Action.

Current disturbances within the Wildlife CESA include access road construction (including paved and unpaved roadways), approximately 19 acres of geothermal exploration, agricultural activities (sprinkler irrigated fields in rotation with alfalfa, small grains, potatoes, and sugar beets), transmission and distribution lines, residential and commercial structures, dispersed recreation, livestock grazing and range improvements, and gravel and mineral pits. Additionally past wildfires have altered the vegetation and landscape, occasionally resulting in the proliferation of nonnative species. These past and present actions have reduced habitat quantity and/or quality for wildlife resources.

The Clear Creek Restoration Project would restore the remaining untreated portion of the burned area from the Naf fire in 2000, therein improving its condition for wildlife. Restoration would have a positive impact on wildlife resources, as does reducing the potential for the spread of wildfire in the future.

The Burley Integrated Hazardous Fuels Management Project (BIHFMP) would create fuel breaks within ½ mile of the BLM-private land boundaries along roads. Though the methods to create fuel breaks (mowing, disking, bulldozing, etc.) would reduce wildlife habitat via the reduction of vegetation, reducing the potential for rapid spread of wildfires and reducing fire severity could be beneficial for wildlife on a broader scale in the future.

The Twin Falls District Noxious Weed and Invasive Plant Treatment Plan would treat current and foreseeable future infestations of noxious weeds and invasive plants, which would promote land health and is beneficial for wildlife resources.

ESR treatments identified in the PESRP would stabilize soils, repair or construct physical improvements, improve lands damaged by wildfire and restore healthy ecosystems, all of which would be beneficial for wildlife resources.

The Burley Landscape Sage Grouse Restoration Project improved the quality of sage-brush steppe habitat in the CESA through removal of encroaching juniper. Within the Wildlife CESA, 12,184 acres have been completed and 5,895 acres remain to be treated. This project has been and would continue to be beneficial for wildlife resources.

Indirect effects could result from human activity and noise surrounding projects. The extent of these effects to habitat would depend on the footprint of these activities, their locations relative to wildlife habitats, and the duration and frequency of activities disruptive to wildlife. The direct and indirect effects to wildlife from the Proposed Action (summarized above) are small relative to the wildlife habitat in the vicinity and region, and wildlife should be able to move away from small areas of direct disturbance and into adjacent suitable habitat. Reclamation of disturbed areas, as proposed by the Project, and rehabilitation projects as identified above, could reestablish habitat for wildlife. Thus, overall cumulative effects to wildlife would be negligible.

Cumulative effects to individuals of species and local meta-populations utilizing specific sites could occur, but greater effects to regional populations are not expected.

SPECIAL STATUS SPECIES, INCLUDING MIGRATORY BIRDS

Special Status Species

Some species of plants and wildlife are accorded special status by Federal and state agencies largely because they are either scarce on a regional level, facing clearly defined threats, or in a position within the regional landscape to potentially become scarce. Special Status Species include threatened, endangered, proposed, or candidates for Federal listing under the ESAof 1973 or equivalent state laws, and BLM-sensitive species.

There are no United State Fish and Wildlife Service (USFWS) listed Threatened or Endangered species occurring in the Project Area or vicinity, therefore there would no effects to Threatened or Endangered species. The Greater sage-grouse (which was observed in the wildlife surveys, see Table 13) had been identified as a candidate species. On September 22, 2015 the USFWS made a determination that protection for the Greater sage grouse under the ESA is no longer warranted and withdrew the species from the candidate species list. This species is present on the BLM Burley Field Office special status species list, so is discussed and analyzed below.

Table 14 below identifies the special status species observed, or having the potential to occur, within the survey area.

Table 14: Special Status Species Occurring, or Could Potentially Occur, Within the Survey Area

Species	Habitat Information
BIRDS	
Brewer's Sparrow	Though Brewer's sparrows primarily breed in sagebrush steppe habitats and are considered to be sagebrush steppe obligates, they are also associated with salt desert scrub habitats. Nests are usually constructed in the mid to upper canopy of tall, dense sagebrush or greasewood. Insects comprise the majority of the bird's diet in the spring and summer. Suitable foraging and nesting habitat is present in the survey area, and the Brewer's sparrow was observed during the biological surveys.
Ferruginous Hawk	Dispersed pinyon-juniper trees found at the ecotone of pinyon-juniper and desert shrub communities provide ideal nesting trees for ferruginous hawks. The ferruginous hawk is also commonly observed nesting in cliffs. Ideal ferruginous hawk hunting territory consists of sagebrush communities containing native grasses and forbs, as these communities generally support a high density of ground squirrels and lagomorphs. Suitable foraging and nesting habitat is present in the survey area, and 2 ferruginous hawks were observed soaring overhead during the raptor survey.
Golden Eagle	Golden eagle habitat is generally open country, in prairies, arctic and alpine tundra, open wooded country and barren areas, especially in hilly or mountainous regions. Golden eagles nest on rock cliff ledges, cliffs or large trees. Pairs may have several alternate nests,

Species	Habitat Information
	and may use some in consecutive years or shift to alternate nests used in different years. Golden eagles use a wide range of habitats for foraging. Suitable foraging and nesting habitat is present in the survey area, and 2 golden eagle were observed soaring overhead during the raptor survey.
Greater Sage-grouse	Sage-grouse are sagebrush obligates; they require sagebrush for different life cycle and foraging needs throughout the year. Both the big sagebrush species and dwarf sagebrush types (ie. low sagebrush and black sagebrush) provide seasonal habitat requirements. Winter habitat use varies depending on snow depth but includes habitats with both big sagebrush and dwarf sagebrush species, and is primarily used November through February. Lekking typically occurs in areas with sparse vegetation that are surrounded by the taller sagebrush with greater canopy cover and density of grasses and forbs needed for suitable nesting. Brood-rearing habitat (i.e., sagebrush, riparian, and wet meadow habitats) is variable as chicks grow but consists of those habitats that provide forage in the form of forbs, invertebrates, and sagebrush. Sage-grouse fall habitat use includes sagebrush habitat in the transition zone between brood-rearing and winter habitat but may overlap with brood-rearing and winter habitats. There are no sage-grouse leks in the Project Area, though all or portions of 9 analysis boxes (36-15, 87-15, 27-14, 21-14, 72-14, 77-11, 28-12, 65-14 and 23-13) are within 5 kilometers (3.1 miles) of a greater sage-grouse lek. A vegetation habitat assessment which followed the Sage Grouse Habitat Assessment Framework was conducted and the results are presented below this table. A greater sage-grouse hen was observed in the northern portion of the Project Area.
Loggerhead Shrike	Loggerhead shrikes nest in isolated trees or large shrubs. They use scattered, tall shrubs and fences as perches to feed on a variety of pretty, which includes small birds, lizards and mice. Suitable foraging and nesting habitat is present in the survey area, and the loggerhead shrike was observed during the biological surveys.
Long Billed Curlew	Short-growth grasslands, mixed-grass prairies, meadows, grazed mixed-grass and scrub communities, cultivated fields, lawns, mud flats, grassy floodplains, sandy islands, shoals, salt marshes along coastal shorelines, and edges of ponds, lakes, and other non-flowing bodies of water comprise common habitats used by long-billed curlews. Long-billed curlews rely on the cover and openness of grasslands, prairies, and pastures to nest and rear young. Suitable foraging and nesting habitat is present in the survey area.

Species	Habitat Information
Short-eared Owl	Short-eared owls tend to be found in open habitats, including grasslands, prairies, wet meadows, and lowland riparian areas, where small mammals and other pretty species may be hunted. Short-eared owl nest sites are located on the ground typically on dry knolls, ridges or hummocks but occasionally in wet areas. Suitable foraging and nesting habitat is present in the survey area, and the short-eared owl was observed during the biological surveys.
Sage Thrasher	Sage thrashers primarily inhabit sagebrush areas, but they can also be found in salt desert scrub habitat where it integrates with sagebrush or greasewood dominates. Nests are either constructed in the branches of sagebrush (occasionally greasewood) or placed underneath the shrub. Insects comprise the majority of a sage thrasher's diet, but the bird will also forage on fruits and berries. Suitable foraging and nesting habitat is present in the survey area, and the sage thrasher was observed during the biological surveys.
Sage Sparrow	Preferred habitat for sage sparrow includes areas containing shrubs at least 48 cm (18 in.) tall with 10-25% ground cover. A sparse grass and forb component is necessary within the shrub interspaces to support insects. Suitable foraging and nesting habitat is present in the survey area, and the sage sparrow was observed during the biological surveys.
Burrowing Owl	Suitable habitat for the burrowing owl consists of shrubs spaced far apart or low stature vegetation that allows the bird to see for long distances. Ideal habitats are also closely associated with burrowing animals (such as ground squirrels and badger), as burrowing owls use holes created by these species as nest sites. Prey for burrowing owl consists of small rodents, reptiles, and insects. Neither burrowing owls nor their burrows or sign were observed during the biological surveys.
MAMMALS	
Kit Fox	Kit foxes are primarily found in arid regions, such as desert scrub, chaparral, and grasslands. Vegetation communities vary with the regional aridland fauna, but some examples of common habitats are saltbrush and sagebrush. Kit foxes may also occur in agricultural areas and urban environments, and prefer areas with loose soils for constructing dens. The kit fox was not observed during the biological surveys.
Pygmy Rabbit	The pygmy rabbit occurs in areas of tall, dense sagebrush or mixed sagebrush habitats. Pygmy rabbit burrows are typically found in relatively deep, loose soils of wind- or water-born origin suitable for burrowing. Pygmy rabbit may occur in areas of shallower or more compact soils with sufficient shrub cover in abandoned burrows of

Species	Habitat Information
	other species. The entire survey area is pygmy rabbit habitat. Five pygmy rabbits and 15 confirmed or potential pygmy rabbit burrows were observed during the biological surveys. Additionally, one historic burrow was located that was old and collapsed, but had a few old pygmy rabbit pellets present. Biologists also observed numerous burrows constructed by larger mammals, including American badger, coyote and red fox. The closest active pygmy rabbit burrow is located adjacent to permitted well 72-22.

Source: Tetra Tech 2015 and NatureServe 2015

Tetra Tech biologists conducted a vegetation habitat assessment which followed the Sage Grouse Habitat Assessment Framework (Stiver et al. 2010), including a fourth order assessment (site assessment) for sage-grouse breeding and winter habitat. Twenty-one transects were established (one in each analysis box): twelve in the northwest survey area and nine in the southeast survey area. Primary habitat types included intermountain basin big sagebrush shrubland (8 transects), intermountain basin mixed salt desert scrub (7 transects), invasive annual grassland (4 transects), intermountain basin semi-desert grassland (1 transect), and nonnative perennial grassland (1 transect) (see also Vegetation section of this EA).

The basin big sagebrush habitat was marginal breeding habitat for sage-grouse and suitable for winter. All survey locations in the basin big sagebrush habitat were missing a native understory of suitable grasses and forbs necessary for nest concealment, so nesting by sage-grouse is not expected in the Project Area. The salt desert scrub vegetation was found to be unsuitable as breeding habitat and marginal winter habitat since sagebrush was either absent or only a minor component of these sites. The remaining transects were all set in grasslands, which are all unsuitable for sage-grouse.

Migratory Birds

On January 11, 2001, President Clinton signed Executive Order (EO) 13186 placing emphasis on the conservation and management of migratory birds. Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918, and the EO addresses the responsibilities of federal agencies to protect them by taking actions to implement the MBTA. The BLM management for these species is based on IM 2008-050 dated December 18, 2007.

Tetra Tech conducted a raptor survey on June 24, 2015, with additional observations made while biologists were onsite for other biological surveys (June 10-14 and June 22-26, 2015). The raptor survey was conducted to document the use of the entire Project Area and a surrounding one mile buffer.

The following raptors were observed using the survey area (i.e. soaring overhead): two golden eagles, two ferruginous hawks, three red-tailed hawks, eight Swainson's hawks (in addition to the ones associated with the nest locations, see Table 15), and five American kestrels. Biologists also found one dead prairie falcon and an additional skull from another raptor (species could not be determined). Additionally, several BLM Burley Field Office sensitive avian species were observed (see above in the Special Status Species subsection for a discussion of habitat requirements and occurrence status).

The focus of the raptor survey was on finding nesting structures (cliffs, power poles, trees and elevated ground surfaces). All known nests, existing in the western portion of the survey area, were checked for activity, and any new nests were documented. Nests were considered "occupied" if there was evidence of recent use and were considered "active" if there was evidence of breeding. Five occupied or active nests were located during the 2015 survey (see Table 15). Three of the nests were known nests, and two were new nests.

Table 15: Active and Occupied Raptor Nests

	Species	**Nest Status**	**Substrate**	**Comments**
Known	Swainson's Hawk	Active	Juniper tree	1 adult, 3 nestlings
Known	Swainson's Hawk	Occupied	Juniper tree	2 adults
New	Long-eared Owl	Occupied	Thicket of squawbush	2 adults
Known	Swainson's Hawk	Active	Juniper tree	1 adult incubating
New	Swainson's Hawk	Occupied	Power pole	1 adult

Source: Tetra Tech 2015

All other known nests were found to be inactive. These are primarily in the western portion of the Project Area and vicinity. Specifically, inactive nests are present in 3 analysis boxes (36-15, 87-15 and 21-14); and 6 analysis boxes (28-12, 27-14, 65-14, 32-23 and 72-22) are adjacent to active or inactive nests. Of these inactive nests, 2 are ferruginous hawk nests; one is adjacent to analysis box 28-12, and the other is generally between analysis boxes 27-14, 32-23 and 87-1.

Proposed Action - Special Status Species, Including Migratory Birds, Impacts

Special Status Species (Mammals)

Potential impacts to pygmy rabbit and kit fox would be similar to those described in the General Wildlife section of this EA (see "Proposed Action –Wildlife Impacts"). As previously discussed, WRE has implemented Design Features such as limiting vehicle speeds through the Project Area, and also controlling fugitive dust through the application of water or aggregate on denuded surfaces as necessary. T herefore, the Project may impact individual pygmy rabbits or kit fox (if present), but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

Fifteen confirmed or potential pygmy rabbit burrows exist within the survey area (exclusively in the western portion of the survey area). Specifically, active pygmy rabbit burrows are located within analysis boxes 72-22, 32-23, 27-14 and 87-15, though the existing well sites are located over 100 meters from an existing pygmy rabbit burrow and direct impacts to active burrows are not anticipated. Further, adoption of the Design Features as described above would serve to reduce impacts to the pygmy rabbit.

As pygmy rabbit colonies can shift over time, and/or the wells identified within the analysis boxes could be relocated elsewhere within the box, it is possible that a well could be re-sited adjacent to an active burrow.

Special Status Species (Birds), Including Migratory Birds

Potential impacts to special status species (birds) and migratory birds would include disturbance to birds due to increased noise and human activity, and disturbance to foraging and nesting habitat during construction and operation of the Project.

During construction and drilling, it is expected that Project generated noise and human activity would deter some avian species from using the Project Area, and could result in the disruption of normal behavioral patterns (operational noise impacts are discussed below). This effect is expected to be greatest when drilling is peaking in activity. This heightened effect is expected to be temporary, primarily lasting for the duration of construction or drilling. These impacts may displace birds and/or reduce breeding success of some birds, especially those most sensitive to disturbance.

Vehicular traffic can also pose a risk to avian species from vehicle collisions. Risk would be increased along the new and existing access roads, as well as along E-Y Road, from traffic accessing the Project site. Additional risk may occur for scavenger species (e.g., raven, raptors) foraging along roads for vehicle caused wildlife mortalities. As the construction phase of the Project is expected to require up to 100 persons, risks of vehicle collisions would be increased during the 1-year construction phase (as operation of the Project is expected have one to two onsite employees per shift, operational impacts from vehicular traffic are less than those anticipated during construction).

Suitable foraging habitat is present in the survey area for the avian species observed (see Table 13 and Table 14). Impacts to these species include the reduction of foraging habitat due to Project construction. These impacts are limited to the 194.4 acres (minimum scenario) and up to 236.9 acres (maximum scenario), that would be disturbed and the associated habitat fragmentation. The suite of birds dependent on basin big sagebrush shrublands and mixed salt desert scrub habitat to meet their life requirements would be the group most highly affected, as these are the primary habitats to be disturbed (present in 15 of the 21 analysis boxes). Impacts to habitat would be ongoing until reclamation is completed.

The basin big sagebrush habitat present in 8 of the 21 analysis boxes is marginal breeding habitat for sage-grouse and suitable for winter. The salt desert scrub vegetation present in 7 of the 21 analysis boxes is unsuitable as breeding habitat and is marginal winter habitat. Grasslands present in 6 of the 21 analysis boxes are unsuitable for sage-grouse. Impacts to sage-grouse would include reduction of suitable wintering habitat within 8 of the 21 analysis boxes, and the resultant habitat fragmentation. There is considerably better habitat in the Project vicinity. Impacts to sage-grouse may affect individuals from the local area but greater effects to the regional population are not expected.

Active and inactive raptor nests exist within the Project Area and vicinity, primarily in the western portions, and nesting habitat is present throughout. Impacts would include disturbance to nests or nesting habitat. Potential nesting habitat would be reduced by 194.4 acres (minimum scenario) and up to 236.9 acres (maximum scenario) due to Project construction. Given the limited amount of affected suitable habitat relative to the nesting habitat available in the Project vicinity, this impact would not affect at the local or regional population level.

Federal geothermal lease IDI-37027 contains a stipulation that applies the raptor nesting buffers described in "*Guidelines for Raptor Conservation in the Western United States*" for numerous raptor species including: Bald eagle (0.5 to 1.0 mile), Northern goshawk (0.5 mile), ferruginous hawk (1.0 mile), golden eagle (0.5 mile), peregrine falcon (1.0 mile), red-tailed hawk (0.33

mile), prairie falcon (0.5 mile), Swainson's hawk (0.25 mile) and burrowing owl (0.25 mile). Following the lease stipulation on lease IDI-37027 would result in the protection of any raptors that may nest within those buffers in the vicinity of wells 25-29, 58-29 and 32-32 during drilling, construction of associated facilities, and major maintenance activities.

Also, Federal geothermal leases 35789, 35788, 35786, 37087 and 36373 contain a stipulation requiring the protection of ferruginous hawks between March 1 and July 15, prohibiting activity within the shorter of 2,000 or the visible range of active nest sites (see Table 4). Adherence to this lease stipulation, should reduce impacts to nesting ferruginous hawks during construction.

After construction and during the operational phase of the project, use of a nesting area in the vicinity of a well site by raptors would indicate a tolerance to the operations of that well site. For routine geothermal well maintenance where sites are checked by a worker driving to a geothermal well site, distance to a nest site as well as human activity tolerance levels by individual birds would determine whether the routine maintenance would be a disturbance issue to a breeding/nesting pair.

If major maintenance (i.e. "working over" the well where a drill rig and associated equipment is required, or activities lasting up to or longer than a week) must be completed near an active ferruginous hawk nest site during the breeding/nesting season, it is likely to have detrimental effects to nesting raptors, and could result in stress to nesting birds or nest abandonment. Between 2008-2014, the BLM observed 26 nests in the northwestern portion of the project area. At the time of observation, all nests were inactive. During the 2015 biological survey, five occupied or active nests were located (see Table 15); three of the nests were known nests, and two were new nests. Given the low concentration of active nest sites in the Project Area and the general infrequency of maintenance activities, it is unlikely that a major maintenance event would impact an active nest site.

For infrequent maintenance that is unexpected and cannot be delayed due to safety or operational concerns (such as installing, removing or repairing pumps), the activity would be conducted as needed. However, should this be conducted during the nesting season it could cause stress to nesting raptors or abandonment of the nest. WRE would follow the BLM's exception request policy as outlined in BLM IB No.-2010-039. The BLM field office biologist, in coordination with the appropriate IDFG staff, would review the application for exception. A final determination for granting an exception to seasonal wildlife restrictions will be made by the BLM field office manager, in consideration of the biologist's recommendation and consistent with applicable law, regulation, policy, or local planning. Each exception request would be considered on a case by case basis.

Subsequent to construction, some surface disturbance could be reclaimed. Total permanent disturbance would be approximately 118.9 acres (minimum scenario) or up to 118.9 acres (maximum scenario); this habitat would be unavailable over the year life of the Project. Further, new man-made structures associated with the Proposed Action (e.g. fencing, lighting, well pads, power poles) could impact special status bird species and migratory birds within and around the Project Area.

Specifically, fencing may be utilized for perching or roosting by many bird species. Fences can also create a collision flight hazard, and tend to pose the greatest risk for species that are heavy bodied and are not quick to take flight. As fence strikes are a fairly low risk and few fences

would be present (primarily around well pad reserve pits and power plant), few impacts are anticipated.

The use of facility lighting (and potentially lighting during construction) can attract insects, which in turn attracts foraging birds. This risk is associated with any and all facilities that have night time lighting. To facilitate ongoing monitoring and for security purposes during the operational scenario, "low wattage" motion-sensored lighting will be located at production well sites, out-buildings that may be on a pad (pump power housing, communications equipment), and at the power plant site. Lighting would be mounted 8-10 ft. off the ground and shielded laterally. During well construction, the drilling rig will be lighted. All lighting will be downward directed, and used as needed for safety purposes. The lighting itself poses no direct risk to birds, but the increased activity in these areas near anthropogenic activity could pose some amount of risk to these species. Additionally, migrating birds may become attracted to or disoriented by artificial lights, particularly during inclement weather, which could pose collision risks with facility and power line infrastructure.

Bird species are susceptible to potential collisions with the power lines (especially with shield wires and guy wires) and power poles due to an inability to see or distinguish the lines. If the power lines are spotted during flight, heavy-bodied, less agile birds or birds within large flocks may lack the ability to quickly negotiate the lines, making these birds more susceptible to a potential collision. Adverse weather conditions obscuring sunlight and moonlight could also contribute to poor detection of the power lines.

Raptors that may hunt from perches on the power poles and aerial foraging birds (e.g., swifts and swallows) would be the bird species most susceptible to collision while foraging. The potential for collision with the power poles is also present when avian species are flying to or from a nesting or roosting site on the power pole. However, raptor species are agile and often familiar with powerlines so raptor collision risk is generally low. Some avian species may have an increased predation risk due to the improved perching locations of raptors and corvids on the gen tie line structures.

Avian electrocutions can occur when a bird simultaneously contacts energized and/or grounded structures, conductors, hardware, or equipment (APLIC 2006). Larger bodied birds are more susceptible to electrocution risks along the power lines, especially during periods of precipitation since the water on their wings helps conduct electricity.

Nests on power pole structures that pose the greatest risk to birds are those that are built in close proximity to energized conductors and hardware. While a nest that is not in close proximity to energized parts may not be an electrocution risk in and of itself, it would tend to cause the parent bird and possibly nest predator birds to routinely land on other parts of the power pole or surrounding poles that may be unsafe (APLIC 2006). In the Project Area, the species most likely to nest on power poles are ravens and raptors.

To reduce the potential impacts of bird injury or mortality from the Proposed Action, WRE has committed to provide raptor protection along the power line in compliance with the standards described in the "Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 2006" (APLIC 2006). Also (and as stated above), WRE would comply with all applicable federal geothermal lease stipulations (see Table 4) specific to the federal lease and the activity proposed. Following this, impacts would be further reduced.

Alternative 1 (No Action) - Special Status Species, Including Migratory Birds, Impacts

Under the No Action Alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) – Special Status Species, Including Migratory Birds, Impacts

In addition to mitigation measures described in the Proposed Action, the Conservation Alternative also includes additional mitigation measures to reduce impacts to special status species.

Avoidance of active pygmy rabbit burrow sites by a minimum of 100 meters would offer a buffer zone around burrow sites, ensuring pygmy rabbits have adequate space to forage near their burrows. Conducting pre-construction surveys for pygmy rabbits in loamy sagebrush habitats would ensure that no new pygmy rabbit burrow sites would be disturbed during construction activities.

All or portions of 9 analysis boxes (36-15, 87-15, 27-14, 21-14, 72-14, 77-11, 28-12, 65-14 and 23-13) are within 5 kilometers (3.1 miles) of a greater sage-grouse lek. Within this 5 kilometer (3.1 mile) buffer area, power trays would be utilized instead of overhead power lines. Power cables would be placed in trays and co-located along the geothermal pipelines. Under this Alternative, approximately 2.5 miles to 5 miles of power cables would be placed in cable trays, and approximately 3.9 miles to 7.9 miles of power lines would be overhead (this represents an approximately 40% reduction in overhead power lines as compared to the Proposed Action). As no overhead power lines would be used within the buffer area, potential impacts to special status species and migratory birds would be reduced due to a lack of perching locations for predator species, and also reduced opportunity for collision impacts with power lines and poles.

Potentially disruptive construction activities (e.g., pad clearing, well drilling), would be avoided within 3.1 miles of occupied sage-grouse leks from March 1 to June 30. This would reduce disturbance to lekking or nesting sage-grouse (and/or hens with early broods). If this period cannot be avoided, applying noise buffering shields would minimize potential disturbance due to noise.

Further, any production well operated within the 5 kilometer (3.1 mile) buffer area would be required to utilize an electric submersible pump (ESP) instead of line shaft pump unless in the unlikely event that reservoir conditions are not supportive of this technology (i.e. if very high temperatures are encountered). As the motor of a submersible pump is below ground, potential noise impacts to special status species and migratory birds would be further reduced.

Constructing power lines in a manner which minimizes or prevents raven nesting would eliminate the potential for ravens to establish new nests on poles constructed for this project. This would reduce expansion of the species into new areas and mitigate the risk for increased predation on sage grouse.

Equipping above ground facilities with structures or devices that discourage nesting of raptors and corvids would also reduce the impacts to sage grouse from increased predation.

Fitting transmission towers with anti-perch devices would reduce predation from raptors and corvids in the vicinity of the towers.

Minimizing the construction footprint in sagebrush habitats would reduce the loss of sage-grouse and other sagebrush obligate species habitat.

Restricting vegetation removal activities associated with construction from March 1 through July 15 would avoid disturbing nesting migratory birds and sage grouse.

The federal geothermal lease stipulation for lease IDI-37027 that applies the raptor nesting buffers described in "*Guidelines for Raptor Conservation in the Western United States*" would be applied project wide. Applying the protective buffers described in the February 2008 draft version of "Guidelines for Raptor Conservation in the Western United States" (Whittington and Allen 2008) to the entire project would avoid adverse effects to nesting raptors. As stated above in the proposed action, use of a nesting area in the vicinity of a well site by raptors would indicate a tolerance to the operations of that well site, and daily routine maintenance and field visits are not likely to have impacts. Requiring an exception request for any additional activities (Working over a well, additional construction, etc.) would allow BLM to address these impacts on a site specific basis and ensure that nesting raptors are protected.

Compensatory Mitigation

Direct impacts from implementation of the compensatory mitigation plan are expected to be minor, and explained below. Any one or a combination of these mitigation options could be utilized to earn credit. Indirectly, the long-term effect of compensatory mitigation is expected to improve overall conditions for sagebrush obligate wildlife species.

Sagebrush Planting – Sagebrush planting would improve habitat conditions for most of the special status species and migratory birds identified above. Adding shrubs would increase food, improve conditions of prey species for sensitive predators and provide critical cover for sensitive animals. Special status species and migratory birds may be temporarily impacted by an increase in human activity during the sagebrush planting, however, restricting activity during the breeding season would alleviate the impact.

Habitat Restoration Partnership – Entering into a partnership would enable the Natural Resources Conservation Service and Pheasants Forever to implement local SGI projects, largely through the chainsaw cutting or masticating juniper trees in sage steppe habitat (or the less likely option of planting sagebrush). Special status species, including migratory birds, would be temporarily impacted by human activity during implementation of the removal projects. This would be minimized by restricting operations during the breeding season from nesting areas or cutting during the non-breeding season. Overall, species are expected to benefit from increased shrub and grass cover resulting from the proposed treatments. Habitat quality for sage-grouse would improve after juniper treatments as increased shrub, grass, and forb cover are expected. Increased cover is expected to improve nest concealment, forage availability, and brood survival. Decreasing trees would reduce perch sites available to predatory birds and could reduce the susceptibility of sage grouse to predation. Sage grouse could also expand into treated areas which they would otherwise have avoided prior to treatment.

Conservation Easement – No direct effects to wildlife are expected as a result of the implementation of a conservation easement. However, as a conservation easement would restrict development within the easement area, it is assumed that special status species, including migratory birds, would benefit from adoption and implementation of a conservation easement.

Implementation of the aforementioned design features, in conjunction with the Project component changes (i.e. power cables instead of overhead power lines within the 5 km buffer

area), should serve to reduce potential impacts to special status species, including migratory birds, as compared to the impacts associated with the Proposed Action.

Cumulative Impacts - Special Status Species, Including Migratory Birds

The cumulative impacts identified would be similar for general wildlife and special status species, including migratory birds. Please see discussion of cumulative impacts in the "Cumulative Impacts – Wildlife" section of the EA above.

LIVESTOCK GRAZING

The Project Area is located within 3 grazing allotments: Jim Sage Allotment, Clear Creek Allotment and Strevell Allotment (see Table 16).

Table 16: Allotment Information

Allotment	Total Acreage (on Public Land)	Total Permitted AUMs[1] (on Public Land)
Jim Sage	75,521 acres	5,131 AUMs
Clear Creek	10,240 acres	567 AUMs
Strevell	6,049 acres	162 AUMs

[1] An AUM (animal unit month) is the amount of forage needed to sustain one cow, five sheep or five goats for a month.

Analysis boxes 58-12, 28-12, 77-11, 21-14, 72-14, 23-13, 65-14, 36-15, 87-15, 27-14, 72-22 and 32-23 are located in the Jim Sage Allotment; specifically, within the Bridge Seeding Pasture. This Pasture is 5,374 acres and is typically stocked at around 18 acres/AUM or approximately 300 AUMs. The allotment contains 19 permittees, three of which typically use the Bridge Seeding Pasture in the spring for approximately 30 days beginning May 1, on a deferred rotation.

Analysis boxes 42-30, 74-30, 27-30, 87-30, 63-31, 24-31 and 48(52-31)-30 are within the Clear Creek Allotment; specifically, within Pasture #3. This Pasture is 2,738 acres and there are 5 permittees. The Pasture is managed under a rest rotation grazing system. When not rested, it is used either in the spring or fall/winter during the following dates: April 1-April 30, June 1 to June 14, and November 10-December 31.The allotment is stocked at around 18 acres/AUM. .

Analysis boxes 25-29, 58-29 and 32-32 are within the Strevell Allotment; specifically, within Pasture #3. This pasture is 631 acres, and has 1 permittee. The Pasture is typically used May 15 to July 15 and/or October 17 to November 6. There is no formal grazing system. The allotment is stocked at around 37 acres/AUM.

Proposed Action - Livestock Grazing Impacts

Total permanent disturbance associated with the Proposed Action would be approximately 118.9 acres (minimum scenario) or up to 118.9 acres (maximum scenario).

Within the Bridge Seed Pasture of the Jim Sage Allotment, total AUMs would be reduced by 4-5 AUM, or approximately 1-2 % of the AUMs within the Pasture and less than 1% of the AUMs in the allotment. Within the Clear Creek Allotment, total AUMs would be reduced by 2-3 AUMs in Pasture #3, 2% of the AUMs in the Pasture and less than 1% of the AUMs within the

Allotment. Within the Strevell Allotment, total AUMS would be reduced by less than 1 AUM in Pasture #3, 6% of the AUMs in the Pasture and much less than 1% of the AUMs within the Allotment.

Project features, especially linear features (such as geothermal pipelines) could restrict access by livestock, influence livestock distribution patterns and movement of livestock into and out of the pastures. The pipelines could also make gathering livestock from a pasture more difficult. When completed, the top of the new geothermal pipelines would average three feet above the ground surface. However, a number of pipeline lengths could be up to six feet in height. Also, the pipelines would be constructed across roads, or constructed across the roads on sleepers and the roadbed run up and over the pipeline. These methods would serve to facilitate the movement of livestock through the well field and no impacts are expected.

Further, to prevent access by cattle to areas which might be harmful to them, WRE has committed to fence the reserve pits in conformance with the Gold Book, and has not proposed any Project activities which would substantially limit livestock's access to the undisturbed areas in the vicinity of the proposed Project.

Due to the small percentage of allotted acres and subsequent AUMs lost to direct disturbance, fencing of those Project facilities potentially harmful to livestock and the fact that project facilities and practices would not prevent continued access by livestock to the undisturbed lands within the Project Area, no impacts on livestock grazing are expected other than those described above.

Alternative 1 (No Action) - Livestock Grazing Impacts

Under the No Action Alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) – Livestock Grazing Impacts

The potential livestock grazing impacts from construction, operation and reclamation of Alternative 2 would be the same as those described for the Proposed Action as the surface disturbance associated with Alternative 2 is the same as the Proposed Action. Including a COA that would involve livestock grazing permittees in the planning of pipeline construction would ensure the ability of livestock to move freely through the grazing allotments. This would lessen the impacts of livestock and access over the proposed action.

Cumulative Impacts - Livestock Grazing

The cumulative effects study area for livestock (i.e. Multiple Resources CESA) is the Project Area and adjacent private lands in the vicinity of the proposed Project.

The Proposed Action is expected to directly impact livestock grazing distribution and the movement of livestock into and out of the affected pastures. However, pipeline design (road crossings and placement of sections of elevated pipe) would reduce this impact. Existing and Proposed geothermal pipelines on private lands in the CEAS would have similar effects to livestock grazing as those described for public lands.

VISUAL RESOURCES

The BLM initiated the visual resource management (VRM) process to manage the quality of landscapes on public land and to evaluate the potential impacts to visual resources resulting from development activities. VRM class designations are determined by assessing the scenic value of the landscape, viewer sensitivity to the scenery, and the distance of the viewer to the subject landscape. These management classes identify various permissible levels of landscape alteration, while protecting the overall visual quality of the region. They are divided into four levels (Classes I, II, III, and IV). Class I is the most restrictive and Class IV is the least restrictive (BLM 1986).

The Proposed Action is located in a VRM Class IV area. The objective of Class IV is to provide for management activities that require major modification of the existing landscape character. The level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. Every attempt, however, should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic landscape elements (BLM 1986).

Proposed Action - Visual Resource Impacts

Project components would be visible and create a contrast with the surrounding landscape. The Project would be extending existing visual disturbances and introducing additional elements into the landscape. However, non-natural features to line and form are already present from the existing utility poles and lines, man-made structures, and dirt roads with exposed natural sediment.

Drilling operations would be visible in the Project Area during site construction and intermittently over the life of the Project. The drill rigs proposed for the Project would be up to 175 feet in height. Well drilling operations would typically take 45 days to complete for each well and would be 24 hours per day, 7 days per week. During drilling operations, lights used when drilling at night would increase rig visibility. Impacts to visual resources from drilling operations would primarily affect the elements of line and color. As drilling operations would occur around the clock, lighting from the drill rigs would affect nighttime darkness. Drilling operations would be temporary and short-term, therefore impacts associated with drilling operations would also be temporary.

At approximately 30 to 45 feet in height, power poles would be the tallest permanent structures associated with the Proposed Action. The power poles would be visually apparent in the foreground, middleground, and background to visitors within and adjacent to the Project Area and along the existing County-maintained and local roads. The power poles would add an extended linear feature to the landscape.

WRE has committed to paint all structures, pipe, etc. an appropriate color to blend with the area and minimize visibility, unless precluded by safety requirements.

As the degree of contrast and modification imposed on the landscape by the Project would fall within the parameters of VRM Class IV objectives, the Project would be in conformance with VRM guidelines and policy. Further, as installation of the prescribed lighting types along with properly shielded lighting would limit light pollution into the natural darkness of the existing

environment, these mitigations would limit lighting impacts as well as limit light pollution effects to local wildlife populations.

Alternative 1 (No Action) - Visual Resource Impacts

Under the No Action Alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) – Visual Resource Impacts

The potential visual resource impacts from construction, operation and reclamation of Alternative 2 would be less than those described for the Proposed Action as fewer power poles would be utilized (approximately 40% of the power lines proposed under the Proposed Action would be placed in cable trays co-located along the length of the geothermal pipelines), therein reducing the visual disturbance.

In addition painting all permanent structures constructed or installed a flat, non-reflective earth tone color would reduce the visual impacts from these structures. Limiting and shielding drill rig and well test facility lights would reduce visual impacts from light pollution for the duration of the drilling and testing phase of the project. Sheilding facility perimeter lighting, and using low-pressure sodium lighting would reduce light pollution for the duration of the project.

Compensatory Mitigation

Impacts from implementation of the compensatory mitigation plan are expected to be minor, and explained below. Any one or a combination of these mitigation options could be utilized to earn credit.

Sagebrush Planting – Impacts to visual resources from sagebrush planting are not anticipated.

Habitat Restoration Partnership – Entering into a partnership would enable the Natural Resources Conservation Service and Pheasants Forever to implement local SGI projects, largely through the chainsaw cutting or masticating juniper trees in sage steppe habitat (or the less likely option of planting sagebrush). Juniper removal methods would alter the visual aspects of the treatment areas. Over time, these impacts would be reduced as the treatment areas recover and become more similar to its surroundings.

Conservation Easement – Impacts from a conservation easement are difficult to determine as the location of the easement is unknown. However, as a conservation easement would restrict development within the easement area, it is assumed that visual resources would be beneficially impacted from adoption and implementation of a conservation easement as the existing character of the landscape would be maintained.

Cumulative Impacts - Visual Resource Impacts

The cumulative effects study area for visual resources, determined largely on a topographic basis representing the potential range of visual impacts covers approximately 325,270 acres.

Drilling operations under the Proposed Action would be visible within the Project Area during site construction and intermittently over the life of the Project. The power poles, visually apparent in the foreground to travelers along the existing roadway system, would add an extended linear feature to the landscape. Proposed Action facilities and activities would be consistent with the BLM Class IV Visual Resource Management classification of the area.

Current disturbances within the Visual CESA include access road construction (including paved and unpaved roadways), geothermal exploration and development, agricultural activities, transmission and distribution lines, residential and commercial structures, and gravel and mineral pits. Additionally past wildfires have altered the vegetation and landscape, occasionally resulting in the proliferation of nonnative species.

The Clear Creek Restoration Project would restore the remaining untreated portion of the burned area from the Naf fire in 2000, therein improving its condition for wildlife and improving its fuel characteristics to reduce the potential for high fire severity and spread. Restoration would have a positive impact on visual resources, as does reducing the potential for the spread of wildfire in the future.

The Burley Integrated Hazardous Fuels Management Project (BIHFMP) would create fuel breaks within ½ mile of the BLM-private land boundaries along roads. Though the methods to create fuel breaks (mowing, disking, bulldozing, etc) would negatively impact visual resources, reducing the potential for rapid spread of wildfires and reducing fire severity would be beneficial.

The Twin Falls District Noxious Weed and Invasive Plant Treatment Plan would treat current and foreseeable future infestations of noxious weeds and invasive plants, which would promote land health and is beneficial for visual resources.

Construction activities associated with the private land portions of the Project (construction and operation of up to 8 production and injection wells; up to 9.1 miles of production and injection pipelines; up to 5 miles of new access roads and a binary geothermal power plant), in addition to other reasonably foreseeable future actions would result in long-term modifications to the line, form, color, and texture of the characteristic landscape. Most power plant facilities would be single story and would not be visible at a distance from the power plant site. The air- cooled condensers would be the tallest permanent structures on the power plant site and are estimated to be about 35 feet tall. The creation of road, pipelines and power lines has and would create strong horizontal linear contrasts. Vegetation and soil removal create color, textural, and linear contrasts with adjacent areas that could be visible long after all the facilities were removed.

As with the Proposed Action project components, to reduce visual impacts, WRE has committed to paint all permanent project facilities a color which would blend with the landscape. Painting of project facilities to reduce their visual effects would be done in accordance with BLM policy.

The contribution of the proposed Project to these cumulative effects on visual resources would be minimal. Any cumulative impacts would be consistent with the BLM Class IV Visual Resource Management classification.

HAZARDOUS AND SOLID WASTES

There are no hazardous material storage facilities in the analysis area and no hazardous materials are known to be routinely used. The transport and handling of hazardous materials in Idaho are subject to numerous federal and state laws and regulations.

Proposed Action – Hazardous and Solid Wastes Impacts

During drilling activities, diesel fuel, lubricants, hydraulic fluids and drilling chemicals (drilling mud, caustic soda, barite, etc.), would be transported to, stored on and used by the Project at the proposed drill sites.

The Project must conform to both federal and state requirements for handling these hazardous/regulated wastes materials. Typical of most construction projects, the storage and use of these materials may result in minor, incidental spills of diesel fuel or oil to the ground during fueling of equipment, filling of fuel storage tanks, and handling lubricants. Other incidental spills could be associated with equipment failures such as ruptured hoses.

As identified in the Project's Operations Plan and Utilization Plan, the drilling contractor and independent contractors would provide fire, injury, spill/discharge and hydrogen sulfide (H_2S) contingency plans. Those plans would be made known to WRE and BLM prior to commencing work so that any necessary response or action can be coordinated efficiently between the parties.

Small quantities of hazardous waste would be generated during construction operations. Typically these wastes would be in the form of empty drums or spent lead acid batteries used for construction equipment. Construction activities typically generate waste oils, oily rags, and oil impregnated absorbent materials used to clean up minor spills from construction equipment. These wastes would be transported to a disposal facility authorized to accept the waste. Most waste generated from the construction activities would be solid (nonhazardous) waste which would also be transported to an offsite disposal facility authorized to accept the waste.

Proper handling, storage and disposal of these hazardous materials, hazardous/regulated wastes and solid wastes in conformance with federal and state regulations would ensure that no soil, groundwater, or surface water contamination would occur with any adverse impacts on the environment or worker health and safety.

Alternative 1 (No Action) - Hazardous and Solid Wastes Impacts

Under the No Action Alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) – Hazardous and Solid Wastes Impacts

The potential hazardous and solid wastes impacts from construction, operation and reclamation of Alternative 2 would be the same as those described for the Proposed Action as the materials and chemicals used with Alternative 2 is the same as the Proposed Action.

Cumulative Impacts - Hazardous and Solid Wastes Impacts

The cumulative effects study area for hazardous and solid wastes (i.e. Multiple Resources CESA) is the Project Area and adjacent private lands in the vicinity of the proposed Project.

The Proposed Action would result in generation and disposal of solid and hazardous wastes. The Project could also result in minor petroleum hydrocarbon (including petroleum contaminated soils) or other hazardous material spills. However, no soil, groundwater, or surface water contamination is anticipated, and no adverse effects to the environment or worker health and safety are anticipated.

Hazardous materials have been used in the past and present, especially with the construction and operation of geothermal exploration and development, and ongoing agricultural activities. Past and present actions have used petroleum fuels (principally diesel fuel), hydraulic fluid, lubricants, drilling chemicals and materials, and pesticides. The transportation, use, storage and disposal of hazardous materials and wastes are subject to numerous federal, state and local laws

and regulations which are intended to protect the public and the environment, and which are applicable to all past and present actions.

Reasonably foreseeable future actions include construction of the private land portions of the Project (construction and operation of up to 8 production and injection wells; up to 9.1 miles of production and injection pipelines; up to 5 miles of new access roads and a binary geothermal power plant), and would also generate and dispose of solid and hazardous wastes.

Hazardous materials stored on site during normal power plant operations include diesel fuel for the fire pump and standby generator, lubricating oils, and small quantities of paint, antifreeze, cleaning solvents, battery acid, transformer insulating fluid, and laboratory reagent chemicals. Geothermal fluid handling chemicals (i.e. lubricating oil and scale inhibitor) would also be stored on site. These materials would be stored within secondary containment and there would be little potential for adverse effects from spills or releases of these materials.

Substantial quantities of the binary working fluid, tentatively isopentane or similar, would be stored and used (though not consumed or intentionally released). Isopentane is a flammable but non-toxic hydrocarbon similar to, but less volatile than propane. During major maintenance activities on the isopentane side of the binary power plant units, the liquid isopentane would first be transferred to the isopentane storage tank.

Small quantities of typical office and industrial trash would be generated during power plant operations. Similar to construction wastes, the operations waste would be removed from the site by a local waste contractor and deposited in an offsite disposal facility authorized to accept the wastes. Sanitary wastes would be handled by a septic system constructed as part of the power plant facilities.

Proper handling, storage and disposal of these hazardous materials, hazardous/regulated wastes and solid wastes in conformance with federal and state regulations would ensure that no soil, groundwater, or surface water contamination would occur with any adverse effects on the environment or worker health and safety. Cumulative effects are unlikely.

SOCIO-ECONOMICS

The Project Area is located in Cassia County, Idaho. The land area of Cassia County is approximately 2,580 square miles. The County seat and largest city is Burley, Idaho (population 10,456).

As of 2014, the population of Cassia County was estimated at 23,540 people. The population density of the County is 9 persons per square mile. The gender of the population within the county is 49.3% female and 50.7% male. The racial makeup of the county is 71.0% White Non-Hispanic, 26.6% Hispanic or Latino, 1.6% American Indian and Alaska Native alone, 0.7% Asian, 0.6% Black Non-Hispanic, and 1.6% identified as two or more races (U.S. Census Bureau 2015c).

Of the population 16 years and over in Cassia County, 10,207 are in the labor force and 6,178 are not. Of those in the labor force, 9,360 are employed and 847 are unemployed. Of those employed, approximately 77.5% were in the private sector, 13.4% were in government, 8.8% were self-employed and 0.3% were unpaid family workers. The three largest industries providing employment were: educational, health and social services (19.7%); agriculture,

forestry, fishing and hunting, and mining (17.6%); and manufacturing (14.6%) (U.S. Census Bureau 2015b).

Median income for a household in the County was $42,039. The percent of labor force unemployed in Cassia County is 3.7% (August 2015) and is lower than the state's unemployment rate of 4.2%, and the nation's unemployment rate of 5.1% (U.S. Census Bureau 2015b, Idaho Department of Labor 2015).

Based on 2009-2013 American Community Survey 5-year estimates, there are 8,369 housing units available in Cassia County, of which 7,653 are occupied and 716 are unoccupied. Of the occupied units, approximately 5,277 are owner occupied and 2,376 are renter occupied. The homeowner vacancy rate is 0.3%, whereas the rental vacancy rate is 6.2% (U.S. Census Bureau 2015a).

Proposed Action – Socio-economics Impacts

Project construction could require up to 100 workers, although substantially fewer would be on site most of the time during construction, as the construction activities would be staged. Construction of the Proposed Action would take approximately 12 months to complete once all permits are obtained and equipment orders are scheduled. Once operating, the Project would have a staff of approximately 15 employees; 1-2 employees may be onsite at a given time. Given the small amount of workers needed, the Project would not induce population growth in the area. Neither does the proposed Project create or provide any infrastructure which would indirectly induce substantial population growth.

Some of these workers may be recruited locally, though most would be specialized workers from outside the local area. Typically, non-skilled workers do not bring families with them on temporary construction assignments. Therefore, most workers would be expected to stay in local hotels, rental housing units or recreational vehicles and campgrounds.

Non-local construction workers are typically paid a per diem rate for daily housing and meal costs. Workers normally spend the per diem on motel accommodations or RV campground space rent, restaurants, groceries, gasoline, and entertainment. In addition, WRE would likely rent or purchase some portion of the equipment and supplies from local suppliers. This spending activity associated with the construction of the Project would have a small but positive effect on local businesses in Cassia County.

Alternative 1 (No Action) - Socio-economics Impacts

Under the No Action Alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) – Socio-economics Impacts

The potential socio-economics impacts from construction, operation and reclamation of Alternative 2 would be the same as those described for the Proposed Action.

Cumulative Impacts - Socio-economics Impacts

The cumulative effects study area for socio-economics (i.e. Air Quality CESA) is Cassia County.

The Proposed Action would not induce a substantial growth or concentration of population, nor would it cause a substantial net increase in the county expenditures; revenues to Cassia County would increase slightly which would be a positive benefit.

Once operational, the Project (including the activities on private land) would have a staff of approximately 15 employees; 1-2 employees may be onsite at a given time. Given the small amount of workers needed, the Project would not induce population growth in the area. Neither does the Proposed Project create or provide any infrastructure which would indirectly induce substantial population growth.

Past and present actions have had a generally positive economic impact. Generally positive economic impacts would also be expected from the other reasonably foreseeable future actions when combined with the Proposed Action.

PUBLIC SAFETY (ROAD TRAFFIC)

The Project is located in the upper reaches of the Raft River drainage basin, and is accessed by proceeding on paved Highway 81 south out of Malta, Idaho about 9 miles, then proceeding west on unpaved County-maintained E-Y Road (that services the U.S. Geothermal Power Plant). Vehicle travel on E-Y Road is sparse. Numerous existing dirt access roads traverse the analysis area.

Proposed Action – Public Safety (Road Traffic) Impacts

During construction of the Project, approximately 2 semi-trucks, 2-5 small worker trucks, and occasional other small personnel vehicles would travel to and from the Project site daily. Once operational, the Project facilities would be inspected up to 4 times per day, which would include driving throughout the analysis area. Also, 1-2 employees would be onsite at any given time and would commute from their residence to the Project site.

WRE would conduct road maintenance activities as need to maintain safe driving condition. These activities could include: blading, surface replacement, dust abatement, spot repairs, slide removal, ditch cleaning (if ditches are needed), culvert cleaning (if culverts are necessary), litter cleanup and noxious weed control (as needed).

WRE has committed to using existing roads whenever possible and cross country travel would be restricted to approved corridors only. Speed limits of 20 - 25 mph would be posted and observed on all unpaved roads in the project area in order to minimize dust and avoid collision and incidental death of local wildlife. Signs would be posted warning the public of increased vehicle traffic in the area during the drilling and construction. Given these commitments, and the low level of Project related vehicle travel during construction and operation, no impacts to public safety (road traffic) are anticipated.

Alternative 1 (No Action) - Public Safety (Road Traffic) Impacts

Under the No Action Alternative, the Proposed Action would not be constructed or operated. The direct, indirect and cumulative impacts would not occur.

Alternative 2 (Conservation) – Public Safety (Road Traffic) Impacts

Other than ensuring road crossings do not limit visibility on maintained roads, the potential public safety impacts from construction, operation and reclamation of Alternative 2 would be the

same as those described for the Proposed Action as the Project-related vehicle travel associated with Alternative 2 is the same as with the Proposed Action.

Cumulative Impacts - Public Safety (Road Traffic) Impacts

The Proposed Action is not expected to have direct impacts to public safety (road traffic), thus there would be no cumulative effects to public safety (road traffic).

CONSULTATION AND COORDINATION

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REFERENCES

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines, The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission, Washington, D.C. and Sacramento, CA.

Bureau of Land Management (BLM). 1985. Cassia Resource Management Plan. Burley District Office. Approved January 24, 1985.

Bureau of Land Management (BLM). 1986. Bureau of Land Management Manual Handbook H 8410 1 Visual Resource Inventory. January 1, 1986.

Bureau of Land Management (BLM). 2008. Record of Decision and Resource Management Plan Amendments for Geothermal Leasing in the Western United States. BLM, Washington, DC. October 2008.

Bureau of Land Management (BLM). 2009. Burley Shrub Planting Environmental Assessment. EA#: ID-220-2009-EA-3555.

Bureau of Land Management (BLM). 2015. LR2000 Mining Claims Geographic Report: List of Mining Claims by Section. Internet Website: http://www.blm.gov/lr2000/index.htm. Accessed: August 18, 2015.

Bureau of Land Management (BLM) and U.S. Forest Service (USFS). 2008. Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States. BLM, Washington, DC. October 2008.

Idaho Department of Environmental Quality. 2014. Idaho's 2012 Integrated Report. Boise, ID. Idaho Department of Environmental Quality.

Idaho Department of Labor. 2015. Cassia County Workforce Trends. September 2015.

Idaho Department of Fish and Game (IDFG). 2015. Scoping Letter RE: DOI-BLM-ID-T020-2015-0016-EA, Walker Ranch Energy Geothermal Project. May 5, 2015.

National Oceanic and Atmospheric Administration (NOAA). 2015. Climate Data Online Data Tools. Internet Website: www.ncdc.noaa.gov/cdo-web/datatools/normals. Accessed August 14, 2015.

National Resources Conservation Service (NRCS). 2015a. Custom Soil Resources Report for Cassia County, ID, Eastern Part: Eastern Survey Area. August 2015.

National Resources Conservation Service (NRCS). 2015b. Custom Soil Resources Report for Cassia County, ID, Eastern Part: Western Survey Area. August 2015.

NatureServe. 2015. NatureServe Explorer: an Online Encyclopedia of Life. [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available: http://explorer.natureserve.org. Accessed September and October, 2015.

Striver, S.J. E.T. Rinkes, and D.D. Naugle (Striver et al.). 2010. Sage-grouse Habitat Assessment Framework. U.S. Bureau of Land Management. Unpublished Report. U.S. Bureau of Land Management, Idaho State Office, Boise, Idaho. August 2010.

Tetra Tech. 2015. Walker Ranch Energy – Baseline Biological Surveys. Report #114-520302. July 9, 2015.

Thurow, T.L. and L.S. Cahn (Thurow and Cahn). 1982. Final Report: INEL Geothermal Environmental Program. No. 1: 3, 5, 6. US Department of Energy-Idaho Operations Office, Idaho Falls, Idaho.

U.S. Census Bureau. 2015a. American Fact Finder, 2009-2013 American Community Survey 5-Year Estimates: Selected Housing Characteristics. Internet Website: http://factfinder.census.gov/rest/dnldController/deliver?_ts=462789778321. Accessed August 15, 2015.

U.S. Census Bureau. 2015b. American Fact Finder, 2009-2013 American Community Survey 5-Year Estimates: Selected Economic Characteristics. Internet Website: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk. Accessed: August 15, 2015.

U.S. Census Bureau. 2015c. State and County Quickfacts: Cassia County, Idaho. Internet Website: http://quickfacts.census.gov/qfd/states/16/16031.html. Accessed: August 15, 2015.

U.S. Department of the Interior (USDI) and U.S. Department of Agriculture (USDA). 2007. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development. BLM/WO/ST-06/021+3071. Bureau of Land Management. Denver, Colorado. 88 pp.

U.S. Department of the Interior (USDI), Bureau of Land Management (BLM), Washington, DC. 2015a. Record of Decision and Approved Resource Management Plan Amendments for the Great Basin Region, Including the Greater Sage-Grouse Sub-Regions of Idaho and Southwestern Montana, Nevada and Northeastern California, Oregon, and Utah. BLM/NV/NV/PL/15-14+1600. September 2015.

U.S. Department of the Interior (USDI), Bureau of Land Management (BLM), Idaho State Office. 2015b. Idaho and Southeastern Montana Greater Sage-Grouse Approved Resource Management Plan Amendment. BLM/ID/SG/EIS-15+1610. September 2015.

U.S. Geological Survey (USGS). 2004. Geological Provinces of the United States Basin and Range Province. Internet Website: http://geomaps.wr.usgs.gov/parks/province/basinrange.html. Accessed September 18, 2015.

U.S. Environmental Protection Agency. 2015. Current Non-Attainment Categories for All Counties. Internet Website: http://www.epa.gov/oar/oaqps/greenbk/ancl.html#idaho. Accessed August 12, 2015.