U.S. Department of the Interior

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In Reply Refer:
1610 and 1790

Dear Reader:

The Draft Environmental Impact Statement (Draft EIS)/Draft Resource Management Plan Amendment (RMPA) for the Wyoming Pipeline Corridor Initiative (WPCI) is hereby submitted for your review. The Bureau of Land Management (BLM) prepared the Draft EIS/Draft RMPA to analyze the potential impacts of the State of Wyoming Proposal and alternatives to create a network of new corridors through nine BLM planning areas in the state of Wyoming. The WPCI consists of pipeline corridors that are 200ft or 300ft wide that would be reserved for pipelines that transport Carbon Dioxide (CO2), enhanced Oil Recovery (EOR) products, and other compatible uses. As proposed, the WPCI would consist of a total of 1,105 miles of corridors that cross BLM lands, in the Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland BLM Field Offices.

The Draft EIS/Draft RMPA was prepared pursuant to the National Environmental Policy Act (NEPA), as well as other regulations and statutes, to address possible environmental and socio-economic impacts that may result from designating pipeline corridors under the WPCI. This Draft EIS/Draft RMPA is not a decision document. Its purpose is to inform the public and interested parties of the impacts associated with designating corridors reserved for CO2, EOR and other compatible uses, while evaluating alternatives to the proposal.

The release of this Draft EIS/Draft RMPA announces a 90-day comment period pursuant to 43 CFR 1610.2 for the Draft RMPA. Comments on the RMP Amendment must be submitted on or before the 90th day following the date the Environmental Protection Agency publishes this notice in the Federal Register.

The WPCI Draft EIS/Draft RMPA may be examined online at the ePlanning site at https://go.usa.gov/xpCMr. Public comments may be submitted through the BLM's WPCI ePlanning project webpage and must be received by July 16, 2020.

For further information concerning the project or making comments, please contact:

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Please note that before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you may ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

The future publication of the Final EIS/Proposed RMPA will establish an opportunity for protests (See §§1610.4-8 and 1610.5-1(b)). A 30-calendar day comment period will be provided after the Final EIS/Proposed RMPA is published. Any person who participated in the planning process and has an interest which is, or may be, adversely affected by the approval or amendment of the RMP may protest such approval or amendment. A protest may raise only those issues which were submitted for the record during the planning process. The BLM will issue a Record of Decision no earlier than 30 days from the date of the Notice of Availability published by the Environmental Protection Agency on the RMPA and Final EIS.

Sincerely,

/s/ Duane Spencer 4/15/2020

Duane Spencer
Acting State Director

EXECUTIVE SUMMARY

INTRODUCTION

The Wyoming Pipeline Corridor Initiative (WPCI) is a proposal from the State of Wyoming Governor's Office (applicant) to designate approximately 1,914 miles of pipeline corridors across private, state, and Bureau of Land Management (BLM)–managed lands throughout the central and western portions of the state that are essential to future production and distribution of oil and gas products and other compatible infrastructure viable to the state's economy. Approximately 1,105 miles of the proposed corridors is located on BLM-administered lands in nine field offices: Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland. The WPCI as proposed by the State of Wyoming would designate a statewide corridor network dedicated to 1) pipelines and facilities associated with carbon capture, utilization, and storage (CCUS) and 2) pipelines and facilities associated with enhanced oil recovery (EOR) and other compatible uses. The WPCI would not authorize any new infrastructure projects or rights-of-way (ROWs) but would amend several BLM resource management plans (RMPs) across the state.

Consideration of the WPCI is a federal action requiring compliance with the National Environmental Policy Act (NEPA) of 1969. To comply with the requirements of NEPA, an environmental impact statement (EIS) is being prepared to disclose the potential environmental impacts associated with the proposed corridors and to consider reasonable alternatives. The BLM Wyoming State Office is the lead federal agency for the preparation of the EIS.

The proposed corridors would be designated only on BLM-administered lands. However, to use those corridors, future site-specific development projects would need to cross state, private, and non-BLM federal land. Accordingly, any subsequent proposed construction project within the corridors would be subject not only to BLM permitting requirements but also to other federal, state, and local permit requirements. A project proponent would be required to obtain all of these federal, state, and local permits and approvals prior to construction within the corridors. Additionally, any future proposed ROW projects within the designated corridors would be required to conduct project-specific NEPA analysis and disclosure.

PURPOSE OF AND NEED FOR THE ACTION

The WPCI would result in a system of corridors that is integrated with the BLM's existing corridor network for the construction of pipelines for the transport of CO_2, EOR products, and other compatible uses on federal lands throughout the state of Wyoming. The purpose for the BLM action is to designate corridors for the preferred location of future pipelines associated with the transport of CO_2, EOR products, and other compatible uses and to amend the various BLM RMPs within the State of Wyoming to incorporate the proposed corridors. The need for the BLM action is to respond to the State of Wyoming Governor's Office project proposal and to support future development of CCUS and EOR through the development of infrastructure to existing oil fields within the state of Wyoming. This need is based on the BLM's responsibility under Section 503 of the Federal Land Policy and Management Act of 1976 (FLPMA) to consider and designate ROW corridors.

The BLM will limit its amendments of these RMPs solely to changes indicated by the action alternatives and will not address other uses or the management of other resources, although the BLM will consider and analyze effects from increased use on other managed resources. The BLM will continue to manage other resources in the affected field office planning areas under the preexisting terms, conditions, and decisions in the applicable RMPs for those other resources. The approved RMP amendments will not include planning and management decisions for lands or minerals administered by other federal agencies, lands that are privately owned, or lands owned by the State of Wyoming or local governments.

ISSUES IDENTIFIED THROUGH SCOPING

The BLM identified issues to be addressed in the EIS through internal and public scoping and through outreach to cooperating agencies and tribes. Table ES-1 presents the primary issues identified during scoping. The affected environment of each resource area and the impacts from implementing any of the alternatives are described in Chapter 3.

Table ES-1. Issues and Related Resource Areas

Resource Area	Issues
Air quality	How would emissions from aboveground facilities, equipment, and vehicles used during pipeline construction and operation affect air quality, including emissions of fugitive dust? How would storage of large quantities of carbon dioxide in the pipeline corridors affect Wyoming's greenhouse gas emissions?
Cultural resources	How would the project directly and indirectly, across the short term and the long term, affect both known and unknown cultural resources, including historic trails and sites of specific concern to Native Americans? How would the project affect known and as-yet-unknown eligible cultural resources where setting is a contributing aspect of integrity, specifically historic trails and sites of specific concern to Native Americans?
Fire and fuel loads	How would vegetation changes affect fire regimes in the pipeline corridors? How would human-made fire from pipeline construction and operation activities, such as use of heavy equipment, blasting, fuel storage, and welding, affect BLM management of wildfires and fuel loads?
Geology and soils	Would the proposed corridors be prone to geologic hazards (earthquakes, landslides/slumping) that could impact pipelines? How would potential future construction associated with the proposed corridors increase the likelihood of geologic hazards, such as landslides from pipeline construction or seismic activity from increased oil and gas development? How would potential future construction associated with the proposed corridors affect soil compaction, erosion, and soil productivity, particularly in sensitive soils, including biological crusts?
Hazardous materials and wastes	How would proposed corridors and potential project-related hazardous materials and wastes be transported, stored, handled, and disposed? What existing hazardous material sites may lead to contamination within the proposed corridors?
Land use and realty	How would the project affect corridors, ROWs, and other land use authorizations? How would the project affect agricultural lands?
Livestock grazing	How would vegetation removal and surface disturbance temporarily and permanently affect acres with suitable forage for grazing and the available animal unit months within each allotment crossed by the proposed corridors, temporarily and permanently? How would the potential project impact the various range improvements it intersects during construction?
Mineral resources	How would the proposed corridors affect existing and potential mineral development operations in the planning area?
Noise	How would noise generated by construction, operation, and maintenance of the potential projects affect sensitive receptors, and what impacts could remain after mitigation is applied?
Paleontological resources	How would construction related to ground-disturbing activities affect known or unknown paleontological resources? How would an increase in human activity during and after construction affect known and unknown paleontological resources?
Public health and safety	What health and safety risks would workers and the public be directly exposed to from the proposed corridors or during construction and operations of potential projects? What impacts to resources from the proposed corridors or potential projects would indirectly lead to worker or public health and safety risks?

Resource Area	Issues
Recreation	How would the proposed corridors affect recreation management areas, recreation resources, special recreation management areas, and extensive recreation management areas?
	How would the long-term presence of aboveground facilities and access roads affect recreational experience and access?
	How would construction, operations, and maintenance activities in the ROW affect recreational experience and access?
	How would restricting all ROWs and associated roads to energy-related vehicles only affect recreation resources and all other BLM resources given strong concern regarding route densities?
Socioeconomics	How could potential future projects affect local economic conditions?
	How could potential future projects affect state and local tax revenues?
	How could potential future projects affect demands for housing and public services?
	How could future projects affect private land values?
	How could the proposed corridors affect other industries?
	How could the proposed corridors affect nonmarket values?
	How could the proposed corridors affect environmental justice communities?
Special designations	How would proposed corridor clearing and surface disturbance affect the relevant and important values of areas of critical environmental concern?
	How would proposed corridor clearing and surface disturbance affect designated wilderness study areas?
Transportation	How would the potential project affect existing transportation corridors or public access?
Vegetation	How would vegetation within corridors recover over time after construction?
	How would corridor maintenance affect vegetative cover during the life of the project?
	Would the project cause the introduction and spread of invasive plants and noxious weeds? If so, how would the introduction of invasive plants and noxious weeds affect revegetation success?
	If special-status plant species are present in or near the proposed corridors, how would populations be affected?
Visual resources	How would construction activity and the long-term presence of the proposed corridors affect the analysis area's viewshed and sensitive viewing locations?
Water	Would construction of future projects in the proposed corridors lead to increases in erosion and resultant sedimentation with the potential to affect water quality? What are the local area and downstream impacts of potential increases in salinity, including in the Colorado River Basin?
	Would construction activities associated with future projects (including hydrostatic testing) increase the risk of surface water or groundwater (including seeps and springs) contamination from chemicals and other hazardous materials?
	Would water-consumptive activities associated with future projects affect the availability and quality of water resources, including streams, groundwater wells, springs, and seeps? What would the water quality and/or quantity impacts be from hydrostatic testing and other water-consumptive activities?
	Would future projects result in the net loss of wetland areas?
	Would future projects lead to the alteration of stream channels and drainage flows and, ultimately, stream classification, groundwater recharge rates, and surface runoff rates?
	Do the proposed corridors overlap with eligible or designated wild and scenic rivers, and, if so, would it affect the classification or alter the eligibility of this resource?
Wild horses	Would wild horses be affected by fragmentation, reduced access to water, open trenches, and vehicle traffic during construction?
	Would wild horse grazing affect revegetation efforts within corridors?

Resource Area	Issues
Wildlife and fisheries	How would construction and operations affect big game movement, migration routes, and parturition areas?
	How would construction and operations affect raptor and migratory bird nesting activities?
	Would construction across stream channels or other waters or both affect native fisheries/aquatic resources because of sedimentation, turbidity, and increase in salinity?
	Would water withdrawals for hydrostatic testing and dust abatement reduce fisheries habitat? How much water would be used? What is the source of the water? How would it be disposed of postconstruction and testing, etc.?
	Would clearing vegetation decrease sage-grouse reproduction and recruitment, resulting in population declines at both the site scale and subpopulation scale? Would decreased availability of cover and forage during winters contribute to long-term population declines? Would pipeline corridors increase potential predation? Would pipeline corridors increase habitat fragmentation that limits sage-grouse use?
	Would the project (clearing habitat, fragmentation, roads, increased activity, invasive weeds) result in special-status species population declines? Would pipeline corridors increase special-status species habitat fragmentation or predation of special-status species? How would water use, noise, and increased activity impact special-status species?

ALTERNATIVES CONSIDERED

In developing the alternatives, the State of Wyoming conducted numerous desktop analyses and held meetings with federal, state, county, and private landowners over several years to determine the placement of 25 segments that make up the proposed corridors. The BLM also compiled information provided in the internal and public scoping process to develop reasonable alternatives. The comparative analysis between alternatives establishes a framework for decision-makers to understand important trade-offs and identify the most effective way to meet the purpose and need.

As part of the alternative development process, the state located corridor segments in existing BLM-designated utility corridors or adjacent to existing pipeline ROWs to collocate the proposed corridors to the extent possible. Additionally, corridors were routed to avoid resources and regional concerns. The BLM decided to carry forward for analysis two alternatives that combined multiple preliminary alternatives that were the most effective at addressing identified resource issues.

Alternative A (referred to hereafter as the *No Action*) consists of the continued management of BLM lands under current RMPs without designating new statewide continuous corridors reserved for the use and the transport of carbon dioxide (CO_2), EOR products, and other compatible uses. Future pipeline ROW applications and the specific routes for pipelines or other compatible infrastructure would be evaluated on a case-by-case basis, and existing designated corridors in BLM RMPs would be used as appropriate for these ROW applications.

Under Alternative B (referred to hereafter as the *Proposed Action*), the BLM would designate corridors on BLM-administered lands only. Alternative B would consist of 1,914 miles of proposed corridors that would connect oil and gas fields that are candidates for EOR and sources of CO_2. Of this total, 1,105 miles would cross BLM lands, 690 miles would cross private surface, 118 miles would cross state lands, and 1 mile would cross U.S. Forest Service surface. The 1,105 miles on BLM land would cross lands managed by the Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland BLM Field Offices. Of the 1,105 miles on BLM lands, approximately 745 miles would be located in current BLM designated utility corridors and approximately 291 miles would be within 0.5 mile of an existing pipeline ROW on BLM lands. The remaining 69 miles would not be located in or near an existing designated corridor.

Proposed corridors on BLM lands that are not within a current BLM-designated utility corridor would require an amendment to one or more BLM RMPs. The amendments would designate a new corridors reserved for transportation of CO_2, EOR products, or other compatible uses. RMP amendments would also be required for those proposed corridors that are within existing designated corridors and that would reserve a portion of the designated corridor exclusively for CO_2 and EOR product pipelines or other compatible uses.

Alternative C (*Resource Conflict Avoidance and Maximize Use of Existing Corridors*) would maximize the use of existing designated corridors and adjust corridor routes as needed to reduce resource impacts, address conflicts with valid existing rights, and collocate infrastructure to minimizing impacts across the landscape. As with Alternative B, the applicable stipulations for existing designated utility corridors in each respective RMP would apply to any new proposed corridors within each BLM field office. Under Alternative C, the BLM would designate pipeline corridors on BLM-administered lands only. Proposed corridors under Alternative C on BLM lands are not within a current BLM-designated utility corridor and would require an amendment to one or more BLM RMPs. The amendments would designate new corridors reserved for the transport of CO_2, EOR products, and other compatible uses.

Alternative D (*Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use*) would maximize the use of existing designated corridors and adjust corridor routes as needed to reduce resource impacts, address conflicts with valid existing rights, and collocate infrastructure to minimizing impacts across the landscape. As with Alternatives B and C, existing stipulations for each respective RMP would apply to any new corridors within each BLM field office. Under Alternative D, the BLM would designate corridors on BLM-administered lands only. Proposed corridors on BLM lands would require an amendment to one or more BLM RMPs. The amendments would designate new corridors reserved for the transport of CO_2, EOR products, and other compatible uses. RMP amendments would also be required for those proposed corridors that are within existing designated corridors and that would reserve a portion of the designated corridor exclusively for CO_2 and EOR product pipelines or other compatible uses.

SUMMARY OF ENVIRONMENTAL EFFECTS

Table ES-2 summarizes and compares environmental effects anticipated from implementing the alternatives considered in the EIS. The No Action (Alternative A) is not included in Table ES-2 because there would be no change in current management conditions for all resource areas. Detailed descriptions of environmental effects are included in Chapter 3.

Table ES-2. Summary and Comparison of Environmental Effects

Resource Area	Alternative B: Proposed Action	Alternative C: Resource Conflict Avoidance and Maximize Use of Existing Corridors	Alternative D: Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
Air quality	Emissions by Alternative B cannot be quantified at this time; however, using surface disturbance as a proxy for fugitive dust, combustion emissions and greenhouse gases (GHGs), Alternative B would have the potential to generate the greatest amount of fugitive dust, combustion emissions, and GHGs. Emissions of GHGs and production from EOR under the alternatives are not expected to differ significantly.	Alternative C would have the potential to generate the least amount of fugitive dust, combustion emissions, and GHGs. Emissions of GHGs and production from EOR under the alternatives are not expected to differ significantly.	Similar to Alternative B in terms of potential to generate the greatest amount of fugitive dust, combustion emissions, and GHGs. Emissions of GHGs and production from EOR under the alternatives are not expected to differ significantly.
Cultural resources	Alternative B has the largest amount of potential surface disturbance and the greatest number of both known (2,239) and estimated (8,676) cultural resources present. Alternative B would have the most potential for impacting cultural resources, including national historic trails (NHT) and other historic trails (four) and sites of specific concern to Native Americans (115 known and 456 projected).	Alternative C would have the least potential for impacting cultural resources because of less potential surface disturbance and because it contains the fewest cultural resources (258 known and 1,110 projected) of the three action alternatives, and specifically lacks any NHT and other historic trails within its proposed corridor.	Alternative D would be similar to Alternative B; however, it would be slightly reduced in comparison because of the fewer number of cultural resources present in the proposed corridors. Alternative D has 1,806 known cultural resources and 7,454 projected cultural resources, including seven resources currently listed on the National Register of Historic Places, five NHT or historic trails, 81 known resources of Native American concern, and a total of 334 projected resources of Native American concern.
Fire and fuel loads	Increased risk of fires and fuels due to development associated with 57,452 acres of new corridor.	Comparatively less than Alternative B, due to development associated with 7,253 acres of new corridor.	Similar to Alternative B, due to development associated with 55,467 acres of new corridor.

Resource Area	Alternative B: Proposed Action	Alternative C: Resource Conflict Avoidance and Maximize Use of Existing Corridors	Alternative D: Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
Geology and soils	Alternative B would have slightly less potential for being prone to geological hazards than Alternative D with approximately 0.4 mile of faults that overlap the corridor and 123.4 acres of land prone to landslides. Alternative B would have the largest potential impact on soil compaction, erosion, soil productivity, and biological soil crusts, with approximately 28,825 acres of disturbed soils that would have a high wind erodibility potential and 16,160 acres that would have a high water erodibility potential. The potential for temporary reduction in soil productivity with 19,762 acres of these soils would be droughty soils, 51,282 acres would have a potential for shallow bedrock, and 9,352 acres would be hydric soils.	Alternative C would have the least potential for being prone to geological hazards because no faults would overlap the proposed corridors and it would contain approximately 4.9 acres of land prone to landslides. Alternative C would have a much smaller potential impact on soil compaction, erosion, soil productivity, and biological soil crusts than the proposed corridors, with approximately 2,712 acres of soils in the corridors that would have a high wind erodibility potential and 1,931 acres that would have a high water erodibility potential. The potential for temporary reduction in soil productivity with approximately 2,225 acres of these soils would be droughty soils, 5,722 acres would have a potential for shallow bedrock, and 1,356 acres would be hydric soils.	Alternative D would have the greatest potential for being prone to geological hazards, with approximately 0.4 mile of faults that overlap the corridor and the most land prone to landslides (137.9 acres). Alternative D would have a slightly smaller impact on soil compaction, erosion, soil productivity and biological soil crusts than Alternative B, with approximately 27,193 acres of soils that would have a high wind erodibility potential and 14,885 acres that would have a high water erodibility potential. The potential for temporary reduction in soil productivity with approximately 17,820 acres of these soils would be droughty soils, 49,037 acres would have a potential for shallow bedrock, and 9,485 acres would be hydric soils.
Hazardous materials and wastes	Minimal direct and indirect impacts from the management of nonproject-related hazardous wastes.	Same as Alternative B.	Same as Alternative B.
Land use and realty	Alternative B is similar to Alternative D in terms of landownership and acreage breakdown; however, it would result in fewer acres of existing ROW and utility corridors: 36,921 acres (64%) as compared to Alternative D. Alternative B is the largest in terms of total acreages and mileage, 57,452 and 1,956, respectively. There would be no conflicts with land use plans. Alternative B would result in similar impacts to agricultural lands as Alternative D (301 acres or 0.5% of corridor).	Alternative C would use the least amount existing ROW acreage (32 acres or <1%). Alternative C is the smallest and would affect the fewest acres and miles, 7,253 and 242, respectively. There would be no conflicts with land use plans. Alternative C would result in the smallest direct impact acquisition of agricultural lands (262 acres); however, this would result in the greatest percentage of agricultural land acquisition for the energy corridor (3.6%).	Alternative D would use the most of all the proposed corridors in terms of total acreage (45,555 acres) and percentage of energy corridors (82%). Alternative D is larger than Alternative B by approximately 2,000 acres and 90 miles. There would be no conflicts with land use plans. Alternative D would result in the greatest direct impact acquisition of agricultural lands (792 acres) for ROW; however, this only constitutes approximately 1.4% of the proposed corridor.

Resource Area	Alternative B: Proposed Action	Alternative C: Resource Conflict Avoidance and Maximize Use of Existing Corridors	Alternative D: Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
Livestock grazing	Acreage-wise, the greatest impacts would occur under Alternative B with temporary removal of up to 32,950 acres of potential forage (6,539 animal unit months [AUMs]), which represents a loss of up to 0.42% of available AUMs across all field offices. No permanent impacts anticipated.	Alternative C would have the least impacts, acreage-wise, with temporary removal of up to 4,798 acres of potential forage (629 AUMs), which represents a loss of up to 0.23% of available AUMs across all field offices. No permanent impacts anticipated.	Impacts would be similar to those under Alternative B with temporary removal of up to 29,933 acres of potential forage (6,447 AUMs), which represents a loss of up to 0.44% of available AUMs across all field offices. No permanent impacts anticipated.
Mineral resources	Alternative B would result in the largest amount of potential future surface disturbance in existing oil and gas fields and oil and gas leases, with approximately 5,854 acres of oil and gas fields and 16,086 acres of existing oil and gas leases (approximately 0.2% of total area in the planning area). Alternative B would result in slightly less potential future surface disturbance in active coal permits and trona areas (135 and 1,018, respectively).	Alternative C would result in a much smaller amount of potential future surface disturbance in existing oil and gas fields and oil and gas leases, with approximately 194 acres of oil and gas fields and 2,549 acres of existing oil and gas leases (approximately 0.05% of total area in the planning area). Alternative C would not affect any active coal permits or trona areas.	Alternative D would result in a slightly smaller amount of potential future surface disturbance in existing oil and gas fields and oil and gas leases, with approximately 5,705 acres of oil and gas fields and 14,804 acres of existing oil and gas leases (approximately 0.2% of total area in the planning area). Alternative D would result in the largest amount of potential future surface disturbance in active coal permits and trona areas (144 and 1,038, respectively).
Noise	Alternative B proposes the largest acreage and noise due to development activities.	Alternative C proposed the fewest acres of new corridors and would, therefore, affect the smallest area.	Alternative D would be similar to Alternative B but with fewer noise impacts.
Paleontological resources	Alternative B has a higher frequency of potential ground-disturbing impacts to paleontological resources than either of the other action alternatives, as noted by acres of higher potential fossil yield classification (PFYC) (50,457). Alternative B has a higher frequency of potential impacts to paleontological resources from increased access from potential projects than either of the other action alternatives because it crosses more acres of PFYC Class U, 3, 4, or 5 geologic units as described above. In addition, less of the acreage available for future access within Alternative B occurs within previously approved corridors that have existing disturbance and require fewer new or improved access roads.	Under Alternative C, corridor acreage available to future ground-disturbing construction projects includes the least acres of higher PFYC of all action alternatives. Alternative C would cross substantially less private land with higher PFYC (5,788).	Corridor acreage available to future ground-disturbing construction projects under Alternative D would include fewer acres of higher PFYC than Alternative B, and a greater percentage of the Alternative D proposed corridors are within currently defined corridors (48,062). Alternative D has the same frequency of potential impacts as Alternative C because the footprint and geologic units crossed would be identical.

Resource Area	Alternative B: Proposed Action	Alternative C: Resource Conflict Avoidance and Maximize Use of Existing Corridors	Alternative D: Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
Public health and safety	Direct impacts to worker and public health and safety would not occur. Indirect impacts to worker and public health and safety could occur from construction and operations of potential pipeline projects.	Same as Alternative B.	Same as Alternative B.
Recreation	Alternative B contains the most recreational resources (90) and the most recreational acres (16,918), which constitutes approximately 29% of the proposed corridor.	Alternative C contains the fewest recreational resources (20) and would result in 2,368 acres of disturbance to recreational resources, which constitutes approximately 33% of the proposed corridors (comprising the greatest percentage of recreational resources).	Alternative D would result in similar impacts to recreational resources as Alternative B because it has slightly fewer recreational resources (86) and would result in disturbance to 14,724 acres to recreational resources, which comprises approximately 27% of the proposed corridor.
Socioeconomics	Alternative B and Alternative D would generally have similar socioeconomic effects. Alternative B and D would have similar impacts to environmental justice populations.	Alternative C would have the least potential among the action alternatives to have adverse indirect effects on other economic activities such as recreation and grazing, and the least potential to affect nonmarket values associated with recreation and environmental characteristics and quality. One potential environmental justice population would be crossed by this corridor.	Impacts would be similar to Alternative B, but with slightly less potential to affect development of other linear infrastructure, such as transmission lines, and the exercise of valid, existing rights. Alternative B and D would have similar impacts to environmental justice populations.
Special designations	Alternative B would result in up to 310 acres of surface disturbance within areas of critical environmental concern (ACECs) in the analysis area. Under Alternative B, up to 15,269.3 acres across five wilderness study areas (WSAs) could be impacted by the proposed corridors.	Alternative C would not impact ACECs in the analysis area. Under Alternative C, up to 2,591.1 acres of the Cedar Mountain WSA could be impacted by the proposed corridors.	Alternative D would result in up to 18.6 acres of surface disturbance within ACECs in the analysis area. Under Alternative D, up to 8,366.4 acres within four WSAs could be impacted by the proposed corridors.
Transportation	Alternatives B and D would have similar effects on traffic volumes.	Alternative C would affect fewer miles of routes and have less of an effect on traffic volumes.	Alternatives B and D would have similar effects on traffic volumes.

Resource Area	Alternative B: Proposed Action	Alternative C: Resource Conflict Avoidance and Maximize Use of Existing Corridors	Alternative D: Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
Vegetation	Alternative B would affect 52,327 acres of shrubland, desert scrub, and grassland within the proposed corridors and 734 acres of developed/disturbed land. Alternative B has the largest area of potential disturbance that could lead to an increase in weed cover. Impacts to special state plant species are provided in Table 3.17-5 and 3.17-6.	Alternative C would affect 6,124 acres of shrubland, desert scrub, and grassland within the proposed corridors and 201 acres of developed/disturbed land. Alternative C would have less potential to spread weeds due to less potential surface disturbance. Impacts to special state plant species are provided in Table 3.17-5 and 3.17-6.	Alternative D would affect 48,935 acres of shrubland, desert scrub, and grassland within the proposed corridors and 1,254 acres of developed/disturbed land. Impacts to invasive species for Alternative D would be similar to Alternative B. Impacts to special state plant species are provided in Table 3.17-5 and 3.17-6.
Visual resources	Alternative B would have the most Class I lands intersected and is the longest (1,956 miles), which would result in the greatest impact to Class I Visual Resource Management (VRM) lands (450,822 acres).	Alternative C, the shortest of the alternatives (242 miles), would result in the least impacts to VRM Class I lands (137,840 acres).	Alternative D would result in less impacts to Class I lands than Alternative B and would result in impacts to 388,779 acres of Class I VRM lands.
Water	Alternatives B and D would have the greatest potential for impacts from erosion because they have similar acreages of highly erodible soils adjacent to water resources within the proposed corridors. Surface disturbance in subwatersheds would be highest under Alternative B, which has the most areas designated as proposed corridors across subwatersheds. Alternative B has the greatest number of subwatersheds with wetlands inside new corridors (wetlands across 333 subwatersheds) and has a similar area of wetlands to Alternative D. Alternatives B and D are similar in their potentials for subwatersheds crossed and net wetlands lost, therefore, their potential impacts are similar.	Alternative C has a lesser potential for erosion and resulting diminutions of water quality due to sedimentation, turbidity, and salinity because its acres of highly erodible soils are approximately one-tenth of the impacts associated with Alternatives B and D. Alternative C would have the least area of proposed corridors designated across 69 hydrologic unit code (HUC)–12 subwatersheds. Alternative C has the smallest area of wetlands within new corridors across 58 HUC-12 subwatersheds.	Alternatives B and D would have the greatest potential for impacts from erosion because they have similar acreages of highly erodible soils adjacent to water resources within the proposed corridors. Alternative D would have similar impacts to Alternative B with a very similar but slightly smaller area designated as proposed corridors across subwatersheds. Alternative D would have the greatest area of wetlands within new corridors. Alternatives B and D are similar in their potentials for subwatersheds crossed and net wetlands lost, therefore, their potential impacts are similar.
Wild horses	Alternative B would affect 15 herd management areas (HMAs), with 433,285 acres out of 3,200,135 acres within the HMAs. Alternative B would have the highest amount of area that could need reclamation and revegetation, with up to 9,659 acres impacted within the HMAs.	Alternative C would affect three HMAs, with 48,770 acres out of 918,889 acres within the HMAs. Alternative C would have the lowest amount of area that could need reclamation and revegetation, with up to 1,029 acres impacted within the HMAs.	Alternative D would affect 15 HMAs, with 362,205 acres out of 3,200,135 acres within the HMAs. Alternative D would have the middle amount of area that could need reclamation and revegetation, with up to 8,204 acres impacted within the HMAs.

Resource Area	Alternative B: Proposed Action	Alternative C: Resource Conflict Avoidance and Maximize Use of Existing Corridors	Alternative D: Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
Wildlife and fisheries	Alternatives B and D would affect the same amount of big game seasonal habitat. Alternative B would remove the most acres of vegetation that provides nesting and foraging habitat to migratory birds, with 52,327 acres of shrubland, desert scrub, and grasslands; 3,082 acres of riparian and wetland; 466 acres of forest and woodland; and 550 acres of cliff, rock, and scree. Development of 1,956 miles of corridors under Alternative B would lead to an increase in vehicle traffic, human presence, and water use that could affect special-status species. There are 22,558.0 acres of priority habitat management area (PHMA) and 34,898.8 acres of general habitat management area (GHMA) crossed by Alternative B.	Alternative C would affect the least amount of big game seasonal habitat and would not cross any migration corridors for mule deer. Alternative C could impact a variety of migratory bird nesting habitats, including 6,124 acres of shrubland, desert scrub, and grasslands; 607 acres of riparian and wetland; and 24 acres of forest and woodland. Alternative C includes 242 miles of proposed corridors, resulting in the least amount of potential impacts from increased vehicle traffic, human presence, and water use that could affect special-status species if corridors are developed. There are 210.9 acres of PHMA and 7,052.5 acres of GHMA crossed by Alternative C.	Alternatives B and D would affect the same amount of big game seasonal habitat. Alternative D could impact a variety of migratory bird nesting habitats, including 48,935 acres of shrubland, desert scrub, and grasslands; 3,360 acres of riparian and wetland; 595 acres of forest and woodland; and 488 acres of cliff, rock, and scree. Alternative D includes 1,866 miles of potential corridors, resulting in vehicle traffic, human presence, and water use that could affect special-status species that would be similar to Alternative B. There are 17,405.9 acres of PHMA and 37,837.3 acres of GHMA crossed by Alternative D.

Summary of Consultation and Coordination

Council on Environmental Quality regulations implementing NEPA allow the lead agency to invite tribal, state, and local governments, as well as federal agencies, to serve as cooperating agencies during the NEPA process. To serve as a cooperating agency, the potential agency or government must have either jurisdiction by law or special expertise relevant to the environmental analysis. Entities that accepted the BLM's invitation and participated as cooperating agencies are listed in Appendix A. Letters to initiate tribal consultation were sent to tribes listed in Appendix A on December 10, 2019. The letters notified the tribes of the proposed project and requested government-to-government consultation between the BLM and the tribes.

The formal public scoping process for the project began on November 15, 2019, with the publication of the notice of intent (NOI) in the *Federal Register*. The BLM also issued a media release and email announcement of the scoping period to the mailing list. The mailing list was developed from the BLM's mailing list, tribal contacts, and other cooperating agencies. The public comment period concluded on December 27, 2019. Cooperating agency scoping meetings were held in Cheyenne, Casper, Thermopolis, and Rock Springs on December 9, 10, 11, and 12, 2019, respectively, a 2:00 p.m. Mountain Standard Time, and a formal public scoping meeting followed directly at 4:00 p.m. Mountain Standard Time. The public scoping meetings provided information on the proposed project and gave members of the public and agency personnel the opportunity to ask questions or make comments. The BLM received a total of 33 submissions from members of the public and the cooperating agencies during the scoping period.

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CHAPTER 1. PURPOSE AND NEED

1.1 INTRODUCTION

The Bureau of Land Management (BLM) Wyoming State Office has prepared these draft resource management plan (RMP) amendments with an associated environmental impact statement (EIS) to analyze the potential direct, indirect, and cumulative effects of potentially establishing new corridors that would create a continuous network through nine BLM planning areas (the planning area) in the state of Wyoming. The RMP amendments would amend the existing Buffalo, Casper, Bighorn Basin, Lander, Pinedale, Rawlins, and Green River RMPs (BLM 1997, 2007, 2008a, 2008b, 2014a, 2015a, 2019a), which allocate resources and provide long-term management goals and objectives for lands and resources administered by the BLM within the nine field offices.

The analysis in the EIS has been conducted in accordance with the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [USC] 4321 et seq.) and its implementing regulations (40 Code of Federal Regulations [CFR] 1500–1508). The applicant proposing the Wyoming Pipeline Corridor Initiative (WPCI) is the State of Wyoming Governor's Office (applicant). The lead federal agency is the BLM Wyoming State Office.

The Council on Environmental Quality's (CEQ's) regulations implementing NEPA allow the lead agency to invite tribal, state, and local governments, as well as federal agencies, to serve as cooperating agencies during the NEPA process. To serve as a cooperating agency, the potential agency or government must have either jurisdiction by law or special expertise relevant to the environmental analysis. Forty-eight federal and state agencies as well as county commissions and conservation districts were invited to be cooperators (Appendices A and C).

1.2 BACKGROUND

The goal of the WPCI is to establish corridors on public lands dedicated to future use for pipelines and other compatible uses. The initiative's objective is to stimulate economic development by connecting oil fields that are good candidates for enhanced oil recovery (EOR) with sources of carbon dioxide (CO_2) that could be used for EOR. Current data and literature suggest that there are more than 90 potential fields suitable for CO_2 flooding with recoverable reserves in excess of 1.5 billion barrels. By their very nature, EOR projects can store large quantities of CO_2, and because CO_2 used during EOR is a purchased commodity, it is recycled continuously in the reservoir rather than vented to the atmosphere. EOR projects can add value by maximizing oil recovery from existing, previously disturbed fields, while at the same time offering a bridge to a reduced carbon emissions future.

If land use plan amendments are approved by the BLM, the WPCI would result in a system of corridors that is integrated with BLM's existing corridor network for the construction of pipelines for the transport of CO_2, EOR products, and other compatible uses on federal lands throughout the state of Wyoming. Identifying corridors across federal lands under the direction of various field offices in Wyoming would lead to greater consistency among the individual field offices and would comprehensively address the desire to manage the location of future pipeline construction and operation activities across field offices, thereby minimizing the aggregate impact of future projects on federal lands in Wyoming.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.3.1 Bureau of Land Management

The purpose for the BLM action is to designate corridors for the preferred location of future pipelines associated with the transport of CO_2, EOR products, and other compatible uses, and to incorporate the designated corridors into the various BLM RMPs within the state of Wyoming. The designation of corridors would streamline environmental reviews of potential projects proposed within the corridors because NEPA documents could tier to this analysis. The BLM action responds to the need to reverse the downward trend of declining oil production by stimulating economic development through EOR. Within the state, CO_2 sources are abundant, but current constraints impacting increased CO_2 flooding center around a limited network and capacity of CO_2 pipelines.

The BLM will limit the amendment of RMPs to changes indicated by the action alternatives and will not address other uses or the management of other resources, although the BLM will consider and analyze effects from increased use on other managed resources. The BLM will continue to manage other resources in the affected field office planning areas under the pre-existing terms, conditions, and decisions in the applicable RMPs for those other resources. The approved RMP amendments will not include planning and management decisions for lands or minerals administered by other federal agencies, lands that are privately owned, or lands owned by the State of Wyoming or local governments. Additionally, the BLM is not making any decisions related to the leasing, development, extraction of federal fluid minerals, or any other infrastructure development.

1.4 DECISION TO BE MADE

Based on the information in the EIS, the BLM will decide whether to approve, approve with modifications, or not approve some or all of the RMP amendments described in the Proposed Action or an alternative. A record of decision (ROD) will be prepared and signed to disclose the BLM's final decision as well as any mitigation measures.

1.5 REGULATORY SETTING

1.5.1 Federal Permits, Authorizations, and Coordination

1.5.1.1 Advisory Council on Historic Preservation

Section 106 of the National Historic Preservation Act requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. The BLM is still consulting with the ACHP for participation in Section 106 consultation.

1.5.1.2 U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) is responsible for ensuring compliance with the Endangered Species Act (ESA). Section 7 of the ESA, as amended, states that any project authorized, funded, or conducted by any federal agencies is not likely to "jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined . . . to be critical" (16 USC 1536(a)(2)). The BLM is responsible for determining if any federally listed or proposed species, or their designated critical habitat, may be affected by the proposed corridors; if any may be affected, the BLM must ensure no jeopardy through consultation with the USFWS. If, upon review of best available scientific and commercial data, the BLM

determines that any federally listed species or their designated critical habitats may be affected by the project, the BLM is required to prepare a biological assessment to identify the nature and extent of adverse impact, and to recommend mitigation measures that would avoid the habitat and/or species or that would reduce the potential impact to acceptable levels. If, however, the BLM determines that no federally listed or proposed endangered or threatened species or their designated critical habitat would be affected by the project, no further action by the BLM is necessary.

1.5.2 Conformance with Land Use Plans and Plan Amendments

1.5.2.1 Bureau of Land Management Resource Management Plans

BLM-administered lands are managed with direction provided in RMPs that establishes the goals and objectives for the management of the resources and land uses. BLM RMPs must be prepared in accordance with FLPMA and regulations at 43 CFR 1600. The planning area includes land administered by the following:

- Buffalo Field Office approved RMP (amended 2019) (BLM 2015b)
- ROD and approved Casper RMP (amended 2009, 2010, 2011, and 2012) (BLM 2007)
- Big Horn Basin Resource Management Plan Revision Project (BLM 2015a)
- ROD and approved Kemmerer RMP (BLM 2010a)
- ROD and approved RMP for the Lander Field Office (BLM 2014a)
- ROD and approved Pinedale RMP (BLM 2008a)
- ROD and approved Rawlins RMP (amended 2012, 2013, 2014, and 2018) (BLM 2008b)
- ROD and Green River RMP (BLM 1997)

Actions that result in a change in the scope of resource uses, terms, conditions, and decisions of federal agency land use plans, including the designation of one or more of the corridors described for the WPCI, would require amendment of one or more of these plans. The BLM does not anticipate needing to amend the ROD and approved RMP amendments for the Rocky Mountain Region Greater Sage-Grouse Conservation Strategy (BLM 2015c). As required by 43 CFR 1610.2(c), the BLM notified the public of potential amendments to RMPs in a notice of intent (BLM 2019b). See Chapter 2 for additional details regarding the proposed plan amendments.

1.5.2.2 County Land Use Plans

County land use plans were reviewed to ensure that the proposed corridors would not conflict with existing land use plans and policies for energy development. Upon review, the proposed corridors would be consistent with the goals and objectives of county land use plans and would not result in conflicts with existing land use plans.

1.5.3 Permits, Authorizations, and Coordination

The proposed corridors would be designated only on BLM land. However, to use those corridors, future site-specific pipeline right-of-way (ROW) projects would need to cross state, private, and non-BLM federal land. Accordingly, any subsequent proposed construction project within the corridors would be subject not only to BLM permitting requirements, but also to other federal, state, and local permit requirements. An applicant would be required to obtain all of these federal, state, and local permits and approvals prior to construction within the corridors. Additionally, any future proposed ROW projects within the designated corridors would be required to conduct project-specific NEPA analysis and disclosure.

1.6 ISSUES

In accordance with NEPA (40 CFR 1501.7), the BLM initiated the scoping process to provide for an early and open process to gather information from the public and interested agencies on the issues and alternatives to be evaluated in the EIS. Issues were identified from public comments, cooperating agency comments, and internal BLM scoping. Appendix C contains detailed information on the scoping process. Issues carried forward for detailed analysis are provided at the beginning of each resource's section in Chapter 3.

CHAPTER 2. DESCRIPTION OF ALTERNATIVES

2.1 INTRODUCTION

NEPA requires federal agencies to evaluate a reasonable range of alternatives for a proposed action when it involves unresolved conflicts concerning alternative uses of available resources. The range of alternatives must meet the purpose and need while addressing environmental effects or conflicts. Reasonable alternatives are defined by the CEQ as those that are technically and economically feasible. NEPA also requires that a no action alternative be evaluated as a baseline for comparing the other analyzed alternatives.

Alternatives are developed to address issues or concerns raised during internal and public scoping. If an alternative is suggested that does not meet the purpose of and need for the project, does not provide benefits over an alternative already being considered, or is not economically or technically feasible, a detailed analysis of that alternative is not required. However, a rationale for eliminating the alternative from detailed analysis must be provided. The alternatives development and evaluation process for this project are described in the following sections.

2.2 ALTERNATIVES DEVELOPMENT AND EVALUATION PROCESS

In developing the Proposed Action, the State of Wyoming conducted numerous desktop analyses and held meetings with federal, state, county, and private landowners over several years to determine placement of 25 segments that make up the proposed corridors. The state located corridor segments in existing designated BLM utility corridors or adjacent to existing pipeline ROWs to collocate the proposed corridors to the extent possible. Additionally proposed corridors were routed to minimize impacts to sensitive resources.

The BLM developed two additional action alternatives for analysis, varied from the State of Wyoming's proposal, to provide a range of alternatives that compare the impacts and address resource issues that were identified during the scoping process.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Alternatives considered but eliminated from detailed analysis included alternatives that modified the corridor widths, varied management requirements within proposed new corridors, or incorporated additional stipulations beyond current RMP stipulations. The alternatives analyzed in detail address impacts through re-routing around sensitive resources and/or use existing designated corridors and RMP stipulations.

2.4 ALTERNATIVES CARRIED FORWARD FOR DETAILED ANALYSIS

2.4.1 Alternative A: No Action

Alternative A (referred to hereafter as the No Action) would consist of the continued management of BLM lands under current RMPs without designating new statewide corridors reserved for the transport of CO_2, EOR products, and other compatible uses. Potential project ROW applications and the specific

routes for infrastructure would be evaluated on a case-by-case basis. Potential project proponents would have the opportunity to use existing corridors designated in existing BLM RMPs or deviate from the existing corridors to meet the goals of the potential project.

2.4.2 Alternative B: Proposed Action

2.4.2.1 Background

Alternative B (referred to hereafter as the Proposed Action) is the WPCI as developed by the State of Wyoming. Alternative B would create a network of new corridors through nine BLM planning areas in the state of Wyoming (Table 2.4-1). As of 2019, CO_2 is being injected into seven fields in Wyoming to recover oil that has been left in the ground during conventional production (see Appendices D and I). The oil currently being produced by using CO_2 is unrecoverable using conventional production techniques (i.e., primary production or water-flooding). Pipeline infrastructure exists in these areas; however, this alternative would facilitate additional routes into new areas.

Naturally occurring sources of CO_2 are found in the western portion of the state in numerous hydrocarbon reservoirs and can be produced in quantities sufficient to support EOR. Two of these reservoirs currently serve as the source CO_2 for ongoing EOR projects. Additionally, human-made sources of CO_2, mainly power plants, can be used for EOR projects.

Alternative B would consist of 1,914 miles of proposed pipeline corridors that would facilitate potential projects that would connect oil fields that are candidates for EOR and sources of CO_2. Of this total, 1,105 miles would cross BLM lands, 690 miles would cross private surface, 118 miles would cross state lands, and 1 mile would cross U.S. Forest Service (USFS) surface. The 1,105 miles on BLM land would cross lands managed by the Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland BLM Field Offices. Of the 1,105 miles on BLM lands, approximately 745 miles would be located in current designated BLM utility corridors and approximately 291 miles would be within 0.5 mile of an existing pipeline ROW on BLM lands. The remaining 69 miles would not be located in or near a pipeline ROW.

Under Alternative B, the BLM would designate proposed corridors on BLM-administered lands only. Proposed corridors on BLM lands that are not within a current BLM-designated utility corridor would require an amendment to one or more BLM RMPs. The amendments would designate a new pipeline corridor reserved for transportation of CO_2, EOR products, or other compatible uses. The amendments would also reserve a portion of the existing designated corridors exclusively for CO_2 and EOR product pipelines or other compatible uses.

2.4.2.2 Proposed Corridor Location

Two size categories of corridors are proposed as part of Alternative B. Trunk corridors would be 300 feet wide and lateral corridors would be 200 feet wide. The proposed corridors are divided into 25 segments based on their corridor type and the regions they would service within the state. Table 2.4-1 provides a description of the location and status of each of the 25 segments. Appendix G provides a graphical depiction of the corridors.

2.4.2.3 Future Potential Corridor Development

Development, NEPA permitting, construction, and operation of potential projects would be conducted by individual project proponents inside the proposed corridors. Proponents would fund the cost of site-specific NEPA, and the BLM and state would require proponents to obtain all federal, state, and local permits before constructing within the proposed corridors. Site-specific NEPA would also be required for any potential project, and all potential projects within the proposed corridors would be subject to all applicable RMP decisions mandated for corridors in the RMP for the respective BLM field office where the proposed corridors are located (Appendix E). A brief description of future potential project elements and activities can be found in Appendix D.

2.4.3 Alternative C: Resource Conflict Avoidance and Maximize Use of Existing Corridors

Alternative C would minimize the miles of new corridors designated, maximize the use of existing designated corridors, address conflicts with valid existing rights (e.g., transmission substations or active mines), and collocate infrastructure to minimizing impacts across the landscape (see Table 2.4-1). As with Alternative B, the applicable stipulations for existing designated utility corridors in each respective RMP would apply to any new proposed corridors within each BLM field office. New corridors would be created and reserved for the transport of CO_2, EOR products, and other compatible uses.

This alternative was developed using the following rationale:

- Any proposed corridor segments from Alternative B that were located in greater sage-grouse (*Centrocercus urophasianus*) priority habitat management areas (PHMA) were eliminated, and it was assumed that future projects needing access across a PHMA would use existing designated corridors. If a proposed corridor segment crossed a PHMA and there was no existing designated corridor that would provide access to the same destination, a new re-routed proposed corridor segment was developed to avoid the PHMA if possible. If that was not possible, the proposed corridor was dropped entirely.
- Any proposed corridor segments from Alternative B that crossed valid existing rights, special designations, national historic trails (NHT), areas managed as BLM Visual Resource Management (VRM) II, or any other resources that are incompatible with potential infrastructure within the proposed corridors were dropped. It was assumed that future projects needing access across these areas would use existing designated corridors.

Any of the proposed corridor segments from Alternative B occurring within existing designated corridors would be managed per existing corridor requirements and would not be dedicated to CO_2, EOR products, or other compatible uses. The net result would be the same as eliminating that proposed corridor segment because other utilities could continue to use the full extent of the existing corridors. Therefore, only the new proposed corridors under Alternative C would be those segments located outside of existing designated corridors, and these corridors would be dedicated for transportation of CO_2, EOR products, or other compatible uses. The corridor width would be 300 feet for trunk lines and 200 feet for lateral lines.

Under Alternative C, the BLM would designate pipeline corridors outside already designated existing corridors in current RMPs on BLM-administered lands only. Proposed corridors under Alternative C on BLM lands are not within a current BLM-designated utility corridor and would require an amendment to one or more BLM RMPs. These amendments would designate a new pipeline corridor reserved for transportation of CO_2, EOR products, or other compatible uses.

2.4.4 Alternative D: Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use

Alternative D would maximize the use of existing designated corridors and adjust proposed corridor routes as needed to reduce resource impacts, address conflicts with valid existing rights (e.g., transmission substations, active mines), and collocate infrastructure to minimize impacts across the landscape (see Table 2.4-1). As with Alternatives B and C, existing stipulations for each respective RMP would apply to any new proposed corridors within each BLM field office.

This alternative was developed using the following rationale:

- Any proposed corridor segments from Alternative B that were located in greater sage-grouse PHMA were re-routed to fall within existing designated corridors. If a corridor segment crossed a PHMA and could not be re-routed into an existing designated corridor, the segment was re-routed to avoid the PHMA or dropped entirely.
- Any proposed corridor segments from Alternative B that crossed valid existing rights, special designations, NHT, areas managed as BLM VRM Class II, or any other resources that are incompatible with potential infrastructure within the proposed corridors were dropped.

All proposed corridors either new or within existing designated corridors on BLM lands would be dedicated for transportation of CO_2, EOR products, or other compatible uses, and any change to this designated use would require an analysis through a new EIS process. The corridor width would be 300 feet for trunk lines and 200 feet for lateral lines.

Under Alternative D, the BLM would designate pipeline corridors on BLM-administered lands only. Proposed corridors on BLM lands that are not within a current BLM-designated utility corridor would require an amendment to one or more BLM RMPs. The amendments would designate new corridors reserved for transportation of CO_2, EOR products, or other compatible uses and would also reserve a portion of the existing designated corridors exclusively for CO_2 and EOR product pipelines or other compatible uses.

2.5 AGENCY PREFERD ALTERNATIVE

In accordance with BLM planning regulations at 43 CFR 1610.4–7, the BLM has identified Alternative D as the agency preferred alternative.

Table 2.5-1. Alternatives Comparison Matrix

Segment	Type	BLM Field Offices	Alternative B: Proposed Action	Alternative C: Resource Conflict Avoidance and Maximize Use of Existing Corridors	Alternative D: Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
1	Lateral	Kemmerer, Rawlins, Rock Springs	144 miles in Lincoln, Sublette, and Sweetwater Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	Segment dropped	157 miles in Lincoln, Sublette, and Sweetwater Counties. Primarily in existing designated corridors; partial re-route to existing designated corridor to avoid resource concerns. Dedicated use to transport CO_2 and EOR products and other compatible uses.
2	Lateral	Rawlins, Rock Springs	125 miles in Carbon and Sweetwater Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	2 miles in Carbon County. Minor re-route around existing valid rights. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses.	125 miles in Carbon and Sweetwater Counties. Primarily in existing designated corridor; minor re-route around existing valid rights. Dedicated use to transport CO_2 and EOR products and other compatible uses
3	Trunk	Lander, Rawlins	50 miles in Fremont and Sweetwater Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	4 miles in Sweetwater County. Corridor segment connects existing designated corridors. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses.	51 miles in Fremont and Sweetwater Counties. Primarily in existing designated corridor; new corridor segment connects existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses.
4	Trunk	Cody, Lander, Rawlins, Rock Springs, Worland	323 miles in Big Horn, Hot Springs, Fremont, Sweetwater, and Washakie Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	44 miles in Big Horn, Park, and Washakie Counties. New corridor connecting existing designated corridors and oil and gas fields. New corridors dedicated use to transport CO_2 and EOR products and other compatible uses.	323 miles in Big Horn, Hot Springs, Fremont, Sweetwater, and Washakie Counties. Primarily in existing designated corridors; new corridor connects existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses.
5	Lateral	Pinedale, Rock Springs	123 miles in Sublette and Sweetwater Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	42 miles in Sublette County. Portions of segment cross greater sage-grouse (*Centrocercus urophasianus*) PHMAs and therefore dropped. New corridor connecting existing designated corridors and oil and gas fields. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses.	47 miles in Sublette County. Portions of segment cross greater sage-grouse PHMA and therefore dropped. New corridor connecting existing designated corridors and oil and gas fields. Dedicated use to transport CO_2 and EOR products and other compatible uses.
6	Trunk	Casper, Rawlins	85 miles in Carbon and Natrona Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	1 mile in Carbon County. Minor re-route around existing valid rights. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses	93 miles in Carbon and Natrona Counties. Re-routed to existing designated corridors; minor re-route around existing valid rights. Dedicated use to transport CO_2 and EOR products and other compatible uses.

Segment	Type	BLM Field Offices	Alternative B: Proposed Action	Alternative C: Resource Conflict Avoidance and Maximize Use of Existing Corridors	Alternative D: Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
7	Trunk	Lander, Rawlins	59 miles in Carbon, Fremont, and Sweetwater Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	27 miles in Carbon, Fremont, and Sweetwater Counties. Minor re-routes around resources of concern. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses	60 miles in Carbon and Fremont Counties. Re-routed to existing designated corridors and around resources of concern. Dedicated use to transport CO_2 and EOR products and other compatible uses.
8	Lateral	Lander	38 miles in Fremont and Sweetwater Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	Segment dropped	38 miles in Fremont and Sweetwater Counties. In an existing designated corridor. Dedicated use to transport CO_2 and EOR products and other compatible uses.
9	Lateral	Lander	44 miles in Fremont County. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	Segment dropped	44 miles in Fremont County. In an existing designated corridor. Dedicated use to transport CO_2 and EOR products and other compatible uses.
10	Lateral	Casper, Lander	104 miles in Fremont and Natrona Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	18 miles in Natrona County. Re-routed around resource concerns. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses.	57 miles in Converse and Natrona Counties. Re-routed around resource concerns. Dedicated use to transport CO_2 and EOR products and other compatible uses.
11	Trunk	Casper, Lander	69 miles in Fremont and Natrona Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	Segment dropped	71 miles in Fremont and Natrona Counties. Re-routed to existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses
12	Lateral	Lander, Casper	56 miles in Fremont and Natrona Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	5 miles in Natrona County. Corridor segment connects existing designated corridors. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses	71 miles in Fremont and Natrona. Re-routed to existing designated corridors and new portion connections existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses
13	Lateral	Lander	28 miles in Fremont County. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	Segment dropped	28 miles in Fremont County. In an existing designated corridor. Dedicated use to transport CO_2 and EOR products and other compatible uses.

Segment	Type	BLM Field Offices	Alternative B: Proposed Action	Alternative C: Resource Conflict Avoidance and Maximize Use of Existing Corridors	Alternative D: Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
14	Lateral	Lander	23 miles in Fremont County. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	Segment dropped	23 miles in Fremont County. In an existing designated corridor. Dedicated use to transport CO_2 and EOR products and other compatible uses.
15	Lateral	Casper, Lander	53 miles in Fremont and Natrona Counties. As described in Alternative B; dedicated use to transport CO_2 and EOR products and other compatible uses.	11 miles in Fremont and Natrona Counties. Corridor segment connects existing designated corridors; minor re-routes around resource concerns. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses.	54 miles in Fremont and Natrona Counties. Primarily in existing designated corridor, new corridor segment connects existing designated corridor; minor re-routes around resource concerns. Dedicated use to transport CO_2 and EOR products and other compatible uses.
16	Lateral	Buffalo, Casper	75 miles in Johnson and Natrona Counties. As described in Alternative B; dedicated use to the transport of CO_2, EOR products, and other compatible uses.	Segment dropped	72 miles in Johnson and Natrona Counties. Primarily in existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses.
17	Trunk	Buffalo, Casper	123 miles in Johnson and Natrona Counties. As described in Alternative B; dedicated use to the transport of CO_2, EOR products, and other compatible uses.	Segment dropped	123 miles in Johnson and Natrona Counties. Primarily in existing designated corridors; minor re-routes to avoid resource concerns. Dedicated use to transport CO_2 and EOR products and other compatible uses.
18	Lateral	Buffalo	65 miles in Campbell and Johnson Counties. As described in Alternative B; dedicated use to the transport of CO_2, EOR products, and other compatible uses.	Segment dropped	65 miles in Campbell and Johnson Counties. Primarily in existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses.
19	Trunk	Cody, Worland	118 miles in Big Horn, Hot Springs, and Park Counties. As described in Alternative B; dedicated use to the transport of CO_2, EOR products, and other compatible uses.	34 miles in Hot Springs County. New corridor segment connects existing designated corridors. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses	118 miles in Big Horn, Hot Springs, and Park Counties. Primarily in existing designated corridors, new corridor segment connects existing designated corridor; minor re-routes to avoid resource concerns. Dedicated use to transport CO_2 and EOR products and other compatible uses.
20	Lateral	Worland	39 miles in Big Horn, Hot Springs, and Washakie Counties. As described in Alternative B; dedicated use to the transport of CO_2, EOR products, and other compatible uses.	Segment dropped	39 miles in Big Horn, Hot Springs, and Washakie Counties. In existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses.

Segment	Type	BLM Field Offices	Alternative B: Proposed Action	Alternative C: Resource Conflict Avoidance and Maximize Use of Existing Corridors	Alternative D: Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
21	Lateral	Cody, Worland	105 miles in Hot Springs and Park Counties. As described in Alternative B; dedicated use to the transport of CO_2, EOR products, and other compatible uses.	36 miles in Park County. New corridor segment connects existing designated corridors; minor re-routes around resource concerns. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses	103 miles in Hot Springs and Park Counties. Primarily in existing designated corridor, new corridor segment connects existing designated corridor; minor re-routes around resource concerns. Dedicated use to transport CO_2 and EOR products and other compatible uses
22	Lateral	Cody, Worland	24 miles in Big Horn County. As described in Alternative B; dedicated use to the transport of CO_2, EOR products, and other compatible uses.	5 miles in Big Horn County. New corridor segment connects existing designated corridors. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses	24 miles in Big Horn County. Primarily in existing designated corridors; new corridor segment connects existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses
23	Lateral	Cody	31 miles in Park County. As described in Alternative B; dedicated use to the transport of CO_2, EOR products, and other compatible uses.	Segment dropped	30 miles in Park County. Primarily in existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses.
24	Lateral	Cody	26 miles in Park County. As described in Alternative B; dedicated use to the transport of CO_2, EOR products, and other compatible uses.	Segment dropped	26 miles in Park County. In existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses.
25	Lateral	Cody	26 miles in Big Horn County. As described in Alternative B; dedicated use to the transport of CO_2, EOR products, and other compatible uses.	10 miles in Big Horn County. New corridor segment connects existing designated corridors. New corridor dedicated use to transport CO_2 and EOR products and other compatible uses	26 miles in Big Horn County. Primarily in existing designated corridors; new corridor segment connects existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

3.1 INTRODUCTION

This chapter describes the existing environment and trends of the area that would be affected by Alternative A (No Action), Alternative B (Proposed Action), and two additional alternatives, Alternatives C and D, and discloses the potential effects of all alternatives. The data used to describe the affected environment and to disclose environmental effects were collected from agency geospatial datasets, field studies, and modelled scenarios based on historic data. For the purpose of this analysis, the assumption was made that future potential development of the corridors would result in the entire width of the corridor being disturbed and that increased EOR development would occur. However, the corridors would not be completely disturbed at any single point in time but would be sequentially disturbed and reclaimed as potential projects are proposed.

Under Alternative B and Alternative D, all proposed corridors, both outside of and within existing designated corridors, would be designated exclusively for the transport of CO_2, EOR products, and other compatible uses. By reserving this right within existing corridors, the area of these new designated corridors would be developed specifically for the transport of CO_2, EOR products, and other compatible uses. That would effectively remove that area of the existing corridor from any other infrastructure development not compatible with the designated use. To effectively analyze this, this EIS includes impact calculations of these areas of overlap of new proposed corridors within existing designated corridors.

Under Alternative C, proposed corridors within existing designated corridors would not be designated exclusively for the transport of CO_2, EOR products, and other compatible uses; therefore, those segments that would fall within existing designated corridors are not included in Alternative C or in the Alternative C analysis because there would be no change to existing designated corridors. Development of these areas is already analyzed in the BLM RMPs associated with existing corridors; therefore, impact calculations only include areas of new proposed corridors outside existing designated corridors.

As noted in Section 1.6, internal and public scoping identified resource issues to be considered for detailed analysis. In this chapter, these issues are organized by relevant major resource areas. Each section presents the issues for analysis, impact indicators used, and existing conditions and analyses needed to address the issues. Impact indicators are the "currency" used to measure changes in the human environment. Indicators may be quantitative or qualitative. For example, a quantitative indicator may be acres of surface disturbance, whereas a qualitive indicator may be predicted change of stream morphological form. Project design features, best management practices (BMPs), and mitigation measures included as part of the state's proposal and compiled from all eight RMPs can be found in Appendix E.

For each resource issue, the analysis describes the following types of effects:

- Direct effects: Effects that are caused by the action and occur at the same time and in the same general location as the action. For the purpose of this analysis, direct effects are those effects that would occur as a result of the designation of new corridors outside existing designated corridors or the change in management within existing designated corridors. Discussions of direct and indirect effects are combined as appropriate.
- Indirect effects: Effects that occur at a different time or in a different location than the action to which the effects are related. For the purpose of this analysis, indirect effects are those effects that would occur from the potential development of the corridors. Further, it is assumed that CO_2-EOR would occur to the reasonably foreseeable extent. Although new injection wells, new production wells, or conversion of wells to injection could occur, data available do not allow the BLM to

predict how many total wells may be necessary to support future CO_2-EOR operations. Where possible, effects are quantified. Discussions of direct and indirect effects are combined as appropriate.

- Unavoidable, adverse effects: Per 40 CFR 1508.20, mitigation measures are measures that could reduce or avoid adverse effects and have not already been incorporated into Alternative B (Proposed Action). Unavoidable, adverse effects are residual effects that would remain after implementation of mitigation measures.

3.2 AIR QUALITY

This section describes the regional climate that contributes to air quality, existing air quality, and climate change and addresses the effects the WPCI may have on air quality.

3.2.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following air quality issues for analysis:

- How would emissions from aboveground facilities, equipment, and vehicles used during pipeline construction and operation affect air quality, including emissions of fugitive dust?
- How would storage of large quantities of CO_2 in the pipeline corridors affect Wyoming's greenhouse gas (GHG) emissions?

Indicators of effects on air quality and GHGs are as follows:

- Discussion of the types of aboveground facilities, equipment, and vehicles to be used during pipeline construction and operation and the types of pollutants they could emit
- Acres of potential surface disturbance from the potential project (as it relates to fugitive dust potential)
- Discussion of EOR technology as it relates to potential contributions to GHG emissions

3.2.2 Affected Environment

3.2.2.1 Climate

Wyoming has a mostly semi-arid climate with large temperature variations because of its geographic diversity and range of elevations (3,100 to 13,800 feet). For most of Wyoming, average summer maximum temperatures range from the upper 70s to the upper 80s (degrees Fahrenheit [°F]), with higher elevations having much lower temperatures. Average winter minimum temperatures are typically in the range of 0°F to 15°F (Frankson et al. 2017). In addition, Wyoming experiences frequent thunderstorms (Frankson et al. 2017) and is windy, especially in the winter when wind speeds can reach up to 40 miles per hour with gusts of up to 60 miles per hour (Curtis and Grimes 2008).

Wyoming has experienced a net warming of 1.4°F since the beginning of the twenty-first century. This warming has been documented in all seasons; winter and summer temperatures have averaged 1.9°F and 1.2°F above the historical average, respectively, since 1995 (Frankson et al. 2017).

3.2.2.2 Air Quality

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) to limit the amount of air pollutant emissions considered harmful to public health and the environment. Standards have been set for six criteria pollutants: carbon monoxide (CO), lead,

nitrogen dioxide (NO_2)[1], ozone[2], sulfur dioxide (SO_2), and particulate matter (PM). States are required to enforce the NAAQS through state implementation plans, which are composed of air quality rules that are applicable to specific stationary sources. Wyoming has established air quality standards for hydrogen sulfides (H_2S), suspended sulfates (SO_3), fluorides (measures as hydrogen fluoride [HF]), and odors. The EPA assigns classifications to geographic areas based on monitored NAAQS concentrations. If the air quality in a geographic area meets the NAAQS for a criteria pollutant, it is called an attainment area for that pollutant. If the air quality in a geographic area does not meet the NAAQS for a criteria pollutant, it is called a nonattainment area for that pollutant.

Air quality in Wyoming is generally good. The proposed corridors are located in attainment areas for all criteria pollutants, with the exception of corridors in portions of three counties. In 2012, the EPA designated all of Sublette County, the northeast portion of Lincoln County, and the northwest portion of Sweetwater County as an 8-hour ozone (2008 standard) nonattainment area, collectively known as the Upper Green River Basin Ozone Nonattainment Designation Area [UGRB]). The UGRB nonattainment area is classified as marginal. The UGRB was considered to be in attainment of the ozone NAAQS by the EPA as of July 20, 2015. However, EPA's proposed determination of attainment has not been finalized yet and UGRB is still considered to be in nonattainment (EPA 2015).

The EPA compiles a summary of air emissions data known as the National Emissions Inventory (NEI). The NEI summarizes emissions from four major source types: stationary sources (e.g., agriculture, fuel combustion, and industrial process), mobile sources (e.g., on-road vehicles, nonroad equipment, locomotives, aircraft), fires (e.g., wildfires, prescribed fires, agricultural field burning), and biogenics (naturally occurring emissions from vegetation and soil). The most recent NEI data are from 2014 (EPA 2014). Biogenics and stationary sources were the largest emission sources in Wyoming in 2014, with Sweetwater, Sublette, and Campbell Counties having the highest total emissions of all the counties (EPA 2014). Wyoming's 2014 emissions are summarized in Table 3.2-1.

Table 3.2-1. Wyoming's 2014 Emissions

Pollutant Source	Pollutant (tons/year)							
	CO	Lead	NOx	$PM_{2.5}$	PM_{10}	SO_2	VOCs†	Total
Biogenics	118,413	N/A	16,930	N/A	N/A	N/A	539,515	674,858
Stationary	70,211	< 1	94,797	29,268	184,554	56,078	237,356	672,264
Mobile	140,185	< 1	64,712	2,275	2,824	149	18,180	228,325
Fire	82,465	N/A	891	6,952	8,226	545	19,259	118,338
Total	**411,274**	**2**	**177,330**	**38,495**	**195,604**	**56,772**	**814,310**	**–**

Source: EPA (2014).

Notes: NOx = nitrogen oxide; $PM_{2.5}$ = PM that is 2.5 micrometers in diameter or less; PM_{10} = PM that is 10 micrometers in diameter or less; VOCs = volatile organic compounds; N/A = not applicable.

† Reported as a contributor to ozone.

In general, Wyoming's emissions of criteria pollutants have decreased from 1990 to 2014, with the largest decreases being SO_2 (80.0%) and CO (61.6%) (EPA 2014).

[1] EPA uses NO_2 as the indicator for the larger group of oxides of nitrogen or NO_x. However, emissions are usually reported as NO_x.

[2] Ozone is not directly emitted into the air but is created by chemical reactions between NO_x and volatile organic compounds in the presence of sunlight.

3.2.2.3 Climate Change and Greenhouse Gas Emissions

Climate change refers to any significant change in the measures of climate lasting for an extended period of time. It includes major changes in temperature, precipitation, and wind patterns that occur over several decades or longer. Global warming refers to the recent and ongoing rise in global average temperature near Earth's surface; it is caused mostly by increasing concentrations of GHGs in the atmosphere. Global warming is causing climate patterns to change. However, global warming itself represents only one aspect of climate change. Climate is both a driving force and limiting factor for ecological, biological, and hydrological processes, and influences resource management.

The scientific community accepts that global temperatures have risen at an increased rate and that the likely cause is gases that trap heat in the atmosphere (GHGs). The Intergovernmental Panel on Climate Change (IPCC) concluded that "warming of the climate system is unequivocal" and that "most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations" (IPCC 2007). The IPCC has identified a target worldwide carbon budget to estimate the amount of CO_2 the world can emit while still having a likely chance of limiting global temperature rise to 2 degrees Celsius (°C) above pre-industrial levels. This budget is estimated to be 1 trillion tonnes of carbon; varying amounts of this budget have already been consumed (IPCC 2014).

In 2009, based primarily on the scientific assessments by the U.S. Global Change Research Program, the National Research Council, and the IPCC, the EPA issued a finding that the changes in our climate caused by elevated concentrations of GHGs in the atmosphere are reasonably anticipated to endanger the public health and public welfare of current and future generations (EPA 2009). In declining to control GHGs from motor vehicles, EPA cited the conclusion of the Natural Research Council's 2001 report, *Climate Change Science: An Analysis of Some Key Questions* (National Research Council 2001), to provide context as to how predicting climate change involves a "complex web of economic and physical factors" as follows:

> Our ability to predict future global anthropogenic emissions of GHGs and aerosols; the fate of these emissions once they enter the atmosphere (e.g., what percentage are absorbed by vegetation or are taken up by the oceans); the impact of those emissions that remain in the atmosphere on the radiative properties of the atmosphere; changes in critically important climate feedbacks (e.g., changes in cloud cover and ocean circulation); changes in temperature characteristics (e.g., average temperatures, shifts in daytime and evening temperatures); changes in other climatic parameters (e.g., shifts in precipitation, storms); and ultimately the impact of such changes on human health and welfare (e.g., increases or decreases in agricultural productivity, human health impacts)… Substantial scientific uncertainties limit our ability to assess each of these factors and to separate out those changes resulting from natural variability from those that are directly the result of increases in anthropogenic GHGs. (National Research Council 2001)

Early models of climate change had difficulty addressing the inherent uncertainty discussed in the 2001 National Research Council report. Newer models and assessments have become better in their ability to minimize some of this uncertainty but remain imprecise in being able to predict how, where, and when effects may manifest at multiple scales. The most recent analysis completed by the U.S. Global Change Research Program is described in the 2017 fourth national climate assessment (U.S. Global Change Research Program 2017). This report builds on the 2007 IPCC finding that human influence likely has been the dominant cause of the observed warming since the mid-twentieth century, with the following expanded conclusion:

> Over the last century, there are no alternative explanations supported by the evidence that are either credible or that can contribute more than marginally to the observed patterns. There is no convincing evidence that natural variability can account for the amount of

> and the pattern of global warming observed over the industrial era…In addition, natural cycles within Earth's climate system can only redistribute heat; they cannot be responsible for the observed increase in the overall heat content of the climate system. (U.S. Global Change Research Program 2017)

According to the National Oceanic and Atmospheric Administration Climate Prediction Center,

> Global mean surface temperatures increased nearly 1.8°F from 1890 to 2006." In addition, "the 2017 average global temperature across land and ocean surface areas was 0.84°C (1.51°F) above the twentieth-century average of 13.9°C (57.0°F), making it the third-warmest year on record behind 2016 (warmest) and 2015 (second warmest). Models indicate that average temperature changes are likely to be greater in the northern hemisphere. Northern latitudes (above 24°N) have exhibited temperature increases of nearly 2.1°F since 1900, with nearly a 1.8°F increase since 1970 alone (Lindsey and Dahlman 2020)

The American Meteorological Society also produces annual state of the climate reports. Chapter 7 of the 2017 report discloses the following*:*

> [t]he annual average temperature in 2017 for the contiguous United States (CONUS) was 12.5°C or 1.0°C above the 1981–2010 average—its third warmest year since records began in 1895, 0.2°C cooler than 2016 and 0.4°C cooler than 2012 (Fig. 7.3). The annual CONUS temperature over the 123-year period of record is increasing at an average rate of 0.1°C decade, with the trend increasing since 1970 to 0.3°C decade.
>
> The nationally averaged precipitation total during 2017 was 104% of average, the 20th wettest year in the historical record. The annual CONUS precipitation total is increasing at an average rate of 4.3 mm decade. Outside the CONUS, Alaska had its seventh warmest year (+1.2°C departure) since statewide records began in 1925, and near-median precipitation (104% of average).
>
> Locations across the West, Great Plains, Great Lakes, Deep South, Midwest, and Northeast had a wetter-than-average year in 2017, while areas of the Northern Rockies and Plains were drier than average (Fig. 7.4b). Six states had annual precipitation totals above their 90th percentile, including Michigan, which was record wet, while only North Dakota was below its 10th percentile. Areas of the West, particularly California, experienced significant drought relief in early 2017, with a multiyear drought nearly eradicated due to the heavy winter precipitation. However, the wet winter allowed vegetation to flourish, creating an abundance of fuels for wildfires during the subsequent dry season. In the Northern Plains, a dry spring and summer set the stage for a rapidly expanding and intensifying drought. The year began and ended with about one-quarter of the contiguous U.S. in drought.
>
> The CONUS winter precipitation was 120% of average, its wettest since 1997/98 and ninth wettest on record. Above-average winter precipitation occurred across the West and parts of the Northern Plains and Midwest. Nevada and Wyoming each had their wettest winter. Spring 2017 was tenth wettest for the CONUS, with 119% of average precipitation. Above-average precipitation occurred across the Northwest, Central Plains, Midwest, Northeast,
>
> For the CONUS, ten months in 2017 were warmer than their respective 1981–2010 average. Every state, except Washington, had a warmer-than-average annual temperature (Fig. 7.4a). Arizona, Georgia, New Mexico, North Carolina, and South Carolina were each record warm. (Bissolli et al. 2018)

Temperatures in western Wyoming are expected to increase by 0.25 to 0.40 °F per decade, while temperatures in surrounding locations in Utah, Wyoming, and Colorado are expected to increase by 0.40 to 1.2 °F per decade. Precipitation across western Wyoming is expected to decrease by 0.1 to 0.6 inches per decade with the largest decrease expected in southwestern Wyoming. The eastern portions of the state are expected to get warmer and wetter (Bissolli et al. 2018).

According to the Fourth National Climate Assessment, "Annual average temperature over the contiguous United States is projected to rise (very high confidence). Increases of about 2.5°F (1.4°C) are projected for the period 2021–2050 relative to 1976–2005 in all representative concentration pathway (RCP) scenarios, implying recent record-setting years may be "common" in the next few decades (high confidence). Much larger rises are projected by late century (2071–2100): 2.8°F–7.3°F (1.6°C –4.1°C) in a lower scenario (RCP4.5) and 5.8°F–11.9°F (3.2°C –6.6°C) in the higher scenario (RCP8.5) (high confidence)" (IPCC 2007). It also predicts that: "Extreme temperatures in the contiguous United States are projected to increase even more than average temperatures. The temperatures of extremely cold days and extremely warm days are both expected to increase. Cold waves are projected to become less intense while heat waves will become more intense. The number of days below freezing is projected to decline while the number above 90°F will rise (very high confidence)."

To assess the potential for and effects of climate change, the standard approach is to measure and predict emissions of GHGs. GHGs are composed of molecules that absorb and re-radiate infrared electromagnetic radiation. When present in the atmosphere, GHGs contribute to global warming. Some GHGs such as CO_2 occur naturally and are also emitted to the atmosphere through human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. The primary GHGs that enter the atmosphere as a result of anthropogenic activities include carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); and fluorinated gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Fluorinated gases are powerful GHGs that are emitted from a variety of industrial processes including production of refrigeration/cooling systems, foams, and aerosols.

GHGs are often presented using metric tons of CO_2 equivalent (mt CO_2e) or million metric tons of CO_2 equivalent (Mmt CO_2e), measurements that express the impact of each different GHG in terms of the amount of CO_2 (this makes it possible to express GHGs as a single number). As defined by EPA, the global warming potential (GWP) provides a "ratio of the time-integrated radiative forcing from the instantaneous release of one kilogram of a trace substance relative to that of one kilogram of CO_2" (EPA 2016). The GWP is used to compare global impacts of different gases and to measure how much energy the emissions of 1 ton of gas will absorb over a given period of time (e.g., 100 years), relative to the emissions of one ton of CO_2. The GWP accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere, which is helpful in assessing the cumulative effects of multiple GHGs.

- CO_2 has a GWP of 1 regardless of the time period used because it is the reference gas. CO_2 remains in the climate for a very long time; CO_2 emissions cause increases in the atmospheric concentrations of CO_2 that will last thousands of years (EPA 2016a).
- CH_4 is estimated to have a GWP of 28 to 36 times that of CO_2 over 100 years. CH_4 emitted today lasts approximately 1 decade on average, which is much less time than CO_2. But CH_4 also absorbs much more energy than CO_2. The net effect of the shorter lifetime and higher energy absorption is reflected in the GWP. The CH_4 GWP also accounts for some indirect effects, such as the fact that $CH_4$is a precursor to ozone, and ozone is in itself a GHG (EPA 2016a).
- N_2O has a GWP of 265 to 298 times that of CO_2 over 100 years. N_2O emitted today remains in the atmosphere for more than 100 years, on average (EPA 2016a).

3.2.3 Methods of Analysis

The analysis area for air quality comprises the entire state of Wyoming because the proposed corridors would occur in more than half of the state's counties, because air quality and emissions are a "fluid" resource that moves across county boundaries, and because Wyoming has a state implementation plan for the entire state. Each potential project and any associated EOR project in a designated corridor would require quantitative assessment of its air quality effects (including GHG emissions) under NEPA. The following analysis assumes that the fugitive dust control plan (see Appendix D) that is part of Alternative B would also be part of Alternatives C and D.

3.2.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. Current emissions and air quality trends in the analysis area (described in the affected environment) would likely continue. The designation of statewide corridors for the transport of CO_2, EOR products, and other compatible uses would not occur. Future emissions from specific projects would continue.

If future pipeline projects are implemented using existing designated pipeline corridors only or no corridors, it could result in multiple, differently-spaced pipeline ROWs. Under this scenario, air quality and GHG impacts would be expected to be similar to the action alternatives with the exception that they would be more dispersed over the landscape. The level of dispersal cannot be predicted at this point and would be dependent on the number and location of future proposed projects. The air quality impacts (including GHG emissions) of any potential future projects would be analyzed through project-specific NEPA. Under Alternative A, the implementation of EOR operations that could influence future GHG emissions would likely be less than the action alternatives unless economic incentives were instituted.

3.2.5 Environmental Effects – Common to All Action Alternatives

There would be no direct effects to air quality from implementation of Alternatives B, C, and D, which all consist of corridor designation. Indirect effects would occur in the future with the construction, operation, and maintenance of specific pipelines and associated aboveground facilities in the corridors. Indirect effects would include the use of EOR in technically and economically feasible oil fields. These indirect effects are discussed in the following environmental effects sections. Under all action alternatives, pipeline construction, operation, and maintenance activities, along with future potential ERO production, would affect air quality (including GHG emissions). Aboveground facilities such as pump or compressor stations and staging areas or storage yards could also create emissions. Typical construction equipment for the three action alternatives would consist of pickup trucks, loaders, various sizes of dozers, shovels and backhoes, side booms, generators, and bending machines. Employees would drive personal or company vehicles, and supplies may be transported by delivery trucks. During operation and maintenance activities, a field service truck or all-terrain vehicle would be needed for periodic valve inspections, leak surveys, corrosion control inspections, noxious weed surveys, erosion control purposes, and pipeline repairs. Two types of emissions would occur under all action alternatives from the installation, operation, and maintenance of potential projects: fugitive dust (PM_{10}) and combustion emissions. Fugitive dust would result from surface disturbance such as land clearing, topsoil removal, grading, excavation, and vehicle traffic on unpaved roads. Fugitive dust emissions would be a function of the type of construction activity, soil characteristics, wind speed, the frequency of precipitation, the amount of traffic, and the types of vehicles. The loading, hauling, and unloading of bulk material; the use of material storage piles; and blasting could also result in fugitive dust generation. Emissions would be greater during drier summer and fall months and in locations with fine-textured soils. Combustion emissions would consist of criteria air pollutants, hazardous air pollutants, and GHGs. Emissions would depend on the engine type and size, fuel used, operating hours, and other factors.

Absent project-specific information, the relative amount of fugitive dust and combustion emissions generated by alternative is generally assumed to be associated with the relative amount of surface disturbance (for which surface disturbance is a proxy) or construction and operation activity. There would be 57,457 acres of surface disturbance under Alternative B, 7,263 acres under Alternative C, and 55,481 acres under Alternative D. However, because no specific potential projects are proposed at this time, the exact types and numbers of equipment and vehicles that would be used are unknown and combustion emissions from construction and operation activity by alternative cannot be quantified at this time. Individual potential projects would require an analysis of impacts to air quality, including the quantification of criteria pollutant and GHG emissions and determination of the need for a conformity analysis (Clean Air Act 176 (c)(1)). Under Alternative C, Segments 1 and 5, which are within the UGRB ozone marginal nonattainment area, would be either dropped or reduced in mileage. This would mean less construction and operation activity and lower combustion emissions in the UGRB for Alternative C than for Alternatives B and D; NOx and VOC emissions would therefore be reduced in the UGRB under Alternative C, and negative effects on the UGRB attainment status would be less likely as compared to Alternatives B and D.

Alternative B's fugitive dust control plan (which would be applied to all three action alternatives) proposes the use of measures such as applying water and magnesium chloride as a dust suppressant, reducing vehicle speeds on unpaved roads, covering haul truck loads, watering active construction areas as needed, and cleaning carry-out areas at paved road access points. Field inspections for dust control would occur daily and be summarized in daily reports. The Buffalo, Cody and Worland, Lander, and Pinedale RMPs also specify dust control BMPs that would be implemented on lands in their planning area (BLM 2008a, 2014, 2015a, 2019a). The use of the fugitive dust control plan and Pinedale BMPs under all action alternatives would likely reduce fugitive dust generation for each alternative.

3.2.5.1 Enhanced Oil Recovery with Carbon Dioxide

EOR requires a pipeline that delivers CO_2 to the oil field at a pressure and density high enough to meet project needs, and a meter to measure the volume of gas purchased. The CO_2 is directed to injection wells strategically to optimize the areal sweep of the reservoir. The injected CO_2 enters the reservoir and moves through the pore spaces of the rock, encountering residual droplets of crude oil, becoming miscible with the oil, and forming a concentrated oil bank that is swept toward producing wells. At the producing wells—there may be three, four, or more producers per injection well—oil and water are pumped to the surface, where they typically flow to a centralized collection facility. The pattern of injection wells and producers, which can change over time, will typically be determined based on computer simulations that model the reservoir's behavior based on different design scenarios. A well manifold allows for individual wells to be tested to see how much oil, gas, and water is being produced at each location and if the concentration of oil is increasing as the oil bank reaches the producers. The produced fluids are separated and the produced gas stream, which may include CO_2 as the injected gas begins to break through at producing well locations, must be further processed. Produced CO_2 is separated from the produced gas and recompressed for reinjection along with additional volumes of newly-purchased CO_2. In some situations, separated produced water is treated and re-injected, often alternating with CO_2 injection, to improve recovery efficiency.

Because it is currently not possible to predict whether new production wells may be necessary to further develop an oil field, direct emissions from the drilling, completion, and operation of these wells cannot be reasonably predicted. No existing gas fields in the proposed corridors are currently undergoing EOR. Existing wells in fields identified as technically feasible for EOR (see Section 3.9, Mineral Resources) may be converted to injection wells.

Based on BLM analysis, over the next 20 years, additional production as a result of EOR in those fields identified as technically feasible could result in approximately 308.7 Mmt CO_2e, based on 2019 production levels. On an annual basis, average indirect CO_2e from EOR would be approximately 15.4 Mmt. To produce this volume of incremental EOR production on an annual basis, approximately 381.0 Mmt CO_2 would be required. Over 20 years, at projected production levels, 7,619.7 Mmt CO_2 input would be necessary. Calculations are provided in Appendix I.

The BLM used EPA's GHG equivalency calculator emission factors (0.43 mt CO_2e/barrel of oil and 0.0551 mt CO_2e per thousand cubic feet of gas) to determine CO_2e emissions from the production estimates. Emissions are assumed to be from the federal mineral estate for analysis purposes, although a certain percentage could be associated with fee or state minerals. As discussed in Appendix I, indirect emissions from the federal mineral estate were approximately 53% of total statewide indirect emissions in 2014. The analysis of potential GHG emissions related to potential future production also assumes that all production would be combusted in the same year it was produced. Methods and assumptions used to determine production are provided in Section 3.9, Mineral Resources.

Because CO_2 is purchased for use, operators would recapture CO_2 from the production stream and reinject it into the field to support ongoing EOR. Although there could be some future leakage from the reservoir or during production operations, it cannot be reasonably estimated at this time. When a site-specific application for permit to drill or other project proposal is submitted for approval, the BLM would further refine its GHG emission estimates.

According to EPA's GHG equivalency calculator, the average annual indirect CO_2e emissions from EOR operations would be approximately equivalent to 3.3 million passenger vehicles driven for 1 year, the energy usage from 1.8 million homes in 1 year, or the emissions from four coal-fired power plants in 1 year. For comparison purposes, one coal-fired power plant emits approximately 4 Mmt per year. It is estimated that approximately 381 Mmt CO_2 used on an annual basis would be sequestered, resulting in a net decrease (annual sequestering minus emitted indirect GHGs from additional production).

On an annual basis, the projected average annual GHG emissions resulting from the additional production would be approximately 0.31% of the 4,912 Mmt reported by EPA for total U.S. combustion emissions in 2017, approximately 20.5% of the USGS 2014 combustion emissions for federal lands in Wyoming, and approximately 11.4% of the statewide 2018 production estimate of 134.6 Mmt (see Appendix I). The net annual GHG indirect emissions reduction would be the equivalent of approximately 78.9 passenger vehicles driven for 1 year, the energy use from 42.1 million homes in 1 year, or nearly 94 coal-fired power plants.

The source of most of the CO_2e for EOR is expected to come from Exxon Mobil's Shute Creek Plant. Other sources that could contribute CO_2 for EOR operations include the Madden field located in the Lander field office planning area and coal-fired power plants. Because these emissions are a result of combustion, they would not be counted in BLM's estimate for the potential project as a whole.

3.2.6 Summary of Impacts

Because no specific potential pipeline projects are proposed, emissions by alternative cannot be quantified at this time; however, using surface disturbance as a proxy for fugitive dust and combustion emissions and GHGs, Alternative B would have the potential to generate the greatest amount of fugitive dust, combustion emissions, and GHGs, and Alternative C would have the potential to generate the least amount of fugitive dust, combustion emissions, and GHGs. Individual projects would require an analysis of impacts to air quality, including the quantification of emissions and determination of the need for a conformity analysis.

Emissions of GHGs and production from EOR under the alternatives are not expected to differ significantly.

3.2.7 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation in existing utility corridors would not result in any irretrievable or irreversible impacts to air quality or climate change. Unavoidable adverse effects to air quality would occur indirectly after designation of the corridors when specific projects are implemented. These impacts would consist of increases in criteria pollutants, hazardous air pollutants, and GHGs from the construction, operation, and maintenance of the potential projects. Air quality impacts from fugitive dust and combustion emissions would be irretrievable and largely associated with construction. Contributions to global GHG emissions would be irreversible. Quantification of these impacts would occur during the analysis of specific projects. The short-term uses associated with future potential development would not cause long-term impacts to the regional airshed. Potential EOR would provide additional short-term and long-term production from reservoirs that may no longer be economically viable.

3.3 CULTURAL RESOURCES

This section describes cultural resources in the proposed corridors, including historic trails and sites of specific concern to Native American tribes, and addresses the effects the project may have on cultural resources.

3.3.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following cultural resource issues for analysis:

- How would the project directly and indirectly, across the short term and the long term, affect both known and unknown cultural resources, including historic trails and sites of specific concern to Native Americans?
- How would the project affect known and as-yet-unknown eligible cultural resources where setting is a contributing aspect of integrity, specifically historic trails and sites of specific concern to Native Americans?

Indicators of effects on cultural resources are as follows:

- Types and numbers of cultural resources, including historic trails and sites of specific concern to Native Americans, known to be present in the WPCI area of potential effect (APE) (defined as a 0.25-mile-wide corridor centered on the proposed corridors)
- Project impact on the setting of historic trails, specifically focused on NHT; sites of specific concern to Native Americans, including Traditional Cultural Properties (TCPs), sacred sites, and resources of traditional religious and cultural importance; and other historic properties, such as National Historic Landmarks, where setting is an important aspect of the resource's integrity

Federal agencies must consider the effects of their actions on cultural resources under NEPA and under Section 106 (54 USC 306108) of the National Historic Preservation Act (54 USC 300101 et seq.). Specifically, Section 106 directs federal agencies to consider the effects of their actions on historic properties and provide the ACHP a reasonable opportunity to comment. The Section 106 process is separate from, but often conducted parallel with, the preparation of an EIS. Other federal legislation applicable to cultural resources in the WPCI APE includes the following:

- American Antiquities Act of 1906 (54 USC 320301 et seq.)
- Archaeological Resources Protection Act of 1979 (54 USC 302101)

- Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001–3002)
- Executive Order 13007, Sacred Sites Act
- Executive Order 11593, Protection and Enhancement of the Cultural Environment
- Executive Order 13175, Consultation and Coordination with Indian Tribal Governments

The Wyoming State Historic Preservation Office (SHPO) is responsible for ensuring that the proposed corridors effects on lands under the jurisdiction of the state are considered under applicable state laws and that state cultural resources and historic properties laws are followed. State of Wyoming statutes and guidelines applicable to cultural resources in the proposed corridors include the following:

- Wyoming Antiquities Act of 1935 (Wyoming State Lands Title 36-1-114-116) requires a permit be obtained from the state to survey, conduct limited testing, or excavate (archaeological data recovery or extensive testing) on any lands owned or controlled by the state.
- Wyoming Environmental Quality Act of 1973 requires the Land Quality Division and the Industrial Siting Division to consider the potential for projects to have adverse environmental impacts, including impacts to archaeological and historic resources.
- Wyoming State Lands Commission Rules, Chapter 3, Section 9 requires that steps be taken in the construction and use of easements to protect and preserve archaeological, paleontological, historical, and any other cultural resources on state land.

Federal undertakings may take place on lands under the jurisdiction of the state. In accordance with Section 101(b)(3) of the National Historic Preservation Act, the Wyoming SHPO is also responsible for advising and assisting federal agencies in carrying out their Section 106 responsibilities and for cooperating with agencies, local governments and organizations and individuals to ensure that historic properties are taken into consideration at all levels of planning and development (36 CFR 800.2(c)(1)(i)).

3.3.2 Affected Environment

Cultural resources, as broadly defined in BLM Manual 8100 (BLM 2004a), are locations of human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. These activities represent human social interaction and/or interaction with the natural or built environment, are generally at least 50 years of age or older, and may or may not be considered significant and therefore eligible for the National Register of Historic Places (NRHP). In totality, the term cultural resources encompasses archaeological sites, historical buildings, structures, objects, and districts considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes, as well as specific areas of the landscape that are important to Native American tribes or other culturally recognizable groups. They are recognized as fragile and irreplaceable material, places, and things with potential public and scientific uses.

A detailed discussion of the prehistoric, protohistoric, and historic cultural contexts relevant to the project is provided in Appendix F.

3.3.2.1 Identified Cultural Resources

To understand the kinds and number of cultural resources, historic trails, and resources of Native American concern that could be impacted by the proposed corridors, an intensive literature review of existing information (Campbell et al. 2020) was conducted as set forth in BLM Manual 8110 (BLM 2004b); the methods used for this review are discussed is more detail in the Methods of Analysis section. The literature review identified 3,806 previous cultural resource investigations that have occurred within the WPCI APE between 1955 and 2019 (Campbell et al. 2020:33). Approximately 96% (n = 3,640) of

these investigations are Class III (intensive-level) surveys that cover roughly 25% of the WPCI APE, with the greatest survey coverage present in the Green River and the Great Divide Basins. Other previous investigations include Class II surveys, as well as projects classified as monitoring/open trench inspection (OTI), testing, data recovery, site evaluation/assessment, geoarchaeological assessment, artifact analysis, treatment plan development, programmatic agreement development, and request for comment projects (Campbell et al. 2020:33). Table 3.3-1 provides a summary of Class III survey coverage by action alternative.

Table 3.3-1. Summary of Class III Survey Coverage by Alternative

Alternative	APE (acres)	Class III Survey Area (acres)	Class III Survey Area (percentage of coverage)
B	312,040	80,524.80	25.81%
C	38,679	9,930	25.67%
D	298,237	72,258.30	24.23%

Source: Campbell et al. (2020).

Note: Alternative C excludes areas crossing existing utilities corridors and therefore shows lower acres overall than either Alternative B or Alternative D.

In addition, eight of the nine BLM field offices have prepared Class I regional-scale cultural overviews for the State of Wyoming (Table 3.3-2).

Table 3.3-2. Available Class I Regional-Scale Cultural Resource Overview by Field Office

BLM Field Office	Year	Coverage Area	Source
Buffalo	2010	Resource Management Planning Area	BLM Buffalo Field Office (2010b)
Cody and Worland	2009	Bighorn Basin Planning Area	BLM Wyoming State Office (2009)
Lander	2011	Lander Field Office Planning Area	BLM Lander Field Office (2011)
Kemmerer	2004	Kemmerer Field Office Planning Area	BLM Kemmerer Field Office (2004c)
Pinedale	2006	Resource Management Planning Area	McNees et al. (2006)
Rawlins	2010	Resource Management Planning Area	TRC Environmental Corporation (2010)
Rock Springs	2013	Rock Springs Field Office Planning Area	BLM Rock Springs Field Office (2013)

Class III investigations to date have recorded 2,392 cultural resources within the WPCI APE (Campbell et al. 2020). Approximately 70% of the sites are prehistoric in age, 16% are historic in age, and 9% possess both a prehistoric and historic component of some type; approximately 5% of the sites could not be assigned a general age from the available data. These cultural resources represent archeological sites; historic architectural and engineering resources, including historic trails; and traditional cultural resources.

Archeological resources relate to the full scope of human presence in the APE, from the Paleoindian period to the Historic period. Most archeological resources to date have been identified as being from the Late Archaic and Late Prehistoric periods (roughly the last 5,000 years) (Campbell et al. 2020).

Historic sites and components as well as historic architectural and engineering resources found across the APE represent habitation, transportation, transmission, energy production and extraction, farming and ranching, military, water control, and educational activities dating from the Territorial era to the Modern era.

Native American site types found within the APE generally are prehistoric and can contain features such as hearths, stone circles, pit houses, alignments, cairns, burials, and rock art as well as artifacts such as chipped stone tools and debitage, ground stone, fire-altered rock, ceramics/steatite, and faunal and floral material.

3.3.2.2 Historic Trails

NHT are "extended trails that closely follow a historic trail or route of travel of national significance" (BLM 2020a). The National Trails System Act of 1968, as amended, states that such trails "shall have as their purpose the identification and protection of the historic route and its historic remnants and artifacts for public use and enjoyment" (National Park Service [NPS] 2019). BLM Manual 6280 (BLM 2012a) identifies requirements of NEPA processes for proposed actions that could impact NHT and/or trails that are undergoing feasibility studies to become NHT.

The California NHT, the Oregon NHT, and the Mormon Pioneer NHT (which represent three emigrant wagon trails and are collectively referred to as the California, Oregon, Mormon Pioneer NHT) and the Pony Express NHT (a mail delivery route) follow the same general primary route across Wyoming. The California, Oregon, Mormon Pioneer NHT and the Pony Express NHT are the only NHT that cross the proposed corridors. The individual trails deviate from the primary route in various locations throughout the WPCI APE. Therefore, for the purposes of this analysis, researchers analyzed all four trails together as the primary route and discussed their respective deviations individually. Three associated historic emigrant trails also cross the WPCI APE: the Bozeman Trail, which diverges from the California, Oregon, Mormon Pioneer NHT near Glenrock, Wyoming; the Bridger Trail, which diverges from the California, Oregon, Mormon Pioneer NHT near Casper, Wyoming; and the Overland Trail, which diverges from the California, Oregon, Mormon Trail in Nebraska.

Neither the Nez Perce NHT nor the Cherokee Trail, which is currently undergoing a feasibility study, are within the WPCI APE.

3.3.2.3 Sites of Specific Concern to Native Americans

Sites of specific concern to Native American tribes include TCPs, sacred sites, and resources of traditional religious and cultural importance. TCPs are physical properties or places that are eligible for the NRHP and that have historical and continuing importance for and are associated with the beliefs, customs, practices, and/or cultural identities of existing communities (NPS 2012; Parker and King 1998). TCPs are most often identified with Native American communities but can also reflect other types of historical communities (NPS 2012). As defined by Executive Order 13007, the term sacred site "means any specific, discrete, narrowly delineated location on federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site." Sacred sites and resources of traditional religious and cultural importance may or may not be eligible for the NRHP.

In general, Native American traditional resources can include archeological sites; stone alignments; petroglyphs and pictographs; plant, wildlife, and lithic resource collection areas; spiritual sites; and locations that may have spiritual or cultural meanings to Native Americans. Previous ethnographic research suggests that resources of Native American concern may include places named in oral histories or legends such as rock formations and the confluence of rivers; human constructed features and sites such as petroglyphs and pictographs, burials, cairns, vision quest structures, medicine wheels, game drive systems, and prehistoric habitations; landscapes, viewscapes, and battlefields; locations used for religious

practices; traditional travel and gathering areas such as trails and dance locations; and natural resource areas such as plant harvesting locations as well as stone and clay deposits (Gulliford 2000; Parker and King 1998).

There are 109 known resources of traditional religious and cultural importance within the WPCI APE. These resources include stone circles and alignments, cairns, lodges, rock art, burials, and battle sites. Each BLM field office has delineated field office–specific protection zones for TCPs, sacred sites, and/or resources of traditional religious and cultural importance. These protection zones include 1) no surface occupancy zones designated by the BLM to prevent surface-disturbing activities from occurring in these areas and 2) controlled surface use zones for which the BLM has designated surface disturbance, and use is subject to special operating constraints that are further defined by field office–specific RMPs and BMPs (see Appendix E). Within the WPCI APE, no surface occupancy zones have been identified by the BLM Lander Field Office for two Native American sacred sites. No Native American TCPs have been documented in the WPCI APE.

3.3.3 Methods of Analysis

The analysis considers how cultural resources, including historic trails and sites of specific concern to Native Americans, could be directly or indirectly impacted by the project and quantifies the types and numbers of these resources present and projected within the WPCI APE, defined as a 0.25-mile-wide corridor centered on the proposed corridors (Campbell et al. 2020). For the purposes of the cultural resources analysis, consideration of visual effects as they relate to historic trails, sites of Native American concern, and other historic properties where setting is a contributing aspect of integrity is limited to the WPCI APE. Potential visual effects are also considered in Section 3.18, Visual Resources. In addition, Section 106–related visual effects at the project-specific level would need to be considered through a larger visual effects analysis area defined for each BLM field office by field office–specific RMP stipulations and BMPs (see Appendix E) but generally vary by site type and field office between 1 and 3 miles from the edge of the WPCI APE.

To understand the kinds and number of cultural resources, historic trails, and resources of Native American concern that could be impacted by the project, an intensive literature review of existing information was conducted as set forth in BLM Manual 8110 (BLM 2004b); no new field surveys were conducted for this analysis. The literature review focused on all federal, state, and private lands in the WPCI APE and identified both previously surveyed areas and previously recorded cultural resources, historic trails, and sites of Native American concern. The information was compiled from SHPO Wyoming Cultural Records Office and BLM databases as well as from current published and unpublished literature, chronologies, cultural and historical contexts, ethnographies, regional Class I overviews, and outreach to specialists in the cultural resources of Wyoming (Campbell et al. 2020). All site and inventory spatial data were processed and integrated into a geodatabase for analysis. Data limitations associated with this literature are discussed in detail in Campbell et al. (2020:76–79) but primarily include incomplete, incorrect, or missing attribute or spatial data in the SHPO Wyoming Cultural Records Office database and time constraints related to completion of the literature review.

The number of projected sites within the APE for each action alternative was also calculated based on the results of the literature review. To calculate the number of projected sites, site density was calculated per alternative based on the number of known sites per 100 acres surveyed (total sites × 100 ÷ total acres surveyed). This estimated site density was then applied to the total APE acreage for each action alternative to get the total number of projected sites for each action alternative.

Visual impacts of project elements on cultural resources where setting is a contributing aspect of integrity, including historic trails and sites of specific concern to Native Americans, would be evaluated based on

Appendix C, Guidance on the Assessment of Setting, in the state protocol (BLM and SHPO 2014), which contains guidelines for determination of visual effects of an undertaking on the integrity of setting. Visual impacts could be categorized as no contrast, weak contrast, or moderate/strong contrast.

Assumptions used for the analysis of impacts to cultural resources include the following:

- Cultural resources would continue to be newly identified within the proposed corridors.
- Cultural resources that have been previously recorded within the WPCI APE generally are representative, in terms of type, location on the landscape, and number and density, of those located in previously un-surveyed portions of the proposed corridors.
- Impacts to all types of cultural resources, including historic trails and resources of Native American concern, were considered regardless of their eligibility for the NRHP.
- The development of corridors for potential projects could lead to surface-disturbing activities that could adversely impact cultural resources, including buried resources, and the potential to reveal unanticipated discoveries of buried cultural materials.
- Cultural resources as a whole would be managed according to the management goals and objectives from the BLM field office–specific RMPs (see Appendix E) as well as by guidance contained in the BLM 8100 Manual Series (BLM 2004a), the BLM 1780 Manual and Handbook (BLM 2016a, 2016b), the state protocol between the BLM Wyoming State Director and the Wyoming SHPO (BLM and SHPO 2014), the Section 106 regulations at 36 CFR 800, and the statewide historic preservation plan (Wyoming SHPO 2016).
- NHT would be managed under the guidelines and stipulations in BLM Manual 6280 (BLM 2012a), the Comprehensive Management and Use Plan Final Environmental Impact Statement: California National Historic Trail, Pony Express National Historic Trail. Management and Use Plan Update, Final Environmental Impact Statement: Oregon National Historic Trail Mormon Pioneer National Historic Trail (NPS 1999), and through the USFS Scenery Management System, "which includes landscape character descriptions and scenic integrity objectives for landscapes that can be used to help assess the compatibility of a proposed project with the surrounding landscape" (BLM n.d. [2020]; also see USFS 1996, 2003).
- TCPs, sacred sites, and resources of traditional and cultural importance would also be managed under the guidelines and stipulations contained in BLM 1780 Manual and Handbook (BLM 2016a, 2016b), the National Historic Preservation Act, Executive Order 13007 (Sacred Sites Act), NAGPRA, Archaeological Resources Protection Act of 1979, Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and other relevant laws.
- Recognizing that historic trails often comprise numerous routes rather than a single trace, zones within which trails are protected from effects begin at the outer edges of trails rather than at a centerline, which is difficult to define.
- Surface-disturbing activities for any potential development would be prohibited or restricted within no surface occupancy or controlled surface occupancy areas identified in each affected BLM RMP (see Appendix E).
- Potential visual effects on the setting of historic trails, including NHT; sites of specific concern to Native Americans, including TCPs, sacred sites, and resources of traditional religious and cultural importance; and other historic properties, such as National Historic Landmarks, where setting is an important aspect of the resource's integrity, would be guided by BLM field office–specific RMP stipulations (see Appendix E).

- Regardless of landownership, an unexpected discovery of cultural resources during construction should be brought to the attention of the responsible BLM authorized officer immediately, although different landownerships would dictate whether state or federal laws are followed. Work would be halted near the find to avoid further disturbance to the resources while the appropriate authorities are contacted, and while the resources are being evaluated and appropriate mitigation measures are being developed.

The following analysis is limited in that all cultural resource data used in the analysis are derived from existing data; no new field surveys were conducted for this analysis. Additional identification efforts in site-specific project areas as well as tribal consultation (as needed) would be needed to make formal determinations about how cultural resources, including sites of Native American concern, would be affected.

3.3.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. There would be no additional impacts to cultural resources, including historic trails and sites of specific concern to Native Americans. Cultural resources would continue to be managed under the requirements of the National Historic Preservation Act and under existing stipulations in the BLM 8100 Manual Series (BLM 2004a); BLM field office–specific RMPs (see Appendix E); the Wyoming state protocol (BLM and SHPO 2014); and other applicable federal, state, and/or local guidelines, laws, ordinances, regulations, stipulations, and standards.

If future projects are implemented using existing designated corridors only or using no corridors, it could result in multiple, differently spaced infrastructure ROWs. Under this scenario, impacts to cultural resources would be more dispersed and thus individual potential projects cumulatively have the potential to impact a greater number of cultural resources in separate corridors.

3.3.5 Environmental Effects – Common to All Action Alternatives

3.3.5.1 Identified Cultural Resources

All action alternatives may lead to development of corridors and potential projects associated with activities that may create or have the potential to create surface disturbance that would result in potential direct and indirect impacts to cultural resources as a whole.

Potential impacts to cultural resources could be direct and permanent ground disturbance associated with the construction of pipelines and associated ancillary facilities, staging stations, and access roads. Direct permanent disturbances could also be due to changes in public accessibility (i.e., the introduction of new or improved access roads). Potential impacts to cultural resources could be indirect and permanent disturbances from changes in public accessibility and indirect and long-term visual, atmospheric, and auditory intrusions. These impacts could compromise aspects of site integrity, such as setting, feeling, and association, which are components of NRHP eligibility. These types of disturbance could damage or destroy these resources if not avoided.

Table 3.3-3 identifies the number and general age of known and estimated cultural resources that could be impacted by each action alternative within the WPCI APE. Table 3.3-4 identifies the NRHP eligibility of the resources summarized in Table 3.3-3.

Table 3.3-3. Number (n) and General Age of Cultural Resources by Alternative

Alternative	Prehistoric Sites (n)	Historic Sites (n)	Multicomponent Sites (n)	Unknown Sites (n)	Total Sites (n)	Sites per 100 Acres Surveyed (n)	Sites Projected for Total APE (n)
B	1,549	436	194	60	2,239	2.78	8,676
C	214	46	11	14	285	2.87	1,110
D	1,201	429	126	50	1,806	2.50	7,454

Table 3.3-4. National Register of Historic Places Eligibility of Cultural Resources by Alternative

Alternative	NRHP-Listed Sites	Sites Eligible	Sites not Eligible	Unevaluated Sites	Unknown Sites	Total Sites
B	4	602	1,240	320	73	2,239
C	0	59	159	65	2	285
D	7	472	987	252	88	1,806

3.3.5.2 National Historic Trails and Other Historic Trails

Impacts to NHT and other historic trails are the same as those identified for cultural resources, as a whole, although with specific consideration of the impact on the trail tread, trail-related artifacts or features, and associated sites. Direct and indirect impacts can result from a variety of natural and human-caused events, such as those that physically alter, damage, or destroy all or part of historic trails; those that improve access, bringing increased use to an area and altering characteristics of the surrounding environment that contribute to the historic trail's importance; and the introduction of visual or audible elements out of character with the historic trail or that alter its setting.

The California, Oregon, Mormon Pioneer NHT; the Pony Express NHT; Bozeman Trail; Bridger Trail; and Overland Trail are significant emigrant trails that cross the proposed corridors. These trails and their alternate routes are summarized in Table 3.3-5.

A variety of modern linear infrastructure, including natural gas pipelines, electric transmission lines, and smaller utility-distribution lines, already crosses the California, Oregon, Mormon Pioneer NHT; Pony Express NHT; Bozeman Trail; Bridger Trail; and Overland Trail in multiple locations. Additional crossings resulting from the WPIC project infrastructure could physically disturb or destroy the tread of these trails, and in the case of the historic trails, associated cultural materials or resources.

Table 3.3-5. Summary of National Historic Trails and Other Significant Emigrant Trails that Cross the Wyoming Pipeline Corridor Initiative Project

Emigrant Trail	Route Name	Contributing Segments	Alternative
California, Oregon, Mormon Pioneer NHT/Pony Express NHT	Primary Route	4	B D
	Sublette Cutoff	3	B D
	Slate Creek Cutoff	Not applicable	D
	Baker - Davis Road	None	B
	Kinney Cutoff	1	B
	West-side Kinney Cutoff	None	B
	Deep Sand Route	None	B
	Deep Sand Route Alternate	1	B
	Seminoe Cutoff	Not applicable	B
	Child's Cutoff	Not applicable	D
	Emigrant Gap Route	4	B
Bozeman Trail	–	None	B D
Bridger Trail	–	17	B D
Overland Trail	48SW1226	8	B D

Note: Not applicable designation indicates no segments have been officially recorded and assigned a Smithsonian trinomial and segment number in the WPCI APE but the trail is identified as crossing the WPCI APE based on a review of historic maps and aerial imagery (Campbell et al. 2020).

Potential visual impacts that would disturb the historic or primitive setting and viewshed of the trails would include large swaths of cleared land, improvement of and/or increased use of existing access roads and construction of new access roads, and chemical treatments of the vegetation in the corridors that create a noticeable contrast across the landscape; use of high-intensity lighting during project construction and operation; and construction of aboveground facilities that would be visible within the viewshed of the trail.

3.3.5.3 Sites of Specific Concern to Native Americans

Impacts to sites of specific concern to Native Americans are the same as those identified for cultural resources as a whole and historic trails, although with specific consideration of the impact to these resources, either physically or through visual, auditory, and/or olfactory intrusions into tribally sensitive areas and landscapes; impacts to sacred sites that would affect the characteristics that make such sites sacred, such as viewshed; changes to resource availability resulting from alteration of faunal and floral habitats and migration patterns; and interruption or prevention of access to important locations due to construction or use of project infrastructure.

Table 3.3-6 identifies the number of known and estimated sites of specific Native American concern and their NRHP eligibility that could be impacted by each action alternative within the WPCI APE.

Table 3.3-6. Number (n) and General Age of Native American Sites by Alternative

Alternative	Eligible Sites (n)	Not Eligible Sites (n)	Unevaluated Sites (n)	Total Sites	Tribal Sites per 100 Acres Surveyed (n)	Tribal Sites Projected for Total APE (n)
B	47	39	29	115	0.14	446
C	2	6	4	12	0.12	47
D	30	30	21	81	0.11	334

3.3.6 Environmental Effects – Alternative B (Proposed Action)

3.3.6.1 Cultural Resources

Under Alternative B, 2,239 known cultural resources and a total of 8,676 projected cultural resources could be directly and indirectly impacted by project activities (see Table 3.3-3). These resources comprise prehistoric (69%), historic (19%), multicomponent (9%), and unknown age (3%) sites. Of the known resources, 27% are eligible for the NRHP (55%), 55% are not eligible, 14% are unevaluated, and 3% have unknown eligibilities. Four resources within the Alternative B WPCI APE are currently listed on the NRHP.

3.3.6.2 National Historic Trails and Other Historic Trails

Under Alternative B, the California, Oregon, Mormon Pioneer NHT; Pony Express NHT; Bozeman Trail; Bridger Trail; and Overland Trail could be impacted by project activities specifically through physical and visual effects because these trails are present within the WPCI APE.

3.3.6.3 Sites of Specific Concern to Native Americans

Under Alternative B, 115 known resources of Native American concern and a total of 446 projected resources of Native American concern could be impacted by project activities specifically through physical and visual, auditory, and olfactory effects (see Table 3.3-3). Of the known resources, 41% are eligible for the NRHP, 34% are not eligible for the NRHP and 25% are unevaluated for the NRHP.

The Lander Field Office has identified two Native American sacred sites in the Wind River Basin that are crossed by and would be directly and indirectly impacted by Alternative B. These sacred sites are within no surface occupancy zones designated by the BLM to prevent development-related surface-disturbing activities from occurring in these areas (BLM 2014a).

3.3.7 Environmental Effects – Alternative C

3.3.7.1 Cultural Resources

Under Alternative C, 285 known cultural resources and a total of 1,110 projected cultural resources could be directly and indirectly impacted by project activities (see Table 3.3-3). These resources comprise prehistoric (75%), historic (16%), multicomponent (4%), and unknown age (5%) sites. Of the known resources, 20% are eligible for the NRHP, 56% are not eligible for the NRHP (56%), 23% are unevaluated, and less than 1% have unknown eligibilities. No resources within the Alternative C WPCI APE are listed on the NRHP.

3.3.7.2 National Historic Trails and Other Historic Trails

The California, Oregon, Mormon NHT; Pony Express NHT; and the Bozeman, Bridger, or Overland Trails do not cross the Alternative C proposed corridor.

3.3.7.3 Sites of Specific Concern to Native Americans

Under Alternative C, 12 known resources of Native American concern and a total of 47 projected resources of Native American concern could be impacted by project activities specifically through physical and visual, auditory, and olfactory effects. Of the known resources, 17% are eligible for the NRHP, 50% are not eligible for the NRHP (50%), and 33% are unevaluated for the NRHP.

3.3.8 Environmental Effects – Alternative D

3.3.8.1 Cultural Resources

Under Alternative D, 1,806 known cultural resources and a total of 7,454 projected cultural resources could be directly and indirectly impacted by project activities (see Table 3.3-3). These resources comprise prehistoric (66%), historic (24%), multicomponent (7%), and unknown age (3%) sites. Of the known resources, 26% are eligible for the NRHP, 55% are not eligible for the NRHP, 14% are unevaluated, and 5% have unknown eligibilities. Seven resources within the Alternative D WPCI APE are listed on the NRHP.

3.3.8.2 National Historic Trails and Other Historic Trails

Under Alternative D, the California, Oregon, Mormon Pioneer NHT; Pony Express NHT; Bozeman Trail; Bridger Trail; and Overland Trail could be impacted by project activities specifically through physical and visual effects because these trails are present within the WPCI APE.

3.3.8.3 Sites of Specific Concern to Native Americans

Under Alternative D, 81 known resources of Native American concern and a total of 334 projected resources of Native American concern could be impacted by project activities specifically through physical and visual, atmospheric, and auditory effects. Resources eligible and not eligible for the NRHP are evenly represented with 37% each; 26% of the resources are unevaluated for the NRHP.

The Lander Field Office has identified one Native American sacred site in the Wind River Basin that is crossed by and would be directly and indirectly impacted by Alternative D. This sacred site is within a no surface occupancy zone designated by the BLM to prevent development-related surface-disturbing activities from occurring in this area (BLM 2014a).

3.3.9 Summary of Effects

Of the action alternatives, Alternative B has both the largest amount of potential surface disturbance and the greatest number of both known and estimated cultural resources present within the WPCI APE. As a result, Alternative B would have the most potential for impacting cultural resources, including NHT other historic trails and sites of specific concern to Native Americans. The effects of Alternative D would be similar although slightly reduced in comparison to Alternative B because of the fewer number of cultural resources present in the WPCI APE for Alternative D. Alternative C would have the least potential for impacting cultural resources because of less potential surface disturbance and because it contains the fewest cultural resources of the three action alternatives, and specifically lacks any NHT and other historic trails within the proposed corridors.

3.3.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or reservation in existing utility corridors would not result in any irretrievable or irreversible impacts to cultural resources or the setting of these resources. Unavoidable adverse impacts would be incurred under each action alternative during the construction and operation of pipeline projects. Activities associated with all action alternatives have the potential to cause surface disturbance and impact cultural resources over both the short term and the long term were these alternatives to be developed. Physical effects primarily include displacement, destruction, or disturbance of surface and subsurface cultural materials and exposure or burial of resources through increased sedimentation or erosion, and once incurred would be permanent (irreversible) because of the nonrenewable nature of in-situ cultural resources.

All action alternatives would also cause potential visual, auditory, or atmospheric effects to cultural resources by introducing modern industrial elements, which could adversely affect their traditional setting, feeling, and association within their historic context. Such effects would be more pronounced and long term for aboveground infrastructure in regular use but could be limited in both effect and duration (i.e., irretrievable) if the cause of the effect were mitigated or removed.

Although implementation of site-specific NEPA, the Section 106 process, and tribal consultation (as needed) would reduce effects to cultural resources, the short-term uses of the corridors may result in long-term impacts to cultural resources and cultural landscapes.

3.4 FIRE AND FUEL LOADS

3.4.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following fire and fuel loads issues for analysis:

- How would vegetation changes affect fire regimes in the pipeline corridors?
- How would human-made fire from pipeline construction and operation activities, such as use of heavy equipment, blasting, fuel storage, and welding, affect BLM management of wildfires and fuel loads?

The indicator of effects with respect to fire and fuel issues is the acres of new pipeline ROW. This indicator is illustrative of how much land would be subject to changes that affect fire and fuel loads.

3.4.2 Affected Environment

Fuels and fire conditions within the affected environment are influenced by vegetation and land uses within the proposed pipeline corridors (Sections 3.7 and 3.17). Vegetation types in the corridors consist of shrubland (including desert scrub and grassland), riparian (including wetlands), agriculture, forest, cliff (including rock and scree), and developed areas. Shrubland is the dominant land cover type within the corridors.

3.4.3 Methods of Analysis

The analysis area for fire and fuel loads is the width of the corridors for all proposed corridors (200-foot width for lateral lines and 300-foot width for trunk lines). The estimated area of new pipeline corridors served as an impact indicator of fire and fuel load effects, which were analyzed by estimating the area of new pipeline corridors to represent the area where proposed pipelines could change fuel loads (by

changing vegetation) and fire risk (from pipeline construction, operations, and maintenance). Fire and fuel load for the alternatives were then qualitatively evaluated in the context of the issue statement below, the BLM RMPs, the state's proposal and design features, and the analysis of vegetation impacts in this EIS (see Section 3.17).

3.4.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved and there would be no impacts from fire or changes to fuels.

Future potential infrastructure projects may be implemented using existing designated corridors or outside of designated corridors, resulting in multiple ROWs. Under this scenario, the risk of human-made fires and impacts to fuel loads could be more dispersed across the analysis area.

3.4.5 Environmental Effects – Common to All Action Alternatives

All action alternatives would involve activities during construction that would increase fire risk. These activities include the use of heavy construction equipment, welding, blasting, and the storage of fuels and flammable materials. The following design features detailed in the state's proposal (see Appendix D) would reduce fire risk during construction activities:

- Clearing vegetation from staging and storage areas to reduce fire danger
- Prohibiting the burning of brush or debris, campfires, or other fires within the pipeline corridors
- Implementing fire precautions during construction for blasting, welding, equipment maintenance and storage, and refueling
- Fire prevention and suppression training for all field crews

Although fire risk cannot be completely eliminated, implementation of fire prevention and suppression measure like those in the state's proposal (see Appendix D) would be effective at reducing fire risks and promoting efficient management of fires that may occur.

All action alternatives would affect vegetation within the corridors. Site disturbance during construction could result in long-term changes to vegetation composition by converting older seral stage vegetation structures to grasslands as well as potentially introducing invasive and noxious weeds. Vegetation community changes from a shrub-dominated cover type to a herbaceous type may create fires of lesser intensity but with the potential to spread fires faster and over greater distances.

Projects within the corridors would implement design features and BMPs that would reduce postconstruction impacts that may increase fuels in the corridors (see Appendix D and Appendix E.)

3.4.6 Environmental Effects – Alternative B (Proposed Action)

Alternative B would add 57,452 acres of new pipeline corridors, including 32,534 acres on BLM-administered lands, in which pipeline construction and operation may occur. Fire risk and fuels would increase due to construction and operation of pipelines. Design features, including fire prevention and suppression requirements (see Appendix D), and BMPs included in existing RMPs (see Appendix E) would reduce the risks of fire associated with the construction and operation of new pipelines. Similarly, restoration and revegetation of pipeline corridors following construction would promote plant reestablishment and native species, which would reduce the risk of additional fuels in the form of non-native invasive vegetation.

3.4.7 Environmental Effects – Alternative C

Alternative C would add 7,253 acres of new pipeline corridors, including 4,773 acres on BLM-administered lands. Fire and fuels impacts associated with pipeline construction and operation would be similar to, but less than those described for Alternative B. Design features and BMPs (see Appendices D and E) would reduce the risks of fire associated with the construction and operation of new pipelines. Restoration and revegetation of pipeline corridors following construction would promote plant reestablishment and native species, reducing the risk of additional fuels in the form of non-native invasive vegetation.

3.4.8 Environmental Effects – Alternative D

Alternative D would add 55,467 acres of new pipeline corridors, including 29,434 acres on BLM-administered lands. Fire and fuels impacts associated with pipeline construction and operation would be similar to those described for Alternative B. Design features and BMPs (see Appendices D and E) would reduce the risks of fire associated with the construction and operation of new pipelines. Restoration and revegetation of pipeline corridors following construction would promote plant reestablishment and native species, reducing the risk of additional fuels in the form of non-native invasive vegetation.

3.4.9 Summary of Effects

Alternatives B and D would add similar acreages of new pipeline corridors, both in total and on BLM-administered lands; Alternative C would add a substantially smaller area of new pipeline corridors. Increases in fire risks and fuels associated with new pipeline corridors would be reduced by design measures and BMPs (see Appendices D and E). Because of the smaller overall area of Alternative C, fire and fuel impacts would be comparatively less than Alternatives B and D.

3.4.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or reservation in existing utility corridors would not result in any irretrievable or irreversible impacts to fire and fuel loads. However, increased fire risk is inherent in the development of infrastructure, and future potential development in newly designated corridors may increase ignition risk or change fuel loads, thereby also impacting fire management strategies in areas where corridors did not previously exist. These impacts would be irretrievable until ignition risks are removed and vegetation is successfully rehabilitated to reduce fire risks. Short-term uses of the corridors would therefore not affect long-term fire and fuel management.

3.5 GEOLOGY AND SOILS

This section describes geologic hazards and soils resources in the proposed corridors and the potential effects that potential future construction in the proposed corridors would have on these resources.

3.5.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following geology and soils issues for analysis:

- Would the proposed corridors be prone to geologic hazards (earthquakes, landslides/slumping) that could impact pipelines? How would potential future construction associated with the proposed corridors increase the likelihood of geologic hazards, such as landslides from pipeline construction or seismic activity from increased oil and gas development?
- How would potential future construction associated with the proposed corridors affect soil compaction, erosion, and soil productivity, particularly in sensitive soils, including biological crusts?

Indicators of effects on geology and soils are as follows:

- Acres of areas within corridors prone to geological hazards (earthquakes, landslides/slumping)
- Acres of highly erodible and sensitive soils in the corridors
- Acres of soils with limited reclamation potential in the corridors

3.5.2 Affected Environment

3.5.2.1 Geologic Hazards

The analysis area for geologic hazards is the proposed and alternative corridors because potential impacts to and from geologic hazards would be limited to the footprint of the corridors. Based on U.S. Geological Survey (USGS), since January 1, 2012, approximately 1,500 earthquakes have been recorded in of Wyoming (USGS 2020a). However, no earthquakes have been recorded in the proposed corridors during that timeframe (USGS 2020a).

Landslides typically occur when a slope becomes unstable and produces rock falls, debris flows, slumps, lateral spread, and creeps. Landslides can cause considerable damage to pipelines and other structures. Most of the landslides in Wyoming occur in remote parts of the state that are typically sparsely populated (Wyoming State Geological Survey [WSGS] 2020a). Cretaceous and Oligocene deposits in central Wyoming and in southern Wyoming exist where tertiary lakebeds and/or continental deposits of the Green River and Wasatch Formations have been involved in considerable sliding and flowage.

3.5.2.2 Soils

The analysis area for soils comprises the subwatersheds that overlap the proposed and alternative corridors because it provides a clear, natural topographical boundary in which to analyze the potential impacts to soil types. The soils analysis area covers approximately 10,521,857 acres.

The most prevalent soil types in the analysis area are as follows (NRCS 2013):

- Wint-Westvaco-Teagulf-Tasselman-Rogrube-Huguston-Haterton (1,045,780.8 acres or 10% of analysis area), which has limited reclamation potential because of potential for steeper slopes.
- Vonason-Tresano-Fraddle-Forelle-Farson (571,919.7 acres or 5% of analysis area), which has limited reclamation potential because of wind erodibility potential.
- Ryan Park-Rock River-Pinelli-Kemmerer-Forelle-Diamondville-Dahlquist (406,242.9 acres or 4% of the analysis area), which has limited reclamation potential because of potential for steeper slopes and potential for finer texture.
- Hiland (402,156.2 acres or 4% of the analysis area), which has a limited reclamation potential because of wind erodibility potential and potential for finer texture.
- Travson-Shingle-Rock outcrop-Midway-Keyner-Hiland-Bowbac (372,298.5 acres or 4% of the analysis area), which has limited reclamation potential because of potential for steeper slopes.
- Ryan Park-Rock River-Carmody-Bosler (342,465.1 acres or 3% of the analysis area), which has limited reclamation potential because of potential for steeper slopes and wind erodibility potential.
- Youngston-Rock outcrop-Persayo-Neiber (326,897.6 acres or 3% of analysis area), which has limited reclamation potential because of potential for steeper slopes.

The most prevalent soil types in the proposed corridors under the Proposed Action are as follows (NRCS 2013):

- Vonason-Tresano-Fraddle-Forelle-Farson (3,423 acres or 6% of the proposed corridor), which has limited reclamation potential because of wind erodibility potential.
- Hiland (2,607 acres or 5% of the proposed corridor), which has a limited reclamation potential because of wind erodibility potential and potential for finer texture.
- Travson-Shingle-Rock outcrop-Midway-Keyner-Hiland-Bow (2,490 acres or 4% of proposed corridor), which has limited reclamation potential because of potential for steeper slopes.
- Ryan Park-Rock River-Carmody-Bosler (2,294 acres or 4% of the proposed corridor), which has limited reclamation potential because of potential for steeper slopes and wind erodibility potential.
- Rock outcrop-Lolite (2,220 acres or 4% of the proposed corridor), which has limited reclamation potential because of potential for steeper slopes and potential for finer texture.
- Shingle-Renohill (1,754 acres or 3% of the proposed corridor), which has limited reclamation potential because of potential for steeper slopes.

3.5.3 Methods of Analysis

Potential impacts to and from geologic hazards were analyzed by overlaying the proposed corridors over geologic hazards maps and calculating acres and miles of areas prone to geologic hazards, such as active faults and landslides, that are overlapped by the proposed corridors. Potential impacts from landslides and seismic activity are discussed qualitatively.

Potential impacts to soils were analyzed by overlaying the proposed corridors over soils maps and calculating the acres of highly erodible and/or sensitive soils overlapped by the proposed corridors, as well as soils with limited reclamation potential that are overlapped by the proposed corridors. Potential impacts to soil productivity, soil compaction, erosion, and sensitive soils are qualitatively discussed.

3.5.4 Environmental Effects – Alternative A (No Action)

3.5.4.1 Geologic Hazards

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved, and there would be no potential for geologic hazards such as landslides to impact potential projects within the proposed corridors. Any increase in oil and gas development under Alternative A would be expected to follow existing trends, which would include declining rates of earthquakes due to produced water disposal and the continued possibility for small earthquakes caused by hydraulic fracturing.

3.5.4.2 Soils

Under the No Action alternative, the applicant's application to develop the proposed corridors under Alternative B would not be approved, and there would be no soil compaction, erosion, soil productivity, or sensitive soils impacts as a result of potential future construction in the proposed corridors.

3.5.5 Environmental Effects – Common to All Action Alternatives

3.5.5.1 Geologic Hazards

Potential effects from geological hazards on potential future pipelines in the corridors could occur from areas where Quaternary faults are crossed, ground motion from earthquakes, landslides or unstable slopes, and subsidence or collapse of a karst. Geologic hazards could have direct and indirect effects on potential projects. Potential direct effect would include loss of equipment or injury to personnel. Indirect effects from geologic hazards could include loss of service to the potential future pipelines and leaks or spills from the pipelines.

The location, magnitude, intensity, and recurrence intervals of earthquakes are subject to extreme variation from predicted values; therefore, the ability to forecast future seismic activity in the analysis area is limited.

The Wyoming BLM mitigation guidelines for surface-disturbing and disruptive activities would apply to all BLM field offices overlapped by the proposed corridors. These guidelines include prohibiting surface disturbance in areas with slopes in excess of 25%. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the authorized officer (BLM 2007). Appendix E includes stipulations, required design features, BMPs, and other guidance from each applicable BLM field office.

Reclamation would be consistent with Wyoming BLM Reclamation Policy, which identifies ten reclamation requirements that must be addressed when developing reclamation proposals for all surface disturbing activities (IM No. WY-2012-032) (BLM 2012b).

3.5.5.2 Soils Resources

Impacts to soil resources resulting from potential future construction of potential projects in the proposed corridors are associated with ground-disturbing activities that could result in soil compaction, loss of soil due to accelerated wind and water erosion, and reduction in soil productivity (particularly in sensitive soils such as biological crusts). Pipeline construction activities, such as clearing, grading, trench excavation, backfilling, heavy equipment traffic, and restoration, could result in impacts to soil resources along the construction ROW, in temporary work areas, and on new and improved access roads.

Compaction-prone soils include soils with clay or finer texture with a somewhat poor, poor, or very poor drainage class. However, no compaction-prone soils were found in the proposed corridors. Clearing would remove protective vegetation cover and would expose soils to the effects of wind, sun, and precipitation, which could increase soil erosion and the transport of sediment to sensitive areas, such as wetlands or waterbodies. Soils in areas with slopes greater than 25% can also be more prone to erosion. Ground-disturbing activities associated with potential future construction in the proposed corridors could also result in temporary and long-term reduction in soil productivity. Soils with limited reclamation potential could have a variety of factors (e.g., soils with steep slopes, soils with sandy and clay texture, soils that are rocky, soils that are highly erosive, and soils with high pH or salts).

No data exist on biological soil crust coverage in the analysis area. If present, all action alternatives would have the potential to cause disturbance to, and potential loss of, biological soil crusts through the surface disturbance associated with potential future pipeline construction of potential projects within the proposed corridors. Biological soil crusts are fragile and have relatively slow recovery times when disturbed (USFS 2020). Disturbance to biological soil crusts can reduce soil stability, soil productivity, and erosion-resistance (USFS 2020).

The Wyoming BLM mitigation guidelines for surface-disturbing and disruptive activities would apply to all BLM field offices overlapped by the proposed corridors. These guidelines include prohibiting surface disturbance in areas with slopes in excess of 25%. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the authorized officer (BLM 2007). All Wyoming BLM field offices must comply with Wyoming BLM Reclamation Policy, which identifies ten reclamation requirements that must be addressed when developing reclamation proposals for all surface disturbing activities (IM No. WY-2012-032) (BLM 2012b). Appendix E includes stipulations, required design features, BMPs, and other guidance from each applicable BLM field office.

3.5.6 Environmental Effects – Alternative B (Proposed Action)

3.5.6.1 Geologic Hazards

Under Alternative B, there would be approximately 0.4 mile of faults that overlaps the proposed corridors (USGS 2020b). These faults include the South Granite Mountains fault system, the North Granite Mountains faults system (western section), and the Split Rock syncline. There would be approximately 123.4 acres of land prone to landslides (slopes of 25% or above) that overlaps the proposed corridors. Potential future construction in these areas could contribute to slope destabilization. The expected increase in oil and gas development under Alternative B would include the continued possibility for seismic activity associated with hydraulic fracturing.

3.5.6.2 Soils Resources

Under Alternative B, approximately 57,514 acres of soils would overlap the proposed corridors, with the potential for disturbance from future construction resulting in potential compaction of these soils (0.5% of soils in analysis area) (NRCS 2013). There would also be potential topsoil losses from wind and water erosion on disturbed surfaces during and after potential future construction in the proposed corridors. Approximately 28,825 acres of disturbed soils would have a high wind erodibility potential, and 16,160 acres would have a high water erodibility potential (NRCS 2013).

Under Alternative B, there would be a potential for temporary reduction in soil productivity on soils in the corridors as a result of potential future construction. Approximately 19,762 acres of these soils would be droughty soils, 51,282 acres would have a potential for shallow bedrock, and 9,352 acres would be hydric soils (NRCS 2013). These characteristics, along with the high erodibility discussed in the previous paragraph, would result in a limited reclamation potential for these disturbed soils and a potential long-term reduction in soil productivity. Any disturbance to, or loss of, biological soil crust where it occurs in the corridors would also result in a potential long-term reduction in soil productivity.

3.5.7 Environmental Effects – Alternative C

3.5.7.1 Geologic Hazards

Under Alternative C, no faults would overlap the proposed corridors (USGS 2020b). There would be approximately 4.9 acres of land prone to landslides (slopes of 25% or above) that overlaps the proposed corridors. Potential future construction in these areas could contribute to slope destabilization. The expected increase in oil and gas development under Alternative C would include the continued possibility for seismic activity associated with hydraulic fracturing.

3.5.7.2 Soils Resources

Under Alternative C, approximately 7,266 acres of soils would overlap the corridors, with the potential for disturbance by future construction, resulting in potential compaction of these soils (less than 0.1% of soils in analysis area) (NRCS 2013). There would also be potential topsoil losses from wind and water erosion on disturbed surfaces during and after potential future construction in the proposed corridors. Approximately 2,712 acres of soils in the corridors would have a high wind erodibility potential, and 1,931 acres would have a high water erodibility potential (NRCS 2013).

Under Alternative C, there would be a potential for temporary reduction in soil productivity on soils in the corridors as a result of potential future construction. Approximately 2,225 acres of these soils would be droughty soils, 5,722 acres would have a potential for shallow bedrock, and 1,356 acres would be hydric soils (NRCS 2013). These characteristics, along with the high erodibility discussed in the previous paragraph, would result in a limited reclamation potential for these disturbed soils and a potential long-term reduction in soil productivity. Any disturbance to, or loss of, biological soil crust where it occurs in the corridors would also result in a potential long-term reduction in soil productivity.

3.5.8 Environmental Effects – Alternative D

3.5.8.1 Geologic Hazards

Under Alternative D, there would be approximately 0.4 mile of faults that overlaps the proposed corridors (USGS 2020b). These faults include the South Granite Mountains fault system, the North Granite Mountains faults system (western section), and the Split Rock syncline. There would be approximately 137.9 acres of land prone to landslides (slopes of 25% or above) that overlaps the proposed corridors. Potential future construction in these areas could contribute to slope destabilization. The expected increase in oil and gas development under Alternative D would include the continued possibility for seismic activity associated with hydraulic fracturing.

3.5.8.2 Soils Resources

Under Alternative D, approximately 55,535 acres of soils would be in the corridors, with the potential for disturbance by future construction, resulting in potential compaction of these soils (0.5% of soils in analysis area) (NRCS 2013). This would be 1,913.3 acres less potential soil disturbance than under Alternative B. There would also be potential topsoil losses from wind and water erosion on disturbed surfaces during and after potential future construction in the proposed corridors. Approximately 27,193 acres of these soils would have a high wind erodibility potential, and 14,885 acres would have a high water erodibility potential (NRCS 2013).

Under Alternative D, there would be a potential temporary reduction in soil productivity on soils in the corridors as a result of potential future construction. Approximately 17,820 acres of these soils would be droughty soils, 49,037 acres would have a potential for shallow bedrock, and 9,485 acres would be hydric soils (NRCS 2013). These characteristics, along with the high erodibility discussed in the previous paragraph, would result in a limited reclamation potential for these disturbed soils and a potential long-term reduction in soil productivity. Any disturbance to, or loss of, biological soil crust where it occurs in the corridors would also result in a potential long-term reduction in soil productivity.

3.5.9 Summary of Effects

3.5.9.1 Geologic Hazards

Of the action alternatives, Alternative D would have the greatest potential for the proposed corridors being prone to geologic hazards because this alternative overlaps the most land prone to landslides. Alternative B would have a slightly lesser potential for the proposed corridors being prone to geologic hazards because it overlaps slightly less land prone to landslides. Alternative D and Alternative B are overlapped by the same amount of faults. Alternative C would have the least potential for the proposed corridors being prone to geologic hazards because the proposed corridors overlap a much smaller amount of land prone to landslides, and no faults overlap the proposed corridors.

3.5.9.2 Soils Resources

Of the action alternatives, Alternative B would have the largest potential impact on soil compaction, erosion, soil productivity, and biological soil crusts followed by Alternative D (Table 3.5-1). Because of the much smaller area of potential surface disturbance, Alternative C would have a much smaller potential impact on soil compaction, erosion, soil productivity, and biological soil crusts than the other action alternatives.

Table 3.5-1. Summary of Potential Soil Disturbance Acreages

Alternative	Acres of Potential Soil Disturbance
B	57,514
C	7,266
D	55,535

3.5.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or reservation in existing utility corridors would not result in any irretrievable or irreversible impacts to soils resources or increase the risk of geologic hazards. Future potential development in areas with potential for geologic hazards could result in landslides or other slope destabilization impacts that would be irreversible if not mitigated through design features.

The required design features listed above would help avoid or reduce soil compaction, erosion, and long-term loss of soil productivity in soils with limited reclamation potential under all action alternatives; however, depending on the soil that would be impacted, there is some potential for long-term impacts to soil productivity in disturbed areas.

3.6 HAZARDOUS MATERIALS AND WASTES

This section describes potential effects from the management of hazardous materials and wastes including hazardous and solid wastes, and potential effects from existing sources of hazardous wastes. Impacts to resources, including water resources, biological resources, air quality, and health and safety from hazardous materials and wastes are described in those respective sections.

3.6.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following hazardous materials and solid wastes topics for analysis:

- How would proposed corridors and potential project-related hazardous materials and wastes be transported, stored, handled, and disposed?
- What existing hazardous material sites may lead to contamination within the proposed corridors?

Indicators of effects related to hazardous materials and solid wastes are as follows:

- Noncompliant management of proposed corridors or potential project-related hazardous materials, hazardous wastes, or solid wastes
- Presence of nonproject-related noncompliant hazardous waste sites or noncompliant response to the discovery of an existing potential contamination source, or both

3.6.2 Affected Environment

The analysis area for hazardous materials and wastes consists of the following:

- Proposed corridors, transportation routes, and disposal areas or landfills where hazardous materials or wastes would be transported, stored, handled, and disposed
- Proposed corridors plus a 0.25-mile buffer where existing nonproject-related sources of hazardous wastes that may contaminant the proposed corridors

A search of hazardous waste cleanup sites revealed four hazardous waste sites within the analysis area for nonproject-related sources of hazardous wastes, as described in Table 3.6-1.

Table 3.6-1. Hazardous Waste Sites within the Affected Environment

Hazardous Waste Site Name	Site Description	Alternative/Location
Sinclair Wyoming Refining Company	Research Conservation and Recovery Act corrective action: this petroleum refining site was designated a large quantity generator of hazardous waste, and as of August 2019 was listed as not in compliance with the Resource Conservation Recovery Act due to failure to submit information.	Alternative D: this site is in Carbon County and falls within Segment 3 and is located east of Sinclair, just north of Lincoln Avenue.
Questar Pipeline Company Eakin Station	No violations identified: limited information is available for this site, although compliance history does not show any violations.	Alternative D: this site is in Lincoln County. The exact location of this site was not identified, although based on location description information, this site is near Highway 189 in Kemmerer and may, therefore, be near or within a segment.
Yellowstone Cody Refinery	Active cleanup site: this crude oil refining site is an active cleanup site for soils, evaporation ponds, and groundwater. Human exposures and groundwater migration are in compliance and currently controlled.	Alternative D: this site is in Park County and falls approximately 0.22 mile from Segment 3, west of Belfry Highway and northwest of the town of Cody.
BLM-Cody Landfill	No violations identified: there are no violations reported for this lined, sanitary municipal solid waste disposal facility.	Alternatives B and D: this site is located in Park County on Cody Landfill Road, approximately 0.14 mile east of the Segment 1 and Segment 3.

Sources: EPA (2019a, 2020); Park County (2020).

3.6.3 Methods of Analysis

The following steps were completed to analyze potential impacts from hazardous materials and wastes:

- Transportation, storage, handling, and disposal procedures for the proposed corridors and potential projects (EPG 2015) were compared to regulatory requirements and industry standards.
- Existing hazardous waste sites within the affected environment were gathered (see Table 3.6-1) and evaluated to identify potential sources of contamination within the proposed corridors.
- Measures for identifying and responding to an existing source of contamination were gathered to qualitatively evaluate project preparedness and response planning.

It is assumed that all potential projects within the proposed corridors would identify nearby landfills or other hazardous waste disposal facilities with the capacity needed for disposal of hazardous materials and wastes during construction and operations. As a result, the capacity of hazardous waste disposal facilities was not evaluated as a measure of hazardous materials and waste management.

3.6.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved, and there would be no potential future construction of pipelines within the proposed corridors that would cause hazardous materials and waste impacts.

3.6.5 Environmental Effects – Common to All Action Alternatives

The designation of proposed corridors would not require the use of hazardous materials or produce hazardous or solid wastes and would not result in direct impacts from management of hazardous materials or wastes.

But, construction and operations of potential projects, whether established through project-specific ROWs (Alternative A) or through corridors (Alternatives B, C, and D), would require the use of hazardous materials (EPG 2015), including fuels, lubricants, and refined oil products for machinery, and would produce hazardous and solid wastes. During operations of potential projects, hazardous materials such as natural gas and crude oil would be transported through pipelines, thereby resulting in potential indirect impacts from management of hazardous materials or wastes.

Hazardous materials and wastes for potential projects would be transported, stored, handled, and disposed in accordance with applicable federal, state, and local regulations (EPG 2015). In addition, all workers would receive training for the management of hazardous materials and wastes. As a result, the risks of mismanagement of hazardous materials and wastes would be minimized. With the exception of accidents or unforeseen events, there would be minimal indirect impacts from the transportation, storage, handling, or disposal of hazardous materials and wastes for potential projects under all alternatives.

As described in Table 3.6-1, the four hazardous waste sites within the affected environment are in compliance with applicable regulations and would, therefore, not pose a risk of contamination within the proposed corridors. If contamination from these existing sites or another source is identified within or near the proposed corridors, workers would respond and manage these wastes according to applicable federal, state and local regulations (EPG 2015) and industry standards as described in Issues Statement No. 1. As a result, the potential for contamination from nonproject-related sources would be minimized, and there would be minimal direct and indirect impacts from the management of nonproject-related hazardous wastes.

3.6.6 Summary of Effects

The management of hazardous materials and wastes would be the same for all alternatives. The transportation, storage, handling, and disposal of project or nonproject-related hazardous materials and wastes would be implemented in accordance with applicable federal, state, and local regulations. As a result, any risks from management of hazardous materials and wastes would be minimized.

3.6.7 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or reservation in existing utility corridors would not result in any use of hazardous materials and wastes. With proper application of federal, state, and local regulations, risks of irretrievable and irreversible impacts related to the use of hazardous materials and wastes during future potential development of the corridors would be minimized, and short-term uses of the corridors would preclude long-term risk of large-scale contamination.

3.7 LAND USE AND REALTY

3.7.1 Issues to be Analyzed and Impact Indicators

This section discusses the potential effects of the proposed project on lands and realty within the project corridors in Wyoming. Internal and public scoping identified the following land use topics for analysis:

- How would the project affect corridors, ROWs, and other land use authorizations?
- How would the project affect agricultural lands?

Indicators of impacts to lands and realty are as follows:

- Acres of BLM-administered land, state land, and private land affected; acres of ROW and utility corridors affected; and acres of agricultural land affected
- Conflict with existing federal, state, or local land use plans and policies and conflict with existing BLM land use authorizations or RMPs

3.7.2 Affected Environment

The analysis area for lands and realty are the proposed corridors. Most of these corridors are within pipeline corridors that were established in existing BLM RMPs (see Table 3.7-1). Proposed corridors would have segments outside of designated corridors that would parallel existing pipelines and disturbances. As discussed in Section 1.5.2.1, BLM-administered lands occurring in the analysis area are managed by direction provided in the RMPs that establish the goals and objectives for the management of resources. The BLM designates utility corridors as a planning-level tool to guide future land use authorizations. Corridors identify preferred areas for placing or co-locating multiple linear ROWs, such as gas pipelines and power lines. FLPMA mandates that the BLM manage public lands and their resource values on the basis of multiple use (43 USC 1701[a][7]).

Land jurisdiction in the analysis area consists of federal and state land-management agencies and private lands. Land jurisdiction in the study corridors is listed in Table 3.7-1 by alternative below.

The proposed corridors cross or are located near federal lands managed by the USFS, BLM, NPS, Department of Energy, Department of Defense (DOD), and Bureau of Reclamation (BOR); state land; county and city land; tribal land; and private land (as shown in Table 3.7-1). Depending on the specific project location, a variety of land use plans (including RMP for a given field office) may be applicable to a given portion of the proposed corridors.

Existing land use includes general developed land use, utilities, mineral development, and realty authorizations. General developed land use types were determined using land use classifications from the USGS National Gap Analysis Program (GAP) landcover data. Agricultural resources in the analysis area include cultivated cropland, pasture/hayland, irrigated land, and grazing allotments (grazing is covered under Section 3.8); however, most of the agricultural land resources on BLM lands are grazing allotments and are discussed in greater detail in Section 3.8.

3.7.3 Methods of Analysis

Land use resources were identified and evaluated for all counties occurring in the project corridors. The affected environment for livestock grazing, recreation, special designations, and transportation are discussed in Sections 3.8, 3.13, 3.15, and 3.16, respectively. The *Land Use and Realty Report for the Wyoming Pipeline Corridor Initiative* prepared by SWCA (2016a) was used as the basis for this inventory, which uses USGS GAP data and landownership data from federal and state agencies and was updated and supplemented with the BLM and secondary source geographic information system (GIS) spatial data.

The methodology for analysis of impacts to land use included the following key steps:

- Estimate, and where applicable, quantify the extent to which the project would affect areas committed to other land uses.
- Identify conflicts with land and resource use plans or regulations.
- Reference potential impacts or conflicts with other resource areas to appropriate EIS section (e.g., grazing, recreation, wildlife, visual, etc.).

3.7.4 Environmental Effects – Alternative A (No Action)

3.7.4.1 Corridors, Rights-of-way, and Other Land Use Authorizations, including Agricultural Land Uses

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. There would be no changes to corridors, ROWs, or land use authorizations, or all of the above from existing uses. The management of these corridors would remain under existing management plans, guidelines, and federal/state/local regulations. There would be no impacts to agricultural land uses on private property or state lands, and agricultural activities practices would remain unchanged from current conditions. Land use would continue to be managed as described in each field office's RMP.

3.7.5 Environmental Effects – Common to All Action Alternatives

3.7.5.1 Corridors, Rights-of-way, and Other Land Use Authorizations

Under all action alternatives, the designation of corridors dedicated use to the transport of CO_2, EOR products, and other compatible uses would lead to temporary and long-term effects to lands and realty. Table 3.7-1 provides a breakdown of acres of designated corridors by alternative by landownership and land use.

Table 3.7-1. Landownership and Uses by Acreages

Landowner and Land Use	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)
Landownership			
BLM land	32,534	4,773	29,434
BOR	1,077	237	1,123
Department of Defense	1	1	1
Federal Aviation Administration	–	–	7
USFWS	–	–	16
USFS	38	–	133
State	3,504	372	3,475
Local government	86	–	128
Private	20,043	1,871	21,083
Total Acres	**57,452**	**7,253**	**55,467**
Land Uses			
Agricultural	**301**	**262**	792
Existing ROW and utility corridor	36,921	32	45,555

The proposed corridors would result in temporary changes to land use and landcover and land use which is described in more detail under each proposed corridor. County land use plans were reviewed to ensure that the proposed corridors would not conflict with existing land use plans and policies for energy development. Upon review, the proposed corridors would be consistent and would not result in conflicts with existing land use plans. There would be permanent changes to land management direction. Impacts to land use and landcover would be in place for the lifetime of the proposed corridors and associated development and until reclamation was successfully accomplished. Potential changes to land use, landcover, and landownership were identified and analyzed in existing RMPs/EISs; however, the designation of the transport of CO_2, EOR products, and other compatible uses would mean potential projects may have to develop elsewhere.

Per Section 503 of FLPMA, for the establishment of a ROW corridor the width needs to be consistent with the planned or established uses within the corridors. Appropriate offsets for any potential project development placement per the appropriate industry and governmental standards would be used. In order to preserve the maximum useable width of the corridors, potential projects would be placed at one edge of the corridor and follow the alignment of the corridor boundary, where feasible. Subsequent pipelines using the corridors could then be located adjacent (offset the required safety distance) and parallel to existing pipelines for their entire length, to the extent possible (see Appendix D). Invocation of eminent domain for future potential development on private lands is not expected but could occur if the U.S. government, states, municipalities, or assignors thereof (such as utility companies) were involved in a proposed project and if the project was determined to be for the greater good of the public.

3.7.5.2 Agricultural Land Uses

Table 3.7-1 provides a breakdown of acreages of agricultural land uses by proposed corridors. Impacts to agricultural land uses would result in similar impacts as discussed above. The clearing of the corridors prior to development with construction vehicles (drive and crush), and the surface disturbance from the development would temporarily remove productive cropland within the ROW. Proposed corridors and development could lead to permanent changes in land use in terms of permanent disturbance and potential

changes to landcover. Access roads may be required through producing croplands in some locations and. access roads associated with development could result in the displacement of croplands. Vehicles on access roads would temporarily interfere with agricultural activities and would result in soil compaction and direct damage to crops. Land required for development within the proposed corridors would be removed from production for the lifetime of the project. The loss of productive cropland would be minor under any proposed corridor, due to the relatively small acreages of agricultural lands available within the corridors compared to the acreages of the proposed energy corridors in their entireties. Overall the land removed from crop production would be very small relative to the cropland within corridors that would continue to be available for crop production. The agricultural land use impacts of any potential future projects would be analyzed through subsequent project-specific NEPA.

3.7.6 Environmental Effects – Alternative B (Proposed Action)

Alternative B proposed designated corridors for the transport of CO_2, EOR products, and other compatible uses overlap 57,452 acres of BLM, BOR, USFS, DOD, state and local government. and private lands. Of this total, 36,921 acres (64%) would be within existing ROWs or designated utility corridors.

3.7.7 Environmental Effects – Alternative C

Alternative C proposed designated corridors for the transport of CO_2, EOR products, and other compatible uses overlap 7,253 acres of BLM, BOR, DOD, USFS, state government, and private lands. Of this total, 32 acres (<1%) would be within existing ROWs or designated utility corridors.

3.7.8 Environmental Effects – Alternative D

Alternative D proposed designated corridors for the transport of CO_2, EOR products, and other compatible uses overlap 55,467 acres of BLM, BOR, USFS, DOD, Federal Aviation Administration, USFWS, state and local government, and private lands. Of this total, 45,555 acres (82%) would be within existing ROWs or designated utility corridors.

3.7.9 Summary of Effects

3.7.9.1 Corridors, Rights-of-Way and Other Land Use Authorizations

Alternative D would use the most of all the proposed corridors in terms of total acreage and percentage of energy corridors (82%), whereas Alternative C would use the least existing ROW and utility corridors. Overall Alternatives B and D are relatively similar in terms of landownership and acreage breakdowns as shown in Table 3.7-1, but Alternative B would result in the use of fewer acres of existing ROW and utility corridors compared to Alternative D (64%).

3.7.9.2 Agricultural Land Use

Overall agricultural land comprises approximately 1 to 4% of all acreage available for energy use per alternative. Although direct impacts from the identified number of acres would occur, the indirect impacts could be greater and would not be known until the project-specific NEPA is conducted. Although Alternative D would result in the greatest direct impact acquisition of agricultural lands (792 acres) for pipeline ROW, this only constitutes approximately 1.4% of the proposed corridors proposed for this alternative. Alternative C would result in the smallest direct impact acquisition of agricultural lands (262 acres); however, this would result in the greatest percentage of agricultural land acquisition for energy corridor of 3.6%. Alternative B would result in similar impacts to those of Alternative D with direct impact acquisition of 301 acres, which comprises 0.5% of the energy corridor.

3.7.9.3 Land Uses and Land Use Plans

Alternative B is the largest in terms of total acreages and mileage, 57,452 and 1,956, respectively. Alternative D is smaller by approximately 2,000 acres and 90 miles. The proposed corridors under Alternative C are the smallest and would affect the fewest acres and miles, 7,253 and 242, respectively. Therefore, Alternatives B and D would result in the greatest impacts to land use from the construction, operation, and maintenance of pipeline infrastructure within the proposed energy corridors, whereas Alternative C would result in significantly fewer impacts due to its smaller footprint.

3.7.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New corridor designation for the transport of CO_2, EOR products, and other compatible uses in existing utility corridors would preclude other land use authorizations (an irretrievable impact) until the designations or use reservations are changed.

Future potential development in new corridors would result in the conversion of some project lands from existing uses to use as potential ROW. In areas where reclamation activities may have limited success, some vegetation communities would take years to reestablish, and some areas may never return to their former vegetation cover and composition. As such, these impacts may represent an irreversible commitment of land use resources. Additionally, changes in land use around the proposed energy corridor may also occur as a result of its designation. These changes are unlikely to be returned to previous use after decommissioning and should, therefore, be considered irreversible. The relationship between local short-term uses of the human environment and maintenance and enhancement of long-term productivity does not apply to this resource.

The loss of land available for agricultural uses during the life of the project would result in unavoidable adverse impacts to agriculture during the life of the pipeline and during decommissioning. In the short term, the current productivity of lands for agricultural uses would be reduced and lands would be unavailable for other uses such as energy production. Overall, impacts to long-term productivity resulting from these activities would be minimal due to the limited amount of agricultural lands used by the action alternatives when compared to the overall footprints of each proposed corridor; however, as discussed above, agricultural land use impacts of any potential future projects would be analyzed through subsequent project-specific NEPA.

3.8 LIVESTOCK GRAZING

3.8.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following livestock grazing issues for analysis:

- How would vegetation removal and surface disturbance temporarily and permanently affect acres with suitable forage for grazing and the available animal unit months (AUMs) within each allotment crossed by the proposed corridors, temporarily and permanently?
- How would the potential project impact the various range improvements it intersects during construction?

This section discusses the anticipated effects of the potential project on livestock grazing on allotments crossed by the proposed corridors. Indicators of impacts to livestock grazing are as follows:

- Acres of proposed corridors that overlap allotments, assuming surface disturbance and vegetation removal
- Discussion of the comparison of the percentage of acres affected by the corridor to the total acres in allotments to determine impact; additionally, an assumed number of AUMs that could be temporarily or permanently lost on grazing lands within the BLM grazing allotments intersecting the proposed corridors
- Discussion of the potential for range improvements to be directly removed or disturbed as a result of surface disturbance activities associated with construction activities

3.8.2 Affected Environment

Livestock grazing allotments are present within the proposed corridors on lands administered by the BLM. Grazing allotments are the geographic units within which the BLM manages livestock grazing and defines the areas of livestock use by individual permittees. Grazing provides an important economic opportunity within local communities; within the proposed corridors it includes the grazing of domestic cattle and other livestock. Grazing on federal lands is governed under the Taylor Grazing Act of 1934, FLPMA, and Public Rangelands Improvement Act of 1978.

The carrying capacity of a livestock grazing allotment is defined in terms of AUMs or the amount of forage required to sustain one cow or its equivalent for a period of 1 month. Table 3.8-1 shows the total federal acres and AUMs for each allotment that occurs partially or completely within each corridor alternative. The table also includes the total AUMs that are allocated to livestock in each allotment and the calculated number of AUMs within each alternative.

3.8.3 Methods of Analysis

The BLM has developed the BLM Rangeland Health Standards for each state (43 CFR 4180.1), and the USFS has a memorandum of understanding with the BLM regarding the use of these standards. The standards address the minimum acceptable conditions for public rangelands based on the health, productivity, and sustainability of the rangelands. In addition to Rangeland Health Standards, specific RMP stipulations, BMPs, and design features that would reduce impacts to livestock grazing can be found in Appendices D and E.

The analysis area for livestock grazing consists of the allotments that are crossed by the action alternatives. The potential project could temporarily affect the acres available for livestock grazing or stocking rates for the entire allotment as a result of a reduction in permitted AUMs or suitable forage; therefore, the analysis area for livestock grazing extends beyond the boundaries of the proposed corridors to include the full allotments that are crossed by the alternatives.

Impacts to livestock grazing are described in terms of change in area (acres) available for livestock grazing by allotment under each alternative (Table 3.8-1). The number of AUMs in the proposed corridors was calculated by multiplying the total AUMs allocated to livestock within the allotment by the percentage of the allotment within the proposed corridors. Calculated AUMs in the action alternatives may or may not be properly represented because the AUMs in these allotments are typically found in concentrated areas; it is conservatively assumed that AUMs (forage) are evenly distributed throughout the allotments.

A temporary reduction in vegetation post-construction could result in a temporary reduction in permitted AUMs if area reductions lower the total available forage accessible to livestock. Although reductions in area available for livestock grazing related to the alternatives would be restricted to corridor boundaries, impacts can only be assessed for each full allotment (including the portions that extend beyond the corridor alternatives). Information to support this analysis was acquired from the BLM Rangeland Administration System (BLM 2020b). Impacts to range improvements are described in qualitative terms. The analysis area for range improvements comprises their intersection with the proposed corridors.

Table 3.8-1. Federal Grazing Allotment Acres and Animal Unit Months by Bureau of Land Management Field Office

Allotment	Total Federal Acres within Allotments			Acres of Allotment within the Proposed Corridor			Percentage of Allotment in the Proposed Corridor			Total Federal AUMs Allocated to Livestock			Calculated AUMs in the Proposed Corridor		
	Alt. B	Alt. C	Alt. D	Alt. B	Alt. C	Alt. D	Alt. B	Alt. C	Alt. D	Alt. B	Alt. C	Alt. D	Alt. B	Alt. C	Alt. D
Buffalo	180,789	0	189,335	1,205	0	1,227	0.67%	0%	0.65%	23,657	0	24,931	158	0	162
Casper	484,247	756,64	358,646	2,868	304	2,126	0.59%	0.40%	0.59%	79,371	13,096	79,650	470	53	472
Cody	444,332	204,091	423,216	4,328	1,115	4,012	0.97%	0.55%	0.95%	54,264	12,331	52,034	529	67	493
Kemmerer	473,094	0	230,836	203	0	616	0.04%	0%	0.27%	49,445	0	22,149	21	0	59
Lander	1,456,796	348,910	1,249,195	8,199	143	7,315	0.56%	0.04%	0.59%	285,240	48,616	252,678	1,605	20	1,480
Pinedale	189,653	189,653	293,033	606	513	898	0.32%	0.27%	0.31%	55,492	21,784	63,292	177	59	194
Rawlins	1,173,359	695,343	1,205,173	4,409	1,003	4,689	0.38%	0.14%	0.39%	325,247	102,411	332,252	1,222	148	1,293
Rock Springs	2,368,878	182,558	1,619,399	6,236	412	4,170	0.26%	0.23%	0.26%	553,167	25,432	500,222	1,456	57	1,288
Worland	689,439	279,924	683,330	4,896	1,308	4,880	0.71%	0.47%	0.71%	126,850	48,249	140,922	901	225	1,006
Total	7,460,586	1,976,142	6,252,162	32,950	4,798	29,933	4.51%	2.10%	4.71%	1,552,733	271,919	1,468,130	6,539	629	6,447

Source: BLM (2020b).

3.8.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. Therefore, under Alternative A, there would be no impacts to livestock grazing as a function of Alternative A; vegetation would be unaffected and grazing practices would remain unchanged. Grazing activities would continue to be managed as described in each field office's RMP. Impacts to livestock grazing from other land uses such as recreation and vegetation treatments would continue similar to current conditions and there would be no impacts to range improvements.

3.8.5 Environmental Effects – Common to All Action Alternatives

3.8.5.1 Forage and AUMs

Under all action alternatives, the designation of corridors dedicated to future use for the potential project would cause direct and indirect impacts to livestock grazing. Direct impacts to grazing allotments from subsequent construction, operation, and decommissioning activities could include the loss of forage, potential disruptions to calving areas and periods, and increased mortality and injuries to livestock resulting from increased vehicle traffic. In addition, livestock could be temporarily displaced from preferred grazing areas and range improvements (including water sources) by construction activities. Loss of forage could result from surface disturbance related to construction of the potential project and aboveground facilities and the placement of permanent structures and facilities. It is not anticipated that new road construction would be required to access the potential project on federal lands; if access road construction is deemed necessary, roads would be built to minimum allowable federal standards. In addition, loss of forage could result from the potential conversion of native vegetation communities due to indirect effects such as erosion and the invasion and spread of noxious and invasive weed species.

In areas where successful reclamation is difficult or lengthy, any loss of forage would be considered a short-term impact. Any loss of forage resulting from construction or placement of structures would not restrict livestock access, except during short periods when trenches are open, and would be considered a short-term impact. In addition, noise and human presence from construction activities near calving areas could result in increased mortality and reduced weight gain or animal performance. Construction activities would result in increased vehicle traffic and potentially increased vehicular speed on roads that are improved. Increased vehicle traffic and speeds would increase the potential for livestock/vehicle collisions and the proliferation of road dust, which could reduce forage potential. If access road improvements are necessary in grazing areas, alternative means would be made available for access to grazing allotments, water resources, grazing facilities, and livestock if retained for public use.

Indirect impacts could include the spread of noxious and invasive species; however, site-specific reclamation plans would be developed to control noxious and invasive species. See Section 3.17, Vegetation, for further discussion of noxious and invasive species impacts to vegetation resources. Impacts to vegetation could lead to the loss of available native forage and increased livestock mortality.

Any temporary losses of forage would not be enough to warrant adjusting the grazing permit associated with individual grazing allotments. The permitted AUMs for grazing allotments would be adjusted if it is identified that there would be a loss of forage in any subsequent site-specific installation NEPA analysis or if subsequent monitoring data shows that there is a loss of livestock carrying capacity. Where there is also a decrease in land acreage for livestock grazing in allotments, a 2-year notice to the permittee would be required, unless waived, per 43 CFR 4110.4-2 (10-01-2005 Ed.) The remaining areas not affected by permanent facilities would be reclaimed immediately following completion of construction as described in Section 3.17, Vegetation.

Additional reclamation measures proposed for vegetation that would benefit livestock are described in Section 3.17, Vegetation. Measures committed for vegetation reclamation would benefit livestock through either preservation or reclamation of forage.

3.8.5.2 Range Improvements

Under all action alternatives, range improvements, which include fences, gates, cattle guards, and stock tanks, could be directly removed or disturbed as a result of surface disturbance activities associated with construction activities. Additional impacts could occur through potential damage to fences, gates, and cattle guards, resulting in the accidental release of livestock. Long-term range monitoring sites could be directly removed or disturbed as a result of surface disturbance activities associated with construction activities.

3.8.6 Environmental Effects – Alternative B (Proposed Action)

Under Alternative B, future potential development of the proposed corridors would temporarily remove up to 32,950 acres of potential forage (6,539 AUMs). Across all field offices, this represents a loss of up to 0.42% of available AUMs.

3.8.7 Environmental Effects – Alternative C

Under Alternative C, future potential development of the proposed corridors would temporarily remove up to 4,798 acres of potential forage (629 AUMs). Across all field offices, this represents a loss of up to 0.23% of available AUMs.

3.8.8 Environmental Effects – Alternative D

Under Alternative D, future potential development of the proposed corridors would temporarily remove up to 29,933 acres of potential forage (6,447 AUMs). Across all field offices, this represents a loss of up to 0.44% of available AUMs.

3.8.9 Summary of Effects

Livestock grazing impacts would be similar between Alternative B and Alternative D. Acreage-wise, the greatest impacts would occur on Alternative B, and the fewest on Alternative C (see Table 3.8-1). Based on the implementation of the proposed mitigation measures and the consideration of acreages affected, it is not anticipated that these losses would make livestock production uneconomical. No permanent impacts to range improvements are anticipated under any alternative.

3.8.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or dedicated use in existing utility corridors would not result in any irretrievable or irreversible impacts to livestock grazing. Future potential development and subsequent maintenance in new and existing corridors would reduce the forage productivity and available AUMs until the disturbances were successfully reclaimed. Any loss of land acreage for livestock grazing as a result of the corridor would be permanent for the life of the project. Should any livestock mortality from vehicle collisions occur due to corridor use or increased mortality from noise and human presence from construction activities near calving areas, that impact would be irreversible. No unavoidable adverse effects to range improvements or structures are anticipated. Overall, impacts to long-term productivity of grazing management would be minimal due to the limited overall percentages that would be impacted by all action alternatives and the assumption that reclamation would return forage productivity.

3.9 MINERAL RESOURCES

This section describes mineral resources and mineral development activities in the planning area and the potential effects that potential future construction in the proposed corridors would have on these resources and activities.

3.9.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following minerals issues for analysis:

- How would the proposed corridors affect existing and potential mineral development operations in the planning area?

Indicators of effects on minerals are as follows:

- Acres of active mines and oil and gas leases overlapped by the proposed corridors
- Acres of known mineral locations overlapped by the proposed corridors
- Estimated increase in oil and gas development in the proposed corridors

3.9.2 Affected Environment

The impact analysis area for minerals is the planning area because active and potential mineral development operations within the nine BLM planning areas would be impacted by the footprint of the proposed corridors. Wyoming ranks eighth in the nation for both crude oil production and natural gas production, and a large portion of that production occurs in the planning area (WSGS 2020b). There are approximately 8,230,159 acres of oil and gas leases in the planning area, and 2,498,601 acres of oil and gas fields in the planning area. The overall acreage of oil and gas leases comprises the federal mineral estate. The BLM only has control over the BLM-administered surface and not necessarily the entire acreage associated with oil and gas leases.

Since 1978, oil production in Wyoming has been declining. This downward trend according to the state has resulted in significant reductions in revenues and adverse impacts to local government and Wyoming workers. The state has identified roughly 2,000 miles of proposed pipeline corridors throughout the central and western portions of the state that they deem important to future oil production and distribution of natural resources vital to the state's economy. Most of these corridors (1,150 miles) cross BLM-administered lands. Large economically significant oil reserves in existing, often "played-out" reservoirs might be good candidates for CO_2 EOR.

CO_2-EOR in Wyoming first began in the late 1980s and more recently in the 2000s when new CO_2-EOR projects have come online. What precipitated EOR was the development of supercritical CO_2 developed at ExxonMobil's Shute Creek Gas Plant in LaBarge, Wyoming (Jones and Freye 2019) (see Appendix G). Since that time, an additional gas processing plant was constructed by ConocoPhillips at Lost Cabin at Madden in the central part of the state. Other known sources for potential CO_2 production include Riley Ridge located north of Shute Creek and sources potentially from carbon capture at coal-fired power plants.

CO_2 from the Shute Creek plant currently serves seven commercial CO_2-EOR projects (Table 3.9-1). Together these seven projects[3] recovered 153 million barrels of incremental oil through 2018. To do this, operators have injected 229 million tons of CO_2 into these legacy oil fields. Additionally, 43,000 barrels of incremental oil production was recovered from 23 separate CO_2-EOR pilot projects.

[3] As of 2015, there were only 130 active commercial CO_2 projects in the United States.

Table 3.9-1. Commercial Carbon Dioxide-Enhanced Oil Recovery Notable Projects in Wyoming

Project	CO_2 Source	As of 2018		CO_2 First Began
		Active Wells	CO_2 wells*	
Wertz	Shute Creek	51	61	1986
Lost Soldier	Shute Creek	87	84	1989
Patrick Draw	Shute Creek	140	77	2003
Salt Creek†	Shute Creek	606	503	2003
Grieve	Shute Creek	8	9	2012
Beaver Creek	Shute Creek	76	17	2008
Big Sand Draw	Shute Creek	17	19	2013

* Recycling gas through reservoir.

† Largest CO_2 project in entire United States.

Besides oil and gas resources, the planning area also produces mineral products such as coal and coalbed CH_4; trona; locatable minerals such as uranium, limestone, gypsum, bentonite, and precious metals; and mineral materials such as building stone, sand and gravel, and clay. Wyoming has been the top coal-producing state in the United States since 1986, accounting for more than 40% of the annual U.S. coal supply (WSGS 2020c). The proposed corridors overlap the Bighorn Coal Field, the Wind River Coal Field, the Powder River Coal Field, the Hanna Coal Field, and the Green River Coal Field. There are approximately 416,322 acres of active coal permits (Wyoming Department of Environmental Quality [WDEQ] permits) in the planning area. There is also approximately 1,004,640 acres of trona areas in the planning area.

3.9.3 Methods of Analysis

Potential effects to mineral resources and mineral development operations were analyzed by overlaying the proposed corridors over maps of known active mining operations and mineral locations using BLM spatial data. Areas where the proposed corridors overlap mineral locations could be made inaccessible for mineral development as a result of potential future construction in the proposed corridors. The proposed corridors would not be allowed to be sited in areas that would make existing authorized mineral development areas inaccessible. Potential impacts to solid mineral development would likely be greater than potential impacts to oil and gas development because of the nature of these types of development. There would likely be less potential for impacts to oil and gas development because of the smaller footprint involved with such development and the ability to extract the resources from beneath the proposed corridors without creating surface disturbance within the proposed corridors.

The Enhanced Oil Recovery Institute (EORI) has developed a list of 100 oil fields in Wyoming that, because of reservoir properties, are technically capable of supporting the use miscible (mixable) CO_2 floods for successful tertiary recovery efforts (see Appendix G). EORI reports "[T]he estimated recoverable reserves for the candidate fields using CO_2-EOR are approximately 1.5 billion barrels of oil" (Jones and Freye 2019). Of these fields, 28 are near existing CO_2 delivery infrastructure and 26, according to the same report, are economically and technically viable. Seven of the fields are undergoing existing CO_2-EOR production.

For purposes of analysis, the BLM has reviewed the list of 100 fields identified by EORI and calculated what the reasonably foreseeable emissions are on an annual basis, and over the next 20 years, based on existing annual production data. This method of analysis was undertaken to support the BLM's analysis of GHGs, which uses average annual data (see Section 3.2). This method also provides the potential level of future activity. The method that the BLM used to determine average annual emissions is provided below.

For production decline curve: Using data from the Wyoming Oil and Gas Conservation Commission, the BLM used field-level 2010 and 2019 production values to determine average annual oil decline; fields where there was an increase in production were removed from consideration. The percent oil decline from 2010 to 2019 was then divided by 10 years for data to get average annual. The BLM further compared the number of producing wells between 2010 and 2019 to filter out those where there were fewer wells on production in 2019 to eliminate potential bias in the results. As a result, records from 15 fields were used to determine average annual decline (average 4.2%). The BLM then used these same records for gas decline; the BLM followed the same process of removing fields that showed increasing production during the 2010–2019 time period resulting in an average of 6.19% decline per year.

The BLM considered using average annual decline in oil from fields currently undergoing CO_2 flood (3.33%) but there were fewer wells on production in 2019, which can mask true reservoir production.

From the initial 100 fields identified by EORI, the BLM filtered out records where no production in 2010 and in 2019 occurred; this resulted in four records being removed from use in our calculations: Hawk Point, Grieve North, Meadow Creek North, and Neiber Dome.

For estimates of future production: the BLM used operator-supplied incremental recovery percentages for the five fields currently using CO_2-EOR (Grieve and Big Sand Draw were not used due to relative shortness of the record) as the common denominator (approximately 17.26%) (see Table 3.9-1). The BLM applied this recovery rate to each 2019 field-level production amount. The BLM used this average annual production increase to produce future year production amounts on a field basis. This method likely overestimates additional recovery on an annual and 20-year basis, but gives a reasonable method for estimating future production and activity levels and the associated average annual emissions of GHGs.

Finally, the BLM assumed 10 years of positive production growth and 10 years of decline. The effect of this approach is that it creates a perfect bell curve. Actual production may peak in an earlier year and at a higher value. However, the BLM uses annual average indirect emission totals to provide context to other existing GHG emissions data, which are presented annually. All data calculations can be found in Appendix I.

Key assumptions for this analysis include the following: the existing well network is sufficient to produce any additional incremental production and there is sufficient reservoir reserves in place to support the 20 years of estimated production. Forecasts beyond this are speculative because there is no available information that describes estimates of original oil in place reserves; the data that the BLM used are the best available. Further, the production values obtained from the Wyoming Oil and Gas Conservation Commission for 2019 in the House, Scott, Hornbuckle, Hilight, and Powell fields are likely influenced (positively skewed) by horizontal well production; horizontal wells may produce from multiple fields. GHG emissions from total reserve estimates provided by the EORI are provided in Section 3.2.5.1.

3.9.3.1 Existing Constraints to Enhanced Oil Recovery

Current constraints impacting increased CO_2 flooding center around the limited network and capacity of CO_2 pipelines in Wyoming. Also, although CO_2 resources in Wyoming are abundant, its availability is largely constrained because of the limited number of gas-producing plants and compression facilities. A significant portion of CO_2 produced in Wyoming is presently being exported for EOR projects in Colorado (Chevron's Rangely Field and Montana's Bell Creek Field) and may not be available to support EOR in the identified technically feasible fields. Going forward, total supply, cost of CO_2, and pipeline capacity would likely determine where additional production can be realized using CO_2-EOR.

3.9.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved, and there would be no potential for impacts to potential or existing mineral development operations within the proposed corridors. Without the proposed corridors, there would be no potential increase in EOR as described under all action alternatives.

3.9.5 Environmental Effects – Common to All Action Alternatives

Potential impacts to potential mineral development operations under all action alternatives would result from land within the proposed corridors being potentially inaccessible to mineral development because of potential future construction in the corridors or the necessary large capital investments necessary to support CO_2-EOR, which may not occur as a result. The proposed corridors may reduce the surface occupancy of existing leases where overlapped by corridors in the planning area.

The proposed corridors would not be allowed to make any existing authorized fluid, geothermal, locatable, or salable mineral development operations inaccessible. Any potential impacts to existing authorized fluid, geothermal, locatable, or salable mineral development operations would have to be addressed during site-specific authorization through rerouting or other means.

Because of the expected increase in oil and gas production under all action alternatives, there would be an increased need for sand and gravel to be used in oil and gas development activities. This could result in an increase in sand and gravel production.

3.9.6 Environmental Effects – Alternative B (Proposed Action)

Under Alternative B, approximately 5,854 acres of oil and gas fields and 16,086 acres of existing oil and gas leases would be overlapped by the proposed corridors. These acreages represent approximately 0.2% of both the total acres of oil and gas fields and the total acres of oil and gas leases in the planning area. Approximately 135 acres of active coal permits (WDEQ permits) would be overlapped by the proposed corridor, which represents approximately 0.03% of the total acres of active coal permits in the planning area. Approximately 1,018 acres of trona areas would be overlapped by the proposed corridor, which represents approximately 0.1% of the total acres of trona areas in the planning area. The proposed corridors would also overlap approximately 345.0 miles of existing pipelines.

Assuming the corridors are developed, it is reasonably foreseeable that CO_2-EOR could be used in approximately 93 new oil fields (including the existing Grieve and Big Sand Draw fields) primarily located in the Powder River and Big Horn Basins, with some additional potential in the Rock Springs Field Office and Lander Field Office planning areas. Using the aforementioned methodology, total new production could be upward of 549.15 million barrels of oil and 1.3 trillion cubic feet of gas. Note that there is uncertainty in these values as they relate to total reserves remaining. Potential future gas production is uncertain as well because of the ultimate level of CO_2 saturation in the oil stream and because of the potential for CO_2 to displace gas beyond the limits of existing production and effective reservoir drainage. It also assumes that an adequate supply of CO_2 is available for use.

3.9.7 Environmental Effects – Alternative C

Under Alternative C, approximately 1,194 acres of oil and gas fields and 2,549 acres of existing oil and gas leases would be overlapped by the proposed corridors. These acreages represent approximately 0.05% and 0.03%, respectively, of the total acres of oil and gas fields and oil and gas leases in the planning area. No active coal permits or trona areas would be overlapped by the proposed corridors. The proposed

corridors would also overlap approximately 56.2 miles of existing pipelines. Where existing corridors are full, new construction would be limited unless the proponent re-occupies the space of lines that are no longer in commission.

Potential future production from CO_2-EOR would be expected to be similar to Alternative B.

3.9.8 Environmental Effects – Alternative D

Under the Alternative D, approximately 5,705 acres of oil and gas fields and 14,804 acres of existing oil and gas leases would be overlapped by the proposed corridors. These acreages represent approximately 0.2% of both the total acres of oil and gas fields and the total acres of oil and gas leases in the planning area. Approximately 144 acres of active coal permits (WDEQ permits) would be overlapped by the proposed corridor, which represents approximately 0.03% of the total acres of active coal permits in the planning area. Approximately 1,038 acres of trona areas would be overlapped by the proposed corridor, which represents approximately 0.1% of the total acres of trona areas in the planning area. The proposed corridors would also overlap approximately 354.0 miles of existing pipelines.

Other impacts would be similar to those identified in Alternative B projected production, and Alternative C as it relates to use of existing corridors. Dedicating portions of existing corridors to CO_2 lines could increase the potential for conflict with existing or new oil and gas development that are also needing to install new major transportation pipelines. This could result in delays in getting product to market and may also temporarily delay new development and limit royalty payments until new pipeline corridors could be identified.

3.9.9 Summary of Effects

Of the action alternatives, Alternative B would result in the largest amount of potential future surface disturbance in existing oil and gas fields and oils and gas leases. This potential surface disturbance would unlikely make areas completely inaccessible to oil and gas development because of the ability to extract oil and gas resource from beneath the proposed corridors without requiring surface disturbance within the corridors. However, the proposed corridors would restrict the areas where surface disturbance associated with oil and gas development activities could occur. Alternative D would result in a slightly smaller amount of potential future surface disturbance in existing oil and gas fields and oils and gas leases. Compared to the other action alternatives, Alternative C would result in a much smaller amount of potential future surface disturbance in existing oil and gas fields and oil and gas leases.

Alternative D would result in the largest amount of potential future surface disturbance in active coal permits and trona areas, followed closely by Alternative B. This surface disturbance could make these areas inaccessible for surface mining activities. Alternative C would not affect any active coal permits or trona areas.

Under Alternative A, there would be no potential for impacts to potential or existing mineral development operations within the proposed corridors. However, unlike the action alternatives, there would also be no potential increase in EOR.

3.9.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or potential future surface disturbances in the proposed corridors where the corridors overlap mineral locations or active mineral development areas would result in irretrievable and irreversible effects on acres available for discretionary mineral development (undeveloped oil and gas, coal leases, trona leases, and salable minerals) in the planning area. The proposed corridors would

not result in irretrievable and irreversible effects on acres available for nondiscretionary mineral development (locatable minerals) in the planning area. This is because a new utility corridor designation does not close an area to mineral development. The BLM could still consider any proposal for mineral development within the proposed corridors, and any facilities proposed would have to be re-routed around those first in time approvals. The impacts to discretionary mineral development would be irretrievable until the corridor designation or ROW infrastructure is removed (unless minerals could be accessed through directional drilling). Overall, impacts to long-term productivity resulting from these activities would be minimal due to the limited amount of proposed new corridor when compared to the mineral resources in the planning area.

3.10 NOISE

This section describes effects the noise generated by the future construction and operation of projects that may occur as a result of the proposed corridors. Noise is considered a human health concern because it can interfere with speech communication and hearing or is otherwise considered annoying. An individual's response to noise is influenced by the type of noise, perceived importance of the noise, appropriateness in the setting, time of day, type of activity during which the noise occurs, and the sensitivity of the individual.

3.10.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following noise issue for analysis:

- How would noise generated by construction, operation, and maintenance of the potential projects affect sensitive receptors, and what impacts could remain after the mitigation is applied?

Indicators of effects of noise are as follows:

- Changes in ambient noise levels (measured in decibels) that exceed allowable noise levels established by federal, state, or local laws, regulations, or guidelines.

3.10.2 Affected Environment

Noise is generally defined as loud, unpleasant, unexpected, or an undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Although prolonged exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise; the perceived importance of the noise, and its appropriateness in the setting; the time of day and the type of activity during which the noise occurs; and the sensitivity of the individual.

As discussed in Section 3.12, Wildlife and Fisheries, noise is known to disrupt wildlife life-cycle activities of foraging, resting, migrating, breeding, sheltering, and other patterns of behavior. Wildlife living near human development can display increased tolerances to human disturbance and noise. In areas where noise and disturbance levels are similar to baseline or natural settings, wildlife in these areas are likely to display lower tolerances for change and disruptive human activities. Additionally, sensitivity to noise varies from species to species, making it difficult to identify how a noise source would affect all fauna in an area.

There are no federal regulations that limit overall environmental noise levels, and there are no federal regulations or guidance that specifically addresses the types of activities that would occur from the potential project. To establish federal noise emission control requirements in response to the Federal

Noise Control Act of 1972 and to ensure assistance and guidance to states and localities, the EPA has published guidelines that address the issue of community noise and contain goals for noise levels affecting residential land use of less than 55 A-weighted decibels (dBA) for exterior levels (EPA 1974). Most of the proposed corridors are in sparsely populated areas.

A noise level from a point source such as concentrated construction activity would decrease by 6 dBA for every doubling of the distance away from the source (Truax 1999). This concept is known as geometric spreading.

3.10.3 Methods of Analysis

The construction noise level was estimated using the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM). The RCNM is FHWA's national model for the prediction of construction noise. This software is based on actual sound level measurements from various equipment types taken during the Central Artery/Tunnel project conducted in Boston, Massachusetts, during the early 1990s. FHWA RCNM has noise levels for various types of equipment preprogrammed into the software; therefore, the noise level associated with the equipment is typical for the equipment type and not based on any specific make or model. The maximum noise levels presented at a specified distance from the source are based on a roster of likely construction equipment operating.

Worker commutes and material delivery vehicles would cause noise that would be short term and have little effect on the hourly average noise level. Therefore, this traffic was not included in the construction noise analysis. It was assumed that all design features and agency mitigation would be implemented. Future individual potential pipeline projects and any associated EOR project in a designated corridor would require quantitative assessment of its effects on ambient noise levels.

3.10.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. No new noise sources would occur, and there would be no potential for impacts to existing noise levels from the potential projects.

3.10.5 Environmental Effects – Common to All Action Alternatives

Construction noise would vary depending on the quantities and type of equipment used. Construction equipment would operate intermittently, and the types of equipment in use at a construction site would change with the construction phase. The equipment used in pipeline projects includes dozers, backhoes, side booms, welding machines, work trucks, graders, and cranes.

Based on the RCNM, the maximum noise levels from construction would be near 90 dBA at 50 feet from the equipment. Such levels would be clearly audible to humans and disruptive to wildlife behaviors and proximal habitat use during maintenance and construction activities, but given the temporary nature of the construction noise, no adverse or long-term effects are anticipated.

During operation and maintenance, a utility truck or all-terrain vehicle would be needed for periodic inspections, surveys, and potential project repairs. Potential project maintenance would involve less equipment than project construction; therefore, impacts to ambient noise levels would be less than impacts caused by construction.

3.10.6 Environmental Effects – Alternative B (Proposed Action)

Alternative B would add 57,452 acres of proposed corridors. Noise impacts associated with potential project construction and operation would be similar to those described for all action alternatives.

3.10.7 Environmental Effects – Alternative C

Alternative C would add 7,253 acres of proposed corridor. Noise impacts associated with potential project construction and operation would be similar to those described for all action alternatives.

3.10.8 Environmental Effects – Alternative D

Alternative D would add 55,467 acres of proposed corridor. Noise impacts associated with potential project construction and operation would be similar to those described for all action alternatives.

3.10.9 Summary of Effects

Noise impacts associated with pipeline construction and operation would be similar in type under all alternatives. Impacts would, however, vary in terms of the size of the area in which these impacts are expected. Alternative B would affect the largest area; therefore, noise impacts from development of the corridors would be higher for Alternative B than for Alternatives C or D. Alternative C proposed the fewest acres of new corridors and would therefore affect the smallest area.

3.10.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or reservation in existing corridors would not result in any irretrievable and irreversible impacts to the soundscape. Noise generated by future potential development during construction and maintenance would be unavoidable but temporary. Noise impacts during operation of the pipeline would be negligible. The short-term use of the proposed corridors would not result in long-term impacts to sustainability of the soundscape.

3.11 PALEONTOLOGICAL RESOURCES

Paleontological resources are any fossilized remains, traces, or imprints of organisms, preserved in or on the Earth's crust, that are of paleontological interest and that provide information about the history of life on earth. Paleontological resources are considered nonrenewable resources because the organisms they represent no longer exist, and such resources, if destroyed, cannot be replaced. Although all fossils offer scientific information, not all provide significant scientific information. Fossils are generally considered scientifically significant if they are unique, unusual, rare, diagnostically or stratigraphically important, or in any other way added to the knowledge in a specific area of science. The types of fossils in a specific area can generally be predicted prior to field survey, based on the age of the rock formations and depositional environment. Most fossils are found in sedimentary deposits.

General BLM management objectives for paleontological resources include locating, evaluating, managing, and protecting paleontological resources and ensuring that proposed land use projects avoid damaging or destroying important paleontological resources. Paleontological resources on public lands are managed under provisions of FLPMA, 43 USC 1737(b); Public Law 94-579; the Omnibus Public Land Management Act of 2009, Subsection D, Section 6302, Public Law 111 011; USFS 36 CFR 291; and Wyoming Statute 36-1-114–116. The BLM's Manual and Handbook H-8270-1 (BLM 1998), Instructional Memorandum (IM) 2009 011 (BLM 2008c), IM 2012-141 (BLM 2012c), IM 2016-124 (BLM 2016c), the USFS *Training Guide for Management of Paleontological Resources* (USFS 2005), and the *Best Practices in Mitigation Paleontology* (Murphey et al. 2019) contain general procedural

guidelines for paleontological resource management and resource protection. In addition, each of the BLM field office RMPs, the Converse County EIS, and USFS plans establish practices and guidelines for the long-term management of paleontological resources on BLM and USFS land. Paleontological resources on private land are the property of the landowner.

3.11.1 Issues to be Analyzed and Impact Indicators

As part of the project's internal and public scoping process, the following paleontological resource issues were identified:

- How would construction related to ground-disturbing activities affect known or unknown paleontological resources?
- How would an increase in human activity during and after construction affect known and unknown paleontological resources?

Indicators of effects on paleontological resources are as follows:

- Acres of geologic units with unknown, moderate, high, and very high potential to contain (e.g., areas of Potential Fossil Yield Classification [PFYC] U, 3, 4, and 5) scientifically important fossils within the corridors. Acres of geologic units provide a quantitative value for unknown exposed and buried paleontological resources that could be physically disturbed during future disturbance.
- In addition, a qualitative assessment of changes in human activity is used as a surrogate for potential effects to known and unknown paleontological resources.

3.11.2 Affected Environment

The analysis area for paleontological resources consists of the Alternative B, C, and D proposed corridors and crosses most of Wyoming's sedimentary basins: Bighorn, Great Divide, Greater Green River, Hanna, Powder River, Shirley, and Wind River Basins. These structurally defined basins are primarily filled with late Mesozoic– and Cenozoic-age sediments and are bounded by the Casper and Wamsutter arches; the Rawlins and Rock Springs uplifts; the Bighorn, Granite (= Sweetwater uplift), Laramie, and Owl Creek Mountains; and the Absaroka, Wind River, and Wyoming (= Thrust Belt) Ranges. These uplifted structures and mountains ranges dividing the sedimentary basins are primarily composed of Precambrian, Paleozoic, and Mesozoic rocks but also contain remnants of late Tertiary rivers. The extensive geologic history contained in these rocks is important because the occurrence of paleontological resources correlates with the geologic units that contain them, thus, the potential for the presence of paleontological resources can be predicted by the geologic units at or near the surface.

The PFYC is a ranking of geologic units according to their relative abundance of significant paleontological resources and the sensitivity of these contained resources to adverse impacts. These rankings are used in land use planning, as well as for identifying areas that may warrant special management and/or special designations. The BLM has assigned a PFYC ranking (Classes 1–5) to each geologic unit (formation, member, or other distinguishable unit) at the most detailed mappable level based on the taxonomic diversity and abundance of previously recorded scientifically significant paleontological resources associated with the unit and the potential for future discoveries, with a higher class number indicating higher potential (BLM 2016c). Additional rankings are provided for geologic units of unknown potential (U), water (W), and ice (I).

Previously published geologic maps and BLM data (2019c) indicate that at least 104 geologic units are crossed by the analysis area. These geologic units include a variety of terrestrial and marine sedimentary rocks that range from Precambrian to Holocene in age (BLM 2019c; EPG 2015). Approximately 77 geologic units in the analysis area are classified as unknown (PFYC U) or have moderate to very high (PFYC 3, 4, and 5) potential to contain important paleontological resources.

3.11.3 Methods of Analysis

The analysis area was superimposed on an existing digital geologic map dataset containing BLM-designated PFYC values (BLM 2019c). The analysis included a review of these calculated acres of the geologic units and PFYC classes within the analysis area; a review of the Resource Report 6 – Geological Resources (EPG 2015), literature, and online known paleontological locality databases; and a qualitative assessment of potential effects on paleontological resources. Potential impacts to paleontological resources are discuss qualitatively.

Acres of PFYC classes, based on mapped geologic units, provide a realistic estimate of the potential for paleontological resources in specific locations, assuming the areal extent of geologic units with potential to contain these resources traversed by the proposed corridors is proportional to the potential for impacts to these resources. Ground-disturbing activities pose a risk to fossil resources; however, given the programmatic nature of the EIS, it is not possible to predict with certainty where development and ground-disturbing activities would occur. Therefore, adverse impacts may occur to fossils in any unknown or moderate to very high potential formation impacted by disturbance. Increased access associated with Alternative B would increase the potential for indirect impacts through personal collection or resource destruction.

It is not usually possible to determine the exact location of exposed fossils in an area without a pedestrian field survey. A systematic paleontological resource survey has not been conducted within most of the analysis area; thus, locality search results only represent a small fraction of actual paleontological resources that have been or are exposed at the surface. Corridor-specific paleontological localities searches would be conducted on a case-by-case basis as future ground-disturbing projects are proposed. Locality data cannot be made public, but fossil assemblages can be described.

Although agencies have procedures and policies for reducing or mitigating impacts to paleontological resources on a project-specific basis, there are potential benefits to a coordinated approach through more consistent environmental analyses and mitigation requirements. Depending on agency and landowner specifications, the potential for impact to paleontological resources increases with reduced agency oversight and project-required review, assessment, and mitigation of these resources.

3.11.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. Under Alternative A, effects to paleontological resources would remain at existing levels. Existing ground-disturbing effects to paleontological resources are associated with multiple use activities, and on BLM land, these effects are managed by current BLM RMPs.

Existing effects to paleontological resources from human activity are associated with access to the area by existing roads for multiple use activities and are managed by the existing BLM RMPs.

3.11.5 Environmental Effects – Common to All Action Alternatives

The corridors themselves would have no impact on paleontological resources because with designation alone there would be no ground-disturbing activities. Thus, this analysis evaluates the potential for paleontological resources to be affected by ground-disturbing activities and increased access associated with future development within the corridors.

Impacts during ground-disturbing activities (e.g., vegetation removal, grading, trenching, heavy equipment traffic) associated with construction could cause damage or loss of scientifically important fossil resources through direct physical impact (e.g., crushing or breaking) and could cause the erosion of fossils from exposed bedrock in areas of cleared vegetation or graded slopes. Within the analysis area, there are areas of existing surface and subsurface disturbance from multiple land uses (e.g., existing roads, pipelines, transmission lines, oil and gas facilities, mining, renewable energy developed, ranching and farming activities); within these areas, known surficial paleontological resources may have been previously impacted or mitigated; however, as described above, erosion of these previously disturbed areas may cause previously covered resources to be exposed. In general, shallow ground-disturbing activities in areas with thick vegetation have a lower potential to impact important paleontological resources, as compared to areas with bedrock exposures. The BLM corridor stipulation for no surface disturbance or development on slopes greater than 25%, generally reduces the potential impacts to paleontological resources than if disturbance was concentrated in areas with higher relief.

Increased human activity during future project construction may impact paleontological resources through unauthorized collection or destruction of fossils by those accessing the analysis area or adjacent lands. Increased access may continue after construction as vegetation removal, road improvements, new roads, and two-tracks used for future project construction and maintenance may be used for other purposes. Post-construction, indirect effects to paleontological resources could occur from increased, unsupervised human activity through unauthorized collection or damage of paleontological resources. Increased human activity could indirectly affect paleontological resources for the long term through increasing unauthorized surface collection of paleontological resources or ground disturbance. This could occur at known or at newly exposed paleontological localities to be identified during future site-specific analysis.

Pedestrian survey and additional desktop analysis, including a previous locality search, of areas of proposed disturbance is needed to identify actual impacts to known paleontological resources. The current BLM field office RMPs discuss a project-specific analysis, which includes pedestrian field surveys, prior to ground-disturbing activities in areas underlain by PFYC 4 and 5 geologic units, and on a case-by-case bases for PFYC Class 3 geologic units. Based on the results of project-specific pedestrian surveys, avoidance or collection of important paleontological resources as well as paleontological resources construction monitoring may be necessary.

3.11.6 Summary of Effects

Impact types would be the same for all action alternatives because disturbance could result in the loss and destruction of scientifically valuable or important fossils. Alternative B has a higher frequency of potential ground-disturbing impacts to paleontological resources than either of the other action alternatives, as noted by acres of higher PFYC in Table 3.11-1. Corridor acreage available to future ground-disturbing construction projects under Alternative D would include fewer acres of higher PFYC than Alternative B and a greater percentage of the Alternative D proposed corridors are within currently defined corridors. Under Alternative C, corridor acreage available to future ground-disturbing construction projects includes the least acres of higher PFYC of all action alternatives. Outside of current corridors, Alternative D has the same frequency of potential impacts as Alternative C because the footprint and geologic units crossed would be identical. Alternative C would cross substantially less

private land with higher PFYC, whereas Alternatives B and D each would cross similar amounts of private land (Table 3.12-2). More private land would be analyzed during future project assessments in Alternatives B and D. The amount of federal acreage that would be crossed by Alternatives B and D is similar and substantially higher than that of Alternative C. A higher percentage of federal land acreage would be analyzed as part of potential projects in Alternatives B and D.

Table 3.11-1 summarizes acres of PFYC class for the action alternatives (BLM 2019c).

Table 3.11-1. Area of Potential Fossil Yield Classification by Alternative

PFYC	Alternative B		Alternative C		Alternative D	
	Acres	Percentage	Acres	Percentage	Acres	Percentage
1	255	< 1%	0	0%	397	1%
2	6,706	12%	1,467	20%	6,977	13%
3	21,171	37%	2,188	30%	19,931	36%
4	966	2%	71	1%	789	1%
5	23,758	41%	2,785	38%	21,954	40%
U	4,562	8%	744	10%	5,388	10%

Note: Digital geologic maps and PFYC values provided by the BLM (2019c).

Table 3.11-2 summarizes the landownership of the combined PFYC U, 3, 4, and 5 acres for each alternative.

Table 3.11-2. Area of Combined Potential Fossil Yield Classifications U, 3, 4, and 5 by Landownership

Landowner	Alternative B		Alternative C		Alternative D	
	Acres	Percentage	Acres	Percentage	Acres	Percentage
BLM	29,257	58%	3,909	68%	26,179	54%
BOR	1,069	2%	236	4%	1115	2%
DOD	1	< 1%	1	< 1%	1	< 1%
Federal Aviation Administration	0	0%	0	0%	7	< 1%
USFWS	0	0%	0	0%	16	< 1%
USFS	25	< 1%	0	0%	25	< 1%
State	3,050	6%	265	5%	2,931	6%
State (Wyoming Game and Fish Department)	68	< 1%	0	0%	67	< 1%
Local government	72	0%	0	0%	104	< 1%
Wind River Indian Reservation	1	< 1%	0	0%	1	< 1%
Private	16,915	34%	1,367	24%	17,615	37%
Total	**50,457**	**100%**	**5,788**	**100%**	**48,062**	**100%**

Note: Digital geologic maps and PFYC values provided by the BLM (2019c).

For all action alternatives, access would increase during the construction of future projects within the proposed corridors, creating increased potential for the public to access fossils. Some increased access may continue after construction on new or improved access roads during future project maintenance, as well as for other land uses. Alternative B has a higher frequency of potential impacts to paleontological resources from increased access from potential projects than either of the other action alternatives because it crosses more acres of PFYC Class U, 3, 4, or 5 geologic units as described above. In addition, less of the acreage available for future access within Alternative B occurs within previously approved corridors that have existing disturbance and require fewer new or improved access roads.

3.11.7 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

Although implementation of mitigation measures would reduce effects to paleontological resources and potentially provide scientific value through preservation and curation, removal of the resources or destruction of previously unknown resources would be an unavoidable, irreversible adverse effect. Protection measures required and enforced on agency-administered land surface would provide for the long-term sustainability of this resource.

3.12 PUBLIC HEALTH AND SAFETY

This section describes potential worker and public health and safety risks associated with the proposed corridors and construction and operations of potential projects. Impacts to resources that may indirectly lead to health and safety risks, such as geologic hazards (e.g., landslides, seismic activity), air quality and water quality degradation, and traffic hazards, are also analyzed in this section (existing conditions and the mechanisms for resource impacts are further detailed in those respective sections).

3.12.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following health and safety topics for analysis:

- What health and safety risks would workers and the public be directly exposed to from the proposed corridors or during construction and operations of potential projects?
- What impacts to resources from the proposed corridors or potential projects would indirectly lead to worker or public health and safety risks?

Indicator of effects related to health and safety include the following:

- Increased risk of worker or public exposure to hazardous materials or conditions

3.12.2 Affected Environment

The affected environment for worker and public health and safety consists of the following:

- Pipeline corridors plus a 0.25-mile buffer to capture the extent project-related risks could reach
- Transportation routes used by workers

3.12.3 Methods of Analysis

The following steps were completed to analyze potential effects on worker and public health and safety:

- Potential directs hazards from the proposed corridors and indirect hazards from construction and operations of potential projects were analyzed to determine increased risks to worker and public health and safety.
- Potential direct effects from degradation of resources from the proposed corridors or indirect effects from degradation of resources during construction and operations of potential projects that would lead to increased risks to worker and public health and safety.

It is assumed that existing infrastructure within or near the proposed corridors would be compliant with applicable regulations focused on the protection of workers and public health and safety. It is also assumed that existing hazardous waste sites within the affected environment (see Table 3.7-1) would remain in compliance. It is assumed that existing emergency response services would have the capacity to respond to any potential project-related incidents, which would be minimized through the project design and implementation of industry standards and regulatory requirements. In addition, traffic controls would be implemented during construction and operations of potential projects as needed, thereby avoiding access restrictions that would conflict with emergency response times. As a result, the analysis of health and safety effects is limited to proposed corridors and potential project-related health and safety risks; risks from other, existing infrastructure or project-related risks to emergency response services are not further evaluated.

3.12.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. The management of these areas would remain under existing management plans, guidelines, and federal/state/local regulations.

3.12.5 Environmental Effects – Common to All Action Alternatives

The designation of corridors would not result in health and safety risks to workers or the public and would therefore not result in direct impacts to health and safety.

Project workers would be indirectly exposed to health and safety risks associated with potential projects, including the use and transport of hazardous materials and production of hazardous wastes (EPG 2015), which may pose fire, explosion, inhalation, or other health and safety risks in the event of inadvertent spills, leaks, or accidents; hazards associated with heavy equipment or welding; and infrastructure failure, which would result in the release of natural gas, refined oil products, crude oil, or CO_2 (EPG 2015).

Pipeline incidents have decreased over the past 2 decades, dropping approximately 10% every 3 years (EPG 2015). All potential projects would be subject to federal (FERC, U.S. Department of Transportation's Office of Pipeline Safety, Occupational Safety and Health Administration, EPA), state, and local regulations and industry standards that focus on worker and public health and safety protection. Individual ROW applications for potential projects would describe concerns related to hazardous materials and wastes in addition to measures for managing these concerns, such as the requirement that a bond would be paid prior to approval of the ROW application to cover the costs of damages to BLM-administered lands, in the case that they occur. This information would be reviewed and considered by the BLM to inform their decision on each application. Hazardous materials and wastes would be transported, stored, handled, and disposed in accordance with applicable federal, state, and local regulations (EPG 2015), and all workers would receive training for the management of hazardous materials and wastes. In

addition, potential projects would include industry standards to minimize health and safety risks, including implementation of Spill Prevention, Control and Countermeasure (SPCC) plans and hazardous materials location restrictions, which would reduce the risk that a hazardous material release would affect surface waters or other sensitive resources.

The risk of the public's exposure to potential project-related health and safety risks during construction and operations would be similar to the risks to workers, although to a reduced degree. These risks would be reduced through access restrictions to the site and buffer zones that would prevent nearby uses of the area by the public. In the event that a member of the public accessed a project site, worker health and safety protections and industry standards implemented during construction and operations would also offer protections to the public. As a result, the potential indirect risks from exposure to hazardous materials and wastes and hazardous site conditions that would increase the exposure of workers and the public to health and safety risks would be minimized, although not avoided, under all alternatives.

During construction and operations of potential projects, inadvertent spills of hazardous materials in water resources would degrade surface water, groundwater, or soil quality, vegetation, or wildlife, which members of the public (including workers) are dependent upon. Changes to soils or substrates during construction may destabilize surfaces, thereby leading to geologic hazards, such as landslides.

Pipeline projects would implement SPCCs and industry standards to proactively plan and respond to spills, such as automatic shutoff valves for pipeline crossings of surface waterbodies, which would reduce the risk of a hazardous material release into waterbodies or other sensitive resources. Restrictions would be placed on the use and locations of hazardous materials to reduce the risk that a hazardous material release would affect surface waters or other sensitive resources. In addition, the potential ROWs include buffer zones to account for the potential extent of effects on resources that would result in public health and safety risks. Additional measures, as described under Issues Statement No. 1, would be implemented to reduce the potential for impacts to resources that would lead to public health and safety risks. As a result, the potential risks from degradation of resources from potential projects that would indirectly increase the exposure of the public to health and safety risks would be minimized, although not avoided, under all alternatives.

3.12.6 Summary of Effects

Direct impacts to worker and public health and safety would not occur under any of the proposed corridors. Indirect impacts to worker and public health and safety could occur from construction and operations of potential pipeline projects. All potential projects would be subject to federal, state, and local regulations and industry standards that focus on worker health and safety protection. Project features would include measures to avoid or minimize health and safety risks or degradation of resources that would lead to health and safety risks. As a result, any risks to worker or public health and safety would be minimized.

3.12.7 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or reservation in existing utility corridors would not result in any impacts to public health and safety. With proper application of federal, state, and local regulations, risks of irretrievable and irreversible impacts to public health and safety from future potential development within the corridors would be minimized, and short-term uses of the corridors would not affect long-term public health and safety.

3.13 RECREATION

3.13.1 Issues to be Analyzed and Impact Indicators

This section discusses the potential effects of the proposed project on recreation within project corridors.

Internal and public scoping identified the following recreation topics for analysis:

- How would the proposed corridors affect recreation management areas, recreation resources, special recreation management areas (SRMAs), and extensive recreation management areas (ERMAs)?
- How would the long-term presence of aboveground facilities and access roads affect recreational experience and access?
- How would construction, operations, and maintenance activities in the ROW affect recreational experience and access?
- How would restricting all ROWs and associated roads to energy-related vehicles only affect recreation resources and all other BLM resources given strong concern regarding route densities?

Indicators that can be used to evaluate impacts to recreation include the size of recreational areas (including SRMA, ERMAs, and other designated recreation sites, which are discussed in greater detail below) that overlap with the project corridors and total miles of routes and trails open and closed to off-highway vehicle (OHV) and nonmotorized use that intersect with the project corridors.

3.13.2 Affected Environment

This section provides baseline information regarding outdoor recreation uses on public and private lands that could be affected by the project corridors in Wyoming. Included within this section is a brief overview of the existing recreational opportunities and activities and an overview of the plans and regulations of federal, state, and local land management agencies that provide recreation opportunities in the analysis area. Direct effects to other resources that indirectly affect recreation are discussed in those respective sections, including Section 3.16, Transportation; Section 3.17, Vegetation; Section 3.18, Visual Resources; and Section 3.21, Wildlife and Fisheries.

The analysis area for recreation comprises a 2-mile buffer around the corridors and includes overlapping recreational resources.

A variety of federal, state, and local land management agencies serve as recreation providers in the analysis area, including USFS, BLM, USFWS, BOR, NPS, various state agencies that regulate recreation uses on state lands, and local and county governments. These entities guide recreation activities on public lands with management plans developed under their guiding authority. All BLM-administered public lands in Wyoming are managed in accordance with the approved RMP for each BLM field office. Each RMP provides goals, objectives, and management actions to guide recreational uses of BLM-administered land resources within the field office. BLM RMPs that are pertinent to the project are listed in Chapter 1. In addition, the BLM prepares a variety of planning documents related to its recreation and visitor services program, including interpretive plans and travel management plans.

Recreational opportunities in the project corridors include hunting and fishing, hiking and mountain biking, horse packing and riding, wildlife viewing and photography, and OHV. One NST, the Continental Divide NST, crosses the proposed corridors. The BLM uses recreation management area designations to manage recreation and visitor services. Within the project corridor are SRMAs and ERMAs. An inventory of SRMAs and ERMAS is provided in *Land Use and Realty Report for the Wyoming Pipeline Corridor Initiative* (SWCA 2016a).

Per the BLM, SRMAs are "administrative units where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation" (BLM 2012d). SRMAs are designated to manage intensively used recreation areas and provide certain recreation opportunities such as boating, hunting, camping, and hiking. ERMAs emphasize the traditional dispersed recreation use of public lands (BLM 2014b). ERMAs have an undeveloped character that allows visitors to escape crowds, rely on their own skills and equipment for recreational pursuits, and enjoy freedom from stricter regulations (BLM 2014b). Both SRMAs and ERMAs are recognized as producing high-quality recreation opportunities and offering beneficial outcomes for recreationist. Recreation and visitor services objects in recreation management areas are recognized as a primary resource management consideration and specific management is required to protect recreational opportunities. Per the BLM handbook, SRMAs and ERMAs are managed under the outcome-focused management approach (OFM), which is defined as an approach to recreational management that focuses on the positive outcomes gained from engaging in recreational experiences (BLM 2014b).

3.13.3 Methods of Analysis

Recreational resources were identified within the project corridors using data from *Land Use and Realty Report for the Wyoming Pipeline Corridor Initiative* (SWCA 2016a) as the basis for this inventory, which used SMRA, ERMA, and national recreational area data. These data were supplemented with the BLM and secondary-source GIS spatial data to estimate acreage of recreational areas, recreationally designated areas, and recreational sites.

The methodology for analysis of impacts to recreational resources included the following key steps:

- Estimate, and where applicable, quantify the extent to which the project would affect or overlap recreational areas, sites, or miles of open routes and trails crossed by the proposed corridors.
- Identify potential use conflicts with recreational uses or management objectives.
- Reference potential impacts or conflicts with other resource areas to appropriate EIS section (e.g., grazing, recreation, wildlife, visual).

3.13.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. There would be no new impacts to recreational resources, including access and user experience, and no changes in the existing recreational uses. The management of these recreational resources would remain under existing management plans, guidelines, and federal/state/local regulations. The OFM in the SRMA and ERMAs would continue as per the 2014 BLM guidance (BLM 2014b).

3.13.5 Environmental Effects – Common to All Action Alternatives

The designation of corridors dedicated to transport of CO_2, EOR products, and other compatible uses would result in the following impacts to recreational resources. Maintenance activities could result in temporary impacts to recreational users in the form of noise, reduced access, and temporary closures of recreational areas. Adherence to the traffic and transportation plan (see Appendix D) would help minimize impacts to access from increases in traffic from construction activities. Context and intensity would vary by alternative and would depend upon acreage losses (i.e., acreage encumbered with facilities) or acreage used during construction, the specific user group, and landscape characteristics near the construction area. People engaged in recreational activities such as hiking, camping, birding, and hunting would be most affected by construction activities from noise, or visual presence of construction

activities could temporarily affect the experiences of visitors participating in dispersed recreation opportunities near the construction area (generally limited to those areas within the 2-mile analysis area). In addition, the Continental Divide NST crosses all action alternatives. Impacts to the Continental Divide NST would be similar to those discussed in Section 3.3.7.2.

Potential development of the corridors could result in permanent visual or auditory impacts in areas used for recreation for the life of the corridors plus final reclamation. Although these impacts would not appreciably affect the availability of the recreational resource for users engaging in recreational activities (i.e., hunting, wildlife viewing, OHV use), the setting in which these activities occur would be affected visually and some users may choose to recreate elsewhere. The development of the corridors could also result in long-term permanent reductions in access and the potential loss of recreational areas. Following development within designated corridors, some areas may become more accessible, with increased opportunities for recreational activities in previously inaccessible (or less accessible) areas, whereas other areas may become less accessible.

Existing federal, state, county, private, and BLM roads would be used to gain access to project corridors during development. It is not anticipated that new road construction would be required, but if required constructed roads on BLM lands would be left in place or completely reclaimed under the direction of the BLM field office. Prior to the construction of new roads, minor repairs would be done on roads that require any surface disturbance activities outside of the existing disturbed area would be used. On public lands, this work would be authorized by temporary ROWs. Overall the construction of access roads could lead to impacts to public access resulting in limited public access to those new roads. Development within the proposed corridors would create short-term, minor, and incidental increases in local traffic, but the development phase is not expected to create substantial congestion for extended periods. Permanent access to developments in the proposed corridors would be authorized by the ROW grant for the project. Furthermore, adherence to the traffic and transportation plan (see Appendix D) would help minimize impacts to access from increases in traffic from development and maintenance activities in the proposed corridors.

3.13.6 Summary of Effects

As shown in Table 3.13-1, Alternative B contains the most recreational resources (90). Therefore, the potential acreage of disturbance to recreational resources under Alternative B would be the largest at 16,918 acres, which constitutes approximately 29% of the proposed corridors. Alternative D would result in similar impacts to recreational resources because it has slightly fewer recreational resources, and would result in slightly less impacts to those resources when compared to Alternative B. Alternative C has the smallest project footprint and contains the fewest recreational resources (20). Alternative C would result in 2,368 acres of disturbance to recreational resources, which constitutes approximately 33% of the proposed corridors. Per the BLM handbook, the management of the SRMAs and ERMAs as OFM would continue, and the designation of proposed corridors would not conflict with the current management of these areas for recreational uses for Alternatives C and D because the proposed corridors were designed to avoid areas managed for recreation. In the case of Alternative B, the proposed corridors were not designed expressly to avoid areas managed for recreation so there may be a conflict with OFM if the proposed corridors were to cross a SRMAs or ERMAs. Alternatives B and D would result in the greatest acreage impact to recreational resources from the construction, operation, and maintenance of pipeline infrastructure within the proposed energy corridors, whereas Alternative C would affect a greater percentage of acreage within the proposed corridors because the recreational resources make up a larger portion of the project footprint than those of the larger proposed energy corridors.

Table 3.13-1. Recreational Facilities and Designations per Alternative and Acreages

Facility	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)
Campgrounds	4 (5)	–	2
Day use area	13	1	15
OHV-designated areas	5 (7)	–	4 (7)
ERMA	25 (15,293)	12 (2,338)	24 (13,252)
SRMA	33 (1,220)	7 (31)	32 (1,194)
NSTs	1	1	1
Dispersed recreation area	1 (97)	–	–
Recreation use area	9 (296)	–	9 (271)
Total recreational facilities	90	20	86
Acreages of disturbance to recreational areas	16,918	2,369	14,724

Note: Mileage where available is provided in parenthesis.

3.13.7 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

The designation of corridors for the transport of CO_2, EOR products, and other compatible uses in existing corridors would not result in any irretrievable and irreversible impacts to recreation. Future potential development within the corridors may result in irretrievable impacts of developed and dispersed recreation, through loss of access, noise, and visual impacts during construction (and potentially operation). The short-term use of the proposed corridors would not result in long-term reductions in viability and use of the area for recreation.

3.14 SOCIOECONOMICS

3.14.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following socioeconomic issues for evaluation in this EIS:

- How could potential future projects affect local economic conditions? Short-term economic effects from potential future pipeline construction and longer-term economic effects from future pipeline operations. Impact indicators for these economic effects include employment, labor earnings, and economic output.
- How could potential future projects affect state and local tax revenues? Short-term and long-term effects on state and local tax revenues. Impact indicators for these effects include potential state and local revenues from sales taxes and other taxes on pipeline construction and operating activity, property taxes on future pipelines, and severance taxes on additional oil and gas production using EOR.
- How could potential future projects affect demands for housing and public services? The impact indicators for these effects are the potential number of projected nonlocal workers associated with future projects and the potential number of short-term rental housing units these workers would be expected to require.
- How could future projects affect private land values? Potential effects on land values were assessed qualitatively and the alternatives were compared based on the number of acres of private land encompassed within the corridors under the action alternatives.

- How could the proposed corridors affect other industries? Potential effects on recreation and tourism-related activity, renewable energy development, and agriculture were evaluated qualitatively.
- How could the proposed corridors affect nonmarket values? Short-term and long-term effects on market values were assessed qualitatively.
- How could the proposed corridors affect environmental justice communities? The potential for disproportionate adverse effects on low income and minority communities was identified based on the demographic characteristics of census tracts traversed by or bordering the proposed corridors and the environmental effects evaluation provided in this EIS.

3.14.2 Affected Environment

The proposed pipeline corridors traverse 12 counties from Sublette and Sweetwater Counties in southwestern Wyoming to Park and Big Horn Counties in north-central Wyoming and Campbell County in northeastern Wyoming. Collectively, the 12 counties had 316,203 residents in 2017, almost 55% of Wyoming's total population (Table 3.14-1).

The 12 counties were grouped into four regions based on Wyoming Labor Market Information regions defined by the Wyoming Department of Workforce Services. This regional classification structure is also used by the Wyoming Department of Administration and Information, Economic Analysis Division (WYEAD) and incorporated in the Wyoming Regional Analysis Project.

3.14.2.1 Southwest Region

The analysis area in the Southwest Region includes Lincoln, Sublette, and Sweetwater Counties. Parts of the region are very geographically diverse and sparsely populated, and the population across all three counties was 72,598 in 2017 (WYEAD 2018). The combined population of the three counties is projected to grow by 3.0% between 2017 and 2040 (see Table 3.14-1). The economy of these three counties is heavily dependent on resource extraction, especially natural gas, oil, trona, and coal. Mining, oil, and gas provide over 18% of the jobs within the three counties, and almost 34% of total labor income (Table 3.14-2), as well as over 33% of the sales and use tax revenues in the region and generate substantial revenue from severance and property taxes (Table 3.14-3).

Table 3.14-1. Population and Demographic Characteristics of Regions within the Analysis Area

Population	Southwest	Northwest	Central	Northeast	Wyoming
Total population 2017	72,598	94,037	94,850	54,718	579,315
Population change 2010–2017	0.6%	0.7%	3.8%	0.0%	2.8%
Projected population change 2017–2040	3.0%	2.1%	2.5%	4.1%	6.1%
Minority residents	15.7%	19.0%	14.5%	11.7%	15.7%
Individuals below poverty level	10.7%	11.2%	10.4%	9.7%	10.9%
Average annual unemployment	4.3%	4.7%	5.1%	4.8%	4.2%
Vacant housing units	8,184	6,848	5,930	3,266	42,851

Sources: U.S. Census (2010, 2017a, 2017b); WYEAD (2018, 2019).

3.14.2.2 Northwest Region

All five counties in the Northwest Region (Big Horn, Fremont, Hot Springs, Park, and Washakie Counties) would be traversed by pipeline corridors under Alternative B. As of 2017, 94,037 people reside in the five counties included in the Northwest Region (WYEAD 2018). The region's economy is diverse and includes mining (bentonite), oil and gas production, tourism, and agriculture (primarily ranching). This region encompasses large portions of Yellowstone National Park, Bridger-Teton National Forest, Shoshone National Forest, and Bighorn National Forest. Mining, oil, and gas provide over 3% of the jobs in the region and almost 8% of the labor income. Tourism provides 12% of the jobs and over 6% of the labor income (see Table 3.14-2).

3.14.2.3 Central Region

The analysis area in the Central Region includes Carbon and Natrona Counties, with a combined population of 94,850 in 2017 (see Table 3.14-1). The city of Rawlins, county seat of Carbon County, is located on the I-80 corridor, which is an important interstate linkage for commerce and trade. The region has historically developed abundant reserves of oil, gas, and coal, especially in and around Casper, the state's second-largest city (Hunt 2014). Wind energy development and other alternative energy efforts are also becoming more common in this region (Natrona County Government 2020). Mining, oil, and gas activity provides over 5% of the employment within the Central Region analysis area counties and over 10% of the annual wages. Travel and tourism provide over 14% of the jobs within these counties and almost 6% of the wages (see Table 3.14-2).

Table 3.14-2. Select Economic Characteristics of Regions within the Analysis Area

Economic Characteristics	Southwest	Northwest	Central	Northeast	Wyoming
Total employment	**33,067**	**44,710**	**45,108**	**25,967**	**269,591**
From mining, oil, and gas (% of total)	18.4%	3.5%	5.5%	23.2%	7.3%
From construction (% of total)	8.1%	5.2%	6.9%	7.9%	7.3%
From travel and tourism (% of total)	10.7%	12.1%	14.2%	11.0%	15.0%
Total annual wages ($ millions)	**$1,804**	**$1,535**	**$2,131**	**$1,465**	**$12,474**
From mining, oil, and gas (% of total)	33.8%	7.9%	10.2%	34.5%	13.8%
From construction (% of total)	7.7%	6.5%	7.7%	7.7%	8.0%
From travel and tourism (% of total)	3.4%	6.2%	5.8%	3.5%	7.0%

Sources: Headwaters Economics (2020); WYEAD (2018).

3.14.2.4 Northeast Region

The analysis area in the Northeast Region includes Campbell and Johnson Counties. The two counties had a combined population of 54,718 in 2017 (WYEAD 2018). The regional economy is heavily reliant on energy production: in 2018, nearly a quarter of total employment—and more than a third of total wages—came from the mining, oil, and gas sector (see Table 3.14-2). Over 26% of sales and use tax revenues were associated with mining, oil, and gas activity, which also generated almost $250 million in severance tax revenues in the region (see Table 3.14-3). Tourism and recreation are also important in the region, which contains large parts of the Bighorn National Forest and Thunder Basin National Grassland.

Table 3.14-3. Revenues Generated within Regions of the Analysis Area

Tax Revenues	Southwest	Northwest	Central	Northeast	Wyoming
Sales and use tax revenues	$129,620,741	$73,610,719	$89,149,727	$110,086,858	$686,766,223
From mining, oil, and gas (% of total)	32.5%	8.4%	7.6%	26.7%	16.7%
Property tax revenues	$350,656,196	$133,933,640	$129,021,182	$294,550,201	$1,344,432,107
From mining, oil, and gas (% of total)	66.0%	36.4%	26.3%	76.5%	48.2%
Severance tax revenues	$224,023,277	$40,124,071	$32,515,841	$245,988,455	$691,690,569

Sources: WYEAD (2018); Wyoming Department of Revenue (2019).

3.14.2.5 Nonmarket Values

The term nonmarket values refers to the benefits that individuals attribute to experiences of the environment or uses of natural and cultural resources that do not involve market transactions and, therefore, lack prices. Examples include the benefits received from wildlife viewing, hiking in a wilderness, or hunting for recreation. In examining nonmarket values, economists often distinguish between "use values" and "nonuse values" (BLM 2012e). Examples of nonuse values could include the benefit individuals receive from attributes such as maintaining environmental quality or ranching lifestyles.

It is challenging to quantify nonmarket values, with the exception of values associated with direct visitation and recreation activity where specific visitor counts are available, and no estimates of the nonmarket values associated with the lands within or immediately proximate to the proposed pipeline corridors are available. For purposes of this EIS, comparative assessment of the potential effects of the alternatives on nonmarket values were based on the proximity of the proposed corridors to BLM special management areas and other areas designated for recreational or environmental purposes.

3.14.2.6 Environmental Justice

Evaluation of environmental justice effects involves assessment of the potential for disproportionately high adverse effects on minority or low-income populations. The CEQ defines a community with potential environmental justice populations as one that has a greater percentage of minority or low-income populations than does an identified reference community. Minority populations are those populations having 1) 50% minority population in the affected area or 2) a meaningfully greater minority population than the reference area (CEQ 1997). The CEQ has not specified what percentage of the population can be characterized as "meaningfully greater" to define environmental justice populations. Therefore, for the purposes of this analysis, a conservative approach was used to identify potential environmental justice populations; it is assumed that if the affected area minority or poverty status, or both populations are more than 10 percentage points greater than those of the reference area (the state of Wyoming), there may be an environmental justice population of concern.

3.14.3 Methods of Analysis

Although the action alternatives could streamline environmental reviews for ROW applications within the proposed corridors, the timing of future development as well as the extent of future energy production resulting from the delivery of CO_2 and its use in EOR are unknown. The general magnitude of potential socioeconomic effects from pipeline construction and operation was developed based on the recent final EIS for the Riley Ridge to Natrona Project (Riley Ridge EIS), which included a 243-mile-long 24-inch-diameter

CO_2 pipeline from Sublette County in southwest Wyoming to Natrona County near Casper, Wyoming (BLM 2018). Because the specifics of future pipeline development—such as the number of pipelines, their length and locations—are unknown, these potential future effects are expressed in terms of effects per mile or effects per worker, or both for use in this EIS and revised to reflect current year (2020) dollars.

A similar approach was used to examine the potential socioeconomic effects from EOR if future projects are developed. Employment, tax revenues, and other metrics from the 2013 University of Wyoming's EORI's study of the economic contribution of EOR in Wyoming were converted to estimates of effects per million barrels of oil produced for use in this EIS (Cook 2013).

Qualitative assessments of potential effects on private land values, other industries, and nonmarket values were based on the locations of the proposed corridors, prior studies of effects associated with energy pipelines, and assessments of effects on recreation, wildlife, grazing, and visual resources in this EIS.

Minority and low-income populations in proximity to the proposed corridors were identified on the basis of census data at the census tract level. Census tracts typically include 2,500 to 8,000 people and, in rural areas, can be quite large in geographic area. For purposes of this assessment, the population in closest proximity to the pipeline corridors under Alternative B and other action alternatives were assumed to have the same characteristics (e.g., minority or low-income status) as the overall population in the census tract in which they are located.

3.14.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. Alternative A would have no effect on socioeconomic conditions relative to current conditions in Wyoming.

3.14.5 Environmental Effects – Common to All Action Alternatives

Designation of the proposed corridors would not produce any direct effects on socioeconomic conditions. Designation of the proposed corridors for the transport of CO_2, EOR products, and other compatible uses could directly affect other economic activities in Wyoming because of the potential conflicts with the development of other linear infrastructure and valid existing rights. The proposed corridors could have indirect socioeconomic effects by streamlining environmental reviews for future projects.

3.14.5.1 Potential Indirect Effects from Pipeline Construction

Construction of future projects could provide a short-term increase in employment, earnings, and economic output along the pipeline route(s). For example, the proposed CO_2 pipeline examined in the Riley Ridge EIS was estimated to support approximately 3.1 total job years per pipeline mile (including direct construction jobs and indirect and induced employment supported by local construction expenditures and worker spending on household goods and services). In the Riley Ridge example, each mile of pipeline constructed was estimated to also provide an estimated $782,000 in regional economic output and $277,000 in labor earnings, including direct, indirect, and induced economic activity. Construction activity was also estimated to produce an estimated $6,000 in annual state and local tax revenues from sales taxes and lodging taxes per mile of pipeline construction (BLM 2018).

In the Riley Ridge example, the pipeline construction workforce was projected to consist of approximately 75% nonlocal workers, or about 1.5 nonlocal workers per mile of pipeline constructed. On average, approximately 0.3 dependents were anticipated to accompany each nonlocal worker (BLM 2018). These temporary workers and dependents would require temporary accommodations during the pipeline construction period. Construction workers and their dependents could compete for short-term lodging in hotels and motels with tourists, hunters, and other visitors. Depending on the intensity of

construction activity in local areas, such competition may push up short-term rental rates and could lead to temporary shortages of short-term accommodations. During the construction period, there would also likely be a short-term increase in demand for public services. This increased demand would come from the influx of workers, as well as the nature of the workforce. Transient labor workforces often place additional demands on police, emergency, and health services.

3.14.5.2 Potential Indirect Effects from Pipeline Operations

Ongoing operations of future projects in the proposed corridors that would be designated under the action alternatives would have less effect on the regional economy than the more labor-intensive construction phase, excepting the potential effects from EOR on oil and gas production (discussed later in this section). Based on the Riley Ridge EIS, future operations and maintenance of a CO_2 pipeline could produce an annual increase in regional economic output of approximately $25,000 per mile of pipeline constructed and a total increase in labor earnings of approximately $11,000 per mile. Ongoing operating and maintenance activities could support approximately 0.08 total jobs per mile of pipeline constructed, including direct jobs and indirect and induced jobs supported by nonlabor operating and maintenance expenses and the expenditures of employee households for local goods and services.

Operations and maintenance payroll and expenditures for the Riley Ridge CO_2 pipeline were projected to produce approximately $1,100 per mile in annual state and local tax revenues, excluding property taxes on the constructed pipeline. Property tax revenues on the constructed pipeline would likely be the largest source of local tax revenues on an ongoing basis and would depend on the value of the pipeline and local assessment rates. In the Riley Ridge EIS, annual property tax revenues were projected to average about $8,800 per mile over the fifty-year projected life of the project (BLM 2018).

The largest potential economic effects from pipeline operations could be indirect effects resulting from the delivery of CO_2 for EOR in Wyoming oil and gas fields. Up to 1.8 billion barrels of oil in Wyoming could be recoverable through the delivery and use of CO_2 for EOR based on current technology (see Appendix D). Based on the 2013 study of EOR in Wyoming by the EORI (Jones and Freye 2019), EOR operating activities support approximately 23 direct jobs and 94 total jobs for each million barrels of oil recovered. Capital investments to drill and complete EOR wells support an additional 42 direct jobs and 70 total jobs per million barrels of oil produced (excluding pipeline development discussed previously). Each million barrels of oil produced through EOR produce approximately $2.8 million in federal royalty revenues, $6 million in Wyoming state royalties, $3.8 million in Wyoming severance tax revenue, and $4.6 million in property taxes for Wyoming counties (Cook 2013).

Potential future EOR projects could also facilitate the use and sequestration of CO_2 from Wyoming coal-fired power plants and provide an additional revenue stream for those plants. Over 75% of the CO_2 produced in Wyoming comes from the state's coal-fired power plants (Thyne n.d. [2007]); however, several of the units at these plants are currently slated for closure within the next decade (Erickson 2019).

3.14.6 Environmental Effects – Alternative B (Proposed Action)

3.14.6.1 Potential Indirect Effects on Private Land Values

Under Alternative B, the proposed corridors on public lands would be connected by approximately 20,043 acres on private land (see Section 3.7). Landowners along the route could expect temporary disruption in the quiet enjoyment of their properties from construction and construction-related activity. Despite the increasing proliferation of CO_2 pipelines, no known studies, published or unpublished, have examined the effects on private property values from the presence of CO_2 pipelines. Prior studies of the effects of other types of energy-related pipelines (such as natural gas and oil pipelines) on nearby property values have reached mixed conclusions, with adverse effects on land values most frequently found in connection with

pipelines that had experienced previously publicized safety incidents such as leaks or explosions (Human Impact Partners 2015). Proponents of future projects would need to negotiate easement agreements with private landowners to cross private lands. Such agreements could compensate for indirect effects on private land values.

3.14.6.2 Potential Effects on Other Industries and Nonmarket Values

Among the three action alternatives, Alternative B would have the most potential to conflict with the future development of other linear infrastructure, such as the construction of new electric transmission lines in support of renewable energy development, and with the development of valid, existing rights for leasable, locatable, and saleable minerals.

Under Alternative B, there could be a minor loss of productive cropland (see Section 3.8.5) and a potential loss of approximately 6,539 AUMs of grazing allotments (approximately 0.4% of total allotments across the nine BLM field offices) during construction of future projects within the corridors (see Section 3.8). At an estimated economic value of roughly $50 in output per AUM from cattle production (BLM 2012e), the annual reduction in agricultural output could be approximately $325,000 assuming full use of the grazing allotments that could be eliminated during construction of future projects.

The proposed corridors under Alternative B would cross the Badlands SRMA; the NHT; Beaver Rim, Jackson Canyon, and Greater Sand Dunes areas of critical environmental concern (ACECs); the Historic Trails Management Area; the Morgan Creek and Red Rim Daley Wildlife Habitat Management Areas (WHMAs); Seminoe State Park; and the Flaming Gorge National Recreation Area (SWCA 2016a). Construction activity associated with potential pipelines could have a temporary effect on visitation and visitor expenditures tied to these areas. Ongoing pipeline operations are likely to be less noticeable to recreational visitors than the short-term effects from construction, but the pipeline ROW would likely be visually apparent from portions of the special management and recreational areas crossed by the proposed corridors. Relative to Alternative C and Alternative D, which were designed to avoid or minimize conflicts with other resources, Alternative B has the most potential to affect recreation and tourism-related economic activity and nonmarket values associated with the environmental characteristics and quality of special management and recreational areas.

3.14.6.3 Environmental Justice

Five of the 27 census tracts containing or bordering the proposed corridors under Alternative B contain potential environmental justice populations. These census tracts are tract 9676 in Carbon County (23.4% minority residents), tract 9681 in Carbon County (16.6% of individuals living in poverty), tract 9402.02 in Fremont County (more than 68% minority residents and over 23% residents living in poverty), tract 9706.01 in Sweetwater County (more than 28% minority residents), and tract 9707 in Sweetwater County (more than 18% of residents living in poverty). Although corridor designation alone would not create any high and adverse effects, these populations could be disproportionately affected by any adverse effects from future pipeline construction and operations within the designated corridors under Alternative B. Future development within the designated corridor would be subject to subsequent NEPA reviews where environmental justice populations would have additional opportunities to participate in the planning of projects that may affect their community.

3.14.7 Environmental Effects – Alternative C

3.14.7.1 Potential Indirect Effects on Private Land Values

Under Alternative C, 1,871 acres of private land would connect the designated corridors, compared to more than 20,000 acres for Alternative B and Alternative D (see Table 3.7-1). In aggregate, Alternative C would have much less potential impact on private land values than the other action alternatives.

3.14.7.2 Potential Effects on Other Industries and Nonmarket Values

Alternative C would have the least potential to conflict with the future development of other linear infrastructure, such as the construction of new electric transmission lines, and with the development of valid, existing rights for leasable, locatable, and saleable minerals.

Alternative C would have the least potential impact on the availability of grazing, with a projected potential loss of approximately 629 AUMs (see Section 3.8). At an estimated economic value of approximately $50 per AUM for cattle production (BLM 2012e), the annual reduction in agricultural output could be approximately $32,000 assuming full use of the grazing allotments that could be eliminated during construction of future projects.

Alternative C would also have the least potential effect on recreation-related economic activity (see Section 3.13.6) and nonmarket values associated with the environmental characteristics and qualities of the special management areas.

3.14.7.3 Environmental Justice

Only one of the 13 census tracts traversed by or bordering the proposed corridors under Alternative C contains a potential environmental justice population: tract 9676 in Carbon County (with more than 23% minority residents).

3.14.8 Environmental Effects – Alternative D

3.14.8.1 Potential Indirect Effects on Private Land Values

The designated corridors under Alternative D would be connected by approximately 21,083 acres of private land, similar to the acreage under Alternative B and substantially more than the private land acreage under Alternative C. In aggregate, any effects on private land values under Alternative D would be similar to Alternative B and larger than Alternative C.

3.14.8.2 Potential Effects on Other Industries and Nonmarket Values

Because segments re-routed into existing corridors would be dedicated to the transport of CO_2, EOR products, and other compatible uses under Alternative D, this alternative would have more potential to conflict with the future development of other linear infrastructure than Alternative C, but less than Alternative B. Alternative D would also have less potential to conflict with the development of valid, existing rights than Alternative B. Alternative D would have similar, minor effects on the agricultural economy compared to Alternative B.

Alternative D would have similar effects on the agricultural economy to Alternative B, including the potential loss of 6.447 AUMs within the proposed corridors during the construction of potential future projects (see Section 3.8). Individual permittees could be adversely affected, and the overall impact on agricultural output could be approximately $325,000 per year assuming full use of the grazing acres that could be eliminated during construction.

By avoiding NHT and other areas with special designations, Alternative D would have slightly less effect on recreation-related opportunities (Section 3.14.6) and economic activity and nonmarket values than Alternative B, but larger effects than Alternative C.

3.14.8.3 Environmental Justice

From an environmental justice standpoint, Alternative D would be the same as Alternative B, with the same potential environmental justice populations living in the same census tracts traversed by or bordering the proposed corridors.

3.14.9 Summary of Effects

Designation of the proposed corridors for the transport of CO_2, EOR products, and other compatible uses could directly affect other economic activities in Wyoming due to potential conflicts with the development of other linear infrastructure and valid existing rights. Alternatives B and D would generally have similar socioeconomic effects, with Alternative D having slightly less potential to affect development of other linear infrastructure, such as transmission lines, and the exercise of valid, existing rights.

By streamlining the environmental review for potential future projects, the proposed corridors could have indirect effects on socioeconomic conditions. Development of future projects within the corridors could create a short-term economic stimulus but could also pose short-term challenges in regard to housing the workforce and providing public services in less densely populated areas. In the long term, the proposed corridors could streamline permitting for the delivery of CO_2 for use in EOR to stimulate additional oil and gas development and production, which could provide substantial economic and fiscal benefits. Alternatives B and D would generally have similar indirect socioeconomic effects. Alternative C would have the least potential among the action alternatives to have adverse indirect effects on other economic activities such as recreation and grazing, and the least potential to affect nonmarket values associated with recreation and environmental characteristics and quality.

3.14.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or reservation of existing corridors for the transport of CO_2, EOR products, and other compatible uses would not result in any irretrievable and irreversible socioeconomic impacts.

The economic effects of future potential development could include increases in employment, earnings and economic output along the pipeline route(s), particularly during construction; as well as increases in employment, earnings, and economic activity throughout the state of Wyoming from the delivery of CO_2 for EOR in Wyoming oil and gas fields. Future potential development of some corridors may affect recreation and tourism-related economic activity and nonmarket values and would also result in small reductions in agricultural use. Future potential development on private lands is expected to affect private land enjoyment, particularly during construction, and potentially, private land values. There would be additional demands on housing and public services during construction if potential projects are constructed within the proposed corridors. These impacts would be irretrievable until construction is completed or until the corridor is reclaimed, or both. Overall, the short-term use of the proposed corridors is expected to result in increases in local and regional long-term productivity.

3.15 SPECIAL DESIGNATIONS

3.15.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following special designation issues for analysis:

- How would proposed corridor clearing and surface disturbance affect the relevant and important values of ACECs?
- How would proposed corridor clearing and surface disturbance affect designated wilderness study areas (WSAs)?

This section discusses the potential effects on special designation areas (SDAs) as a result of the potential project. Indicators of impacts to SDAs are as follows:

- Acres of proposed corridors plus a 150-foot buffer overlapping ACECs
- Acres of proposed corridors plus a 2-mile buffer overlapping WSAs

3.15.2 Affected Environment

SDAs are units of land managed by federal or state agencies for the protection and enhancement of specific resource values. Agency-designated SDAs discussed in this analysis include WSAs and ACECs. The analysis area for WSAs includes a 2-mile buffer around the proposed corridors, and the analysis area for ACECs includes a 150-foot buffer around the proposed corridors. These analysis areas were determined to account for impacts to visual and noise resources. Recreation areas and wildlife management areas identified in this section as designated land use areas are described in more detail in Section 3.13, Recreation, and Section 3.21, Wildlife and Fisheries.

3.15.2.1 Areas of Critical Environmental Concern

ACECs are an administrative designation made by the BLM through a land use plan. FLPMA defines an ACEC as an area "within the public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards." To be designated as an ACEC, the area must meet the criteria of relevance and importance (as defined in BLM Manual 1613; BLM 1988). ACECs are only designated on BLM-administered lands. There is no single set of prescriptions for management of ACECs. Special management is designed specifically to protect the relevant and important values associated with each ACEC and therefore varies from area to area. No ACECs are physically crossed by the proposed corridors. Two ACECs have been designated on BLM lands within the analysis area. The applicable RMPs for each BLM field office identify the specific conditions and/or restrictions imposed within each of the ACECs. The ACECs within the analysis area are listed in Table 3.15-1.

Table 3.15-1. Areas of Critical Environmental Concern, Field Office, Acreage, and Relevant and Important Values

ACEC	Field Office	Area (acres)	Relevant and Important Values
Jackson Canyon	Casper	14,000	Bald eagle (*Haliaeetus leucocephalus*) winter communal night roosts
Greater Sand Dunes	Rock Springs	38,650	Outstanding geologic features, prehistoric and historic values of national significance, and recreation values of regional/national importance

3.15.2.2 Wilderness Study Areas

The Wilderness Act of 1964 established the National Wilderness Preservation System and a process for federal agencies to recommend wilderness areas to U.S. Congress. Wilderness, as defined by the Wilderness Act, is untrammeled (free from human control), undeveloped, and natural, offering outstanding opportunities for solitude or primitive and unconfined recreation. With the passage of FLPMA in 1976, U.S. Congress directed the BLM to inventory public land for wilderness characteristics including the appearance of naturalness, outstanding opportunities for solitude or primitive and unconfined recreation, special features and values (such as ecological, geological, educational, historical, scientific, and scenic values), and manageability (adequate size; i.e., at least 5,000 acres of public lands or of sufficient size to make preservation practicable). WSAs contain wilderness characteristics and are managed to preserve those values until U.S. Congress either designates them as wilderness or releases them for other uses. No WSAs are physically crossed by the proposed corridors. The WSAs within the analysis area are listed in Table 3.15-2.

Table 3.15-2. Wilderness Study Areas, Field Office, and Area

WSA	Field Office	Area (acres)
Bennett Mountains	Rawlins	5,850.5
Alkali Basin/East Sand Dunes	Rock Springs	13,084.8
Alkali Draw	Rock Springs	18,154.8
South Pinnacles	Rock Springs	10,894.4
Cedar Mountain	Worland	20.627.1

3.15.3 Methods of Analysis

This analysis identifies the impacts to SDAs that would occur from the construction, operation, and decommissioning of the potential project.

The analysis area for ACECs comprises all ACECs with portions of land within a 150-foot buffer on either side of the proposed corridors. A 150-foot buffer was selected because it encompasses all surface disturbances from construction of the potential project as well as development of access roads and other construction support facilities. Quantification of impacts to ACECs is based on the acres of ACECs that fall within the ACEC analysis area compared by alternatives.

The analysis area for WSAs comprises all WSAs with portions of land within a 2-mile buffer on either side of the proposed corridors. A 2-mile buffer was selected because it encompasses all surface disturbances from construction of the potential project and other construction support facilities. In addition, noise and visual disturbances from construction generally would dissipate to background levels well within the 2-mile buffer. Quantification of impacts to WSAs is based on the acres of WSAs that fall within the WSA analysis area compared by alternatives.

The impact assessment generally focuses on conformance with the management objectives for the area and impact to the resource values for which the SDA was designated (for example, the relevant and important values of an ACEC or the wilderness attributes of a WSA).

3.15.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. There would be no impacts to SDAs beyond existing conditions and trends.

3.15.5 Environmental Effects – Common to All Action Alternatives

Implementation of the potential project would result in the use of some ACEC lands as designated corridors. Impacts to ACECs from the potential project would primarily come from surface disturbance and vegetation removal associated with construction activities. In cases where access road development in ACECs would not be fully avoided, but rather limited to existing corridors and/or subject to closure/rehabilitation, impacts would include vegetation loss and visual impacts until reclamation is complete.

No WSAs are physically crossed by the proposed corridors. However, under all action alternatives, scenery of the landscapes that are intersected by the proposed corridors could be affected through the construction, operation, and maintenance of the potential project, including the modification of the landscapes' inherent character. Surface disturbance and vegetation removal would create contrast on the landscape that may be visible from WSAs. The magnitude and extent of impacts would depend on the type of project authorized, its location, its total length, and a variety of site-specific factors that are not known at this time but would be addressed by NEPA reviews at the project-specific level. The greatest visual impacts would be in the short term, including disturbance of the soil, introduced geometric landforms, temporary structures, active mining, and removal of vegetation in the viewshed. Reclamation of potential project areas would include revegetation and topsoil replacement that would minimize impacts to naturalness seen from within WSAs. Please see Section 3.18, Visual Resources, for additional impacts to visual resources as a result of the potential project.

3.15.6 Environmental Effects – Alternative B (Proposed Action)

Under Alternative B, the proposed corridors (and 150-foot-wide buffer) would cross the Jackson Canyon ACEC and Greater Sand Dunes ACEC. Proposed corridor development would result in up to 291.1 acres (or less than 1%) of surface disturbance and construction activities within the Jackson Canyon ACEC that could affect bald eagle (*Haliaeetus leucocephalus*) winter communal night roosts. Considering design features discussed in Section 3.21, Wildlife and Fisheries, and that less than 1% of the ACEC would be subject to surface disturbance, anticipated impacts to the relevant and important values of Jackson Canyon ACEC would be negligible.

Proposed corridor development would result in up to 18.6 acres (or less than 1%) of surface disturbance and construction activities in the Greater Sand Dunes ACEC that could affect the areas outstanding geologic features, prehistoric and historic values, and recreation values. Design features discussed in Section 3.5, Geology and Soils, would reduce impacts to the outstanding geologic features in the area. Design features discussed in Section 3.3, Cultural, would reduce impacts to the prehistoric and historic values. Design features discussed in Section 3.13, Recreation, would reduce impacts to the resource values in the ACEC. Considering those design features and mitigation measures and that less than 1% of the ACEC would be subject to surface disturbance, anticipated impacts to the relevant and important values of the Greater Sand Dunes ACEC would be negligible.

3.15.7 Environmental Effects – Alternative C

Under Alternative C, the potential project would not impact ACECs within the analysis area.

3.15.8 Environmental Effects – Alternative D

Under Alternative D, the proposed corridors (and 150-foot-wide buffer) would cross the Greater Sand Dunes ACEC. Impacts to the Greater Sand Dunes ACEC would be the same as those expected under Alternative B.

3.15.9 Summary of Effects

Design features and mitigation measures related to ACEC values would reduce, but not eliminate, impacts to ACECs that result from potential development of the proposed corridors. Alternative B would result in up to 310 acres of surface disturbance within ACECs in the analysis area, Alternative D would result in 18.6 acres, and Alternative C would not impact ACECs in the analysis area (Table 3.15-3).

Table 3.15-3. Future Potential Development within Areas of Critical Environmental Concern by Alternatives

ACEC	Area (acres)	Acres within Analysis Area		
		Alternative B	Alternative C	Alternative D
Jackson Canyon	14,000	291.1	0	0
Greater Sand Dunes	38,650	18.6	0	18.6

Under Alternative B, up to 15,269.3 acres across five WSAs could be impacted by the proposed corridors. Under Alternative C, up to 2,591.1 acres of the Cedar Mountain WSA could be impacted by the proposed corridors. Under Alternative D, up to 8,366.4 acres within four WSAs could be impacted by the proposed corridors (Table 3.15-4). Impacts to these areas include modification of the landscapes' inherent character from potential surface disturbance and vegetation removal that would create contrast on the landscape that may be visible from these WSAs.

Table 3.15-4. Impacts to Wilderness Study Areas by Alternative

WSA	Area (acres)	WSA Acreage Impacted		
		Alternative B	Alternative C	Alternative D
Bennet Mountains	5,850.5	162.5	0	0
Alkali Basin/East Sand Dunes	13,084.8	1,504.6	0	1,534.6
Alkali Draw	18,154.8	6,856.7	0	258.8
South Pinnacles	10,894.4	3,707.9	0	3,535.4
Cedar Mountain	20.627.1	3,037.6	2,591.1	3,037.6

3.15.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or reservation in existing corridors would not result in any irretrievable and irreversible impacts to special designations. Impacts from future potential development of corridors to ACEC relevant and important values and WSA wilderness characteristics would be irretrievable until the ROWs were successfully reclaimed. The short-term use of the proposed corridors would not result in long-term reductions in the viability of managing these areas for the protection and enhancement of specific resource values.

3.16 TRANSPORTATION

3.16.1 Issues to be Analyzed and Impact Indicators

Internal and public scoping identified the following transportation issues for analysis:

- How would the potential project affect existing transportation corridors or public access?

This section discusses the potential effects of the potential project on transportation and access within the proposed corridors in Wyoming. Potential effects include alterations in traffic, public access, and safety. Indicators of impacts to transportation are as follows:

- Miles and number of existing routes and roads crossed by the proposed corridor

3.16.2 Affected Environment

The analysis area for evaluating transportation impacts includes the transportation network that would be used for access to and within the proposed corridor during the construction, operation, and maintenance of the WPCI, where a potential project could increase the amount of traffic on the state highway network, county roads, and local roads. The road network in and near the analysis area includes paved all-weather U.S. and state highways, paved and dirt or gravel county roads, and BLM-administered roads.

Existing traffic along the major routes, highways, arterials, and local roads includes oil and gas exploration and development, mining operators, regional and interstate through-traffic, residential and/or private landowners, livestock grazing permittees, and recreational activities such as seasonal hunting, OHV use, and sightseeing. Existing conditions along routes within the analysis area consist of low volumes of traffic generally moving at free-flow speeds. Existing conditions at intersections within the analysis area include low delays per vehicle and little to no congestion. Traffic is heaviest in the southern portion of the analysis area, along I-80, due to the more extensive road network associated with higher density population centers and existing development. A list of road and rail crossings is provided in Appendix B of the state's proposal.

3.16.3 Methods of Analysis

Project-related increases in the number of users of existing highways and arterial and local roads in the analysis area would result in impacts to transportation and access. The impacts of alternatives are discussed in terms of the miles and number of existing routes and roads crossed by the proposed corridors. Although access routes for construction and maintenance have yet to be determined, those routes and roads physically crossed by the proposed corridor are likely to experience the most traffic volume increases. This analysis also includes a qualitative discussion of construction-related traffic as a result of future development within the proposed corridors.

The impact analysis for transportation incorporates the following assumptions:

- Project-generated traffic would be greatest during the construction and development phase and would decrease as construction ends.
- It is not anticipated that construction of new roads would be required to access the proposed corridors.
- After construction, all existing roads would be returned to their original status, unless directed otherwise by applicable land management agencies or landowners.
- All use and modification of federal, state, and county roads would be conducted in accordance with the applicable regulations.

3.16.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. There would be no changes to traffic volume, public access, or safety as a result of the potential project. The management of existing corridors would remain under existing management plans, guidelines, and federal/state/local regulations.

3.16.5 Environmental Effects – Common to All Action Alternatives

The majority of transportation-related impacts (e.g., increased vehicle trips) would be from development- and construction-related traffic. Although access routes for construction and maintenance have yet to be determined, those routes and roads physically crossed by the proposed corridor are likely to experience the most traffic volume increases (Table 3.16-1).

Vehicle trips associated with project construction would generally occur during daylight hours, with most trips occurring between 5:00 and 6:00 in the morning and evening. Typically, work weeks are 5 days, but may be extended to 6 or 7 days depending on construction scheduling. During boring, directional drilling, and hydrostatic testing, work would be conducted 24 hours a day until the process is complete. The anticipated increase in vehicle trips across action alternatives is negligible and would likely not adversely impact traffic flow and congestion in the analysis area. Given the slight increase in traffic volume and the limited anticipated congestion, adverse impacts to public safety are not likely.

Construction would require crossing paved and unpaved roads with varying levels of traffic and may require temporary road closures. In the case of road closures, detours or other measures would be implemented to permit traffic flow during construction. Proponents must coordinate road closures and detours with federal, state, and local transportation departments and emergency responders. Major paved highways, interstate highways, railroads, paved roads, and unpaved roads where traffic cannot be interrupted would be crossed by boring under the roadbed. All paved county roads and state highways would be crossed via slick bore or small directional drill bore method. Smaller unpaved roads would be crossed by open trenching and restored back to original status. Road closures and detours would temporarily affect traffic flow and public access in the analysis area.

Under all action alternatives, proponents would use existing federal, state, county, private, and BLM roads to gain access to the ROW during construction whenever practicable. It is not anticipated that new road construction would be required to access the construction ROW on federal lands, but if it is, roads would be built to minimum allowable federal standards. After construction, roads on public lands would be left in place or completely reclaimed, at the direction of the BLM field office. The retention of new roads would provide additional public access to BLM-administered lands. Any new roads constructed on private lands would be reclaimed in accordance with landowner requirements and would not have lasting impacts to transportation.

Although traffic impacts would exist throughout the life of the project, these impacts would decrease and be limited to maintenance and operations following construction and development. After construction, surface travel along the ROW generally would be limited to periodic valve inspections, leak surveys, erosion and corrosion control inspections, noxious weed surveys, and any potential project repairs that may be needed; these activities would cause infrequent additional vehicle trips and have little to no impact on traffic flow and volumes in the analysis area.

3.16.6 Summary of Effects

Potential project development activities under all action alternatives would increase traffic temporarily on the road network in the analysis area, primarily during construction and decommissioning activities. Alternatives B and D would have similar effects on traffic volumes, whereas Alternative C would affect fewer miles of routes and have less of an effect on traffic volumes (Table 3.16-1).

Although an increase in traffic on any given roadway could increase the potential risk for an accident, the findings of this transportation analysis do not suggest a measurable increase in transportation-related accidents. Permanent impacts to transportation would be negligible because of the low number of vehicle trips generated as a result of the potential project.

Table 3.16-1. Summary of Transportation Routes Crossed by Proposed Corridors

Alternative	Number of Roads and Routes Crossed by the Proposed Corridors	Miles of Roads and Routes Crossed by the Proposed Corridors
B	2,452	247.2
C	325	28.1
D	2,481	257.8

3.16.7 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

Under all action alternatives, there would be no unavoidable adverse effects, because transportation resources would not be permanently altered as a result of construction or operations. The slight increase in vehicle traffic that would occur as a result of the potential project would not impact the short-term use or the long-term productivity of local transportation.

3.17 VEGETATION

3.17.1 Issues to be Analyzed and Impact Indicators

The section analyzes the vegetation communities that could be removed or altered by potential projects within the proposed corridors and how ecosystem functions and habitats could be affected. Clearing the corridors would decrease vegetation cover and plant species abundance and could spread noxious weeds and other invasive species. Special-status plant species and designated critical habitats could also be affected by clearing vegetation within the proposed corridors and by other project activities.

Internal and public scoping identified the following vegetation issues for analysis:

- How would vegetation within corridors recover over time after construction?
- How would corridor maintenance affect vegetative cover during the life of the project?
- Would the project cause the introduction and spread of invasive plants and noxious weeds? If so, how would the introduction of invasive plants and noxious weeds affect revegetation success?
- If special-status plant species are present in or near the proposed corridors, how would populations be affected?

3.17.2 Affected Environment

The vegetation technical report prepared for the project describes the vegetation resources present within the proposed corridors and evaluates the types of impacts to vegetation resources that could result from the project (Western EcoSystems Technology, Inc. [WEST] 2016a). The proposed corridors are characterized by low precipitation and high summer evapotranspiration rates, open grasslands, shrublands, forests, intermittent streams, ephemeral streams, and a few perennial rivers and wetlands (Wiken et al. 2011), where a mosaic of dryland farming, cattle grazing, residential development, and energy development (oil, coal, and gas) has impacted some areas of the native mixed grass-shortgrass prairies and shrublands (Jin et al. 2013). Proposed corridors include shrub-scrublands, herbaceous-grasslands, hay-pastures, croplands, herbaceous and woody wetlands, evergreen forests, deciduous forests, and mixed forests. GAP vegetation classification data at the division level were used to determine habitats present within the corridors and a 1-mile buffer. The GAP divisions are listed in Table 3.17-1; because of the large size of the project, the divisions are grouped into six general habitat categories for analysis.

Table 3.17-1. Vegetation Types within Proposed Corridors

GAP Division	General Vegetation Category
Western North American Cool Semi-Desert Scrub & Grassland	Shrubland, desert scrub, grassland
Central North American Grassland & Shrubland	Shrubland, desert scrub, grassland
Western North American Grassland & Shrubland	Shrubland, desert scrub, grassland
Eastern North American-Great Plains Flooded & Swamp Forest	Riparian, wetland
Rocky Mountain-Great Basin Montane Flooded & Swamp Forest	Riparian, wetland
Eastern North American Marsh, Wet Meadow & Shrubland	Riparian, wetland
North American Bog & Fen	Riparian, wetland
North American Great Plains Saline Marsh	Riparian, wetland
North American Western Interior Brackish Marsh, Playa & Shrubland	Riparian, wetland
Western North American Freshwater-Marsh, Wet Meadow & Shrubland	Riparian, wetland
Open Water	Riparian, wetland
Herbaceous Agricultural Vegetation	Agricultural
Pasture & Hay Field Crop	Agricultural
Introduced & Semi Natural Vegetation	Agricultural
Eastern North American & Great Plains Cool Temperate Forest & Woodland	Forest, woodland
Rocky Mountain Cool Temperate Forest & Woodland	Forest, woodland
Western North American Cool Temperate Woodland & Scrub	Forest, woodland
Eastern North American Temperate & Boreal Cliff, Scree & Rock Vegetation	Cliff, rock, scree
Western North American Temperate Cliff, Scree & Rock Vegetation	Cliff, rock, scree
Great Plains Cliff, Scree & Rock Vegetation	Cliff, rock, scree
Barren	Cliff, rock, scree
Quarries, Mines, Gravel Pits and Oil Wells	Developed, disturbed
Recently Disturbed or Modified	Developed, disturbed
Developed & Urban	Developed, disturbed

Source: USGS (2011).

BLM-administered forest resources are present, primarily in the northwestern part of the proposed corridors. FLPMA and BLM Manual MS-5000, Forest Management (BLM 1991), authorize timber sales and require the BLM to receive fair market value for forested vegetation that is removed.

Invasive plant species and noxious weeds in Wyoming have been negatively impacting natural resources, recreation, and wildlife management for many years (WYGFD 2010a, 2010b). Despite rigorous management efforts, invasive plant species and noxious weeds persist in disrupting the functionality of native plant communities in most Wyoming ecosystems. An additional challenge in Wyoming and across the western United States is the rapidly expanding presence of annual invasive grasses, predominately downy brome grass, commonly known as cheatgrass (*Bromus tectorum*). In addition to cheatgrass, there are 30 state-designated noxious weeds in Wyoming and additional weeds designated as declared weeds in every county in Wyoming (Wyoming Weed and Pest Council 2020; Wyoming Department of Agriculture 2019).

Special-status species include those listed under the ESA in the 12 counties and those listed as sensitive by the nine BLM field offices overlapping the project (BLM 2010c; USFWS 2020a). ESA-listed plant species that may occur in the proposed corridors include Ute ladies'-tresses (*Spiranthes diluvialis*), blowout penstemon (*Penstemon haydenii*), and desert yellowhead (*Yermo xanthocephalus*). Two populations of desert yellowhead are present near proposed corridors within Fremont County; one is within designated critical habitat. Whitebark pine (*Pinus albicaulis*), a candidate for listing, may occur in the area. In addition, western prairie fringed orchid (*Platanthera praeclara*) could occur downstream in the Platte River drainage system and is protected through consultation procedures outlined in the Platte River Recovery and Implementation Program. Background information, including special-status species descriptions, habitat requirements, and maps, is provided in *Special Status Species Report for the Wyoming Pipeline Corridor Initiative* (SWCA 2016b). The greatest threat to the special-status plants in Wyoming is habitat loss (e.g., conversion to cropland, filling wetlands, intensive mowing). Introduced invasive plants, fire suppression, and overgrazing also threaten these species.

3.17.3 Methods of Analysis

The analysis considers the vegetation cover by habitat type that could be removed within the proposed corridors and quantifies vegetation cover available within a 1-mile buffer of the proposed corridors (the analysis area). The analysis reviews special-status plant species that are known to occur or have the potential to occur in the analysis area because of the presence of potentially suitable habitats. GAP vegetation classification data at the division level were used to determine potentially suitable habitats present within the analysis area. Quantification of potentially suitable habitat for each special-status plant species is based on the GAP habitat type(s) within the species range as mapped by WYNDD or within counties where the species is known to occur when a WYNDD range map was not available (USGS 2011; WYNDD 2020b). More site-specific information about habitat, soils, associated vegetation, and other factors are needed to make supportable determinations about how species would be affected. These details would be gathered for potential projects within the proposed corridors.

Inventory data for weeds were obtained from the BLM's National Invasive Species Information Management System database (BLM 2020c). The analysis describes the known populations within the proposed corridors. Even if weeds are present and prevention control is conducted, there would be some level of new infestations introduced. Weed-free seed mixes for reclamation are required to be noxious-weed free; however, BLM policy states these mixes can contain up to 2% non-noxious weed seed (WO IM 2006-073). Weed management plans at the project level would address objectives and goals for specific noxious and invasive weed species. Plans would include site-specific analysis that includes resistance and resilience of a particular habitat, reclamation success, climate, and other factors.

3.17.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. Therefore, under Alternative A, there would be no impacts to vegetation and special-status plant species or their habitats as a function of Alternative B, and vegetation species within the proposed corridors would continue to be managed as described in each BLM field office's RMP.

3.17.5 Environmental Effects – Common to All Action Alternatives

3.17.5.1 General Vegetation

The vulnerability of habitats to development and climate change has been assessed by The Nature Conservancy, the Wyoming Game and Fish Department (WYGFD), and the WYNDD, ranking them according to their overall susceptibility to these disturbances as low, moderate, and high risk habitats (Pocewicz et al. 2014). Sagebrush shrublands, desert shrubland, prairie grasslands, wetlands, and riparian habitats are ranked as highly vulnerable. Wetlands are further discussed in Section 3.19, Water.

Construction of pipelines, roads, and temporary workspaces would remove vegetation within the proposed corridors. Clearing would remove protective vegetation cover and could increase soil erosion and the transport of sediment to sensitive areas such as wetlands or waterbodies (see Section 3.19, Water). Grading, excavation, and backfilling could result in the mixing of topsoil with subsoil and in loss and alteration of seed banks, which could result in long-term reduction of productivity and introduction of noxious and invasive weeds. Soil contamination from equipment spills and/or leakage of fuels, lubricants, and coolants could damage or prevent growth of vegetation due to soil contamination.

The use of existing designated corridors is intended to reduce impacts to native vegetation; however, existing corridors may currently contain native, undisturbed vegetation. The quality of vegetative cover in the proposed corridors, and quantity required to be removed, would be determined during preconstruction surveys. Although corridors were sited adjacent to existing corridors when possible, it is not assumed that proposed corridors adjacent to existing designated corridors contain disturbed or less valuable vegetative resources.

Disturbed areas would be reclaimed after construction. Grassland and herbaceous plant communities would recover relatively quickly, whereas shrubland and forest communities would take a comparatively longer time to regenerate. Habitat recovery can be slow because of Wyoming's climate and the ecology of sagebrush and other ecological communities (Knight et al. 2014). Wyoming big sagebrush (*Artemisia tridentate*) and other sagebrush shrubs can take 35 to 120 years to re-establish in a disturbed ROW through natural propagation (Baker 2006).

Projects within the proposed corridors would implement design features and BMPs that would reduce residual impacts based on site-specific characteristics (see Appendix E). The proposed project's upland restoration and revegetation plan (see Appendix D) complies with the Wyoming BLM reclamation policy (BLM IM No WY-2012-032) (BLM 2012b) and includes the following:

- Stockpile topsoil and vegetation separate from subsoil to provide seeds, vegetative propagules, and soil microbiota to facilitate plant re-establishment.
- Use native seed mixes to restore vegetation on public lands. Seed mixes would correspond with surrounding vegetation types. Within forested areas, seed type would be determined by appropriate agency/landowner.
- Implement livestock grazing controls.
- Implement post-restoration monitoring, maintenance, and reporting to meet performance criteria.

During operations, vegetation within portions of the proposed corridors would be maintained in a native, herbaceous state to facilitate routine maintenance. Therefore, there would be a long-term reduction in shrub and tree cover within the 10-foot-wide maintenance corridor.

Disturbed areas would be restored at final reclamation to the pre-disturbance landforms and desired plant community (see Appendix E). Outside of the 10-foot-wide maintenance corridor, forested areas would be reforested using seedlings grown from locally adapted seed that comes from the same seed zone and elevation range as the disturbed areas. If natural regeneration of the forested areas is practical, the area would be surveyed to ensure that regeneration is successful. Where practical in forested areas, Wyoming forestry BMP water protection guidelines would be followed.

3.17.5.2 Invasive Species

Removal of vegetation and disturbance of soils are likely to introduce and spread invasive plants including noxious weeds. Noxious and invasive weeds may become established within areas of surface disturbance, particularly where there are established populations within 500 feet providing a seed bank. Disturbed areas and areas directly adjacent to disturbance would be the most susceptible to weed invasion.

Noxious and invasive weeds can affect revegetation success by outcompeting native plant species for nutrients and available moisture. A noxious and invasive weed control plan has been prepared for the proposed project (see Appendix D), which includes management measures including conducting weed surveys. Dense stands of noxious and invasive weeds identified during preconstruction field surveys would be pretreated with approved herbicides before vegetation clearing begins. Vegetation and soils from weed-infested areas would be separated from other soil stockpiles. Areas disturbed by project activities would be reclaimed and regularly monitored to record and treat new weed populations.

3.17.5.3 Special-Status Plant Species

Based on species' ranges and associated vegetation communities, blowout penstemon (endangered), desert yellowhead (threatened), and whitebark pine (candidate) could occur in the proposed corridors or within the 1-mile analysis area (see analysis in Section 3.17.9.3). Desert yellowhead designated critical habitat in not present within proposed corridors but occurs within the 1-mile analysis area in Fremont County. A second population of desert yellowhead discovered after designation of critical habitat occurs even closer to the proposed corridors in Fremont County. Western prairie fringed orchid (*Platanthera praeclara*) occurs downstream outside of the proposed corridors; however, the proposed corridors would occur in the species' Area of Influence (AOI) and disturbance within the Platte River drainage system can affect this species downstream with new water depletions or change of use.

Because proposed corridor designation may lead to consumptive use of water or have the potential to affect water quality in the Platte River drainage system, there may be impacts to western prairie fringed orchid downstream.

Individual projects proposed within any future corridor established under this initiative would first evaluate the suitability of habitats to support listed species. Where the BLM determines the proposed project and prospective pipeline may affect a listed or proposed species or its designated or proposed critical habitat, the BLM must initiate Section 7 consultation with the USFWS. Based on the BLM's request for consultation, the USFWS would evaluate the effects of the individual project and consider the likely effects of the action. Results of the consultation may include provisions for incidental take or reasonable and prudent measures to further reduce the likelihood of take or adverse impacts to a species or its designated critical habitats.

Based on the presence of potentially suitable habitats and the species' ranges, the BLM sensitive plant species listed for the nine field offices (Table 3.17-2) could occur within proposed corridors or in the 1-mile analysis area, with the exception of Owl Creek miner's candle (*Cryptantha subcapitata*) (see analysis in Section 3.17.9.3). Descriptions of species and their potentially suitable habitats are provided in *Special Status Species Report for the Wyoming Pipeline Corridor Initiative* (SWCA 2016b).

Table 3.17-2. Bureau of Land Management Sensitive Plant Species

Common Name	Scientific Name
Porter's sagebrush, wormwood	*Artemisia porter*
Meadow milkvetch	*Astragalus diversifolius*
Trelease's milkvetch	*Astragalus racemosus* var. *treleasei*
Cedar Rim thistle	*Cirsium aridum*
Ownbey's thistle	*Cirsium ownbeyi*
Owl Creek miner's candle	*Cryptantha subcapitata*
Evert's wafer-parsnip	*Cymopterus evertii*
Large-fruited bladderpod	*Lesquerella macrocarpa*
Beaver Rim phlox	*Phlox pungens*
Rocky Mountain (Fremont County) twinpod	*Physaria saximontana* var. *saximontana*
Limber pine	*Pinus flexilis*
Whitebark pine	*Pinus albicaulis*
Persistent sepal yellowcress	*Rorippa calycina*
Shoshonea	*Shoshonea pulvinata*
Green River (low) greenthread	*Thelesperma caespitosum*

Sources: BLM (2010c); WYNDD (2020).

Proposed corridors could lead to habitat loss and increased invasive plants, as described in the previous section. Residual impacts to special-status plant species would be low as a result of implementing project design features, BMPs, and RMP stipulations (see Appendix E). Surface-disturbing and disruptive activities would be prohibited or restricted within buffers around plant populations. Preconstruction surveys would identify populations and any project modifications needed to minimize impacts. Reclamation of all disturbed areas would promote the re-establishment of native habitats and prevent the spread of weeds.

3.17.6 Environmental Effects – Alternative B (Proposed Action)

3.17.6.1 General Vegetation

Up to 57,514 acres of vegetation could be removed within proposed corridors and associated areas under Alternative B. These impacts are primarily within shrubland, desert scrub, and grassland (approximately 52,327 acres), and 3,082 within riparian-wetland cover types. Approximately 2.2 million acres of shrubland, desert scrub, and grassland cover is available within 1 mile of the Alternative B proposed corridors, which means Alternative B would affect approximately 2% of these habitats available within a 2-mile-wide corridor. Wetland impacts are discussed in Section 3.19, Water.

Some trees within the forest-woodland habitats in the proposed corridors under Alternative B (approximately 466 acres) would be removed and, under BLM forest management policy, BLM would receive revenue for their sale at fair market value.

3.17.6.2 Invasive Species

Approximately 57,457 acres of land could be disturbed under Alternative B. Existing populations of weeds could spread into disturbed areas. Based on BLM data, weed species prevalent in the Alternative B proposed corridors include cheatgrass, Canada thistle, saltlover (*Halogeton glomeratus*), Scotch cottonthistle (*Onopordum acanthium*), and prickly Russian thistle (*Salsola tragus*) (see Table 3.17-4). Not all areas have been surveyed or included in this data set.

3.17.6.3 Special-Status Plant Species

Potentially suitable habitat for ESA-listed and BLM sensitive species is assumed to be present within the Alternative B proposed corridors based on quantification of GAP vegetation type(s) within a species' range (see Tables 3.17-5 and 3.17-6). Project-level surveys would identify and qualify suitability of these habitats and presence-absences of plant populations. There is no designated critical habitat in the proposed corridors; however, there is critical habitat for desert yellowhead within 1 mile of Alternative B. A second population of desert yellowhead discovered after designation of critical habitat occurs even closer to the proposed corridors in Fremont County. Approximately 10,725 acres of the Alternative B proposed corridors is within the western prairie fringe orchid AOI.

3.17.7 Environmental Effects – Alternative C

3.17.7.1 General Vegetation

Up to 7,266 acres of vegetation could be removed within proposed corridors and associated areas under Alternative C (see Table 3.17-3). These impacts are primarily within shrubland, desert scrub, and grassland (approximately 6,124 acres), and 607 areas is within riparian-wetland cover types. Approximately 297,569 acres of shrubland, desert scrub, and grassland cover is available within 1 mile of the Alternative C proposed corridors, which means this alternative would affect approximately 2% of this habitat available within a 2-mile-wide corridor. Fewer impacts to sagebrush shrubland would occur due to protection of sage-grouse habitats. Maximizing the use of existing corridors would decrease removal of habitat in undisturbed areas. Wetland impacts are discussed in Section 3.19, Water.

Some trees within the forest-woodland habitats in Alternative C corridors (approximately 24 acres) would be removed and, under BLM forest management policy, the BLM would receive revenue for their sale at fair market value.

3.17.7.2 Invasive Species

Approximately 7,263 acres of land could be disturbed under Alternative C. Existing populations of weeds could spread into disturbed areas. Based on BLM data, weed species prevalent in the Alternative C proposed corridors include cheatgrass and prickly Russian thistle (see Table 3.17-4). Not all areas have been surveyed or included in this data set.

3.17.7.3 Special Status Plant Species

Potentially suitable habitat for ESA-listed and BLM sensitive species could be present within the Alternative C proposed corridors based on quantification of GAP vegetation type(s) within a species' range (see Tables 3.17-5 and 3.17-6). Project-level surveys would identify and qualify suitability of these

habitats and presence-absence of plant populations. There is no designated critical habitat or known populations of desert yellowhead in the proposed corridors or within 1 mile of the Alternative C corridors. Approximately 577 acres of the Alternative C proposed corridors are within the western prairie fringe orchid AOI.

3.17.8 Environmental Effects – Alternative D

3.17.8.1 General Vegetation

Up to 55,535 acres of vegetation could be removed within proposed corridors and associated areas under Alternative D (see Table 3.17-3). These impacts are primarily within shrubland, desert scrub, and grassland (approximately 48,935 acres), and 3,360 acres is within riparian-wetland cover types. Approximately 2 million acres of shrubland, desert scrub, and grassland cover are available within 1 mile of Alternative D proposed corridors, which means this alternative would affect approximately 2% of this habitat available within a 2-mile-wide corridor. Wetland impacts are discussed in Section 3.19, Water.

Some trees within the forest-woodland habitats in the proposed corridors under Alternative D (approximately 595 acres) would be removed and, under BLM forest management policy, the BLM would receive revenue for their sale at fair market value.

3.17.8.2 Invasive Species

Approximately 55,481 acres of land could be disturbed under Alternative D. Existing populations of weeds could spread into disturbed areas. Based on BLM data, weed species prevalent in the Alternative D proposed corridors include cheatgrass, Canada thistle, saltlover, Scotch cottonthistle, and prickly Russian thistle (see Table 3.17-4). Not all areas have been surveyed or included in this data set.

3.17.8.3 Special-Status Plant Species

Potentially suitable habitat for ESA-listed and BLM sensitive species could be present within the Alternative D proposed corridors based on quantification of GAP vegetation type(s) within a species' range (see Tables 3.17-5 and 3.17-6). Project-level surveys would identify suitable habitat and plant populations. There is no critical habitat in the proposed corridors. There is critical habitat for desert yellowhead within 1 mile of Alternative D. A second population of desert yellowhead discovered after designation of critical habitat occurs even closer to the proposed corridors in Fremont County. Approximately 10,951 acres of Alternative D is within the western prairie fringe orchid AOI.

3.17.9 Summary of Effects

3.17.9.1 General Vegetation

For all action alternatives, vegetation removed would primarily affect shrubland, desert scrub, and grassland cover. Disturbed areas would be reclaimed and monitored after construction of potential projects. During operations, vegetation within portions of the proposed corridors would be maintained in a native, herbaceous state to facilitate routine pipeline maintenance.

The acres of each vegetative cover type in the proposed corridors and within 1 mile of each alternative's proposed corridors are summarized in Table 3.17-3.

Table 3.17-3. Acres of Vegetative Cover Type

Cover Type	Alternative B		Alternative C		Alternative D	
	Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer
Shrubland, desert scrub, grassland	52,327	2,205,226	6,124	297,569	48,935	2,083,020
Riparian-wetland	3,082	152,141	607	25,354	3,360	152,713
Agricultural	355	33,886	310	21,018	903	51,817
Forest-woodland	466	34,578	24	1,873	595	37,756
Cliff, rock, scree	550	24,350	0	30	488	17,846
Developed, disturbed	734	33,828	201	7,316	1,254	41,860

Source: USGS (2011).
Note: assumes +/- 1% error in acreage totals due to rounding.

3.17.9.2 Invasive Species

Surface disturbance can lead to the spread and establishment of noxious and invasive weeds that can interfere with reclamation success. Noxious and invasive weeds are likely to encroach onto disturbed areas and also expand into adjacent weed-free areas. Weeds such as cheatgrass, Canada thistle, saltlover (halogeton), Scotch cottonthistle, and prickly Russian thistle are likely to spread into disturbed areas. Alternative B has the largest area of potential disturbance that could lead to an increase in weed cover. The effects of Alternative D would be similar to Alternative B, whereas Alternative C would have less potential to spread weeds due to less potential surface disturbance.

Known weed populations that have been recorded in the BLM National Invasive Species Information Management System database within the proposed corridors are summarized in Table 3.17-4. Not all areas have been surveyed by the BLM, and additional populations are likely present within corridors.

3.17.9.3 Special-Status Plant Species

Table 3.17-5 compares the availability of suitable habitat for ESA-listed species in the proposed corridors that could be removed or altered. Suitable habitat is based on the GAP habitat type(s) within the species' range as mapped by WYNDD or within counties where the species is known to occur when a WYNDD range map was not available.

Table 3.17-6 compares the availability of suitable habitat for BLM listed species in the proposed corridors that could be removed or altered. Suitable habitat is based on the GAP habitat type(s) within the species' range as mapped by WYNDD or within counties where the species is known to occur when a WYNDD range map was not available.

Table 3.17-4. Invasive Plants within the Proposed Corridors

Symbol	Common Name	Scientific Name	County	Alt. B # Populations	Alt. B Total Acres	Alt. C # Populations	Alt. C Total Acres	Alt. D # Populations	Alt. D Total Acres
ACRE3	Hardheads	*Acroptilon repens*	Big Horn, Johnson	1	< 1	0	0	3	9
ARMI2	Lesser burdock	*Arctium minus*	Johnson	1	< 1	0	0	1	< 1
BRTE	Cheatgrass	*Bromus tectorum*	Fremont, Natrona	97	68	65	8	96	21
CADR	Whitetop	*Cardaria draba*	Hot Springs, Park	12	4	1	< 1	13	4
CANU4	Nodding plumeless thistle	*Carduus nutans*	Fremont, Johnson, Sublette	8	< 1	6	< 1	8	< 1
CIAR4	Canada thistle	*Cirsium arvense*	Fremont, Johnson, Sublette, Natrona	13	29	1	< 1	13	48
CIVU	Bull thistle	*Cirsium vulgare*	Johnson	6	2	0	0	6	2
COAR4	Field bindweed	*Convolvulus arvensis*	Johnson	4	< 1	0	0	4	< 1
ELAN	Russian olive	*Elaeagnus angustifolia*	Big Horn	1	< 1	0	0	1	< 1
EUES	Leafy spurge	*Euphorbia esula*	Johnson	3	11	0	0	3	14
HAGL	Saltlover	*Halogeton glomeratus*	Fremont	28	11	9	< 1	28	11
HYNI	Black henbane	*Hyoscyamus niger*	Sublette	5	< 1	5	< 1	5	< 1
ONAC	Scotch cottonthistle	*Onopordum acanthium*	Fremont, Johnson, Natrona	10	47	0	0	11	46
RUCR	Curly dock	*Rumex crispus*	Johnson	2	< 1	0	0	2	< 1
SAKA	Russian thistle	*Salsola kali*	Fremont	3	< 1	0	0	3	< 1
SATR12	Prickly Russian thistle	*Salsola tragus*	Fremont, Natrona	48	12	36	5	48	12
SORO	Buffalobur nightshade	*Solanum rostratum*	Johnson	2	< 1	0	0	2	< 1
TARA	Saltcedar	*Tamarix ramosissima*	Johnson	2	33	0	0	2	33
XANTH2	Cocklebur	*Xanthium*	Johnson	1	< 1	0	0	3	8

Source: BLM (2020b).

Table 3.17-5. Threatened and Endangered Plant Species and Their Potentially Suitable Habitat (acres)

Common Name	Scientific Name	Status	Alternative B		Alternative C		Alternative D	
			Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer
Ute ladies-tresses	*Spiranthes diluvialis*	Threatened	0	0	0	0	0	0
Blowout penstemon	*Penstemon haydenii*	Endangered	1,820	44,097	755	26,387	755	26,801
Whitebark pine	*Pinus albicaulis*	Candidate	32	3,428	6	388	32	2,362
Desert yellowhead	*Yermo xanthocephalus*	Threatened	0	29,703	0	0	0	29,716
Desert yellowhead critical habitat			0	357	0	0	0	357

Sources: USFWS (2020a); WYNDD (2020).
Note: assumes +/- 1% error in acreage totals due to rounding.

Table 3.17-6. Bureau of Land Management Sensitive Plant Species and Their Potentially Suitable Habitat (acres)

Common Name	Scientific Name	Alternative B		Alternative C		Alternative D	
		Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer
Porter's sagebrush, wormwood	*Artemisia porter*	6,647	268,457	233	13,150	6,180	246,982
Meadow milkvetch	*Astragalus diversifolius*	2,092	89,213	2	1,880	2,046	89,162
Trelease's milkvetch	*Astragalus racemosus var. treleasei*	116	10,143	9	858	115	9,540
Cedar Rim thistle	*Cirsium aridum*	5,372	232,997	570	33,874	4,685	206,785
Ownbey's thistle	*Cirsium ownbeyi*	152	9,000	0	0	152	9,000
Owl Creek miner's candle	*Cryptantha subcapitata*	0	0	0	0	0	0
Evert's wafer-parsnip	*Cymopterus evertii*	3,988	175,793	337	17,060	3,823	168,176
Large-fruited bladderpod	*Lesquerella macrocarpa*	2,293	97,521	0	0	1,253	44,924
Beaver Rim phlox	*Phlox pungens*	2,412	125,027	790	45,630	2,252	117,192
Rocky Mountain (Fremont County) twinpod	*Physaria saximontana var. saximontana*	120	7,840	54	4,019	148	8,227
Limber pine	*Pinus flexilis*	892	53,469	23	1,872	967	50,424
Persistent sepal yellowcress	*Rorippa calycina*	11,150	433,820	1,668	73,323	11,079	433,644
Shoshonea	*Shoshonea pulvinata*	32	2,705	8	440	30	2,280
Green River (low) greenthread	*Thelesperma caespitosum*	1,257	58,511	0	0	1,471	72,726

Sources: BLM (2010c); WYNDD (2020).
Note: assumes +/- 1% error in acreage totals due to rounding.

3.17.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or reservation in existing corridors would not result in any irretrievable and irreversible vegetation impacts. Future potential development within the corridors would result in vegetation maintenance in a native, herbaceous state to facilitate routine maintenance. Within each corridor, there would be a long-term reduction in shrub and tree cover for ROW maintenance (10-foot-wide for each ROW). Wyoming big sagebrush and other sagebrush shrubs can take 35 to 120 years to re-establish in a disturbed ROW through natural propagation (Baker 2006). Ongoing weed control is likely to be needed for weed populations that become established within and near the proposed corridors. Short-term use resulting in decreases in vegetation cover types through removal or through weed proliferation could affect short-term ecological function and use of the area for livestock and wildlife grazing but is not expected to result in changes to the long-term productivity of the area for these uses.

3.18 VISUAL RESOURCES

Visual resources refer to all objects (human-made and natural, moving and stationary) and features (e.g., landforms and water bodies) that are visible on a given landscape. These resources may add to or may detract from the overall scenic quality of the landscape. A visual impact is the creation of an intrusion or perceptible contrast that affects the scenic quality of a landscape. A visual impact can be perceived by an individual or group as either positive or negative, depending on a variety of factors or conditions (e.g., personal experience, time of day, and weather/seasonal conditions).

3.18.1 Issues to be Analyzed and Impact Indicators

This section addresses potential impacts to visual resources; as this analysis is programmatic in nature and future project-level NEPA would be conducted for site-specific projects, the analysis focuses on what the designation of the corridors and plan amendments would mean for management of visual resources. This analysis does not analyze construction and operation activities associated with potential projects, such as how generation of dust, visual intrusions from construction activities, vegetation clearing, and vehicle and equipment use may affect viewsheds and sensitive viewing locations. The focus of this analysis is to identify and disclose potential conflicts with visual resource management (VRM) objectives.

Internal and public scoping identified the following visual resource topics for analysis:

- How would construction activity and the long-term presence of the proposed corridors affect the analysis area's viewshed and sensitive viewing locations?

Indicators of impacts to visual resources are as follows:

- Sensitive viewing locations within 0.5 mile of proposed corridors
- Acreage of VRM within 2.5 mile of the proposed corridors (total of 5 miles) and contrast of the current VRM class objectives as prescribed by the RMPs.

3.18.2 Affected Environment

3.18.2.1 Landscape Character

Although much of the region that would be traversed by the corridors are sparsely populated, human influences have altered much of the visual landscape, especially with respect to land use. In some places, intensive human activities such as transportation corridors, mineral extraction, and energy development have degraded visual qualities; these types of scenarios are requisitely managed by the BLM to allow

these activities and, in some cases, mitigate potential impacts to landscape character. Conversely, human influence on large swaths of undisturbed lands, where natural processes dominate, is seemingly sparse. In these scenarios, the BLM may manage the landscape to prohibit or minimize these activities.

Visual resources in the proposed corridors vary widely, from mountains and foothills in the southwestern portion to low rolling prairie in the central and eastern portions. All four classifications (Classes I, II, III, and IV; see Section 3.18.2.2) are represented in the analysis area, across the nine different RMP planning areas.

The RMPs for the affected BLM jurisdictions provide detailed descriptions of the local field office landscape character descriptions.

3.18.2.2 Regulatory Setting

Scenic values are identified in FLPMA as one of the array of resources that the BLM must manage and protect. In addition to the BLM, a variety of federal, state, and local land management agencies manage lands in the analysis area, including the USFS, USFWS, BOR, NPS, various state agencies that regulate uses on state lands, and local and county governments. These entities guide visual resources under their guiding authority. Visual resources for all BLM-administered public land in Wyoming are managed in accordance with the approved RMP or management framework plan for each BLM field office. Each RMP/ management framework plan provides goals, objectives, and management actions to guide visual resource management of BLM-administered land resources within the field office. BLM RMPs that are pertinent to the project are listed in Chapter 1.

To meet its responsibility to maintain the scenic values of public lands, the BLM has developed a VRM system based on the concept that every landscape has the basic environmental design elements of form, line, color, and texture. Projects that repeat natural environmental design elements are generally considered to be in harmony with their surroundings and result in less impact to visual resources; those that do not repeat natural environmental design elements create contrast and result in greater impacts to visual resources. The VRM system provides an orderly method for observing the scenic qualities of public lands, classifying existing visual resources and determining appropriate management actions.

BLM field offices conducted their Visual Resource Inventory (VRI) in 2008 through 2011. The VRI classes represent the inventoried scenic value of lands administered by the BLM that have comparable objective definitions as BLM VRM classes, with Classes I and II having the highest scenic value, followed by Class III and Class IV. VRI classes do not represent BLM management direction for visual resources but instead represent existing scenic values.

The VRI is composed of three factors:

- Scenic Quality Rating Units. Rating units divide the landscape within the planning area into discrete units of similar natural character based on the physical design elements of form, line, color, and texture.
- Sensitivity Level Rating Units. Sensitivity levels (high, moderate, low) measure public concern for scenic value. Determinations include identification of visually sensitive publics (i.e., TCPs), landscape features of concern, and any other corresponding scenic values identified or documented by the public. Visual sensitivity reflects attitudes and perceptions held by people regarding the landscape and in general reflect the public's level of sensitivity for visual change to the landscape.
- Delineation of Distance Zones. Distance zones (foreground/middleground, background, seldom seen) assist in defining areas that are visible from nearby access areas from landscapes that appear farther away. The VRI process includes identifying places where the public is most likely to view public lands.

VRI Class I includes the most highly valued visual landscapes while VRI Class IV are the least valued. In each RMP, BLM-administered lands are assigned to management classes (VRM Classes I–IV) with established objectives.

3.18.3 Methods of Analysis

This analysis assumes that visual impact levels would be proportional to the number of visually sensitive features that would be near proposed corridors or intersected by them. In most cases, visually sensitive features that would fall within or be located close to a designated corridor would more likely be affected by future proposed project developments than those sensitive features farther away from a corridor; however, it should be recognized that a visual impact assessment is highly site and project specific, and actual future projects and their locations are not known at this time. These site-specific reviews would include NEPA and the visual contrast rating process to ascertain site- and project-specific impacts. As potential projects are proposed, disclosures of findings for cultural and historical contexts of landscape would be made in accordance with BLM's Visual Resource Contrast Rating system, as outlined in BLM Manual 8431 (BLM 1986). The level of contrast for proposed projects would be evaluated to determine the degree to which proposed projects would affect the intrinsic visual character and in turn the scenic quality of a landscape based on the level of contrast created between the specific proposed project and the existing landscape. Potential projects would be evaluated on a case-by-case basis by the BLM, which may include a viewshed analysis, identification of key observation point, site photographs, simulations, and tiered NEPA-analysis.

Spatial analysis was performed to evaluate the likelihood for impacts as well as to disclose potential incompatibilities with VRI and VRM objectives. The distance for foreground/middleground under the BLM's landscape characterization of distance zones is less than 3 to 5 miles away. This is the area that can be seen from travel routes (roads, railroads, rivers) for a distance of 3 to 5 miles where proposed corridor activities might be viewed in detail. The outer boundary of this distance zone is defined as the point where the texture and form of individual plants are no longer apparent in the landscape.

The analysis area for visual resources is a 5-mile buffer surrounding the proposed corridors (2.5 miles on each side).

This distance represents a reasonable distance a viewer in the foreground/middleground could discern the proposed corridors; beyond 5 miles (i.e., background and seldom seen), a viewer could not discern the corridors because of a variety of factors, including, but not limited to, variations in topography, haze, and human-sight limitations. The 5-mile buffer captures areas more visible to the public, where changes are more noticeable and are more likely to trigger public concern.

3.18.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. Because Alternative A does not designate corridors, if potential projects are authorized and development occurs under this alternative, it is likely to result in less colocation of proposed projects than under Alternative B, assuming that the same amount of development occurred under both alternatives. The lack of concentrated impacts that result from colocation would be expected to result in a lower overall level of impacts along individual corridors, but because there would be no sharing of ROWs, roads, and other facilities between projects, Alternative A would likely result in a higher number of impacts, spread out over a larger area.

As future proposed project/ROW applications and the specific routes would be evaluated on a case-by-case basis, and existing infrastructure corridors designated in existing BLM RMPs would be in conformance with VRM class objectives, impacts to visual resources would be managed by the BLM as they are today.

3.18.5 Environmental Effects – Common to All Action Alternatives

Designation of the proposed corridors and land use plan amendments alone are not expected to impact visual resources. Under the action alternatives, if proposed projects are authorized and project development occurs, visual impacts at sensitive view locations may occur on federal and nonfederal lands both within and within sight of the proposed corridors and future construction therein. The magnitude and extent of impacts would depend on the type of project authorized, its location, its total length, and a variety of site-specific factors that are not known at this time but would be addressed by NEPA reviews at the project-specific level. Landscapes that are intersected by the proposed corridors and the scenery they possess could be affected through the construction, operation, and maintenance of future proposed projects, including the modification of the landscapes' inherent character. NHT (whose designations sometimes pertain to visual resources), s sensitive viewing resource, would be intersected by the proposed corridors. Application of the visual resource mitigation measures and BMPs as provided in the nine RMPs would further reduce the potential impacts of proposed projects (see Appendix E). Additionally, application of other BLM resource mitigation measures and BMPs (i.e., vegetation, soils), as well as the State of Wyoming's construction and installation BMPs (see Appendix D) would further reduce visual resources impact of proposed projects.

3.18.6 Environmental Effects – Alternative B (Proposed Action)

Table 3.18-1 displays the acreage of VRM classes within the analysis area for Alternative B. If micrositing would not shift the corridor's footprint (300 feet wide for the trunk, 200 feet wide for the lateral) outside of Class I or II lands, additional alternative selection would likely be required and BMPs would need to be developed to meet those objectives. Alternatively, the BLM may choose to amend a given RMP to reclassify lands.

Table 3.18-1. Alternative B Visual Resource Management Classification

VRM Classification	Acres
Class I	450,822
Class II	3,152,302
Class III	4,746,028
Class IV	8,014,307

3.18.7 Environmental Effects – Alternative C

Table 3.18-2 displays the acreage of VRM classes within the analysis area for Alternative C.

Table 3.18-2. Alternative C Visual Resource Management Classification

VRM Classification	Acres
Class I	137,840
Class II	3,040,372
Class III	3,405,264
Class IV	7,103,657

3.18.8 Environmental Effects – Alternative D

Table 3.18-3 displays the acreage of VRM classes within the analysis area for Alternative D.

Table 3.18-3. Alternative D Visual Resource Management Classification

VRM Classification	Acres
Class I	388,779
Class II	3,624,576
Class III	4,746,028
Class IV	8,014,307

3.18.9 Summary of Effects

Overall, Alternative B would have the most Class I lands intersected, followed by Alternative D, then Alternative C. Alternative B, which is the longest of the alternatives (1,956 miles) would result in the greatest impact to Class I VRM lands. Alternative C, the shortest of the alternatives (242 miles) would result in the least impacts to VRM Class I lands.

3.18.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

Corridor designation and land use plan amendments are not expected to adversely impact visual resources. Future potential development of the corridors would result in unavoidable adverse impacts to visual resources. This includes viewshed impacts during construction (such as fugitive dust and the presence of construction equipment and crews) and operation (visible infrastructure and long-term vegetation changes), both of which would be irretrievable until the activity and infrastructure is removed and successful revegetation occurs. The short-term use of the proposed corridors would not result in impacts to long-term sustainability of visual resources.

3.19 WATER

This section addresses, discusses, and quantifies, where applicable, the potential direct and indirect impacts to surface water resources, groundwater resources, wetlands, and specially designated water resources like wild and scenic rivers from activities associated with the WPCI. Direct impacts include those impacts resulting from the designation of proposed corridors. Indirect impacts include those impacts associated with the development of potential projects, such as during pipeline construction and operation activities.

3.19.1 Issues to be Analyzed and Impact Indicators

This section addresses, discusses, and quantifies, where applicable, the potential direct and indirect impacts to surface water resources, groundwater resources, wetlands, and specially designated water resources like wild and scenic rivers from activities associated with the WPCI. Internal and public scoping comments detailed in the scoping summary report (BLM 2020d) identified the following water resource issues for analysis:

- Would construction of future projects in the proposed corridors lead to increases in erosion and resultant sedimentation with the potential to affect water quality? What are the local area and downstream impacts of potential increases in salinity, including in the Colorado River Basin?

- Would construction activities associated with future projects (including hydrostatic testing) increase the risk of surface water or groundwater (including seeps and springs) contamination from chemicals and other hazardous materials?
- Would water-consumptive activities associated with future projects affect the availability and quality of water resources, including streams, groundwater wells, springs, and seeps? What would the water quality and/or quantity impacts be from hydrostatic testing and other water-consumptive activities?
- Would future projects result in the net loss of wetland areas?
- Would future projects lead to alteration of stream channels and drainage flows and, ultimately, stream classification, groundwater recharge rates, and surface runoff rates?
- Do the proposed corridors overlap with eligible or designated wild and scenic rivers, and, if so, would it affect the classification or alter the eligibility of this resource?

Indicators of impacts to water resources are as follows:

- Acres of potential surface disturbance; acres of wetland and acres of highly erodible soil adjacent to water features within the proposed corridors
- River miles of eligible or designated wild and scenic rivers within the proposed corridors. Number and type of water features intersecting proposed corridors; current water quality impairments; number and type of seeps and springs intersecting proposed corridors; and number and type of shallow, unconfined groundwater sources (depths less than 20 feet) intersecting the proposed corridors
- Qualitative discussion on the effects of water consumptive activities; the potential for water contamination; and the potential for alteration of stream flow and groundwater recharge rates in absence of quantifiable metrics

3.19.2 Affected Environment

The analysis area for potential effects to water resources consists of the area encompassing the 360 individual USGS-defined 12-digit hydrologic unit code (HUC) subwatersheds intersected by the proposed corridors. This analysis area is appropriate as it encompasses a reasonable downstream extent to consider secondary effects to water quality and quantity that could result from the proposed corridors and the indirect impacts of potential surface and subsurface disturbance from potential projects within the proposed corridors.

The water resources analysis area falls within the Missouri River and Upper Colorado River HUC-2 water regions. Streams and rivers, lakes, reservoirs, seeps, springs, wetlands, and groundwater sources within the analysis area would be the focus of the water resources section of the EIS. Resource reports prepared by the applicant were used as the basis for this inventory and updated and supplemented with BLM and secondary-source GIS spatial data. Soils and fisheries are related resources discussed in more detail in Sections 3.5 and 3.21, respectively.

Water resources are managed according to the management goals and objectives from the National BLM Water Resource Program Strategy (BLM 2015d) in combination with local RMPs. The BLM manages water resources to maintain or improve surface water and groundwater resources, to provide for the physical and legal availability of water to facilitate authorized uses on public lands, and to bring all watersheds to their full potential conditions (BLM 2015d).

3.19.2.1 Surface Water

Precipitation is the source of most water in the state, and perennial streams are primarily fed by seasonal weather phenomena, including snowmelt and rainfall runoff (WWC Engineering 2007). Section 404 of the Clean Water Act (CWA) regulates the discharge of dredge or fill material into waters of the U.S. (WOTUS), which can include "rivers, creeks, streams, arroyos, lakes, and their associated special aquatic sites" (such as wetlands) (U.S. Army Corps of Engineers [USACE] 1987). These WOTUS are administered by the USACE in conjunction with the EPA. Section 401 of the CWA establishes water quality criteria and is administered by the WDEQ. The use of surface water in Wyoming is administered by the Wyoming State Engineer's Office in accordance with Title 41 of the Wyoming Statutes.

3.19.2.2 Groundwater

Groundwater is stored in aquifers below the earth's surface and is a result of rainfall, snowmelt, and streamflow infiltrating into geologic material (WWC Engineering 2007). Groundwater that occurs in shallow, unconsolidated alluvial aquifers is important in supporting perennial streams, springs, and seeps, which occur where groundwater discharges to the ground surface. Groundwater is an important water resource in the arid West and is used in a multitude of capacities, including as a source of drinking water, in industrial processes, and for agriculture and livestock (WSGS 2020d).

Groundwater use is also administered by the Wyoming State Engineer's Office in accordance with Title 41 of the Wyoming Statutes.

3.19.2.3 Wetlands

Wetlands are defined by the presence of hydrology showing regular inundation, or "wetness"; a predominance of hydrophytic (water-loving) vegetation; and soils characteristic of saturation (i.e., hydric soils). Wetland areas comprise a small percentage of land in the West, but their presence is critically important to the surrounding ecosystems because many species depend on wetlands for habitat, forage, and water (WYGFD and Ducks Unlimited, Inc.2018). Under the jurisdiction of the CWA, wetlands with surface connectivity to navigable water are under the administration of the USACE, similar to other surface water features discussed above. Additionally, the BLM manages wetlands in accordance with the BLM Manual Technical Reference 1737-6; *Riparian Area Management: Management Techniques in Riparian Areas* (BLM 1992). The WYGFD guides statewide conservation efforts of wetlands and riparian corridors through the Wyoming Wetlands Conservation Strategy (Wyoming Joint Ventures Steering Committee 2010).

3.19.2.4 Wild and Scenic Rivers

No wild and scenic rivers segments eligible or designated under the Wild and Scenic River Act of 1968 intersect the proposed corridors, and for this reason, there is no further analysis for impacts to wild and scenic rivers in this EIS.

3.19.3 Methods of Analysis

The methodology for analysis of impacts to water resources consists of the following steps:

- Qualitatively discuss the potential and known impacts of corridor designation, and more specifically, construction and operation activities related to potential projects.
- Reference potential impacts or conflicts with other resource areas to the appropriate EIS section (e.g., aquatic resources [i.e., fisheries], soils).

- Differentiate and, where applicable, quantify the water resources affected by the proposed corridors and potential projects. Quantification has been completed using indicators that are not necessarily a direct measurement of the impact itself but can be used to understand the intensity of the potential impact in context with the baseline condition.

Assumptions for the analysis of impacts to water resources are as follows:

- The proposed corridors would adhere to all BMPs as listed in Appendix E (as well as the BLM RMPs.
- Erosion potential from potential projects' surface-disturbing activities and the resultant effects to water quality were only considered an impact to water resources when a soil type classified as highly erodible by water was adjacent to (e.g., within 500 feet) an NHD-defined waterway or NWI waterbody and within the proposed corridors. Adjacency to water features were defined per the consensus in affiliated RMPs that surface-disturbing activities should be avoided within 500 feet of surface water and/or riparian areas.

3.19.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved. Under Alternative A, impacts to water resources would remain unchanged. Linear development projects would continue to be assessed on a case-by-case basis and impacts to water resources would follow existing conditions and trends.

3.19.5 Environmental Effects – Common to All Action Alternatives

3.19.5.1 Surface and Groundwater

Impacts to water quality would only occur as individual potential projects are brought forward for siting in the proposed corridors. These impacts would occur from surface disturbance increasing erosion rates and the resultant sedimentation, turbidity, and salinity in streams during the construction and operation phases of potential projects. During the construction of pipelines and associated infrastructure (i.e., access roads, laydown yards), and until reclamation occurs, surface disturbance would remove vegetation and could exacerbate erosion in susceptible areas. Water quality concerns arise in instances of soil erosion adjacent to water resources due to the potential for soil to transport to streams causing increases in sedimentation, turbidity, and salinity. Sedimentation in water involves the deposition of PM and can decrease water quality by increasing suspended sediment and turbidity (clarity of a liquid) with the potential to affect light penetration and general ecological productivity (Castro and Reckendort 1995). Suspended sediment also has the potential to transmit absorbed pesticides and nutrients into water systems; this can lead to an upset of chemical balance and aquatic habitat for preferred species. See Section 3.21 for a discussion on the impacts to aquatic resources such as fisheries. Salinity is a measure of dissolved solids in water, and increases in salinity can further degrade water quality with associated economic costs (Miller et al. 2017). This is especially important in the Colorado River Basin, where salinity control is an ongoing concern.

Impacts to water quality from erosion are quantitatively analyzed here by determining the area of highly erodible soils within proposed corridors that also occur adjacent to a water resource within each HUC-12 subwatershed. If disturbed, these areas have the greatest potential to affect water quality.

Surface runoff may increase temporarily from ground disturbance during the construction of potential projects. Disturbance decreases vegetative cover, compaction from equipment decreases infiltration rates, and both increase the amount of runoff and erosion with potential to affect water quality. Further

discussion on soil compaction is included in Section 3.5.5.2. Stormwater measures minimize these effects, and reclamation of these areas after construction returns the runoff rate to the baseline condition. Successful bank reconstruction and revegetation associated with reclamation can take anywhere from a growing season to a few years to establish itself depending on factors including the appropriate application of stabilization measures and the establishment of native vegetation. Timeframes for reclamation can only be understood at the potential project level.

Impacts associated with erosion and the resultant sedimentation, turbidity, and salinity would be minimized through compliance with the design features set forth in Appendix E. Erosion control design features such as slope and trench breakers, sediment barriers, and mulching would minimize erosion by directing runoff away from disturbed areas, decreasing velocities, and improving water infiltration. Additionally, surface disturbance would be limited to project-specific approved areas, and a project-specific stormwater pollution prevention plan would be required. Reclamation of disturbed land after construction would stabilize disturbed areas and reestablish vegetation to achieve the long-term goal of reducing impacts associated with erosion. Complying with standard operating procedures described in the upland erosion control, revegetation, and maintenance plan; wetland and waterbody construction and mitigation plan; and the restoration and revegetation plan in Appendix D would minimize the impacts from erosion described above.

Designation of proposed corridors would lead to surface- and subsurface-disturbing activities during future potential projects, including alterations of stream channels for the establishment of pipeline crossings.

Channel crossings for pipelines are generally designed and constructed in one of two ways: an open-cut trench or a bore under the waterway. Regardless of the method, additional temporary workspace is required near the crossing to allow for material storage and equipment staging because these operations cannot be done within the crossing. Open-cut trenches pose the greatest risk to the physical bed and bank because the trench is physically excavated for pipe installation and then replaced. Open-cut trenches are limited to the area required for the trench itself plus an additional area to operate the excavation equipment. There are multiple ways to limit streamflow at the excavation, and the most common is to complete the crossing during low-flow periods. Standard practice is to use the materials removed to replace the bed and bank, to initiate immediate reclamation, and to engineer necessary stabilization measures. This method is often used for the majority of water crossings, especially in smaller streams. By boring under the waterway for pipe installation, direct disturbance to the stream is usually avoided. But this method has the unique potential for the borehole to rupture during the process, releasing the drilling mud to the stream, thus affecting downstream water quality. Standard practices for bores include initial geotechnical investigations that determine if a waterway's underlying materials would allow a bore without rupture. These crossings would each be completed in a relatively short time frame (days to weeks) and would occur at very site-specific locations. Crossings would be monitored as the reclamation process progressed and into the operation of potential projects. The intensity of disturbance and success in bank reconstruction and revegetation are related to the likelihood of stream alteration. However, the intensity of disturbance and outcomes of reclamation for potential projects are not known at this time. Because of the short-term time frame of a direct disturbance and its site-specific nature, stream crossings would not be anticipated to lead to stream alterations or changes to stream classifications unless disturbance intensity was high and reclamation attempts were unsuccessful.

Groundwater recharge from in-channel areas could be affected by surface water withdrawals and associated reduced stream flows during construction of potential projects. However, the amount and sources of water for potential projects are not known at this time. See the discussion on stream crossings and potential for hydrological alterations.

Impacts associated with the alteration of hydrological flow are expected to be minimal with compliance of design features set forth in Appendix E. Waterbody crossings would be conducted consistent with Federal Energy Regulatory Commission (FERC) Wetland and Waterbody Construction and Mitigation Procedures current at the time of construction. Complying with the standard operating procedures described in the Wetland and Waterbody Construction and Mitigation Plan (see Appendix D) would further lessen impacts associated with the construction of waterbody crossings.

Risks to stream channels and drainage flows are quantified by the number of crossings and intersections of pipeline corridors for the proposed corridors with perennial and intermittent streams. The risk of changes to groundwater recharge rates is indicated by an area of shallow, unconfined groundwater sources (alluvial aquifers) within the proposed corridors.

Impacts to water quality due to the accidental release of hazardous materials into water resources could occur from potential projects during the construction and operation phases by means of leaks and spills that occur near, or with the potential to be transported to, a waterway or vulnerable aquifer.

Construction and operation activities such as refueling and maintaining equipment create the potential for spills that result in water resource contamination. Appendix E contains design features that would minimize this risk, such as installing lined, secondary containment around liquid materials in handling and storage areas; parking and fueling equipment, and storing hazardous materials at least 500 feet from water supply wells, springs, waterways, or wetlands, where practicable (or establishing other secondary precautions where not practicable). In the event that spills occur during future projects, the Waste and Spill Management Specifications document (see Appendix D) defines spill preparedness and response measures, such as storage of adequate amounts of absorbent materials and containment booms near areas of construction and operation, that would decrease the extent of effects. The indicator used to identify the risk to water quality due to the accidental release of hazardous materials into water resources is the number of waterway crossings by the proposed corridors and the number of wells, springs, and seeps within the proposed corridors. Additionally, areas within the proposed corridors with shallow groundwater have been defined. The proposed corridors cross no sole source aquifers (as defined by EPA 2017).

Potential projects in the proposed corridors would also require the hydrostatic testing of new pipelines. This testing also requires the release of the hydrostatic test water at the conclusion of testing. Complying with standard operating procedures described in the Hydrostatic Testing and Discharge Plan (see Appendix D) would guide the release of hydrostatic test waters to avoid impacts to surface or groundwater resources, including using clean water for testing, discharging to upland areas using discharge dissipation devises, and testing discharge water to check for contaminants.

Water would be required for potential project use as hydrostatic testing fluid and during construction of the pipeline for dust abatement, trench dewatering, and horizontal directional drilling. The use of water within the state of Wyoming is authorized by the Wyoming State Engineer's Office in accordance with Title 41 of the Wyoming Statutes according to the prior appropriation doctrine (first in time, first in right), including a policy that requires new water uses to occur without injury to senior water users. Impacts to water quality and availability from water withdrawals would be temporary and would occur during the construction and operation phases of potential projects by means of depletions of streams, shallow groundwater sources, and other waterbodies with associated effects on downstream users and local and downstream wildlife. See Section 3.21 for a discussion of the impacts of water withdrawals on aquatic resources.

The amount of water needed and the sources of that water are not known at this time. Water withdrawals would require analysis at the project-specific level. However, design features included in Appendix E would minimize impacts by requiring that water withdrawals are acquired and discharged in accordance with the rules, regulations and best practices applicable to the type of pipeline being installed.

3.19.5.2 Wetlands

Designation of proposed corridors and construction of potential projects would lead to surface- and subsurface-disturbing activities during ROW clearing, trenching, pipe installation, and water body crossings, among others. These activities could occur within aquatic habitats such as wetlands, impacting these resources through the temporary removal of riparian vegetation and/or the placement of fill materials.

Impacts associated with the net loss of wetlands are expected to be minimal with compliance of design features (see Appendix E). Complying with the standard operating procedures described in the wetland and waterbody construction and mitigation plan and the biological resources conservation measure plan (see Appendix D) would avoid or minimize impacts associated with surface and subsurface activities near wetlands. Any disturbance within wetlands would require compliance with FERC's wetland and waterbody construction and mitigation plan (see Appendix D), which includes compliance with CWA Section 404 permitting requirements via a permit with the USACE. During construction of potential projects, environmental inspectors would be responsible for verifying the location of signs and highly visible flagging that marks the boundaries of sensitive resource areas, including wetlands.

The potential for impacts to wetlands is quantified by determining acres of wetlands that would be within the proposed corridors.

3.19.6 Summary of Effects

3.19.6.1 Surface and Ground Water

Of the proposed corridors, Alternatives B and D would have the greatest potential for impacts from erosion because they have similar acreages of highly erodible soils adjacent to water resources within the proposed corridors (Table 3.19-1). Alternative C has a lesser potential for erosion and resultant diminutions of water quality due to sedimentation, turbidity, and salinity as acres of highly erodible soils are approximately one-tenth of the impacts associated with Alternatives B and D (Table 3.19-1).

Generally, surface disturbance in subwatersheds would be highest under Alternative B which has the most areas designated as proposed corridors across 360 HUC-12 subwatersheds. Alternative D would have similar impacts to Alternative B with a very similar but slightly smaller area designated as proposed corridors across 342 HUC-12 subwatersheds. Alternative C would have the least area of proposed corridors designated across 69 HUC-12 subwatersheds.

Alternatives B and D have similar levels of impact indicators related to the risk of channel alteration from surface and sub-surface disturbing activities and contamination from the accidental release of hazardous materials, respectively, with more than 1,000 streams crossed by proposed corridors (see Table 3.19-1). Alternative C has much less at more than 200 (see Table 3.19-1). However, any potential projects would likely be sited in the existing corridors that have previously been designated as well as the proposed corridors analyzed here; therefore, impacts from potential projects under Alternative C would be very similar to the other alternatives.

Adherence to existing regulations would minimize impacts from water withdrawals for potential project use. A robust understanding of impacts associated with water-consumptive activities can only happen at the project level; therefore, this discussion of impact differences between proposed corridors is limited.

Table 3.19-1. Surface and Groundwater Impact Indicators by Alternative

Impact Indicator	Alternative B	Alternative C	Alternative D
Acres within proposed corridors	57,412	7,257	55,440
Acres of highly erodible soils adjacent to water resources within proposed corridors	320	34	321
Number of perennial streams crossed by proposed corridors	107	25	121
Number of intermittent streams crossed by proposed corridors	1,025	231	1,021
Number of seeps/springs within proposed corridors	1	0	1
Number of groundwater wells within proposed corridors	69	16	117
Number of streams with impairment within proposed corridors	1	1	1
Miles of depth to initial groundwater of less than 20 feet	153	33	190

3.19.6.2 Wetlands

Alternative D would have the greatest area of wetlands within new corridors across 317 HUC-12 subwatersheds (Table 3.19-2). However, Alternative B has the greatest number of subwatersheds with wetlands inside new corridors (wetlands across 333 subwatersheds) and with a similar area of wetlands (see Table 3.19-2). Alternative C has the smallest area of wetlands within new corridors across 58 HUC-12 subwatersheds (see Table 3.19-2).

Differences between the number of subwatersheds impacted is especially relevant when considering disturbances to wetlands because wetlands serve critical functions in their watersheds as filters and habitat that ultimately improve water quality with associated secondary downstream effects. Because Alternatives B and D are similar in their potentials for subwatersheds crossed and net wetlands lost, their potential impacts are similar.

Table 3.19-2. Wetlands Impact Indicators by Alternative

Impact Indicator	Alternative B	Alternative C	Alternative D
Acres of wetlands within proposed corridors	843	181	967
Number of water bodies crossed by proposed corridors	27	4	27

3.19.7 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

Corridor designation and land use plan amendments are not expected to adversely impact water resources. Potential project development of the proposed corridors may include some instances where adverse impacts from erosion are unavoidable, such as weather events that exceed the design capacity and overcome designated erosion control barriers. Even with the deployment of design features intended to lessen impacts of erosion, some destabilization of soils is anticipated. Environmental monitoring would detect these events when they occur and would require that corrective measures be taken to avoid ongoing impacts, limiting irretrievable temporary reduction in water quality to short-term durations in time (hours or days). While the risk of accidental releases of hazardous materials would not be completely mitigated, design features would make it unlikely that surface water, groundwater, or wetlands would be impacted. Associated impacts from contamination would likely be long term, though not irreversible. Impacts from water withdrawals would have short-term effects so long as critical thresholds of baseflow are not

superseded, and for this reason, these impacts are not considered irreversible. Irreversible effects are not anticipated since environmental measures, including reclamation, would mitigate potential long-term effects on water resources. While the amount of water-consumptive activities cannot be fully quantified or mitigated, water use would be temporary, ending after construction of the potential project. In summary, while impacts could affect short-term disturbances to water resources, impacts would not affect the long-term sustainability of water resources.

3.20 WILD HORSES

3.20.1 Issues to be Analyzed and Impact Indicators

This section describes the potential impacts from the alternatives on wild horses. Internal and public scoping identified the following issues for analysis for wild horses:

- Would wild horses be affected by fragmentation, reduced access to water, open trenches, and vehicle traffic during construction?
- Would wild horse grazing affect revegetation efforts within corridors?

Impact indicators for measuring potential impacts to wild horses are as follows:

- Acres of potential disturbance within wild horse herd management areas (HMAs)

3.20.2 Affected Environment

The BLM manages the population growth of wild horse and burro herds under its Wild Horse and Burro Program. The BLM uses fertility measures (e.g., birth control), periodic removal of excess individuals, and sales of animals to private care to maintain certain population levels for specific areas. The BLM has designated HMAs across 10 western states as part of its program. To promote healthy conditions on the range, the BLM determines what are called appropriate management levels (AMLs) for each HMA. An AML is the number of wild horses and burros that can live in an HMA and still be in balance with other public land resources and uses (BLM 2020e). The AML is a range of low to maximum levels that allows for population growth over a certain time period without causing rangeland damage. Wild horses and burros that exceed the AML are to be removed from the HMA. However, as of March 2019, wild horse and burro populations exceeded total AMLs by over 61,000 individuals across the West (BLM 2019d).

In Wyoming, the BLM manages 16 HMAs for wild horses (no burros are managed in Wyoming). The 16 HMAs cover approximately 3,644,379 acres across federal, state, local, and private lands. The combined AMLs for all of the HMAs in Wyoming is 3,725 animals (BLM 2020f). The March 2019 population estimate of wild horses in Wyoming HMAs is 7,836, which is more than double the AMLs for the state (BLM 2019d).

3.20.3 Methods of Analysis

Potential impacts to wild horses are analyzed by comparing the amount of potential disturbance of each alternative within HMAs. The area of analysis for wild horses is a 1-mile buffer around all proposed surface disturbance for each alternative. This area of analysis was selected because 1 mile is the general line-of-sight distance for horses to see or hear any project activity.

3.20.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved, and impacts to wild horses would remain unchanged. Potential projects would continue to be assessed on a case-by-case basis and impacts to wild horses would follow existing conditions and trends.

Under Alternative A, wild horse impacts to revegetation efforts for reclamation would remain unchanged. Potential projects would continue to be assessed on a case-by-case basis and impacts to revegetation would follow current conditions and trends.

3.20.5 Environmental Effects – Common to All Action Alternatives

All three action alternatives cross multiple HMAs and would affect wild horses via noise and increased human activity during pipeline construction and maintenance activities. Construction and maintenance of the pipeline would temporarily displace wild horses to other areas for the duration of the activity. Wild horses would avoid open trenches and vehicle traffic during construction. The intensity of wild horse avoidance would depend on the scale of the human activity (e.g., the number of vehicles used, the number of personnel deployed, the number of miles of pipeline being constructed, the number of construction days). The impact would be short-lived and limited to the duration of the construction/maintenance activity. Once the open trenches are covered and reclaimed and vehicle traffic discontinues, wild horses should resume using that area. Other temporary impacts could include loss of forage, potential disruptions to birthing, and increased mortality and injuries to wild horses resulting from increased vehicle traffic.

Wyoming HMAs range in size from 19,107 acres (Rock Creek HMA) to 687,546 acres (Salt Wells Creek HMA). Each action alternative impacts a different percentage of each HMA. On average, between all the action alternatives, 9.5% of an HMA would be impacted. The majority of an HMA would still be available for wild horse use. Fragmentation of habitat and reduced access to water during construction would be temporary and limited to the duration of construction and reclamation. Once reclamation is successful, the area would no longer be fragmented, and wild horses could use the area again.

Under all action alternatives, wild horses could affect revegetation efforts within the corridors. They may graze on or trample newly revegetated corridors, which would delay or decrease the success of reclamation efforts.

3.20.6 Environmental Effects – Alternative B (Proposed Action)

Alternative B would affect 15 HMAs. The percentage of an HMA that would be impacted by Alternative B ranges from 1.8% to 30.0%. Within those 15 HMAs, Alternative B would affect 433,285 acres out of 3,200,135 acres. Therefore, approximately 13.5% of the total acreages in the 15 HMAs would be temporarily unavailable for use by wild horses during construction and maintenance activities.

Alternative B would have the highest amount of area that could need reclamation and revegetation. Up to 9,659 acres within 15 impacted HMAs may need to be revegetated as part of pipeline reclamation. If wild horses were excluded from the Alternative B area to increase the chance of reclamation success, they would still be allowed to roam and graze on 99.7% of the total acreages in the 15 impacted HMAs.

3.20.7 Environmental Effects – Alternative C

Alternative C would affect three HMAs. The percentage of an HMA that would be impacted by Alternative C ranges from 0.9% to 15.0%. Within those three HMAs, Alternative C would affect 48,770 acres out of 918,889 acres. Therefore, approximately 5.3% of the total acreages in the three HMAs would be temporarily unavailable for use by wild horses during construction and maintenance activities.

Alternative C would have the lowest amount of area that could need reclamation and revegetation. Up to 1,029 acres within three impacted HMAs may need to be revegetated as part of pipeline reclamation. If wild horses were excluded from the Alternative C area to increase the chance of reclamation success, they would still be allowed to roam and graze on 99.89% of the total acreages in the three impacted HMAs.

3.20.8 Environmental Effects – Alternative D

Alternative D would affect 15 HMAs. The percentage of an HMA that would be impacted by Alternative D ranges from 1.8% to 30%. Within those 15 HMAs, Alternative D would affect 362,205 acres out of 3,200,135 acres. Therefore, approximately 11.3% of the total acreages in the 15 HMAs would be temporarily unavailable for use by wild horses during construction and maintenance activities.

Alternative D would have the middle amount of area that could need reclamation and revegetation. Up to 8,204 acres within 15 impacted HMAs may need to be revegetated as part of pipeline reclamation. If wild horses were excluded from the Alternative D area to increase the chance of reclamation success, they would still be allowed to roam and graze on 99.74% of the total acreages in the 15 impacted HMAs.

3.20.9 Summary of Effects

Impacts to wild horses from the three action alternatives would result from noise and increased human activity during the construction and maintenance of pipeline corridors. Wild horses would temporarily be displaced from areas of human activity. Table 3.20-1 summarizes the impacts of all alternatives on HMAs.

Table 3.20-1. Impacts to Herd Management Areas from All Alternatives

Alternative	Number of HMAs Impacted	Acres of HMAs Impacted	Percentage of HMA Acres Impacted
A	0	0	0.00%
B	15	433,285	13.5%
C	3	48,770	5.3%
D	15	362,205	11.3%

Wild horses could decrease or delay the success of revegetation efforts within corridors by grazing or trampling the revegetated area. Table 3.20-2 summarizes the impacts of all alternatives on revegetation efforts that could be hampered by wild horse grazing or trampling.

Table 3.20-2. Impacts to Revegetation from All Alternatives

Alternative	Acres of HMAs that Could Require Revegetation	Percentage of Acres of HMAs that Could Require Revegetation
A	0	0.00%
B	9,659	0.30%
C	1,029	0.11%
D	8,204	0.26%

3.20.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

Corridor designation and land use plan amendments are not expected to adversely impact wild horses. Future potential development of the corridors would result in portions of HMAs that would be unavailable for use by wild horses during construction and maintenance activities (and, potentially, revegetation efforts). These impacts would be irretrievable, lasting only for the time periods in which these activities take place. The short-term use of the proposed corridors would not result in impacts to long-term sustainability of the Wild Horse and Burro Program.

3.21 WILDLIFE AND FISHERIES

3.21.1 Issues to be Analyzed and Impact Indicators

This section analyzes how the project may affect wildlife, including big game, raptors and migratory birds, fisheries, and special status species (ESA-listed and BLM sensitive species). Local policies, including greater sage-grouse 2015 RMP revisions and amendments, Wyoming Governor's Sage-Grouse Executive Order 2019-3, and Wyoming Governor's Big Game Migration Corridor Executive Order 2020-1 were reviewed as they relate to the project. Impact indicators include acres of seasonal habitats and potentially suitable habitats that would be directly impacted by clearing ROWs. The analysis addresses how the quality of habitats, habitat fragmentation, predation, noise, water use, and water quality may affect wildlife species.

Internal and public scoping identified the following issues for analysis for wildlife and fisheries:

- How would construction and operations affect big game movement, migration routes, and parturition areas?
- How would construction and operations affect raptor and migratory bird nesting activities?
- Would construction across stream channels or other waters or both affect native fisheries/aquatic resources because of sedimentation, turbidity, and increase in salinity?
- Would water withdrawals for hydrostatic testing and dust abatement reduce fisheries habitat? How much water would be used? What is the source of the water? How would it be disposed of postconstruction and testing, etc.?
- Would clearing vegetation decrease sage-grouse reproduction and recruitment, resulting in population declines at both the site scale and subpopulation scale? Would decreased availability of cover and forage during winters contribute to long-term population declines? Would pipeline corridors increase potential predation? Would pipeline corridors increase habitat fragmentation that limits sage-grouse use?
- Would the project (clearing habitat, fragmentation, roads, increased activity, invasive weeds) result in special-status species population declines? Would pipeline corridors increase special-status species habitat fragmentation or predation of special-status species? How would water use, noise, and increased activity impact special-status species?

Impact indicators for measuring potential impacts to wildlife and fisheries are:

- Acres and linear miles of impacts in big game seasonal habitats
- Acres of impacts in the potentially suitable habitats of special-status wildlife species.
- Acres of impact in watersheds occupied by special-status fish species.
- Acres of impact within greater sage-grouse PHMA and general habitat management areas (GHMA).

3.21.2 Affected Environment

The Wildlife Resources Technical Report (WEST 2016b) prepared for the project provides background information on the wildlife resources present within the proposed corridors. The project crosses diverse plant communities and wildlife habitats and wildlife species ranges. An extensive list of amphibians, reptiles, birds, and mammals potentially occurring within the proposed corridors is provided in the wildlife report. Many of the species can be grouped by the general habitat they rely on (e.g., grassland, shrubland, forest, or wetlands/riparian). Vegetation Section 3.17 describes and quantifies those habitats within the proposed corridors and within 1 mile of the proposed corridors.

Elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), moose (*Alces alces*), bighorn sheep (*Ovis canadensis*), and white-tailed deer (*Odocoileus virginianus*) occur within the big game area of analysis. WYGFD and BLM have defined and identified big game seasonal habitats in Wyoming. Three seasonal habitats for big game are crucial winter range, parturition areas, and migration corridors. Crucial winter range is habitat used by big game in the winter that is a determining factor in the population's ability to maintain itself at WYGFD's population objective level over the long term. Parturition area is an area where big game calving, fawning, or lambing occurs. Migration corridor is an area used by big game for seasonal movements between summer and winter ranges. The State of Wyoming issued Executive Order 2020-1 on February 14, 2020, that designated three migration corridors for mule deer and laid out the process for designating future migration corridors for mule deer and pronghorn in the state. Mule deer is the only big game species that currently has state-designated migration corridors. With each designated migration corridor, the state has identified areas of high use (areas used by 20% or greater of global positioning system [GPS]–collared animals), medium use (areas used by 10–20% of GPS-collared animals), and low use (areas used by less than 10% of GPS-collared animals). The big game area of analysis contains the following big game seasonal habitats:

- Crucial winter range: elk, mule deer, pronghorn, moose, bighorn sheep, and white-tailed deer
- Parturition area: elk, mule deer, pronghorn, moose, and bighorn sheep
- Migration corridor: mule deer

Raptors and other migratory birds occur seasonally or year-round within the proposed corridors and are protected under the Migratory Bird Treaty Act. Eagles are given additional protection under the Bald and Golden Eagle Protection Act. Grasslands, shrublands, forested areas, and wetlands/riparian habitats throughout the proposed corridors provide important nesting and foraging habitats.

WYGFD's stream classification was developed in 2006 with Blue Ribbon streams (national importance) holding greater than 600 pounds of trout per mile and Red Ribbon streams (statewide importance) holding 300 to 600 pounds per mile (WYGFD 2006). They are recognized as "special resources" under the Wyoming Stream Mitigation Procedure promulgated by USACE and are weighted relatively high when USACE mitigates adverse effects under its permit authority.

Special-status wildlife species include those listed under the ESA in the 12 counties and those listed as sensitive by the nine BLM field offices overlapping the project (BLM 2010c; USFWS 2020a). Eight ESA-listed species listed for the area include Canada lynx (*Lynx canadensis*), grizzly bear (*Ursus arctos horribilis*), northern long-eared bat (*Myotis septentrionalis*), black-footed ferret (*Mustela nigripes*), North American wolverine (*Gulo gulo luscus*), yellow-billed cuckoo (*Coccyzus americanus*), western glacier stonefly (*Zapada glacier*), and Kendall Warm Springs dace (*Rhinichthys osculus thermalis*). Critical habitat for Canada lynx is present within Fremont, Lincoln, Park, and Sublette Counties. There is proposed critical habitat for yellow-billed cuckoo in Sweetwater County. In addition, Colorado River fish and their critical habitat occur downstream; and least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), whooping crane (*Grus americana*), and pallid sturgeon (*Scaphirhynchus albus*) occur

downstream in the Platte River. There are 33 BLM sensitive species (10 mammals, 15 birds, five fish, two amphibians, and one reptile) listed as BLM sensitive by the BLM field offices in the proposed corridors. Background information on these species, including species descriptions, habitat requirements, and range maps are provided in *Special Status Species Report for the Wyoming Pipeline Corridor Initiative* (SWCA 2016b).

Due to the threats to greater sage-grouse habitats from the introduction of invasive plant species, changes in fire regimes, and direct removal resulting from changes in land use (Knick et al. 2003; Knick and Connelly 2011) and to greater sage-grouse from West Nile virus in the southern portion of the Powder River Basin (Naugle et al. 2005), conservation efforts led by WYGFD and in cooperation with USFWS, BLM, USFS, and greater sage-grouse working groups are ongoing in an effort to prevent a federal listing of the species. WYNDD lists the greater sage-grouse as a Species of Concern (Keinath et al. 2003), and the Wyoming Bird Conservation Plan lists the bird as a Level I (Conservation Action) species (Nicholoff 2003).

The governor of Wyoming has issued Executive Order 2019-3, which establishes "Core Population Areas" for greater sage-grouse. Mapping efforts in 2008 that were last updated in 2015 identified areas of "core" habitat, which support 83% of the state's greater sage-grouse population. Core areas account for approximately 24% of the surface area of the state of Wyoming. The state has been divided into eight individual working group areas and these groups work to facilitate and implement local conservation plans that benefit greater sage-grouse and their habitat (WYGFD n.d. [2015]). In addition, the Wyoming BLM has issued several regulations regarding management of the greater sage-grouse in Wyoming. BLM IM 2010-012, 2012-043, 2012-044, and 2012-019 include specific protection measures guiding development in greater sage-grouse habitat, specifically in core population areas (BLM 2010d, 2012e, 2012f, 2012g).

Greater sage-grouse is considered a "landscape species" because it uses a variety of sagebrush structural stages to meet seasonal habitat requirements. Mating birds aggregate on leks (display grounds), which are generally bare or grassy patches within larger sagebrush stands (WYGFD 2003). Nesting habitat for females is denser sagebrush that provides hiding cover and is often within 4 miles of lekking areas (Holloran and Anderson 2005; WYGFD 2003, 2017). Juvenile greater sage-grouse feed on forbs and insects and are often found in more mesic habitat. In winter, this species concentrates in areas with sagebrush that stands above snow cover (WYGFD 2003).

Greater sage-grouse require an extensive mosaic dominated by sagebrush of varying densities and heights along with an associated diverse native vegetation community dominated by native grasses and forbs. Quality habitat for sage-grouse is described as a sagebrush stand with 15 to 25% canopy cover of sagebrush and a tall and dense understory of native grasses and forbs. The tallest sagebrush available on Wyoming sites is preferred for nesting. These sites are generally larger stands, with patches of taller (16–32 inches), denser (up to 35% canopy cover) sagebrush interspersed throughout the stand and where no more than 25% of the stand comprises small openings. Tall (> 7 inches) and dense residual herbaceous cover of native grasses and forbs from the previous growing season provides cover at the onset of the nesting season, when female sage-grouse select their nest sites and egg-laying and incubation begin (USFS 2002). Paige and Ritter (1999) indicate that herbaceous cover for good nesting habitat should be at least 20%.

BLM manages greater sage-grouse habitat using GHMA and PHMA. GHMA are occupied seasonal or year-round habitats where some special management applies to sustain greater sage-grouse populations, including no authorization of new surface occupancy or surface-disturbing activities within 0.25 mile of an occupied lek, timing limitations within 2.0 miles of an occupied lek, restriction on activities that create noise, and new authorized land uses only after avoiding and minimizing impacts. PHMA have the highest

conservation value to maintaining sustainable greater sage-grouse populations and areas containing breeding, late brood rearing, and winter habitats. PHMA are the same areas designated by Wyoming Executive Order 2015-4 as core and connectivity habitats. Management of these areas includes no authorization of new surface occupancy or surface-disturbing activities within 0.6 mile of an occupied lek, timing limitations within 4.0 miles of an occupied lek, limitations on roads within 1.9 miles of the perimeter of occupied leks, limitations on density of disturbances and disruptions, restrictions on activities that create noise, and new authorized land uses only after avoiding and minimizing impacts (BLM 2015a).

3.21.3 Methods of Analysis

The vegetation characteristics within the proposed corridors is the most important factor for determining likelihood of species presence. The vegetation communities and habitat types identified within the proposed corridors, as described in Vegetation Section 3.17, provide suitable resources and habitat for a variety of common wildlife species in Wyoming, including raptors, migratory birds, big game, sensitive wildlife, as well as fish and other aquatic species.

Potential impacts to big game are analyzed by comparing the acres within the proposed corridors for each alternative with different big game seasonal habitats. The area of analysis for big game is a 1-mile buffer around the corridor for each alternative. This area of analysis was selected because 1 mile is the general line-of-sight distance for big game to see or hear any potential project activity. Impact indicators for measuring potential impacts to big game are acres of the area of analysis within each big game seasonal habitat type and linear miles of the area of analysis that intersect each big game seasonal habitat type.

For fisheries, the analysis area includes 50 meters upstream to 250 meters downstream at stream crossings. The analysis considers Blue Ribbon and Red Ribbon streams within the proposed corridors. For sensitive fish the analysis area is HUCs within the species range.

The analysis reviews special-status species that are known to occur or have potential to occur as indicated by acres of potentially suitable habitats within the corridors and within a 1-mile buffer. GAP vegetation classification data at the “Division” level were used to determine potentially suitable habitats present within the corridors and a 1-mile buffer (see Vegetation Section 3.17). Quantification of potentially suitable habitat for each species is based on the GAP habitat type(s) within the species range as mapped by WYNDD or within a species’ AOI map when a WYNDD range map was not available (USFWS 2020b; WYNDD 2020). Although habitat availability is helpful in determining if species could occur, more site-specific information about habitat, soils, associated vegetation, and other factors are needed in order to make supportable determinations about the magnitude or degree to which a particular species may be affected. These details would be gathered prior to potential projects within the proposed corridors and project modifications made if needed.

Potential temporary and long-term loss of greater sage-grouse habitat and reduced habitat function are analyzed by comparing the acres of GHMA and PHMA that intersect the corridors for each alternative and acres of GHMA within 2.0 miles and acres of PHMA with 4.0 miles of the corridors for each alternative. Additionally, population monitoring has been conducted across Wyoming since 1948 using lek counts because the number of males per lek is a reasonable indicator of species abundance. Potential impacts to greater sage-grouse populations are analyzed by comparing the average peak male attendance over the last twenty years for occupied leks in GHMA within 2.0 miles and in PHMA within 4.0 miles of each corridor.

3.21.4 Environmental Effects – Alternative A (No Action)

Under Alternative A, the applicant's application to develop the proposed corridors under any of the action alternatives would not be approved.

3.21.4.1 Big Game

Under Alternative A, impacts to big game movement, migration corridors, and parturition areas would remain unchanged. Pipeline projects would continue to be assessed on a case-by-case basis and impacts to big game would follow existing conditions and trends.

3.21.4.2 Migratory Birds Including Raptor Species

Under Alternative A, impacts to raptor and migratory birds and their nesting and foraging habitats would remain unchanged. Pipeline projects would continue to be assessed on a case-by-case basis and impacts to raptors and migratory birds would follow existing conditions and trends.

3.21.4.3 Fisheries

Under Alternative A, impacts to fisheries would remain unchanged. Pipeline projects would continue to be assessed on a case-by-case basis and impacts to fish would follow existing conditions and trends.

3.21.4.4 Special-Status Wildlife Species

Under Alternative A, impacts to special-status species and critical habitats would remain unchanged. There would be no additional habitat loss, fragmentation, or predation. Pipeline projects would continue to be assessed on a case-by-case basis and impacts to listed wildlife would follow existing conditions and trends.

Under Alternative A, impacts to special-status species due to noise, human presence, and water use would remain unchanged. Pipeline projects would continue to be assessed on a case-by-case basis and impacts to special-status species would follow existing conditions and trends.

3.21.4.5 Greater Sage-Grouse

Under Alternative A, impacts to greater sage-grouse and their habitats would remain unchanged. Potential projects would continue to be assessed on a case-by-case basis and impacts to greater sage-grouse and their habitats would follow existing conditions and trends.

3.21.5 Environmental Effects – Common to All Action Alternatives

3.21.5.1 Big Game

All three action alternatives cross numerous movement corridors, migration routes, and crucial or year-long seasonal habitats for big game. Construction and operations for all the action alternatives would have the potential to cause stress or displace big game, or both from parts of their crucial winter range, parturition areas, and migration corridors for the duration of the activity. Areas of human activity within big game migration corridors or parturition areas would be temporarily unavailable for big game feeding, resting, migration, or parturition. Noise, dust, equipment and vehicle traffic, and general human activity would cause big game to avoid construction areas and potentially restrict big game movement if the activity area is large enough. The intensity of big game avoidance would depend on the scale of the human activity and the ability to address crucial seasonal use through avoidance measures and timing limitations.

3.21.5.2 Migratory Birds Including Raptor Species

Approximately 2% of available habitat within a 1-mile buffer of the proposed corridors could be developed for the potential projects. Migratory birds are most vulnerable to impacts and potential incidental take during the nesting season. Potential impacts to migratory birds include permanent and temporary habitat loss; nest or young abandonment due to construction activities or an increase in human presence; mortality of birds from vehicle collisions or destruction of nests, eggs, and young; fragmentation of habitat; and an increase in invasive or noxious weeds (e.g., cheatgrass) that reduces habitat quality.

Residual impacts to migratory bird species would be low as a result of implementing project design features, BMPs, and RMP management actions and stipulations (see Appendix E). Surface-disturbing and disruptive activities would be prohibited or restricted within raptor seasonal nest buffers, which would protect sensitive nesting areas for raptors and other migratory bird species. Preconstruction surveys would identify the seasonal nest activity status, new nests, and any project modifications needed to minimize impacts to nesting migratory birds. Reclamation of all disturbed areas would promote the re-establishment of migratory bird habitat; however, shrubland and forest habitats would take longer to reestablish compared to grassland habitats. Reclamation includes soil management, reseeding, and invasive or noxious weed control to re-establish habitat and cover quality and quantity.

3.21.5.3 Fisheries

Construction across stream channels or other waters or both could affect native fisheries and other aquatic resources because of turbidity and a potential increase in salinity. There is potential for an increase of turbidity due to fine sediments entering the water from construction activities; the severity is dependent upon soil type, soil moisture, and the amount of disturbance and its proximity to the watershed. Salinity would only be increased if the soils being disturbed within the watershed were saline and had the ability to be transported into the stream. Proper BMPs and construction techniques would help mitigate these effects (see Appendix E).

There is potential for water withdrawals from hydrostatic testing and dust abatement to reduce the amount of fisheries habitat; however, the volume and durations of the withdrawals would have to be large to have a noticeable impact. Hydraulic modeling would show any potential impacts so that the amount of withdrawal would be able to be maintained below a level of impact.

3.21.5.4 Special-Status Wildlife Species

Types of impacts that could affect special-status wildlife include short-term and long-term habitat loss and fragmentation; short-term and long-term reduction in quality of habitat due to habitat removal and invasive plant establishment; and increased predation due to clearing vegetation within designated corridors. Fragmentation could result in an altered wildlife community as species more adaptable to edge vegetative structure establish themselves, whereas species requiring undisturbed, contiguous vegetative cover may be subjected to relocating or the negative effects of predation, parasitism, or competition (WEST 2016b). Individual projects within the proposed corridors are likely to fragment the habitat, creating edge effect with consequences for ecological processes, including seed dispersal, predation rates, and movement of species (Cadenasso et al. 2003). These impacts have the potential to cause population declines in some special-status wildlife species if impacts are not mitigated.

Noise could disrupt wildlife life-cycle activities of foraging, resting, migrating, and other patterns of behavior. Although wildlife already existing in proximity to human development may already be habituated to noise from land use and human disturbance, changes to these baseline activities may still result in wildlife disruption. Sensitivity to noise varies from species to species.

Table 3.21-1 lists wildlife species protected under the ESA for the 12 counties crossed by the project (USFWS 2020a). Based on species ranges and habitat requirements, northern long eared bat, western glacier stonefly, and Kendall Warm Springs dace would not occur in the analysis areas for the action alternatives. There is no designated critical habitat for Canada lynx within any proposed corridors. Although the project is outside of the occupied range of Platte River and Colorado River fish species, the proposed corridors occur within the AOIs. The AOI identifies areas where a project could have direct and indirect effects to the species and their habitat.

Table 3.21-1. Threatened and Endangered Wildlife Species and their Habitats

Common Name	Scientific Name	Status	Habitat
Canada lynx	*Lynx canadensis*	Threatened	Forest
Grizzly bear	*Ursus arctos horribilis*	Threatened	Forest
Northern long-eared bat	*Myotis septentrionalis*	Threatened	Forest
Black-footed ferret	*Mustela nigripes*	Nonessential experimental	Shrubland
North American wolverine	*Gulo gulo luscus*	Proposed threatened	Forest
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Riparian
Western glacier stonefly	*Zapada glacier*	Threatened	Riparian
Kendall Warm Springs dace	*Osculus thermalis*	Endangered	Riparian
Platte River species AOI*	–	–	Riparian
Colorado River fish AOI†	–	–	Riparian

Sources: USFWS (2020a); WYNDD (2020).

Note: General habitat types used by these species are indicated by forest (forest, woodland), shrubland (shrubland, grassland, sagebrush), and riparian (riparian, wetland, streams, lakes/shoreline).

*AOI for least tern, endangered; pallid sturgeon, endangered; piping plover, threatened; and whooping crane, endangered.

† AOI for bonytail (*Gila elegans*), endangered; Colorado pikeminnow (*Ptychocheilus lucius*), endangered; humpback chub (*Gila cypha*), endangered; and razorback sucker (*Xyrauchen texamus*), endangered.

In the ESA-listings for Canada lynx, grizzly bear, wolverine, and yellow-billed cuckoo, habitat alteration, loss, and fragmentation are listed as factors that influence the viability of populations (i.e., Factor A as outlined under section 4(a)(1) of the ESA). Proposed projects within proposed corridors would first evaluate the suitability of habitats to support listed and special status species. Where the BLM determines that the proposed action and prospective pipelines may affect a federally listed or proposed species or its designated or proposed critical habitat, the BLM would ensure that no action would result in jeopardy or adverse modification of those species and habitats through Section 7 consultation with the USFWS. Based on any BLM request for consultation, the USFWS would evaluate the effects of the individual project and consider the likely effects of the action. Results of the consultation may include provisions for incidental take and any reasonable and prudent measures to further reduce the likelihood of take or adverse impacts to a species or its designated critical habitats.

BLM sensitive species listed in the nine affected field offices were evaluated based on known populations, range, and habitat requirements (WYNDD 2020) to determine their potential to occur within proposed corridors (Table 3.21-2). BLM sensitive wildlife species have the potential to occur in the proposed corridors under all alternatives. Habitats that may support these species and are available in the proposed corridors are indicated in Table 3.21-2. Habitat categories are based on the vegetative cover types described in Section 3.17, Vegetation.

Table 3.21-2. Bureau of Land Management Sensitive Wildlife Species and their Habitats

Common Name	Scientific Name	Habitat
Mammals		
Pygmy rabbit	*Brachylagus idahoensis*	Shrubland
Townsend's big-eared bat	*Corynorhinus townsendii*	Forest, riparian
White-tailed prairie dog	*Cynomys leucurus*	Shrubland
Black-tailed prairie dog	*Cynomys ludovicianus*	Shrubland
Spotted bat	*Euderma maculatum*	Forest, riparian
Long-eared myotis	*Myotis evotis*	Forest, riparian
Fringed myotis	*Myotis thysanodes*	Forest, riparian
Wyoming pocket gopher	*Thomomys clusius*	Shrubland
Idaho pocket gopher	*Thomomys idahoensis*	Shrubland
Swift fox	*Vulpes velox*	Shrubland
Birds		
Baird's sparrow	*Ammodramus bairdii*	Shrubland
Northern goshawk	*Accipiter gentilis*	Forest
Sagebrush sparrow	*Artemisiospiza nevadensis*	Shrubland
Burrowing owl	*Athene cunicularia*	Shrubland
Ferruginous hawk	*Buteo regalis*	Shrubland
Greater sage-grouse	*Centrocercus urophasianus*	Shrubland
Mountain plover	*Charadrius montanus*	Shrubland
Trumpeter swan	*Cygnus buccinators*	Riparian
Peregrine falcon	*Falco peregrinus*	Forest, cliff
Bald eagle	*Haliaeetus leucocephalus*	Riparian
Loggerhead shrike	*Lanius ludovicianus*	Shrubland, disturbed
Long-billed curlew	*Numenius americanus*	Shrubland
Sage thrasher	*Oreoscoptes montanus*	Shrubland
White-faced ibis	*Plegadis chihi*	Riparian
Brewer's sparrow	*Spizella breweri*	Shrubland
Fish		
Bluehead sucker	*Catostomus discobolus*	Riparian
Flannelmouth sucker	*Catostomus latipinnis*	Riparian
Roundtail chub	*Gila robusta*	Riparian
Yellowstone cutthroat trout	*Oncorhynchus clarkii bouvieri*	Riparian
Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*	Riparian
Reptiles/Amphibians		
Great Basin spadefoot	*Spea intermontana*	Shrubland, riparian
Midget faded rattlesnake	*Crotalus viridis concolor*	Shrubland, cliff
Northern leopard frog	*Rana pipiens*	Riparian

Sources: BLM (2010c); WYNDD (2020).

Note: General habitat types used by these species are indicated by forest (forest, woodland), shrubland (shrubland, grassland, sagebrush), riparian (riparian, wetland, streams, lakes/shoreline), disturbed (developed, disturbed), cliff (cliff, rock, scree).

Special-status wildlife would be subject to the incremental loss of habitat (cover, nesting, and foraging) and increased habitat fragmentation until restoration has been completed and native vegetation is reestablished. Removal of these habitats from proposed corridors would result in temporary habitat loss, fragmentation, reduced habitat quality, and edge effects along corridors. For most special-status wildlife species, the direct and indirect residual effects are due to the slow recovery of habitat cover during revegetation reclamation of areas disturbed by construction. Grassland and herbaceous plant communities would recover relatively quickly, whereas shrubland and forest communities would take a comparatively longer time to regenerate. Habitat recovery can be slow due to Wyoming's climate and the ecology of sagebrush and other ecological communities (Knight et al. 2014). Wyoming big sagebrush and other sagebrush shrubs can take 35 to 120 years to re-establish in a disturbed ROW through natural propagation (Baker 2006). Residual impacts are anticipated for the pygmy rabbit, greater sage-grouse, sage thrasher, sagebrush sparrow, and other sensitive sagebrush species from the impacts of sagebrush removal and habitat fragmentation.

Excavations, roads, aboveground facilities and equipment, human activity, noise, and changes to water use would have direct and indirect impacts to special-status species. Increased activity, including construction traffic could lead to direct mortality from vehicle collisions. Indirect impacts could include temporary displacement of wildlife as a result of increased noise and human presence. Individuals may be displaced from critical or seasonal habitats during sensitive periods resulting from noise and human presence (e.g., disruption of nesting, breeding, lekking). The intensity of species avoidance would depend on the scale of the human activity; some species are more sensitive to human presence than others. Impacts to wildlife due to construction noise would be temporary and localized, and operational noise of possible pipelines would not represent a measurable impact on local wildlife.

Residual impacts to species would be minimized by implementing project design features, BMPs, and RMP stipulations (see Appendix E). Surface-disturbing and disruptive activities would be prohibited or restricted within areas occupied by special-status species. Preconstruction surveys would identify the presence/absence of special-status species, and any project modifications needed to minimize impacts to those species. Mortality from collisions with project vehicles would be minimized through implementation of speed limits on project roads. Reclamation of all disturbed areas would promote the re-establishment of protective habitat. Reclamation includes soil management, reseeding, and invasive or noxious weed control to reestablish habitat and cover quality and quantity.

3.21.5.5 Greater Sage-Grouse

Direct impacts to greater sage-grouse include surface disturbance to important habitats, mortality resulting from collisions, and destruction of nests and nest abandonment. Indirect impacts to greater sage-grouse include habitat fragmentation, increased noise levels and human activity, dispersal of noxious weeds and invasive plant species, increased risk of wildfire, dust effects, potential for increased presence of West Nile virus, and increase in predation. The potential influence of noise on sage-grouse demonstrates a need to incorporate noise considerations into land use decisions in and around sage-grouse habitats (Nevada Department of Wildlife 2018). WYGFD (2019) has a protocol for measuring and reporting sound levels at sage-grouse leks. Noise restrictions required by RMPs would be implemented for the project as described in Appendix E (e.g., limit noise to less than 10 decibels above ambient measures (20–24 decibels) at sunrise at the perimeter of a lek during active lek season).

Recent studies have shown that oil and gas development can negatively impact greater sage-grouse populations as a result of increased noise and human activity (Holloran 2005; Walker et al. 2007). Greater sage-grouse have been observed to abandon lek sites in areas with increased road development (Braun 1998; Holloran 2005; Walker et al. 2007). In Canada, brooding females were shown to avoid areas with increased levels of visible oil wells (Aldridge 2005), and in western Wyoming, brooding females avoided

producing gas wells during the early brood-rearing period (Holloran 2005). Chick survival has been shown to decrease as oil well densities within 0.6 mile of brooding locations increase (Aldridge 2005). Greater sage-grouse hens that used leks within approximately 2 miles of oil and gas development moved further away from leks to nesting areas and had lower nest initiation rates than hens near undisturbed leks (Lyon and Anderson 2003). Connelly et al. (2000) recommends that energy-related facilities be located more than 2 miles from active lek sites under ideal habitat conditions, 3 miles when habitat conditions are not ideal, and 11 miles when sage-grouse populations are migratory (Lyon and Anderson 2003).

Research has also shown that increased food sources associated within oil and gas developments (e.g., roadkill or litter) generally resulted in increased population levels of predators, especially corvids, unless deterrents were used on gas field–related structures (Andren 1994; Avery and Genchi 2004). In addition, the development of project infrastructure would increase the availability of travel corridors for terrestrial mammalian predators (Gelbard and Belnap 2003; Science Applications International Corporation 2003). This development could increase predation rates of individual greater sage-grouse, nesting hens, and juveniles during brood-rearing periods.

3.21.6 Environmental Effects – Alternative B (Proposed Action)

3.21.6.1 Big Game

Alternative B overlaps crucial winter range for elk, mule deer, pronghorn, moose, and bighorn sheep; parturition areas for elk, mule deer, pronghorn, and moose; and migration corridors for mule deer. Table 3.21-3 lists the acres and linear miles of the area of analysis for Alternative B within each big game seasonal habitat type along with the percentage of each seasonal habitat type within the area of analysis. Within mule deer migration corridors, 6,897 acres of high use, 3,541 acres of medium use, and 287 acres of low use are within the Alternative B area of analysis.

Table 3.21-3. Acreages and Linear Miles of Alternative B Area of Analysis within Big Game Seasonal Habitats and Percentage of Seasonal Habitats within Area of Analysis

Species	Seasonal Habitat Type	Acres within Area of Analysis	Percentage of Seasonal Habitat Type Impacted	Linear Miles within Area of Analysis
Elk	Crucial winter range	109,318	2.51%	84
	Parturition area	22,806	0.75%	16
Mule deer	Crucial winter range	277,913	4.39%	208
	Parturition area	2,118	0.92%	1
	Migration corridor	26,312	2.16%	20
Pronghorn	Crucial winter range	514,974	8.62%	420
	Parturition area	373	1.36%	0
Moose	Crucial winter range	21,355	1.65%	13
	Parturition area	1,338	1.52%	0
Bighorn sheep	Crucial winter range	1,495	0.16%	1
	Parturition area	0	0.00%	0
White-tailed deer	Crucial winter range	0	0.00%	0

3.21.6.2 Migratory Birds Including Raptor Species

GAP vegetation classification data at the "Division" level were used to determine habitats present within the corridors and a 1-mile buffer. Based on the analysis of GAP vegetation in Section 3.17, Vegetation, Alternative B could impact a variety of migratory bird nesting habitats, including 52,327 acres of shrubland, desert scrub, and grasslands; 3,082 acres of riparian and wetland; 466 acres of forest and woodland; and 550 acres of cliff, rock, and scree (see Table 3.17-3). The amount of habitat that would potentially be removed within corridors equates to approximately 2% of available habitats within a 1-mile buffer of the proposed corridors; however, temporary indirect impacts to those adjacent habitats could occur due to noise, human presence, fragmentation, and edge effects.

3.21.6.3 Fisheries

Based on AOI within the HUC-8 watersheds, Alternative B may impact the various special-status fish species within the 1-mile buffer and the Alternative B corridor (Table 3.21-4).

Table 3.21-4. Special-Status Fish Species Area of Influence by Watershed, Alternative B

Species	HUC-8 Name	Acres in 1-Mile Buffer	Acres in Corridor
Bluehead sucker	Big Sandy	17,645.87	317.45
	Bitter	9.42	0.00
	Blacks Fork	20,279.32	340.77
	Upper Green	54,481.95	1,041.88
	Upper Green-Flaming Gorge Reservoir	10,506.05	190.65
	Upper Green-Slate	34,614.35	833.35
	Total	**137,536.96**	**2,724.10**
Colorado River cutthroat trout	Bitter	9.42	0.00
	Upper Green	54,469.85	1,041.88
	Upper Green-Flaming Gorge Reservoir	10,457.05	187.31
	Upper Green-Slate	259.43	0.00
	Total	**65,195.76**	**1,229.19**
Flannelmouth sucker	Big Sandy	21,754.28	406.76
	Bitter	101,261.80	1,938.10
	Blacks Fork	20,279.32	340.77
	Great Divide closed basin	2,136.76	70.19
	Upper Green	70,645.19	1,327.49
	Upper Green-Flaming Gorge Reservoir	10,506.05	190.65
	Upper Green-Slate	35,216.03	873.29
	Total	**261,799.44**	**5,147.24**
Roundtail chub	Blacks Fork	18,637.12	308.75
	Upper Green-Slate	1,030.30	19.21
	Grand Total	**19,667.42**	**327.96**

Species	HUC-8 Name	Acres in 1-Mile Buffer	Acres in Corridor
Yellowstone River cutthroat trout	Big Horn Lake	32,771.88	709.67
	Clarks Fork Yellowstone	6,567.69	50.75
	Dry	813.62	17.08
	Greybull	70,842.73	1,594.17
	Little Wind	46.16	0.00
	Shoshone	80,991.50	1,683.46
	Upper Bighorn	54,209.78	1,390.44
	Upper Wind	0.15	0.00
	Total	**246,243.52**	**5,445.58**

3.21.6.4 Special-Status Wildlife Species

Impacts to special-status species from Alternative B would vary by species and would be determined at the project level. Tables 3.21-17 and 3.21-18 quantify potential habitats for each species based on their range within the analysis area. Suitability of these areas to support listed species would be determined for specific projects. Alternative B would primarily impact shrubland, grassland, and sagebrush habitats, and, therefore, impact several special-status species that rely on these habitats throughout the proposed corridors. 155 acres of critical habitat for Canada lynx is within 1 mile of the Alternative B corridors, but not within the proposed corridors (Table 3.21-17).

Development of 1,956 miles of corridors under Alternative B would lead to an increase in vehicle traffic, human presence, and water use that can affect special-status species. Impacts to species would be minimized by implementing project design features, BMPs, and RMP stipulations (see Appendix E).

3.21.6.5 Greater Sage-Grouse

Alternative B overlaps PHMA and GHMA for greater sage-grouse. Table 3.21-5 lists the number of acres within the analysis areas. There are 22,558.0 acres of PHMA and 34,898.8 acres of GHMA crossed by Alternative B. There are 3,510,624.9 acres of PHMA and 2,892,962.0 acres of GHMA within the analysis areas.

Table 3.21-5. Acreages of Priority Habitat Management Areas and General Habitat Management Areas within the Analysis Areas

PHMA		GHMA	
Acres within Corridor	**Acres within 4-Mile Buffer**	**Acres within Corridor**	**Acres within 2-Mile Buffer**
22,558.0	3,510,624.9	34,898.8	2,892,962.0

Alternative B is within 2 miles of 57 leks and within 4 miles of 266 leks. Table 3.21-6 lists the average peak male counts at those leks within the last 20 years.

Table 3.21-6. Average Peak Male Count at Leks within the Analysis Areas

Average Peak Male Count at Leks within 2 miles	Average Peak Male Count at Leks within 4 miles
13.9	25.6

3.21.7 Environmental Effects – Alternative C

3.21.7.1 Big Game

Alternative C overlaps crucial winter range for elk, mule deer, pronghorn, and moose and parturition areas for elk and moose. Alternative C would not cross any migration corridors for mule deer. Table 3.21-7 lists the acres and linear miles of the area of analysis for Alternative C within each big game seasonal habitat type along with the percentage of each seasonal habitat type within the area of analysis.

Table 3.21-7. Acreages and Linear Miles of Alternative C Area of Analysis within Big Game Seasonal Habitats and Percentage of Seasonal Habitats within Area of Analysis

Species	Seasonal Habitat Type	Acres within Area of Analysis	Percentage of Seasonal Habitat Type Impacted	Linear Miles within Area of Analysis
Elk	Crucial winter range	8,633	0.20%	6
	Parturition area	361	0.01%	0
Mule deer	Crucial winter range	80,991	1.28%	54
	Parturition area	0	0.00%	0
	Migration corridor	0	0.00%	0
Pronghorn	Crucial winter range	71,788	1.20%	52
	Parturition area	0	0.00%	0
Moose	Crucial winter range	6,355	0.49%	3
	Parturition area	965	1.09%	0
Bighorn sheep	Crucial winter range	0	0.00%	0
	Parturition area	0	0.00%	0
White-tailed deer	Crucial winter range	0	0.00%	0

3.21.7.2 Migratory Birds Including Raptor Species

GAP vegetation classification data at the "Division" level were used to determine habitats present within the corridors and a 1-mile buffer. Based on the analysis of GAP vegetation in Section 3.17, Vegetation, Alternative C could impact a variety of migratory bird nesting habitats, including 6,124 acres of shrubland, desert scrub, and grasslands; 607 acres of riparian and wetland; and 24 acres of forest and woodland (see Table 3.17-3). The amount of habitat removed equates to approximately 2% of available habitats within a 1-mile buffer of the Alternative C corridors; however, temporary indirect impacts to those adjacent habitats could occur due to noise, human presence, fragmentation, and edge effects.

3.21.7.3 Fisheries

Based on AOI within the HUC-8 watersheds, Alternative C may impact the various special-status fish species within the 1-mile buffer and pipeline corridor (Table 3.21-8).

Table 3.21-8. Special-Status Fish Species Area of Influence by Watershed, Alternative C

Species	HUC-8 Name	Acres in 1-Mile Buffer	Acres in Corridor
Bluehead sucker	Bitter	9.42	0.00
	Blacks Fork	9,504.05	0.00
	Upper Green	52,894.14	756.79
	Upper Green-Flaming Gorge Reservoir	10,503.49	0.00
	Upper Green-Slate	48,098.53	0.00
	Total	**121,009.64**	**756.79**
Colorado River cutthroat trout	Bitter	9.42	0.00
	Upper Green	56,653.19	756.79
	Upper Green-Flaming Gorge Reservoir	10,454.49	0.00
	Upper Green-Slate	259.43	0.00
	Total	**67,376.53**	**756.79**
Flannelmouth sucker	Bitter	101,939.62	0.00
	Blacks Fork	9,504.05	0.00
	Great Divide closed basin	2,005.26	0.00
	Upper Green	57,177.24	756.79
	Upper Green-Flaming Gorge Reservoir	10,503.49	0.00
	Upper Green-Slate	48,242.10	0.00
	Grand Total	**229,371.76**	**756.79**
Roundtail chub	None	0.00	0.00
Yellowstone River cutthroat trout	Big Horn Lake	32,592.99	417.50
	Clarks Fork Yellowstone	4,511.79	40.33
	Dry	813.62	0.00
	Greybull	68,439.28	0.00
	Little Wind	46.16	0.00
	Shoshone	82,321.92	637.94
	Upper Bighorn	54,332.42	821.72
	Upper Wind	0.14	0.00
	Grand Total	**243,058.33**	**1,917.50**

3.21.7.4 Special-Status Wildlife Species

Alternative C corridors would result in the least amount of habitat loss, which would reduce the potential for fragmentation and predation that could impact special-status species populations. Impacts to special-status species would vary by species and would be determined at the project level. Tables 3.21-17 and 3.21-18 quantify potential habitats for each species based on their range within the proposed corridors. Suitability of these areas to support listed species would be determined for specific projects. Alternative C would primarily impact shrubland, grassland, and sagebrush habitats and, therefore, impact several special-status species that rely on these habitats throughout the proposed corridors. There is no Canada lynx critical habitat within 1 mile of Alternative C (Table 3.21-17).

Alternative C includes 242 miles of proposed corridors, resulting in the least amount of potential impacts from increased vehicle traffic, human presence, and water use that could affect special-status species if corridors are developed. Impacts to species would be minimized by implementing project design features, BMPs, and RMP stipulations (see Appendix E).

3.21.7.5 Greater Sage-Grouse

Alternative C overlaps PHMA and GHMA for greater sage-grouse. Table 3.21-9 lists the number of acres within the analysis areas. There are 210.9 acres of PHMA and 7,052.5 acres of GHMA crossed by Alternative C. There are 280,276.2 acres of PHMA and 649,420.8 acres of GHMA within the analysis areas.

Table 3.21-9. Acreages of Priority Habitat Management Areas and General Habitat Management Areas within the Analysis Areas

PHMA		GHMA	
Acres within Corridor	**Acres within 4-Mile Buffer**	**Acres within Corridor**	**Acres within 2-Mile Buffer**
210.9	280,276.2	7,052.5	649,420.8

Alternative C is within 2 miles of 12 leks and within 4 miles of 28 leks. Table 3.21-10 lists the average peak male counts at those leks within the last 20 years.

Table 3.21-10. Average Peak Male Count at Leks within the Analysis Areas

Average Peak Male Count at Leks within 2 miles	Average Peak Male Count at Leks within 4 miles
23.0	24.7

3.21.8 Environmental Effects – Alternative D

3.21.8.1 Big Game

Alternative D overlaps crucial winter range for elk, mule deer, pronghorn, and moose; parturition areas for elk, mule deer, pronghorn, and moose; and migration corridors for mule deer. Table 3.21-11 lists the acres and linear miles of the area of analysis for Alternative D within each big game seasonal habitat type along with the percentage of each seasonal habitat type within the area of analysis.

Table 3.21-11. Acreages and Linear Miles of Alternative D Area of Analysis within Big Game Seasonal Habitats and Percentage of Seasonal Habitats within Area of Analysis

Species	Seasonal Habitat Type	Acres within Area of Analysis	Percentage of Seasonal Habitat Type Impacted	Linear Miles within Area of Analysis
Elk	Crucial winter range	91,868	2.11%	72
	Parturition area	15,929	0.52%	12
Mule deer	Crucial winter range	296,399	4.68%	220
	Parturition area	812	0.35%	0
	Migration corridor	17,146	1.41%	13

Species	Seasonal Habitat Type	Acres within Area of Analysis	Percentage of Seasonal Habitat Type Impacted	Linear Miles within Area of Analysis
Pronghorn	Crucial winter range	501,107	8.39%	404
	Parturition area	373	1.36%	0
Moose	Crucial winter range	17,057	1.32%	10
	Parturition area	2,419	2.74%	1
Bighorn sheep	Crucial winter range	0	0.00%	0
	Parturition area	0	0.00%	0
White-tailed deer	Crucial winter range	0	0.00%	0

3.21.8.2 Migratory Birds Including Raptor Species

GAP vegetation classification data at the "Division" level were used to determine habitats present within the corridors and a 1-mile buffer. Based on the analysis of GAP vegetation in Section 3.17, Vegetation, Alternative D could impact a variety of migratory bird nesting habitats, including 48,935 acres of shrubland, desert scrub, and grasslands; 3,360 acres of riparian and wetland; 595 acres of forest and woodland; and 488 acres of cliff, rock, and scree (see Table 3.17-3). The amount of habitat removed equates to approximately 2% of available habitats within a 1-mile buffer of the Alternative D corridors; however, temporary indirect impacts to those adjacent habitats could occur due to noise, human presence, fragmentation, and edge effects.

3.21.8.3 Fisheries

Based on AOI within the HUC-8 watersheds, Alternative D may impact the various special-status fish species within the corridors and 1-mile buffer (Table 3.21-12).

Table 3.21-12. Special-Status Fish Species Area of Influence by Watershed, Alternative D

Species	HUC-8 Name	Acres in 1-Mile Buffer	Acres in Corridor
Bluehead sucker	Blacks Fork	0.00	116.33
	Upper Green	44,750.55	1,012.19
	Upper Green-Flaming Gorge Reservoir	0.00	190.58
	Upper Green-Slate	18.33	1,087.95
	Total	**44,768.88**	**2,407.04**
Colorado River cutthroat trout	Upper Green	44,750.51	1,086.67
	Upper Green-Flaming Gorge Reservoir	18.33	187.24
	Total	**44,768.84**	**1,273.91**
Flannelmouth sucker	Bitter	–	1,947.54
	Blacks Fork	–	116.33
	Great Divide closed basin	–	68.62
	Upper Green	44,750.55	1,086.89
	Upper Green-Flaming Gorge Reservoir	–	190.58
	Upper Green-Slate	18.33	1,092.90
	Total	**44,768.88**	**4,502.86**

Species	HUC-8 Name	Acres in 1-Mile Buffer	Acres in Corridor
Roundtail chub	Blacks Fork	8,267.48	81.01
	Upper Green-Slate	208.81	2.93
	Total	**8,476.29**	**83.94**
Yellowstone River cutthroat trout	Big Horn Lake	18,402.31	712.26
	Clarks Fork Yellowstone	4,511.72	40.33
	Dry	0.00	17.08
	Greybull	0.00	1,552.30
	Little Wind	0.00	0.00
	Shoshone	32,620.99	1,695.92
	Upper Bighorn	32,420.76	1,392.71
	Upper Wind	0.00	0.00
	Total	**87,955.78**	**5,410.61**

3.21.8.4 Special-Status Wildlife Species

Impacts to special-status species would vary by species and would be determined at the project level. Tables 3.21-17 and 3.21-18 quantify potential habitats for each species based on their range within the proposed corridors. Suitability of these areas to support listed species would be determined for specific projects. Alternative D would primarily impact shrubland, grassland, and sagebrush habitats, which would affect several special-status species that rely on these habitats throughout the proposed corridors. Alternative D crosses the most riparian habitat and potentially would have the most impact on species, including bats and amphibians, that depend on those habitats. There is no Canada lynx critical habitat within 1 mile of Alternative D (Table 3.21-17).

Alternative D includes 1,866 miles of potential corridors, resulting in vehicle traffic, human presence, and water use that could affect special-status species that would be similar to Alternative B; however, Alternative D re-routes corridors around priority sage-grouse habitat, which could reduce impacts to sagebrush species (see Section 3.21.5). Impacts to species would be minimized by implementing project design features, BMPs, and RMP stipulations (see Appendix E).

3.21.8.5 Greater Sage-Grouse

Alternative D overlaps PHMA and GHMA for greater sage-grouse. Table 3.21-13 lists the number of acres within the analysis areas. There are 17,405.9 acres of PHMA and 37,837.3 acres of GHMA crossed by Alternative D. There are 2,940,330.2 acres of PHMA and 3,065,454.5 acres of GHMA within the analysis areas.

Table 3.21-13. Acreages of Priority Habitat Management Areas and General Habitat Management Areas within the Analysis Areas

PHMA		GHMA	
Acres within Corridor	**Acres within 4-Mile Buffer**	**Acres within Corridor**	**Acres within 2-Mile Buffer**
17405.9	2,940,330.2	37,837.3	3,065,454.5

Alternative D is within 2 miles of 54 leks and within 4 miles of 211 leks. Table 3.21-14 lists the average peak male counts at those leks within the last 20 years.

Table 3.21-14. Average Peak Male Count at Leks within the Analysis Areas

Average Peak Male Count at Leks within 2 miles	Average Peak Male Count at Leks within 4 miles
14.3	23.4

3.21.9 Summary of Effects

3.21.9.1 Big Game

The three action alternatives would temporarily restrict big game movement and temporarily displace big game from areas of construction and operations within crucial winter range, parturition areas, and migration corridors for the duration of the activity. Table 3.21-15 summarizes whether each alternative would affect a big game seasonal habitat.

Table 3.21-15. List of Alternatives and Whether They Would affect a Big Game Seasonal Habitat

Species	Seasonal Habitat Type	Alternative A	Alternative B	Alternative C	Alternative D
Elk	Crucial winter range	No	Yes	Yes	Yes
	Parturition area	No	Yes	Yes	Yes
Mule deer	Crucial winter range	No	Yes	Yes	Yes
	Parturition area	No	Yes	No	Yes
	Migration corridor	No	Yes	No	Yes
Pronghorn	Crucial winter range	No	Yes	Yes	Yes
	Parturition area	No	Yes	No	Yes
Moose	Crucial winter range	No	Yes	Yes	Yes
	Parturition area	No	Yes	Yes	Yes
Bighorn sheep	Crucial winter range	No	Yes	No	No
	Parturition area	No	No	No	No
White-tailed deer	Crucial winter range	No	No	No	No

3.21.9.2 Migratory Birds Including Raptor Species

Primary effects to migratory birds and raptors under all action alternatives may include removal of habitat; increased noise, traffic, and human activity during construction; and decreased habitat quality during reclamation. Alternative B would remove the most acres of vegetation that provides nesting and foraging habitat. For all alternatives, impacts to migratory birds if corridors are developed would be minimized by implementing project design features, BMPs, and RMP stipulations (e.g., seasonal buffers around identified nests) (see Appendix E); therefore, residual impacts would be low.

3.21.9.3 Fisheries

Depending on the alternative, the project may impact a range of 500 to 1500 m of Blue Ribbon streams (six locations on the North Platte River and two on the Shoshone River) and between 250.00 and 3393.17 m of Red Ribbon streams (two locations on Alkali Creek, one at Bates Creek, five at Deer Creek, seven on the Green River, six on Meeteetse Creek and two on Rawhide Creek) (Table 3.21-16).

Table 3.21-16. Potential Disturbance to Blue and Red Ribbon Streams, by Alternative

Alternative	Blue Ribbon Stream Crossings	Total Length* of Blue Ribbon Stream Crossings (m)	Percentage of Potential Disturbance	Red Ribbon Stream Crossings	Total Length* of Red Ribbon Stream Crossings (m)	Percentage of Potential Disturbance
B	2	500	0.014%	9	2,250	0.051%
C	0	0	0.000%	1	250	0.008%
D	6	1,500	0.052%	14	3,393	0.081%

* Quantified by a buffer of 200 m downstream and 50 m upstream of each crossing.

3.21.9.4 Special-Status Wildlife Species

Habitat loss, alteration, and fragmentation may occur for all action alternatives if development of corridors occurs. This could impact special-status species populations if they occur in the proposed corridors. Long-term effects to species could occur if there is a slow recovery of habitat cover during revegetation reclamation of areas disturbed by construction. Grassland and herbaceous plant communities would recover relatively quickly, whereas shrubland and forest communities would take a comparatively longer time to regenerate. During this time, there may be an increase in predation. Table 3.21-17 compares the availability of potentially suitable habitat in the proposed corridors and a 1-mile buffer based on each species' range and required habitats (WYNDD 2020; USFWS 2020b).

Table 3.21-17. Threatened and Endangered Wildlife Species and Their Habitats (acres)

Common Name	Scientific Name	Status	Habitat	Alternative B		Alternative C		Alternative D	
				Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer
Canada lynx	*Lynx canadensis*	Threatened	Forest	170	8146	1	209	46	5290
Canada lynx critical habitat		–	–	0	155	0	0	0	0
Grizzly bear	*Ursus arctos horribilis*	Threatened	Forest	47	6779	9	454	42	5510
Northern long-eared bat	*Myotis septentrionalis*	Threatened	Forest	0	0	0	0	0	0
Black-footed ferret	*Mustela nigripes*	Nonessential experimental	Shrubland	2,049	69,332	0	0	2,544	92,916
North American wolverine	*Gulo gulo luscus*	Proposed threatened	Forest	73	7897	7	397	56	6565
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Riparian	1,448	76,962	298	10,642	1,707	79,325
Western glacier stonefly	*Zapada glacier*	Threatened	Riparian	0	0	0	0	0	0
Kendall Warm Springs dace	*Osculus thermalis*	Endangered	Riparian	0	0	0	0	0	0
Platte River species AOI*		–	Riparian	10,725	446,810	577	34,578	10,951	464,498
Colorado River fish AOI†		–	Riparian	9,320	461,175	1,014	61,045	8,223	403,063

Sources: USFWS (2020a); WYNDD (2020).

* AOI for least tern, endangered; pallid sturgeon, endangered; piping plover, threatened; and whooping crane, endangered.

† AOI for bonytail (*Gila elegans*), endangered; Colorado pikeminnow (*Ptychocheilus lucius*), endangered; humpback chub (*Gila cypha*), endangered; and razorback sucker (*Xyrauchen texamus*), endangered.

Table 3.21-18 compares the availability of potentially suitable habitat in the proposed corridors based on a BLM sensitive species' range and required habitats (WYNDD 2020).

Table 3.21-18. Bureau of Land Management Sensitive Wildlife Species and Their Habitats (acres)

Common Name	Scientific Name	Habitat	Alternative B		Alternative C		Alternative D	
			Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer
Mammals								
Pygmy rabbit	*Brachylagus idahoensis*	S	24,115	1,047,180	2,013	102,128	20,245	894,612
Townsend's big-eared bat	*Corynorhinus townsendii*	F, R	2,484	134,840	422	18,215	2,792	138,844
White-tailed prairie dog	*Cynomys leucurus*	S	45,526	1,919,937	5,772	277,697	42,036	1,783,522
Black-tailed prairie dog	*Cynomys ludovicianus*	S	100	511,317	4	32,805	94	496,383
Spotted bat	*Euderma maculatum*	F, R	993	50,756	310	11,097	999	48,960
Long-eared myotis	*Myotis evotis*	F, R	2,570	142,871	556	22,615	3,178	150,340
Fringed myotis	*Myotis thysanodes*	F, R	1,828	96,776	518	19,897	2,104	95,605
Wyoming pocket gopher	*Thomomys clusius*	S	9,152	381,280	325	18,476	8,353	355,773
Idaho pocket gopher	*Thomomys idahoensis*	S	3,003	151,453	943	54,327	3,092	160,321
Swift fox	*Vulpes velox*	S	34,164	1,503,225	2,108	110,802	32,400	1,391,535
Birds								
Baird's sparrow	*Ammodramus bairdii*	S	5,306	236,599	296	19,121	5,312	239,514
Northern goshawk	*Accipiter gentilis*	F	466	34,578	24	1,873	595	37,756
Sagebrush sparrow	*Artemisiospiza nevadensis*	S	52,327	2,205,226	6,124	297,569	48,935	2,083,020
Burrowing owl	*Athene cunicularia*	S	52,327	2,205,226	6,124	297,569	48,935	2,083,020
Ferruginous hawk	*Buteo regalis*	S	52,327	2,205,226	6,124	297,569	48,935	2,083,020
Greater sage-grouse	*Centrocercus urophasianus*	S	52,327	2,205,226	6,124	297,569	48,935	2,083,020
Mountain plover	*Charadrius montanus*	S	52,327	2,205,226	6,124	297,569	48,935	2,083,020
Trumpeter swan	*Cygnus buccinators*	R	772	38,190	188	8,558	1111	44,544
Peregrine falcon	*Falco peregrinus*	F, C	1,016	58,928	24	1,903	1083	55,602
Bald eagle	*Haliaeetus leucocephalus*	R	3,082	152,141	607	25,354	3,360	152,713
Loggerhead shrike	*Lanius ludovicianus*	S, D	53,061	2,239,054	6,325	304,885	50,189	2,124,880
Long-billed curlew	*Numenius americanus*	S	52,327	2,205,226	6,124	297,569	48,935	2,083,020
Sage thrasher	*Oreoscoptes montanus*	S	52,327	2,205,226	6,124	297,569	48,935	2,083,020
White-faced ibis	*Plegadis chihi*	R	3,082	152,141	607	25,354	3,360	152,713
Brewer's sparrow	*Spizella breweri*	S	52,327	2,205,226	6,124	297,569	48,935	2,083,020

Common Name	Scientific Name	Habitat	Alternative B		Alternative C		Alternative D	
			Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer	Proposed Corridors	1-Mile Buffer
Fish								
Bluehead sucker	*Catostomus discobolus*	HUC	2,724	137,537	757	121,010	2,407	44,769
Flannelmouth sucker	*Catostomus latipinnis*	HUC	5,147	261,799	757	229,372	4,503	44,769
Roundtail chub	*Gila robusta*	HUC	328	19,667	0	0	84	8,476
Yellowstone cutthroat trout	*Oncorhynchus clarkii bouvieri*	HUC	5,446	246,244	1,917	243,058	5,411	87,956
Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*	HUC	1,229	65,196	757	67,377	1,274	44,768
Reptiles/Amphibians								
Great Basin spadefoot	*Spea intermontana*	S, R	20,251	905,955	2168	108,813	17693	780,679
Midget faded rattlesnake	*Crotalus viridis concolor*	S, C	52,877	2,229,576	6,124	297,599	49,423	2,100,866
Northern leopard frog	*Rana pipiens*	R	3,082	152,141	607	25,354	3,360	152,713

Sources: BLM (2010c); WYNDD (2020).

Note: F = forest, woodland; S = shrubland, grassland, sagebrush; D = developed, disturbed; R = riparian, wetland, streams, lakes/shoreline; and C = cliff, rock, scree. For fish, habitat is the watersheds (HUC) within a species range.

All alternatives could result in some level of direct and indirect impacts to special-status wildlife species due to increased vehicle traffic, noise, human presence, and water use. Species avoidance would depend on the scale and duration of the human activity. Most impacts would occur temporarily during construction but would be minimized by implementing project design features, BMPs, and RMP stipulations. Impacts during pipeline operations would be minimal due to decreased traffic and human presence.

3.21.9.5 Greater Sage-Grouse

Direct impacts to greater sage-grouse that may occur if corridors are developed include surface disturbance to important habitats, mortality resulting from collisions, and destruction of nests and nest abandonment. Indirect impacts to greater sage-grouse include habitat fragmentation, increased noise levels and human activity, dispersal of noxious weeds and invasive plant species, increased risk of wildfire, dust effects, potential for increased presence of West Nile virus, and increase in predation.

Table 3.21-19 provides a comparison of acres of PHMA and GHMA within the analysis areas. Alternative B would affect the most acres of PHMA and Alternative D would affect the most acres of GHMA. Alternative C would affect the least acres of both PHMA and GHMA.

Table 3.21-19. Acreages of Priority Habitat Management Areas and General Habitat Management Areas within the Analysis Areas

Alternative	PHMA		GHMA	
	Acres within Corridor	Acres within 4-Mile Buffer	Acres within Corridor	Acres within 2-Mile Buffer
B	22,558.0	3,510,624.9	34,898.8	2,892,962.0
C	210.9	280,276.2	7,052.5	649,420.8
D	17,405.9	2,940,330.2	37,837.3	3,065,454.5

Table 3.21-20 provides a comparison of leks and average peak male counts within the analysis areas. The average peak male count at leks within PHMA and within 4 miles of the corridors is similar for all alternatives. The average peak male count at leks within GHMA and within 2 miles of the corridors is highest at leks in proximity to Alternative C; Alternative B and Alternative D have similar average peak male counts within the analysis area.

Table 3.21-20. Number of Leks and Average Peak Male Count at those Leks within the Analysis Areas

Alternative	PHMA		GHMA	
	Number of Leks	Average Peak Male Count within 4 miles	Number of Leks	Average Peak Male Count within 2 miles
B	266	25.6	57	13.9
C	28	24.7	12	23.0
D	211	23.4	54	14.3

3.21.10 Irretrievable and Irreversible Impacts and Short-Term Uses versus Long-Term Productivity

New utility corridor designation or reservation in existing corridors would not result in any irretrievable and irreversible wildlife or fisheries impacts. Future potential development of corridors would result in noise and activities that may cause temporary displacement of big game, migratory birds, and other wildlife species from key habitats. Habitat may also be decreased through vegetation removal during ROW development. Within each corridor, there would be a long-term reduction in shrub and tree cover for ROW maintenance (10-foot-wide maintenance corridor for each ROW). Wyoming big sagebrush and other sagebrush shrubs can take 35 to 120 years to re-establish in a disturbed ROW through natural propagation. In the case of shrub and tree cover for ROW maintenance, impacts would be considered irretrievable until revegetation is successfully accomplished. Irreversible impacts would include wildlife mortality from vehicular collisions should any occur. Together, these impacts could affect the short-term productivity of terrestrial wildlife (through some habitat loss and potential mortalities) but are not expected to affect long-term productivity of wildlife in the area. Future potential development also has the potential to result in increased sedimentation in the watershed, flow alterations due to construction, and dewatering activities, which can be irreversible.

CHAPTER 4. CUMULATIVE IMPACTS

4.1 INTRODUCTION

This section analyzes the cumulative impacts of project alternatives and past, present, and reasonably foreseeable future actions affecting the same resources as those alternatives (40 CFR 1508.7). As defined in 40 CFR 1508.7 (CEQ regulations for implementing NEPA), a cumulative impact is an effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or nonfederal) or person undertakes such actions. Cumulative effects may result from individually minor but collectively significant actions occurring over a period of time.

4.2 IMPACT ASSESSMENT METHODOLOGY

The cumulative impact of past and present actions is represented through the description of the affected environment section for each resource section (CEQ 2005). Reasonably foreseeable future actions include proposed implementation-level projects, future management from state and local government plans, and future management from federal land use plans. These reasonably foreseeable future actions include projects that are proposed or part of ongoing management plans. They do not include speculative actions (not proposed or developed at a level to allow analysis) or pending management plans that have not progressed enough to develop proposed management. A list of these reasonably foreseeable future actions is found in Appendix H. Because of the extent of the proposed corridors, cumulative impacts were generally analyzed at a statewide scale to encompass all the BLM-administered land that could be impacted by the proposed project.

4.3 AIR QUALITY

The Community Multiscale Air Quality emission inventory and modeling done for the Moneta Divide EIS provides analysis of the cumulative impacts of reasonably foreseeable future actions throughout the state of Wyoming, including the impact area encompassed by this project. Accordingly, this analysis has been used to inform this cumulative impacts analysis as it includes all of the reasonably foreseeable future actions that would affect the same areas that this project would. Cumulative impacts from reasonably foreseeable future actions vary by pollutants across the state. Current and reasonably foreseeable emissions of NOx, VOC, and SO_2 have the potential to contribute to regional-scale ozone and $PM_{2.5}$ concentrations, as well as regional-scale visibility impairment, deposition of nitrogen and sulfur to soils, and acidification of sensitive lakes. Emissions of coarse PM (PM_{10}) and CO are most likely to affect concentrations of these same pollutants within the near vicinity of specific projects. However, the CMAQ modeling did indicate that future attainment of NAAQS for all criteria pollutants with the exception of ozone for one monitoring site in Sublette County and PM_{10} for two monitoring sites in Sheridan and Sweetwater Counties (Section 5.1, Moneta Divide EIS; BLM 2020g).

4.3.1 Greenhouse Gas Emissions

As discussed in Appendix I, the USGS reports that the total nationwide emissions estimate for federal minerals in 2014 was approximately 1,279.53 Mmt CO_2e, and federal lands in Wyoming contributed approximately 727.7 Mmt CO_2e (57%) in 2014 (Merrill et al. 2018). Compared to these nationwide federal totals, Wyoming's federal direct emissions from extractive activities in oil and natural gas systems in 2014 were 9.089 Mmt CO_2e, and indirect emissions from stationary combustion activities totaled 75.18

Mmt CO_2e. Total gross national GHG emissions in 2017 were 6,456.7 Mmt CO_2e, and emissions from fossil fuel combustion were 4,912 Mmt CO_2e (EPA 2019b; see Appendix I).

Total gross emissions for the year 2020 based on BLM Wyoming field office planning documents is projected to be approximately 86.2 Mmt CO_2e (5.7 Mmt CO_2e direct emissions and 80.5 Mmt CO_2e indirect emissions; see Appendix I). Additional indirect emissions from potential future CO_2-EOR on an annual basis is projected to add 15.4 Mmt CO_2e (see Section 3.2.4.1). Two programmatic oil and gas documents that have recently been completed or are nearing completion provide CO_2e projections. The analysis in the Moneta Divide EIS estimates that the project could emit on an annual basis approximately 26 Mmt CO_2e (direct and indirect). Similarly, the analysis in the Converse County EIS estimates that approximately 28 Mmt CO_2e per year would be emitted.

Recent amendments to the Buffalo RMP project that gross coal emissions would average approximately 368.2 Mmt per year (BLM 2019a) and gross oil and gas emissions would average approximately 988,015 mt per year (BLM 2019a). Although the BLM Casper Field Office planning area also includes coal fields, emissions from coal in this planning area are not considered reasonably foreseeable due to market downturns and lack of activity.

In summary, total annual emissions from oil and gas operations in Wyoming (based on BLM planning documents, the Moneta Divide EIS, and the Converse County EIS), including indirect emissions estimates from potential future CO_2-EOR, are estimated at 156 Mmt CO_2e. With the addition of the potential for 381 Mmt being sequestered through the use of CO_2-EOR (see Section 3.2.4.1), the net effect would be approximately 225 Mmt not being released to the atmosphere. The estimated cumulative annual emissions from oil and gas operations in Wyoming (156 Mmt CO_2e) is approximately 2.4% of EPA's 2017 gross national GHG emissions (6,456.7 Mmt CO_2e). Compared to the Global Carbon Project's projected 2018 total of 4.0 gigatons (Global Carbon Project 2019) from oil and gas activities in the United States, the total Wyoming federal cumulative emission estimate represents approximately 3.9%.

4.4 CULTURAL RESOURCES

The cumulative impacts of past and present actions on cultural resources and their associated settings in the planning area are represented by the description of the existing affected environment. Reasonably foreseeable future actions with potential to impact cultural resources include all surface-disturbing activities that could result in impacts to cultural sites and cultural setting (see Appendix F). The total amount of disturbance associated with these developments is approximately 386,198 acres throughout the state. Additionally, the cumulative impacts of visual impacts and noise within the viewshed or noise attenuation range of culturally sensitive areas would affect cultural setting (see Noise and Visual Resources cumulative impacts). All future proposed projects with the potential to contribute to impacts to cultural resources would be required to comply with the Section 106 consultation process as mandated by the National Historic Preservation Act. Through this process, the BLM and consulting parties would determine how to avoid, minimize, or mitigate impacts to those resources.

4.5 FIRE AND FUEL LOADS

The cumulative impacts of past and present actions on woodlands in the planning area are represented by the description of the existing affected environment. Reasonably foreseeable future actions with potential to affect fire and forestry include surface-disturbing activities that would remove both fine and course fuels, thereby reducing fire risk. However, it should also be noted that increased infrastructure and developed acreage under operation does increase risk of ignition (see Appendix D). The total amount of cumulative removal of fuels would be approximately 386,198 acres of vegetation, largely within dry

shrubland/grassland cover types. All of this cumulative development would be required to comply with existing RMP requirements related to management of vegetation, fire, and forestry products. For additional details on ongoing BLM and USFS management of fire and forestry, please reference the BLM RMPs and forest plans listed in Section 1.5.2.

4.6 GEOLOGY AND SOILS

The cumulative impacts of past and present actions on geologic resources in the planning area are represented by the description of the existing affected environment. The total amount of disturbance associated with potential future developments within corridors is approximately 386,198 acres throughout the state. There are no documented reasonably foreseeable future actions with the potential to affect geologic stability or sensitive geologic formations. The cumulative impacts of past and present actions on soils in the planning area are represented by the description of the existing affected environment. Reasonably foreseeable future actions with potential to impact soils include all reasonably foreseeable future actions that would remove surface vegetation, disturb soils (see Appendix H), and create the potential for soil erosion and subsequent sedimentation. The total amount of disturbance associated with these developments is approximately 386,198 acres. It is unknown how many of these reasonably foreseeable future actions would occur on highly erodible soils. The current BLM RMPs and forest plans require specific stipulations for site-specific projects to prevent cumulative long-term loss of soils or soil productivity through disturbance and subsequent erosion.

4.7 HAZARDOUS MATERIALS AND WASTES

Although hazardous materials and wastes would be transported, stored, handled, and disposed in accordance with applicable federal, state, and local regulations (EPG 2015), and projects would include industry standards to minimize health and safety risks, including implementation of SPCC plans and hazardous materials location restrictions, spills do still occur. In terms of cumulative impacts related to hazardous materials, the increased reasonably foreseeable development would result in a concomitant increase in risk of hazardous spills. In 2018, the Wyoming Oil and Gas Conservation Commission reported 715 spills, or an average of 2 two spills a day (Petroleum Association of Wyoming 2020). Based on a potential reasonably foreseeable development of 26,665 wells, this number of spills could more than double at full production build out to a risk of a cumulative total of 1,430 spills per day if existing wells are still producing at the current rate.

4.8 LAND USE AND REALTY

The cumulative impacts of past and present actions on lands and realty in the analysis area (planning area) are represented by the description of the existing affected environment. None of the reasonably foreseeable future actions outlined in Appendix H would have cumulative effects on lands and realty as none of the proposed uses would affect land tenure, existing or proposed ROWs, or designated or proposed utility corridors, and all uses would be in accordance with FLPMA, the Mineral Leasing Act, Recreation and Public Purposes Act, BLM Manual 6220, and other applicable BLM regulations. Alternatives B through D do contribute cumulatively to lands and realty impacts by proposing new designated utility corridors or reserved use within existing corridors. The direct and indirect impacts of Alternatives B through D are also representative of the cumulative impacts to land use described in Chapter 3.

4.9 LIVESTOCK GRAZING

The cumulative impacts of past and present actions on livestock grazing in the planning area are represented by the description of the existing affected environment. Reasonably foreseeable future actions with potential to impact range vegetation, and subsequently grazing allotments, include all reasonably foreseeable future actions that would remove vegetation through surface-disturbing activities (see Appendix H). The total amount of disturbance associated with these developments is approximately 386,198 acres, which represent approximately 1.3% of the total federally managed vegetation and habitat resources statewide. This relatively low cumulative total would not remove enough forage to preclude continued livestock operations by grazing permittees.

4.10 MINERAL RESOURCES

The cumulative impacts of past and present actions on minerals in the state are represented by the description of the existing affected environment. Reasonably foreseeable future actions that would affect the minerals of the state include oil and gas extraction, leasable solid mineral development, and locatable mineral development. Reasonably foreseeable oil and gas development totals an estimated 36,144 wells over the life of the project. This approximates the current number of producing wells in Wyoming. It is difficult to estimate what production from these wells would be, however, based on current production rates for a similar number of wells; this would extract cumulatively approximately 18.4 million barrels of oil and 1.3 trillion cubic feet of natural gas (Petroleum Association of Wyoming 2019). Additionally, there is approximately 3,072 acres of reasonably foreseeable uranium development (with approximately 2 to 4 million pounds of uranium per year expected to be extracted) and 3,957 acres of reasonably foreseeable coal development (estimated total of 500 million tons of coal extracted).

4.11 NOISE

The cumulative impacts of past and present actions on noise in the planning area are disclosed in the description of the existing affected environment. Reasonably foreseeable future actions with potential to impact noise within the state include any development (see Appendix H), all of which create noise through construction and operation. The relative impacts of cumulative noise can be estimated through the 386,198 acres of estimated reasonably foreseeable future development. In general terms, surrounding areas within 0.50 to 0.75 mile from these areas would be periodically subject to both construction and operational noise. Most of this development would be occurring in already developed areas and would not cause health and safety issues to residents. However, it would displace wildlife and impact the aesthetics for visitors to public lands in those areas where the development occurs.

4.12 PALEONTOLOGICAL RESOURCES

The cumulative impacts of past and present actions on paleontological resources in the planning area are represented by the description of the existing affected environment. Reasonably foreseeable future actions with potential to impact paleontological resources include all surface-disturbing activities that could result in impacts to fossils or geologic formations (see Appendix H). The total amount of disturbance associated with these developments is approximately 386,198 acres throughout the state. However, it should be noted that all of the RMPs through which the proposed corridors would occur include requirements to minimize or avoid impacts to paleontological resources and to maintain the long-term sustainability of this resource. Respective BLM field office RMPs and USFS plans include stipulations to maintain the long-term sustainability of these resources.

4.13 PUBLIC HEALTH AND SAFETY

Reasonably foreseeable future actions that would affect the public safety include oil and gas extraction, leasable solid mineral development, and locatable mineral development. In terms of public safety, transportation accidents were a leading cause of injury and death in Wyoming in 2018 (Edwards 2020). Reasonably foreseeable oil and gas development provides an indicator of potential increases in transportation in the state. Reasonably foreseeable oil and gas development totals an estimated 26,665 wells over the life of the project. Cumulatively, travel while working in these developments is the highest cause of injuries and/or mortalities. Cumulative oil and gas development could more than double vehicle trips in Wyoming with concomitant increase in risk of accidents. Note that all proposed projects would be subject to federal, state, and local regulations and industry standards that focus on worker health and safety protection. Project features would include measures to avoid or minimize health and safety risks or degradation of resources that would lead to health and safety risks. However, based on existing data, that would not completely remove this cumulative risk.

4.14 RECREATION

The cumulative impacts of past and present actions on recreation in the planning area are disclosed in the description of the existing affected environment. Reasonably foreseeable future actions with potential to impact recreation include any project development that would involve developed industrial infrastructure that would affect existing recreational experience (see Appendix H). This could include visual contrast and noise from infrastructure construction and subsequent operation. Total cumulative disturbance that could impact recreational experience includes approximately 386,198 acres that would be directly disturbed. This represents less than 1% of the total public-managed lands available for recreation throughout the state.

4.15 SOCIOECONOMICS

The cumulative impacts of past and present actions on socioeconomics in the state are represented by the description of the existing affected environment. Reasonably foreseeable future actions that would affect the socioeconomics of the state are largely driven by reasonably foreseeable mineral development in the state. Reasonably foreseeable oil and gas development totals an estimated 26,665 wells over the life of the project. This, combined with reasonably foreseeable development scenarios for BLM field offices within the is projected to create a cumulative total of approximately 5,000 to 6,000 jobs annually over the life of reasonably foreseeable projection scenario (20 to 30 years). This prediction is similar to the current number of employees directly employed by the oil and gas industry for a similar number of existing wells (approximately 7,000 jobs). With the similarity in the existing number of producing wells (25,116 wells) and the reasonably foreseeable development scenario (26,665 wells), the additional cumulative socioeconomic contributions would be similar. This would include an estimated total payroll for that reasonably foreseeable development of an additional approximately $668 million per year at full development. Cumulative tax, royalties, and lease revenues from that reasonably foreseeable development is estimated to be approximately $900 million per year at full development (Center for Western Priorities 2020). Reasonably foreseeable uranium and coal development would also contribute to this (see Appendix H). Note that socioeconomic contributions from future development over this long of a time period can vary widely based on economic conditions and the price of oil, natural gas, coal, uranium, trona, and other leasable and locatable minerals.

Conversely, reasonably foreseeable development would effectively remove approximately 386,198 acres of land that provide recreational opportunity in Wyoming. This represents approximately 2% of the federally managed land in the state. Recreation in Wyoming is estimated to contribute $1.6 billion or

4.4% of the state's overall economy (Bureau of Economic Analysis 2019). Loss of these lands recreational value would cumulatively impact the ability of the state to provide that recreational opportunity and would affect that economic contribution.

4.16 SPECIAL DESIGNATIONS

The Greater Sand Dunes ACEC and the Jackson Canyon ACEC both could be impacted by general reasonably foreseeable oil and gas development that could occur. These impacts could include visual impacts and noise impacts from development outside of the ACECs. However, there are not any specific known reasonably foreseeable projects that would directly impact these ACECs at this time. Any specific oil and gas or other permitted projects that do arise would be analyzed through site-specific NEPA at the time the project is proposed. Proposed projects would be required to conform to all specific BLM RMP requirements for the protection of the relevant and important values for that ACEC.

4.17 TRANSPORTATION

The cumulative impacts of past and present actions on travel and transportation management in the planning area are represented by the description of the existing affected environment. Reasonably foreseeable future actions with the greatest potential to impact travel and transportation include project oil and gas developments that would create additional traffic throughout the analysis area. Cumulative increases in oil and gas development are estimated to be approximately 26,665 wells. In general, with fracking, vehicle trips for oil and gas drilling can range from 1,000 to 2,000 trips per well for the life of the well (Colorado Department of Transportation 2015). To establish the context of this cumulative increase, in 2019 there were an estimated 25,605 producing wells in Wyoming (Petroleum Association of Wyoming 2019). A typical well can expect 560 trips a year, or 1.5 trips per well pad per day during production (Colorado Department of Transportation 2015). Accordingly, it is estimated that existing operating wells throughout the state create approximately 38,408 vehicle trips per day, and at full development, reasonably foreseeable development would add an additional 39,998 vehicle trips per day at full development.

4.18 VEGETATION

The cumulative impacts of past and present actions on vegetation in the planning area are represented by the description of the existing affected environment. Reasonably foreseeable future actions with potential to impact vegetation include all reasonably foreseeable future actions that would remove vegetation through surface-disturbing activities (see Appendix H). The total amount of disturbance associated with these developments is approximately 386,198 acres, which represent approximately 1.3% of the total federally managed vegetation and habitat resources statewide. This disturbance would largely be in shrubland/desert scrub, grassland, or previously disturbed areas.

4.19 VISUAL RESOURCES

The cumulative impacts of past and present actions on visual resources are reflected in the description of the existing affected environment and the current visual resource inventory for the planning area. Reasonably foreseeable future actions within the planning area with the potential to impact visual resources development that would result in surface disturbance and placement of human-created facilities (Appendix H). Within the cumulative impacts analysis area, this includes reasonably foreseeable oil and gas facilities, mining facilities, roads, and other infrastructure projects. This reasonably foreseeable future development would comprise 386,198 acres of disturbance. These developments would all be required to

comply with existing VRM designations for the respective field offices where they occur. The cumulative impacts of managing those lands for those VRM designations have been analyzed in detail in the respective EISs for those field offices.

4.20 WATER

The cumulative impacts of past and present actions on water resources in the planning area are represented by the description of the existing affected environment. Reasonably foreseeable future actions with potential to impact soils and subsequently water include all reasonably foreseeable future actions that would remove surface vegetation, disturb soils (see Appendix H), and create the potential for soil erosion and subsequent sedimentation impacts to surrounding perennial waterbodies The total amount of disturbance associated with these developments is approximately 386,198 acres, which represents approximately 1% of the total watershed acreage that is federally managed within the state. The current BLM RMPs and forest plans require specific stipulations for site-specific projects to prevent cumulative long-term impacts to water resources.

4.21 WILD HORSES

The cumulative impacts of past and present actions on wild horses in the planning area are represented by the description of the existing affected environment. Reasonably foreseeable future actions with potential to impact wild horse HMAs include all reasonably foreseeable future actions that would remove vegetation forage through surface-disturbing activities or that would disturb wild horses through human presence and disturbance (see Appendix H). Most of the wild horse HMAs are subject to leasable and locatable mineral development and the placement of ROWs. The total acreage of HMAs in Wyoming represents approximately 20% of the total land managed by BLM. It is difficult to predict how much reasonably foreseeable development would occur on HMAs, particularly with regard to oil and gas reasonably foreseeable development. However, assuming that it would occur throughout the BLM planning area, an estimated cumulative total of 76,492 acres of wild horse HMA could be cumulatively impacted over the next 20 to 30 years. This represents approximately 2% of the total existing HMA acreage.

4.22 WILDLIFE AND FISHERIES

The cumulative impacts of past and present actions on wildlife habitat in the planning area are represented by the description of the existing affected environment. Reasonably foreseeable future actions with potential to impact vegetation and subsequently wildlife habitat include all reasonably foreseeable future actions that would remove habitat through surface-disturbing activities (see Appendix H). The total amount of disturbance associated with these developments is approximately 386,198 acres, which represent approximately 1.3% of the total federally managed vegetation and habitat resources statewide. This disturbance would largely be in shrubland/desert scrub, grassland, or previously disturbed areas. Wildlife species that would be cumulatively impacted include big game, nongame species, migratory bird species (including greater sage-grouse), and raptors.

The potential for soil erosion and subsequent sedimentation to surrounding perennial waterbodies could cause impacts to water quality that would cumulatively impact fisheries. However, BMPs for the BLM field offices, forest plans standards and guidelines, and WDEQ regulations were developed to mitigate these potential impacts and maintain long-term sustainability to fish-bearing waters and water quality in the state.

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APPENDIX A

Consultation and Coordination

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INTRODUCTION

Council on Environmental Quality (CEQ) regulations implementing National Environmental Policy Act (NEPA) require that federal agencies provide meaningful opportunities to the public and stakeholders to provide input and identify their concerns during an environmental impact statement (EIS) process. Federal laws such as the Endangered Species Act, the Clean Water Act, and the National Historic Preservation Act of 1966, as amended, mandate public involvement and consultation with agencies or federally recognized tribal governments. This appendix provides information on the consultation and coordination that occurred during the NEPA process for the Wyoming Pipeline Corridor Initiative EIS.

AGENCY CONSULTATION

CEQ regulations implementing NEPA allow the lead agency to invite tribal, state, and local governments, as well as federal agencies, to serve as cooperating agencies during the NEPA process. To serve as a cooperating agency, the potential agency or government must have either jurisdiction by law or special expertise relevant to the environmental analysis. State agencies are cooperators under the memorandum of agreement between the Bureau of Land Management (BLM) and State of Wyoming. Agencies not listed below may later become cooperating agencies if they are found to have jurisdiction by law or special expertise. The following agencies were invited to be cooperators:

- Albany County Commissioners
- Big Horn Commissioners
- Bureau of Indian Affairs
- Bureau of Reclamation
- Campbell County Commissioners
- Campbell County Conservation District
- Carbon County Commissioners
- Clear Creek Conservation District
- Coalition of Governments
- Converse County Commissioners
- Department of Revenue
- Fremont County Commissioners
- Hot Springs Conservation District
- Hot Springs County Commissioners
- Johnson Country Commissioners
- Laramie County Commissioners
- Lincoln Conservation District
- Little Snake River Conservation District
- Medicine Bow Conservation District
- Meeteetse Conservation District
- National Park Service
- Natrona County Commissioners
- Office of Surface Mining Reclamation and Enforcement
- Office of the Governor of Wyoming
- Park County Commissioners
- Popo Agie Conservation
- Powder River Conservation District
- Powell-Clarks Fork Conservation District
- Saratoga-Encampment-Rawlins Conservation District
- Shoshone Conservation District
- South Big Horn Conservation District
- State of Wyoming
- Sublette County Commissioners
- Sublette County Conservation District
- Sweetwater County Commissioners
- Sweetwater County Conservation District
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- U.S. Geological Survey
- Uinta County Commissioners
- Washakie County Commissioners
- Washakie County Conservation District

PUBLIC INVOLVEMENT

The formal public scoping process for the Wyoming Pipeline Corridor Initiative (WPCI) began on November 15, 2019, with the publication of the notice of intent in the *Federal Register*. The notice of intent initiated the public scoping process and served to notify the public of the BLM's intent to prepare an EIS. The BLM also issued media releases and emails that announced the public scoping period to the mailing list. The mailing list was developed from BLM's mailing list, tribal contacts, and other cooperating agencies. The public comment period concluded on December 27, 2019. Cooperating agency scoping meetings were held at 2 p.m. mountain standard time in Cheyenne, Casper, Thermopolis, and Rock Springs, Wyoming, on December 9, 10, 11, and 12, 2019, respectively. Formal public scoping meetings followed at 4:00 p.m. mountain standard time. The public scoping meetings provided information on the WPCI and gave members of the public and agency personnel the opportunity to ask questions or make comments. The public scoping meetings were open-house forums; representatives from the BLM, the State of Wyoming, and SWCA Environmental Consultants, the third-party NEPA contractor, were available during the public scoping meetings for questions. Meeting attendees were encouraged to review materials and maps and ask questions. The BLM developed several posters that were on display throughout the room; these showed an overview of the WPCI, the WPCI schedule, methods for providing comments, and several overview maps.

Members of the public, tribes, cooperators, and other agencies had several methods for providing comments during the scoping period:

- Comments could be handwritten on comment forms at the scoping meeting. Comment forms were provided to all meeting attendees and were also available throughout the meeting room so attendees could write and submit comments during the meeting.
- Electronic submissions were received via the BLM's ePlanning website: go.usa.gov/xpCMr.

The BLM received a total of 33 submissions from members of the public and the cooperating agencies during the scoping period. In all, 283 unique comments were identified from all 33 submissions. Issue statements were developed from similar comments. All comments were given equal consideration, regardless of method of submittal. For more information on the scoping comments and the scoping analysis process, refer to the January 2020 *Scoping Summary Report, Wyoming Pipeline Corridor Initiative Project Draft Environmental Impact Statement* available on the BLM's ePlanning website at go.usa.gov/xpCMr.

TRIBAL AND SECTION 106 CONSULTATION

The requirements for consultation under the National Historic Preservation Act are in addition to and independent of the opportunity for qualified entities to cooperate under the provisions of NEPA. Letters to initiate tribal consultation were sent to the tribes listed below on December 10, 2019. The letters notified the tribes of the WPCI and requested government-to-government consultation between the BLM and the tribes To date, only the Northern Cheyenne Tribe has responded.

- Blackfeet Nation
- Cheyenne and Arapaho
- Cheyenne River Sioux Tribe
- Chippewa Cree Tribe of the Rocky Boy's Reservation
- Comanche Nation
- Crow Creek Sioux Tribe of the Crow Creek Reservation
- Crow Tribe of Indians
- Eastern Shoshone Tribe of the Wind River Reservation
- Fort Peck Assiniboine and Sioux Tribes

- Lower Brule Sioux Tribe
- Nez Perce Tribe
- North Arapaho Tribe
- Northern Cheyenne
- Oglala Sioux Tribe
- Omaha Tribe of Nebraska
- Ponca Tribe of Nebraska
- Rosebud Sioux Tribe
- Shoshone-Bannock Tribes of Forth Hail Reservation
- Sisseton Wahpeton Oyate of the Lake Traverse Reservation
- Spirit Lake Tribe
- Standing Rock Sioux Tribe
- Three Affiliated Tribes
- The Ute Tribe of the Uintah and Ouray Reservation
- Winnebago Tribe of Nebraska
- Yankton Sioux Tribe

U.S. FISH AND WILDLIFE SERVICES CONSULTATION

The BLM is required to consult with the U.S. Fish and Wildlife Service (USFWS) to determine whether any federally listed or proposed endangered or threatened species or their designated critical habitat are near the proposed corridors. The USFWS was invited to be a cooperating agency and provide comments during scoping and on the draft resource management plan amendment/EIS. The BLM responded to scoping comments from the USFWS and is in coordination with the USFWS regarding this initiative. As the BLM moves toward a preferred alternative, the BLM will work with the USFWSs to determine if any federally listed or proposed endangered or threatened species or their designated critical habitat would be affected by the proposed corridors. If, upon review of existing data, the BLM determines that these species or habitats may be affected by the proposed corridors, the BLM would prepare a biological assessment to identify the nature and extent of adverse impacts, and to recommend mitigation measures that would avoid the habitat and/or species or that would reduce the potential impact to acceptable levels. If, however, the BLM determines that no federally listed or proposed endangered or threatened species or their designated critical habitat would be affected by the WPCI, no further action by the BLM would be necessary.

LIST OF PREPARERS

Tables A-1 and A-2 identify BLM staff and consultants used in the preparation of the EIS.

Table A-1. BLM Staff Used in the Preparation of this Environmental Impact Statement

Name	Entity and Position	Role
Janelle Alleman	State Office Interdisciplinary Team (SO IDT)	Acting Branch Chief – Planning, Social, and Cultural
Thomas Bill	Field	
Kathy Boden	Field	Archeology
Brent Breithaupt	SO IDT	Paleontology
Keith Brown	SO IDT	Recreation
Bonni Bruce	Field	Rawlins Field Office (RFO) – Archeology
Health Cline	Field	RFO - Wildlife

Name	Entity and Position	Role
Holly Elliot	Field	WRBBD – Project and Environmental Coordinator (P&EC)
Jennifer Fleuret	Core team	NEPA and Planning
Susan Foley	Field	RFO – P&EC
Merry Gamper	SO IDT	Minerals
Noelle Glines Bovio	SO IDT	Visuals, Special Designations, and Lands With Wilderness Characteristics
Mark Goertel	SO IDT	Rangeland
Amber Haverlock	Field	Buffalo Field Office (BFO) – Realty Specialist
Kenneth Henke	SO IDT	Weeds and Hazmat
Michael Hogan	SO IDT	Reality
Susan Hunter	Core team	Geographic Information System (GIS)
Sonja Hunt	Field	HDD Resource Advisor
Joshua Jackson	SO IDT	Forestry
Bradley Jost	SO IDT	Riparian
Chris Keefe	SO IDT	Threatened and & Endangered Species (T&E)
Kristen Lenhardt	Management	Public Affairs Officer
Douglas Linn	Field	PRO-AFM Minerals and Lands
Walter Loewen	SO IDT	P&EC
Darren Long	SO IDT	Wildlife – Greater Sage-Grouse
Philip Lowe	Core team	Solicitor
Jennifer Marzluf	SO IDT	Wildlife – Greater Sage-Grouse
Ryan McCammon	SO IDT	Air
Lauren McKeever	SO IDT	P&EC
Erik Norelius	SO IDT	Natural Resources Specialist Fluids
Timothy Novotny	RFO	Assistant Field Manager
Bradford Purdy	Core team	Public Affairs
Kellie Roadifer	Field	Pinedale Field Office
Michael Robinson	Field	Casper Field Office (CFO) – P&EC
Jennifer Schein Dobb	SO IDT	Economist
Heather Schultz	Core team	Project Manager
Michael Valle	Core team	Project Lead
George Varhalmi	SO IDT	Geologist
Jennifer Weber	Field	CFO Reality Specialist
June Wendlandt	SO IDT	Wild Horses
Timothy Wilson	Management	Acting DSD Minerals and Lands
Janelle Wrigley	Field	RFO – Reality

Table A-2 Consultant Staff Used in the Preparation of this Environmental Impact Statement

Name	Role
SWCA Environmental Consultants	
Tom Hale	Project Manager
Amanda Nicodemus	Deputy Project Manager, Chapters 1 and 2, Greater Sage-Grouse
Chris Bockey	Visual
Laren Cyphers	Livestock Grazing, Transportation, and Special Designations; Cumulative Effects
Jeremy Eyre	Soils and Geology, Minerals
David Fetter	Physical Resources Lead
Kara Giblin	Biological Resources Lead; Vegetation and Wildlife and Fisheries
Janet Guinn	Senior NEPA Quality Assistance/Quality Control and Alternatives Development
James Gregory	Fire and Fuel Loads
Joanna Guest	Noise
Vanessa Hastings	Technical Editor
Kimberly Ip	Wild Horses
Laura Klewicki	Public Health and Safety and Hazardous Materials
Jason Kline	Fisheries
Georgia Knauss	Paleontological Resources
Melanie Medeiros	Cultural Resources
Haley Monahan	Water Quality
Naomi Ollie	Tribal Concerns and Cultural Resources
Matt Petersen	Senior NEPA Quality Assistance/Quality Control; Alternatives Development; Cumulative Effects
Ryan Rausch	Visual
Gretchen Semerad	Air Quality
Bryan Swindell	GIS Lead
Linda Tucker Burfitt	Lead Editor
Jennifer Wynn	Lands and Realty, Recreation
Debbi Smith	Formatting and Section 508 Accessibility
BBC Research & Consulting	
Doug Jeavons	Socioeconomics and Environmental Justice
Michael Verdon	Socioeconomics and Environmental Justice

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APPENDIX B

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APPENDIX C

Scoping Report

U.S. Department of the Interior
Bureau of Land Management

Scoping Summary Report

Wyoming Pipeline Corridor Initiative Project
Draft Environmental Impact Statement

January 2020

PREPARING OFFICE

U.S. Department of the Interior
Bureau of Land Management
Wyoming State Office

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1 INTRODUCTION

The Wyoming Pipeline Corridor Initiative Project (WPCI Project or project) is a proposal from the State of Wyoming to designate approximately 1,914 miles of pipeline corridors across private, state, and Bureau of Land Management (BLM)–managed lands throughout the central and western portions of the state that are essential to future production and distribution of oil and gas products viable to the state's economy (Figure 1). Approximately 1,105 miles of the proposed corridors is located on BLM-managed lands in nine field offices: Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland. The WPCI Project as proposed by the State of Wyoming would designate a statewide pipeline corridor network dedicated to pipelines and facilities associated with carbon capture, utilization, and storage (CCUS), and of pipelines and facilities associated with enhanced oil recovery (EOR). The project would not authorize any new pipelines or construction but would amend several BLM resource management plans (RMPs) across the state.

Consideration of the project is a federal action requiring compliance with the National Environmental Policy Act (NEPA) of 1969. To comply with the requirements of NEPA, an environmental impact statement (EIS) is being prepared to disclose the potential environmental impacts associated with the proposed project and to consider alternatives to the project. The BLM Wyoming State Office is the lead agency for the preparation of the EIS. The EIS will inform the public and agencies about the potential impacts the project could have on the human environment.

2 SCOPING PROCESS

The BLM follows the public involvement requirements according to the Council on Environmental Quality (CEQ) regulations set forth in 40 Code of Federal Regulations (CFR) 1501.7, which states "There should be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action." The scoping process was open to agencies, tribes, and the public to identify the range of issues to be addressed during the EIS process. The BLM solicited comments from relevant agencies, tribes, and the public. Additionally, the BLM held internal scoping meetings with resource specialists across the state to solicit feedback on potential resource issues. Comments from both the external and internal scoping meetings were organized and analyzed, and then issues that will be addressed in the EIS analysis were identified.

In addition to the identification of relevant issues, another key objective of the scoping process is to identify alternatives that should be analyzed in detail. Under CEQ regulations, the scope of an EIS consists also of alternatives that warrant consideration and detailed analysis, including the no action alternative, as well as mitigation measures and other reasonable courses of action (40 CFR 1508.25 (b)).

2.1 Publication of the Notice of Intent

The formal public scoping process for the project began on November 15, 2019, with the publication of the notice of intent (NOI) (Appendix A) in the *Federal Register*. The NOI initiated the public scoping process and served to notify the public of the BLM's intent to prepare an EIS. The BLM also issued media releases and emails that announced the public scoping comment period to the project mailing list. The mailing list was developed from the BLM's mailing list, tribal contacts, and other cooperating agencies. The public scoping comment period concluded on December 27, 2019. Although the formal comment period has ended, the BLM will, to the best of its ability, continue to consider all comments received. However, any future scoping comments received may not be formally published in a scoping report or other document.

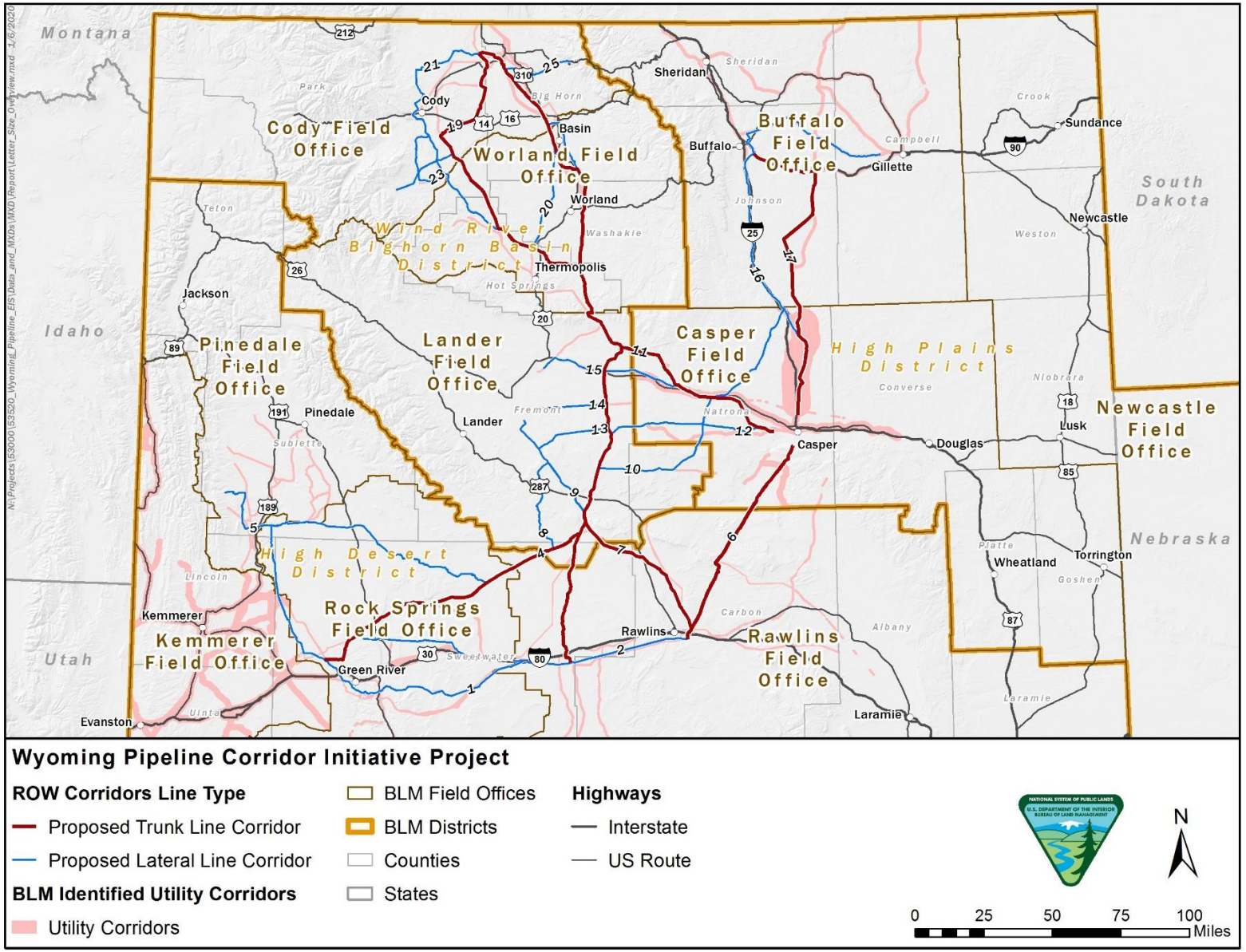

Figure 1. Project Overview

2.2 Scoping Meetings

Cooperating agency scoping meetings were held in Cheyenne, Casper, Thermopolis, and Rock Springs, Wyoming, on December 9, 10, 11, and 12, 2019, respectively, at 2:00 p.m. Mountain Time, and a formal public scoping meeting followed directly after at 4:00 p.m. Mountain Time.

For the cooperating agency meetings, the BLM provided a short presentation summarizing the WPCI project, schedule, and NEPA process and solicited feedback and questions from the cooperating agencies for consideration. Cooperating agencies were able to review all scoping meeting materials including maps and handouts.

The public scoping meetings were open-house forums that provided information on the Proposed Action and gave members of the public the opportunity to ask questions or make comments. Representatives from the BLM, the State of Wyoming, and the third-party NEPA contractor SWCA Environmental Consultants were available during the public scoping meetings for questions. Meeting attendees were encouraged to review materials and maps available and to ask questions.

The BLM developed several posters that were on display throughout the room; these showed an overview of the proposed project, the project schedule, methods for providing comments, and several overview maps. Scoping meeting materials are provided in Appendix B.

2.3 Opportunities for Public Comment

Members of the public, tribes, cooperators, and other agencies had several methods for providing comments during the public scoping comment period:

> Comments could be handwritten on comment forms at the scoping meeting. Comment forms were provided to all meeting attendees and were also available throughout the meeting room so attendees could write and submit comments during the meeting.
>
> Electronic submissions were received via the BLM's ePlanning website: go.usa.gov/xpCMr

3 COOPERATING AGENCIES

The CEQ's regulations implementing NEPA allow the lead agency to invite tribal, state, and local governments, as well as federal agencies, to serve as cooperating agencies during the NEPA process. To serve as a cooperating agency, the potential agency or government must have either jurisdiction by law or special expertise relevant to the environmental analysis.

State agencies are cooperators under the memorandum of agreement between the BLM and State of Wyoming. Agencies not listed below may later become cooperating agencies if they are found to have jurisdiction by law or special expertise.

Agencies invited to be cooperators include the following:

- Albany County Commissioners
- Big Horn County Commissioners
- Bureau of Indian Affairs
- Bureau of Reclamation
- Campbell County Commissioners
- Campbell County Conservation District
- Carbon County Commissioners
- Carbon County Commissioners

- Clear Creek Conservation District
- Coalition of Governments
- Converse County Commissioners
- Department of Revenue
- Fremont County Commissioners
- Hot Springs Conservation District
- Hot Springs County Commissioners
- Johnson County Commissioners
- Laramie County Commissioners
- Lincoln Conservation District
- Lincoln County Commissioners
- Little Snake River Conservation District
- Lower Wind River Conservation District
- Medicine Bow Conservation District
- Meeteetse Conservation District
- National Park Service
- Natrona County Commissioners
- Natrona County Conservation District
- Office of Surface Mining Reclamation and Enforcement
- Office of the Governor of Wyoming
- Park County Commissioners
- Popo Agie Conservation District
- Powder River Conservation District
- Powell-Clarks Fork Conservation District
- Saratoga-Encampment-Rawlins Conservation District
- Shoshone Conservation District
- South Big Horn Conservation District
- State of Wyoming
- Sublette County Commissioners
- Sublette County Conservation District
- Sweetwater County Commissioners
- Sweetwater County Conservation District
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- U.S. Geological Survey
- Uinta County Commissioners
- Washakie County Commissioners
- Washakie County Conservation District

4 TRIBAL CONSULTATION

The requirements for consultation under the National Historic Preservation Act are in addition to and independent of the opportunity for qualified entities to cooperate under the provisions of NEPA. Letters to initiate tribal consultation were sent to the tribes listed below on December 10, 2019. The letters notified the tribes of the proposed project and requested government-to-government consultation between the BLM and the tribes.

- Blackfeet Nation
- Cheyenne and Arapaho Tribes of Oklahoma
- Cheyenne River Sioux Tribe
- Chippewa Cree Tribe of the Rocky Boy's Reservation
- Comanche Nation
- Crow Creek Sioux Tribe of the Crow Creek Reservation
- Crow Tribe of Indians
- Eastern Shoshone Tribe of the Wind River Reservation

- Fort Peck Assiniboine and Sioux Tribes
- Lower Brule Sioux Tribe
- Nez Perce Tribe
- Northern Arapaho Tribe
- Northern Cheyenne
- Oglala Sioux Tribe
- Omaha Tribe of Nebraska
- Ponca Tribe of Nebraska
- Rosebud Sioux Tribe
- Shoshone-Bannock Tribes of the Forth Hail Reservation
- Sisseton Wahpeton Oyate of the Lake Traverse Reservation
- Spirit Lake Tribe
- Standing Rock Sioux Tribe
- Three Affiliated Tribes
- The Ute Tribe of the Uintah and Ouray Reservation
- Winnebago Tribe of Nebraska
- Yankton Sioux Tribe

5 SCOPING COMMENTS

This section summarizes the individual comments received during the formal public scoping comment period and during the BLM's internal scoping process. In accordance with CEQ NEPA regulations (40 CFR 1501.7), it is through the scoping process that the lead agency will

- determine the scope and significant issues to be analyzed in depth in the EIS;
- identify and eliminate from detailed study the issues that are not substantive, narrowing the discussion of such issues to a brief presentation in the EIS about why the project effects related to these particular issues would not have significant effects on the human environment; and
- identify a range of reasonable alternatives that address the issues identified during scoping.

5.1 Public Scoping

5.1.1 Summary of Submissions

The BLM Wyoming State Office received 33 submissions from members of the public, federal agencies, state agencies, organizations, businesses, and cooperating agencies during the public scoping comment period (Table 1). Comments consisted of three handwritten comments submitted during the public scoping meetings and 30 submissions emailed directly to the BLM Project Manager, Heather Schwartz, and/or submitted electronically via the BLM's ePlanning website. All comments were given equal consideration, regardless of method of submittal.

Table 1. Comment Submissions

Submission Number	Date Received	Submission Type	Name
001	12/11/2019	Cooperating agency	Hot Springs County
002	12/11/2019	Individual	Carol Dockery
003	12/12/2019	Individual	David Allison
004	11/18/2019	Individual	Jean Public

Submission Number	Date Received	Submission Type	Name
005	12/19/2019	Cooperating agency	Campbell County Board of Commissioners
006	12/17/2019	Cooperating agency	Board of Carbon County Commissioners
007	12/9/2019	Cooperating agency	Hot Springs County
008	12/3/2019	Federal agency	National Park Service National Trails
009	12/5/2019	Business	Occidental Petroleum Corporation
010	12/20/2019	Organization	Petroleum Association of Wyoming
011	12/20/2019	Business	Power Company of Wyoming LLC/Transwest Express LLC
012	12/16/2019	State agency	Wyoming Department of Environmental Quality, Abandoned Mine Land Program
013	12/27/2019	Cooperating agency	Wyoming County Commissioners Association
014	12/18/2019	Organization	Wyoming Pipeline Authority
015	12/19/2019	State agency	Wyoming Department of Agriculture
016	12/18/2019	State agency	Wyoming Department of Environmental Quality, Air Quality Division
017	12/26/2019	Cooperating agency	Converse County Board of Commissioners
018	12/24/2019	Organization	Enhanced Oil Recovery Institute
019	12/24/2019	Business	Genesis Alkali
020	12/23/2019	Cooperating agency	Hot Springs Conservation District
021	12/26/2019	Cooperating agency	Hot Springs County Natural Resources Planning Committee
022	12/27/2019	Cooperating agency	Saratoga-Encampment-Rawlins Conservation District
023	12/23/2019	Federal Agency	U.S. Fish and Wildlife Service
024	12/27/2019	Cooperating agency	Washakie County Commissioners
025	12/23/2019	State agency	Wyoming Game and Fish Department
026	12/23/2019	Organization	Wyoming Farm Bureau
027	12/19/2019	Cooperating agency	Office of Governor Mark Gordon
028	12/20/2019	Organization	Western Watersheds Project
029	12/18/2019	Cooperating agency	Sweetwater County Board of County Commissioners
030	12/26/2019	Federal agency	U.S. Environmental Protection Agency
031	12/27/2019	Cooperating agency	Washakie County Conservation District
032	12/26/2019	Organization	Wyoming Outdoor Council and Greater Yellowstone Coalition
033	12/27/2019	Organization	Continental Divide Trail Coalition

5.1.2 Methodology and Comment Coding

Once public comment submissions were received, individual comments were identified with a unique numeric identifier and coded according to an initial list of categories (Table 2). If a specific comment pertained to more than one category, that comment was assigned to multiple categories. In total, 283 unique comments were identified from all 33 submissions. Similar comments coded to each category were aggregated and used to develop category questions (Section 5.1.3). Each group of comments contains key categories and a brief summary, identifies all comments used to develop the question, and lists a few representative comments. The selected comments are not all inclusive but are intended to provide a

representative example that is typical of others in the category and to illustrate the common themes and concerns summarized. A complete record of all public comments is available in the project's administrative record.

Table 2. Public Comment Coding Categories

Initial Coding Category	Coding Counts	Percentage of Total
Add to mailing list	4	1%
Air quality	13	3%
Alternatives	32	7%
Avoidance, minimization, and mitigation	60	14%
Cultural resources	1	0%
Cumulative effects	14	3%
Environmental justice	3	1%
General ecological resources	1	0%
Geology and minerals	11	2%
Groundwater	9	2%
Hazardous and solid waste management	3	1%
Land use and access	23	5%
Native American concerns	3	1%
Negative comment (non-substantive)	2	0%
NEPA analysis and related processes	29	7%
Out of scope	8	2%
Positive comment (non-substantive)	20	5%
Proposed Action	27	6%
Public health and safety	6	1%
Purpose and need	5	1%
Range and grazing	12	3%
Recreation	18	4%
Request for additional information	6	1%
Socioeconomics	22	5%
Soils	4	1%
Special-status species	29	7%
Surface water	24	5%
Transportation	5	1%
Vegetation	14	3%
Visual resources	6	1%
Wildlife, general	26	6%

5.1.3 Public Scoping Comments

Air Quality

AIR 1: Would Storage of Large Quantities of CO_2 in the Pipeline Corridor affect Wyoming's GHG Emissions?

(028-009, 030-018, 028-007, 028-008, 028-012, 030-016)
Commenters expressed concern about the scientific uncertainty of CO_2 capture benefits, like those associated with the proposed action. It was recommended that the BLM analyze the net emissions consequences of increased oil production from EOR, as well as the residual, non-captured coal plant emissions potentially enabled by the project. Representative comments follow:

> "Because so much uncertainty exists as to whether the CO_2 pipelines for which the state wishes to see BLM amend nine RMPs would be net CO_2 contributors or net CO_2 negative, BLM's EIS must fully analyze an alternative that assesses the impacts of the possible net CO_2 outcomes and discuss how the impacts of a net CO_2 contributor outcome would be minimized, avoided, and mitigated." (028-008)

> "The EPA recommends that the BLM include a general description of the anticipated direct and indirect greenhouse gas (GHG) emissions and reductions associated with the CO_2 sequestration and enhanced recovery projects." (030-018)

> "However, current scientific literature assessing the GHG emission impacts of EOR finds mixed results, not the purely positive impact asserted in the WPCI Proposal. It is currently far from clear whether EOR is a net CO_2 contributor or whether it is net carbon negative, and the available research studies are difficult to compare because the GHG emission scenarios are set up differently within them. Furthermore, that determination rests in large part on whether the source of the CO_2 is anthropogenic (e.g., created by coal-fired power plants) or naturally occurring (already in the ground). The majority of EOR projects have used naturally occurring CO_2, and absent a large increase in oil prices or some other kind of strong, reliable financial incentive, this seems likely to continue.6 If this is the case for EOR projects associated with the WPCI project, it would push the WPCI project's downstream GHG and climate change impacts toward the net CO_2 contributor end of the spectrum. The WPCI Proposal does not specify whether anthropogenic or naturally occurring sources of CO_2 would be carried in this pipeline network, and instead merely identifies the locations of both. Whether an EOR project is net carbon negative or a net CO_2 contributor can also be influenced by how old a specific EOR project is. Research suggests that EOR projects are initially net carbon negative for their first few years but then become net CO_2 contributors if they continue." (028-007)

AIR 2: Would Emissions from Aboveground Facilities, Equipment, and Vehicles used during Pipeline Construction and Operation affect Air Quality, including Visibility?

(032-015, 028-003, 028-004, 028-005, 028-017, 030-006)
Commenters recommended that the BLM consider the GHG emissions and exacerbation of climate change that could result from the construction and operation of the pipeline. Commenters also suggested the BLM quantify and discuss the significance of the direct, indirect, and cumulative GHGs generated by the Proposed Action. Representative comments follow:

> "BLM must consider recent climate science as well as the GHG emissions that would result from the construction and operation of the CO_2, oil, and natural gas pipeline network for which it is considering amending nine RMPs. BLM must also consider the

upstream, downstream, and cumulative GHG and climate change impacts from the increased oil production that is a purpose of the WPCI Proposal, increased natural gas production that would result from increased access to markets resulting from the Project's natural gas pipelines, as well as cumulative impacts from past, present, and reasonably foreseeable projects." (028-004)

"Based on our current understanding of the proposed Wyoming Pipeline Corridor Initiative (WPCI) project and the area, the EPA has identified the following key topics that we recommend be analyzed and discussed in the Draft EIS so that potential impacts to public health and the environment can be fully understood: (3) air resources; (4) GHG emissions and climate change." (030-006)

Alternatives

ALT 1: Alternatives to the Proposed Action should include other Source and Sink Locations.

(005-001, 005-002, 017-002)
Commenters suggested that additional CO_2 sources and oil fields that could benefit from EOR should be included in the analysis. Representative comments follow:

"Additionally, there are significant CO_2 sources such as the Dry Fork Station and the Wyodak Campus, which could be analyzed as the origin of supply source points in the pipeline network recognizing that private surface easements would need to be obtained by a third party before construction of pipelines could occur. The Dave Johnson and Laramie River power plants should also be considered as a major CO_2 supply source in this study." (005-002)

"While we recognize that Converse County has a significant portion of private surface, there could be some tangible benefits of getting CO_2 to the county through this infrastructure proposal by promoting opportunities to develop additional lateral pipelines for EOR to multiple existing oil field complexes." (017-002)

ALT 2: Alternatives to the Proposed Action should include Flexibility in Use of Designated Corridors.

(010-004, 013-003, 022-015, 024-003, 026-003, 030-002)
Commenters suggested that corridors should be flexible in the types of uses permitted in the corridors. Representative comments follow:

"The RMPs must provide flexibility to allow use of the pipeline corridors for various purposes consistent with BLM's Federal Land Policy and Management Act (FLPMA) multiple use mandate; and the RMPs must retain flexibility to resolve resource conflicts, in the context of valid existing rights on a case by case basis. In summary, flexibility in the use of pipeline corridors, the ability to resolve potential resource conflicts with respect to pipeline corridors, and the inclusion of other key resource issues in the RMP amendments are of significant concern to our members and, as such, BLM needs to ensure they are clearly provided for in the EIS and potential RMP amendments." (010-004)

"As the WPCI moves forward, the County would like the Bureau of Land Management and State of Wyoming to also plan for future gas & crude pipelines to be included in the corridor. Consideration of the possibility to allow broadband infrastructure could be an

added benefit to help connect rural Wyoming. Finally, it will be important to explore any overlooked opportunities for potential future lateral pipelines to tie-in to the main trunk lines." (024-003)

"Broadband infrastructure is an important topic in Wyoming and WyFB likes that the proposal references broadband infrastructure as a use that could be located in the corridor in the future. WyFB requests that further details and analysis regarding future siting telecommunication infrastructure placement in the proposed corridor. As technology advances, reliable broadband will become more and more critical to WyFB members." (030-002)

ALT 3: Alternatives to the Proposed Action should avoid Known Environmental Conflicts.

(006-003, 011-006, 019-003, 019-004, 019-005, 019-006, 020-008, 025-001, 028-026, 032-007) Commenters suggested that alternatives should be developed that avoid known environmental conflicts such as scenic and recreational areas, important habitats for wildlife, and existing rights. Representative comments follow:

"The BLM must consider the factors enumerated at 43 C.F.R. § 2802.11(b) along with other relevant factors and should consider identifying areas where the BLM will not allow corridors for environmental, safety, or other reasons in accordance with 43 C.F.R. § 2802.11(d)." (032-007)

"When considering the proposed pipeline corridor, we encourage evaluating alternative routes with existing line development and corridors. Although the current proposed trunk corridor (6) is the location of an existing product pipeline, there is no established corridor. Corridor 6 is proximate to significant scenic and recreational areas including the Seminoe to Alcova Scenic Byway. Alternatives to the proposed action should evaluate other routes in Carbon County that have existing corridor development to lessen potential degradation to scenic & recreational areas, habitat fragmentation and disturbance. Examples of possible alternative routes include two on trunk corridor 6-running along an existing corridor south of Casper towards Hanna or Medicine Bow and along US 30 and I-80 that would go to Sinclair; or headed west from Casper, North of Alcova, then South on US 789 towards Bairoil." (006-003)

"Given the extensive conflicts with existing, authorized, and planned infrastructure and current right-of-way grants, PCW and Trans West recommend that BLM develop an alternative route for the WPCI corridors currently proposed for south of Rawlins. Due to the congestion in the I-80 utility corridor, which PCW and Trans West believe is at or near capacity between Sinclair and Rawlins, we encourage the BLM to develop alternative WPCI corridors, as well as any new RMP utility corridors, north of Sinclair and Rawlins." (011-006)

"Many of the proposed pipeline corridors are within biologically important big game habitats; are within sage-grouse core population areas; or are within 0.6 miles and 0.25 miles of numerous core area and non-core area leks, respectively. Although these proposed corridors generally follow existing pipelines and corridors, we recommend developing an alternative that analyzes minor changes to the proposed routes where they bisect 'vital' habitats (per the Wyoming Game and Fish Commission Mitigation Policy 20 16) in order to avoid potential loss of habitat function." (025-001)

ALT 4: Alternatives to the Proposed Action should be Located on Federal Lands and Collocated.

(004-003, 017-004, 022-011, 022-023, 022-033, 025-002, 029-001, 029-003, 029-009, 030-008, 032-004)
Commenters suggested that alternatives should be located on federal lands to the extent possible, collocated with existing corridors to minimize impacts, and collocated with existing rights-of-way to reduce disturbance. Representative comments follow:

> "The SER CD fully supports the statement in the Purpose and Need, 'Identifying integrated corridors across federal lands under the direction of the various field offices in Wyoming would lead to greater consistency among the individual field offices and would comprehensively address the desire to manage the location of future pipeline construction and operation activities across field offices, thereby minimizing the aggregate impact of future projects on federal lands in Wyoming.' The SER CD believes it is imperative that integrated corridors be collocated with existing statewide utility corridors (see Map 1 attachment) or collocated with Region 4 Section 368 Energy Corridors (see Map 4 attachment). This will not only minimize the aggregate impact of future projects on federal lands, but on private and state lands too. These exiting corridors have roads that could be used for more purposes and reduce the need for additional habitat fragmentation, expanded reclamation challenges, and reduce additional noxious weed infestation opportunities." (022-011)

> "Additionally, there are numerous utility corridors already designated in RMPs. Some of these corridors do not line up with field office or other boundaries making it unlikely they will be utilized in the future. We recommend the BLM consider an alternative that looks at all intra-state utility corridors on BLM lands to reduce the number of corridors on the landscape, ensure they connect to other corridors, and consolidate pipelines and other linear infrastructure." (025-002)

> "Unless the BLM identifies resource concerns specific to CO_2 pipelines, we recommend collocating these CO_2 corridors with existing ROWs wherever possible to minimize the footprint of disturbance and associated impacts." (030-008)

ALT 5: The Impact Analysis should include an Alternative where Uncertainties Associated with Air Quality are Fully Analyzed.

(028-006, 028-008)
Two comments suggested that the impact analysis include an alternative that addresses the uncertainties related to air quality. Both comments follow:

> "The EIS Must Consider a Range of Reasonable Alternatives, Including an Alternative Studying the Significant Uncertainties Associated with the WPCI Proposal's GHG Emissions and Net CO_2 Outcomes." (028-006)

> "Because so much uncertainty exists as to whether the CO_2 pipelines for which the state wishes to see BLM amend nine RMPs would be net CO_2 contributors or net CO_2 negative, BLM's EIS must fully analyze an alternative that assesses the impacts of the possible net CO2 outcomes and discuss how the impacts of a net CO_2 contributor outcome would be minimized, avoided, and mitigated." (028-008)

Avoidance, Minimization, and Mitigation

MIT 1: Areas that Should be Avoided

(032-025, 033-007)
Commenters provided areas that should be avoided by the Proposed Action and alternatives. A representative comment follows:

> "To this end, CDTC seeks to minimize the impacts of utility developments and their associated facilities on the Trail's resources. To do so, CDTC encourages avoiding the following resources whenever possible in sighting utility corridors and facilities near the Trail:
>
> 1. Wilderness areas and their adjacent buffer zones;
> 2. BLM NLCS and WSA areas, USFS semi-primitive non-motorized areas and NPS natural areas;
> 3. Areas of significant cultural, historic and natural value;
> 4. The Foreground zone as determined by the Scenery Management System for all Trails, and as seen from prominent viewpoints and key scenic features such as rock outcrops with large expansive vistas, or open landscape, sub alpine, alpine areas where the landscape is uninterrupted by man's influence or development;
> 5. Wetlands and other important natural features; and
> 6. Any other special area where important Trail values, such as a sense of remoteness, would be compromised." (033-007)

MIT 2: Suggested Coordination

(012-002, 012-003, 015-004, 019-004, 019-007, 022-019, 022-021, 022-029, 031-004)
Commenters provided situations where operators should coordinate with other entities to minimize impacts. Representative comments follow:

> "We would request that the AML Program be contacted when such planning commences so that we can provide the best available data on known underground mine workings and provide input into either avoidance or mitigative strategies." (012-003)
>
> "We strongly encourage BLM staff and pipeline development companies to work closely and consistently with all affected grazing permittees and agriculture producers to learn of their concerns and recommendations regarding these proposed corridors. Agriculture producers are intimately familiar with areas affected by this proposal and they possess irreplaceable long-term, on-the-ground knowledge. We highly recommend that during the planning process developers and BLM officials seek and address the concerns and recommendations of these stewards of habitat, forage and rangeland health." (015-004)
>
> "WCCD encourages the BLM to work closely with pipeline development companies to ensure the private landowner's concerns and interests are met on an individual basis including any road construction, reclamation, and pipeline placement." (031-004)

MIT 3: Minimize Disturbance where Possible

(013-002, 032-011)

Commenters suggested that corridors should be collocated to the extent possible and that pipelines and associated facilities should be placed in such a manner to minimize disturbance. Both comments follow:

"Ensure pipelines and associated facilities are collocated with existing corridors and other disturbances to the extent possible. WCCA appreciates that the majority of the proposed pipeline on public lands will be sited in existing designated corridors or adjacent to existing pipelines. Collocating pipelines will reduce impacts to natural resources, wildlife and wildlife habitat and ensure that public lands remain open to multiple uses. BLM and the State should seek to collocate all pipelines with designated corridors or existing pipelines where practicable. WCCA encourages BLM and the State to consider siting construction rights-of-way, temporary work spaces and associated aboveground facilities on lands that have already been disturbed or to collocate these activities with other similar disturbances. This would also serve to reduce impacts to public lands, natural resources and multiple uses." (013-002)

"BLM should ensure that any surface disturbing infrastructure is sited appropriately to avoid adverse impacts to other resources, particularly infrastructure that will require ongoing maintenance." (032-011)

MIT 4: Reclamation Practices

(015-008, 022-006, 022-031, 028-009, 029-005, 032-010)
Commenters suggested that reclamation of disturbed areas be required, and monitoring should be enforced to ensure disturbed areas are returned to pre-disturbance quality. Representative comments follow:

"The WDA Insists the BLM oversee and ensure successful/performance based reclamation and mitigation In the proposed corridor, including any new/temporary roads and disturbed areas. This also Includes monitoring and eradicating Invasive and noxious weeds until desired vegetation Is established." (015-008)

"Appendix E Upland Erosion Control, Revegetation, and Maintenance Plan and Appendix F Upland Restoration and Revegetation Plan. The SER CD requests 'Mulch' procedures be included on all disturbed areas for 'Installation', 'Restoration', and 'Revegetation'. With the lack of topsoil in our district, mulch is necessary to have any chance at reclamation success on flat or sloped areas. Appendix E Upland Erosion Control, Revegetation, and Maintenance Plan and Appendix F Upland Restoration and Revegetation Plan. The 'Seed Mixes' section on page 80 states, 'Additionally, agricultural based private lands will be reseeded to the specifications of applicable landowners. All seed mixes on private lands will be consistent with adjacent undisturbed lands and approved by applicable landowners.' The SER CD requests modifying the statement to say 'Additionally, private lands will be reseeded to the specifications of applicable landowners. Whether or not the lands are considered agricultural or native, the expertise and goals of the private landowner should be honored. Many times private landowners top priority is soil stability for native private lands and this is not always consistent with planting seeds consistent with adjacent undisturbed lands.'" (022-031)

MIT 5: Air Quality

(030-017, 032-015)
Comments follow:

> "Dust suppression from disturbed areas is a particularly critical mitigation consideration in the arid west. The EPA recommends the Draft EIS include a commitment to addressing dust control as site-specific corridor projects are evaluated. We suggest such plans include, but not be limited to; dust suppression methods and the level of required or anticipated control, inspection schedules, and documentation and accountability processes. Given the arid climate of the area and the associated challenges with reclamation, the EPA recommends reducing surface disturbance to effectively reduce fugitive dust." (030-017)

> "The BLM should evaluate and mitigate reasonably foreseeable GHG emissions." (032-015)

MIT 6: Environmental Justice

(030-019)
Comment follows:

> "…Mitigation measures or alternatives to avoid or reduce any disproportionate adverse impacts. The EPA recommends involving any affected communities in developing the measures and in identifying alternate corridor routes. Given that this is a linear project, the BLM may want to consider the guidance developed by the Federal Highway Administration for linear transportation projects (https://www.environment.fhwa.dot.gov/env_topics/ej/guidance_ejusticenepa.aspx). In addition, the EPA recommends reviewing the EIS for the expansion ofl-25 through Pueblo, Colorado (https://www.codot.gov/library/studies/i25puebloeis, see chapter 3.6). The Pueblo EIS has a good discussion of minority and low-income thresholds, examples of adjusting the alternatives to reduce impacts to EJ populations, and mitigation measures." (030-019)

MIT 7: Socioeconomics

(015-009)
Comment follows:

> "The BLM must analyze and mitigate Increased costs and reduced revenues on disturbed land for private landowners and grazing permittees in the final EIS and Record of Decision." (015-009)

MIT 8: Public Health and Safety

(030-004)
One comment indicated that a spill response plan be included in the analysis. Comment follows:

> "Based on our current understanding of the proposed Wyoming Pipeline Corridor Initiative (WPCI) project and the area, the EPA has identified the following key topics that we recommend be analyzed and discussed in the Draft EIS so that potential impacts to public health and the environment can be fully understood: (1) pipeline construction, safety and spill response;" (030-004)

MIT 9: Recreation

(033-008, 033-013)
Two comments provided avoidance, minimization, and mitigation measures for the Continental Divide National Scenic Trail. Both comments follow:

> "In addition, we encourage the following guidelines to identify areas, where when necessary to cross, parallel or otherwise include the CDNST, utility lines and facilities may be located as to reduce their impacts to the CDNST:
>
> 1. Locating at a site where the CDNST crosses an existing state or federal highway or highway intersection. In these instances, through applying sound sighting procedures, many of these crossings may only be visible at the point of intersection. We encourage the practice of careful sighting whenever possible.
>
> 2. Locating at a site where the CDNST crosses areas that are already developed, and classified as Rural or Urban by the USFS Recreation Opportunity Spectrum (ROS);
>
> 3. Upgrading or co-aligning a new corridor with existing lines, or relocating existing lines into new single corridors, and the subsequent decommissioning of replaced or relocated utility lines;
>
> 4. Utilization of an underground route through open areas for natural gas pipelines; and
>
> 5. Passage through an area where Trail values, such as a sense of remoteness, would not be compromised.
>
> Finally, we highly encourage sighting teams to engage with CDTC and other agency partners to identify these key areas and potential mitigation when the CDNST and its unique resources cannot be avoided." (033-008)
>
> "We recommend that the should any impacts occur to the CDNST, the EIS addresses mitigation to help alleviate direct, ancillary and cumulative impacts to the CDT in identification of these potential corridors. The section should address the need for both on-site and off-site enhancements to benefit the unavoidable scenery and Recreation Opportunity Spectrum setting effects on the CDNST and other National Scenic and Historic Trails. Potential mitigation to minimize impacts could be both onsite and off-site strategies and might include the following:
>
> 1. Funding for CDNST trail development and maintenance, corridor management, rights-of-way acquisition, and trailhead developments;
> 2. Removal of facilities that are no longer needed;
> 3. Relocation of existing smaller capacity transmission lines to the corridors identified by the proposal, and reclamation of those sites back to a natural state;
> 4. Careful review of the height and type of power line towers;
> 5. Careful location of power line towers so as to minimize their impacts;
> 6. Color and reflectivity of facilities; and
> 7. Landscape treatment within the right-of-way and at other places that screen structures." (033-013)

MIT 10: Water Quality

(020-006, 022-034, 023-003, 025-006, 025-007, 025-010, 025-017, 030-012)
Several comments pertained to requiring water quality monitoring and other measures such as setback

distances and implementing erosion control measures as means to minimize and mitigate impacts to water quality. Representative comments follow:

> ” The SER CD requests any pipeline proponent be required to pay for an extensive water quality monitoring plan and subsequent monitoring for the North Platte River and all tributaries in close proximity to any new Proposed Project corridor per SER CD Long Range Plan, Policy Water Resources #7: ‘The District requires water quality monitoring as a part of all energy and right-of-way development projects to ensure groundwater and surface water quality is not degraded.’” (022-034)
>
> “We recommend extra workspaces for vehicle parking or construction staging areas be located a minimum of 300-feet from wetlands and waterbodies. In addition, we recommend temporary extra workspaces and additional temporary workspaces for stockpiling of excavated material should be located a minimum of 150-feet from wetland and waterbodies.” (023-003)
>
> “Riparian areas and floodplains should not be used as staging or refueling areas. All chemicals, solvents and fuels should be kept at least 500 feet away from streams and riparian areas.” (025-010)

MIT 11: Streams and Wetlands

(025-012, 025-013, 025-014, 025-015, 029-007, 030-014, 030-015, 032-023)
Several comments included mitigation measures that should be included to avoid, minimize, and mitigate impacts to stream and wetland resources. Representative comments follow:

> “Where pipeline crossings of streams (perennial or intermittent) will be trenched not bored, stream banks should be re-stabilized with large angular rock (greater than two feet in one dimension). Riprap should be placed from the channel bottom to the top of the normal high-water line on the bank. We recommend that the applicant utilize double-ditching techniques to separate the top one-foot of stream bottom substrate from deeper soil layers. Substrate layers should be replaced in the same order that they are removed from the stream. The trench should be open less than 24 hours if the stream/river is less than 1 00-feet wide and no more than 72 hours if the stream/river is more than 1 00-feet wide.” (025-012)
>
> “Any pipelines that parallel drainages should be located outside the l 00-year floodplain. Pipeline crossings of riparian areas and streams should be at right angles to minimize the area of disturbance.” (025-013)
>
> “The Green River is the source of drinking water for the cities of Rock Springs, Green River and Granger and for several unincorporated communities. It provides high quality process water for several mines and major industries. In addition, the Green River provides water for the Seedskadee National Wildlife Refuge and the Fontenelle and Flaming Gorge Reservoirs which support sport fishing, boating and other recreational opportunities. To protect Green River water for these important uses, Sweetwater County recommends that all pipeline crossings of the Green River be completed by boring under the river and that up and down stream safety shut off values be installed to limit the size of product spills if a potential break in a pipeline occurs.” (029-007)
>
> “The EPA recommends that impacts to wetlands and other surface water bodies be avoided and minimized to the maximum extent practicable during waterbody crossings. Where feasible, the EPA recommends the use of horizontal directional drilling for pipeline routing under all water crossings and their associated floodplains and wetlands. Unless other resource concerns outweigh aquatic resource impacts, we recommend

identifying corridor alignments that minimize potential impacts to aquatic resources. If more damaging, open-cut water body crossings are anticipated, it is recommended that mitigation measures be used to stabilize and return stream banks to preconstruction contours, and waterbody crossing areas be graded and revegetated immediately following construction. Additionally, it is recommended that rip-rap, gabions, or other methods to harden banks be avoided or used only sparingly to control erosion and stabilize banks at stream crossings during and/or after construction. The EPA supports an overall goal to return construction sites to natural, preconstruction conditions." (030-015)

MIT 12: Vegetation

(025-004, 025-008, 025-009)
Representative comments follow:

"Riparian canopy or stabilizing vegetation should not be removed if possible. Crushing or shearing streamside woody vegetation is preferable to complete removal. Any such vegetation that is removed in conjunction with stream crossings should be reestablished immediately following completion of the crossing. Proper riparian grazing management strategies, including rest, should be applied to disturbed stream banks." (025-008)

"We recommend the use of large wood plank matting joined with cable to minimize impacts to the riparian habitat." (025-009)

MIT 13: Wildlife

(022-028, 025-003, 025-005, 025-011, 025-016, 028-027, 028-038, 028-041, 028-042, 028-043, 028-044, 028-045, 032-012, 032-018, 032-024)
Several comments pertained to measures to reduce impacts to wildlife and their habitats. Suggestions of avoiding sensitive habitats and following timing limitation stipulations, construction practices to avoid impacting priority streams, and compensatory mitigation were the most mentioned topics. Representative comments follow:

"The Department recognizes it is impossible to avoid all seasonally important wildlife habitats on a project of this scale. If pipeline corridors are designated that do cross important wildlife habitats, we recommend the application of appropriate timing limitation stipulations to construction activity in order to protect species when they are most vulnerable to disturbance." (025-003)

"Any pipeline crossing of perennial streams that is a Blue Ribbon or Red Ribbon Trout Stream and/or contain Species of Greatest Conservation Need should be accomplished by boring under the active channel to avoid impacts to the channel and associated riparian areas. This would further eliminate any concerns with sedimentation and the need to avoid critical times of year such as when fish species are spawning. Not entering the live channel will also eliminate all aquatic invasive species concerns. Boring pits should be located far enough back from the channel that stream bank stability is not reduced." (025-011)

"It would be far preferable for the WPCI corridors to be sited outside of priority habitat management areas (PHMA) and sagebrush focal areas (SFA). But if BLM allows siting inside them, BLM should provide the option of voluntary grazing permit retirement buyout as compensatory mitigation for the WPCI project. Permanent retirement of livestock grazing confers multiple benefits for sage-grouse habitats and populations. Permanently retiring grazing allotments is a proven and cost-effective method of obtaining habitat service gains, as well as a way of facilitating fence removal, thus

removing a well-known threat to sage-grouse. Riparian areas where grazing has been removed can show markedly beneficial changes in two to five years, while upland areas take longer." (028-043)

"Construction, operation, and maintenance should be timed appropriately to avoid raptor nesting seasons, sage grouse lekking, parturition times for big game, and other sensitive times for wildlife where the adverse impacts of development could be exacerbated." (032-018)

Cultural Resources

CUL 1: How Would the Proposed Action affect Cultural Resources and Cultural Resources of Native American Concern?

(032-020)
Comment follows:

"The BLM must ensure adequate consultation with tribes, particularly regarding traditional cultural properties, which may not be mapped, and any other resources of cultural or spiritual significance. The BLM should avoid designated and proposed National Historic Trails and their viewsheds. The current proposal sites corridors across the Mormon, California, and Oregon trails and through their protected viewsheds." (032-020)

Cumulative Effects

CUM 1: What are the Cumulative Effects from the Proposed Action on the Kirby Creek and Bridger Pass Area?

(001-001, 007-002, 013-004, 020-002, 020-004, 021-008)
Commenters provided information regarding existing projects and planned projects for the Kirby Creek and Bridger Pass areas. Representative comments follow:

"Bridger Pass (on the boundary between HSC and Fremont Co.) is a choke point. It contains corridors for vehicles, wildlife, drainage and pipelines in a very narrow bit of real estate. I expect Game & Fish will have some issues there. We also have a growing interest in being able to develop the existing County Road into an alternate all-weather route out of the County (since shutdowns in the Canyon are frequent), and this will ultimately require more right-of-way or easement in Bridger Pass than currently exists." (007-002)

"The Conservation District has historically been involved in the Kirby Creek CRM project which has restored significant segments of Kirby Creek to previous conditions. Millions of dollars have been invested in stream restoration work, much of it, within the designated energy corridors." (020-004)

CUM 2: What are the Cumulative Effects from the Proposed Action and Development Projects?

(011-002, 019-002, 019-003, 030-003, 033-006)
Commenters provided information regarding development projects that could contribute to cumulative effects. Representative comments follow:

> "PCW and Trans West are developing the CCSM Project and TWE Project, respectively, in southern Wyoming. The CCSM Project is an approximately 3,000-megawatt (MW) wind energy project located in Carbon County, Wyoming, south of Sinclair. The TWE Project is an approximately 730-mile transmission line extending to southern Nevada. In Wyoming, the TWE Project begins south of Sinclair, continues west to Wamsutter, and then turns south roughly following the Carbon Sweetwater County line before crossing into Colorado. Development of the CCSM Project and TWE Project has been underway since 2008. Together, the CCSM Project and TWE Project will constitute a $6 billion investment in Wyoming. PCW and Trans West have collectively invested hundreds of millions of dollars in the development and construction of these critical infrastructure projects." (011-002)

> "Genesis Alkali LLC is a trona mining and soda ash production company in Western Wyoming, producing approximately four million tons per year of natural soda ash and employing about 900 people at our two facilities near Green River, Wyoming. Soda ash is the largest inorganic material exported from the United States and Genesis Alkali is the largest US producer. Ninety percent of all soda ash produced in the United States is produced in Wyoming, just west of Green River. Southwest Wyoming holds almost all of the nation's mineable trona reserves, the majority of which lie within the approximately 700,000-acre Known Sodium Leasing Area (KSLA)." (019-002)

> "In addition to looking at direct impacts in the immediate vicinity of the proposed pipeline, the Council on Environmental Quality (CEQ) regulations (40 C.F.R. § 1502.16) instruct agencies to consider other effects that are reasonably foreseeable. Thus, in addition to considering the impacts occurring from the proposed amendments, the EPA recommends that the Draft EIS evaluate whether this project would facilitate increased oil and gas production or exploration and any associated potential impacts including any potential beneficial impacts." (030-003)

CUM 3: What are the Cumulative Effects of the Proposed Action on the Continental Divide National Scenic Trail?

(033-012)
Comment follows:

> "Perhaps our greatest concern has to do with cumulative effects. If full environmental-impact analysis occurs only at the project or activity level, then how does the agency propose to assess the cumulative impacts of multiple projects or activities over time and their impacts to the entire CDNST? While we applaud the agency's intentions to undertake such a forward looking planning process, we are concerned that without rigorous attention to the cumulative impacts of incremental decisions, the cumulative impacts of multiple projects and activities could be obscured and lead to unintended consequences that may or may not be consistent with a particular management direction for the CDNST. CDTC believes that for linear resources, such as the CDNST, that are affected by more than one corridor, that special attention be given to a full exploration

and understanding of the cumulative effects to these very special and unique resources." (033-012)

CUM 4: What are the Cumulative Effects from the Proposed Action on Wildlife Habitat?

(028-034, 028-035)
Comments follow:

> "Similarly, sage-grouse habitat in Wyoming and across the grouse's range is impacted by grazing and recreation including authorized and unauthorized off-road vehicle use. The EIS must consider the cumulative impact of the establishment of pipelines and the past, current, and projected energy leasing/development, grazing, and recreational activity on sage-grouse and its habitat." (028-034)

> "The EIS must analyze the impacts to big game species including cumulative impacts. Fragmentation and disturbance of habitat adversely impacts big game species. As with sage-grouse discussed above, the effects of establishing the proposed pipeline corridors must be analyzed in the context of other past, present, and foreseeable activities that affect big game and their habitat. These activities and uses include energy leasing and development, recreation, and linear disruptions such as roads, fences, and fuel breaks." (028-035)

Environmental Justice

ENJ 1: Would Construction, Operation, Maintenance, and Reclamation of Pipelines in the Trunk and Lateral Corridors affect Environmental Justice Communities?

(028-022, 030-007, 030-019)
Commenters recommended analysis of impacts to minority, low-income, and tribal communities, specifically impacts to the health and welfare of these communities. One commenter recommended involving any affected communities in developing mitigation measures or alternate corridor routes to avoid or reduce any disproportionate adverse impacts to the communities. A representative comment follows:

> "In addition, the EIS must analyze the impacts to indigenous communities that would result from the construction and operation of the pipelines and oil and gas development associated with them, including the impacts of worker man camps." (028-022)

General Ecological Resources

ECO 1: Would the Proposed Construction or Operation of the Pipeline Affect Ecosystem Services?

(022-014)
One commenter expressed general concern to impacts on ecosystem services. The comment follows:

> "The SER CD requests that ecosystem services are analyzed to full extent in the Proposed Action, per SER CD Long Range Plan, Policy Ecosystem Services #1: 'The District will ensure ecosystem services as defined and outlined by the National Agricultural Statistics Service Wyoming Agricultural Statistics report are analyzed to the full extent within all NEPA documents and subsequent actions.'" (022-014)

Geology and Minerals

GEO 1: Is the Analysis Area Prone to Geologic Hazards (earthquakes, landslides/slumping) that could affect Pipelines or that could be Exacerbated by Pipeline Construction or Oil and Gas Development (fracking) supported by the Proposed Action?

(012-002, 012-004, 012-005)
Comments noted potential geologic hazards that could affect pipelines supported by the Proposed Action. Comments follow:

> "After receiving notice of this initiative, AML asked their consultants who have been working on this large area project to perform a high-level review of the proposed WPCI corridors for such conflicts or potential risks. I am providing some general mapping to illustrate that there are potential risks to the integrity of such installations in some areas. The attached mapping provides a general analysis of potential areas of risk should pipelines or other such utilities be installed over known underground workings. We feel that such areas will need to be considered, and carefully evaluated for geologic stability, and actual risks of ground failure, as final routes for such extensive pipelines are worked out. Many of these workings could be avoided with careful advance planning. Otherwise specialized engineering techniques may be required to ensure the integrity and safety of such installations." (012-002)

> "The attached maps provide what we presently know of mines that would potentially impact the proposed pipelines. You will note that one map also provides a location for a coal fire The attached maps provide what we presently know of mines that would potentially impact the proposed pipelines. You will note that one map also provides a location for a coal fire" (012-004)

> "One attached PDF provides a general view of the proposed pipelines, and a basic map of the distribution of abandoned mines across the state. The remaining PDFs provide mapping of different parts of the state that our consultants have evaluated. We hope this high-level information is informative and provides a place to start a discussion on how underground mine workings should be considered during any design effort for infrastructure that could be at risk from ground subsidence." (012-005)

GEO 2: Would the Pipeline Corridors affect Valid Existing Rights of Mines in the Analysis Area?

(019-003, 019-004)
Comments follow:

> "As proposed, WPCI Lateral Corridor 1 passes through lands designated as Core Population areas pursuant to the Wyoming Executive Order on Greater Sage-Grouse Core Area Protection. Additionally, as proposed, portions of WPCI Lateral Corridor 1, as well as the western most portion of Truck Corridor 4, pass through the KSLA, and more particularly, Genesis Alkali active and planned future mining areas. Genesis Alkali maintains that this proposed routing should be modified both to minimize the impact to trona producers and to avoid the Sage Grouse Core Population areas as well as the KSLA to the maximum extent feasible." (019-003)

> "Trona mining, both dry mining and solution mining, creates surface subsidence of up to seven (7) feet. Genesis Alkali has longstanding experience working with pipeline owners/operators, both natural gas and liquids, to mitigate the impacts of subsidence on

pipelines that cross over mining areas. These mitigation discussions can take significant time and effort and costs can run into the millions, which can take a toll on pipeline owner/operators and on the Wyoming's trona mining businesses who are affected. To avoid such costs, designated routes for new pipelines should be developed to avoid current and future mining areas whenever practicable." (019-004)

GEO 3: Would the Pipeline Corridors make Leasable, Locatable, Saleable, and oil/Gas/Geothermal Mineral Locations Inaccessible to Exploration and/or Development?

(009-001, 009-002, 010-001)
Representative comments follow:

"Oxy is committed to low carbon ventures utilizing C02 sequestration and EOR as part of its low carbon initiative to become carbon neutral. Oxy is the world's largest handler of C02 for EOR and has potential EOR prospects within the Powder River Basin. In addition to Oxy's alignment with the State of Wyoming's EOR and sequestration initiatives, the proposed corridors cross a significant portion of Oxy owned surface, specifically in SW Wyoming. Oxy generally supports the State of Wyoming's proposal to increase transportation corridors for EOR activities but wants to ensure its interests are fully and adequate protected. For that reason, the BLM must consider and expressly protect all valid and existing rights." (009-002)

"Collectively, PAW's members produce over 90% of the State's oil and gas, generate more than $5 billion in economic activity, and employ more than 18,000 of Wyoming's hardworking men and women. Our members have an interest in this project and need to be kept informed of decisions made throughout the process. PAW members are actively pursuing new federal fluid mineral leases in prospective areas and may submit future APDs in order to develop existing and future leases in the proposed area of the corridor. PAW and its members, therefore, may be directly affected by the amended RMPs and associated Records of Decision (ROD)." (019-004)

GEO 4: Would the Pipeline Corridors increase Oil and Gas Development in the Analysis Area?

(028-015, 028-016, 030-003)
Commenters noted that the BLM must update the reasonably foreseeable development scenarios for oil and gas production in the nine RMPs and analyze the impacts to resources from the potential increase in oil and gas development across the state. Representative comments follow:

"BLM's Wyoming RMPs contain reasonably foreseeable development scenarios for oil and gas development, often expressed as a range representing the low and high numbers of oil and gas wells expected to be developed. This approach will need to be augmented for the WPCI Proposal because EOR in depleted oil fields may result in greater production from existing wells, not just the development of new wells. As a result, the reasonably foreseeable development scenarios must also include estimates for increased production from existing wells" (028-016)

"In addition to looking at direct impacts in the immediate vicinity of the proposed pipeline, the Council on Environmental Quality (CEQ) regulations (40 C.F.R. § 1502.16) instruct agencies to consider other effects that are reasonably foreseeable. Thus, in addition to considering the impacts occurring from the proposed amendments, the EPA recommends that the Draft EIS evaluate whether this project would facilitate increased

oil and gas production or exploration and any associated potential impacts including any potential beneficial impacts." (030-003)

Groundwater

GRW 1: Would the Proposed Action Lead to an Increase Risk of Groundwater Contamination from Chemicals?

(028-013, 028-014, 030-010, 030-011)
Representative comments follow:

"The coal ash disposal impacts of extending the lifespan and/or utilization rate of coalfired power plants that would otherwise be retired or utilized at lower rates must also be analyzed in the EIS. Wyoming coal ash disposal pond sites are some of the most contaminated in the United States. A May 2019 study of the Dave Johnston power plant's coal ash disposal pond found 'arsenic, cadmium, molybdenum and radium were at statistically significant levels above the groundwater protection standards,' requiring closure and remediation. Groundwater contaminants exceeding allowable standards have also been found at coal ash disposal ponds for the Jim Bridger and Naughton coal power plants, also requiring closure and remediation." (028-013)

"We recommend the Draft EIS include an evaluation of potential adverse impacts from pipeline leaks or spills. This should include potential adverse impacts to; surface waters, public or private water supplies, human health, vegetation, or wildlife. In this part of the analysis, it would be useful to discuss the probabilities and/or likely frequencies of different types of spill or leak events over the life of this type of pipeline. We expect this information would be useful in determining appropriate, safe corridor locations." (030-010)

GRW 2: How Would the Proposed Action affect Groundwater, Especially Shallow Groundwater Resources?

(002-001, 021-005, 028-017, 030-005, 030-011, 030-012)
Several comments were general in nature and requested that impacts to groundwater resources be addressed in the analysis. Other comments were more specific as to the type of groundwater resource, including livestock wells, aquifers, and groundwater recharge areas. Representative comments follow:

"Based on our current understanding of the proposed Wyoming Pipeline Corridor Initiative (WPCI) project and the area, the EPA has identified the following key topics that we recommend be analyzed and discussed in the Draft EIS so that potential impacts to public health and the environment can be fully understood: (2) groundwater and surface water resources;" (030-005)

"Is this going to interfere in the livestock wells and also the Big Springs in Thermopolis. Also, the personal water wells." (002-001)

"…If the BLM determines that leaks from CO_2 pipelines have potential impacts to groundwater resources, we recommend presenting baseline data on groundwater resources, with particular emphasis on: the major aquifers in the project areas; the location and extent of the groundwater recharge areas; the location of shallow and sensitive aquifers that are susceptible to contamination from surface activities; and, the uses of each potentially impacted aquifer (e.g. stock, domestic, irrigation, public water supply, etc.)." (030-011)

Hazardous and Solid Waste Materials

HAZ 1: Would a Hazardous Materials Spill affect Public Health and Safety (e.g., contaminated soils or groundwater, near roadways)?

(025-007, 025-010, 025-014)
One commenter expressed concern about the potential effects of a hazardous materials spill on water resources. This commenter suggested several mitigation measures. A representative comment follows:

> "Any pipeline crossings of live streams should be protected by automatic shutoff valves. Additional shutoff valves should be installed on both sides of any drainage basin crossed within I0 miles above a Blue or Red Ribbon Trout Stream or streams containing SGCN species." (025-014)

Land Use and Access

LUA 1: How would the Proposed Action affect the Relevant and Important Values of Areas with Special Designation?

(029-008, 032-025)
Comment follow:

> "In the vicinity of TI7N R106W Sect ion 10 and T I7N RI07W Section 12, Lateral Pipeline Corridor #I crosses the Flaming Gorge National Recreation Area (FGNRA). The FGNRA is a national recreation resource whose wildlife, fisheries and scenic resources support a multi-million dollar multi-state recreation industry. With this in mind, Sweetwater County encourages the state, BLM and USFS to ensure that any proposed crossing of the FGNRA be completed in a manner that utilizes existing pipeline corridors and rights of way and preserves water quality, wildlife habitat and visual resources. As previously stated, all crossings of the Green River should be completed by boring underneath the river or gorge and with the installation of up and down stream safety shut off values." (029-008)

> "BLM should avoid siting the corridor within or along the border of WSAs. For instance, the current proposal sites the corridor on the northern border of Alkali Draw WSA, along the southern border of Pinnacles WSA, and near the southern border of Cedar Mountain WSA, where an important Native American sacred site is located. BLM should also avoid siting corridors along the base of Steamboat Mountain, which is protected by ACEC [areas of critical environmental concern] and SMA designations, provides habitat for a rare desert elk herd, and is significant to Native American tribes." (032-025)

LUA 2: How Would the Proposed Action affect other Corridors, Rights-of-Way, or Land Uses?

(001-001, 008-003, 011-001, 011-003, 011-004, 011-005, 011-007, 013-005, 020-002, 020-005, 021-006, 029-004, 031-005, 032-014)
Several comments noted potential existing conflicts with other rights-of-ways, and general comments requested these types of conflicts to be addressed in the impact analysis. Additionally, other land use

types near the project were mentioned, and requests were made to include the potential impacts to these other types of land uses. Representative comments follow:

> "Our primary concerns are 1) the preservation of NHT resources, 2) the continuation of public access to the NHTs, and 3) the preservation of applicable historic settings along the NHTs." (008-003)

> "One of the proposed lateral pipeline corridors in Carbon County would interfere with the TWE Project and the CCSM Project. The affected area is located in Township 21 North, Range 86 West, Sections 31 and 32; and Township 21 North, Range 87 West, Sections 33, 34, 35, and 36, Sixth Principal Meridian (see attached Figure 1). Specifically, the proposed lateral pipeline corridor would interfere with the TWE Project transmission line in three locations and would interfere with the Wyoming Terminal of the TWE Project. The TWE Project Northern Terminal is critical and integral to the success of the entire $3 billion TWE Project. The lateral line corridor would also interfere with the CCSM Project Overland Substation, as well as with multiple electrical transmission lines connecting to the substation. Installing up to three high-pressure pipelines under or within an electrical transmission substation or terminal location is an incompatible use that affects PCW' s and Trans West's ability to safely operate the CCSM and TWE Projects within their authorized rights-of way." (011-003)

> "We also encourage BLM to review existing rights-of-way in the proposed WPCI corridors and provide written notice to existing right-of-way holders during development of the draft EIS to solicit early input from these right-of-way holders regarding how the proposed WPCI corridors may affect the integrity of, or the ability to operate, existing facilities. Early avoidance of conflicts between the WPCI corridors and current and authorized infrastructure will help BLM and the State of Wyoming achieve the designation of feasible, functional pipeline corridors that can be used to efficiently locate and analyze future project-specific proposals." (011-007)

> "WCCD encourages the BLM to maintain a strong communication with all affected grazing permittees and agriculture producers to learn of their concerns and recommendations regarding the proposed corridors. Potential concerns may include: Increased off and on-road traffic; Cut fences; Opened gates; Damaged range improvements; Decreased Animal Unit Months; Decreased palatability of vegetation and forage from road dust and development activities; Reclamation failures; Introduction and spread of noxious weeds" (031-005)

LUA 3: How Would the Proposed Action affect Land Use Plans?

(006-001, 006-004, 022-001, 022-002, 022-006, 031-001, 031-002)
Several comments noted existing land use plans that could apply to areas that overlap the project. Most land use plans allow and, in some instances, encourage these types of projects, but there exists the potential for conflicts in priorities and goals. Representative comments follow:

> "A goal in the Carbon County Comprehensive Land Use Plan is to achieve a sustainable balance between energy development, agriculture, and the environment. Two strategies to address this goal are the following: encourage a steady, paced development of the gas and oilfields; enhance the County Government's capacity to monitor, comment on, and influence state and federal decisions on energy development projects. Additionally, a goal within the Land Use Plan is to sustain scenic areas, wildlife habitat, and other important open spaces. One strategy is to limit development in wildlife migration corridors, winter range, and birthing areas, and sage grouse core areas." (006-001)

"Our comments are specific to our mission as a local government entity within the project area: 'develop and direct programs to promote long-term conservation and enhancement of our natural resources while contributing to the economic stability of the district and its residents.' As this project impacts the conservation of our natural resources and the stability of the district and residents, we believe it is important you continue to inform us of proposed actions and decisions for the Proposed Project. Conservation districts are the only local government charged, specifically by state statute, with natural resource management. District supervisors serve as the grass roots representatives of private landowners and the general public, providing leadership and direction in natural resource conservation programs. We appreciate the continued opportunity to express the importance of pertinent issues and concerns on the Proposed Project." (022-001)

"Goal- WCCD supports minerals and oil and gas production and will provide information and education on the importance of natural resource conservation. The minerals and oil and gas industry is a significant part of the custom and culture of the district, and it provides economic opportunity to Washakie County.

i. Supports the continued development and extraction of minerals, and oil and gas within federal and state jurisdiction in keeping with the local and regional custom and culture, in order to maintain the economic stability of Washakie County.

ii. Encourages mineral, and oil and gas production to be conducted in an environmentally responsible manner and to ensure industries continuance is compatible with the principles of multiple use on public lands." (031-002)

Native American Concerns

NAC 1: Would the Proposed Pipeline Development Physically (directly) or Indirectly (visually) Affect both Known and Unknown Cultural Resources of Native American concern?

(028-019, 028-020, 028-022)
One commenter recommended meaningful tribal consultation to ensure traditional ecological knowledge was used in this planning process. A representative comment follows:

"The WPCI Project area encompasses ancestral, historic, traditional, or treaty lands for many indigenous peoples, including the Apsaalooké (Crow); Arapaho; Bannock; Eastern Shoshone; Očeti Šakówiŋ (Sioux); Só'taeo'o, Tsétsėhéstâhese, and Tsistsistas (Cheyenne); and Ute. Based on past projects, we anticipate that BLM will notify tribes about the Project and invite them to participate in government-to-government consultation, but that BLM will not provide financial resources that would help tribes to do so, nor provide sufficient time for internal tribal decision-making related to the consultation. Given the federal government's track record with other large-scale oil and gas projects in the Great Plains, there is a high risk that this Project's tribal consultation process will not meaningfully influence the outcome of BLM's NEPA decision-making, but instead will merely tick a box on a checklist. However, without meaningful tribal consultation, it will be virtually impossible for BLM's EIS to include traditional ecological knowledge that could help BLM achieve more sustainable land management practices." (028-020)

Negative Comment (non-substantive)

(004-001, 004-002)
One commenter expressed general opposition to the Proposed Action. A representative comment follows:

> "They are blasting. They are destroying vegetation. They are killing all wildlife on this land. This is a totally massively destructive plan to ruin 2000 miles of land." (004-002)

NEPA Analysis and Related Processes

PRO 1: The EIS should include all Statutes and Regulations Pertinent to the Proposed Action and Agency Decision.

(010-004, 016-001, 022-10, 022-027, 023.002, 032-003)
Representative comments follow:

> "Please include the Clean Air Act in this list of regulations." (016-001)

> "The RMPs must provide flexibility to allow use of the pipeline corridors for various purposes consistent with FLPMA's multiple use mandate; and the RMPs must retain flexibility to resolve resource conflicts, in the context of valid existing rights on a case by case basis. In summary, flexibility in the use of pipeline corridors, the ability to resolve potential resource conflicts with respect to pipeline corridors, and the inclusion of other key resource issues in the RMP amendments are of significant concern to our members and, as such, BLM needs to ensure they are clearly provided for in the EIS and potential RMP amendments." (010-004)

PRO 2: The NEPA Process should include Participation from Various Agencies and Stakeholders, Solicitation of Information from the Public, and a Robust Tribal Consultation.

(008-002, 011-007, 015-001, 022-001, 022-004, 022-036, 028-002, 028-021)
Commenters requested varying levels of participation from becoming a cooperator to being kept informed of the EIS process for the WPCI Project. One commenter suggested the EIS include a description of the government-to-government consultation with the tribes and how the BLM would support tribal participation in the NEPA process. Representative comments follow:

> "As the federal Administrator of these NHT we would like to review with you our options for participation in the NEPA process (including evaluation of proposals under the National Trails System Act) and request consulting party status for the NHPA process." (008-002)

> "We also encourage BLM to review existing rights-of-way in the proposed WPCI corridors and provide written notice to existing right-of-way holders during development of the draft EIS to solicit early input from these right-of-way holders regarding how the proposed WPCI corridors may affect the integrity of, or the ability to operate, existing facilities. Early avoidance of conflicts between the WPCI corridors and current and authorized infrastructure will help BLM and the State of Wyoming achieve the designation of feasible, functional pipeline corridors that can be used to efficiently locate and analyze future project-specific proposals." (011-007)

> "Therefore, the EIS should explain how government-to-government consultation for this Project will be meaningful and how BLM will support tribal participation beyond just issuing invitations." (028-021)

PRO 3: The EIS should include a Summary of how Subsequent NEPA Analysis will be Completed at the Project Level.

(020-001, 020-009, 021-002, 021-007, 022-010, 028-001, 032-008)
Several comments provided assumptions on how subsequent NEPA would be completed at the project level and requested that clarification be provided. Representative comments follow:

> "Secondly, I note that this pipeline corridor initiative was first considered at a multi-state scale, several years ago. This present planning effort will 'zoom in' the environmental review of the corridor network to a statewide or county-by-county scale. We recognize that the next (and final) step would be a more site-specific review of individual pipeline proposals within the proposed corridors. The inherent danger of this layering of federal, state, and local focus is that all prior environmental review has been at macro levels. When we finally get to the micro phase, with individual pipelines proposed for placement, will the environmental assessment give the site-specific proposals a 'pass' due to the state-level EIS?" (021-002)

> "If the current EIS is not able to sufficiently address such environmental impacts at this time, then it should speak to the environmental assessment process for the future pipeline construction permitting stage. Clear direction should be given to address these concerns, in the event it is determined that an EIS is not warranted at that future time." (021-007)

PRO 4: Impact Analysis Methods

(028-10, 028-15, 028-18, 028-208, 028-039, 028-040, 030,001, 032-002, 033-003)
Several comments included information on how the impact analysis for various resources should be conducted. Representative comments follow:

> "The EIS Must Analyze the Impacts of Wyoming Producing More Fossil Fuels Instead of Renewable Energy as a Result of the WPCI Project" (028-010)

> "BLM Must Update the Reasonably Foreseeable Development Scenarios for Oil Production in the Nine RMPs, and Analyze the Increased Impacts to Other Resources That Would Result from the WPCI Project" (028-015)

> "Wyoming's pipeline proposal includes 1,105 miles of pipelines on BLM lands and another 809 miles on other lands. The BLM must not only analyze the impacts of the pipeline corridors that traverse BLM-administered lands but must also analyze the impacts related to the 809 miles of pipelines that will be enabled by the construction of pipelines on BLM lands. Related activities on non-federal lands that are connected to the BLM action must be analyzed as indirect impacts and count towards the significance of and required mitigations for BLM actions." (028-040)

> "Because of the projects scope (almost 2000 miles of corridor intersecting nine field offices) the 25 segments of proposed corridor should be analyzed individually as well as cumulatively in order to satisfy NEPA's 'hard look' requirement." (032-002)

Out of Scope

(003-001, 005-003, 013-001, 017-003, 017-005, 022-007, 026-002, 032-022)
Most out-of-scope comments were regarding the extent of the Proposed Action, export of products out of state, or the potential for future lateral tie-ins. Representative comments follow:

> "WyFB requests the State and the BLM consider and analyze ways for future developers to be able to use corridor and associated pipelines. This should include permitting tie-ins

for future lateral pipelines that would cross private lands. It should include working with developers on private lands now to determine where laterals would be sited and permit the public lands portion now." (026-002)

"Finally, all opportunities for exporting products out of the state (natural gas, oil, C02, etc.) should be considered to the maximum extent possible in this analysis." (017-005)

Positive Comment (non-substantive)

(002-002, 006-002, 007-001, 010-002, 013-006, 014-001, 015-002, 017-001, 018-001, 018-003, 019-001, 020-009, 021-001, 024-001, 026-001, 027-001, 031-001, 031-003, 033-001)
Several commenters expressed support for the project and project goals. Representative comments follow:

"Carbon County supports the Wyoming Pipeline Corridor Initiative to further the establishment of pipelines associated with CCUS, and EOR." (006-002)

"PAW understands the benefits of this project and the need to streamline the NEPA process for future pipeline project proponents within the corridor. PAW is pleased to see BLM's recognition of valid existing rights in the NOI, and the inclusion of valid existing rights as part of BLM's planning criteria. In addition, we are further encouraged to see oil and gas development in the area is also a stated issue that needs to be addressed in BLM's analysis." (010-002)

"The WPA supports the proposed action of the designation of a statewide pipeline corridor network for future pipeline development associated with CCUS as well as associated EOR (C02-EOR) facilities. Amending the RMPs will create greater consistencies and efficiencies across Wyoming BLM field offices to make future analysis of pipeline-specific proposals more efficient." (014-001)

"Providing incentives for the expansion of pipeline infrastructure for CCUS and EOR is a critical component of Converse County's overall development and marketing strategy and is vital to the long-term economic health of our county and the State of Wyoming." (017-001)

"As a proud partner of the USFS, BLM and NPS, CDTC recognizes the need to replace an overly burdensome energy corridor process with more efficient planning methods. We commend the intent of developing a method that defines a collaborative process and provides a framework for pre-selection of potential corridors for future energy development projects." (033-001)

Proposed Action

PRA 1: The Proposed Action Description should include Flexibility in the Use of Corridors.

(010-003, 010-004, 013-004, 022-15, 026-003, 029-009, 032-13)
Several commenters noted that the Proposed Action description focuses on limiting the corridors to carbon capture and EOR products but does mention that the corridors could be used for other uses such as broadband. Commenters requested that it be made clear that the corridors would be multi-use. Some representative comments follow:

"However, consistent with BLM's FLPMA multiple use mandate, our members would like to ensure continued flexibility for the State of Wyoming and oil and gas operators to use pipeline corridors for a variety of purposes and to resolve resource conflicts on a case-by-case basis. PAW members are concerned about the State of Wyoming's

> Wyoming Pipeline Corridor Initiative Proposal (WPCI) statement that use of the 'corridors are constrained to only transport CCUS and EOR products; however, other compatible uses may be considered that would not limit future use of the corridors for CCUS and EOR pipelines and facilities.'" (010-003)
>
> "Ensure the proposed pipeline corridor has the capacity for additional pipelines. BLM and the State should ensure the pipeline as proposed can accommodate additional pipelines. There appear to be segments of the proposed corridor that may not have the physical room needed for additional infrastructure. For example, at least four pipelines, a county road, electrical transmission lines and livestock watering flow lines already occupy the Kirby Creek-Jim Bridger pass route. BLM and the State should consider whether there is sufficient capacity for additional pipelines in this and other already-crowded corridors." (013-004)
>
> "Section 1.0 Introduction. The purpose identified for the Proposed Project is 'to establish corridors on public lands dedicated to future use for pipelines associated with CCUS, and EOR.' Yet it goes on to on to say, 'other compatible uses (i.e. broadband infrastructure) at the outer boundaries of the corridors would be considered.' The remainder of the document only identifies the Proposed Project corridor to be used for CCUS and EOR. The SER CD supports a statewide corridor designation for all energy-related, technology-related, and intra/interstate commerce-related products known now or developed in the future. If the scope of the Proposed Project continues with the narrow focus, we suggest removing the vague statement about other compatible uses unless they are clearly defined." (022-015)

PRA 2: The Proposed Action Conflicts with Existing Rights or Projects.

(011-001, 011-003, 011-004)
One commenter provided known conflicts with the Proposed Action. Representative comments include the following:

> "One of the proposed lateral pipeline corridors in Carbon County would interfere with the TWE Project and the CCSM Project. The affected area is located in Township 21 North, Range 86 West, Sections 31 and 32; and Township 21 North, Range 87 West, Sections 33, 34, 35, and 36, Sixth Principal Meridian (see attached Figure 1). Specifically, the proposed lateral pipeline corridor would interfere with the TWE Project transmission line in three locations and would interfere with the Wyoming Terminal of the TWE Project. The TWE Project Northern Terminal is critical and integral to the success of the entire $3 billion TWE Project. The lateral line corridor would also interfere with the CCSM Project Overland Substation, as well as with multiple electrical transmission lines connecting to the substation. Installing up to three high-pressure pipelines under or within an electrical transmission substation or terminal location is an incompatible use that affects PCW' s and Trans West's ability to safely operate the CCSM and TWE Projects within their authorized rights-of way." (011-003)
>
> "In addition to the specific conflicts with the CCSM Project and TWE Project discussed above, the WPCI lateral and trunk pipeline corridors south of Rawlins interfere with other existing, authorized and planned infrastructure. There are multiple pipelines, communication lines, and transmission lines owned by other companies in the area and crossing those facilities would either be technically infeasible or would add significant, potentially prohibitive cost to future WPCI pipeline project developers." (011-004)

PRA 3: The Proposed Action was Designed to Minimize Environmental Impacts.

(014-004, 018-002, 022-011, 022-023, 022-035, 026-001, 027-003, 029-011, 032-005)
Commenters noted that the Proposed Action is collocated with designated corridors or existing pipeline rights-of-way to minimize environmental impacts. Representative comments follow:

> "The WPA has been involved with the corridor planning and design since the beginning of the project. The WPA provided technical assistance in the analyses used to develop proposed routes, with primary consideration for EOR development. The majority of the WPCI proposal lies within previously established pipeline corridors in existing RMPs or parallels existing pipeline rights-of-way. In instances where the WPCI proposal diverges from existing corridors or pipelines, it is due to analyses using GIS imagery that diverted the corridors away from potential human conflicts such as housing or agriculture, or other important natural resources." (014-024)

> "The SER CD fully supports the statement in the Purpose and Need, 'Identifying integrated corridors across federal lands under the direction of the various field offices in Wyoming would lead to greater consistency among the individual field offices and would comprehensively address the desire to manage the location of future pipeline construction and operation activities across field offices, thereby minimizing the aggregate impact of future projects on federal lands in Wyoming.' The SER CD believes it is imperative that integrated corridors be collocated with existing statewide utility corridors (see Map 1 attachment) or collocated with Region 4 Section 368 Energy Corridors (see Map 4 attachment). This will not only minimize the aggregate impact of future projects on federal lands, but on private and state lands too. These exiting corridors have roads that could be used for more purposes and reduce the need for additional habitat fragmentation, expanded reclamation challenges, and reduce additional noxious weed infestation opportunities." (022-011)

PRA 4: The Proposed Action Description should include a General Description of Pipeline Construction and Associated Facilities

(006-004, 022-016, 022-018, 022-022, 022-024, 022-026, 030-009)
Commenters recognized that the BLM would not be authorizing construction of any pipelines at this time, but to fully assess the potential impacts to resources, the Proposed Action description should include general construction practices and associated facilities. Representative comments follow:

> "Section 2.3 Associated Aboveground Facilities. The SER CD requests clarification for the conflicting statement in paragraph 2.3.1, 'Access will be year-round, depending upon winter weather.' If access is dependent on winter weather, it is not year-round access and should be clearly stated as such. Section 2.3 Associated Aboveground Facilities, 2.3.3 Pump and Compressor Stations. Please remove the word 'approximate' before the '3- to 10-acre fenced area'. It should be either an approximate number of acres or a range but not both. Section 2.3 Associated Aboveground Facilities, 1.2.5 Measurement Facilities. The SER CD requests clarification as to whether the vegetation will be cleared or not in these areas." (022-024)

> "We understand that this EIS will not authorize pipeline construction. We nonetheless recommend that general information about pipeline construction be included so that anticipated impacts can be considered when selecting ROWs. We recommend that information regarding the following project facility components be incorporated into the Draft EIS to assess potential construction impacts within ROW alternatives:

- Description of anticipated support facilities typical for this type of pipeline including; operation and maintenance buildings, construction camps, pipeline yards, compressor stations, maintenance roads, and materials sites;
- Anticipated temporary land use locations;
- Typical pipeline type(s) by use - Type 1 Single use, Type II Multiple source, Type III Hybrid lines;
- Typical pipeline wall thicknesses; and,
- Location of potential CO_2 sources and sinks to be connected to the proposed pipeline corridors.

The EPA recommends that to the greatest extent possible the WPCI pipelines be co-located within existing infrastructure ROWs and make use of existing Federal and State designated corridors on public land, avoiding potential additional adverse impacts to wetlands and other aquatic resources; and to avoid the need for additional access roads and material source sites." (030-009)

PRA 5: Sweetwater County supports the Current Placement of Trunk Corridor #4.

(029-010)
Sweetwater County supports the placement of Trunk Corridor #4 in its current location because it minimizes impacts to the Tri-territory Scenic Loop Tour route. The comment follows:

"Approximately one third of the WPCI Pipeline Trunk Corridor #4 is located adjacent to and parallel to the Tri-territory Scenic Loop Tour route. In this corridor, proposed pipelines would be buried and surface disturbance reclaimed thus resulting in minimal view shed impacts to the Tri-territory Loop Tour. Because of this, Sweetwater County supports the establishment of Pipeline Corridor #4 in this location. It should be emphasized that Sweetwater County opposes the West-wide Energy designation of the Tri-territory Loop Tour portion of this corridor as a multi-modal corridor which would allow both underground and above ground energy transmission lines. Sweetwater County believes that construction of above ground transmission facilities within this would be a detriment to the Tri-territory Scenic Loop Tour and the scenic vistas of the Killpecker Sand Dunes, North and South Table Mountains, Spring Butte, Steamboat Mountain and Boars Tusk and others. For the protection of these natural features and the scenic loop tour, Sweetwater County supports this corridor as an underground right of way corridor only which would be compatible with the WPCI project. To ensure proper coordination with West-wide Energy above ground only corridors, Sweetwater County encourages the BLM to compare the western portion of this trunk line with the West-wide Energy Corridor." (029-010)

Public Health and Safety

SAF 1: How Would a Hazardous Materials Spill Affect Public Health and Safety?

(004-005, 012-001, 012-004, 030-004, 030-010)
A couple of comments were general, indicating that the analysis should include a look at the potential impacts from spills. A couple of comments provided details of how conflicts with underground mines could lead to public health and safety concerns. Representative comments follow:

"We recommend the Draft EIS include an evaluation of potential adverse impacts from pipeline leaks or spills. This should include potential adverse impacts to; surface waters, public or private water supplies, human health, vegetation, or wildlife. In this part of the

analysis, it would be useful to discuss the probabilities and/or likely frequencies of different types of spill or leak events over the life of this type of pipeline. We expect this information would be useful in determining appropriate, safe corridor locations." (030-010)

"The Wyoming AML Program has performed a recent assessment of underground mine workings as they intersect existing infrastructure such as power transmission lines, pipelines, roads, and other utilities and infrastructure. We have found that there are numerous intersections of such infrastructure with subsiding mine workings, and that in some areas there is risk of failure of the ground surface which could significantly disrupt or damage such infrastructure, and as a result interrupt public services. In some cases, such failures could significantly compromise public health and safety. We have concerns that such conditions could occur within the proposed pipeline corridors if the locations, extents, and depths of abandoned underground mines are not considered by designs for the pipelines that may eventually be installed under this initiative." (012-001)

SAF 2: How would fire affect public health and safety?

(028-030)
Comment follows:

"Further, an increase in annual grass abundance in the pipeline corridor and adjacent lands alters the fire regime, changing the timing and style of wildfires. This in turn can lead to larger scale ecological transformation as burnt areas are more likely to see annual grasses revegetate instead of native vegetation." (028-030)

Purpose and Need

PAN 1: The Need for the Project Must be Clearly Explained and Verified.

(013-005, 032-001)
Commenters requested clarification on use of the corridors and how these corridors relate to other designated corridors. The comments follow:

"Provide evidence for the purpose and need of this project. The evidence should address the need for each segment of the project as well as the project as a whole. This discussion should clearly explain that a corridor designation is not a prerequisite to the grant of a pipeline rights of way, and that the absence of a designated corridor is not an impediment to the authorization and construction of new pipelines." (032-001)

"Clarify the anticipated use and scope of the proposed pipeline corridor and how the proposed corridor might interact with the Section 368 Energy West-Wide Energy Corridors. It is unclear based on the Proposal whether the proposed corridors would be solely for CO_2 [carbon dioxide] pipelines or would be available for pipelines transporting other resources, such as natural gas or crude. WCCA requests the BLM and the State clarify the ultimate intent of the corridors and consider uses beyond solely CO_2. Additionally, WCCA asks that BLM explain how the WPCI fits within or relates to the Section 368 West-wide Energy Corridor. Specifically, are the efforts duplicative, interconnected and/or complementary? WCCA encourages BLM and the State to reduce redundant analysis where possible and to broadly consider the location of corridors to ensure efficient and effective development and collocation where possible." (013-005)

PAN 2: The Purpose and Need should include a Description of How the Project Encourages Carbon Capture Technology and Infrastructure.

(014-005, 027-002, 027-004)
Commenters suggested that the project would encourage development of pipeline infrastructure that would support further development of carbon capture technologies. Representative comments follow:

> "The WPCI is a first of its kind project that we believe incentivizes solutions to some of our nation's most substantial environmental and economic challenges." (027-004)

> "The WPCI proposal is receiving national attention as a model for the federal government to support the development of CO_2 pipeline networks for use in CCUS. This project is in alignment with the federal bipartisan USE IT Act (Utilizing Significant Emissions with Innovative Technologies). The USE IT Act supports the commercial use of industrial CO_2 emissions and carbon capture technology as well as expedited permitting for the development of CO_2 pipeline infrastructure." (014-005)

Range and Grazing

RNG 1: Would Vegetation Removal and Surface Disturbance Temporarily and Permanently Affect Available Animal Unit Months or Acres with Suitable Forage for Grazing?

(015-003,015-007, 021-003, 022-003, 026-004)
Commenters expressed general concern regarding the suitability of disturbed areas for continued livestock grazing. Representative comments follow:

> "This corridor project will have a direct Impact on livestock grazing as pipelines are built. The BLM should analyze any loss or Impact to these Important environmental, historical and social values of livestock grazing." (015-007)

> "WDA appreciates the BLM recognizing the potential impact to livestock grazing and agriculture producers in the 1,914 mile proposed corridor area. However, there are a number of specific impacts to agriculture the BLM must analyze in the EIS: increased off- and on-road traffic, increased number of speeding vehicles In the area causing death or impairments of livestock, cut fences, opened gates, damaged range improvements, decreased Animal Unit Months (AUM's), decreased palatability of vegetation and forage from road dust and development activities, unsuccessful reclamation of disturbed areas, introduction and spread of noxious weeds and other detrimental social and economic impacts on livestock management operations." (015-003)

RNG 2: Would the Pipeline Affect the Various Range Improvements it Intersects during Construction?

(015-003, 002-001)

> General concern was expressed regarding the potential for damaged range improvements. A representative comment follows:

> "Is this going to interfere in the livestock wells and also the Big Springs in Thermopolis. Also, the personal water wells." (002-001)

Recreation

REC 1: Would the Construction, Operation, and Long-Term Presence of Aboveground Facilities and Access Roads affect Recreational Experience and Access?

(029-002, 029-008, 033-011)
Commenters generally asked for additional analysis of impacts to recreational experiences within, intersected by, or otherwise impacted by the proposed corridors. Using existing pipeline corridors and rights-of-way to preserve recreational user experience and access was suggested. Representative comments follow:

> "As a unit of the National Trails System, and otherwise considered designated area, the proposal should include a more fully evaluated section on impacts to recreational experiences within, intersected by, or otherwise impacted by the proposed corridors. We realize that each trail section is unique with specific localized conditions, however, we also feel that there should be consistent treatment of the Trail and its resources and the experience it offers all users in the discussion of impacts to recreational resources in this document. We encourage that evaluation of the potential impacts to recreational resources of the CDNST be included in the EIS." (033-011)

> "In the vicinity of TI7N R106W Sect ion 10 and T I7N RI07W Section 12, Lateral Pipeline Corridor #I crosses the Flaming Gorge National Recreation Area (FGNRA). The FGNRA is a national recreation resource whose wildlife, fisheries and scenic resources support a multi-million dollar multi-state recreation industry. With this in mind, Sweetwater County encourages the state, BLM and USFS to ensure that any proposed crossing of the FGNRA be completed in a manner that utilizes existing pipeline corridors and rights of way and preserves water quality, wildlife habitat and visual resources. As previously stated, all crossings of the Green River should be completed by boring underneath the river or gorge and with the installation of up and down stream safety shut off values." (029-008)

REC 2: How Would the Proposed Action Affect National Historic and Scenic Trails?

(008-001, 008-003, 029-006, 029-011, 033-002, 033-003, 033-004, 033-005, 033-006, 033-007, 033-008, 033-009, 033-010, 033-011, 033-012, 033-013)
Commenters recommended that the analysis of impacts to National Historic and Scenic Trails include preservation of trail resources, public access and recreation experience, visual and audible impacts, and cumulative effects of infrastructure projects. Additionally, commenters requested more detailed mapping of where the Proposed Action would parallel or intersect National Historic and Scenic Trails. Representative comments follow:

> "Our primary concerns are 1) the preservation of NHT resources, 2) the continuation of public access to the NHTs, and 3) the preservation of applicable historic settings along the NHTs." (008-003)

> "There are several routes that will cross, parallel and/or may impact the CDNST. While many of these corridors will occur at road intersections or overlap with existing corridors, the CDNST should be identified in the project planning map so that adequate evaluation may occur. The corridors include the following: 1. Lateral Corridors: #2,#8 and maybe #9 (difficult to tell from the project map), 2. Trunk Corridors: #3,#4 and maybe #7(difficult to tell from the project map). Specifically, where the crossings/alignments for corridors #7, #8, #3, #4 and #9 intersect nearby where the CDNST occurs and should be more

adequately mapped to reflect and evaluate any potential impacts to the CDNST. It is good to see that the CDNST is not included the oil production and CCUS areas." (033-002)

"As a unit of the National Trails System, and otherwise considered designated area, the proposal should include a more fully evaluated section on impacts to recreational experiences within, intersected by, or otherwise impacted by the proposed corridors. We realize that each trail section is unique with specific localized conditions, however, we also feel that there should be consistent treatment of the Trail and its resources and the experience it offers all users in the discussion of impacts to recreational resources in this document. We encourage that evaluation of the potential impacts to recreational resources of the CDNST be included in the EIS." (033-011)

Socioeconomics

SOC 1: How Would the Proposed Action Affect the Economic Output of Other industries in the Analysis Area?

(009-001, 010-001, 011-002, 015-003, 015-005, 015-009, 022-032, 026-004, 031-006) Commenters recommended the analysis include the economic contribution of other oil and gas production, transmission construction and operation, grazing leases, and tourism. Representative comments follow:

"Oxy submits these scoping comments to the BLM because of the significant impact the proposed amendments to the RMPs may have on Oxy's ongoing and future operations in the State of Wyoming. Oxy has significant interest in areas managed by the BLM including over 225,000 acres of operated oil and gas leases, as wells as employees and contractors in the State of Wyoming. Oxy is also among the world's largest independent oil and natural gas exploration and production companies. Oxy has fee ownership of mineral rights under nearly eight million net lease hold acres across the west, much of this in Wyoming, inclusive of royalty interests, and holds significant fee and federal mineral leases within the planning areas associated with the proposed RMP amendments." (009-001)

"PCW and Trans West are developing the CCSM Project and TWE Project, respectively, in southern Wyoming. The CCSM Project is an approximately 3,000-megawatt (MW) wind energy project located in Carbon County, Wyoming, south of Sinclair. The TWE Project is an approximately 730-mile transmission line extending to southern Nevada. In Wyoming, the TWE Project begins south of Sinclair, continues west to Wamsutter, and then turns south roughly following the Carbon Sweetwater County line before crossing into Colorado. Development of the CCSM Project and TWE Project has been underway since 2008. Together, the CCSM Project and TWE Project will constitute a $6 billion investment in Wyoming. PCW and Trans West have collectively invested hundreds of millions of dollars in the development and construction of these critical infrastructure projects." (011-002)

"livestock grazing represents a vital economic value to agriculture producers and to local communities." (015-005)

SOC 2: How Would the Proposed Action Affect Employment, Earnings, and Output over the Life of the WPCI Project?

(014-003, 017-001, 022-008, 022-009, 022-013, 024-002, 028-003, 028-004, 030-003, 030-019, 031-002, 032-026)
Several comments requested the analysis include the socioeconomic impacts to local economies from the WPCI Project and from increased oil and gas development that the project would encourage. One comment requested that this analysis include the economic impacts to environmental justice (EJ) communities within nearby communities. Representative comments follow:

> "Injecting C02 into depleted oil fields would increase oil production unrecoverable through conventional methods while offering a solution to reducing carbon emissions. Increased C02-EOR development would also generate considerable royalties and taxes to the State of Wyoming and associated counties as well as adding thousands of jobs." (014-003)

> "The SER CD requests a socio-economic impact analysis be provided in the Proposed Action, per SER CD Long Range Plan, Policy Socio-economics #3: 'Local, state, and federal agency plans or management recommendations shall include a socio-economic impact description (either brief or in-depth depending on the case needs) that addresses the effects on the District natural resources, economies, and health and welfare of the District citizens.'" (022-013)

> "…Assess EJ and other socioeconomic concerns for any EJ communities, to the extent information is available, including: A discussion of the potential direct, indirect and cumulative environmental impacts of the proposed project on the health or welfare of these communities, including air quality and water quality and impacts. Health risks to EJ communities from the proposed pipeline may include construction and operation impacts as well as potential leak risks. An evaluation of the socio-economic impacts and benefits to the local communities, including the potential for any additional loading placed on local communities' abilities to provide necessary public services and amenities…" (030-019)

SOC 3: How Would the Proposed Action Affect End-Consumer Purchases?

(028-011)
Comment follows:

> "The WPCI Proposal proposes increased use of EOR in depleted Wyoming oil fields and new CO_2, oil and natural gas pipelines. This would tie up capital that could be used instead for renewable energy production and would result in additional fossil fuel products being offered to the public instead of renewable energy, potentially displacing the public's purchase of renewables. As a result, the EIS must analyze the impacts of Wyoming producing additional new fossil fuel for end-consumer purchase instead of producing renewable energy. Any EIS must also fully disclose the potential indirect and cumulative impacts of CO_2 pipeline use on coal combustion and coal-fired power plant retirement and/or utilization." (028-011)

Soils

SOL 1: Would Project Design and Location Affect the Risk of Ground Subsidence and Soil Erosion Associated with the Proposed Action?

(012-005, 019-004, 020-007, 032-009)
Commenters expressed concern about the risk of surface subsidence, erosion, and seismicity associated with mining practices and pipeline location decisions. Representative comments follow:

> "The BLM should evaluate seismicity, slope stability, soil type, and reclamation potential in the locations of the proposed corridor." (032-009)

> "Trona mining, both dry mining and solution mining, creates surface subsidence of up to seven (7) feet. Genesis Alkali has longstanding experience working with pipeline owners/operators, both natural gas and liquids, to mitigate the impacts of subsidence on pipelines that cross over mining areas. These mitigation discussions can take significant time and effort and costs can run into the millions, which can take a toll on pipeline owner/operators and on the Wyoming's trona mining businesses who are affected. To avoid such costs, designated routes for new pipelines should be developed to avoid current and future mining areas whenever practicable." (019-004)

Special-Status Species

SSS 1: How Would the Proposed Action Affect Habitat and Local Populations of Greater Sage-Grouse?

(019-003, 019-005, 022-032, 025-001, 028-023, 028-024, 028-025, 028-026, 028-031, 028-033, 028-034, 032-006, 032-017)
Commenters requested that the analysis include potential impacts to greater sage-grouse designated habitat areas (e.g., priority habitat management areas and core) and individuals. Representative comments follow:

> "Many of the proposed pipeline corridors are within biologically important big game habitats; are within sage-grouse core population areas; or are within 0.6 miles and 0.25 miles of numerous core area and non-core area leks, respectively. Although these proposed corridors generally follow existing pipelines and corridors, we recommend developing an alternative that analyzes minor changes to the proposed routes where they bisect 'vital' habitats (per the Wyoming Game and Fish Commission Mitigation Policy 20 16) in order to avoid potential loss of habitat function." (025-001)

> "The avoidance of PHMAs and SFAs is vitally important because, for the most part, Wyoming PHMAs and SFAs are within Priority Areas of Conservation (PACs), key habitats for sage-grouse conservation that were identified by the U.S. Fish and Wildlife Service. The U.S. Fish and Wildlife Service's 2013 Conservation Objectives Team Report (COT Report) states, 'Development of infrastructure for any purpose (e.g., roads, pipelines, powerlines, and cellular towers) results in habitat loss, fragmentation, and may cause sage-grouse habitat avoidance. Additionally, infrastructure can provide sources for the introduction of invasive plant species and predators.'" (028-025)

> "The EIS Must Analyze the Impacts to Greater Sage-Grouse and Other Wildlife of Amending the RMPs to Establish Pipeline Corridors." (028-031)

SSS 2: How Would Water Depletions Affect Species Protected under the Endangered Species Act in the Upper Colorado River Basin and Platte River Basin?

(023-001)
Comment follows:

> "Appendix I does not discuss federally listed species that may be affected by water depletions but should be included. Please be aware that under the Upper Colorado River Endangered Fish Recovery Program and the Platte River Recovery Implementation Program, formal interagency consultation under section 7 of the ESA is required for projects that may lead to water depletions, in excess of 0.1 acre-foot per year, from any system that is a tributary to the Colorado River, and central and lower Platte River. Federal agency actions resulting in water depletions to the Colorado River system may affect the endangered bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) and their habitat downstream in the Green and Colorado River systems. In addition, upstream depletions may contribute to the destruction or adverse modification of designated critical habitat for these four species. Critical habitat is designated for Colorado River Fish in Colorado and Utah in downstream riverine habitat in the Yampa, Green, and Colorado River systems (see 50 CFR 17.95(e)). The Service, in accordance with the Upper Colorado River Endangered Fish Recovery Program, adopted a de minimis policy, which states that water-related activities in the Upper Colorado River Basin that result in less than 0.1 acre-foot per year of depletions in flow have no effect on the Colorado River endangered fish species, and thus do not require consultation for potential effects on those species. Similarly, detention basins designed to detain runoff for less than 72 hours, and temporary withdrawals of water outside of critical habitat (e.g., for hydrostatic pipeline testing) that return all the water to the same drainage basin within 30 days, are considered to have no effect and do not require consultation. Federal agency actions resulting in water depletions to the central and lower Platte River may affect the whooping crane (*Grus americana*), including their critical habitat, and the endangered least tern (*Sternula* [Sterna] *antillarum*), pallid sturgeon 2 (*Scaphirhynchus albus*), Western prairie fringed orchid (*Platanthera praeclara*), and the threatened piping plover (*Charadrius melodius*)." (023-001)

SSS 3: How Would the Proposed Action Affect Special-Status Plants?

(032-019)
Comment follows:

> "BLM should ensure that potential adverse impacts to rare and sensitive plants are evaluated and avoided to the extent possible." (032-019)

Surface Water

SWR 1: Would Construction Associated with the Proposed Action Lead to Increases in Erosion and Resultant Sedimentation with the Potential to Affect Water Quality?

(020-006, 020-007, 030-012)
Representative comments follow:

> " The Hot Springs Conservation District has site specific knowledge of erosion and erosion control which may be of use during Phase Ill NEPA analysis of an actual carbon dioxide pipeline project." (020-007)

> "When considering corridor alternatives, the EPA recommends that the following resource impacts be discussed, including disclosure of which waters may be impacted, the nature of potential impacts, and specific pollutants likely to impact those waters: Surface Water Quality and Sedimentation: Potential impacts to water quality from runoff associated with surface disturbance. Runoff could introduce sediment as well as salts, selenium and other pollutants. Drinking Water: Any potential impacts to drinking water from the project, including source water protection areas and other municipal or private water supplies. Impaired Waterbodies: Potential impacts to impaired waterbodies, including waterbodies listed on the CWA § 303(d) list and waterbodies with Total Maximum Daily Loads (TMDLs). Groundwater: Any potential impacts to groundwater, including groundwater recharge areas and shallow and sensitive aquifers…" (030-012)

SWR 2: Would the Proposed Action Affect Surface Water Resources?

(021-005, 028-017, 030-005, 030-010)
A few comments were general in nature requesting that impacts to surface water resources be addressed in the analysis. Representative comment follows:

> "Based on our current understanding of the proposed Wyoming Pipeline Corridor Initiative (WPCI) project and the area, the EPA has identified the following key topics that we recommend be analyzed and discussed in the Draft EIS so that potential impacts to public health and the environment can be fully understood: (2) groundwater and surface water resources;" (030-005)

SWR 3: Would the Proposed Action Result in the Net Loss of Wetland Areas?

(020-003, 030-011, 030-013, 030-014, 030-015)
Commenters requested that wetlands be described and impacts to wetlands and wetland function be analyzed. Representative comment follows:

> "We anticipate that the primary potential for impacts to surface waters would stem from pipeline construction and from permanent surface disturbances such as access roads and ancillary facilities. The EPA recommends that the BLM characterize surface waters in proximity to the proposed corridors by: Mapping surface water resources in the proposed development areas. This could include a summary discussion of the water resources that exist in the project areas. Presenting baseline data on the condition and quality of surface water resources, and where appropriate and possible, reasons why these resources have been impacted, including: Lists of any Clean Water Act impaired or threatened waterbody segments within or downstream of the project areas, including the designated uses of those waterbodies and the specific pollutants of concern; Inventories and maps of existing wetlands and Waters of the U.S. within the project areas, including wetlands that

are regulated under Section 404 of the CWA, and wetlands that are determined to be non-jurisdictional and protected under Executive Order 11990-Protection of Wetlands (May 24, 1977), and, where project impacts are likely, acreages and channel lengths, habitat types, values, and functions of these waters" (030-011)

SWR 4: Would the Proposed Action Lead to Alteration of Stream Channels and Drainage Flows and Ultimately Stream Classification?

(020-004, 022-032, 029-007, 030-013, 030-015)
Commenters requested the analysis to include impacts to stream and rivers. Representative comments follow:

> "The protection, improvement, and restoration of wetlands and riparian areas are a high priority. These resources increase landscape and species diversity, support many species of western wildlife, and are critical to the protection of water quality and designated beneficial water uses. In addition, these areas warrant protection under Section 404 of the CWA as well as Executive Order 11990. We suggest that the BLM analyze potential impacts to the following for each proposed corridor: Stream structure and channel stability; Streambed substrate, including seasonal and spawning habitats; Stream bank vegetation, riparian habitats, and aquatic biota;…" (030-013)

> "Segment 6 Location Concerns. The SER CD has major concerns with the location of Segment 6. As located in the Proposed Project, it cuts through mule deer crucial range and mule deer winter range; goes across a blue ribbon stream segment; crosses the North Platte River in the miracle mile area, an area with very high economic value for tourism and recreation (see circled area on Map 3 attachment); it crosses the North Platte River 3 times and appears to be in the river bed for nearly a mile (see circled area on Map 2 attachment); goes through winter and yearlong bighorn sheep area; goes through pronghorn crucial range; bisects the sage-grouse core area v4 west of Seminoe Reservoir and would be in close proximately to at least 2 leks (see circled area on Map 2 attachment)." (022-032)

Transportation

TRA 1: Would the Proposed Action Affect Existing Transportation Corridors or Public Access?

(001-001, 021-006, 029-004, 029-011, 032-014)
Commenters generally suggested areas of specific concern or sensitivity. Representative comments follow:

> "One concern: Bridger Pass. It gets crowded up there, and the County may propose substantial improvements to the road." (001-001)

> "Pipeline Lateral Corridor #5: Sweetwater County supports this corridor and its designation as an underground pipeline corridor only. During construction, special attention should be given to historical trails, crossings of Sweetwater County roads, and protection of wildlife habitat especially the aspen groves and isolated springs along Bush Rim. Sweetwater County supported locating the Denbury Pipeline within this corridor." (029-011)

Vegetation

VEG 1: Would the Proposed Action Affect Vegetation Cover?

(004-002, 004-004, 033-005, 028-028)
Commenters were generally concerned about potential negative impacts to vegetation cover and subsequent habitat fragmentation. A representative comment follows:

> "Adverse impacts also include lights, access roads, cleared swaths of land, off-road vehicle access on utility rights-of-way, guy wires, chain link fences, and chemical treatments of the vegetation in the corridor." (033-005)

VEG 2: Would the Proposed Action Result in the Introduction and Spread of Noxious Weeds and Other Invasive Plants?

(015-008, 022-012, 028-029, 031-006)
Commenters recommend that the EIS analyze and disclose the potential to increase the spread of noxious weeds and other invasive plants. A representative comment follows:

> "The WDA Insists the BLM oversee and ensure successful/performance-based reclamation and mitigation in the proposed corridor, including any new/temporary roads and disturbed areas. This also Includes monitoring and eradicating Invasive and noxious weeds until desired vegetation Is established." (015-008)

VEG 3: Would a Pipeline Leak or Spill Affect Vegetation Cover?

> (030-010)
> The comment follows:
>
> "We recommend the Draft EIS include an evaluation of potential adverse impacts from pipeline leaks or spills. This should include potential adverse impacts to; surface waters, public or private water supplies, human health, vegetation, or wildlife. In this part of the analysis, it would be useful to discuss the probabilities and/or likely frequencies of different types of spill or leak events over the life of this type of pipeline. We expect this information would be useful in determining appropriate, safe corridor locations." (030-010)

Visual Resources

VIR 1: Would Construction Activity and the Long-Term Presence of the Pipeline Affect the Analysis Area's Viewshed and Sensitive Viewing Locations?

(015-006, 022-005, 029-002, 032-020, 032-021, 033-010)
Commenters expressed concern about existing open spaces, scenic vistas, and other protected viewsheds that could be traversed or impacted by the identified corridors. Representative comments follow:

> "CDTC recommends the mapping of visual resources and the impacts to these resources conducted in a manner consistent with the Scenery Management System to adequately protect the integrity and quality of the scenic resources in the areas traversed or impacted by the identified corridors." (033-010)
>
> "The BLM must ensure adequate consultation with tribes, particularly regarding traditional cultural properties, which may not be mapped, and any other resources of cultural or spiritual significance. The BLM should avoid designated and proposed

National Historic Trails and their viewsheds. The current proposal sites corridors across the Mormon, California, and Oregon trails and through their protected viewsheds." (032-020)

Wildlife, General

WLF 1: How Would the Proposed Action Affect Big Game Migration Routes and Important Habitat Areas?

(022-032, 025-001, 028-035, 028-036, 032-016)
Commenters requested that the analysis include potential impacts to big game designated migration routes and important habitat areas including crucial, winter, and year-long ranges. Representative comments follow:

> "Segment 6 Location Concerns. The SER CD has major concerns with the location of Segment 6. As located in the Proposed Project, it cuts through mule deer crucial range and mule deer winter range; goes across a blue ribbon stream segment; crosses the North Platte River in the miracle mile area, an area with very high economic value for tourism and recreation (see circled area on Map 3 attachment); it crosses the North Platte River 3 times and appears to be in the river bed for nearly a mile (see circled area on Map 2 attachment); goes through winter and yearlong bighorn sheep area; goes through pronghorn crucial range; bisects the sage-grouse core area v4 west of Seminoe Reservoir and would be in close proximately to at least 2 leks (see circled area on Map 2 attachment)." (022-032)

> "The current proposal sites corridors within stopovers in the famous and imperiled Red Desert to Hoback (Sublette) mule deer migration corridor and within the proposed Wyoming Range MDC. BLM should avoid crossing designated and proposed migration corridors, particularly in stopovers, and must incorporate the best available science on mule deer migrations in its draft EIS. The current proposal sites corridors within crucial winter range for at least eleven mule deer herd units including the Sublette herd. Given population declines and various environmental pressures on our mule deer herds, BLM should avoid mule deer CWR to the maximum extent possible." (032-016)

WLF 2: How Would the Proposed Action Affect Wildlife Species?

(021-004, 028-031, 028-32, 029-002, 030-010)
Commenters requested that the analysis include general impacts to wildlife species. Representative comment follows:

> "The EIS must analyze the direct, indirect, and cumulative impacts of amending the RMPs on wildlife. Of particular concern are special status species [SSS] and wide-ranging species that are affected by habitat fragmentation." (028-032)

WLF 3: How Would the Proposed Action Affect Wildlife Habitat?

(004-002, 004-004, 020-005, 022-005, 022-009, 022-012, 029-011)
Commenters requested that the analysis include general impacts to wildlife habitat. Representative comments follow:

> "Policy Ecosystem Services #3: The District, in agreement with Carbon County, wants to sustain scenic areas, wildlife habitat, and other important open spaces (Carbon County 2012)." (022-005)

> "The SER CD is concerned with continued habitat fragmentation within the district including developing new installation roads, operation and maintenance roads, increasing native range disturbance, and expanding the spread of noxious/invasive plants as supported by SER CD Long Range Plan, Policy Wildlife #1: 'The District promotes wildlife conservation, sustainability of healthy wildlife habitat and populations, and their contributions to the local economy.' and Policy Range #6: 'The District supports and strongly encourages the control of noxious weeds and pests by owners, managers, and users of all lands.'" (022-012)

5.2 BLM Internal Scoping

5.2.1 BLM Internal Scoping Process

The BLM Wyoming State Office coordinated with the nine BLM field offices (Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland) to solicit feedback and comments on the Proposed Action during the internal scoping process. The BLM Wyoming State Office held a project kickoff meeting and conference call on August 8, 2019, to present proposed project information to selected representatives and resource specialists (collectively known as the interdisciplinary team [IDT]), from the nine field offices. Follow-up conference calls were held in late August and September 2019. The IDT provided comments and identified issues for their area of expertise and field office throughout the process, and comments were continually refined. The BLM Wyoming State Office also held IDT meetings in conjunction with the public scoping meetings to discuss and finalize comments. The comment tracking spreadsheets, comment documents, and IDT meeting notes are available in the project's administrative record.

5.2.2 BLM Comments

Air Quality

How would emissions from equipment and vehicles used during pipeline construction and operation affect air quality, including visibility?

How would storage of large quantities of CO_2 in the pipeline corridor affect Wyoming's GHG emissions?

Alternatives

Corridor reroute possibilities include for Segment 7 to head west to U.S. Route 287 and follow the route north to the crossing and to shift Segment 6 to the east along Wyoming Highway 487 to pass east of Shirley Mountain and toward Medicine Bow.

The Rawlins Field Office is satisfied with where the existing corridors are placed in their region, but there are some issues with where the existing corridors cross into the Lander Field Office.

A proposed solar project in Section 24, Township 19 North, Range 109 West appears to conflict with the Proposed Action. The Proposed Action would need to be rerouted around this facility.

The establishment of a ROW corridor pursuant to Section 503 of FLPMA, the width needs to be consistent with the planned or established uses within the corridor. This includes the appropriate offsets for any pipeline placement to the appropriate industry and governmental standards. Five pipelines in 150

feet of corridor may require a wider corridor. Consider less pipelines and larger pipes instead. For instance, in place of 20-inch use 24-inch or 30-inch pipeline.

Avoidance, Minimization, and Mitigation

Regardless of whether invasive plants are currently present or how much prevention control is conducted, it should be assumed that some level of new infestations will be introduced from potential construction activities. Seed mixes for reclamation are required to be noxious weed free; however, under state law, seed mixes can contain a 3% of other weeds. This alone can possibly create weed issues. There is no BLM statewide standard for the amount of invasive plants and other noxious weeds allowed in any given area.

Cultural Resources

How would the Proposed Action physically (directly) affect both known and unknown cultural resources?

How would the proposed pipeline development indirectly affect known eligible cultural resources with integrity of setting?

How would the proposed pipeline development physically (directly) or indirectly (visually) impact both known and unknown cultural resources of Native American concern?

Cumulative Effects

Approximately 5 miles of Segment 2 in the Rawlins Field Office area is located within the Red Rim-Daley WHMA, which parallels an existing transmission line. This would widen the existing disturbance in this area, further fragmenting habitat. This increased fragmentation could lead to increased predation because of adequate vegetation, e.g., large sagebrush or greasewood, cover.

Construction would be seasonal, and workers would be competing for limited temporary housing with workers on other projects as well as tourists and recreationists. The discussion of cumulative housing impacts would be important.

Environmental Justice

Would construction, installation, cleanup, and reclamation of pipelines in the trunk and lateral corridors affect environmental justice communities?

Would operations and maintenance of pipelines in the trunk and lateral corridors affect environmental justice communities?

Would reclamation following the abandonment of pipelines in the trunk and lateral corridors affect environmental justice communities?

Fire and Fuel Loads

How would a human-made fire affect BLM management of wildfires and fuel loads?

Geology and Minerals

Is the analysis area prone to geologic hazards (earthquakes, landslides/slumping) that could affect pipelines or that could be exacerbated by pipeline construction or oil and gas development (fracking) supported by the Proposed Action?

Would pipeline construction increase the likelihood of landslides in landslide-prone areas?

Would disturbance from pipeline construction affect cave and karst resources?

Would the pipeline corridors overlap and affect active mines in the analysis area?

Would the pipeline corridors make mineral locations inaccessible to exploration/development?

Groundwater

Would construction activities associated with the pipelines in the designated corridors (including hydrostatic testing) increase the risk of surface water or groundwater (including seeps and springs) contamination from chemicals?

Would water-consumptive activities associated with Proposed Action construction affect the availability and quality of water resources, including groundwater and springs and seeps?

How would the Proposed Action affect groundwater, especially shallow groundwater resources?

Land Use and Access

How would the Proposed Action affect other corridors, ROWs, and/or land use authorizations?

How would the Proposed Action affect agricultural land uses on private property and/or state lands?

How would construction, operation, and maintenance of the project affect land uses and land use plans?

NEPA Analysis and Related Processes

A mining claim report needs to be run to determine potential impacts to existing mining claims.

As a direct competent to trails management, the National Trails Act identifies trail resources to include the landscape and noise that can be seen and/or heard from the trail. The trails visual protection corridor decisions found in the BLM land use plans are a direct result of the BLM protecting places on the trails where sensitive trail resources are present. Any proposal that is in direct conflict of the National Trails Act is considered interference with the nature and purpose of the trails.

For the socioeconomic analyses, it is reasonable to use the Riley Ridge to Natrona analysis as an example of economic impacts associated with short-term construction and long-term operation of the pipeline. There is a lot of uncertainty in when and where pipelines would be constructed; therefore, impact calculations should be the per-mile impacts associated with construction and operation phases from the Riley Ridge to Natrona analysis. Reporting total statewide impacts would inevitably inflate impacts and imply a false sense of precision. The Riley Ridge to Natrona analysis can also be used to estimate sales tax and lodging tax and to report potential tax revenue generated per worker.

Property taxes should be addressed qualitatively by saying that property taxes would be levied on pipelines and infrastructure in each county.

Severance taxes are levied on the extraction of minerals, not its transportation, so if the assumption is that no operators would employ EOR without the presence of a pipeline in these corridors, then severance taxes levied on the incremental reserves extracted from existing fields through EOR would be relevant to this analysis.

Impacts to SSS need to be analyzed individually as to which species or habitats could be impacted.

Impacts to Visual Resource Management (VRM) need to be evaluated in association to the Proposed Action and how it may contrast with the land use plan VRM Class objectives. The Visual Resource Inventory will be used to define the baseline data to help inform the contrast analysis and visual simulations in relation to the proposed action and its location on BLM lands. If the contrast to the landscape does not meet the current VRM objectives on the ground, then alternatives and BMPs would need to be developed to meet those objectives.

Noise

How would noise generated by construction, operation, and maintenance of the pipeline affect sensitive receptors, and what impacts could remain after the mitigation is applied?

Paleontological

How would construction related to ground-disturbing activities directly or indirectly affect known or unknown paleontological resources?

How would an increase in human activity during and after construction directly or indirectly affect known and unknown paleontological resources?

Proposed Action

Segment 6 overlaps the Seminoe-Alcova Backcountry Byway, Morgan Creek WHMA, Miracle Mile Blue Ribbon trout fishery and recreation area, sand dunes near Seminoe State Park, North Platte River, and Dugway Campground. Many areas could have erosion and reclamation issues because of steep slope and poor soil stability. Sand dunes are also potential habitat for blowout penstemon.

Segment 7 could have erosion and reclamation issues because of poor soil quality and boggy soap holes, which would make it difficult to access some portions of the corridor.

Segment 3 overlaps the following no surface occupancy areas for sage-grouse leks: May Day, Fivemile Junction, Sourdough, Minex West, Discover, and Discover South. Segment 6 overlaps the following no surface occupancy areas for sage-grouse leks: Idaho Airstrip, Gooseberry Creek, 2783111, Kortes Road, Canyon Creek, Canyon Creek South, Meers Camp, Rattlesnake Spring, Canyon Creek North Fork Lower, Kortes Road, Canyon Creek, and Rattlesnake Spring. Segment 7 overlaps the following no surface occupancy for sage-grouse leks: Tin Can, Conners, and Frenchmen.

Public Health and Safety

How would a hazardous materials spill affect public health and safety (e.g., contaminated soils or groundwater, near roadways)?

How would a fire affect public health and safety?

Range and Grazing

How would vegetation removal and surface disturbance temporarily and permanently affect acres with suitable forage for grazing?

How would vegetation removal and surface disturbance affect the available animal unit months within each allotment crossed by the corridors, temporarily and permanently?

How would the pipeline impact the various range improvements it intersects during construction?

How would disturbance associated with the Proposed Action increase invasive species and reduce forage for livestock?

Recreation

How would the proposed pipeline corridor network affect recreation management areas, recreation resources, special recreation and management areas, and extensive recreation and management areas?

How would the long-term presence of aboveground facilities and access roads affect recreational experience and access?

How would construction, operations, and maintenance activities in the ROW affect recreational experience and access?

How would restricting all pipeline ROWs and associated roads to energy-related vehicles only affect recreation resources and all other BLM resources given strong concern regarding route densities?

How would the Proposed Action impact national historic and scenic trails?

Socioeconomics

How would construction, installation, operations and maintenance, cleanup, and reclamation of pipelines in the trunk and lateral corridors affect the direct, indirect, and induced employment, earnings, and economic output from related expenditures within the analysis area?

How would construction, installation, operations and maintenance, cleanup, and reclamation of pipelines in the trunk and lateral corridors affect the demand for short-term housing, long-term housing and public services, such as police, emergency response, and health services, within the analysis area?

How would construction, installation, operations and maintenance, cleanup, and reclamation of pipelines in the trunk and lateral corridors affect state and county tax revenues, primarily from sales and lodging taxes?

How would operations and maintenance of pipelines in trunk and lateral corridors affect state and county tax revenues, primarily from property and severance taxes from oil, gas, and CO_2 production?

How would construction, operations and maintenance, installation, cleanup, and reclamation of pipelines in the trunk and lateral corridors affect the tourism and recreation economy from the temporary closures of public land?

How would construction, installation, operations and maintenance, cleanup, and reclamation of pipelines in the trunk and lateral corridors affect non-market values and property values?

How would construction, installation, operations and maintenance, cleanup, and reclamation of pipelines in the trunk and lateral corridors affect private land values near the corridors?

How would the pipeline corridors impact indirect socioeconomic resources (i.e., employment, earnings, and output) through EOR over the life of the project?

Soils

Would construction associated with the Proposed Action result in soil compaction?

Would construction associated with the Proposed Action result in disturbance to sensitive soils (e.g., biological crusts)?

Would the Proposed Action result in increased erosion from lack of soil protection?

Would the Proposed Action result in temporary loss of soil productivity until successful reclamation?

Would the Proposed Action result in long-term loss of soil productivity in areas with soils that have low reclamation potential?

Would construction associated with the Proposed Action result in soil compaction?

Would construction associated with the Proposed Action result in disturbance to sensitive soils (e.g., biological crusts)?

Would the Proposed Action result in increased erosion from lack of soil protection?

Would the Proposed Action result in temporary loss of soil productivity until successful reclamation?

Would the Proposed Action result in long-term loss of soil productivity in areas with soils that have low reclamation potential?

Special Designations

How would future corridor clearing and surface disturbance affect the relevant and important values of each of the following ACECs crossed by or within 150 feet of the corridors: Beaver Rim ACEC (scenic value), National Historic Trail ACEC (scenic value), Jackson Canyon ACEC, Greater Sand Dunes ACEC?

How would future corridor clearing and surface disturbance affect the relevant and important values of each of the following ACECs crossed: Beaver Rim ACEC (scenic value), Jackson Canyon ACEC, Greater Sand Dunes ACEC?

How would future corridor clearing and surface disturbance affect designated wilderness study areas?

Special-Status Species

Would clearing vegetation decrease sage-grouse reproduction and recruitment, resulting in population declines at both the site scale and subpopulation scale?

Would decreased availability of cover and forage during winters contribute to long-term population declines?

Would pipeline corridors increase potential predation?

Would pipeline corridors increase habitat fragmentation that limits sage-grouse use?

Would the Proposed Action (clearing habitat, fragmentation, roads, increased activity, invasive weeds) result in SSS population declines?

Would pipeline corridors increase SSS habitat fragmentation or predation of SSS?

How would water use, noise, and increased activity impact SSS?

Surface Water

Would construction associated with the Proposed Action lead to increases in erosion and resultant sedimentation with the potential to affect water quality?

Would water-consumptive activities associated with Proposed Action construction affect the availability and quality of water resources, including streams and wetlands?

Does the Proposed Action overlap with eligible or designated wild and scenic rivers, and, if so, would it affect the classification or alter its eligibility?

Would the Proposed Action result in the net loss of wetland areas?

Would the Proposed Action lead to alteration of stream channels and drainage flows and ultimately stream classification, groundwater recharge rates, and surface run-off rates?

What will the water quality and/or quantity impacts be from hydrostatic testing and other water-using activities associated with the proposed pipeline?

Would the Proposed Action lead to increased salinity levels in the Upper Colorado River Basin?

What are the local area and downstream impacts to the increase in salinity?

How would salinity alter the instream habitat and associated aquatic species?

Vegetation

How would construction affect vegetation cover?

Would construction of the corridor remove forested vegetation for which BLM is directed under 43 CFR 5000 to receive fair market value?

Would removal of forested vegetation cause increased sediment delivery to streams and lakes?

Would reclamation efforts use seedlings grown from seed from the correct elevation and seed zones?

Would reforestation success be measured and additional plantings done to ensure reforestation is accomplished within the regulatory required timelines?

Would fuels created from the removal of vegetation be treated sufficiently to reduce the risk of fire?

Would construction cause the introduction and spread of noxious weeds and other invasive plants?

How would the introduction of noxious weeds and invasive species affect revegetation success?

Visual Resources

How would construction activity and the long-term presence of the pipeline affect the analysis area's viewshed and sensitive viewing locations?

How would construction activity and the long-term presence of the pipeline affect the analysis area's viewshed and sensitive viewing locations?

Wild Horses

Would wild horses be affected by fragmentation, reduced access to water, open trenches, and vehicular traffic during construction?

Would wild horse grazing affect revegetation efforts within corridors?

Wildlife, General

How would construction and operations affect big game movement, migration routes, and parturition areas?

How would construction and operations affect raptor and migratory bird nesting activities?

Would construction across stream channels and/or other waters affect native fisheries/aquatic resources because of sedimentation, turbidity, and increase in salinity?

Would water withdrawals for hydrostatic testing and dust abatement reduce fisheries habitat?

6 FUTURE STEPS IN THE EIS PROCESS

Once alternatives are developed, the BLM will analyze the effects of each alternative on the environment. The analysis will consider the scoping feedback and finalized issues for analysis. The documentation of the process and the results will be included in the draft EIS.

Once the draft EIS is internally vetted with cooperating agencies, it will be made available for public review. The availability of the draft EIS will be announced in the *Federal Register* and advertised in the local and regional media. Public comments will be accepted for 90 days. The BLM will review and consider all comments received on the draft EIS. The document will be modified as appropriate based on public comments; all substantive comments and responses will be incorporated into the final EIS.

The notice of availability (NOA) of the final EIS will be announced in the *Federal Register* and advertised in local and regional media. The NOA will outline procedures to protest the final EIS during the 30-day period after the NOA is published in the *Federal Register*. A 60-day Governor's Consistency Review will occur concurrent with this protest period.

A record of decision selecting the alternative to be implemented will be issued following the 60-day Governor's Consistency Review and resolution of protests on the final EIS. Throughout the process the public may continue to monitor the BLM's project website for updates and can request to be added to the BLM's project mailing list.

To be added to the mailing list:

Email: hschultz@blm.gov

Mail: Heather Schultz, Project Manager
BLM Wyoming State Office
5353 Yellowstone Road
Cheyenne, Wyoming 82009

Appendix A

Federal Register Notice of Intent

DEPARTMENT OF HOMELAND SECURITY

[Docket No. CISA–2019–0015]

Notice of the President's National Infrastructure Advisory Council Meeting

AGENCY: Cybersecurity and Infrastructure Security Agency, DHS.

ACTION: Announcement of meeting; request for comments.

SUMMARY: The Cybersecurity and Infrastructure Security Agency (CISA) announces a public meeting of the President's National Infrastructure Advisory Council (NIAC). To facilitate public participation, CISA invites public comments on the agenda items and any associated briefing materials to be considered by the council at the meeting.

DATES:

Meeting Registration: Individual registration to attend the meeting in person is required and must be received no later than 5:00 p.m. EST on December 12, 2019.

Speaker Registration: Individuals may register to speak during the meeting's public comment period must be received no later than 5:00 p.m. EST on December 4, 2019.

Written Comments: Written comments must be received no later than 12:00 p.m. EST on December 11, 2019.

NIAC Meeting: The meeting will be held on Thursday, December 12, 2019 from 9:00 a.m.–1:00 p.m. EST.

ADDRESSES: The NIAC meeting will be held at the Eisenhower Executive Office Building, 1650 Pennsylvania Ave. NW, Washington, DC 20502.

Comments: Written comments may be submitted on the issues to be considered by the NIAC as described in the **SUPPLEMENTARY INFORMATION** section below and any briefing materials for the meeting. Any briefing materials that will be presented at the meeting will be made publicly available on Friday, December 6, 2019 at the following website: *https://www.dhs.gov/national-infrastructure-advisory-council.*

Comments identified by docket number ''*CISA–2019–0015*'' may be submitted by any of the following methods:

- *Federal eRulemaking Portal: www.regulations.gov.* Follow the instructions for submitting written comments.
- *Email: NIAC@hq.dhs.gov.* Include docket number *CISA–2019–0015* in the subject line of the message.
- *Fax:* 703–235–9707, ATTN: Ginger K. Norris.
- *Mail:* Ginger K. Norris, Designated Federal Officer, National Infrastructure Advisory Council, Cybersecurity and Infrastructure Security Agency, Department of Homeland Security, 245 Murray Lane, Mail Stop 0612, Arlington, VA 20598–0612.

Instructions: All submissions received must include the agency name and docket number for this notice. All written comments received will be posted without alteration at *www.regulations.gov,* including any personal information provided. For detailed instructions on sending comments and additional information on participating in the upcoming NIAC meeting, see the ''PUBLIC PARTICIPATION'' heading of the **SUPPLEMENTARY INFORMATION** section of this document.

Docket: For access to the docket and comments received by the NIAC, go to *www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT: Ginger K. Norris, 202–441–5885, *ginger.norris@cisa.dhs.gov.*

SUPPLEMENTARY INFORMATION: The NIAC is established under Section 10 of E.O. 13231 issued on October 16, 2001. Notice of this meeting is given under the Federal Advisory Committee Act (FACA), 5 U.S.C. Appendix (Pub. L. 92–463). The NIAC shall provide the President, through the Secretary of Homeland Security, with advice on the security and resilience of the Nation's critical infrastructure sectors.

The NIAC will meet in an open meeting on December 12, 2019, to discuss the following agenda items with DHS leadership.

Agenda

I. Call to Order
II. Opening Remarks
III. Insurance Panel Discussion
IV. Discuss and Deliberate Current Task
V. Public Comment
VI. Closing Remarks
VII. Adjournment

Public Participation

Meeting Registration Information

Due to additional access requirements and limited seating, requests to attend in person will be accepted and processed in the order in which they are received. Individuals may register to attend the NIAC meeting by sending an email to *NIAC@hq.dhs.gov.*

Public Comment

While this meeting is open to the public, participation in FACA deliberations are limited to council members. A public comment period will be held during the meeting from approximately 12:45 p.m.–1:00 p.m. EST. Speakers who wish to comment must register in advance and can do so by emailing *NIAC@hq.dhs.gov* no later than Wednesday, December 4, 2019, at 5:00 p.m. EST. Speakers are requested to limit their comments to three minutes. Please note that the public comment period may end before the time indicated, following the last call for comments.

Information on Services for Individuals With Disabilities

For information on facilities or services for individuals with disabilities or to request special assistance at the meeting, contact *NIAC@hq.dhs.gov* as soon as possible.

Dated: November 6, 2019.

Ginger K. Norris,

Designated Federal Official, National Infrastructure Advisory Council, Cybersecurity and Infrastructure Security Agency, Department of Homeland Security.

[FR Doc. 2019–24744 Filed 11–14–19; 8:45 am]

BILLING CODE 9110–9P–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[LLWY925000.L13400000.PQ0000 20X]

Notice of Intent To Prepare Resource Management Plan Amendments for 9 BLM-Wyoming Resource Management Plans and an Associated Environmental Impact Statement

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of intent.

SUMMARY: In compliance with the National Environmental Policy Act (NEPA) of 1969, as amended, and the Federal Land Policy and Management Act (FLPMA) of 1976, as amended, the Bureau of Land Management (BLM) intends to prepare an Environmental Impact Statement (EIS) to analyze potential Resource Management Plan (RMP) amendments for BLM Wyoming's Cody, Worland, Buffalo, Casper, Lander, Pinedale, Kemmerer, Rawlins and Rock Springs field offices. The proposed amendments would designate pipeline corridors as part of the Wyoming Pipeline Corridor Initiative (WPCI) proposed by the State of Wyoming. By this notice, the BLM is announcing the beginning of the scoping process to solicit public comments and identify issues.

DATES: Comments on the RMP amendments and associated EIS may be submitted in writing until December 16, 2019. The date(s) and location(s) of any

scoping meetings will be announced at least 15 days in advance through local media, newspapers and the BLM website at *https://go.usa.gov/xpCMr.* To ensure the BLM can adequately consider and incorporate all comments, please submit written comments prior to the close of the 30-day scoping period or 15 days after the last public meeting, whichever is later. The BLM will provide additional opportunities for public participation upon publication of the Draft EIS.

ADDRESSES: You may submit comments on issues and planning criteria related to the EIS during public scoping meetings or on the WPCI ePlanning website at *https://go.usa.gov/xpCMr.*

Documents pertinent to this proposal may be examined in person at the BLM Wyoming State Office, 5353 Yellowstone Road, Cheyenne, WY 82009.

FOR FURTHER INFORMATION CONTACT: Heather Schultz, Project Manager, telephone: 307–775–6084; address: 5353 Yellowstone Road, Cheyenne, Wyoming; email: *hschultz@blm.gov.* Contact Ms. Schultz to be added to the WPCI mailing list. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service (FRS) at 1–800–877–8339 to contact the above individual during normal business hours. The FRS is available 24 hours a day, 7 days a week, to leave a message or question with the above individual. You will receive a reply during normal business hours.

SUPPLEMENTARY INFORMATION: The State of Wyoming is proposing a pipeline corridor network for carbon capture, utilization, and storage (CCUS) and enhanced oil recovery (EOR) to be designated on BLM-managed lands in Wyoming through the land use planning process. The State of Wyoming proposes that 2,000 miles and 25 segments of pipeline corridors be designated on BLM-managed lands and in those lands' associated RMPs. The proposed WPCI corridors are divided into segments based on proposed width and the regions they will service.

The BLM plans to analyze the State's proposal by preparing an EIS. Based on the findings of the EIS process, the BLM may amend the nine RMPs containing lands proposed for pipeline corridors to designate those corridors. If the BLM were to receive a right-of-way application for CCUS and EOR pipelines or related facilities in the future, project-specific NEPA would be completed separately at that time. The purpose of this public scoping process is to determine relevant issues that will influence the scope of the environmental analysis, including alternatives, and guide the planning process. BLM and State of Wyoming personnel have identified preliminary issues to address within the planning area, including Greater Sage-Grouse; big game habitat (including migration corridors); potential conflicts with coal mining and other resource uses; air quality; transportation; vegetation and reclamation success; anticipated oil and gas development in the planning area; and opportunities to apply best management practices and design features.

The BLM also seeks input on planning criteria, which include compliance with laws and regulations and integration into affected plans. The BLM has identified the following preliminary planning criteria:

- The planning and environmental review processes will comply with FLPMA, the Endangered Species Act, the Clean Water Act, and all other applicable laws, regulations, and policies.
- Valid existing rights will continue to be recognized.
- The BLM will continue to manage other resources in the planning areas under pre-existing terms, conditions, and decisions in the applicable RMPs.
- The BLM will coordinate with Federal, State, and local agencies and tribal governments in the development of the EIS.
- Any amendments to BLM RMPs will be consistent with the existing plans and policies of state and local governments, to the extent practicable.

Please follow the procedures identified above to submit comments on issues and planning criteria. Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. The BLM will evaluate identified issues to be addressed in the plan, and will place them into one of three categories:

1. Issues to be resolved in the plan;
2. Issues to be resolved through policy or administrative action; or
3. Issues beyond the scope of this plan.

The BLM will provide an explanation in the Draft RMP/Draft EIS as to why an issue was placed in category 2 or 3. The public is also encouraged to help identify any management questions and concerns that should be addressed in the plan. The BLM will work collaboratively with interested parties to identify the management decisions that are best suited to local, regional, and national needs and concerns.

The BLM will utilize and coordinate the NEPA scoping process to help fulfill the public involvement process under the National Historic Preservation Act (54 U.S.C. 306108) as provided in 36 CFR 800.2(d)(3). The information about historic and cultural resources within the area potentially affected by the proposed action will assist the BLM in identifying and evaluating impacts to such resources.

The BLM will use an interdisciplinary approach to develop the plan in order to consider the variety of resource issues and concerns identified. Specialists with expertise in the following disciplines will be involved in the planning process: Rangeland management, minerals and geology, forestry, outdoor recreation, archaeology, paleontology, wildlife and fisheries, lands and realty, hydrology, soils, sociology, and economics.

Authority: 40 CFR 1501.7, 43 CFR 1610.2.

Duane Spencer,

Acting State Director.

[FR Doc. 2019–24752 Filed 11–14–19; 8:45 am]

BILLING CODE 4310–22–P

DEPARTMENT OF JUSTICE

Agency Information Collection Activities; Proposed Collection; Comments Requested; Immigration Practitioner Complaint Form

AGENCY: Executive Office for Immigration Review, Department of Justice.

ACTION: 30-Day notice.

The Department of Justice (DOJ), Executive Office for Immigration Review, will be submitting the following information collection request to the Office of Management and Budget (OMB) for review and approval in accordance with the Paperwork Reduction Act of 1995.

DATES: Comments are encouraged and will be accepted for an additional days until December 16, 2019.

FOR FURTHER INFORMATION CONTACT: If you have additional comments especially on the estimated public burden or associated response time, suggestions, or need a copy of the proposed information collection instrument with instructions or additional information, please contact Lauren Alder Reid, Assistant Director,

Appendix B

Scoping Meeting Materials

U.S. Department of the Interior
Bureau of Land Management

Wyoming Pipeline Corridor Initiative

Public Scoping Open House

December 2019

About the Proposed Action

The Wyoming Pipeline Corridor Initiative is a proposal from the State of Wyoming to designate almost 2,000 miles of pipeline corridors across private, state and BLM-managed lands in Wyoming (Figure 1). Approximately 1,150 miles of the proposed corridors are located on BLM managed lands. The project would designate a statewide pipeline corridor network for future development of pipelines associated with carbon capture, utilization and storage, as well as pipelines and facilities associated with enhanced oil recovery. The project will not authorize any new pipelines or construction but will amend several BLM Resource Management Plans across the state to make future analysis of project specific proposals more efficient.

One of the primary purposes of the pipeline corridor network is to connect existing oil fields suitable for enhanced oil recovery (EOR) with anthropogenic and natural carbon dioxide (CO2) sources. The CO2 will be injected into existing, often "played-out" oil fields, thereby increasing oil production beyond conventional recovery methods with little additional surface disturbance.

About This Public Open House Meeting

The purpose of this public open house is to solicit and obtain public feedback regarding the Proposed Action to inform the development of a Draft Environmental Impact Statement (EIS). Resource specialists from the BLM are available to answer your questions.

How to Comment

The comment period closes on **December 27, 2019**. All comments received during the comment period will be considered equally in the development of the Draft EIS. Scoping comments can be submitted in one of the following ways:

- By providing written comments in the comment forms available at this meeting. The comment station has comment boxes in which you can place your completed comment form. You may also give your completed form to any BLM or USFS employee. These comment forms will not be accepted beyond the conclusion of this meeting.
- If you wish to submit a comment at a later date, please do so via BLM's ePlanning website: go.usa.gov/xpCMr

Before including your personal information in your comment, you should be aware that your entire comment—including your personal information—may be made publicly available at any time. Although you can ask us in your comment to withhold your personal information from public review, we cannot guarantee that we will be able to do so. All submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be available for public inspection in their entirety.

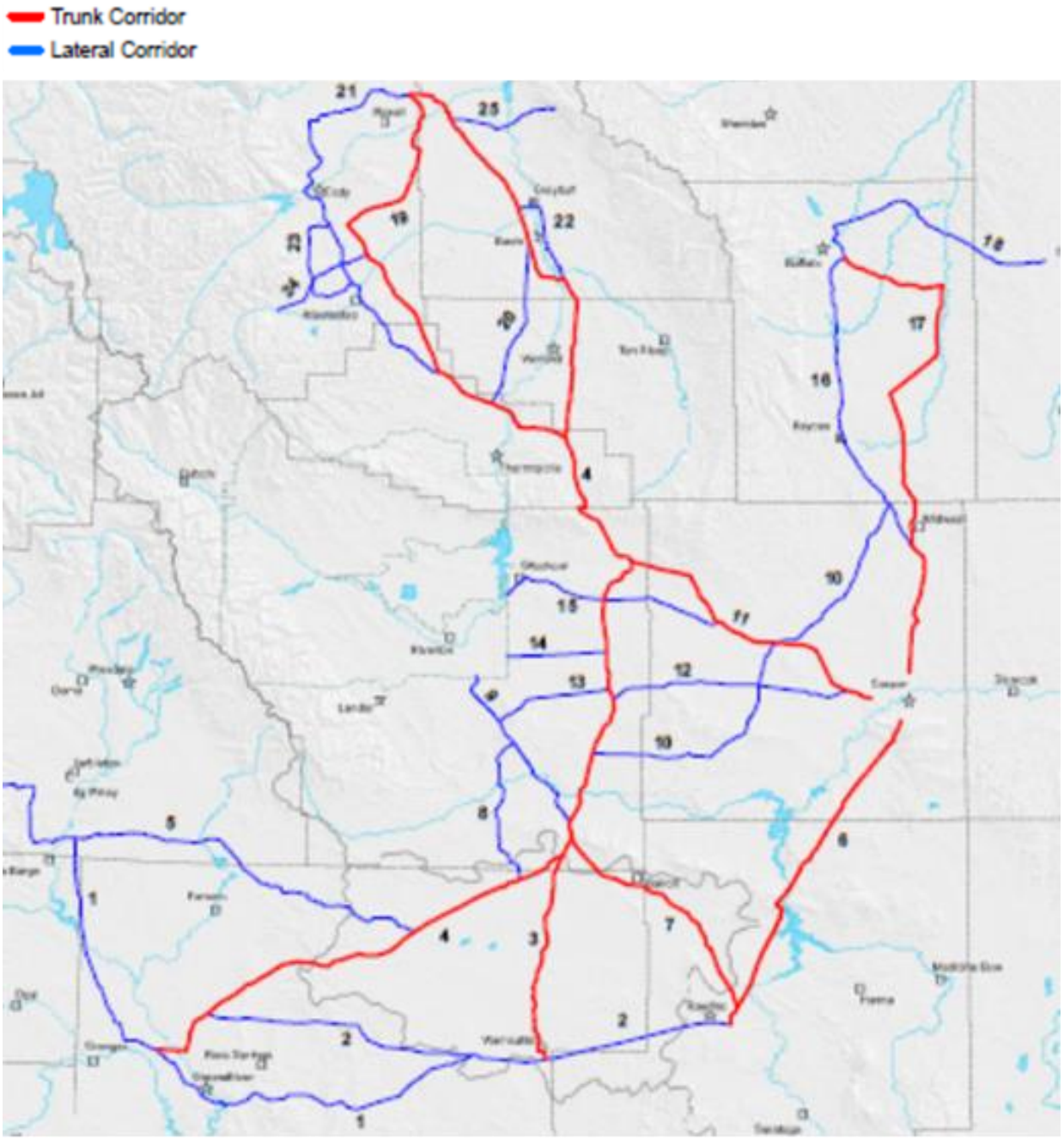

Figure 1. Project area

U.S. Department of the Interior
Bureau of Land Management

WYOMING PIPELINE CORRIDOR INITIATIVE

Public Scoping Meeting Registration and Comment Form

Please be advised that your entire comment—including your personal information—may be made publicly available at any time. While you may ask us in your comment to withhold your personal information from public review, we cannot guarantee that we will be able to do so.

MEETING LOCATION AND DATE (CHECK ONE):

☐ Cheyenne Dec. 9 ☐ Casper Dec. 10 ☐ Thermopolis Dec. 11 ☐ Rock Springs Dec. 12

NAME/ORGANIZATION: _____

ADDRESS: _____

EMAIL: _____

☐ Yes, please include my information on the mailing list so I can receive information about the project.

PLEASE WRITE YOUR COMMENT ON THE BACK OF THIS FORM AND DEPOSIT IT IN THE COMMENT BOX BEFORE LEAVING THE MEETING TONIGHT. PUBLIC COMMENTS AFTER THIS MEETING WILL ONLY BE ACCEPTED VIA BLM'S EPLANNING WEBSITE.

U.S. Department of the Interior
Bureau of Land Management

WYOMING PIPELINE CORRIDOR INITIATIVE

Public Scoping Meeting Registration and Comment Form

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U.S. Department of the Interior
Bureau of Land Management

WYOMING PIPELINE CORRIDOR INITIATIVE

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U.S. Department of the Interior
Bureau of Land Management

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COMMENT

Do you wish to have your personal information withheld? ☐ Yes ☐ No

COMMENT

Do you wish to have your personal information withheld? ☐ Yes ☐ No

COMMENT

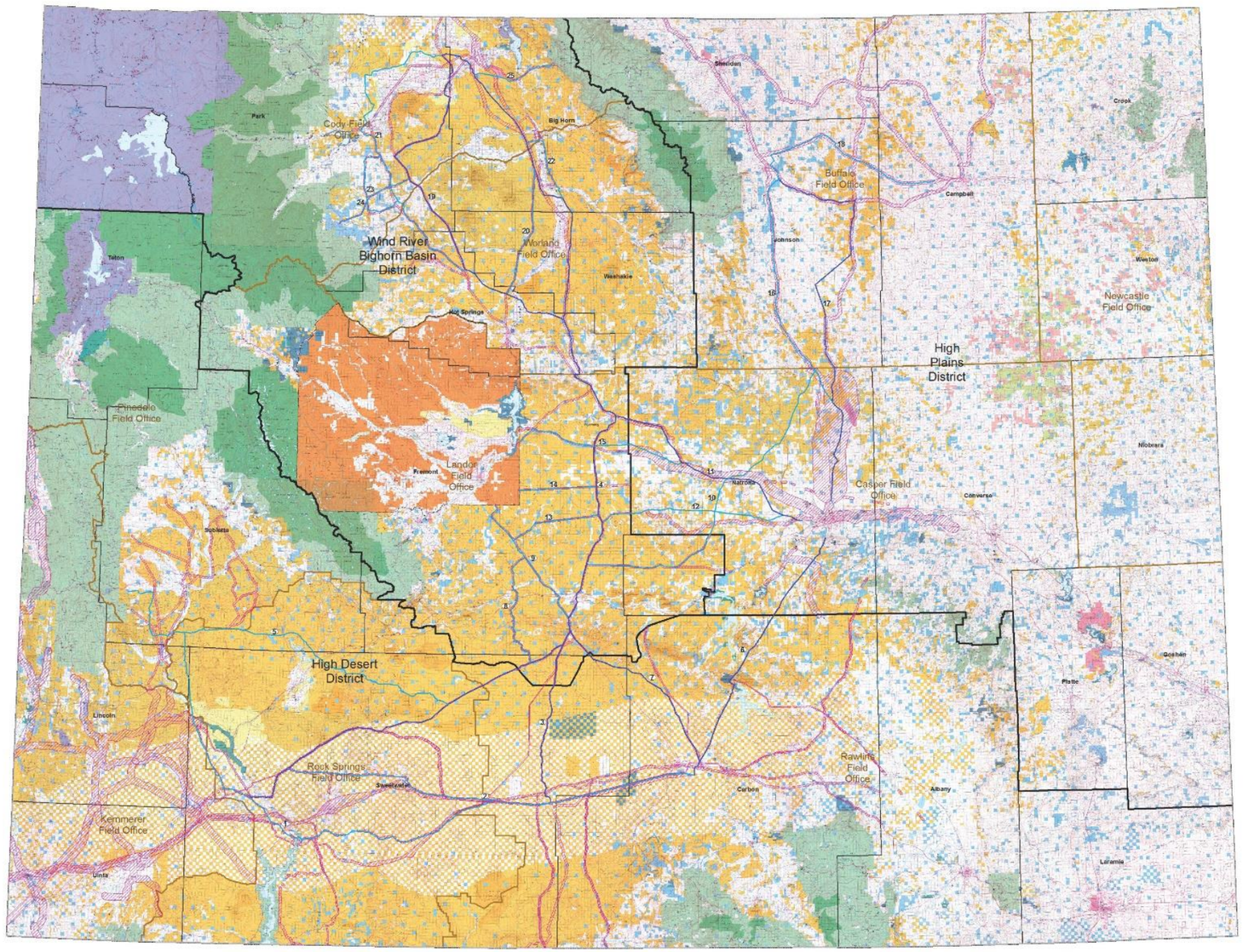
Do you wish to have your personal information withheld? ☐ Yes ☐ No

COMMENT

Do you wish to have your personal information withheld? ☐ Yes ☐ No

NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

WPCI Overview



WPCI BLM Statewide

ROW Corridors Line Type

- Lateral Line
- Trunk Line

BLM Identified Utility Corridors

- Utility Corridors

Surface Management Agency

- Bankhead Jones
- Bureau of Land Management
- Bureau of Reclamation
- Corps of Engineers
- Department of Agriculture
- Department of Defense
- Department of Energy
- Department of Veterans Affairs
- Federal Aviation Administration
- Fish & Wildlife Service
- Forest Service
- General Services Administration
- Local Government
- National Grasslands
- National Park Service
- State
- State (State Parks & Hist Sites)
- State (University of Wyoming)
- State (Wyoming Game & Fish)
- Wind River Indian Reservation

0 12.5 25 50 75 100 Miles

September 2019

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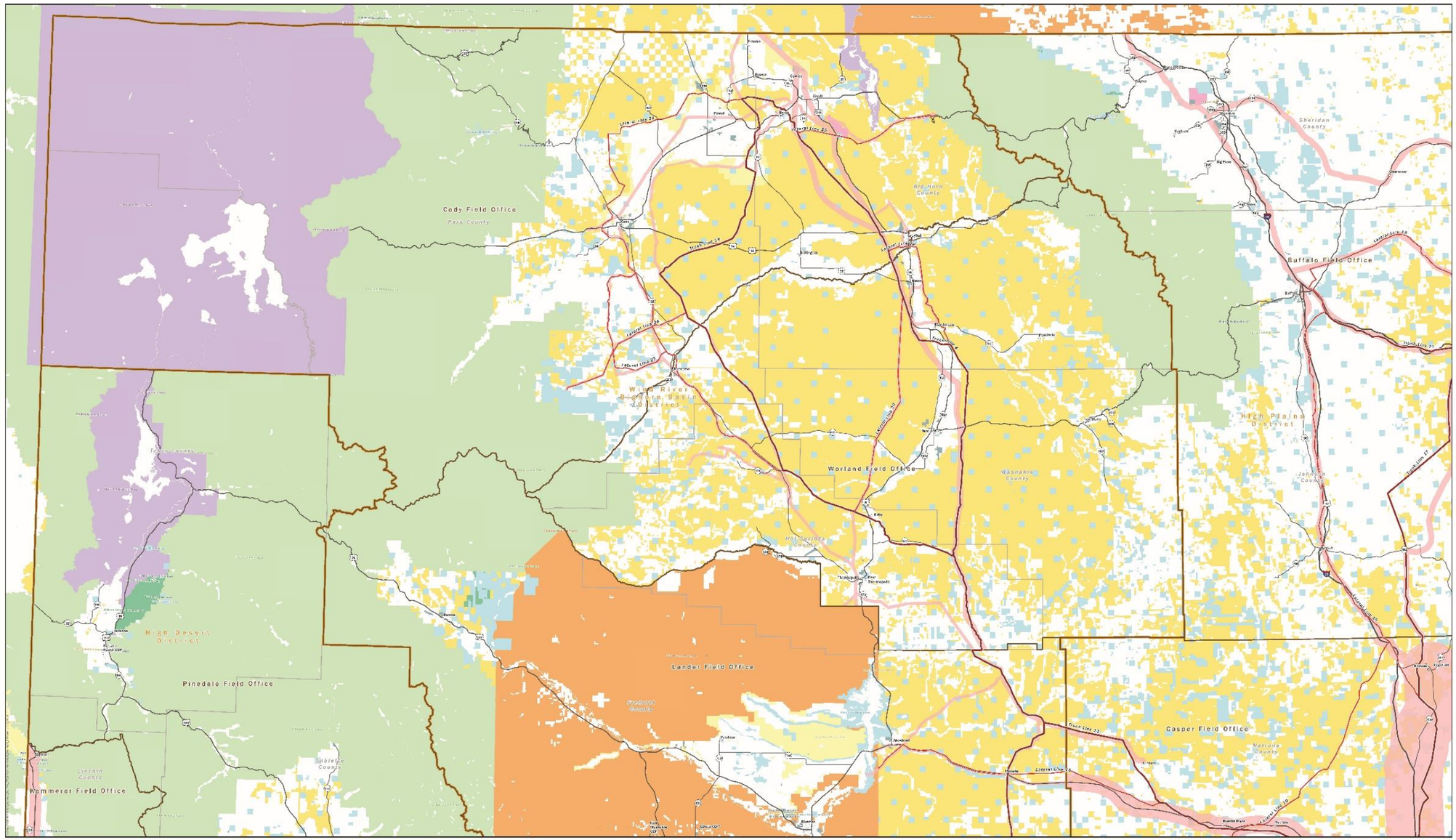
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

WPCI Project NW Wyoming



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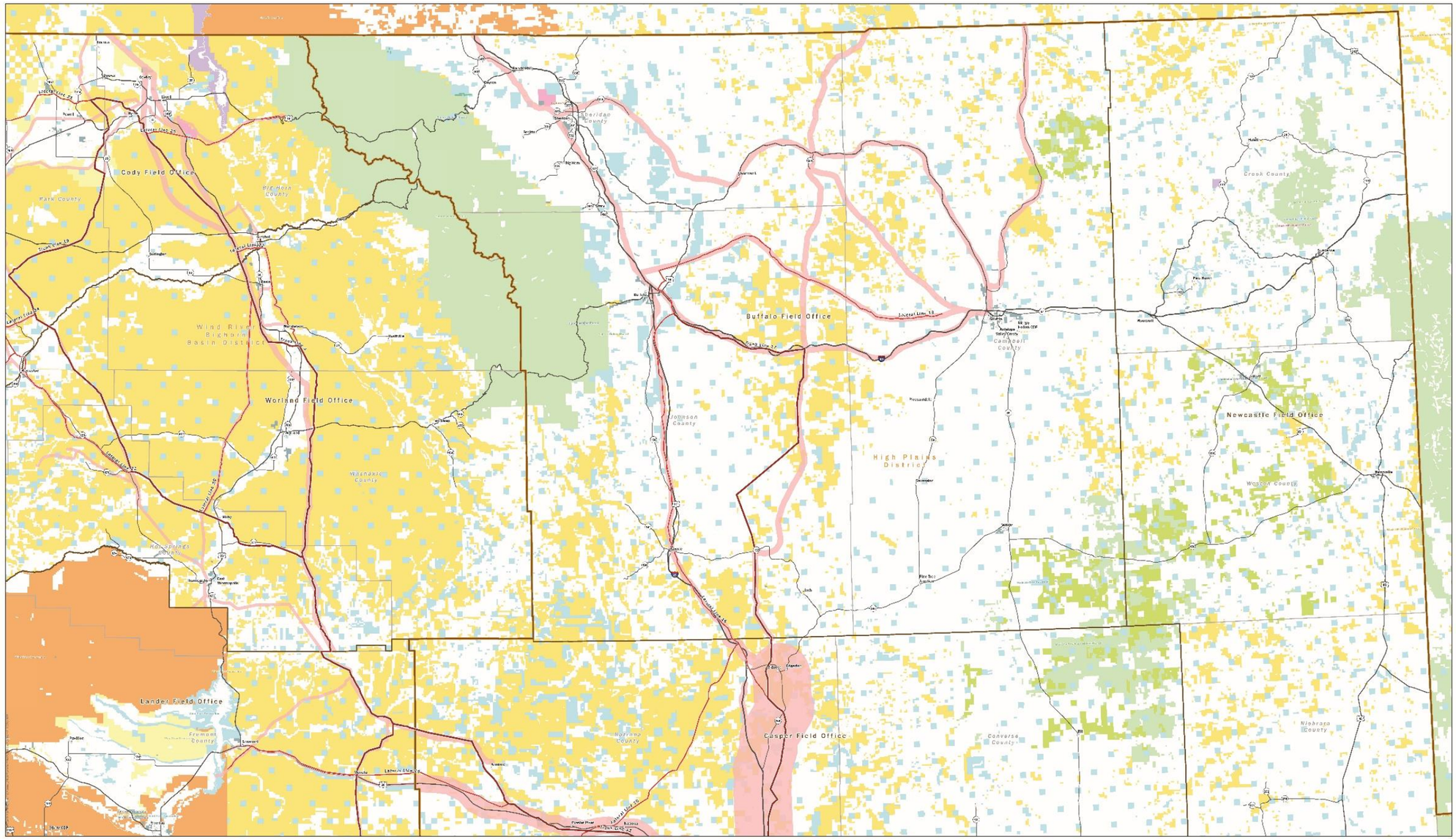
WPCI Project NE Wyoming



Wyoming Pipeline Corridor Initiative Project

ROW Corridors Line Type
- Proposed Trunk Line Corridor
- Proposed Lateral Line Corridor

BLM Identified Utility Corridors
- Utility Corridors

- BLM Field Offices
- BLM Districts
- Counties

Highways
- Interstate
- US Route
- State Route

Surface Management Agency
- National Grasslands
- Bureau of Land Management
- Bureau of Reclamation
- Corps of Engineers
- Department of Agriculture
- Department of Defense
- Department of Energy
- Department of Veterans Affairs
- Federal Aviation Administration
- Fish & Wildlife Service
- Forest Service
- Local Government
- National Park Service
- State
- State (State Parks & Hist Sites)
- State (University of Wyoming)
- State (Wyoming Game & Fish)
- Wind River Indian Reservation

0 10 20 30 40 50 Miles

N

NAD83, WY East 4301

Data Sources: State of Wyoming, FWOA, BLM, ESRI, USGS
Last Updated: 11/22/2019

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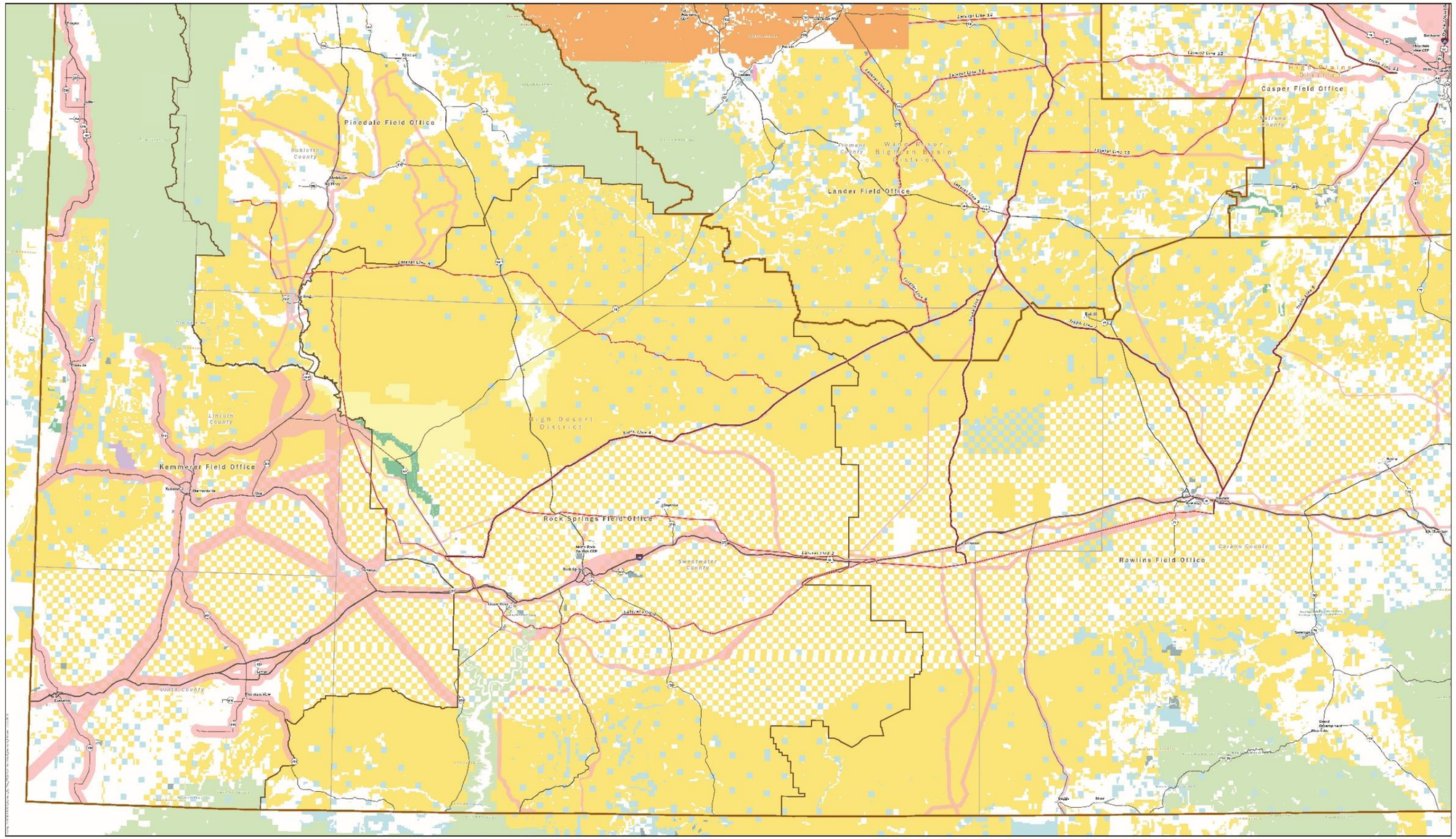
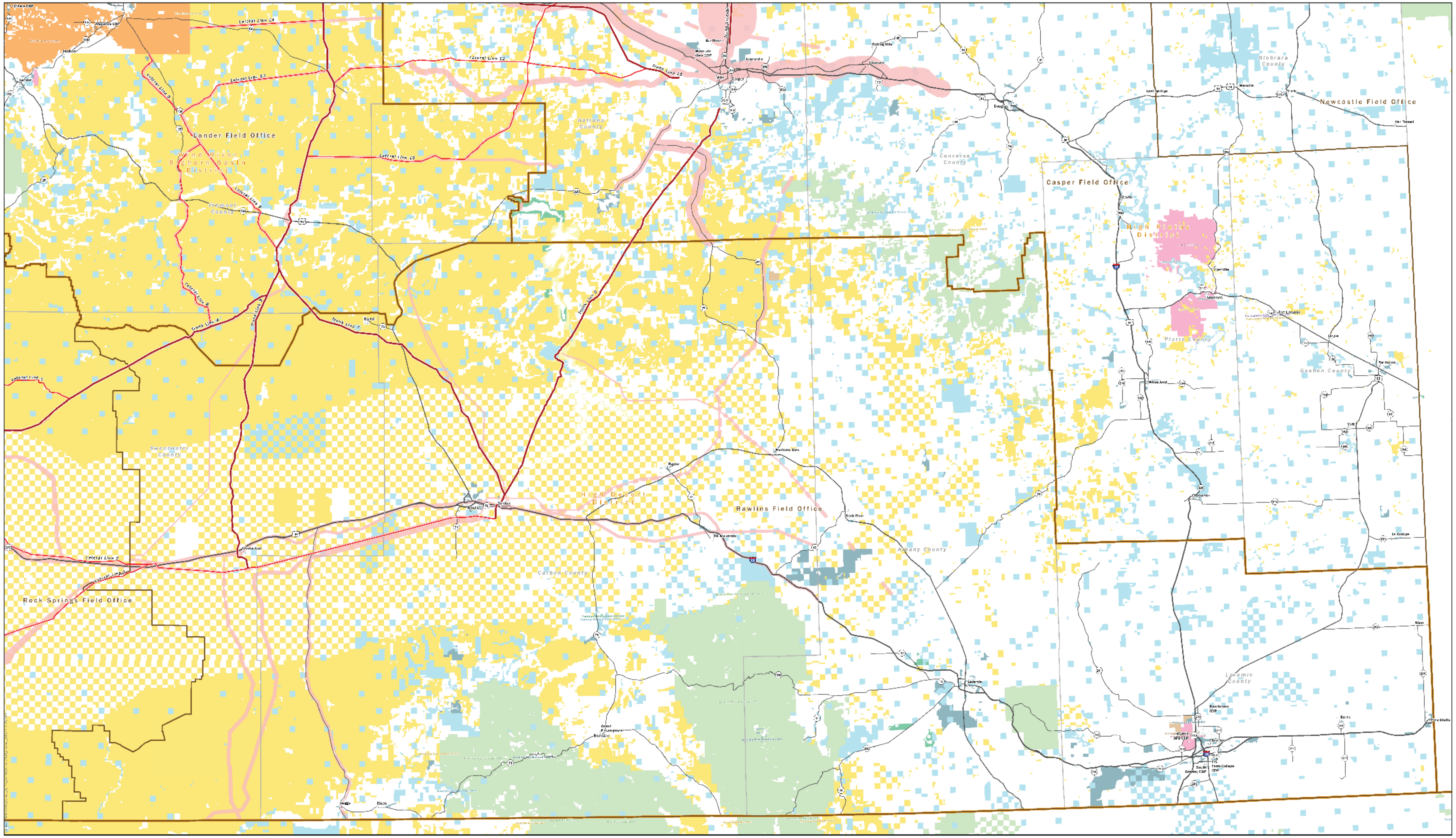
WPCI Project SW Wyoming



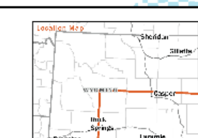
WPCI Project SE Wyoming



Wyoming Pipeline Corridor Initiative Project

ROW Corridors Line Type		Highways	Surface Management Agency			
Proposed Trunk Line Corridor	BLM Field Offices	Interstate	National Grasslands	Department of Agriculture	Fish & Wildlife Service	State (State Parks & Hist Sites)
Proposed Lateral Line Corridor	BLM Districts	US Route	Bureau of Land Management	Department of Defense	Forest Service	State (University of Wyoming)
BLM Identified Utility Corridors	Counties	State Route	Bureau of Reclamation	Department of Energy	Local Government	State (Wyoming Game & Fish)
Utility Corridors			Corps of Engineers	Department of Veterans Affairs	National Park Service	Wind River Indian Reservation
				Federal Aviation Administration	State	

0 10 20 30 40 50 Miles



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NAD83, UTM Zone 13N

Data Sources: State of Wyoming, SWCA, BLM, ESRI, USGS
Last Updated: 11/21/2019

APPENDIX D

Wyoming Pipeline Corridor Initiative: State of Wyoming Proposal

Wyoming Pipeline Corridor Initiative

State of Wyoming Proposal

July, 2019

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List of Abbreviations and Acronyms

ACHP - Advisory Council on Historic Preservation
AIS - Aquatic Invasive Species
API - American Petroleum Institute
ASME - American Society of Mechanical Engineers
BA - Biological Assessment
BBO - Billion Barrels of Oil
BLM - Bureau of Land Management
BMP - Best Management Practice
BOR - Bureau of Reclamation
CEQ - Council on Environmental Quality
CFR - Code of Federal Regulations
CFS - Cubic Feet per Second
CO_2 - Carbon Dioxide
CWA - Clean Water Act
DOT - United States Department of Transportation
EI - Environmental Inspector
EO - Executive Order
EOR - Enhanced Oil Recovery
EORI - Enhanced Oil Recovery Institute, University of Wyoming
EPA - U.S. Environmental Protection Agency
ESA - Endangered Species Act of 1973
ETWS - Extra Temporary Work Space
FERC - Federal Energy Regulatory Commission
FWS - U. S. Fish and Wildlife Service
HDD - Horizontal Directional Drill
HP - Horsepower
IM - Instruction Memoranda
ISO - International Standards Organization
MBTA - Migratory Bird Treaty Act
MBO - Million Barrels of Oil
MMCFD - Million Cubic Feet per Day
MP - Milepost
NDE - Non-Destructive Evaluation
NDT - Non-Destructive Test
NEPA - National Environmental Policy Act
NGL - Natural Gas Liquids
NOI - Notice of Intent
OHV - Off Highway Vehicle
OSHA - Occupational Safety and Health Administration
POD - Plan of Development
RMP - Resource Management Plan
ROW - Right-of-Way
SCADA - Supervisory Control and Data Acquisition
SHPO - State Historic Preservation Office
SUP - Special Use Permit
SWPPP - Stormwater Pollution Prevention Plan
TCF - Trillion Cubic Feet
TUP - Temporary Use Permit

USACE - U.S. Army Corps of Engineers
USFS - United States Forest Service
USFWS - United States Fish and Wildlife Service
WDEQ – Wyoming Department of Environmental Quality
WGFD – Wyoming Game and Fish Department
WPA – Wyoming Pipeline Authority
WPCI – Wyoming Pipeline Corridor Initiative
W.S. – Wyoming Statute

1.0 Introduction

The State of Wyoming (State) is seeking regulatory approval from federal land management agencies in Wyoming for the Wyoming Pipeline Corridor Initiative (WPCI). Utilizing funding allocated by the Wyoming legislature, and through coordination with the University of Wyoming's Enhanced Oil Recovery Institute (EORI), industry representatives, and the Wyoming Pipeline Authority (WPA) , we have identified approximately 1914 miles of primarily existing pipeline corridors throughout the central and western portion of the state that are essential to future production and distribution of natural resources vital to the state's economy (see Appendix A, Figure 1). The WPCI design connects existing oil fields suitable for enhanced oil recovery (EOR) identified by EORI and industry (Appendix A, Figure 2) with anthropogenic and natural carbon dioxide (CO_2) sources (Appendix A, Figure 3). WPCI is based on the need for future corridors on federal lands to accommodate construction of multiple, co-located pipelines of varying diameter and capacity.

The purpose of WPCI is to establish corridors on public lands dedicated to future use for pipelines associated with carbon capture, utilization and storage (CCUS), and enhanced oil recovery (EOR). In addition, other compatible uses (i.e. broadband infrastructure) at the outer boundaries of the corridors would be considered. In order to meet this purpose, 200 ft. (lateral) or 300 ft. (trunk) wide corridors are constrained to only transport CCUS and EOR products; however, other compatible uses may be considered that would not limit future use of the corridors for CCUS and EOR pipelines and facilities. When site-specific projects are proposed in the corridors they would be designed and constructed to reduce impacts through placement of facilities to avoid resources values, including placement adjacent to the corridor.

There are 1104.67 miles of BLM lands crossed by the WPCI corridors including lands managed by the Kemmerer, Buffalo, Rock Springs, Rawlins, Casper, Cody, Worland and Pinedale, Wyoming field offices (see Table 1-1 and Appendix B, Table 1).

WPCI consists of 25 segments in the western and central portions of the state. A list of the segments and their lengths is provided on Table 1-2. Narrative descriptions of each segment are provided in the text below (Section 2.1, Project Location).

Table 1-1
Miles of Federally-Managed Lands Crossed by WPCI Corridors[1]

Federal Land Management Agency	Miles Crossed
BLM – Kemmerer Field Office	2.30
BLM – Buffalo Field Office	35.99
BLM – Rock Springs Field Office	223.65
BLM – Rawlins Field Office	130.66
BLM – Casper Field Office	101.49
BLM – Pinedale Field Office	27.08
BLM – Cody Field Office	134.31
BLM – Worland Field Office	159.14
BLM – Lander Field Office	290.05
Total BLM	1104.67
Private	690.03
State	118.37
Water Crossing	0.93
Total All Ownership	1914.00

[1] Federal land ownership of individual parcels are shown in the Map Book (see CD attached to the back of this POD).

Of the 1914 miles of pipeline corridor that comprise WPCI, ~1105 miles occur on BLM managed lands. On BLM managed lands, ~745 miles (or ~65 percent) of WPCI are located in approved corridors designated by BLM in current or currently draft Resource Management Plans (RMPs). Additionally, ~291 miles of WPCI, which are outside of designated corridors are located adjacent (within 0.5 miles) to existing pipelines on federally-managed lands. Therefore, a total of ~1036 miles (or ~90 percent) of WPCI are either within designated corridors, or within 0.5 miles of existing pipeline infrastructure on federally managed lands. Private (690.03 miles) and state lands (118.37 miles) are also crossed by WPCI.

Table 1-2
WPCI Total Segment Length

Segment	Counties	Length (Miles)
1	Lincoln, Sublette, Sweetwater	133.17
2	Carbon, Sweetwater	125.40
3	Freemont, Sweetwater	50.50
4	Bighorn, Fremont, Hot Springs, Park, Sweetwater, Washakie	320.30
5	Sublette, Sweetwater	123.34
6	Carbon, Natrona	80.26
7	Carbon, Fremont, Sweetwater	58.96
8	Fremont, Sweetwater	38.22
9	Fremont	43.96
10	Fremont, Natrona	104.50
11	Fremont, Natrona	69.18
12	Fremont, Natrona	55.64
13	Fremont	27.60
14	Fremont	22.94
15	Sublette, Natrona	52.59
16	Johnson, Natrona	74.52
17	Johnson, Natrona	123.31
18	Campbell, Johnson	64.82
19	Bighorn, Hot Springs, Park	110.10
20	Bighorn, Hot Springs, Washakie	39.41
21	Hot Springs, Park	88.17
22	Bighorn	24.26
23	Park	30.99
24	Park	26.02
25	Bighorn	25.84
Total		**1914.00**

Wyoming has large, economically significant oil reserves in existing, often "played-out", reservoirs that are good candidates for EOR using CO_2. Currently, CO_2 is being injected into five fields in Wyoming to recover oil which has been left in the ground during conventional production. The oil currently being produced using CO_2 is unrecoverable using conventional production techniques (i.e., primary production or water-flooding). Between 2010 and 2012, CO_2 flooding in Wyoming produced over 23 million barrels of oil (MBO) – about 14 percent of Wyoming crude production during that time. Through the end of 2012 the combined incremental oil produced by CO_2 in Wyoming exceeded 95 MBO generating approximately $180 million in government royalties, $77 million in severance tax and $94 million in property taxes to Wyoming counties.[1]

Wo *et al*. (2009) identified more than 500 existing oil reservoirs in Wyoming as potential CO_2 EOR candidates and estimated that 1.2 to 1.8 billion barrels of additional oil (BBO) might be recovered by CO_2 flooding and up to 20 trillion cubic feet (TCF) of CO_2 could be sequestrated after CO_2 EOR in Wyoming's oil basins.[2]

[1] Cook, B. R. 2013. Wyoming's miscible CO_2 enhanced oil recovery potential from main pay zones: an economic scoping study. Enhanced Oil Recovery Institute, School of Energy Resources, University of Wyoming.

[2] Wo, S, L. D. Whitman, and J. R. Steidtmann. 2009. Estimates of potential CO_2 demand for CO_2 EOR in Wyoming

EOR using CO_2 is receiving national attention as a potential mechanism for sequestering greenhouse gas emissions. By their very nature, EOR projects can store large quantities of CO_2. Because CO_2 used during EOR is a purchased commodity, it is recycled continuously in the reservoir rather than vented to the atmosphere. In essence, EOR projects can add value by maximizing oil recovery from existing, previously disturbed fields, while at the same time offering a bridge to a reduced carbon emissions future.[3] Many experts believe geologic sequestration is one of the best alternatives for dealing with carbon emissions because CO_2 EOR effectively reduces the cost of sequestering CO_2 by earning revenues for the CO_2 emitter from sales of CO_2 for EOR.

Known sources of CO_2 in Wyoming are shown on Figure 1-3. In addition to anthropogenic sources of CO_2 (principally power plants), Wyoming has nearly 150 TCF of naturally-occurring CO_2 in numerous formations in the western portion of the state. CO_2 occurs naturally in many hydrocarbon reservoirs and can be produced in quantities sufficient to support EOR. Two of these reservoirs (Shute Creek and Lost Cabin) currently serve as the source for CO_2 for ongoing EOR projects in the state. Shute Creek produces 7 Mpta (2016) of CO2 and Lost Cabin produces 0.9 Mpta (2017) of CO2.

This POD describes the BMPs that may be taken by individual project proponents during construction, operation, maintenance and termination of pipeline facilities on federally-managed lands. The commitments made by the BLM and State in this POD, along with any conditions of approval included in federal authorizations, would become contractually binding on project proponents who develop infrastructure within the WPCI corridors.

1.1 WPCI Purpose and Need

Since 1978, oil production in Wyoming has been declining. This downward trend in production has resulted in significant reductions in revenues to the state and federal governments, adverse impacts to local government revenues and a loss of jobs. Although Wyoming is the 8th largest domestic source of oil production, annual crude production in the state has fallen 38 percent from the 1978 peak. This fall in production, coupled with lower oil prices from the mid-1980s through 1990s and the increasing importance of natural gas, reduced the contribution of crude oil to total state severance tax revenues from about 40 percent in the early 1990s to just 15 percent in 1999.[4] According to EORI, Wyoming mineral royalties and severance collections from oil are projected to be 16 to 23 percent below the 1978 peak in the coming years.[5]

Wyoming's experience with CO_2 flooding goes back to the 1980s when Amoco Production Company began injecting CO_2 in the Bairoil Field in south central Wyoming utilizing CO_2 from ExxonMobil's Shute Creek Gas Plant in southwestern Wyoming. Three additional projects have

Basins. SPE 122921

[3] National Energy Technology Laboratory, 2010. Carbon Dioxide Enhanced Oil Recovery – Untapped Domestic Energy Supply and Long Term Carbon Storage Solution. www.netl.doe.gov

[4] Cook, B. R. 2013. Wyoming's miscible CO_2 enhanced oil recovery potential from main pay zones: an economic scoping study. Enhanced Oil Recovery Institute, School of Energy Resources, University of Wyoming.

[5] *Ibid*

subsequently come online utilizing CO_2 from Shute Creek: Anadarko began CO_2 flooding in the Salt Creek and Patrick Draw fields in 2003, and Devon initiated CO_2 flooding in the Beaver Creek Field in 2008.

Denbury constructed their 232-mile long Greencore Pipeline, which transports CO_2 from Lost Cabin to points in the Powder River Basin in Wyoming and on to the Bell Creek Field in Montana. In addition, Denbury and Elk Petroleum began injecting CO_2 in the Grieve Field, near Casper, in 2013.

EORI estimated that the five fields currently being CO_2 flooded in Wyoming account for nearly 2,000 jobs annually, paying a total of about $326 million in labor income from 2010-2012 and adding $1.65 billion to Wyoming gross state product.[6] EORI also estimates that 188 jobs are supported for every million barrels of incremental oil production, or 6.7 jobs per million cubic feet/day (MMCFD) of purchased CO_2. EORI's assessment suggests that EOR can contribute thousands of Wyoming jobs annually in the coming decades.

Wo *et al*. (2009) estimated total CO_2 demand for EOR ranges from 6.1 to 9.2 TCF in the Powder River Basin, 4.8 to 7.2 TCF in the Bighorn Basin, 1.2 to 1.8 TCF in the Wind River Basin, 1 to 1.4 TCF in the Greater Green River Basin, 0.68 to 1.02 TCF in the Overthrust Belt, 0.09 to 0.13 TCF in the Laramie Basin, and 0.08 to 0.12 TCF in the Denver-Cheyenne Basins.[7] The purpose of WPCI is to provide federal authorization for a pipeline network to connect CO_2 sources with these basins.

Construction and operation of pipelines would be conducted by individual project proponents utilizing the WPCI corridors. The BLM and State intends this process to result in a system of integrated and preferred corridors for the construction of pipelines on federal lands throughout the state of Wyoming. Identifying integrated corridors across federal lands under the direction of the various field offices in Wyoming would lead to greater consistency among the individual field offices and would comprehensively address the desire to manage the location of future pipeline construction and operation activities across field offices, thereby minimizing the aggregate impact of future projects on federal lands in Wyoming.

1.2 Purpose and Content of Plan

This plan describes the location and typs of BMPs for future projects that are proposed within the WPCI corridors. During the course of designing and constructing the individual projects, changes to the POD may be necessary and additional site-specific studies and information may be required by regulatory agencies. The federal land management agencies would consider and approve any changes necessary to address the site-specific needs of individual projects.

This POD and its appendices are a requirement for new or amended permits, approvals, clearances, and plans that may be issued prior to and during construction. The POD

[6] *Ibid*

[7] Wo, S, L. D. Whitman, and J. R. Steidtmann. 2009. Estimates of Potential CO2 Demand for CO2 EOR in Wyoming Basins. SPE 122921

appendices contain additional construction information and mitigation measures, whereas the main body of the POD addresses the overall guidelines. Unless otherwise specified by the landowner or land management agency, the specifications in the POD will be implemented on all lands affected by construction in the WPCI corridors.

This POD describes the construction phase, mitigation measures, operation, and maintenance of future projects which be constructed in the WPCI corridors. Numerous appendices are incorporated into this POD:

- Appendix A – Figures and Construction Typical Drawings
- Appendix B – Tables
- Appendix C – Waste and Spill Management Specifications
- Appendix D – Hydrostatic Testing and Discharge Plan
- Appendix E – Upland Erosion Control, Revegetation, and Maintenance Plan
- Appendix F – Restoration and Revegetation Plan
- Appendix G – Wetland and Waterbody Construction and Mitigation Plan
- Appendix H – Noxious and Invasive Weed Control Plan
- Appendix I – Biological Resource Conservation Measure Plan
- Appendix J – Unanticipated Discoveries Plan for Cultural Resources
- Appendix K – Unanticipated Discoveries Plan for Paleontological Resources
- Appendix L – Fire Prevention and Suppression Plan
- Appendix M – Blasting Plan
- Appendix N – Fugitive Dust Control Plan
- Appendix O – Traffic and Transportation Plan

Attached to the back cover of this POD is a CD that contains maps of the WPCI corridors (hereafter the “Map Book”). The CD images are based on 7.5-minute quadrangle maps which show the location of WPCI corridors including segment identification and mileposts.

1.3 Regulatory Review and Construction Timing Restrictions

The BLM and the State would require project proponents to obtain all federal, state, and local permits before constructing within the WPCI corridors. A list of authorizing actions which may be necessary to construct pipeline projects in the WPCI corridors is provided in Appendix B, Table 2.

2.0 Project Overview

The WPCI corridors were established based on reasonably foreseeable development of resources that will require pipeline construction for development. EOR was the principal development activity used to select the WPCI corridors. The specific types of pipelines that may utilize WPCI corridors – along with products and quantities delivered through the pipelines – will be identified in project-specific applications filed by individual project proponents.

For analysis purposes, two "sizes" of corridors are proposed as part of WPCI. Trunk corridors were designed to accommodate five lines, for example, a CO_2 pipeline, a crude pipeline, a natural gas pipeline, a natural gas liquids (NGL) pipeline, and one additional unspecified pipeline. Lateral corridors were designed to accommodate, for example, a CO_2 pipeline, a crude pipeline and a natural gas pipeline. Other combinations of pipelines can occur in any of the WPCI corridors. The appropriate corridor type designation is shown on Appendix A, Figure 1.

In determining the construction right-of-way width necessary for each of the two corridor sizes, a 50 foot offset from adjacent, existing pipelines and a 100-foot wide construction ROW was assumed. Based on these offset assumptions, the total ROW width necessary to construct three pipelines in the WPCI lateral corridors is 200 feet. Constructing five pipelines in the trunk corridors will require 300 feet.

Individual trunk pipelines may reach 24-inches in diameter. Smaller diameter pipelines, such as lines designed to supply CO_2 to individual fields, could be installed. At this point the exact number or diameter of pipelines which will be constructed in any given segment of WPCI is not known. To a large extent, use of the corridors will be driven by oil prices and CO_2 availability. The construction descriptions below and in Chapter 3 are based on what WPA considers the largest diameter pipeline (i.e., 24-inch diameter) that will be constructed in WPCI corridors. A typical dimensioned drawing of a 100-foot wide pipeline construction ROW is shown in Appendix A, Figure 4.

2.1 Project Location

The general location of the WPCI corridors is shown on Appendix A, Figure 1. More detailed maps of the corridor alignments on federally-managed lands can be found in the Map Book.

WPCI corridors are divided into segments based on their proposed ROW width and the regions they will service within the state. As previously mentioned, the majority of these corridor segments lie within pipeline corridors that were established in existing or proposed RMPs. Those proposed outside of designated corridors typically parallel existing pipelines and disturbance. Below are brief summaries of the 25 segments that make up the WPCI.

Segment 1 is a 200-foot lateral corridor. This segment is approximately 133 miles long and lies within Lincoln, Sublette, and Sweetwater counties.

Segment 2 is a 200-foot lateral corridor within Carbon and Sweetwater counties. This segment is approximately 125 miles long and generally follows the I-80 corridor between Rawlins and Rock Springs.

Segments 3, 4, 6, and 7 are a series of 300-foot trunk corridors that provide transportation between locations along the I-80 corridor in central Wyoming and northern termini. Segment 3 is approximately 51 miles long and lies within Fremont and Sweetwater counties. Segment 4 is approximately 320 miles long and traverses Big Horn, Fremont, Hot Springs, Park, Sweetwater, and Washakie counties. Segment 6 is an 80 mile long segment within Carbon and Natrona counties. Finally, Segment 7 is approximately 59 miles and lies within Carbon, Fremont, and Sweetwater counties.

Segment 5 is an approximately 123 mile long, 200-foot wide lateral corridor. This segment will provide transportation from Riley Ridge CO2 production facilities. This designated segment lies within Sublette and Sweetwater counties.

Segments 8, 9, 13, and 14 are relatively short segments of 200-foot lateral corridors that will provide for transportation into the region around Lander. They range in lengths between approximately 23 and 44 miles long. These segments are located primarily within Fremont County, with a small portion of Segment 8 within Sweetwater County.

Segment 10 is a 200-foot wide lateral corridor that provides transportation between the Lander area and the southern Powder River Basin. This segment is approximately 105 miles long, and lies within Fremont and Natrona counties.

Segment 11 is designated as a 300-foot wide trunk corridor. It is approximately 70 miles long, and would provide transportation services from Casper, to the southern end of the Bighorn Basin. Segment 11 segments will lie within Fremont and Natrona counties.

Segments 12 and 15 are both 200-foot lateral corridors that provide for resource transportation generally between Casper and Lander. The corridors are approximately 55 miles long. These segments will lie within Fremont and Natrona counties.

There is one, 300-foot trunk and two, 200-foot lateral corridors within the Powder River Basin, which are designated as Segments 17, 16, and 18, respectively. Segment 17 is a trunk corridor that is approximately 123 miles long. Segments 16 and 18 are lateral corridors that range in lengths between approximately 65 and 75 miles. These corridor segments lie within Campbell, Johnson, and Natrona counties.

There are seven WPCI segments proposed within the Bighorn Basin. These segments will lie within Big Horn, Hot Springs, Park, and Washakie Counties. Segment 19 is proposed as an approximately 110 mile long, 300-foot wide trunk corridor. Segments 20 through 25 are designated as 200-foot wide lateral corridors. They range in lengths between approximately 24 and 89 miles long.

2.2 Construction Right-of-Way and Temporary Work Spaces

2.2.1 Construction Right-of-Way. Construction of a 24-inch diameter pipeline will utilize a nominal 100-foot-wide construction ROW. A dimensioned schematic of a typical 100-foot wide construction ROW is included in Appendix A, Figure 4. Half of the construction ROW (50 feet) will be located on the area previously disturbed during construction of the existing, adjacent pipeline.

In some areas resource constraints may require a narrowed construction ROW. These locations will be determined during the NEPA site-specific process and project specific permitting and could include cultural resource sites, wetlands, habitat for protected species, topography, etc. In these locations, the construction ROW may be narrowed to 75-feet. A restricted construction ROW configuration is shown in Appendix A, Figure 5.

2.2.2 Extra Temporary Work Spaces. In addition to the construction ROW, additional extra temporary work spaces (ETWS) will be required at a number of areas. Typically, these extra work spaces will be located at:

- stream crossings
- wetland crossings
- foreign pipeline crossings
- railroad crossings
- road crossings
- overhead utility crossings
- areas with side hill construction
- cathodic protection

Typically, ETWS of 50 x 50 to 100 feet, adjacent to one side of the construction ROW will be required in these locations for storage of spoil, additional specialized equipment (i.e., boring equipment), equipment staging, etc. necessary to safely complete the crossings. Appendix B, Table 4 lists locations where ETWS will likely be necessary to complete construction of pipelines in the WPCI corridors. Additional extra temporary work spaces will be determined during project-specific design.

2.3 Associated Aboveground Facilities

While the pipelines constructed in the WPCI corridors will be buried, a few aboveground facilities could be installed in the WPCI corridor where necessary for safe and efficient operation of the pipeline. The project-specific components of the POD will show the location of these facilities, the size of the needed construction area and the size of the permanently disturbed area of the facility after construction. The POD will include plans for reclamation of disturbed areas not needed for pipeline operations.

2.3.1 Block Valves. A number of aboveground block valves will be required to isolate sections of the pipeline in an emergency or for maintenance activities (See Appendix A – Figure 6). The block valve locations will be determined during final project design and installed within the construction ROW. Spacing will be consistent with federal regulations and varies by the pipeline product. Each block valve will occupy an area of approximately 30 x 30 feet and will be graveled and fenced. Access will be year-round, depending upon winter weather.

2.3.2 Pigging equipment. Pipe pigging equipment will be installed as necessary to allow for pipeline maintenance. Typically, these facilities consist of a series of risers for inserting and catching scrapers used to clean the inside of the pipeline. The facilities are typically located at metering locations or at block valves. Their locations will be determined during design of individual projects.

2.3.3 Pump and Compressor Stations. Some pipeline projects constructed in the WPCI corridors may require the installation of pump or compressor stations. These pump or compressor stations will include valve manifolds, pumps, pigging equipment, power distribution, and control buildings. Pump stations, if required, will be within an approximate 3- to 10-acre fenced area.

2.3.4 Staging Areas and Storage Yards. Staging areas are temporary secured sites where pipe and equipment are located prior to delivery to the ROW. Vegetation is cleared from the areas to reduce fire danger. The project specific POD will show the location and dimensions.

2.3.5 Measurement Facilities. These sites vary in size from a few to tens of acres. They are located where the transfer or delivery of pipeline products is required. The project specific POD will show the location dimensions and equipment located at the site.

2.4 Land Requirements

Appendix B, Table 5 summarizes land requirements for each corridor segment of WPCI. This table assumes that 3 and 5 pipelines are eventually constructed in all the lateral and trunk corridor segments (i.e., the entire 200- or 300-foot wide corridors are disturbed).

2.5 Access Roads

Whenever practicable, proponents will use existing federal, state, county, private and BLM roads to gain access to the ROW during construction. It is not anticipated that new road construction will be required to access the construction ROW on federal lands, but if it is, roads will be built to minimum allowable federal standards. The first preference are roads that can be used with no improvements. Second preference are roads that require minor maintenance (i.e., grading, filling, graveling, installing drainage structures or culverts and minor widening of the road surface all activities within the existing disturbed area). Third preference are roads that require any surface disturbance outside of the existing disturbed area. On public lands, this work is authorized by temporary ROWs, associated with the primary ROW for the pipeline. The final preference are access roads that require new construction. After construction, roads on public lands will be left in place or completely reclaimed, at the direction of the BLM field office.

Use of access on private lands is at the landowner's discretion. Hauling equipment and materials will be conducted in accordance with the road owner's requirements. Following construction completion, roadways will be reclaimed in accordance with landowner requirements.

Permanent access crossing Public Land to aboveground facilities is authorized by the ROW grant for the pipeline.

2.6 Pipeline Markers

The pipelines will be identified by pipeline markers placed at each public road crossing, railroad crossing and at other locations in accordance with CFR ¶195.410 and other applicable regulations. A typical pipeline marker is shown in Appendix A, Figure 7.

3.0 Pipeline Construction and Installation

This section provides a description of standard pipeline construction BMPs that the State proposes project proponents should utilize as projects are constructed within the WPCI corridors. These BMPs are industry standards and should be implemented in conjunction with site-specific plans included in the POD appendices and permit conditions.

Pipeline construction typically follows the sequence of events shown in Appendix A, Figure 8 and as described below.

3.1 Preconstruction

By the time of construction, all site-specific biological and cultural resources will be identified and permit stipulations will be determined. Project proponents will have identified avoidance areas and the locations of the ROW subject to seasonal restrictions (see Appendix B, Table 3). These designated areas will be included on the project-specific alignment sheets.

Civil engineering surveys will identify the centerline of the pipeline and the boundaries of both sides of the approved ROW working limits and ETWS before construction activities start. Construction inspectors will be responsible for verifying that the limits of authorized construction work areas are staked before construction. Flagged or painted lath will be set at approximately 200-foot intervals, or as required to maintain line of sight, along the proposed centerline. The edges of work limits will be marked at 200-foot intervals, or as required to maintain line of sight, with flagging or painted lath. All ETWS areas will be marked in a similar fashion with each of the four corners flagged. This staking will clearly demark the boundary of the area that can be used or accessed by construction personnel. Equipment and vehicles will not be parked or driven beyond these stakes and no other ground-disturbing activities will be allowed outside the staked boundaries of the work area.

Before earth-moving activities, best management practices (BMPs) will be installed to limit sediment transport and erosion consistent with regulatory approvals and the Upland Erosion Control and Sediment Control Plan (see Appendix E). Specific areas requiring BMPs will be designated on alignment sheets. Site-specific BMPs will be developed based on construction site characteristics and weather conditions. BMPs will be inspected routinely and maintained in good working order.

3.2 Construction Equipment

Typical construction equipment will include pickup trucks, loaders, various sizes of dozers, shovels and backhoes, side booms, generators, welders, bending machines, etc. (see Appendix B, Table 6). Most of the equipment used during construction will consist of dozers, blades, and trackhoes. Typical schematics for construction are included in Appendix A.

3.3 Clearing, Grading and Topsoiling

In addition to the ROW configurations shown in Appendix A, Figures 4 and 5, several additional construction configurations may be necessary depending on proximity to other lines and available working space. The nominal ROW for larger diameter pipelines will be 50 feet permanent and 50 feet temporary (see Appendix A, Figure 4).

During clearing, tree limbs and brush will be windrowed or piled for use during reclamation. Stumps will be left in place except over the trench line or removed as necessary to create a safe and level workspace. The environmental inspector (EI) will coordinate with the appropriate agency or landowner to locate areas for stump disposal. Trees will be felled inside the approved right-of-way boundaries under agreement with the landowner or land management agency. Grading will not occur over historic trails, drainages, wetlands or most ETWS.

Construction activity and ground disturbance will be limited to approved, staked areas. Whenever possible, grading will be limited to help preserve vegetation and to limit erosion and improve reclamation success. In hilly terrain, where slopes run across ROW, a level work area will be cut out of the hillside for safe construction. These areas will be returned to the natural contours to the extent possible.

Where grading is needed to create a safe, level working area, approximately 4-6 inches of topsoil (where available) will be stripped and stockpiled from the full construction ROW before cut, fill or other grading operations. In some areas, it may not be necessary to grade and stockpile topsoil. For example, level rangeland may not need to be graded for construction. In these cases, topsoiling will not be necessary, except over the trench line, which preserves the root system and increases reclamation success. Available topsoil will vary across the WPCI corridors. No matter the amount of topsoil removed, topsoil will be stockpiled separately (see Appendix A, Figure 5) from subsoil and will not be used to pad the trench or construct trench breakers. Topsoil will be used as the final layer of soil during the reclamation process.

In wetlands, only the topsoil on the trench line will be removed and segregated before digging and removing the subsoil (double-ditching method). The wetland boundaries will be flagged before construction. Topsoil removal in wetlands will generally range between 12-18 inches. In floodplains, the topsoil depth can range from 6-12 inches. Dry drainages or washes that cross the right-of-way will not be blocked with topsoil piles. Topsoil will be placed on the banks of the drainage (typically in ETWS) so natural flows are not impeded, and topsoil is not washed away.

Required dust control measures are described in the Fugitive Dust Control Plan (Appendix N). Dust abatement water would be obtained in compliance with both federal and state regulations, as well as existing water rights.

3.4 Survey Monuments

All survey markers found within the right-of-way will be protected. Survey markers include, but are not limited to, Public Land Survey System line and corner markers, other property boundary line and comer markers, and horizontal and vertical geodetic monuments. In the event of obliteration or disturbance of any of the above, the proponent shall immediately

report the incident, in writing, to the BLM Authorized Officer or his delegate and the respective installing authority if known. Where any of the above survey markers are obliterated or disturbed during construction or maintenance of the project, the BLM Authorized Officer or his delegate will determine how the marker is to be restored. The proponent will be instructed to secure the services of a registered land surveyor or informed that an official survey will be executed by the BLM. All surveying activities will be in conformance with the Manual of Surveying Instructions and appropriate State laws and regulations. Surveys by registered land surveyors will be examined by the BLM Authorized Officer or his delegate and the BLM State Office Chief Cadastral Surveyor for conformance with the Manual of Surveying Instructions and State laws and regulations before being filed in the appropriate State or county offices of record. The proponent shall be responsible for all administrative and survey costs.

3.5 Trenching

Construction methods used to excavate a trench will vary depending on soils, rock, terrain, and related factors. Excavated subsoil will be stored separately from windrowed topsoil piles (Section 3.3). Like topsoil, subsoil will not be stored in flowing waterbodies, dry drainages or washes that cross the right-of-way. Gaps will be left periodically in the subsoil piles to avoid ponding and excess diversion of natural runoff during storm events.

Measures will be taken to ensure access is provided for private landowners or tenants to move vehicles, equipment, and livestock across the ditch. Adequate precautions will also be taken to ensure that livestock are not prevented from reaching water sources because of the open ditch. Measures to be taken include contacting livestock operators and providing adequate crossing locations. The EI will determine the need and placement of soft plugs for livestock and wildlife travel. The soft plugs will be of minimal compaction and installed with ramps.

The depth and width of the ditch will vary depending upon pipe diameter and soil types. A typical ditch will be excavated approximately 3-4 feet wide at the bottom and the sides will be sloped to Occupational Safety and Health Administration (OSHA) specifications (up to approximately 8 feet wide).

The minimum backfill will vary depending on soil type and existing conditions. Table 3-1 lists the different cover requirements. Minimum cover may change depending on the existence of other utilities.

Table 3-1
Minimum Pipeline Cover

Minimum Cover	No Rock	Rock Trench
Standard trench	36”	30”
Agricultural land	60”	60”
Water crossings (> 100’ wide)	60”	60”
Drainage or intermittent waterways	60”	60”
Road crossings	60”	60”
Drainage ditch at public road crossing	48”	48”

Occasionally, ditches could be excavated to depths greater than the minimum values specified to achieve specific cover. Greater depths of cover could be required at unpaved road crossings, foreign pipeline crossings, water bodies, railroads, etc. Machine excavation will not be performed closer than 5 feet from any existing pipeline encountered in the ROW unless

authorized by the pipeline owners/operators. Existing pipeline locations will be marked in the field and notification given to the operator of the underground utility consistent with federal and state requirements. Where the pipeline traverses locations for which there are definite plans to level the land for irrigation or other purposes, the pipe will be buried at a depth to accommodate these plans.

Trenches will not be left open longer than 21 days. In areas where a longer open trench period is necessary, livestock and wildlife crossovers will be constructed between 1,200 and 2,500 feet. Crossovers will be sloped on each side to act as an escape ramp for animals that enter the trench. Open trenches will be inspected daily for trapped animals. Areas where crossovers are needed include, water sources, active livestock or wildlife trails, wildlife migration corridors, existing roadways and tie-in locations.

3.6 Blasting

Where rock is encountered, tractor-mounted mechanical rippers or rock trenching equipment may be used to facilitate excavation. In areas where rippers or trenchers are not practical or sufficient, blasting may be employed. Blasting will be used only where necessary and conducted by a fully licensed operator. All necessary authorizations will be obtained and all safety precautions observed. All blasting work will be conducted in compliance with federal, state, and local rules, and regulations.

3.7 Road and Railroad Crossings

Installation of road crossings will be achieved by boring or open cut techniques depending upon local regulations, traffic, and construction equipment availability. Crossings at two track roads and gravel roads will typically be open cut. All paved county roads and state highways will be crossed via slick bore or small directional drill bore method.

All road and railroad crossings will be designed in accordance with ASME B31.4 and API RP 1102. A list of road and rail crossings is provided in Appendix B, Table 4. Typical drawings of a bored and open cut road crossing are shown in Appendix A, Figures 9 and 10. A typical two-track road/trail crossing drawing is provided in Appendix A, Figure 11.

3.8 Waterbody Crossings

Wetland and waterbody crossings will be conducted consistent with the Federal Energy Regulatory Commission's (FERC) Wetland and Waterbody Construction and Mitigation Procedures (FERC's procedures) current at the time of construction.[8] A copy of FERC's Procedures is contained in Appendix G.

The State will require individual projects to comply with the FERC Procedures. Compliance with a U.S. Army Corps of Engineers (USACE) nationwide permit will be required for construction activities affecting jurisdictional waters. A 401 water quality certification may be required from the Wyoming Department of Environmental Quality (WDEQ) for construction activities on some WPCI

[8] www.ferc.gov/industries/gas/enviro/procedures.pdf

corridors.

3.9 Areas with Special Conditions

To the extent feasible, individual projects will be routed to avoid impacts to environmental and cultural resources. However, it will not be possible to avoid some areas entirely. To construct through these areas, timing restrictions (see Appendix B, Table 3) and construction stipulations will be established to help protect these resources. It is anticipated that the stipulations will be developed in the NEPA and other regulatory processes.

3.9.1 Close Proximity and Collocated Facilities

WPCI was designed to maximize collocation of new pipelines with existing utilities. Adjacent utilities will be staked the entire length and their representative will be notified before the start of construction. Construction activity will be limited near adjacent utilities. In order to preserve the maximum useable width of the corridor, initial pipeline placement will be, where feasible, at one edge of the corridor and follow the alignment of the corridor boundary, not wandering through the corridor. Subsequent pipelines using the corridor will be located adjacent to, offset the required safety distance, and parallel to existing pipelines their entire length, to the extent possible. These subsequent pipelines also will not wander through the remaining width of the corridor when possible.

3.9.2 Surface Slumping

Prior to construction, the project ROW will be reviewed for surface slumping in the detailed engineering design phase. Impacts to the pipeline from slumping and other geohazards will be mitigated during project design.

3.9.3 Bank Erosion

Waterbody crossings will be reviewed during the detailed design phase to insure all potential bank erosion issues are addressed. Crossing approaches will be tapered to gradual slopes and water bars installed, where required, to eliminate small abrupt changes in elevation. The new gradual slope will taper to match the undisturbed terrain. BMPs will be initiated as described in the Upland Erosion Control, Revegetation and Maintenance Plan to reduce erosion and limit sediment transport (Appendix E). Additional reclamation measures are described in the Restoration and Revegetation Plan (Appendix F).

3.9.4 Active Faults

Active faults in the WPCI corridors will be evaluated during the detailed engineering phase of the project. If active faults exist, designs will be developed that will mitigate the effects from fault movement on the pipeline.

3.9.5 Areas of Historic or Cultural Significance

The WPCI corridors cross over and adjacent to numerous known cultural resources, including historic trails. Additional surveys and mitigation plans will be developed through the

subsequent site-specific NEPA process and in consultation with the Wyoming State Historic Preservation Officer (SHPO) as part of the Section 106 process.

3.9.6 Paleontological Resources

Areas with potential paleontological resources may require construction monitoring and or recovery. Areas with potential paleontological resources will be identified in the NEPA process and site-specific mitigation measures (including trench monitoring) will be developed.

3.10 Pipe Installation

Pipe installation includes stringing, bending for horizontal or vertical angles in the alignment, welding pipe segments together, inspection, coating joint areas to prevent corrosion, and then lowering-in and padding as described in greater detail below.

3.10.1 Stringing

Line pipe will typically be shipped directly from the manufacturer by rail to off-loading areas and then hauled to staging areas where stringing trucks will collect and deliver the pipeline to the ROW. Each individual joint of pipe will be unloaded with a side-boom or trackhoe and placed (strung) parallel to the ditch in a continuous line. Sufficient pipe for road or waterbody crossings will be stockpiled at ETWAs near crossings.

Stringing operations will be coordinated with trenching and installation activities in order to properly manage the construction time at a particular tract of land. Gaps in excavation will be left to allow crossing of wildlife, livestock and other uses.

3.10.2 Bending

After joints of pipe are strung along the ditch but before the joints are welded or pressed together, individual joints of pipe will be bent to accommodate horizontal and vertical changes in direction. Field bends will be made utilizing a hydraulically operated bending machine. Where the deflection of a bend exceeds the allowable limits for field-bent pipe, factory (induction) bends will be installed.

3.10.3 Welding

After pipe joints are bent, the pipe joints will be lined up end-to-end and clamped into position. The pipeline joints will be welded together in conformance with standards applicable to the type of pipeline being installed. Welding activities will conform to requirements in the Fire Prevention and Suppression Plan (Appendix L).

3.10.4 Coating

The coating of pipeline will be done in accordance with standards applicable to the specific type of pipeline being installed.

3.10.5 Cathodic Protection

Cathodic protection will be installed in accordance with standards applicable to the specific type of pipeline being installed.

3.10.6 Lowering-in and Padding

Before pipe sections are lowered into the ditch, inspections will be conducted to verify the pipe is properly fitted and installed into the ditch, minimum cover is provided, and the trench bottom is free of rocks and other debris that could damage the external pipe coating. Side-boom tractors will be used to simultaneously lift the pipe section, position it over the ditch, and lower it in place. Specialized padding machines may be used to sift soil fines from the excavated subsoil to provide rock-free pipeline padding and bedding. Sandbags may be used to pad the bottom of the ditch instead of, or in combination with, padding with soil fines. In rocky areas, padding material or a rock shield will be used to protect the pipe. No topsoil will be used to pad pipe.

3.11 Backfilling

Backfilling will begin after a section of pipe has been successfully placed in the ditch. Trench breakers will then be installed, as needed. Before backfilling the trench, the equipment operator will check the trench for wildlife and/or livestock and will be sure any wildlife or livestock found in the trench is removed before backfilling begins. Backfilling will be conducted using a bulldozer, rotary auger backfiller, padding machine, or other suitable equipment. Backfilling will generally use the subsoil previously excavated from the trench, except in rocky areas where imported select fill material may be needed.

Backfill will be graded and compacted for ground stability, by tamping or walking with a wheeled or tracked vehicle. Compaction will be performed to the extent that no voids remain in the trench. Backfilling will not be performed with frozen soils to prevent the formation of large consolidated masses that will not break down. In irrigated agricultural areas, the backfill will be replaced at the same compaction density as the adjacent undisturbed soil. Any excavated materials or materials unfit for backfill either will be used elsewhere or properly disposed of in compliance with applicable regulations. A mound will be placed over the trench approximately 0.5-feet in height to account for subsidence (except in wetlands, waterbody crossings and at road crossings where compaction will be adequate to keep roadway flat).

3.12 Pressure Testing and Water Use

Consumptive water uses may be required for horizontal directional drilling, dust abatement during construction and to pressure test the installed pipe. Consumptive water use will be acquired and discharged in accordance with the rules, regulations and best practices applicable to the type of pipeline being installed. A hydrostatic testing and discharge plan is included in Appendix D of this POD.

3.13 Cleanup and Reclamation

All construction debris and miscellaneous items will be removed from the construction site and disposed of properly. No trash will be buried. All fences and roads will be replaced/rebuilt as negotiated with the landowner. Appendix C contains a waste and spill management plan for WPCI.

Disturbed portions of the construction workspace (including the ROW and ETWS) will be returned as closely as possible to pre-construction grades and contours. Original drainage patterns will be reestablished and contours will be returned as closely as possible to original condition. Topsoil will be replaced over the ROW from the approximate area in which it was stripped. Reseeding and mulching will be completed as soon as possible, depending upon permit stipulations, weather conditions, and guidance from the agencies and landowners. All disturbed areas will be seeded and mulched. Any temporary BMPs will be removed and final BMPs (waterbars, berms, slash material) will be installed as described in Appendix F.

Reclamation of lands disturbed by construction will be in accordance with applicable regulations and permit requirements. Species and seeding rates effective in controlling erosion will be used to revegetate the disturbed areas. Species will be selected after consideration of climatic adaptation, species adaptation to soil texture, possible adverse conditions such as drought or saline soils, palatability to wildlife, and shrub cover for wildlife (see Appendix F). Non-native species will not be used on public lands except where steril annuals are required for cover crop. Seed will be planted by drilling or broadcasting. Prior to seeding, the reclaimed area will be roughned (typically by a Dozer with ripper blades) to provide microsites for seed deposition and snow (moisture) capture. A rangeland drill is the preferred seeding equipment. Areas not accessible to a rangeland drill will be broadcast-seeded. Broadcast-seeding rates will be double those of drill application. Seeding will be performed during the appropriate period when the seeds will receive the benefit of winter or spring moisture.

BMPs for final reclamation are described in the Upland Erosion Control, Revegetation, and Maintenance Plan (see Appendix E).

3.14 Livestock Barrier and Other Livestock Issues

Fences crossing the ROW will be braced, cut, and temporarily fitted with gates to permit construction traffic passage. During construction, the opening will be controlled as necessary (including use of cattle guards) to prevent the passage of livestock and/or wild horses. Existing fences will be replaced and braces left in place upon completion of construction activities. Care will be taken not to obstruct or damage gates or cattle guards. Those damaged or made inoperable will be repaired to the land management agency and/or private landowner satisfaction. Any damage to livestock facilities (corrals, fences, water sources, etc.) will be repaired to the owner's specifications.

3.15 Health and Safety

The following health and safety measures will be implemented:

- Construction activities will cease, with the exception of pneumatic or hydrostatic testing operations, boring or drilling, by sunset. Nighttime construction (with the exception of pneumatic or hydrostatic testing) will not be permitted without approval of the appropriate regulatory agency.
- No burning of brush or debris, and no campfires, lunch fires, or warming fires will be allowed on the ROW.
- Water or chemical soil binders will be used to control dust along the ROW and access roads during construction only in accordance with federal, state, and local requirements. Water for dust control will be obtained by permits or purchased through contracts with owners with valid, existing water rights.
- Equipment will be properly maintained to reduce emissions and noise. Vehicles and equipment will be operated at safe speeds at all times on the ROW and access roads.
- Camping will prohibited on the ROW.

3.16 Waste Disposal

Waste and spill management is discussed in Appendix C of this POD. The following waste disposal measures will be implemented:

- No littering will be allowed on the corridor. Construction and operations sites will be maintained in a sanitary condition at all times and waste materials at these sites will be disposed of promptly at an appropriate waste disposal site.
- Excess or unsuitable materials will be disposed of at commercial disposal sites, commercial recycling centers, or other approved disposal sites.
- Compliance will occur with all hazardous waste disposal requirements.
- Human wastes, temporarily located within self-contained facilities (portable toilets), will be removed from the corridors and disposed of according to applicable laws and regulations. These facilities will not be placed within 100 feet of a drainage or waterbody.

4.0 Operation and Maintenance Activities

The pipeline systems installed in the WPCI corridors will be operated and maintained according to industry standards and federal regulations to ensure safe operation and to maintain the integrity of the pipeline system.

4.1 Surveillance

Communications and detection systems will be designed and installed consistent with standards applicable to the type of pipeline being installed.

4.2 Right-of-Way Access

Surface travel along the ROW generally will be limited to periodic valve inspections, leak surveys, erosion control (Stormwater Inspection), and any pipeline repairs that may be needed. In addition, access to the ROW for the corrosion control inspections and noxious weed surveys will be necessary. This will be conducted typically with a field service truck or

ATV. Specific ROW travel requirements will be described when a ROW grant is issued.

4.3 Pipeline and Site Maintenance and Repair

Specialists and technicians will be on-call to service the pipeline. Surface traffic will be limited to workers performing pipeline and valve maintenance, periodic monitoring and inspection, and emergency repairs to the pipeline or associated equipment.

Repairs required because of minor corrosion and slight external mechanical damage to pipe and coating material can be made without interruption or with minimum interruption of service. Repairs are usually made under a reduced pipeline pressure and require a minimum amount of excavation and heavy equipment. Other minor repairs include BMP maintenance, pipeline marker replacement, and debris removal.

Some settling of the backfilled trench will occur, particularly after the first winter following construction. In this case, subsidence and potholes will be filled if necessary and the surface restored to normal grade and reseeded. If subsidence is discovered in subsequent years, the potholes will be filled, if necessary, and the surface restored to normal grade and reseeded.

Pipeline failures or external mechanical damage needing major repairs may require shutdown of the pipeline. In these instances, the pipeline segment could be isolated between mainline valves.

4.4 Environmental Inspections

Individual project proponents will be responsible for monitoring pipeline operations after construction is completed. This will include post-construction inspection of stormwater management devices as stipulated in the stormwater permit from the WDEQ. Inspection personnel will have the qualifications necessary to conduct stormwater inspections and reporting for pipelines. Individual project proponents will also be responsible for noxious weed control for any issued ROW grants.

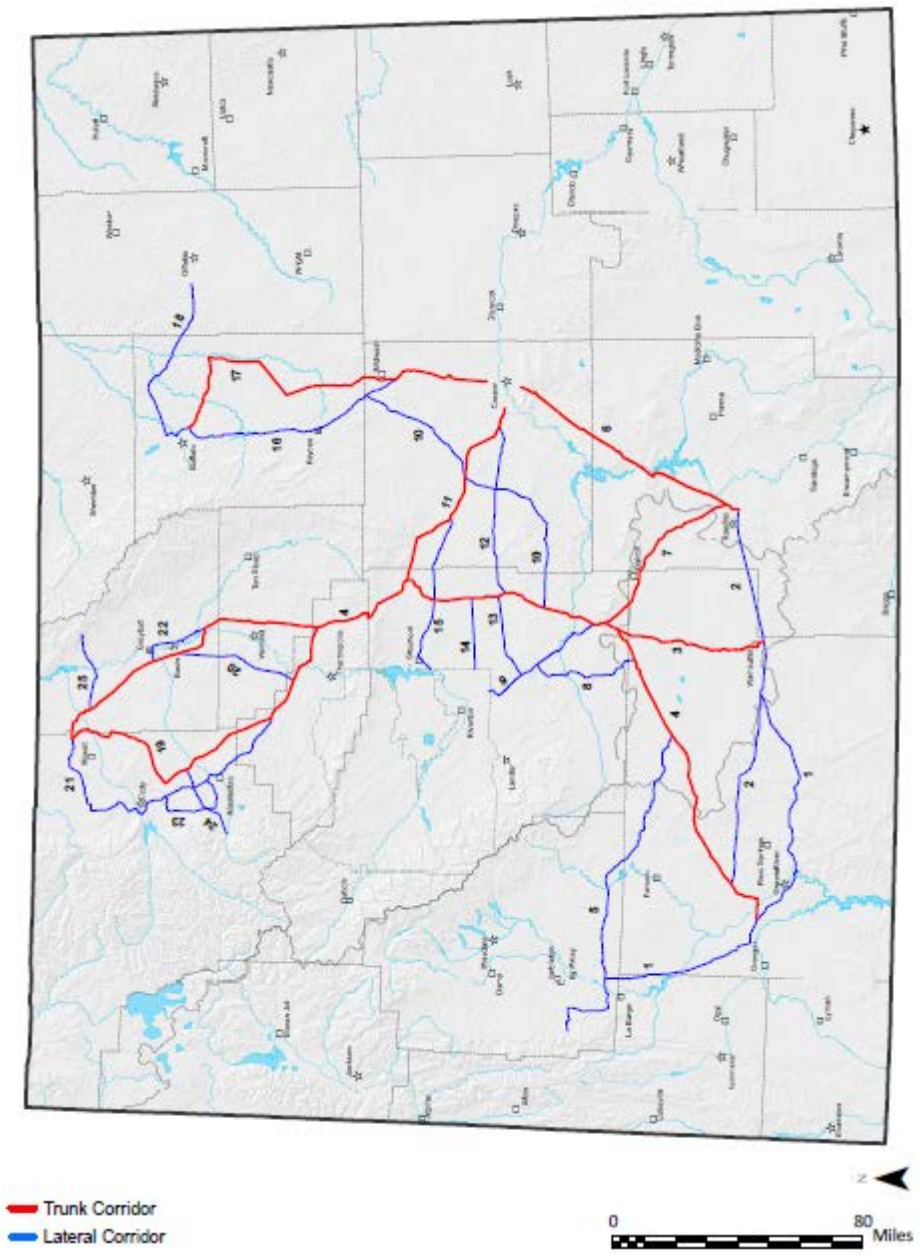
4.5 Wildlife Avoidance Periods

General pipeline maintenance should be scheduled to avoid any wildlife construction closure periods. Emergency maintenance in these areas during the wildlife constraint periods will be coordinated with the land management agency.

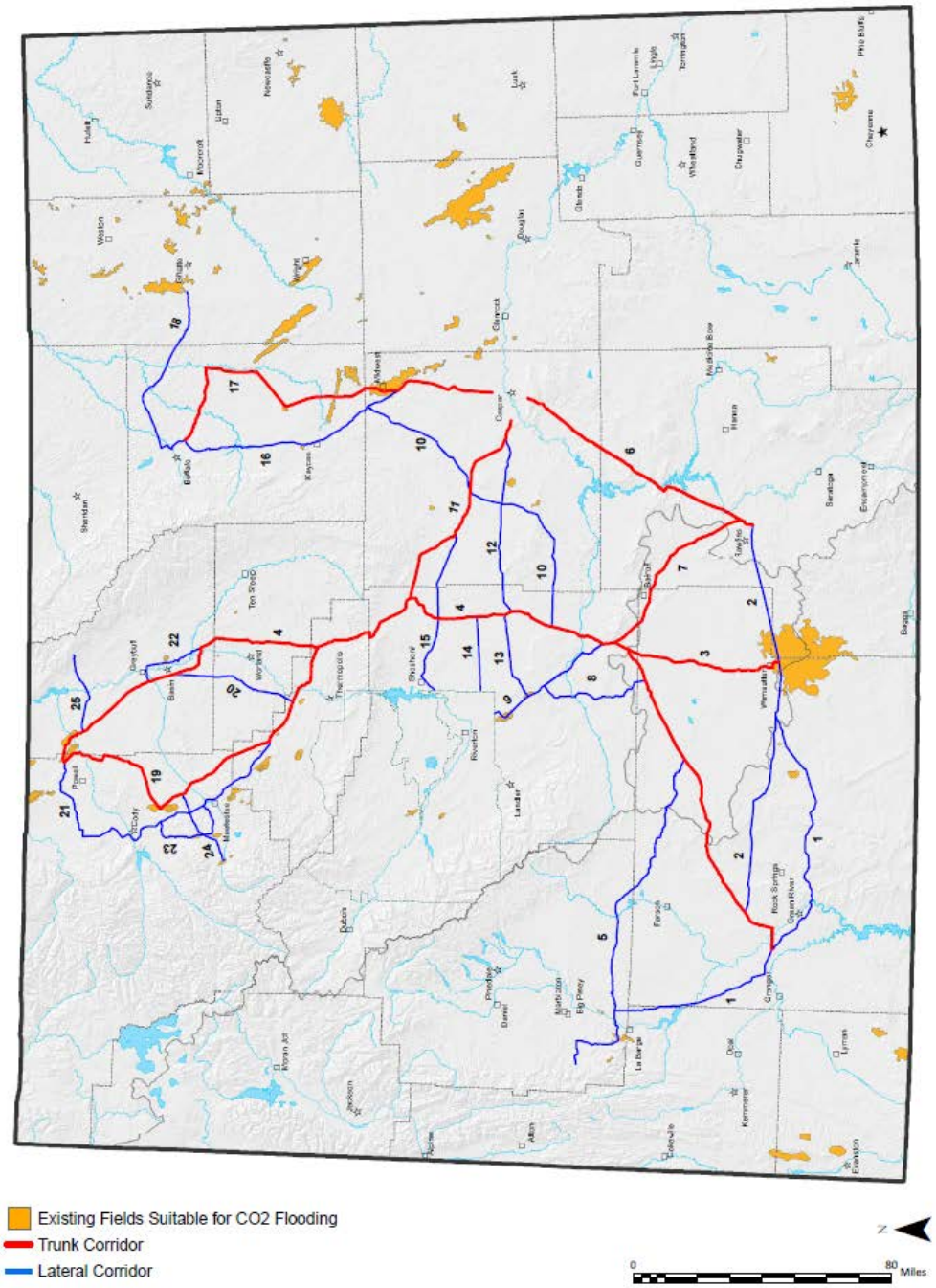
Appendix A
Figures and Construction Typical Drawings

Figure 1 – Location of WPCI Corridors
Figure 2 – Existing Wyoming Oil Fields Suitable for Enhanced Oil Recovery Using CO_2 Flooding
Figure 3 – Instate Anthropogenic and Natural CO_2 Sources Which May be Suitable for CO_2 Flooding
Figure 4 – Typical 100-foot Wide Construction ROW
Figure 5 – Typical 75-foot Wide Restricted ROW
Figure 6 – Typical Block Valve Location
Figure 7 – Typical Pipeline Marker
Figure 8 – Typical Pipeline Construction Sequence
Figure 9 – Typical Uncased Road Crossing: Bored
Figure 10 – Typical Uncased Road Crossing: Open Cut
Figure 11 - Typical Trail and Two-Track Road Crossing

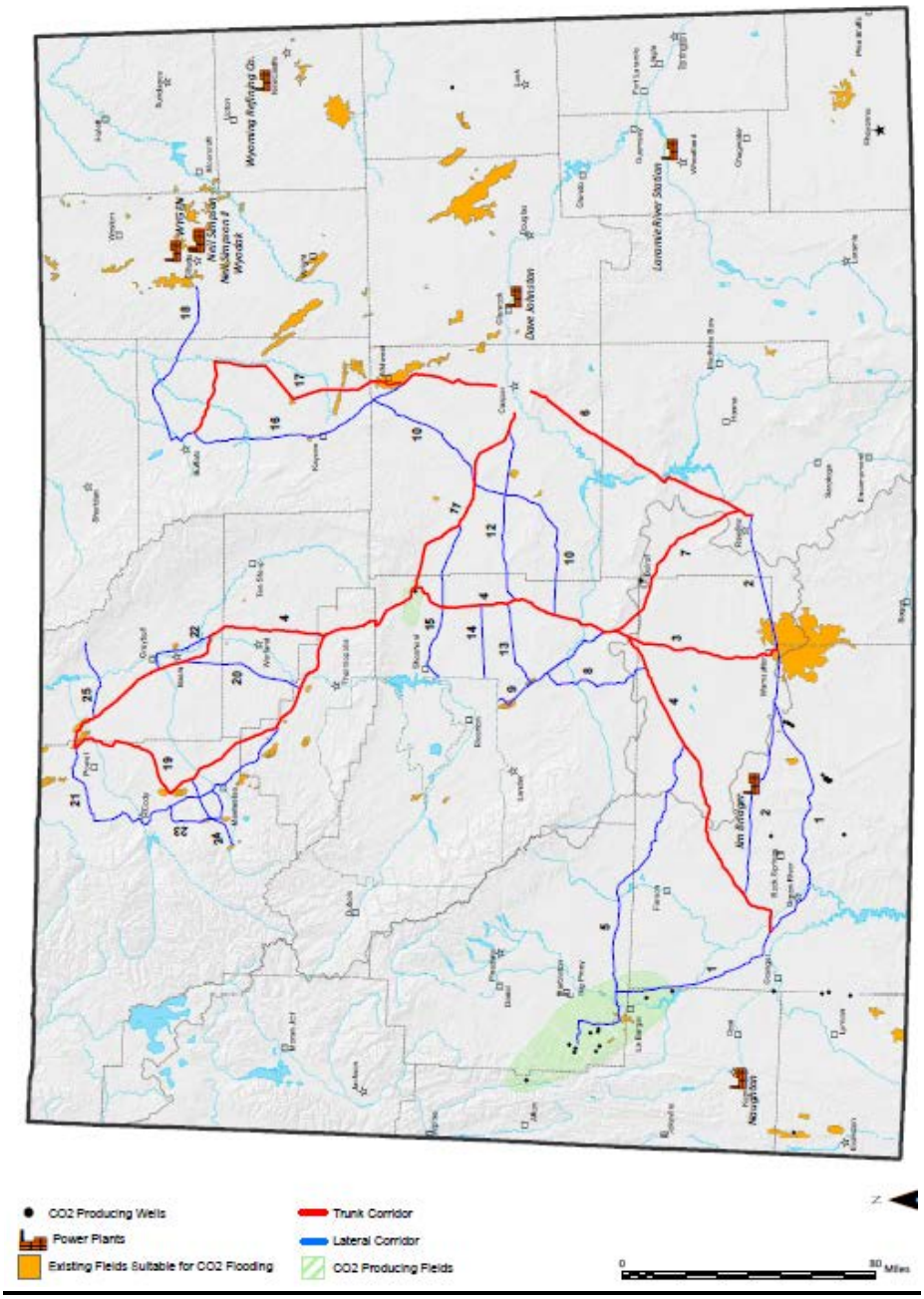
Appendix A
Figure 1
WPCI Trunk and Lateral Corridors

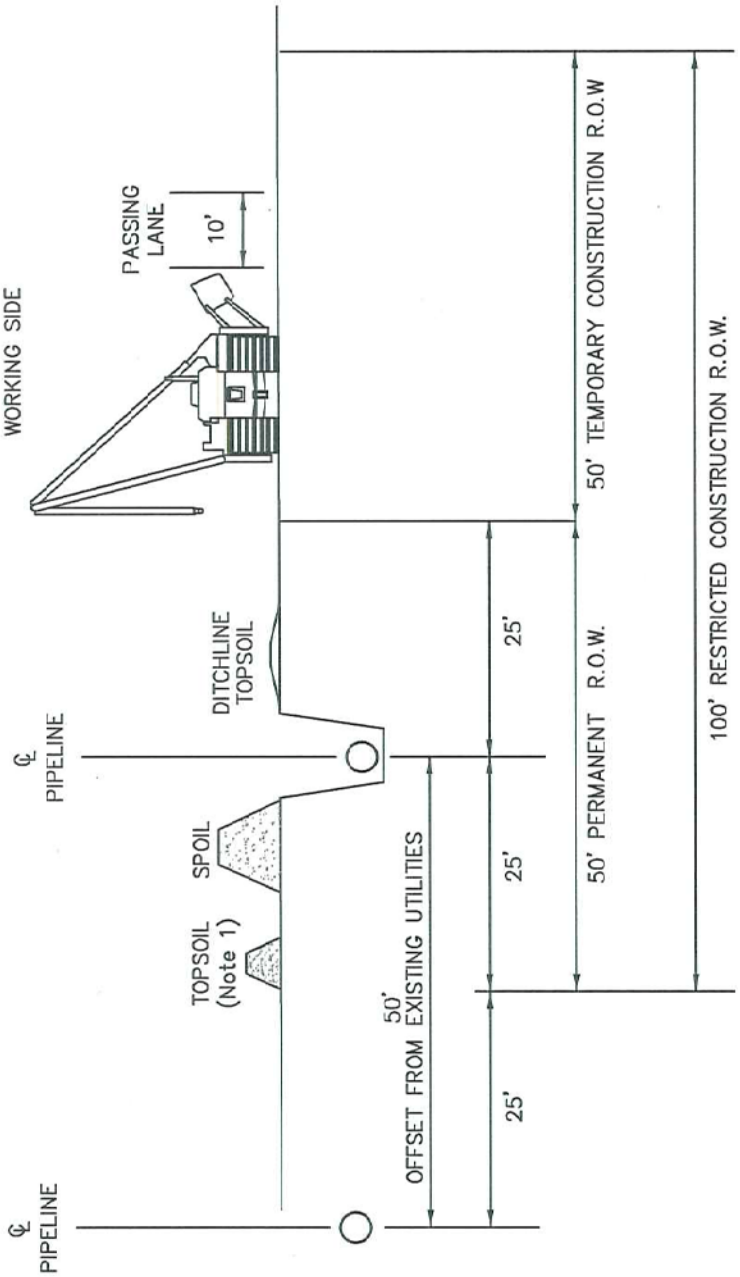


Appendix A
Figure 2
Existing Wyoming Oil Fields Suitable for Enhanced Oil Recovery Using CO_2 Flooding



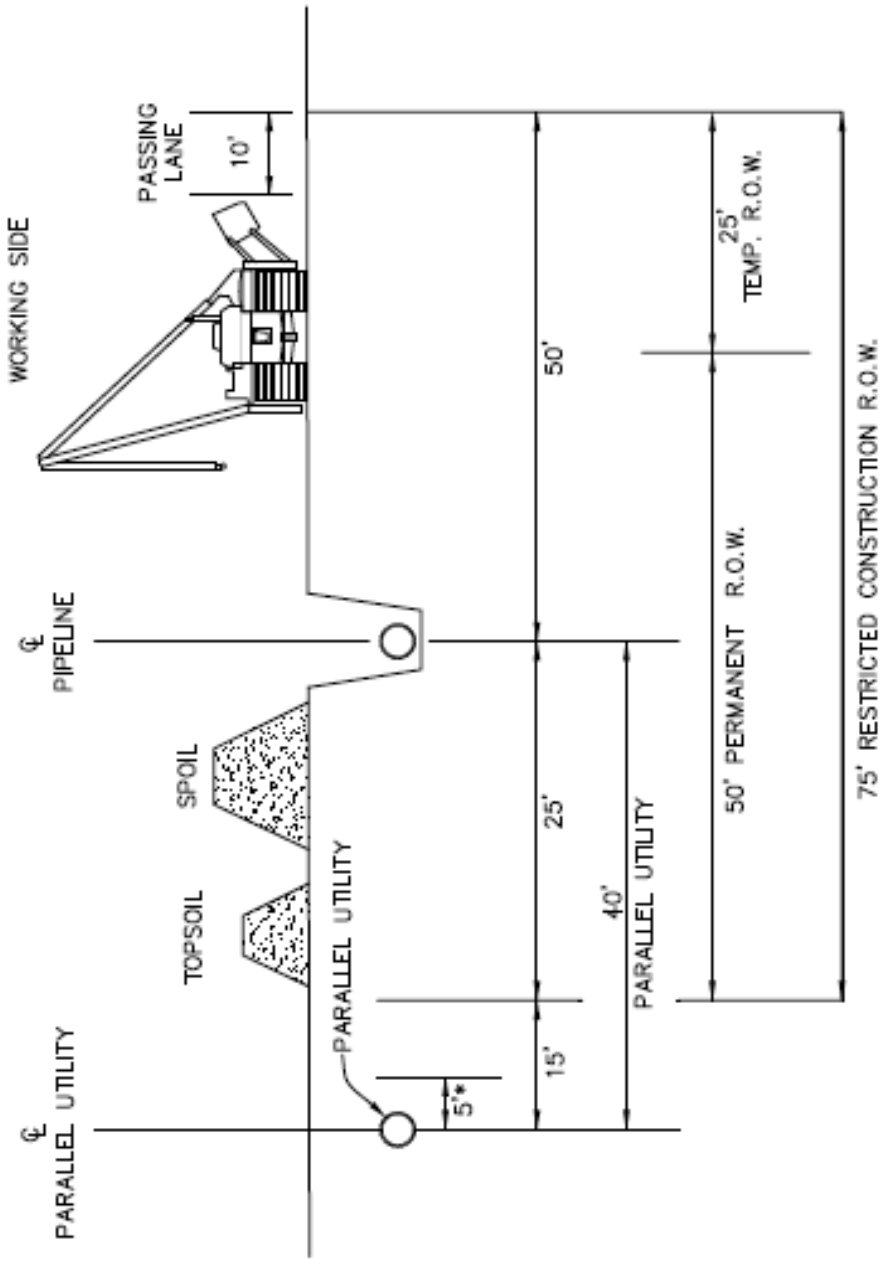
Appendix A
Figure 3
Instate Anthropogenic and Natural CO_2 Sources Which May be Suitable for CO_2 Flooding





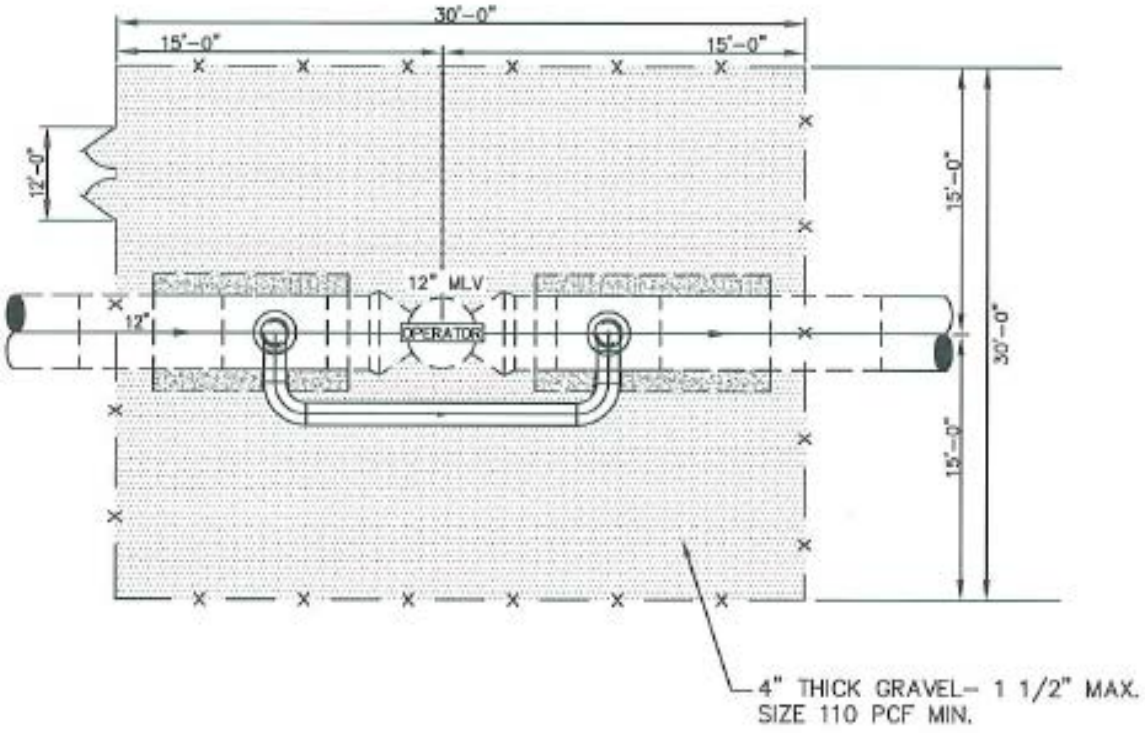
Wyoming Pipeline Corridor Initiative
Appendix A
Figure 4
Typical 100-foot Wide Construction ROW

Wyoming Pipeline Authority



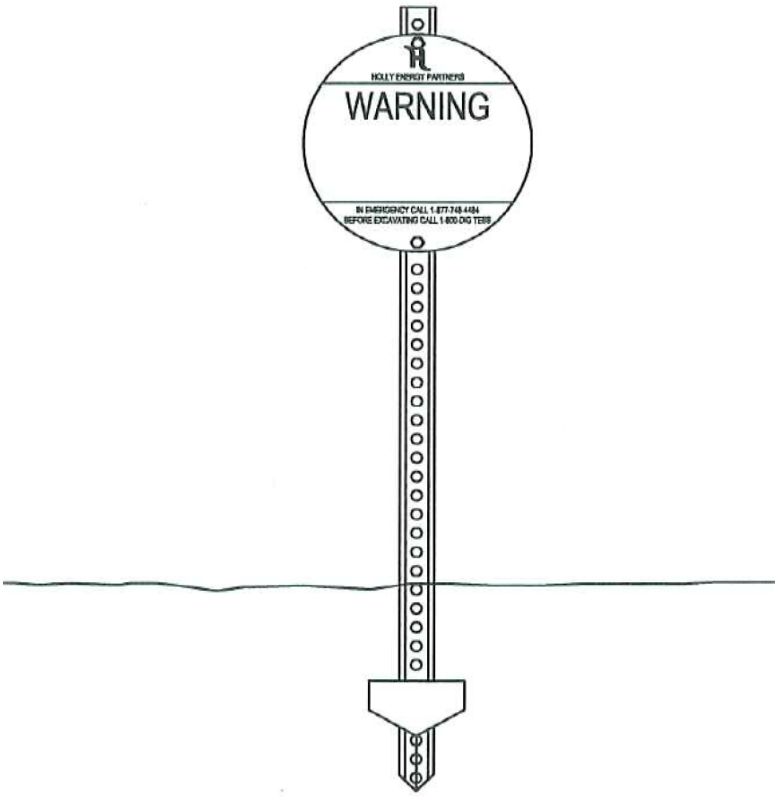
Wyoming Pipeline Corridor Initiative
Appendix A
Figure 5
Typical 75-foot Wide Restricted ROW

Wyoming Pipeline Authority



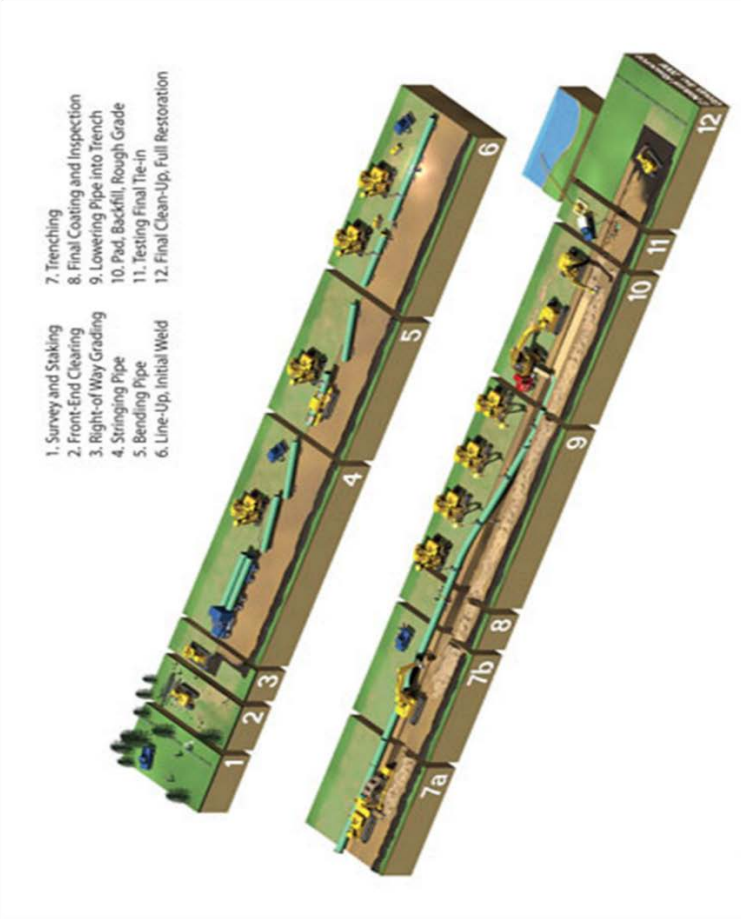
Wyoming Pipeline Corridor Initiative
Appendix A
Figure 6
Typical Block Valve Location

Wyoming Pipeline Authority



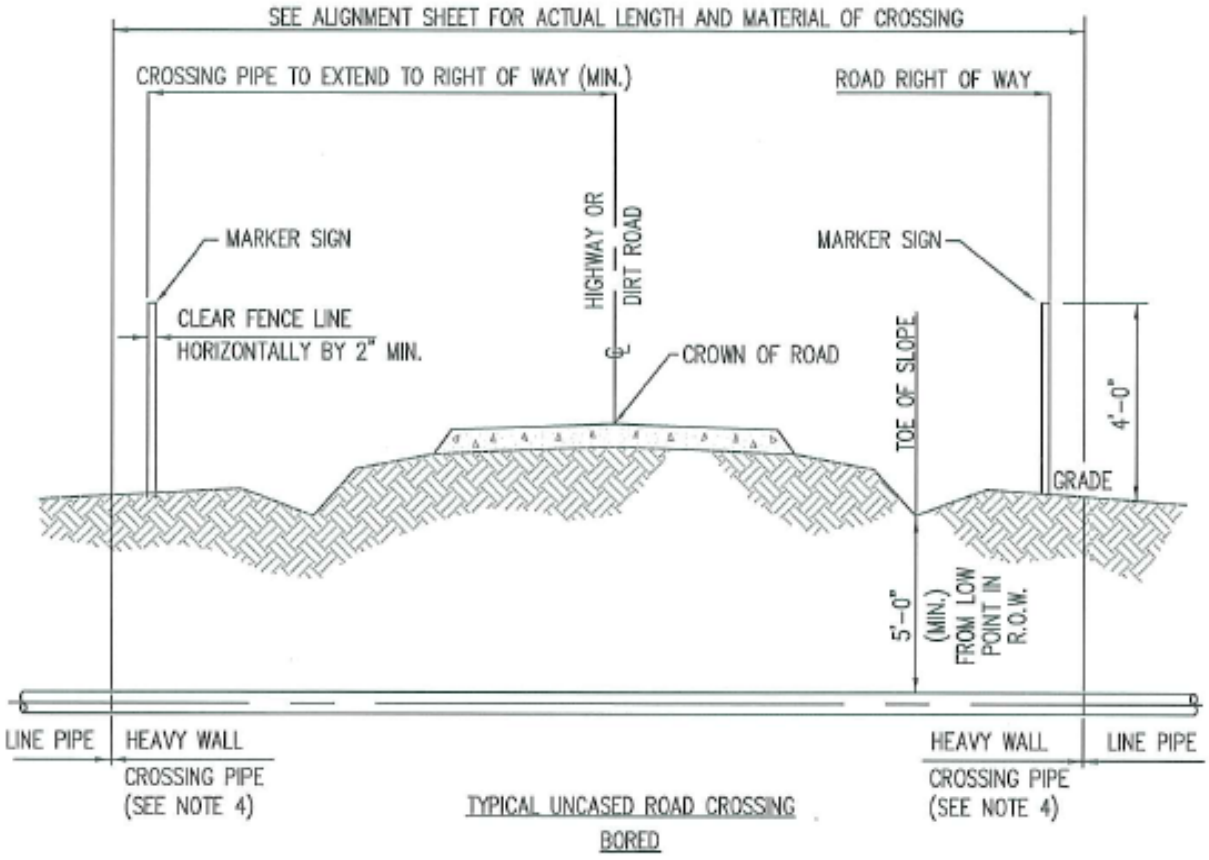
Wyoming Pipeline Corridor Initiative
Appendix A
Figure 7
Typical Pipeline Marker

Wyoming Pipeline Authority



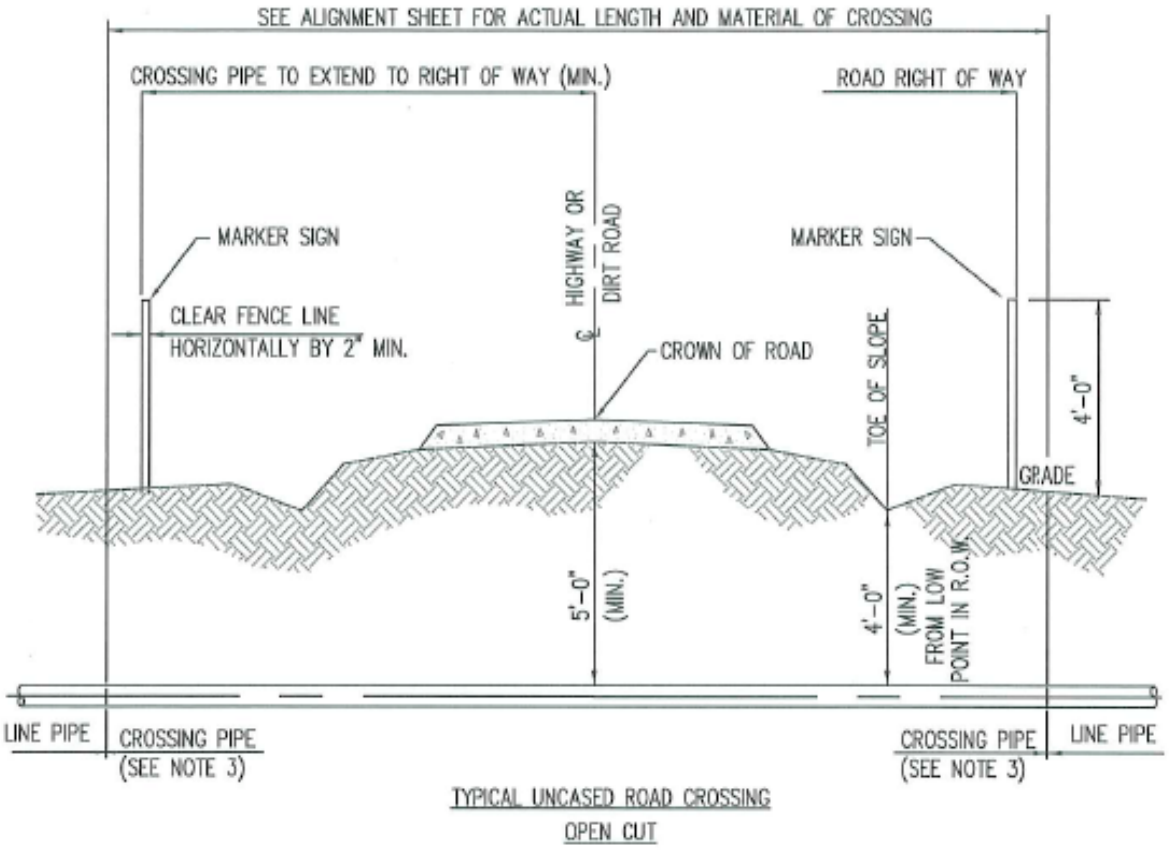
Wyoming Pipeline Corridor Initiative
Appendix A
Figure 8
Typical Pipeline Construction Sequence

Wyoming Pipeline Authority



Wyoming Pipeline Corridor Initiative
Appendix A
Figure 9
Typical Uncased Road Crossing: Bored

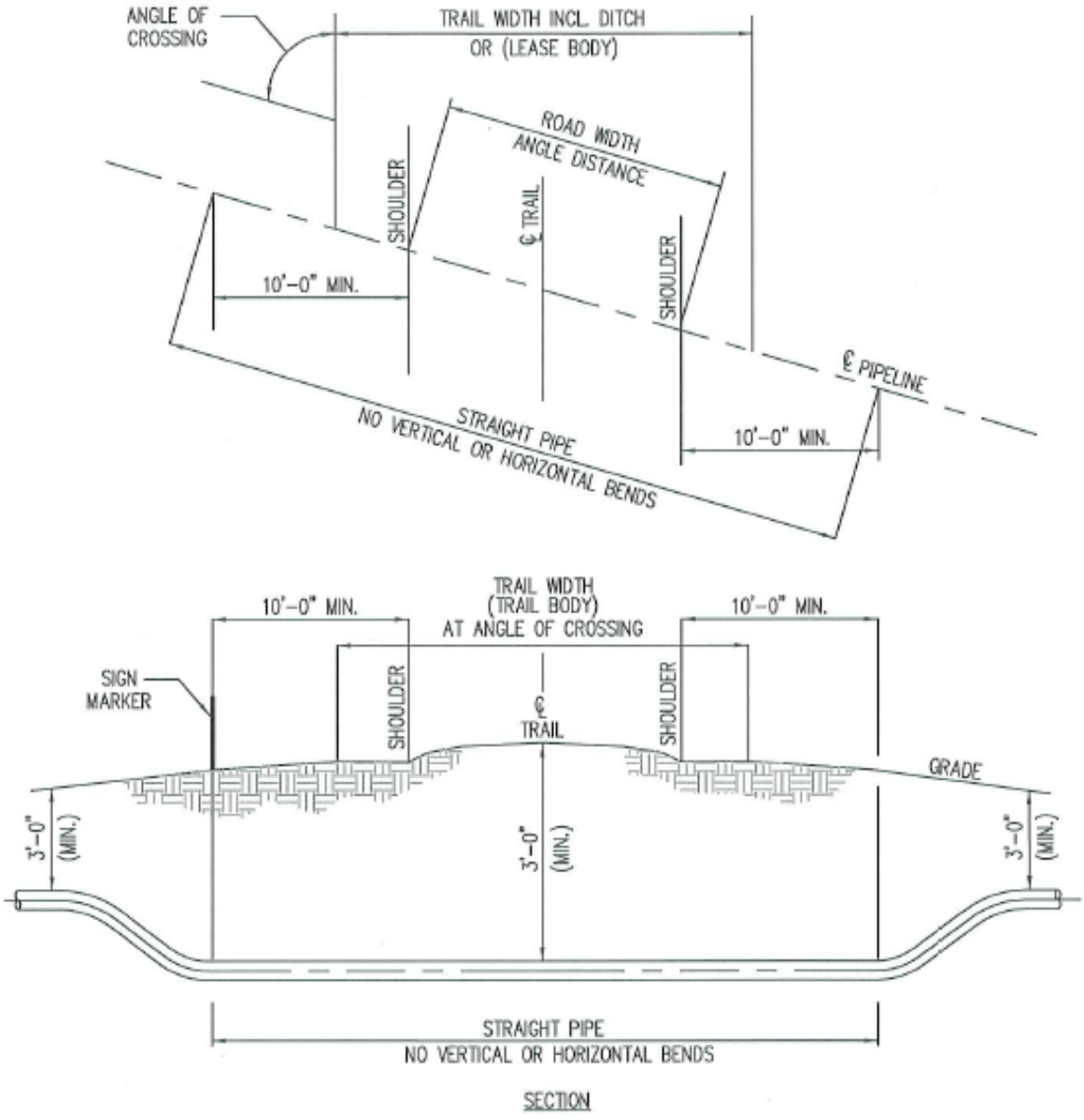
Wyoming Pipeline Authority



TYPICAL UNCASED ROAD CROSSING
OPEN CUT

Wyoming Pipeline Corridor Initiative
Appendix A
Figure 10
Typical Uncased Road Crossing: Open Cut

Wyoming Pipeline Authority



Wyoming Pipeline Corridor Initiative
Appendix A
Figure 11
Typical Trail and Two-Track Road Crossing

Wyoming Pipeline Authority

Appendix B
Tables

Table 1 - Landownership (Miles Crossed) of Each Segment of WPCI
Table 2 - Authorizing Actions Which May be Necessary to Construct Pipelines in the WPCI Corridors
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Table 4 - Locations of Extra Temporary Work Spaces Necessary to Construct Pipelines in the WPCI Corridors
Table 5 - Land Requirements (Acres) for Each Segment of WPCI
Table 6 - Typical Construction Equipment List

Appendix B
Table 1
Landownership (Miles Crossed) of Each Segment of WPCI

Segment	Counties	WPCI Width (feet)	Miles Crossed						
			Private	State	BLM	USFS	BOR	DOD	Total
1	Lincoln, Sublette, Sweetwater	200	65.30	2.85	64.90	1.05	10.16	0.00	144.25
2	Carbon, Sweetwater	200	67.63	4.07	53.70	0.00	0.00	0.00	125.40
3	Fremont, Sweetwater	300	13.90	1.00	35.60	0.00	0.00	0.00	50.50
4	Bighorn, Fremont, Hot Springs, Park, Sweetwater, Washakie	300	70.18	16.48	233.30	0.00	3.05	0.00	323.01
5	Sublette, Sweetwater	200	3.22	7.70	112.35	0.00	0.00	0.00	123.27
6	Carbon, Natrona	300	39.58	8.55	31.96	0.00	4.63	0.00	84.72
7	Carbon, Fremont, Sweetwater	300	10.70	3.26	45.00	0.00	0.00	0.00	58.96
8	Fremont, Sweetwater	200	2.01	1.94	34.25	0.00	0.00	0.00	38.20
9	Fremont	200	3.11	1.83	38.99	0.00	0.00	0.00	43.93
10	Fremont, Natrona	200	23.70	3.89	76.90	0.00	0.00	0.00	104.50
11	Fremont, Natrona	300	44.12	5.13	19.92	0.00	0.00	0.00	69.18
12	Fremont, Natrona	200	28.30	4.17	23.17	0.00	0.00	0.00	55.64
13	Fremont	200	3.62	1.52	22.45	0.00	0.00	0.00	27.60
14	Fremont	200	2.04	0.84	20.06	0.00	0.00	0.00	22.94
15	Freemont, Natrona	200	13.70	4.50	34.39	0.00	0.00	0.00	52.59
16	Johnson, Natrona	200	49.99	16.18	8.35	0.00	0.00	0.00	74.52
17	Johnson, Natrona	300	73.57	10.86	38.88	0.00	0.00	0.00	123.31
18	Campbell, Johnson	200	54.39	4.52	5.91	0.00	0.00	0.00	64.82
19	Bighorn, Hot Springs, Park	300	29.89	6.81	73.34	0.00	8.08	0.00	118.13
20	Bighorn, Hot Springs, Washakie	200	1.36	2.12	35.93	0.00	0.00	0.00	39.41
21	Hotsprings, Park	200	40.80	4.40	42.97	0.00	16.58	0.00	104.75
22	Bighorn	200	5.70	0.10	18.35	0.00	0.00	0.00	24.15
23	Park	200	23.92	3.44	3.64	0.00	0.00	0.00	30.99
24	Park	200	15.61	1.19	9.21	0.00	0.00	0.00	26.02
25	Bighorn	200	3.69	1.02	21.14	0.00	0.00	0.02	25.87
Totals			**690.03**	**118.37**	**1104.67**	**1.05**	**42.51**	**0.02**	**1956.64**

Appendix B
Table 2
Authorizing Actions Which May be Necessary to Construct Pipelines in the WPCI Corridors

Agency	Nature of Authorizing Action	Authority
Federal Permits, Approvals, and Reviews		
Bureau of Land Management	Amends Resource Management Plan	Federal Land Policy and Management Act of 1976
	Grant right-of-ways and issue temporary use permits	Section 28 of the Mineral Leasing Act of 1920
	Issue materials sales contracts	Materials Act of 1947, as amended; 30 U.S.C. 601, 602; 43
	Issue antiquities and cultural resource use permit to excavate or remove cultural resources on federal lands	Antiquities Act of 1906, 16 U.S.C. Section 431-433; Archaeological Resources Public Protection Act of 1979, 16 U.S.C. Section 470aa-
	Approve herbicide use on federal lands	BLM Manual 9011.1, Guidelines for Conducting Chemical Pest Control Program
U.S. Fish and Wildlife Service	Section 7 Consultation process for endangered or threatened	Endangered Species Act of 1973; 16 U.S.C. 1531 et seq.
Federal Highway Administration	Issue permits to cross federal-aid highways	23 U.S.C. Sections 116, 123, 23 CFR Part 645 Subpart B
U.S. Army Corps of Engineers	Issue Section 404 permit (nationwide) for placement of dredged or filled material in waters of the U.S.	Section 404 of the Clean Water Act of 1972 (40 CFR 122-123); 33 U.S.C. Section 1344; 33 CFR Parts 323, 325
Bureau of Alcohol, Tobacco and Firearms	Issue permits to purchase, store, and use explosives	Section 1102(a) of the Organized Crime Control Act of 1970, 18 U.S.C. Section 841-848; 27 CFR Part 181
Advisory Council on Historic Preservation	Review and compliance activities related to cultural resources	Section 106 National Historic Preservation Act (16 U.S.C. 470) (36 CFR Part 80)
State of Wyoming and Local		
Department of Environmental Quality – Water Quality Division	Issue National Pollution Discharge Elimination System (NPDES) Permit for discharges; approve Storm Water Pollution Prevention Plan	Wyoming Environmental Quality Act, W.S. 35-11-301
	401 Water Quality Certification	Section 401 of the Clean Water Act
Wyoming Highway Department	Issue permits for oversize and overweight loads	Chapters 17 and 20 of the Wyoming Highway Department Rules and Regulations
	Issue encroachment permits for state highways	Chapter 12 of the Wyoming Highway Department Rules and Regulations
State Land Board	Issue easements to cross state lands	W.S. 35-20 and 36-20
Wyoming State Engineer's Office	Grant permit to appropriate water for hydrostatic testing, dust control, and other uses	W.S.41-121 through 147
State Historic Preservation Office	Review compliance activities related to cultural resources	Section 106 National Historic Preservation Act (16 U.S.C. 470)
County Commissioners	Road crossing permits, land use permits, and licenses	County zoning regulations
County Health Departments	Temporary sanitation facilities	County sanitation regulations

Appendix B
Table 3
Construction Timing Restrictions Which will be Observed for Construction Activities in the WPCI Corridors

Common Name	Spatial Buffer (miles)	Seasonal Stipulation
Golden Eagle	0.5	January 15 - July 31
Ferruginous Hawk	1	March 15 - July 31
Swainson's Hawk	0.25	April 1 - August 31
Bald Eagle	0.5	January 1 – August 15
Prairie Falcon	0.5	March 1 - August 15
Peregrine Falcon	0.5	March 1 - August 15
Short-eared Owl	0.25	March15- August 1
Burrowing Owl	0.25	April 1 – September 15
Northern Goshawk	0.5	April 1 - August 15
Osprey	0.25	April 1 - August 31
Cooper's Hawk	0.25	March 15 – August 31
Sharp-shinned Hawk	0.25	March 15 – August 31
Red-tailed Hawk	0.25	February 1 – August 15
Rough-legged Hawk (winter resident only)	----	----
Northern Harrier	0.25	April 1 - August 15
Merlin	0.5	April 1 - August 15
American Kestrel	0.125	April 1 – August 15
Common Barn Owl	0.125	February 1 – September 15
Northern Saw-whet Owl	0.25	March 1 - August 31
Boreal Owl	0.25	February 1 – July 31
Long-eared Owl	0.25	February 1 – August 15
Great Horned Owl	0.125	December 1 – September 31
Northern Pygmy-Owl	0.25	April 1 – August 1
Eastern Screech -owl	0.125	March 1 – August 15
Western Screech-owl	0.125	March 1 – August 15
Great Gray Owl	0.25	March 15 – August 31
Sage Grouse Core Area Leks	0.6	No Surface Occupancy
Sage Grouse Non-Core Area Leks	0.25	No Surface Occupancy
Sage Grouse Core Area	Entire Delineated Area	March 15 – June 30
Sage Grouse Non-Core Area Leks	2	March 15 – June 30
Sage Grouse Winter Concentration Areas	Entire Delineated Area	November 15 – March 14
Deer, Elk, and Pronghorn Crucial Winter Range	Entire Delineated Area	November 15 – April 30
Sharp-tail Grouse Leks	0.25	No Surface Occupancy
Sharp-tail Grouse Leks	2	April 1 – July 15

*** Note**: Construction stipulations will apply to species if previously collected data verifies their presence. Additional surveys will be conducted for species, as determined by applicable resource agencies.

Appendix B
Table 4
Locations of Extra Temporary Workspaces Necessary to Construct Pipelines in the WPCI Corridors

Segment	Milepost	Purpose	Feature Name
1	1.15	I 80	Interstate
1	1.41	Union Pacific Railroad	Railroad
1	1.78	Union Pacific Railroad	Railroad
1	15.30	Bitter Creek	StreamRiver - Perennial
1	39.27	SR 430	State Highway
1	40.20	Salt Wells Creek	StreamRiver - Intermittent
1	57.45	Little Bitter Creek	StreamRiver - Intermittent
1	59.55	US 191	US Highway
1	64.25	Green River	Artificial Path
1	70.81	SR 530	State Highway
1	77.44	Union Pacific Railroad	Railroad
1	77.47	Union Pacific Railroad	Railroad
1	77.85	SR 374	State Highway
1	78.01	I 80	Interstate
1	79.23	SR 372	State Highway
1	80.40	SR 372	State Highway
1	84.73	SR 372	State Highway
1	89.01	Union Pacific Railroad	Railroad
1	116.92	SR 372	State Highway
1	118.88	Green River	Artificial Path
2	6.70	SR 71	State Highway
2	8.98	Sugar Creek	StreamRiver - Intermittent
2	20.19	Separation Creek	StreamRiver - Intermittent
2	32.22	SR 789	State Highway
2	59.33	Union Pacific Railroad	Railroad
2	59.52		RAMP
2	59.54	I 80	Interstate
2	59.57		RAMP
2	85.01	Union Pacific Railroad	Railroad
2	98.20	SR 371	State Highway
2	113.21	Uss Company Railroad	Railroad
2	113.37	Killpecker Creek	StreamRiver - Intermittent
2	117.49	US 191	US Highway
3	3.27	Union Pacific Railroad	Railroad
3	4.10	I 80	Interstate
4	0.50	SR 372	State Highway
4	4.90	Green River	Artificial Path
4	25.82	US 191	US Highway
4	33.63	Uss Company Railroad	Railroad

4	35.01	Killpecker Creek	StreamRiver - Intermittent
4	79.26	Bush Creek	StreamRiver - Intermittent
4	80.60	Bear Creek	StreamRiver - Intermittent
4	82.49	Red Creek	StreamRiver - Perennial
4	99.09	Lost Creek	StreamRiver - Intermittent
4	103.59	Arapahoe Creek	StreamRiver - Intermittent
4	106.31	Arapahoe Creek	StreamRiver - Intermittent
4	108.27	Arapahoe Creek	StreamRiver - Intermittent
4	110.95	West Fork Crooks Creek	StreamRiver - Intermittent
4	113.44	Spring Creek	StreamRiver - Intermittent
4	116.98	Mason Creek	StreamRiver - Intermittent
4	117.68	Unnamed	StreamRiver - Intermittent
4	118.19	Unnamed	StreamRiver - Intermittent
4	124.72	US 287	US Highway
4	127.08	Sweetwater River	Artificial Path
4	130.44	Buffalo Creek	StreamRiver - Intermittent
4	145.55	Coyote Creek	StreamRiver - Intermittent
4	146.89	Dry Coyote Creek	StreamRiver - Intermittent
4	152.19	SR 136	State Highway
4	173.19	Poison Creek	StreamRiver - Intermittent
4	173.87	US 20	US Highway
4	180.37	Unnamed	StreamRiver - Intermittent
4	180.79	Alkali Creek	Artificial Path
4	181.13	Burlington Northern Railroad	Railroad
4	181.97	Unnamed	StreamRiver - Intermittent
4	184.33	South Fork Sand Creek	StreamRiver - Intermittent
4	185.25	Sand Creek	Artificial Path
4	186.39	South Fork Badwater Creek	Artificial Path
4	187.84	Badwater Creek	StreamRiver - Perennial
4	191.14	Cottonwood Creek	StreamRiver - Intermittent
4	193.54	Bridger Creek	StreamRiver - Perennial
4	200.56	Unnamed	StreamRiver - Intermittent
4	204.44	South Bridger Creek	StreamRiver - Perennial
4	207.66	West Bridger Creek	StreamRiver - Perennial
4	214.20	West Kirby Creek	StreamRiver - Perennial
4	220.08	Kirby Creek	StreamRiver - Intermittent
4	224.59	Lake Creek	StreamRiver - Intermittent
4	224.61	Lake Creek	StreamRiver - Intermittent
4	224.67	Lake Creek	StreamRiver - Intermittent
4	232.28	Nowater Creek	StreamRiver - Intermittent
4	239.47	East Fork Nowater Creek	StreamRiver - Intermittent

4	246.20	Slick Creek	StreamRiver - Intermittent
4	247.14	US 16	US Highway
4	262.73	US 20	US Highway
4	263.04	Burlington Northern Railroad	Railroad
4	264.14	Bighorn River	Artificial Path
4	264.86	Alamo Creek	StreamRiver - Intermittent
4	265.14	Alamo Creek	StreamRiver - Intermittent
4	265.26	Alamo Creek	StreamRiver - Intermittent
4	265.39	Alamo Creek	StreamRiver - Intermittent
4	265.72	SR 433	State Highway
4	266.58	Alamo Creek	StreamRiver - Intermittent
4	266.58	Alamo Creek	StreamRiver - Intermittent
4	266.64	Alamo Creek	StreamRiver - Intermittent
4	269.52	Dobie Creek	StreamRiver - Intermittent
4	272.46	Elk Creek	StreamRiver - Intermittent
4	272.51	Elk Creek	StreamRiver - Intermittent
4	272.62	Elk Creek	StreamRiver - Intermittent
4	276.16	Antelope Creek	StreamRiver - Intermittent
4	278.76	SR 30	State Highway
4	282.04	Greybull River	Artificial Path
4	282.17	Greybull River	Artificial Path
4	282.27	Greybull River	Artificial Path
4	286.79	Dry Creek	StreamRiver - Perennial
4	287.73	US 14	US Highway
4	290.07	Little Dry Creek	StreamRiver - Intermittent
4	302.16	Little Dry Creek	StreamRiver - Intermittent
4	309.61	Unnamed	StreamRiver - Intermittent
4	309.65	Unnamed	StreamRiver - Intermittent
4	309.69	Unnamed	StreamRiver - Intermittent
4	309.71	Unnamed	StreamRiver - Intermittent
4	309.76	Unnamed	StreamRiver - Intermittent
4	312.91	SR 32	State Highway
4	314.11	Shoshone River	Artificial Path
4	314.68	US 14A	US Highway
5	17.27	Bush Creek	StreamRiver - Perennial
5	19.25	Jack Parnell Creek	StreamRiver - Intermittent
5	25.38	Rock Cabin Creek	StreamRiver - Perennial
5	40.33	Pacific Creek	StreamRiver - Perennial
5	40.49	North Pacific Creek	StreamRiver - Intermittent
5	40.59	Uss Company Railroad	Railroad
5	42.06	SR 28	State Highway

5	44.60	Dry Sandy Creek	StreamRiver - Intermittent
5	46.44	Little Sandy Creek	StreamRiver - Perennial
5	60.25	Big Sandy River	Artificial Path
5	60.36	US 191	US Highway
5	94.49	Green River	Artificial Path
5	95.71	US 189	US Highway
5	100.96	Birch Creek	StreamRiver - Intermittent
5	103.61	Birch Creek	StreamRiver - Intermittent
5	105.28	Dry Piney Creek	StreamRiver - Perennial
5	108.33	Fogarty Creek	StreamRiver - Perennial
5	119.21	Beaver Creek	StreamRiver - Perennial
5	120.20	Spring Creek	StreamRiver - Perennial
6	2.03	Union Pacific Railroad	Railroad
6	2.16	SR 76	State Highway
6	2.35	I 80 Ramp	RAMP
6	2.39	I 80	Interstate
6	2.41	I 80 Ramp	RAMP
6	5.18	Sugar Creek	StreamRiver - Perennial
6	9.50	North Platte River	Artificial Path
6	11.12	North Platte River	Artificial Path
6	28.27	Hurt Creek	StreamRiver - Perennial
6	33.39	Morgan Creek	StreamRiver - Perennial
6	37.47	North Platte River	Artificial Path
6	40.72	Sage Creek	StreamRiver - Perennial
6	54.37	Canyon Creek	StreamRiver - Perennial
6	69.84	Bolton Creek	StreamRiver - Intermittent
6	73.94	Stinking Creek	Artificial Path
6	75.63	Bates Creek	StreamRiver - Perennial
6	75.97	SR 487	State Highway
7	0.23	Sugar Creek	StreamRiver - Perennial
7	32.88	US 287	US Highway
7	43.86	Lost Soldier Creek	StreamRiver - Intermittent
7	44.76	Lost Soldier Creek	StreamRiver - Intermittent
7	53.19	Crooks Creek	StreamRiver - Perennial
7	58.63	Crooks Creek	StreamRiver - Perennial
8	13.15	East Alkali Creek	StreamRiver - Intermittent
8	22.86	Warm Springs Creek	StreamRiver - Perennial
8	25.98	US 287	US Highway
8	26.19	Sweetwater River	Artificial Path
9	3.25	O'Brian Creek	StreamRiver - Intermittent
9	4.22	Nancy Creek	StreamRiver - Intermittent

9	7.32	US 287	US Highway
9	9.41	Ice Slough	StreamRiver - Intermittent
9	15.10	Sweetwater River	Artificial Path
9	25.44	West Fork Long Creek	StreamRiver - Intermittent
9	31.56	SR 135	State Highway
10	0.24	I 25	Interstate
10	3.41	Scott Creek	StreamRiver - Intermittent
10	3.66	Lane Creek	StreamRiver - Intermittent
10	7.16	Government Creek	StreamRiver - Intermittent
10	7.81	Government Creek	StreamRiver - Intermittent
10	39.97	Burlington Northern Railroad	Railroad
10	40.10	US 20	US Highway
10	49.33	Middle Fork Casper Creek	StreamRiver - Perennial
10	56.21	South Fork Casper Creek	StreamRiver - Intermittent
10	59.49	Poison Spider Creek	StreamRiver - Perennial
10	61.50	Soap Creek	StreamRiver - Intermittent
10	65.88	Cabin Creek	StreamRiver - Intermittent
10	69.77	Horse Creek	StreamRiver - Intermittent
10	78.04	Cottonwood Creek	StreamRiver - Intermittent
10	78.11	Dry Creek	StreamRiver - Intermittent
10	88.61	Sage Hen Creek	StreamRiver - Intermittent
10	94.13	West Sage Hen Creek	StreamRiver - Intermittent
10	97.44	Unnamed	StreamRiver - Intermittent
10	97.85	Unnamed	StreamRiver - Intermittent
10	103.93	Unnamed	StreamRiver - Intermittent
11	13.09	South Fork Casper Creek	StreamRiver - Intermittent
11	24.59	Middle Fork Casper Creek	StreamRiver - Perennial
11	33.00	South Fork Powder River	StreamRiver - Intermittent
11	35.07	US 20	US Highway
11	45.79	Poison Creek	StreamRiver - Intermittent
11	49.19	Alkali Creek	StreamRiver - Intermittent
11	50.06	Burlington Northern Railroad	Railroad
11	50.18	E-K Creek	StreamRiver - Intermittent
11	55.40	Red Creek	StreamRiver - Intermittent
11	63.97	South Fork Sand Creek	StreamRiver - Intermittent
11	66.65	Sand Creek	Artificial Path
11	67.27	Sand Creek	Artificial Path
11	67.39	Sand Creek	Artificial Path
12	19.57	South Fork Casper Creek	StreamRiver - Intermittent
12	19.64	South Fork Casper Creek	StreamRiver - Intermittent
12	19.66	South Fork Casper Creek	StreamRiver - Intermittent

12	27.11	Middle Fork Casper Creek	StreamRiver - Perennial
12	33.63	Wallace Creek	StreamRiver - Perennial
12	44.71	Deer Creek	StreamRiver - Perennial
12	47.54	East Canyon Creek	StreamRiver - Intermittent
12	48.81	West Canyon Creek	StreamRiver - Intermittent
12	55.56	SR 136	State Highway
13	0.13	SR 136	State Highway
13	1.48	Muskrat Creek	Artificial Path
13	7.11	Unnamed	StreamRiver - Intermittent
13	8.84	Unnamed	StreamRiver - Intermittent
13	9.56	Unnamed	StreamRiver - Intermittent
13	17.88	Rock Creek	StreamRiver - Perennial
13	19.09	Conant Creek	StreamRiver - Perennial
14	2.03	Muskrat Creek	Artificial Path
14	7.31	Horseshoe Creek	Artificial Path
14	12.09	Conant Creek	StreamRiver - Intermittent
14	15.81	Oil Springs Creek	StreamRiver - Intermittent
14	17.75	SR 136	State Highway
14	19.21	Dry Cheyenne Creek	StreamRiver - Intermittent
15	5.32	Poison Creek	StreamRiver - Intermittent
15	46.85	US 20	US Highway
15	47.06	Poison Creek	Artificial Path
16	0.07	Castle Creek	StreamRiver - Intermittent
16	4.31	Unnamed	StreamRiver - Intermittent
16	6.09	SR 387	State Highway
16	8.00	I 25	Interstate
16	10.44	I 25	Interstate
16	10.79	Dugout Creek	StreamRiver - Intermittent
16	11.10	Unnamed	StreamRiver - Intermittent
16	16.87	I 25	Interstate
16	23.95	I 25	Interstate
16	24.51	South Fork Powder River	StreamRiver - Intermittent
16	30.13	Middle Fork Powder River	Artificial Path
16	30.92	SR 191	State Highway
16	31.77	SR 196	State Highway
16	31.90	I 25	Interstate
16	35.92	North Fork Powder River	StreamRiver - Perennial
16	41.39	SR 196	State Highway
16	53.27	South Fork Crazy Woman Creek	StreamRiver - Perennial
16	56.56	North Fork Crazy Woman Creek	StreamRiver - Perennial
16	65.07	I 25	Interstate

17	21.65	East Teapot Creek	StreamRiver - Intermittent
17	28.00	Teapot Creek	StreamRiver - Intermittent
17	28.17	SR 259	State Highway
17	31.87	Castle Creek	StreamRiver - Intermittent
17	31.89	Castle Creek	StreamRiver - Intermittent
17	31.95	Castle Creek	StreamRiver - Intermittent
17	36.90	Unnamed	StreamRiver - Intermittent
17	37.70	SR 387	State Highway
17	48.51	Salt Creek	StreamRiver - Perennial
17	49.21	Meadow Creek	StreamRiver - Perennial
17	55.82	Salt Creek	StreamRiver - Perennial
17	57.32	Powder River	Artificial Path
17	58.30	SR 192	State Highway
17	102.07	I 90	Interstate
17	105.43	I 90	Interstate
17	113.45	Crazy Woman Creek	StreamRiver - Perennial
18	3.47	Wild Horse Creek	StreamRiver - Intermittent
18	24.96	Powder River	StreamRiver - Perennial
18	34.30	Crazy Woman Creek	StreamRiver - Perennial
18	51.76	Clear Creek	Artificial Path
18	59.19	Rock Creek	StreamRiver - Perennial
18	59.34	Rock Creek	StreamRiver - Perennial
18	59.44	Rock Creek	StreamRiver - Perennial
18	59.85	Clear Creek	StreamRiver - Perennial
18	62.99	I 90	Interstate
19	0.27	Kirby Creek	StreamRiver - Intermittent
19	3.94	Kirby Creek	Artificial Path
19	5.56	Kirby Creek	StreamRiver - Intermittent
19	6.99	Unnamed	StreamRiver - Intermittent
19	11.65	Kirby Creek	StreamRiver - Intermittent
19	11.72	SR 172	State Highway
19	16.39	Bighorn River	Artificial Path
19	16.60	Burlington Northern Railroad	Railroad
19	16.63	Unnamed	StreamRiver - Intermittent
19	17.57	US 20	US Highway
19	18.04		
19	19.79	Unnamed	StreamRiver - Intermittent
19	28.45	Cottonwood Creek	StreamRiver - Perennial
19	31.00	Grass Creek	StreamRiver - Perennial
19	31.09	Grass Creek	StreamRiver - Perennial
19	41.37	SR 431	State Highway

19	42.32	Gooseberry Creek	StreamRiver - Perennial
19	54.40	Fifteen mile Creek	StreamRiver - Intermittent
19	54.43	Fifteen mile Creek	StreamRiver - Intermittent
19	54.52	Fifteen mile Creek	StreamRiver - Intermittent
19	64.35	Greybull River	Artificial Path
19	70.76	Dry Creek	StreamRiver - Intermittent
19	83.22	North Fork Dry Creek	StreamRiver - Intermittent
19	88.03	US 14	US Highway
19	101.08	Whistle Creek	StreamRiver - Intermittent
19	106.42	SR 295	State Highway
19	109.18	Unnamed	StreamRiver - Intermittent
19	109.49	Unnamed	StreamRiver - Intermittent
19	109.92	Shoshone River	Artificial Path
19	110.90	Bitter Creek	Artificial Path
19	112.32	Unnamed	StreamRiver - Perennial
19	112.42	US 14A	US Highway
20	5.54	Cottonwood Creek	StreamRiver - Perennial
20	9.28	Little Gooseberry Creek	StreamRiver - Perennial
20	10.31	North Fork Little Gooseberry Creek	StreamRiver - Perennial
20	12.61	Gooseberry Creek	StreamRiver - Perennial
20	13.65	SR 431	State Highway
20	18.94	Fifteen mile Creek	Artificial Path
20	27.79	Sixmile Creek	StreamRiver - Intermittent
20	28.93	Fivemile Creek	StreamRiver - Intermittent
20	34.13	South Fork Elk Creek	StreamRiver - Intermittent
20	36.16	Elk Creek	StreamRiver - Intermittent
21	0.51	SR 120	State Highway
21	0.67	Grass Creek	StreamRiver - Perennial
21	1.45	Grass Creek	StreamRiver - Perennial
21	12.37	Gooseberry Creek	StreamRiver - Perennial
21	17.90	Little Buffalo Creek	StreamRiver - Intermittent
21	24.39	SR 120	State Highway
21	29.59	Greybull River	Artificial Path
21	30.02	SR 120	State Highway
21	31.52	Unnamed	StreamRiver - Intermittent
21	34.61	Cottonwood Creek	StreamRiver - Intermittent
21	36.66	South Fork Dry Creek	StreamRiver - Intermittent
21	46.20	Sage Creek	StreamRiver - Perennial
21	55.32	Sulphur Creek	StreamRiver - Perennial
21	55.52	SR 291	State Highway
21	57.66	US 14	US Highway

21	57.76	Shoshone River	Artificial Path
21	59.01	Trail Creek	StreamRiver - Perennial
21	60.74	Dry Creek	StreamRiver - Perennial
21	61.55	Heart Mountain Canal	Artificial Path
21	62.94	SR 120	State Highway
21	63.20	Cottonwood Creek	StreamRiver - Perennial
21	64.40	North Fork Cottonwood Creek	StreamRiver - Perennial
21	65.13	Idaho Creek	StreamRiver - Perennial
21	70.88	Iron Creek	StreamRiver - Intermittent
21	72.82	Buck Creek	StreamRiver - Intermittent
21	75.94	Alkali Creek Patch	StreamRiver - Intermittent
21	85.20	Unnamed	StreamRiver - Intermittent
21	87.40	SR 294	State Highway
21	98.32	SR 295	State Highway
21	102.14	SR 114	State Highway
21	102.94	Unnamed	StreamRiver - Perennial
21	102.95	Burlington Northern Railroad	Railroad
22	2.63	Nowood River	Artificial Path
22	4.12	SR 31	State Highway
22	20.27	Bighorn River	Artificial Path
22	20.52	Burlington Northern Railroad	Railroad
22	20.67	US 20	US Highway
23	1.74	Meeteetse Creek	StreamRiver - Perennial
23	5.59	Spring Creek	StreamRiver - Perennial
23	11.43	Spring Creek	StreamRiver - Perennial
23	13.35	Rush Creek	StreamRiver - Perennial
23	15.18	Short Fork Meeteetse Creek	StreamRiver - Perennial
23	16.14	Meeteetse Creek	StreamRiver - Perennial
23	19.46	South Fork Sage Creek	StreamRiver - Perennial
23	20.48	Sage Creek	StreamRiver - Perennial
23	23.10	Hoodoo Creek	StreamRiver - Perennial
24	1.56	South Fork Dry Creek	StreamRiver - Intermittent
24	3.76	SR 120	State Highway
24	6.18	South Fork Dry Creek	StreamRiver - Intermittent
24	8.19	Cottonwood Creek	StreamRiver - Intermittent
24	11.09	Unnamed	StreamRiver - Intermittent
24	11.88	Horse Creek	StreamRiver - Intermittent
24	12.71	Meeteetse Creek	Artificial Path
24	14.30	Rush Creek	StreamRiver - Perennial
24	15.82	Spring Creek	StreamRiver - Perennial
24	17.65	Unnamed	StreamRiver - Intermittent

24	17.76	Rawhide Creek	StreamRiver - Perennial
24	22.74	Rose Creek	StreamRiver - Perennial
24	25.03	Pickett Creek	StreamRiver - Perennial
24	25.77	Greybull River	Artificial Path
25	0.98	Five Springs Creek	StreamRiver - Perennial
25	2.60	Elk Springs Creek	StreamRiver - Intermittent
25	5.50	US 14A	US Highway
25	5.69	Five Springs Creek	StreamRiver - Perennial
25	12.47	Bighorn River	Artificial Path
25	12.49	Burlington Northern Railroad	Railroad
25	18.89	US 310	US Highway
25	18.97	Unnamed	StreamRiver - Intermittent
25	25.78	Unnamed	StreamRiver - Intermittent

	Appendix B Table 5 Land Requirements for Each Segment of WPCI (Acres)							
Segment Name	**Counties**	**Private**	**State**	**BLM**	**USFS**	**BOR**	**DOD**	**Total**
1	Lincoln, Sublette, Sweetwater	1583.34	72.15	1565.48	25.36	247.37	0.00	3493.70
2	Carbon, Sweetwater	1642.51	98.61	1295.83	0.00	0.00	0.00	3036.95
3	Fremont, Sweetwater	505.31	36.43	1293.90	0.00	0.00	0.00	1835.64
4	Bighorn, Fremont, Hot Springs, Park, Sweetwater, Washakie	2583.19	600.17	8451.91	0.00	110.91	0.00	11746.18
5	Sublette, Sweetwater	80.66	186.59	2719.96	0.00	0.00	0.00	2987.21
6	Carbon, Natrona	1439.88	311.58	1161.37	0.00	168.24	0.00	3081.06
7	Carbon, Fremont, Sweetwater	383.22	117.85	1637.79	0.00	0.00	0.00	2138.86
8	Fremont, Sweetwater	48.70	47.30	828.30	0.00	0.00	0.00	924.31
9	Fremont	73.46	44.46	945.95	0.00	0.00	0.00	1063.87
10	Fremont, Natrona	571.56	93.87	1863.83	0.00	0.00	0.00	2529.26
11	Fremont, Natrona	1605.42	186.71	723.20	0.00	0.00	0.00	2515.34
12	Fremont, Natrona	685.05	101.23	559.95	0.00	0.00	0.00	1346.23
13	Fremont	87.70	36.90	543.16	0.00	0.00	0.00	667.75
14	Fremont	48.72	20.26	486.40	0.00	0.00	0.00	555.38
15	Freemont, Natrona	331.47	108.67	832.52	0.00	0.00	0.00	1272.66
16	Johnson, Natrona	1212.65	388.98	202.74	0.00	0.00	0.00	1804.37
17	Johnson, Natrona	2675.09	395.09	1414.93	0.00	0.00	0.00	4485.11
18	Campbell, Johnson	1318.75	108.86	143.11	0.00	0.00	0.00	1570.72
19	Bighorn, Hot Springs, Park	1087.48	247.82	2664.48	0.00	293.01	0.00	4292.79
20	Bighorn, Hot Springs, Washakie	33.06	51.27	868.69	0.00	0.00	0.00	953.03
21	Hotsprings, Park	988.58	106.90	1041.03	0.00	400.97	0.00	2537.48
22	Bighorn	137.46	2.03	444.18	0.00	0.00	0.00	583.67
23	Park	579.15	83.38	87.74	0.00	0.00	0.00	750.27
24	Park	375.88	29.25	222.31	0.00	0.00	0.00	627.44
25	Bighorn	91.46	24.80	509.29	0.00	0.00	0.87	626.41
Totals		**20169.75**	**3501.15**	**32508.06**	**25.36**	**1220.50**	**0.87**	**57425.68**

Appendix B **Table 6** **Typical Construction Equipment List**
Dozer with Ripper
Dozer with Winch and Angle Blade
Tow Tractor
Sideboom
Back hoe (3/4-yard)
Ditching Machine
Padding Machine
Motor Grader
Motor Crane
Bending Machine
Boring Machine
Air Compressor
Pipe Coating Trucks
Pumps
Flatbed Truck w/ Winch
Pickup
Stringing Truck
Crew Truck
Skid Truck
Dump Truck
Tractor with Lowboy
Mechanic's Truck
Fuel/Grease Truck
Water Truck with Sprinkler
Office Trailer
Warehouse Trailer
Welding Machines (200 amp, tractor-mounted)
Welder's Trucks (1 ton)
Tractor (reclamation)
Disc ploughs (reclamation)
Chisel ploughs (reclamation)
Reseeding equipment (reclamation)

Appendix C
Waste and Spill Management Specifications

Introduction

These waste and spill specifications apply to all work within the WPCI where waste may be generated or a spill may occur. Project specific waste and spill specifications, beyond those outlined in this document, may be applied by individual project proponents.

Contractors will attend pre-construction meetings to review environmental issues and requirements relating to jobs, prior to initiating construction activities. During pre-construction meetings, requirements for proper waste management, spill reporting, and cleanup will be reviewed. Contractors will comply with requirements set forth below and identified in their contract's Scope of Work.

Waste and Spill Management Plan Templates will be completed by Proponents' Contractors. Contractors will comply with environmental guidance provided by Proponents, in addition to all applicable federal, state, and local regulations.

Contractors will be responsible for ensuring that applicable personnel, including subcontractors, understand spill prevention procedures and how to handle, store, transport, and dispose of wastes per these specifications. Contractors will keep records of training and provide copies of such records to Proponents and applicable regulatory agencies, upon request.

Waste Management – Proponents Responsibilities

Before Work Begins

For all wastes that are anticipated to be generated, Proponents will determine their classification (hazardous, non-hazardous, or special waste). Proponents will notify Contractors of waste classifications.

If waste classification is unknown, Proponents will arrange for sampling to determine waste classification as soon as possible, but this may occur after work has begun.

Contractors will review and approve Contractors' Waste management Plan, prior to pre-construction meetings.

Proponents will conduct pre-job meetings to review Waste Management Plans and responsibilities, and review authorized personnel and environmental contacts.

Proponents will make all required notifications, unless otherwise specified in Scopes of Work.

Before Generating Waste

Proponents will inspect all secondary containment provided by Contractors

Proponents will provide the U.S. Environmental Protection Agency (EPA) a generator number for all hazardous wastes generated and a hazardous waste contingency plan, if necessary.

During Waste Generation

For unanticipated wastes generated during construction activities, Proponents and Contractors will confer regarding classification responsibilities as soon as possible, after the waste is generated. Wastes will be managed in accordance with applicable federal, state, and local regulations. Proponents will obtain EPA hazardous waste ID numbers, if necessary.

After Waste Generation

Proponents will arrange for all hazardous and special wastes generated during construction activities to be transported by a licensed waste hauler, to a permitted waste disposal facility.

Waste Management – Contractor Responsibilities

Before Work Begins

Contractors will develop Waste Management Plans for all wastes anticipated during projects and submit them to Proponents for approval. At the Proponents' discretion, Waste Management Plans may cover multiple activities of similar scope. Construction work will not commence prior to obtaining Proponents' approval of Waste Management Plans. If potentially hazardous wastes are addressed, Contractors will receive training in accordance with federal, state, and local requirements.

Contractors will minimize waste generated during projects by purchasing and using the appropriate amount of material. All excess materials purchased by Contractors will be removed by Contractors at the end of projects.

Contractors will furnish Proponents with copies of any permits, clearances, or authorizations obtained by Contractors.

Before Generating Waste

Contractors will be familiar with federal, state, and local environmental requirements.

Contractors will provide all drums (DOT Spec. 1A1 or 1A2), roll-off bins, or other containers necessary to contain wastes generated during the performance of work, including wastes generated in response to spill response and cleanup activities, unless otherwise specific in Scopes of Work. All containers will be approved by Proponents, as necessary.

Contractors will collect all waste near the close of each workday and place it in appropriate containers, which will be in Proponent approved locations.

During Waste Generation

Contractors will be responsible for general housekeeping activities in work areas.

Contractors will notify Proponents prior to placing any potentially hazardous or special waste in storage so that Proponents may conduct sampling and analyses, if necessary.

Contractors will be responsible for proper packaging, labeling, marking, and storing of waste.

Contractors will keep hazardous, non-hazardous, special and general trash wastes separate. These specific waste streams will not be mixed.

Contractors will keep waste logs, identifying location at which wastes are generated, volume and type of waste generated, date waste generated, and where applicable location to which waste was transported or stored (general, non-hazard classified trash excluded). Contractors will provide waste logs to Proponents' authorized representative weekly. Any waste shipped will be accompanied by a log.

For unanticipated wastes generated during construction activities, Proponents and Contractors will confer on classification responsibilities as soon as possible, after waste is generated.

If classification of waste is unknown, all waste will be assumed to be hazardous until final classification is received by Proponents. Contractors will label, store, and transport waste accordingly.

In accordance with Contractors' approved Waste Management Plan, they will be responsible for handling, storing, and transporting non-hazardous wastes generated by Contractors during execution of their contract.

Any proposed changes to approved Waste Management Plans will be submitted in writing and agreed to by both Contractors and Proponents, prior to instituting the change.

After Waste Generation

Contractors will notify Proponents prior to moving any waste off site.

Contractors will be responsible for ensuring that hazardous and special wastes are transported by Proponent authorized, licensed transporters only, and that all waste is accompanied by appropriate shipping papers, complete with required information and signatures.

Contractors are prohibited from transporting hazardous waste.

Contractors will submit all waste shipping papers to Proponents.

Contractors will supply disposal containers for general trash generated by their personnel and subcontractors associated with their projects, and will transport general trash to disposal facilities in accordance with their Waste Management Plan.

Spill Management – Proponent Responsibilities

Proponents will review spill prevention and response as part of pre-construction meetings.

In the event of a reportable spill, or release which involves Proponents processed materials (e.g. pipeline liquids, used oil, etc.), Proponents will notify appropriate federal and state agencies.

Proponents will provide copies of release reports, required by federal or state agencies, to any jurisdictional land management agency.

Spill Management – Contractor Responsibilities

Contractors will comply with spill prevention, control, and containment procedures set forth below, and in Scopes of Work for all work associated with execution of their contract.

Contractors will ensure that their personnel and subcontractors are aware of spill prevention and containment responsibilities.

Contractors will develop lists of all emergency contacts within Contractor's and subcontractors' organizations, and descriptions of emergency response equipment that will be provided by Contractors.

Contractors will have copies of Material Safety Data Sheets (MSDS) for each chemical to be used during their projects. They will be available for review, if requested by Proponents or regulatory entities.

Spill Prevention – Contractor Responsibilities

Contractors will install lined, secondary containment, impervious to materials being stored, around liquids materials handling and storage areas to prevent spilled materials from reaching waters of the state. Areas that require containment structures include:

- Liquid and hazardous waste drum storage areas,
- Bulk storage tanks,
- Tanker trucks if parked at one location for more than two days, and
- Liquids handling and operations areas.

Proponents and Contractors will structure operations in a manner that reduces risk of spills or accidental exposure of fuels or hazardous materials to waterbodies or wetlands. Proponents and their contractors must, at a minimum, ensure the following:

- All employees handling fuels and other hazardous materials are properly trained;

- All equipment is in good operating order and inspected on a regular basis;
- Trucks transporting fuel to on-site equipment travel only on approved access roads;
- All equipment is parked overnight and/or fueled at least 500 feet from a water supply well or spring, a waterbody, or a wetland boundary. These activities can occur closer only if EI concludes, in advance, no reasonable alternative and Proponents and their Contractors have taken appropriate steps to prevent spills and provide for prompt cleanup, if necessary.
- Specifically, in certain instances, refueling or fuel storage may be unavoidable due to site specific conditions or unique construction requirements (e.g. continuously operating pumps). The following precautions will be taken within 500 feet of water supply wells or springs, waterbodies, or wetland boundaries:

    - Adequate amounts of absorbent materials and containment booms must be kept on hand by each crew to enable rapid cleanup of any spill that may occur;
    - Fuel and lubricating oils may not be stored in wetlands or waterbodies;
    - Secondary containment structures must be lined with suitable plastic sheeting, provide a containment volume of at least 150 percent of the storage vessel, and allow for at least one foot of freeboard; and
    - Provide for adequate lighting of locations and activities.

- Hazardous materials are not stored within 500 feet of water supply wells or springs, waterbodies, or wetland boundaries without prior approval of applicable governmental authorities.
- Concrete coating activities are not performed within 500 feet of water supply wells or springs, waterbodies, or wetland boundaries, unless within an existing industrial site designated for such uses.
- Adequate amounts of absorbent materials and containment booms will be kept on crew to enable rapid cleanup of any spill that may occur.
- Secondary containment structures will be lined with suitable plastic sheeting and provide containment volume of at least 150 percent of storage vessels, and allow at least one foot of freeboard.
- Adequate lighting will be provided for all locations and activities.

Contractors will install drip pans or other suitable containment devices to collect all fluids when performing on-site maintenance. All waste fluids will be removed from work sites by Contractors and disposed of properly.

Contractors will inspect equipment for integrity, including but not limited to, valves, hoses, and fittings. Contractors will monitor all loading and unloading operations of chemicals and fuels to ensure proper response and to prevent spills. Contractors' personnel will inspect equipment prior to each use.

Spill Response – Contractor Responsibilities

Contractors will provide immediate notice to Proponents' Authorized Representatives in the event of a spill, or other emergency. All spills occurring on land or in waterbodies (wet or dry) or wetlands, regardless of quantity will be cleaned up immediately.

If releases or spills occur, Contractors will stop operations and take immediate measures to control their release and prevent dispersal of spilled materials. For spills to land, Contractors will initiate cleanup of affected areas by removing the soil and placing it into new or reconditioned DOT approved drums, or other suitable containers, as determined appropriate by Proponents. Contractors will be deemed the generator of wastes resulting from spills. Contractors will excavate and remediate areas of spilled material. For spills that enter water, Contractors will contain spills and remove spilled material using pumps or absorbent materials.

With the exception of spills/releases that involve Proponent processed materials, Contractors will be responsible for making necessary notifications to the appropriate federal agencies for any release or spill of hazardous substances in excess of reportable quantities, established by 40 CRF 117, 40 CFR 302, and 40 CFR 355, or releases of oil as defined by 40 CFR 110, which occurs as a result of Contractors' or their subcontractors' activities.

Contractors will be responsible for making any necessary notifications to state agencies, as per state requirements.

Contractors will be responsible for making any necessary notifications to appropriate land management agencies or landowners' whose property may be impacted by spills.

Contractors will document and record all spills. Copies of the documentation will be provided to Proponents' Authorized Representatives.

Appendix D
Hydrostatic Testing and Discharge Plan

Introduction

Once Proponents construct pipelines, they must be pressure tested in accordance with Code of Federal Regulations (CFR) Part 192 requirements, in order to be in compliance with DOT regulations. Proponents will hydrostatically test their completed pipelines using water pressurized to the appropriate level, and in accordance with specifications outlined in this plan and any additional project specific information that will be required of Proponents.

Agency Consultation

Proponents will consult with state agencies regarding state requirements for water withdrawal and discharge. Proponents will consult with agencies regarding project specific requirements.

The following Wyoming Game and Fish Department (WGFD) recommendations for discharging surface waters used for hydrostatic testing will be followed for projects using the WPCI corridors:

Hydrostatic test waters released during pipeline construction could cause alterations of stream channels, increased sediment loads and introduction of potentially toxic chemicals into drainages, thereby resulting in adverse impacts to aquatic biota. Furthermore, release of water into drainages other than the source drainage can result in the introduction of aquatic invasive species (New Zealand mud snail, European ear snail, whirling disease spores, etc.). Introduction of aquatic invasive species can be devastating to the ecosystems of vast basins in the receiving waters. To minimize impacts, direct discharge of hydrostatic test waters to streams other than the source water will be prohibited. Discharge will occur into the source drainage in a manner that does not increase erosion or alter stream channels. Discharge will occur into temporary sedimentation basins and the dewatering of the temporary sedimentation basin will be done in a manner that precludes erosion.

To prevent the spread of aquatic invasive species (AIS), the following will be required:

- If equipment has been used in a high risk infested water [a water known to contain Dreissenid mussels (zebra/quagga mussels)], the equipment must be inspected by an authorized aquatic invasive species inspector recognized by the state of Wyoming prior to its use in any Wyoming water.
- Any equipment entering the state from March through November (regardless of where it was last used), must be inspected by an authorized aquatic invasive species inspector prior to its use in any Wyoming water.
- If aquatic invasive species are found, the equipment will be decontaminated by an authorized aquatic invasive species inspector.
- Any time equipment is moved from one 4th level (8-digit Hydrological Unit Code) watershed to another within Wyoming, the following will occur:

- DRAIN: Drain all water from watercraft, gear, equipment, and tanks. Leave wet compartments open to dry.
- CLEAN: Clean all plants, mud, and debris from vehicle, tanks, watercraft, and equipment.
- DRY: Dry everything thoroughly. In Wyoming, it is recommended that drying occur for 5 days in summer (June - August); 18 days in Spring (March - May) and Fall (September - November); or 3 days in Winter (December - February) when temperatures are at or below freezing.

Uptake

Proponents will withdraw water for use during hydrostatic testing at project specific locations in the vicinity of the WPCI corridor. All surface water used in hydrostatic testing will be discharged within the same watershed (8-digit HUC) from which it is withdrawn.

Applications for withdrawal of hydrostatic test water will identify the following:

- Location (legal description and relation to closest pipeline milepost)
- Source (river, water body or well)
- County
- Amount withdrawn
- Sensitive fish species present in source, if any
- Known water quality issues (i.e., 303d listed waters or other pollutants present)
- Locations of potable water intakes within three miles of withdrawal site.

Surface water intakes will be set in areas of flowing water to avoid sedimentation and the rate of extraction will assure continued flow in surface water sources. Up to 2,500 gallons per minute (5.6 cfs) or no more than 10 percent of a waterbody's base flow will be withdrawn for testing purposes. Water will be drawn out with low pressure pumps, pumping into the suction side of a high pressure pump that moves water into pipelines. All pumps will be set in fuel/oil containment areas (see Appendix C).

In the instances where hydrostatic test waters are located at some distance from the construction ROW, Proponents will lay temporary pipelines to convey water from their source to hydrostatic test areas. There will also be instances where temporary hard piping is required to move water to Proponents' hydrostatic test locations. All temporary hard piping will be laid on the ground surface, unless regulatory or landowner requirements prohibit it.

Proponents will be aware and considerate of the concern that appropriation of groundwater could cause detrimental effects to areas with limited water resources. Proponents applying for temporary use of water rights for water sources will only utilize water sources that are authorized and approved by the Wyoming State Engineer's Office. Proponents will comply with all limitations or conditions on withdrawal imposed by the agencies. Any additional restrictions issued by appropriate federal, state, or local jurisdictions, regarding water withdrawal activities, will be observed by Proponents.

Discharge

Hydrostatic Testing Water Discharge Locations

Proponents will test their pipelines in as many sections as necessitated by elevation changes, watershed boundaries, and water source availability. Locations of water sources, watershed boundaries, and elevations changes will be used to locate manifolds for water uptake and discharge.

Moving water back across elevation changes following testing is only accomplished by using high pressure air. Compressor cannot efficiently maintain pressures required to move test water over large elevation changes and long distances. Further, high pressure air has a tendency to become entrained within discharge water, creating unpredictable and unsafe conditions at discharge locations. In the event that situations such as this arise, proponents will be permitted to use surface water from outside of the HUC-8 watershed in which they are located, for testing purposes, if it will mitigate dangers such as those previously described. Proponents will however have to return test water to the HUC-8 from which it was withdrawn for discharge.

Treatment

Proponents will discharge hydrostatic test water to open ground. It may be possible at some discharge points for hydrostatic test water to migrate to nearby surface waterbodies, depending on the volume of water discharged and proximity of the surface water body source. When test water is obtained from potable water sources, or surface waters confirmed as not containing AIS and/or pathogens, AIS and pathogens will not be a concern for discharge, so only erosion and sedimentation controls will be employed. If surface water is used for testing that is either confirmed as containing AIS or is unknown as containing AIS, Proponents will employ measures to prevent their discharge and subsequent migration to other waterbodies.

Treatment methods used to prevent introduction or spread of AIS will be dependent upon the best available science at the time Proponents are developing their projects, which will be directed by WGFD, or other appropriate regulatory entities. Potential impacts associated with AIS treatment tools (e.g. biocide) will be determined prior to their selection and their effects will be mitigated to the greatest extent possible.

Discharge Permits and Monitoring

Typically, hydrostatic test water will pick up some iron oxide (rust) from new pipelines, depending on the total time water remains in pipelines. Quantities are likely to be small, but may give discharge water a slightly red color. Test water may also pick up sand or dirt left over from installation.

Proponents will discharge hydrostatic test water in a manner that precludes erosion. If a discharge point is less than 0.5 miles from a perennial stream and/or flow is more than 0.5 cfs, Proponents will discharge test water into a temporary sediment basin, or other approved structure to minimize erosion and control sedimentation. Any contaminants in discharge water

will likely below regulatory levels, however, test water will be collected and tested at a certified water testing laboratory. To minimize erosion concerns, discharge locations will be nearly level, or gently rolling, vegetated upland areas. Sites with restrictive drainage features (e.g. bedrock) will be avoided.

WDEQ authorizes hydrostatic testing of pipes under their General Permit to Discharge Wastewater. General Permits for Temporary Discharges require the following:

- Discharged water must be relatively uncontaminated and must not have the potential to contribute to non-conventional or toxic pollutant loadings to receiving waters;
- No trans-basin transfer of surface water will be allowed, in order to prevent spreading of AIS;
- Discharges must be of short duration, lasting no longer than one year.

Proponents will submit a Notice of Intent (NOI) of any anticipated discharge at least 30 days in advance of their proposed activity. NOIs are reviewed by WDEQ and a written response (facility certification form) will be provided, indicating that projects are covered under a General Permit. Facility certifications forms list effluent limitations and monitoring requirements.

Once temporary discharge is completed, Proponents will be required to provide a Notice of Termination and water analytical results to WDEQ. WDEQ then terminates coverage, denies termination, or requests additional data.

Appendix E
Upland Erosion Control, Revegetation, and Maintenance Plan

Introduction

This Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) describes measures for minimizing erosion and enhancing revegetation. Alternative measures may be approved so long as they:

- Provide equal or better environmental protection;
- Are necessary due to a portion of this plan being infeasible or unworkable based on project specific conditions; or
- Are specifically required in writing by a federal or state land management agency for the portion of a project on their land or under their jurisdiction.

Supervision and Inspection

Environmental Inspection

- Proponents will participate in a third party compliance monitoring program for federal and non-federal land along the length of their projects;
- EIs will have peer status with all other activity inspectors; and
- EIs will have authority to stop activities that violate environmental conditions of the ROW agreement or project specific approval documents, federal and state environmental permit conditions, or landowner requirements; and to order appropriate corrective action.

Responsibilities of Environmental Inspectors

At a minimum, EIs will be responsible for the following:

- Ensuring compliance with requirements of this Plan, environmental conditions of project authorizations, other environmental permits and approvals, and environmental requirements in landowner easement agreements;
- Identifying, documenting, and overseeing corrective actions, as necessary, to bring an activity back into compliance;
- Verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;
- Verifying the location of signs and highly visible flagging marking boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along construction work areas;
- Identifying erosion and sediment control and soil stabilization needs in all areas;
- Ensuring that locations of dewatering structures and slope breakers will not direct water onto known cultural resource sites or locations of sensitive species;

- Verifying that trench dewatering activities do not result in deposition of sand, silt, and/or sediment near points of discharge into wetlands or waterbodies. If such deposition occurs, dewatering activities will be stopped and the design of discharge changed to prevent reoccurrence;
- Ensuring that subsoil and topsoil are tested in agricultural areas to measure compaction and determine need for corrective action;
- Advising Chief Construction Inspectors when conditions (e.g. wet weather) make it advisable to restrict construction activities to avoid excessive rutting;
- Ensuring restoration of contours and topsoil;
- Verifying that soils imported for agricultural or residential use have been certified as free of noxious weeds and soil pests, unless otherwise approved by private landowners;
- Determining need for and ensuring that erosion controls are properly installed and maintained, as necessary, to prevent sediment flow into wetlands, waterbodies, sensitive areas, and onto roads;
- Inspecting and ensuring the maintenance of temporary erosion control measures, at least:

    - On a daily basis in areas of active construction or equipment operation;
    - On a weekly basis in areas with no construction or equipment operation; and
    - Within 24 hours of each 0.5 inch of rainfall;

- Ensuring repair of all ineffective temporary erosion control measures within 24 hours of identification;
- Keeping records of compliance with environmental conditions in project authorizations, and mitigation measures during active construction and restoration; and
- Identifying areas that will be given special attention to ensure stabilization and restoration after construction phases.

Preconstruction Planning

Proponents will do the following before construction activities commence:

Construction Work Areas

Identify all construction work areas that will be needed for safe construction and ensuring that appropriate cultural and biological resource surveys have been completed.

Grazing Deferment

Develop grazing deferment plans with willing landowners, grazing permittees, and land management agencies to minimize grazing disturbance of revegetation efforts.

Road Crossings and Access Points

Develop plans for safe and accessible conditions at all roadway crossings and access points during construction and restoration activities.

Disposal Planning

Determine methods and locations for disposal of construction debris consistent with the requirements of Appendix C.

Agency Coordination

Proponents will coordinate with appropriate federal, state, and local agencies, as outlined in this Plan.

- Obtain written recommendations from local conservation authorities or land management agencies regarding permanent erosion control and revegetation specifications.
- Develop specific procedures in coordination with appropriate agencies to prevent introduction and/or spread of invasive or noxious plants and soil pests that result from construction and restoration activities.

Stormwater Pollution Prevention Plan (SWPPP)

Make available SWPPPs that are prepared for project specific compliance with the Clean Water Act's Stormwater Program General Permit requirements.

Installation

Approved Areas of Disturbance

- Ground disturbance will be limited to construction of ROW, ETWSs, pipe storage yards, borrow and disposal areas, access roads, and other project specific approved areas. Any ground disturbing activities outside of these approved areas, except those required to comply with regulatory requirements (e.g. dewatering structures), will require approval by appropriate agencies. All construction or restoration outside of approved areas is subject to prescribed survey and mitigation requirements.
- Construction ROW width will not exceed that which is authorized by the grant. In the event that additional width is required, Proponents will make their requests through EIs, who will process them accordingly. At no time will ROW width be allowed to increase if the action is not consistent with applicable survey and mitigation requirements. Additional ROW areas will be explained in weekly and bi-weekly environmental reports.

Topsoil Segregation

Mixing topsoil with subsoil will be prohibited without approval from applicable land management agencies or private landowners. In deep soils (greater than 12 inches of topsoil), at least 12 inches of topsoil will be segregated. Where topsoil segregation is required, separation will be maintained throughout all construction activities. Segregated topsoil cannot be used for padding pipelines.

The ditch-plus-spoil-side topsoiling is the preferred method for projects. There are a number of instances where this method may not be possible (e.g. steep slopes, weed infestations, etc.). Use of alternative topsoiling methods must be specifically identified and requested in the ROW application or supported by the project proponent's environmental analysis. A description of the various topsoiling methods follows.

- Ditch-Plus-Spoil-Side: Proponents will mow the working side of the ROW, leaving topsoil in place. There will be no additional ROW required for topsoil storage. Topsoil will be stored on undisturbed topsoil. If the working side is rough, light blading will be necessary to smooth the surface for safety purposes. This method will generally preserve most root structures.
- Full-ROW: Proponents will topsoil the full ROW, with the exception of the area necessary for topsoil placement. If topsoil is deep, then additional ROW may be needed for topsoil placement. If topsoil is shallow, there will be room to use the approved ROW to store topsoil. The additional ROW will only be used for topsoil storage, and no additional surface disturbance will be required.
- Ditch-Plus-Working-Side: Proponents will mow the entire construction ROW. They will topsoil the working side and ditch portions of the ROW. Topsoil will be stored on undisturbed topsoil at the outer edge of the working side of the construction ROW. No additional ROW will be necessary for workspace.
- Full-ROW: Proponents will mow the entire construction ROW. Proponents will then topsoil the entire ROW, with the exception of where topsoil is stored. Half of the topsoil will be stored on the working side and the other half on the spoil side, and it will be stored on undisturbed ROW.

In addition to topsoil segregation methods, other topsoil mitigation measures will be implemented during construction activities. Some examples include:

- If rutting occurs but topsoil and subsoil do not mix, Proponents will rip compacted topsoil up to 12 inches deep to de-compact topsoil after construction activities are complete and prior to reseeding ROWs.
- Prior to replacing segregated topsoil, Proponents will rip or disc compacted subsoil up to 12 inches deep, prior to replacing topsoil and reseeding.
- Where topsoil is lost, due to construction activities, Proponents will be responsible for replacing topsoil from a local source.

- No more than 12 inches of topsoil will be segregated. Ample native seed base is contained in the top 12 inches of topsoil, and additional topsoil depth segregated may inhibit native seed establishment (via dilution).
- Separation of topsoil and subsoil will be maintained throughout all construction activities. Topsoil cannot be used to pad pipelines.

Irrigation

Water flow in crop irrigation systems will be maintained, unless shutoff is coordinated with affected parties.

Temporary Erosion Control

Proponents will install temporary erosion controls immediately after initial disturbance of soil. Temporary erosion controls will be maintained daily, throughout construction, and reinstalled as necessary until replaced by permanent erosion controls, or restoration is complete.

- Temporary Slope Breakers (see Appendix E, Figure 1)
    - Temporary slope breakers are intended to reduce runoff velocity and diver water away from construction ROWs. They may be constructed of materials such as soil, silt fence, straw bales, or sand bags.
    - Temporary slope breakers will be installed on all disturbed areas, where necessary to avoid erosion. They must be installed on slopes greater than 5 percent where the base is less than 50 feet from waterbody, wetland, or road crossings, at the following spacing:

Slope (%)	Spacing (feet)
5 – 15	300
>15 – 30	200
>30	100

    - Outfalls from each temporary slope breaker will be directed to stable, well vegetated areas, or the Proponent will construct energy dissipating devices at the end of the slope breaker and off the ROW.
    - Outfalls of each temporary slope breaker will be located to prevent sediment discharge into wetlands, waterbodies, or other sensitive resources.

- Sediment Barriers
    - Sediment barriers will be installed, where necessary, to stop flow of sediments and prevent deposition of sediments onto sensitive resources. They may be constructed of materials such as soil, silt fence, straw bales, or sand bags.
    - At a minimum, they will be installed and maintained across entire ROWs at the base of slopes greater than 5 percent, where the base of is less than 50 feet from waterbody, wetland, or road crossings, until revegetation is successful as defined

in this Plan. Adequate room will be maintained between the base of slopes and sediment barriers to accommodate ponding water and sediment deposition.
    - Sediment barriers will be installed along edges of wetlands or waterbodies to prevent sediment flow from entering these resources.

- Mulch
    - Mulch will be applied on all slopes (except in actively cultivated cropland) concurrent with or immediately after seeding. Mulch will be spread uniformly over seeded areas to cover at least 75 percent of the surface at a rate of up to 2 tons/acre, unless land management agencies or private landowners approve otherwise.
    - Mulch will consist of weed free straw or hay, wood fiber hydromulch, erosion control fabric, or a functional equivalent.
    - Mulch will be used before seeding if:

        - Final grading and installation of permanent erosion control measures will not be completed with 20 days of construction activities concluding; or
        - Construction or restoration activity is interrupted for extended periods.

    - If mulching is used before seeding, application rates will be increased to 3 tons/acre.
    - If wood chips are used as mulch, not more than 1 ton/acre will be used and the equivalent of 11 lbs/acre available nitrogen (at least 50 percent of which is slow release) will be added.
    - Mulch will be adequately anchored to minimize loss due to wind and water.
    - Liquid mulch binders will not be used within 100 feet of wetlands or waterbodies; manufacturer use rates will be followed.
    - Erosion control fabric will be installed on wetland and waterbody banks at the time of final contouring. Erosion control fabric will be anchored with staples or other appropriate devices.

Restoration

Cleanup

- Cleanup operations will commence immediately following backfill operations. Final grading, topsoil replacement, and installation of permanent erosion control structures will be completed with 20 days after backfilling trenches (10 days in residential areas). If weather conditions prevent compliance with these timeframes, temporary erosion control structures will be maintained until conditions allow for final measures.
- Travel lanes may be left open temporarily to allow access by construction traffic if temporary erosion control structures are installed and maintained. Travel lanes will be removed and ROWs reclaimed when access is no longer required.

- Rock excavated from trenches will only be used to backfill trenches to the top of existing bedrock profiles. Rock not returned to trenches can only be distributed in ROWs in a manner that emulates adjacent undisturbed areas. Remaining rock will be disposed of in a manner that must be approved by appropriate land management agencies or private landowners.
- Excess rock will be removed from at least the top 12 inches of soil in all actively cultivated or rotated croplands and pastures and hayfields, as well as at other areas requested by applicable land management agencies or private landowners.
- Construction ROWs will be graded to restore pre-construction contours and leave soil in proper condition for planting.
- Construction debris will be removed from all construction work areas.
- Temporary sediment barriers will be removed when replaced by permanent erosion control measures, or when revegetation is successfully established.

<u>Permanent Erosion Control Devices</u>

- Trench Breakers (see Appendix E, Figure 2)

    - Trench breakers are intended to slow the flow of subsurface water along pipeline trenches. They may be constructed of materials such as sand bags or polyurethane foam. Topsoil will not be used in trench breakers.
    - Engineers, or similarly qualified professionals, will determine the need for and spacing of trench breakers.
    - In agricultural fields, where slope breakers are not typically required, trench breakers will be installed at the same spacing as if permanent slope breakers were required.
    - At a minimum, trench breakers will be installed at the base of slopes greater than 5 percent where the base is less than 50 feet from waterbodies or wetlands.

- Permanent Slope Breakers

    - Permanent slope breakers are intended to reduce runoff velocity, divert water off of construction ROWs, and prevent sediment deposition into sensitive resources. They may be constructed of materials such as soil, sand bags, or some functional equivalent.
    - Permanent slope breakers will be constructed in all areas, except cultivated areas, using recommendations from land managing agencies or local conservation authorities. In the absence of recommendations, spacing will be the same as previously described for Temporary Slope Breakers.
    - Outfalls from permanent slope breakers will be directed to stable, well vegetated areas, or energy dissipating devices will be constructed at the end of the slope breaker and off the ROW.
    - Outfalls of permanent slope breakers will be positioned to prevent sediment discharge into wetlands, waterbodies, or other sensitive resources.

- Soil Compaction Mitigation

    - Topsoil and subsoil will be tested for compaction at regular intervals in agricultural areas disturbed by construction activities, using penetrometers or similar devices. ROW soils will be compared to adjacent, undisturbed soils to determine mitigation needs.
    - Severely compacted agricultural areas will be plowed with deep tillage implements. In areas where topsoil is segregated, subsoil will be plowed prior to replacing topsoil.

- Revegetation

    - General

        - Proponents will be responsible for ensuring successful revegetation of soils disturbed by project related activities.

    - Soil Additives

        - Fertilizer and add soil pH modifiers will be used in accordance with written recommendations obtained from land management agencies, local conservation authorities, or private landowners. Recommended soil pH modifier and fertilizer will be incorporated into the top 2 inches of soil immediately after application.

    - Seeding Requirements – Seed mix recommendations are provided in Appendix F of this POD

        - Seedbeds in disturbed areas will be prepared to a depth of 3 to 4 inches using appropriate equipment to provide firm seedbeds. When hydroseeding will be used, seedbeds will be scarified to facilitate lodging and germination.
        - Disturbed areas will be seeded in accordance with written recommendations in Appendix F, or as prescribed by land management agencies or private landowners. Cultivated croplands will only be seeded if requested by landowners.
        - Seeding operations will be performed within species specific seeding dates. If timing does not allow for immediate seeding, temporary erosion control measures will be maintained until the beginning of appropriate seeding windows.
        - Seeding rates will be based on Pure Live Seed and seed will be used within 12 months of testing.

- Legume seed will be treated with a species specific inoculant in accordance with manufacturer's recommendations for the appropriate seeding method.
- Seed drills, equipped with cultipackers will be used where possible for seed application. Broadcast or hydroseeding may be used, if necessary, at double the recommended seeding rates. If broadcasters are used, seedbeds will be firmed with cultipackers or imprinters after seeding. If site conditions limit the effectiveness of cultipackers and imprinters (e.g. rocky soil), alternative methods may be used to cover seed (e.g. chain drags).

o Off-Road Vehicle Control

- Measures will be installed and maintained to control unauthorized vehicle access to ROWs, as prescribed by land management agencies or private landowners. These measures may include:

  - Signs;
  - Fences with locking gates;
  - Timber barriers, pipe barriers, or boulder barriers across ROWs; and
  - Trees or shrubs across ROWs.

o Post-Construction Activities

- Proponents will cooperate with resource agencies and private landowners to provide protections that minimize disturbance of revegetation efforts, which may include the following:

  - Leaving ROW surfaces in roughened condition;
  - Including native, low palatable plant species in seeding mixes, such as sagebrush or western yarrow;
  - Negotiating with allotment permittees and agencies to limit grazing by ungulates in ROWs, by using options such as herding, salting, and fencing; or
  - Negotiating with allotment permittees and agencies to defer grazing, if appropriate.

o Monitoring and Maintenance

- All disturbed areas will be inspected after the first and second growing seasons to determine success of revegetation.
- Revegetation in non-agricultural areas will be considered successful if, upon visual survey, density and cover of non-nuisance vegetation are

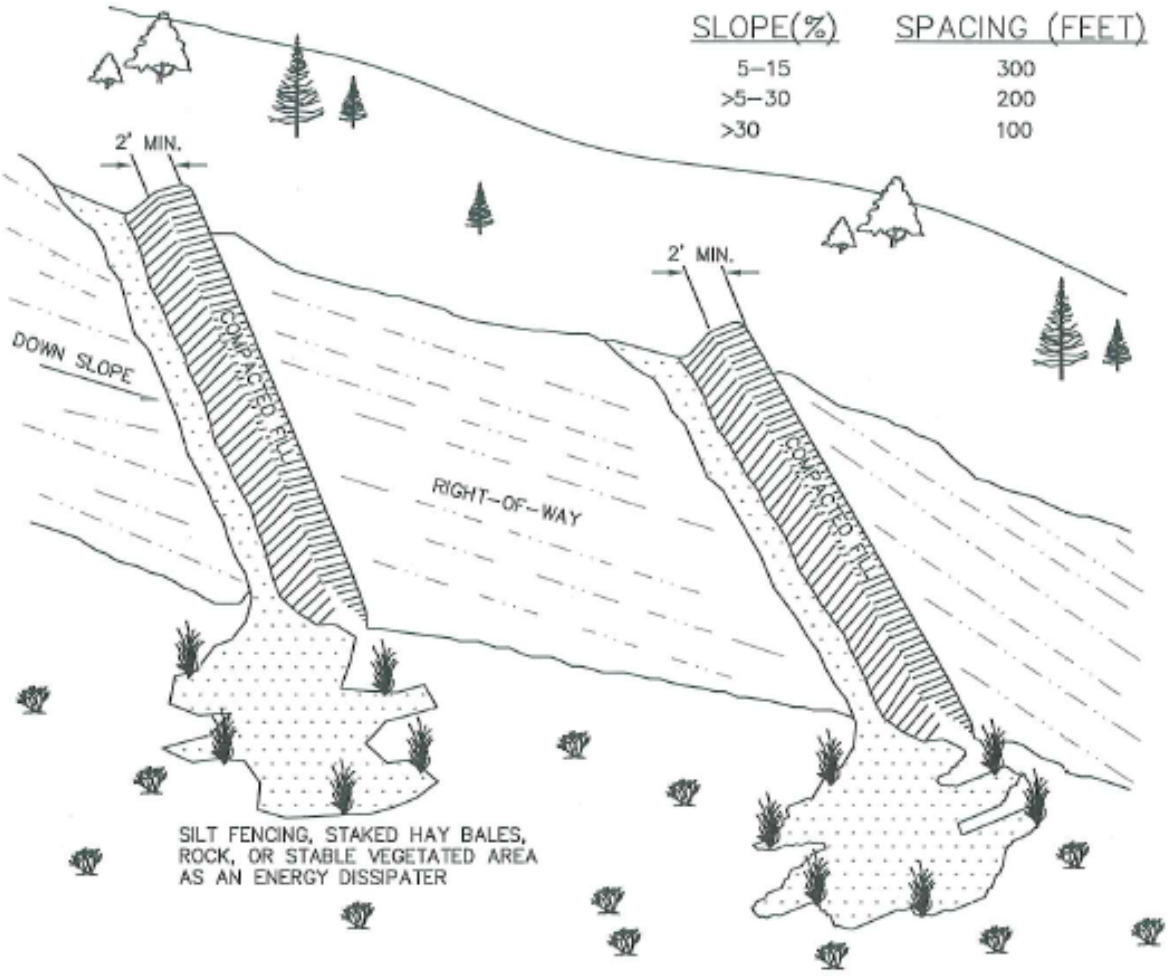
similar in disturbed and adjacent undisturbed lands. In agricultural areas, revegetation will be considered successful if crop yields are similar in disturbed and adjacent undisturbed lands. In Sage Grouse Core Areas, revegetation will be considered successful if species composition, density, and cover meet the requirements established in Executive Order 2011-5, or applicable Executive Orders that may follow, and land management agency requirements.

- Proponents will continue revegetation efforts until appropriate vegetation is successfully established.
- Problems with drainage and irrigation systems that result from pipeline construction will be monitored and corrected.
- Routine vegetation maintenance will not be done more frequently than every 3 years. However, to facilitate routine pipeline corrosion and leak surveys, corridors not exceeding 10 feet in width, centered on pipelines, may be annually maintained in a native, herbaceous state.
- Unauthorized off-road vehicle access will be controlled throughout the life of pipelines.

o Reporting

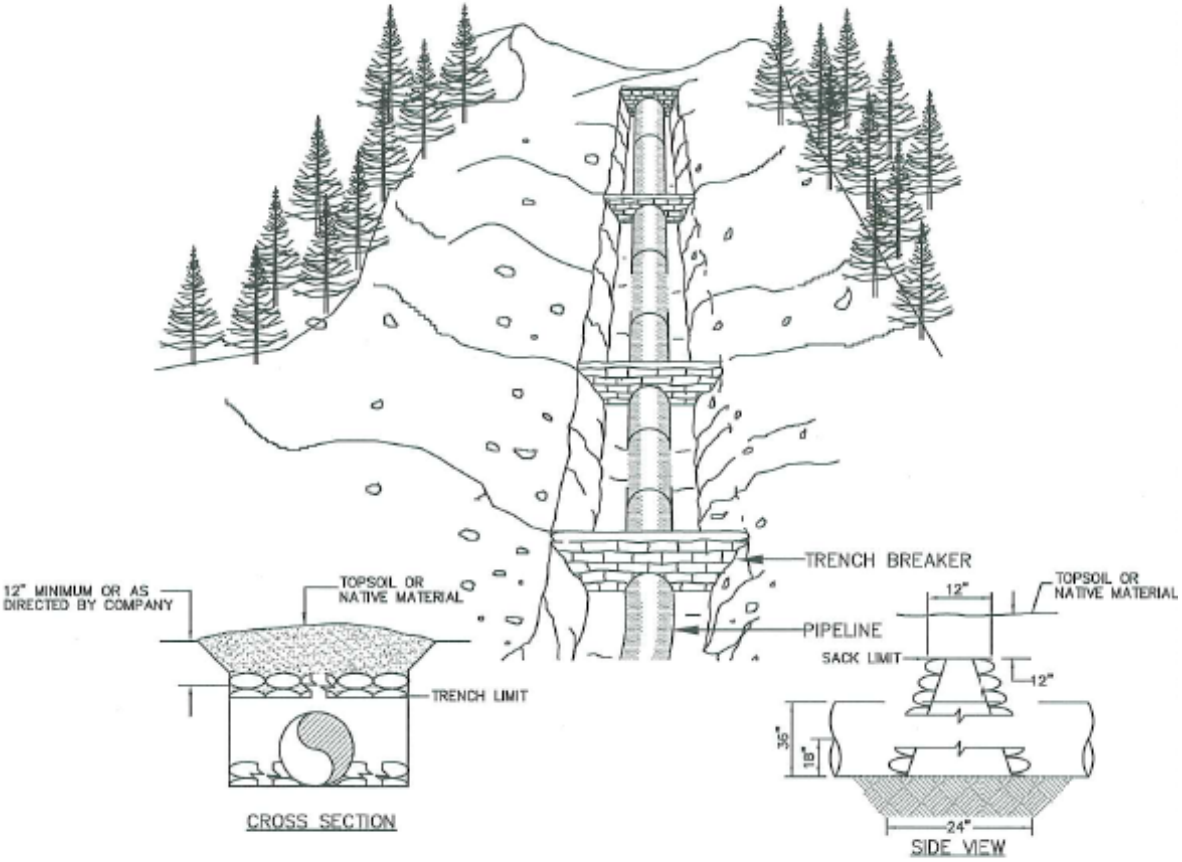
- Proponents will maintain records that identify the following, by project specific milepost:

    - Method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used;
    - Acreage treated;
    - Dates of backfilling and seeding;
    - Names of landowners that request special seed treatment and a description of follow-up actions; and
    - Problem areas, and how they are addressed.



Wyoming Pipeline Corridor Initiative
Appendix E
Figure 1
Temporary Slope Breakers

Wyoming
Pipeline Authority



Wyoming Pipeline Corridor Initiative
Appendix E
Figure 2
Trench Breakers

Wyoming Pipeline Authority

Appendix F
Upland Restoration and Revegetation Plan

Introduction

This Restoration and Revegetation Plan (Plan) is specific to dominant ecological sites that will be encountered within the WPCI. Measures and methods in this plan will be applicable to all Proponents as they construct and operate within the WPCI. This Plan utilizes methods developed previously for pipeline projects that were approved within Wyoming. Proponents may adapt or update their methods using established and/or published protocols.

Purpose

This plan describes the measures and methods that should be implemented by Proponents to mitigate impacts to upland habitats that result from pipeline construction, within the WPCI. Riparian and wetland restoration will be described in Appendix G, in this POD.

The Plan is applicable to the ROW, ETWS, and sections of access roads that will be restored. Revegetation criteria standards are presented to judge plant establishment success.

Goals and Objectives

Short- and long-term restoration and revegetation goals will comply with BLM, Wyoming reclamation policy (**BLM IM No. WY-2012-032:** March 27, 2012, or more recent versions if applicable). Short- and long-term restoration goals will apply to the ROWs, ETWS, and access roads

The short-term goals of pipeline project restoration are to prevent weed infestations; stabilize disturbed areas using proper soil handling techniques and native plant species; and provide conditions necessary to achieve the long-term goal. The long-term goals of pipeline construction are to facilitate eventual native plan communities and ecosystem reconstruction to maintain a safe and stable landscape, and meet the desired outcomes of applicable land use plans. These goals will be met by implementing the following 10 Reclamation Requirements:

- Manage all waste materials;
- Ensure subsurface integrity, and eliminate sources of ground and surface water contamination;
- Re-establish slope stability, surface stability, and desired topographic diversity;
- Reconstruct and stabilize water courses and drainage features;
- Maintain the biological, chemical, and physical integrity of topsoil and subsoil;
- Prepare sites for revegetation;
- Establish desired self-perpetuating native plan communities;
- Reestablish a complementary visual composition;
- Manage invasive species; and
- Develop and implement a reclamation monitoring and reporting strategy.

In addition to BLM requirements for reclamation, the Governor of Wyoming has established greater sage grouse Core Areas for conservation of habitats, via Executive Order (EO) (State of Wyoming, Executive Order 2011-5: June 2, 2011). Proponents will comply with the directives set forth in the EO for all activities within Core Areas.

Schedule

Restoration of pipeline projects will be initiated once trench closure is finalized in construction segments. Restoration will include cleaning up, backfilling, grading, topsoiling, installing erosion control devices, preparing seedbeds, and establishing cover. Areas that will not be seeded within 14 days following final grading, due to seasonal limitations, slopes greater than 10 percent, erosive soils, or aesthetically sensitive areas will be seeded with sterile annual grasses or select species that will not offer competition to desirable, native plant communities. Seeding of native plants to establish permanent vegetation cover will occur during late fall to early winter to take advantage of winter and spring precipitation. Temporary plant cover will be incorporated into soils before permanent plants are seeded.

Process

ROW Clearing, Grading, and Topsoil Removal

Initial construction activities include surveying and staking construction ROWs, removal of vegetation and topsoil, and grading ROWs for safe construction passage. Dense stands of noxious and invasive weeds identified during pre-construction field surveys will be pretreated with approved herbicides before vegetation clearing begins. ROW surveying and staking will identify the width of excavation and blade work, including cut and fill locations. ROW vegetation will be removed along with topsoil and stockpiled.

Topsoil thickness will vary throughout construction ROWs, dependent upon soil type, etc. EIs will identify topsoil thickness for removal and stockpiling. Topsoil and vegetation mixtures will be stripped and stockpiled separately from subsoil stockpiles. Certified weed free erosion control blankets, straw bales, wood fiber, etc. will be used to limit erosion. Topsoil vegetation mixtures and subsoil will be replaced in proper order during backfilling and final grading operations. Topsoil vegetation mixtures will provide plant propagules to support plant re-establishment along ROWs, in addition to the seed mixtures or containerized seedlings that will be planted by Proponents.

Surface rocks, where present, will be windrowed adjacent to topsoil stockpiles. After seeding, rock will be separated from topsoil and then placed on the construction ROW in a manner that emulates adjacent undisturbed areas or OHV control if requested. Salvaged rock will be used to re-create rock outcrops and rock faces, to the extent possible. Excess rock will be removed and disposed of at approved locations.

During construction, all vehicle travel will be within approved construction ROWs and ETWSs, and on approved access roads. Cross-country vehicle travel outside of approved construction ROWs and workspaces on non-approved, existing access roads will not be allowed.

ROW, ETWS, and Access Road Restoration

Restoration of ROWs will involve backfilling the excavated trench, restoring pre-existing terrain contours, replacing stockpiled subsoil and topsoil/vegetation mixtures, installing erosion control devices, preparing seedbeds, and seeding. Appropriate seed mixes will correspond with surrounding vegetation types. In visually sensitive areas, ROW alignments will have an uneven edge by either leaving shrubs in place when clearing, or seeding/planting "clumps" of shrubs along the perimeter. ETWS restoration will follow similar steps as ROW restoration.

Access roads will be reclaimed according to BLM and landowner directions. To discourage OHV use of restored temporary access roads, the following deterrents will be used in consultation with BLM and WGFD:

- Leave the ROW surface in a roughened condition, especially within 200 feet from entryways such as roads
- Establish "keep off" signs with an explanation at entryways onto the ROW;
- Install rock barriers, earthen berms, or other barricades at existing authorized OHV routes that cross the ROW;
- Work closely with the BLM and private landowners, grazing lessees, local law enforcement personnel, and adjacent landowners to monitor and eliminate unauthorized access to the ROW; and
- Maintain, repair, or replace countermeasures during the life of the project.

Restoration will follow similar steps as ROW restoration.

Backfilling

Backfilling of subsoil materials will be required after pipelines are aligned in trenches and padded with screened subsoil, or other appropriate material. Excavated subsoil will be used to backfill trenches. Excessive subsoil will be feathered across construction ROWs, creating a roughened surface to capture precipitation, decrease erosion, and provide sites for plant establishment.

Compacted Soils

Compacted soils will typically be associated with ROW travel lanes, pipe laydown locations, and access roads. Subsoil decompaction will reduce soil bulk density. Areas that have a soil bulk density of at least 25 percent greater than adjacent non-disturbed soils will be treated. Identified locations will be decompacted to a minimum depth of 6-12 inches prior to topsoil replacement. Soil ripping will occur along contours to minimize erosion and facilitate soil-water retention to aid revegetation. ETWS and access roads will be treated the same as construction ROWs.

Terrain Contouring

Construction ROWs, ETWS, and access roads will be contoured to emulate their surrounding landscapes. Contouring will emphasize restoration of existing drainage and landform patterns, to the greatest extent possible.

Topsoil and Vegetation Mixture Replacement

Stockpiled topsoil/vegetation mixtures will be spread over construction ROWs after recontouring is completed. Topsoil and vegetation mixtures will provide seeds, vegetative propagules, and soil microbiota to facilitate plant re-establishment.

Mulch

Mulch cover will be used to minimize soil erosion, conserve soil moisture, and moderate surface temperatures to improve seed establishment success. Appropriate mulch materials will be selected dependent upon soil type, slope, etc. (see Appendix E).

Erosion Control

Erosion will be controlled via vegetation establishment, certified weed-free mulch, soil tackifiers, and water control devices. Proponents will establish a permanent plant cover as quickly as possible following construction, however, erosion control devices will be implemented in the interim to limit soil loss.

Water bars will be installed to control surface water flow in all areas, except agricultural and pasture lands. The purposes of water bars are:

- Decrease overland water velocities by reducing slope lengths;
- Remove water from disturbed areas in a controlled manner to reduce erosive power;
- Direct water into stabilized locations to minimize surface scour; and
- Maximize water infiltration in disturbed areas.

Water bars will be installed using the following spacing unless directed to vary from those criteria by land management agencies or private landowners:

Typical Water Bar Spacing	
Slope	Spacing (feet)
<5 percent	None
5 to 15 percent	300
15 to 30 percent	200
>30 percent	100

Water bars will consist of a one-foot-high berm with an upslope swale. They will gently angle downslope to divert stormwater runoff to stable, upland discharge points or energy dissipating devices. They will be reseeded consistent with construction ROWs.

Noxious and Invasive Weed Abatement

Noxious and invasive weeds reduce ROW revegetation success by competing for soil water, nutrients, space, and sunlight. Where project specific biological surveys identify noxious and/or invasive weed presence, control will occur prior to ground disturbance. Additionally, post

construction weed establishment will be controlled within project specific ROWs. The Noxious and Invasive Weed Control Plan (Appendix H) will address weed abatement specifically.

Revegetation

Vegetation types within the WPCI area are variable, based on a number of factors. . All disturbed areas will be seeded using species and seeding rates for vegetation types that correspond to adjacent undisturbed areas along the WPCI, or consistent with private landowner requirements. Seed will be obtained from commercial vendors or collected locally, whichever is most feasible. Seeds will be tested for purity and viability, and certified weed free.

The following criteria will be used for selecting appropriate seed mixes:

- Erosion control capability;
- NRCS ecological site descriptions, where available;
- Sage-grouse or other sensitive species requirements, if applicable;
- Land use;
- Seed availability;
- Wildlife habitat characteristics; and
- Livestock management requirements.

Seed Mixes

Pipelines will cross sagebrush-steppe, mountain big sagebrush, salt-desert shrub, shortgrass prairie, forested and agricultural based vegetation types. Native seed mixes will be used to restore vegetation on public lands. Forested vegetation community disturbance will be seeded as determined by appropriate land management agencies or landowners. Additionally, agricultural based private lands will be reseeded to the specifications of applicable landowners. All seed mixes on private lands will be consistent with adjacent undisturbed lands, and approved by applicable landowners.

Seeding Methods

NRCS guidelines for seeding native plants in arid and semi-arid rangelands will be followed by Proponents. The guidelines call for at least 20 – 40 pure live seeds per square foot for drilled seed, and double that for broadcast seeding.

The primary goals of all seeding methods will be to place seed in direct contact with soil at average depths of 0.5-inch, but not greater than 1-inch, cover seed with soil, and firm surrounding soil to eliminate air pockets. Some methods of seeding are more effective than others; type of terrain and slope can dictate seeding methods. All disturbed areas will be seeded, with the exception of exposed rock faces.

Drill seeding will be the preferred seeding methods for Proponents, as it places seed at uniform depths. Seed drills are limited to use on slopes less than 15 percent, in most instances.

In areas where slopes do not allow drilling seed, broadcast seeding will be used. Broadcast seeding will be followed by harrowing to cover the seed with soil. Broadcast seeding may use hand operated, cyclone type seeders; mechanical, broadcast seeders attached to imprinting devices; or specially designed blowers (if applicable and as approved by land management agency or landowner).

Hydroseeding and hydromulching use water with a slurry of seed, mulch, and tackifier. This is not an ideal seeding method. However, for steep slopes that do not allow equipment access, this method may be used.

Seeding and Transplanting Timing

Seeds must be planted at the correct times. Proponents will follow applicable seeding guidelines and land management agency reclamation requirements to maximize reclamation success.

Soil Amendments and Weed Control

Soil amendments will consist of fertilizers, mulch, tackifying agents, or soil stabilizing emulsions. Ideally Proponents will not apply fertilizers, as they may encourage weed growth, but they may become necessary in site specific situations. Mycorrhizal fungi will be used to inoculate soils in order to aid shrub establishment. Application of mycorrhizal propagules will be in accordance with manufacturers' recommendations.

Erodible Soils Restoration Treatment

Erodible soils may occur within the WPCI, and may require additional restorative inputs to minimize erosion. If these conditions are discovered in project specific surveys, the restoration objective will be to rapidly stabilize the soils with erosion control measures, including vegetative cover. Erosion control measures will include one or more of the following:

- Sterile annual grasses (6 – 8 pounds pure live seed per acre);
- Certified weed free straw bales or wattles;
- Fiber mats on highly erosive surfaces and steep slopes,;
- Silt fencing;
- Water bars;
- Soil tackifier; and/or
- Wetting compounds.

Appropriate erosion control measures will be implemented immediately after trench closure.

Livestock Grazing Control

Pipeline projects will traverse livestock grazing allotments on BLM land. Succulent grass and forb growth could attract livestock. Excessive grazing may cause plant establishment efforts to fail. The following management practices for livestock grazing will be implemented.

- Leave the ROW surface in a roughened condition.
- Include low palatable plant species in the seed mix such as sagebrush and western yarrow.
- Negotiate with allotment permittees the need to limit livestock grazing in the ROW by implementing one or more of the following in areas where grazing becomes problematic: herding or placing salt licks and/or protein blocks one mile from the ROW, deferring grazing for three years, closing pastures, utilizing seasonal deferments, fencing, and/or reducing stocking preference. The pipeline proponent may compensate permittees if reduced stocking preference or pasture closures occur.

Monitoring and Maintenance

The purpose of post restoration monitoring is to evaluate long-term soil stability, vegetative cover and density, habitat quality, and noxious and invasive weed densities. Proponents will monitor restoration success for a minimum of 5 years, or consistent with requirements of applicable land management agencies.

The primary requirements of monitoring will include the following:

- Assess the effectiveness of temporary and permanent erosion control structures to ensure stability of ROWs and ETWS, and to ensure that runoff is naturally controlled with no accelerated erosion or washouts. ROW monitoring for substantial and/or new erosion, or third party damage, will be completed by Proponents' aerial surveillance and will be completed throughout the life of their project.
- Monitor and assess, through quantitative analysis, the success of reseeding and transplanting efforts. Vegetation sample plots will be developed with appropriate land management agencies and/or private landowners, and used to measure plant density, cover, bare ground, and plant litter. Sample plots will be compared to appropriate control plots outside of the approved ROW.
- Monitor the survival of special plantings, and the extent to which the restored project are visually blends in with adjacent undisturbed areas.
- Monitor and assess weeds in accordance with the Noxious and Invasive Weed Control Plan (Appendix H). Weed colonies, which were not previously identified, will be reported to the appropriate land management agencies or landowners, and treated according to their specifications.
- Monitor and identify other situations that may hinder restoration success, and treat them appropriately.

Revegetation Performance Criteria

Upland revegetation of non-agricultural lands will generally be considered successful when vegetation within the ROW supports non-noxious/invasive plants that are similar in forb, graminoid, and woody plant cover and density to those growing on adjacent undisturbed lands. Vegetation and erosion monitoring will occur for a minimum of five years. Additional monitoring and restoration activity will occur as deemed necessary by appropriate land management

agencies and/or landowners. Determination of restoration success will be determined, based on Proponent monitoring data, by appropriate land management agencies and/or landowners.

Quantitative vegetative monitoring programs will document Proponents' reclamation progress in their ROW. Appropriate land management agencies and/or landowners will participate in selection of monitoring and control plots.

Revegetation will be considered successful when ROW herbaceous and woody plant cover is 80 percent of herbaceous and woody plant cover in control plots, unless more rigorous project specific criteria are required. The severity of soil erosion and weed establishment will be judged in reference and control plots using respective indicators from the BLM Rangeland Health Assessment Procedures Manual. Negligible disturbance to soil, vegetation, and cultural resources will occur during sampling.

Remedial Action and Maintenance

Proponents will address erosion problems as soon possible. Additional erosion control work will be performed as necessary. Temporary erosion control structures will be removed when sites are deemed stable and restoration is determined to be successful.

Reseeding or replanting efforts will occur, as deemed necessary by appropriate land management agencies and/or landowners, when monitoring identifies a restoration failure. Noxious and invasive weed control is included in maintenance requirements, and will be performed in accordance with the Noxious Weed Control Plan (Appendix H).

Reporting

Proponents will document their observations of restoration success following field inspections and provide summary reports to appropriate land management agencies, resource management agencies, and landowners. Areas that require additional restoration work will be identified by project specific mile post. Reports, including a summary of corrective actions proposed, will be submitted as soon as possible after their discovery. Areas where noxious and/or invasive weed control is necessary will be reported as well.

Appendix G
Wetland and Waterbody Construction and Mitigation Plan

Proponents will follow procedures established for the Federal Energy Regulatory Commission (FERC), which are attached below (*Wetland and Waterbody Construction and Mitigation Procedures*). Since projects within WPCI do not require oversight of FERC, Proponents will not be required to implement the "Filing" requirements described in the procedures manual. Additionally, in instances where state or local regulations are more stringent than those described in the attached manual, Proponents will be required to adhere to those more stringent regulatory requirements.

Federal Energy Regulatory Commission

Office of Energy Projects

May 2013

WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES

Washington, DC 20426

MAY 2013 VERSION

WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES

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WETLAND AND WATERBODY
CONSTRUCTION AND MITIGATION PROCEDURES (PROCEDURES)

I. APPLICABILITY

A. The intent of these Procedures is to assist project sponsors by identifying baseline mitigation measures for minimizing the extent and duration of project-related disturbance on wetlands and waterbodies. Project sponsors shall specify in their applications for a new FERC authorization, and in prior notice and advance notice filings, any individual measures in these Procedures they consider unnecessary, technically infeasible, or unsuitable due to local conditions and fully describe any alternative measures they would use. Project sponsors shall also explain how those alternative measures would achieve a comparable level of mitigation.

Once a project is authorized, project sponsors can request further changes as variances to the measures in these Procedures (or the applicant's approved procedures). The Director of the Office of Energy Projects (Director) will consider approval of variances upon the project sponsor's written request, if the Director agrees that a variance:

1. provides equal or better environmental protection;

2. is necessary because a portion of these Procedures is infeasible or unworkable based on project-specific conditions; or

3. is specifically required in writing by another federal, state, or Native American land management agency for the portion of the project on its land or under its jurisdiction.

Sponsors of projects planned for construction under the automatic authorization provisions in the FERC's regulations must receive written approval for any variances in advance of construction.

Project-related impacts on non-wetland areas are addressed in the staff's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan).

B. DEFINITIONS

1. "Waterbody" includes any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes:

   a. "minor waterbody" includes all waterbodies less than or equal to 10 feet wide at the water's edge at the time of crossing;

   b. "intermediate waterbody" includes all waterbodies greater than 10 feet wide but less than or equal to 100 feet wide at the water's edge at the time of crossing; and

   c. "major waterbody" includes all waterbodies greater than 100 feet wide at the water's edge at the time of crossing.

2. "Wetland" includes any area that is not in actively cultivated or rotated cropland and that satisfies the requirements of the current federal methodology for identifying and delineating wetlands.

II. PRECONSTRUCTION FILING

A. The following information must be filed with the Secretary of the FERC (Secretary) prior to the beginning of construction, for the review and written approval by the Director:

1. site-specific justifications for extra work areas that would be closer than 50 feet from a waterbody or wetland; and

2. site-specific justifications for the use of a construction right-of-way greater than 75-feet-wide in wetlands.

B. The following information must be filed with the Secretary prior to the beginning of construction. These filing requirements do not apply to projects constructed under the automatic authorization provisions in the FERC's regulations:

1. Spill Prevention and Response Procedures specified in section IV.A;

2. a schedule identifying when trenching or blasting will occur within each waterbody greater than 10 feet wide, within any designated coldwater fishery, and within any waterbody identified as habitat for federally-listed threatened or endangered species. The project sponsor will revise the schedule as necessary to provide FERC staff at least 14 days advance notice. Changes within this last 14-day period must provide for at least 48 hours advance notice;

3. plans for horizontal directional drills (HDD) under wetlands or waterbodies, specified in section V.B.6.d;

4. site-specific plans for major waterbody crossings, described in section V.B.9;

5. a wetland delineation report as described in section VI.A.1, if applicable; and

6. the hydrostatic testing information specified in section VII.B.3.

III. ENVIRONMENTAL INSPECTORS

A. At least one Environmental Inspector having knowledge of the wetland and waterbody conditions in the project area is required for each construction spread. The number and experience of Environmental Inspectors assigned to each construction spread shall be appropriate for the length of the construction spread and the number/significance of resources affected.

B. The Environmental Inspector's responsibilities are outlined in the Upland Erosion Control, Revegetation, and Maintenance Plan (Plan).

IV. PRECONSTRUCTION PLANNING

A. The project sponsor shall develop project-specific Spill Prevention and Response Procedures that meet applicable requirements of state and federal agencies. A copy must be filed with the Secretary prior to construction and made available in the field on each construction spread. This filing requirement does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

1. It shall be the responsibility of the project sponsor and its contractors to structure their operations in a manner that reduces the risk of spills or the accidental exposure of fuels or hazardous materials to waterbodies or wetlands. The project sponsor and its contractors must, at a minimum, ensure that:

a. all employees handling fuels and other hazardous materials are properly trained;

b. all equipment is in good operating order and inspected on a regular basis;

c. fuel trucks transporting fuel to on-site equipment travel only on approved access roads;

d. all equipment is parked overnight and/or fueled at least 100 feet from a waterbody or in an upland area at least 100 feet from a wetland boundary. These activities can occur closer only if the Environmental Inspector determines that there is no reasonable alternative, and the

project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;

e. hazardous materials, including chemicals, fuels, and lubricating oils, are not stored within 100 feet of a wetland, waterbody, or designated municipal watershed area, unless the location is designated for such use by an appropriate governmental authority. This applies to storage of these materials and does not apply to normal operation or use of equipment in these areas;

f. concrete coating activities are not performed within 100 feet of a wetland or waterbody boundary, unless the location is an existing industrial site designated for such use. These activities can occur closer only if the Environmental Inspector determines that there is no reasonable alternative, and the project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;

g. pumps operating within 100 feet of a waterbody or wetland boundary utilize appropriate secondary containment systems to prevent spills; and

h. bulk storage of hazardous materials, including chemicals, fuels, and lubricating oils have appropriate secondary containment systems to prevent spills.

2. The project sponsor and its contractors must structure their operations in a manner that provides for the prompt and effective cleanup of spills of fuel and other hazardous materials. At a minimum, the project sponsor and its contractors must:

a. ensure that each construction crew (including cleanup crews) has on hand sufficient supplies of absorbent and barrier materials to allow the rapid containment and recovery of spilled materials and knows the procedure for reporting spills and unanticipated discoveries of contamination;

b. ensure that each construction crew has on hand sufficient tools and material to stop leaks;

c. know the contact names and telephone numbers for all local, state, and federal agencies (including, if necessary, the U. S. Coast Guard and the National Response Center) that must be notified of a spill; and

d. follow the requirements of those agencies in cleaning up the spill, in excavating and disposing of soils or other materials contaminated by a spill, and in collecting and disposing of waste generated during spill cleanup.

B. AGENCY COORDINATION

The project sponsor must coordinate with the appropriate local, state, and federal agencies as outlined in these Procedures and in the FERC's Orders.

V. WATERBODY CROSSINGS

A. NOTIFICATION PROCEDURES AND PERMITS

1. Apply to the U.S. Army Corps of Engineers (COE), or its delegated agency, for the appropriate wetland and waterbody crossing permits.

2. Provide written notification to authorities responsible for potable surface water supply intakes located within 3 miles downstream of the crossing at least 1 week before beginning work in the waterbody, or as otherwise specified by that authority.

3. Apply for state-issued waterbody crossing permits and obtain individual or generic section 401 water quality certification or waiver.

4. Notify appropriate federal and state authorities at least 48 hours before beginning trenching or blasting within the waterbody, or as specified in applicable permits.

B. INSTALLATION

1. Time Window for Construction

Unless expressly permitted or further restricted by the appropriate federal or state agency in writing on a site-specific basis, instream work, except that required to install or remove equipment bridges, must occur during the following time windows:

a. coldwater fisheries - June 1 through September 30; and

b. coolwater and warmwater fisheries - June 1 through November 30.

2. Extra Work Areas

a. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from water's edge, except where

the adjacent upland consists of cultivated or rotated cropland or other disturbed land.

b. The project sponsor shall file with the Secretary for review and written approval by the Director, site-specific justification for each extra work area with a less than 50-foot setback from the water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. The justification must specify the conditions that will not permit a 50-foot setback and measures to ensure the waterbody is adequately protected.

c. Limit the size of extra work areas to the minimum needed to construct the waterbody crossing.

3. General Crossing Procedures

a. Comply with the COE, or its delegated agency, permit terms and conditions.

b. Construct crossings as close to perpendicular to the axis of the waterbody channel as engineering and routing conditions permit.

c. Where pipelines parallel a waterbody, maintain at least 15 feet of undisturbed vegetation between the waterbody (and any adjacent wetland) and the construction right-of-way, except where maintaining this offset will result in greater environmental impact.

d. Where waterbodies meander or have multiple channels, route the pipeline to minimize the number of waterbody crossings.

e. Maintain adequate waterbody flow rates to protect aquatic life, and prevent the interruption of existing downstream uses.

f. Waterbody buffers (e.g., extra work area setbacks, refueling restrictions) must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

g. Crossing of waterbodies when they are dry or frozen and not flowing may proceed using standard upland construction techniques in accordance with the Plan, provided that the Environmental Inspector verifies that water is unlikely to flow between initial disturbance and final stabilization of the feature. In the event of perceptible flow, the project sponsor must comply with all applicable Procedure requirements for "waterbodies" as defined in section I.B.1.

4. Spoil Pile Placement and Control

   a. All spoil from minor and intermediate waterbody crossings, and upland spoil from major waterbody crossings, must be placed in the construction right-of-way at least 10 feet from the water's edge or in additional extra work areas as described in section V.B.2.

   b. Use sediment barriers to prevent the flow of spoil or silt-laden water into any waterbody.

5. Equipment Bridges

   a. Only clearing equipment and equipment necessary for installation of equipment bridges may cross waterbodies prior to bridge installation. Limit the number of such crossings of each waterbody to one per piece of clearing equipment.

   b. Construct and maintain equipment bridges to allow unrestricted flow and to prevent soil from entering the waterbody. Examples of such bridges include:

      (1) equipment pads and culvert(s);
      (2) equipment pads or railroad car bridges without culverts;
      (3) clean rock fill and culvert(s); and
      (4) flexi-float or portable bridges.

      Additional options for equipment bridges may be utilized that achieve the performance objectives noted above. Do not use soil to construct or stabilize equipment bridges.

   c. Design and maintain each equipment bridge to withstand and pass the highest flow expected to occur while the bridge is in place. Align culverts to prevent bank erosion or streambed scour. If necessary, install energy dissipating devices downstream of the culverts.

   d. Design and maintain equipment bridges to prevent soil from entering the waterbody.

   e. Remove temporary equipment bridges as soon as practicable after permanent seeding.

   f. If there will be more than 1 month between final cleanup and the beginning of permanent seeding and reasonable alternative access to the right-of-way is available, remove temporary equipment bridges as soon as practicable after final cleanup.

g. Obtain any necessary approval from the COE, or the appropriate state agency for permanent bridges.

6. Dry-Ditch Crossing Methods

a. Unless approved otherwise by the appropriate federal or state agency, install the pipeline using one of the dry-ditch methods outlined below for crossings of waterbodies up to 30 feet wide (at the water's edge at the time of construction) that are state-designated as either coldwater or significant coolwater or warmwater fisheries, or federally-designated as critical habitat.

b. Dam and Pump

(1) The dam-and-pump method may be used without prior approval for crossings of waterbodies where pumps can adequately transfer streamflow volumes around the work area, and there are no concerns about sensitive species passage.

(2) Implementation of the dam-and-pump crossing method must meet the following performance criteria:

(i) use sufficient pumps, including on-site backup pumps, to maintain downstream flows;
(ii) construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);
(iii) screen pump intakes to minimize entrainment of fish;
(iv) prevent streambed scour at pump discharge; and
(v) continuously monitor the dam and pumps to ensure proper operation throughout the waterbody crossing.

c. Flume Crossing

The flume crossing method requires implementation of the following steps:

(1) install flume pipe after blasting (if necessary), but before any trenching;

(2) use sand bag or sand bag and plastic sheeting diversion structure or equivalent to develop an effective seal and to divert stream flow through the flume pipe (some modifications to the stream bottom may be required to achieve an effective seal);

(3) properly align flume pipe(s) to prevent bank erosion and streambed scour;

(4) do not remove flume pipe during trenching, pipelaying, or backfilling activities, or initial streambed restoration efforts; and

(5) remove all flume pipes and dams that are not also part of the equipment bridge as soon as final cleanup of the stream bed and bank is complete.

d. Horizontal Directional Drill

For each waterbody or wetland that would be crossed using the HDD method, file with the Secretary for the review and written approval by the Director, a plan that includes:

(1) site-specific construction diagrams that show the location of mud pits, pipe assembly areas, and all areas to be disturbed or cleared for construction;

(2) justification that disturbed areas are limited to the minimum needed to construct the crossing;

(3) identification of any aboveground disturbance or clearing between the HDD entry and exit workspaces during construction;

(4) a description of how an inadvertent release of drilling mud would be contained and cleaned up; and

(5) a contingency plan for crossing the waterbody or wetland in the event the HDD is unsuccessful and how the abandoned drill hole would be sealed, if necessary.

The requirement to file HDD plans does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

7. Crossings of Minor Waterbodies

Where a dry-ditch crossing is not required, minor waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

a. except for blasting and other rock breaking measures, complete instream construction activities (including trenching, pipe installation, backfill, and restoration of the streambed contours) within 24 hours.

Streambanks and unconsolidated streambeds may require additional restoration after this period;

b. limit use of equipment operating in the waterbody to that needed to construct the crossing; and

c. equipment bridges are not required at minor waterbodies that do not have a state-designated fishery classification or protected status (e.g., agricultural or intermittent drainage ditches). However, if an equipment bridge is used it must be constructed as described in section V.B.5.

8. Crossings of Intermediate Waterbodies

Where a dry-ditch crossing is not required, intermediate waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

a. complete instream construction activities (not including blasting and other rock breaking measures) within 48 hours, unless site-specific conditions make completion within 48 hours infeasible;

b. limit use of equipment operating in the waterbody to that needed to construct the crossing; and

c. all other construction equipment must cross on an equipment bridge as specified in section V.B.5.

9. Crossings of Major Waterbodies

Before construction, the project sponsor shall file with the Secretary for the review and written approval by the Director a detailed, site-specific construction plan and scaled drawings identifying all areas to be disturbed by construction for each major waterbody crossing (the scaled drawings are not required for any offshore portions of pipeline projects). This plan must be developed in consultation with the appropriate state and federal agencies and shall include extra work areas, spoil storage areas, sediment control structures, etc., as well as mitigation for navigational issues. The requirement to file major waterbody crossing plans does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

The Environmental Inspector may adjust the final placement of the erosion and sediment control structures in the field to maximize effectiveness.

10. Temporary Erosion and Sediment Control

Install sediment barriers (as defined in section IV.F.3.a of the Plan) immediately after initial disturbance of the waterbody or adjacent upland.

Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan; however, the following specific measures must be implemented at stream crossings:

a. install sediment barriers across the entire construction right-of-way at all waterbody crossings, where necessary to prevent the flow of sediments into the waterbody. Removable sediment barriers (or driveable berms) must be installed across the travel lane. These removable sediment barriers can be removed during the construction day, but must be re-installed after construction has stopped for the day and/or when heavy precipitation is imminent;

b. where waterbodies are adjacent to the construction right-of-way and the right-of-way slopes toward the waterbody, install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil within the construction right-of-way and prevent sediment flow into the waterbody; and

c. use temporary trench plugs at all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody.

11. Trench Dewatering

Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in silt-laden water flowing into any waterbody. Remove the dewatering structures as soon as practicable after the completion of dewatering activities.

C. RESTORATION

1. Use clean gravel or native cobbles for the upper 1 foot of trench backfill in all waterbodies that contain coldwater fisheries.

2. For open-cut crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing instream construction activities. For dry-ditch crossings, complete streambed and bank stabilization before returning flow to the waterbody channel.

3. Return all waterbody banks to preconstruction contours or to a stable angle of repose as approved by the Environmental Inspector.

4. Install erosion control fabric or a functional equivalent on waterbody banks at the time of final bank recontouring. Do not use synthetic monofilament

mesh/netted erosion control materials in areas designated as sensitive wildlife habitat unless the product is specifically designed to minimize harm to wildlife. Anchor erosion control fabric with staples or other appropriate devices.

5. Application of riprap for bank stabilization must comply with COE, or its delegated agency, permit terms and conditions.

6. Unless otherwise specified by state permit, limit the use of riprap to areas where flow conditions preclude effective vegetative stabilization techniques such as seeding and erosion control fabric.

7. Revegetate disturbed riparian areas with native species of conservation grasses, legumes, and woody species, similar in density to adjacent undisturbed lands.

8. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5 percent that are less than 50 feet from the waterbody, or as needed to prevent sediment transport into the waterbody. In addition, install sediment barriers as outlined in the Plan.

   In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the waterbody.

9. Sections V.C.3 through V.C.7 above also apply to those perennial or intermittent streams not flowing at the time of construction.

D. POST-CONSTRUCTION MAINTENANCE

1. Limit routine vegetation mowing or clearing adjacent to waterbodies to allow a riparian strip at least 25 feet wide, as measured from the waterbody's mean high water mark, to permanently revegetate with native plant species across the entire construction right-of-way. However, to facilitate periodic corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In addition, trees that are located within 15 feet of the pipeline that have roots that could compromise the integrity of the pipeline coating may be cut and removed from the permanent right-of-way. Do not conduct any routine vegetation mowing or clearing in riparian areas that are between HDD entry and exit points.

2. Do not use herbicides or pesticides in or within 100 feet of a waterbody except as allowed by the appropriate land management or state agency.

3. Time of year restrictions specified in section VII.A.5 of the Plan (April 15 – August 1 of any year) apply to routine mowing and clearing of riparian areas.

VI. WETLAND CROSSINGS

A. GENERAL

1. The project sponsor shall conduct a wetland delineation using the current federal methodology and file a wetland delineation report with the Secretary before construction. The requirement to file a wetland delineation report does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

   This report shall identify:

   a. by milepost all wetlands that would be affected;

   b. the National Wetlands Inventory (NWI) classification for each wetland;

   c. the crossing length of each wetland in feet; and

   d. the area of permanent and temporary disturbance that would occur in each wetland by NWI classification type.

   The requirements outlined in this section do not apply to wetlands in actively cultivated or rotated cropland. Standard upland protective measures, including workspace and topsoiling requirements, apply to these agricultural wetlands.

2. Route the pipeline to avoid wetland areas to the maximum extent possible. If a wetland cannot be avoided or crossed by following an existing right-of-way, route the new pipeline in a manner that minimizes disturbance to wetlands. Where looping an existing pipeline, overlap the existing pipeline right-of-way with the new construction right-of-way. In addition, locate the loop line no more than 25 feet away from the existing pipeline unless site-specific constraints would adversely affect the stability of the existing pipeline.

3. Limit the width of the construction right-of-way to 75 feet or less. Prior written approval of the Director is required where topographic conditions or soil limitations require that the construction right-of-way width within the boundaries of a federally delineated wetland be expanded beyond 75 feet. Early in the planning process the project sponsor is encouraged to identify site-specific areas where excessively wide trenches could occur and/or where spoil piles could be difficult to maintain because existing soils lack adequate unconfined compressive strength.

4. Wetland boundaries and buffers must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

5. Implement the measures of sections V and VI in the event a waterbody crossing is located within or adjacent to a wetland crossing. If all measures of sections V and VI cannot be met, the project sponsor must file with the Secretary a site-specific crossing plan for review and written approval by the Director before construction. This crossing plan shall address at a minimum:

   a. spoil control;

   b. equipment bridges;

   c. restoration of waterbody banks and wetland hydrology;

   d. timing of the waterbody crossing;

   e. method of crossing; and

   f. size and location of all extra work areas.

6. Do not locate aboveground facilities in any wetland, except where the location of such facilities outside of wetlands would prohibit compliance with U.S. Department of Transportation regulations.

B. INSTALLATION

1. Extra Work Areas and Access Roads

   a. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.

   b. The project sponsor shall file with the Secretary for review and written approval by the Director, site-specific justification for each extra work area with a less than 50-foot setback from wetland boundaries, except where adjacent upland consists of cultivated or rotated cropland or other disturbed land. The justification must specify the site-specific conditions that will not permit a 50-foot setback and measures to ensure the wetland is adequately protected.

   c. The construction right-of-way may be used for access when the wetland soil is firm enough to avoid rutting or the construction right-of-way has been appropriately stabilized to avoid rutting (e.g., with timber riprap, prefabricated equipment mats, or terra mats).

      In wetlands that cannot be appropriately stabilized, all construction equipment other than that needed to install the wetland crossing shall

use access roads located in upland areas. Where access roads in upland areas do not provide reasonable access, limit all other construction equipment to one pass through the wetland using the construction right-of-way.

d. The only access roads, other than the construction right-of-way, that can be used in wetlands are those existing roads that can be used with no modifications or improvements, other than routine repair, and no impact on the wetland.

2. Crossing Procedures

a. Comply with COE, or its delegated agency, permit terms and conditions.

b. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.

c. Use "push-pull" or "float" techniques to place the pipe in the trench where water and other site conditions allow.

d. Minimize the length of time that topsoil is segregated and the trench is open. Do not trench the wetland until the pipeline is assembled and ready for lowering in.

e. Limit construction equipment operating in wetland areas to that needed to clear the construction right-of-way, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction right-of-way.

f. Cut vegetation just above ground level, leaving existing root systems in place, and remove it from the wetland for disposal.

The project sponsor can burn woody debris in wetlands, if approved by the COE and in accordance with state and local regulations, ensuring that all remaining woody debris is removed for disposal.

g. Limit pulling of tree stumps and grading activities to directly over the trenchline. Do not grade or remove stumps or root systems from the rest of the construction right-of-way in wetlands unless the Chief Inspector and Environmental Inspector determine that safety-related construction constraints require grading or the removal of tree stumps from under the working side of the construction right-of-way.

h. Segregate the top 1 foot of topsoil from the area disturbed by trenching, except in areas where standing water is present or soils are

saturated. Immediately after backfilling is complete, restore the segregated topsoil to its original location.

i. Do not use rock, soil imported from outside the wetland, tree stumps, or brush riprap to support equipment on the construction right-of-way.

j. If standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, use low-ground-weight construction equipment, or operate normal equipment on timber riprap, prefabricated equipment mats, or terra mats.

k. Remove all project-related material used to support equipment on the construction right-of-way upon completion of construction.

3. Temporary Sediment Control

Install sediment barriers (as defined in section IV.F.3.a of the Plan) immediately after initial disturbance of the wetland or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench). Except as noted below in section VI.B.3.c, maintain sediment barriers until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan.

a. Install sediment barriers across the entire construction right-of-way immediately upslope of the wetland boundary at all wetland crossings where necessary to prevent sediment flow into the wetland.

b. Where wetlands are adjacent to the construction right-of-way and the right-of-way slopes toward the wetland, install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil within the construction right-of-way and prevent sediment flow into the wetland.

c. Install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way through wetlands. Remove these sediment barriers during right-of-way cleanup.

4. Trench Dewatering

   Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in silt-laden water flowing into any wetland. Remove the dewatering structures as soon as practicable after the completion of dewatering activities.

C. RESTORATION

1. Where the pipeline trench may drain a wetland, construct trench breakers at the wetland boundaries and/or seal the trench bottom as necessary to maintain the original wetland hydrology.

2. Restore pre-construction wetland contours to maintain the original wetland hydrology.

3. For each wetland crossed, install a trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from the wetland, or as needed to prevent sediment transport into the wetland. In addition, install sediment barriers as outlined in the Plan. In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the wetland.

4. Do not use fertilizer, lime, or mulch unless required in writing by the appropriate federal or state agency.

5. Consult with the appropriate federal or state agencies to develop a project-specific wetland restoration plan. The restoration plan shall include measures for re-establishing herbaceous and/or woody species, controlling the invasion and spread of invasive species and noxious weeds (e.g., purple loosestrife and phragmites), and monitoring the success of the revegetation and weed control efforts. Provide this plan to the FERC staff upon request.

6. Until a project-specific wetland restoration plan is developed and/or implemented, temporarily revegetate the construction right-of-way with annual ryegrass at a rate of 40 pounds/acre (unless standing water is present).

7. Ensure that all disturbed areas successfully revegetate with wetland herbaceous and/or woody plant species.

8. Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after revegetation and stabilization of adjacent upland areas are judged to be successful as specified in section VII.A.4 of the Plan.

D. POST-CONSTRUCTION MAINTENANCE AND REPORTING

1. Do not conduct routine vegetation mowing or clearing over the full width of the permanent right-of-way in wetlands. However, to facilitate periodic corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In addition, trees within 15 feet of the pipeline with roots that could compromise the integrity of pipeline coating may be selectively cut and removed from the permanent right-of-way. Do not conduct any routine vegetation mowing or clearing in wetlands that are between HDD entry and exit points.

2. Do not use herbicides or pesticides in or within 100 feet of a wetland, except as allowed by the appropriate federal or state agency.

3. Time of year restrictions specified in section VII.A.5 of the Plan (April 15 – August 1 of any year) apply to routine mowing and clearing of wetland areas.

4. Monitor and record the success of wetland revegetation annually until wetland revegetation is successful.

5. Wetland revegetation shall be considered successful if all of the following criteria are satisfied:

   a. the affected wetland satisfies the current federal definition for a wetland (i.e., soils, hydrology, and vegetation);

   b. vegetation is at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction;

   c. if natural rather than active revegetation was used, the plant species composition is consistent with early successional wetland plant communities in the affected ecoregion; and

   d. invasive species and noxious weeds are absent, unless they are abundant in adjacent areas that were not disturbed by construction.

6. Within 3 years after construction, file a report with the Secretary identifying the status of the wetland revegetation efforts and documenting success as defined in section VI.D.5, above. The requirement to file wetland restoration reports with the Secretary does not apply to projects constructed under the automatic authorization, prior notice, or advance notice provisions in the FERC's regulations.

   For any wetland where revegetation is not successful at the end of 3 years after construction, develop and implement (in consultation with a

professional wetland ecologist) a remedial revegetation plan to actively revegetate wetlands. Continue revegetation efforts and file a report annually documenting progress in these wetlands until wetland revegetation is successful.

VII. HYDROSTATIC TESTING

A. NOTIFICATION PROCEDURES AND PERMITS

1. Apply for state-issued water withdrawal permits, as required.

2. Apply for National Pollutant Discharge Elimination System (NPDES) or state-issued discharge permits, as required.

3. Notify appropriate state agencies of intent to use specific sources at least 48 hours before testing activities unless they waive this requirement in writing.

B. GENERAL

1. Perform 100 percent radiographic inspection of all pipeline section welds or hydrotest the pipeline sections, before installation under waterbodies or wetlands.

2. If pumps used for hydrostatic testing are within 100 feet of any waterbody or wetland, address secondary containment and refueling of these pumps in the project's Spill Prevention and Response Procedures.

3. The project sponsor shall file with the Secretary before construction a list identifying the location of all waterbodies proposed for use as a hydrostatic test water source or discharge location. This filing requirement does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

C. INTAKE SOURCE AND RATE

1. Screen the intake hose to minimize the potential for entrainment of fish.

2. Do not use state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and/or local permitting agencies grant written permission.

3. Maintain adequate flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.

4. Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable.

D. DISCHARGE LOCATION, METHOD, AND RATE

1. Regulate discharge rate, use energy dissipation device(s), and install sediment barriers, as necessary, to prevent erosion, streambed scour, suspension of sediments, or excessive streamflow.

2. Do not discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and local permitting agencies grant written permission.

Appendix H
Noxious and Invasive Weed Control Plan

Plan Purpose

The purpose of this plan is to prescribe methods to prevent, mitigate, and control the spread of noxious and invasive weed (weed) species during and following construction of pipelines within the WPCI. Proponents will be responsible for implementing the methods described in this plan, in addition to any project specific requirements prescribed by applicable regulatory agencies. This plan is applicable to Proponents that construct pipeline in the WPCI both during construction and operations phases.

Goals and Objectives

Proponents' goals will be to prevent the spread of Weeds identified in the WPCI and avoid introduction of new weeds. Monitoring will be required to ensure the success of control measures.

Weed Inventory

Proponents will complete biological surveys of their project specific ROWs and work areas to identify Weed presence, prior to commencement of their projects. Inventories will include proposed access roads, ETWS, staging areas, contractor construction yards, aboveground facilities, and potential water sources. Data collected will include weed species and GPS locations, and will be collected using a combination of existing databases and field surveys.

Weed Management

Weeds will be treated prior to construction activities. However, it should be noted that widespread distributions of species such as cheatgrass (*Bromus tectorum*) cannot be effectively eradicated by currently available control measures. In these instances, unless new methods becomes available, exhaustive treatment activities will not be required by Proponents. Rather, Proponents' goal will be to preclude the spread of these species to areas where they do not currently exist.

Various regulatory agencies, with land management jurisdiction in the WPCI, may have different weed management requirements. Proponents will be required to follow weed management prescriptions of whichever land management agency has jurisdiction along their project. If there are overlapping jurisdictions, Proponents will be required to follow the most stringent management requirements.

Identification of Problem Areas

Prior to construction, Proponents will provide their contractors with information and training regarding weed management, weed identification, and potential impacts of weeds on agriculture, livestock, and wildlife. Contractors will be informed of the importance of preventing

the spread of weeds into uncontaminated areas and of controlling proliferation of existing weeds.

Before surface disturbance activities begin, areas of weed infestation will be identified and marked with signs. Areas of concern will include all locations where weeds need to be treated. Signs will also identify the locations of all equipment cleaning stations that will be setup along the ROW.

Preventative Measures

Prevention is the most effective approach to weed management. Proponents will assist applicable regulatory agencies with control efforts, within their approved work areas. They will comply with all agency preventative requirements and implement weed control measures in areas of concern. The following general preventive measures should be implemented to minimize the spread of both terrestrial and aquatic weeds. Additional measures, or new technologies, may be required of Proponents if they become available prior to approval of their pipelines.

General

- Proponents will conduct Employee Environmental Awareness Programs (EEAP) before surface disturbance activities begin, in order to educate personnel about environmental concerns and requirements, including weed identification, prevention, and control methods. No personnel should be allowed to work within the WPCI before completing an EEAP. Qualified EIs will conduct trainings.
- Qualified EIs or contract weed control personnel will conduct on-site biological monitoring in areas of concern before, during, and after construction.

Soil, Straw, and Mulch

Contractors will ensue that all straw or hay bales used for sediment barriers or mulch are certified weed-free and obtained from state cleared sources. If certified weed-free bales are unavailable, alternative weed-free sediment barriers will be utilized.

Cleaning Stations

To prevent transport of weed seeds, roots, or other propagules along the ROW, or other project areas, Proponents will implement an equipment cleaning program in accordance with the following guidelines.

- All contractor vehicles and equipment arriving from out of state will be cleaned prior to beginning work in the ROW or other project areas.
- All equipment and vehicles that come into contact with vegetation or disturbed soil in areas of concern for weeds will be cleaned before allowing them to proceed along the ROW or other project areas. Initial clearing and grading crews will segregate contaminated topsoil along the edge of the ROW, and mark it accordingly, so crews that

follow will not need to clean their vehicles and equipment when traveling through areas of concern, with the exception of timber removal and restoration crews.

- Proponents will develop certification programs to ensure that all vehicles and equipment have been cleaned of weeds.
- Proponents will place cleaning stations along their project in locations where they can most effectively and efficiently clean applicable vehicles and equipment.
- Cleaning of vehicles and equipment will only occur at cleaning stations. Cleaning will be carried out using high pressure equipment to remove seeds, roots, and rhizomes. Cleaning efforts will be concentrated on tracks, feet, tires, and undercarriage. If weather conditions are exceptionally dry and vehicles are mud free, compress air may be used for cleaning.
- Vehicle cabs will be cleaned and refuse capable of transporting weeds will be placed in appropriate refuse bins.

Treatment Methods

Proponents will implement weed control measures in accordance with existing regulations and jurisdictional land management agency or landowner agreements. Special attention will be given to designated noxious weeds, as eradication of all weeds will likely be beyond the controls of Proponents. Preventing the introduction or spread of other weed species will be the responsibility of Proponents.

General Methods

Within project areas, weed control during the pre-construction and construction phases will be carried out primarily using herbicide treatment methods. Herbicide treatment will consist of spot application, or broad area application, as appropriate. While herbicide application will be the primary treatment method, other methods will be implemented if they are deemed more appropriate.

Control measures may utilize one or more of the following treatment methods:

- Manual Methods –Weeds pulled by hand. If seeds are present, plants will be removed and destroyed.
- Mechanical Methods – Equipment will mow or disk weed populations. Any mowing or disking will occur prior to seed development. Subsequent seeding with prescribed restoration seed mixes will occur as soon as possible following soil disturbance to re-establish suitable vegetation cover and slow the re-invasion of weeds.
- Herbicide Application – Herbicide application will be used to remove, reduce, or contain noxious weed populations. Only herbicides approved by applicable regulatory agencies or landowners will be used. Applications will be controlled to minimize impacts on surrounding native vegetation. In areas of dense infestation, or where impacts on native species will be difficult to avoid, broader application methods may be used and a follow-up seeding program implemented.

Treatment methods will be species specific and based on area specific conditions. Proponents will coordinate with applicable resource agencies during and after construction to ensure adequate weed control.

There is potential for spreading weeds as a result of withdrawing water for project related activities, as seeds could be present in water sources. Proponents will treat weeds within 200 feet of project water sources to minimize the threat of this vector of weed transport. Only herbicides, or other methods, approved for use in close proximity to water sources will be permitted.

Treatment Schedule

Most perennial and biennial species are best controlled by applying herbicide twice per year: once during spring and once during the period from early August to early September. Late season treatments need to be timed so that living leaf and stem growth is still present, but after hot summer temperatures have passed.

Once Proponents have inventoried weed presence within their work areas, they will be required to establish an appropriate treatment schedule.

Treatment Approach during Restoration and Revegetation

Successful restoration and revegetation will be vital to the overall success of Proponents' weed control programs. Proponents will have to establish protocols that minimize weeds, while allowing for the success of project area restoration. Proponents will consult will applicable resource agencies to develop the most efficient process for success.

Monitoring

Proponents will develop weed monitoring programs to ensure their project areas are progressing toward appropriate vegetative cover and diversity, and that weed populations are appropriately managed. Ideally Proponents would eradicate weed populations in their work areas. However, more realistically, Proponents will be required to prevent the introduction of new weed populations and the spreading of existing weed populations.

Monitoring During Construction

The majority of weed monitoring will occur before and after construction activities. Initial monitoring will occur in conjunction with pre-construction weed treatments to assure populations are addressed. Additionally, EIs will monitor clearing, grading, and soil segregation activities to ensure proper weed treatment. EIs will monitor project areas throughout the construction phase of projects to document weed presence or spread, and notify weed control staff to address populations, as appropriate.

Monitoring After Construction

Proponents will begin their post-construction monitoring in the first growing season after construction activities have been completed. They will, at a minimum, monitor their sites in spring and late summer. In addition, equipment cleaning stations will be monitored to ensure they do not become infested. Result of monitoring will dictate additional treatment/control methods.

Below is an example of the minimum requirements for Proponents' monitoring schedules:

- Identify and evaluate weed conditions in the spring and late summer, paying particular attention to noxious weeds;
- Identify and evaluate locations, by milepost and GPS point, where additional treatment may be required and what will likely be the most appropriate treatment method;
- Disclose any treatment methods that are implemented;
- Assess reseeding efforts, their success, and competition with weed populations; and
- Identify areas where reseeding may be beneficial.

The above monitoring observations will be summarized in annual reports, which will be provided to applicable resource agencies. Reports will contain a minimum of the following:

- An assessment of the condition of known weed infestations;
- Identification of areas that require remedial action;
- Recommendations and schedules for additional treatment methods;
- Monitoring forms; and
- Photographs to further document any reported issues.

Herbicide Application and Handling

Herbicide application will be conducted according to EPA standards, and information gathered from various land management agencies and weed management districts located in project areas. Prior to applying herbicides, Proponents' weed management staff will be licensed and will obtain all applicable permits. No herbicide application will occur without coordination with, and concurrence of, applicable regulatory agencies or landowners.

All herbicide applications will follow EPA label instructions. All OSHA requirements will be followed when applying herbicides. Application will be suspended if any of the following conditions arise:

- Wind velocity exceeds 6 mph during application of liquids or 15 mph during application of granular herbicides;
- Snow or ice cover foliage; or
- Precipitation is occurring, or imminent.

Vehicle mounted sprayers will be used primarily in open areas that are readily accessible by vehicles. Hand application that targets individual plants will be used to treat small or scattered weed populations. Calibration checks of equipment will be conducted at the beginning of spraying, and periodically per manufacturer recommendations, to ensure proper application rates.

Herbicides will be transported to work areas daily while being applied, with the following provisions:

- Only the quantity needed for that day will be transported;
- Concentrate will only be transported in approved containers, in a manner that prevents tipping or spilling, and in a compartment isolated from food, clothing, and safety equipment;
- Mixing will be done at a distance greater than 500 feet from any waterbody, wetland, or other sensitive area. No herbicide will be applied in these areas without written approval by applicable regulatory agencies; and
- All herbicide equipment and containers will be inspected daily for leaks.

Herbicide Spills and Cleanup

All reasonable precautions will be taken to avoid spills. In the event of a spill, cleanup will occur immediately. Spill kits will be maintained in vehicles and in herbicide storage areas. All herbicide contractors will obtain and have readily available copies of Material Safety Data Sheets for herbicides they are using. All herbicide spills will be reported in accordance with applicable laws and requirements.

The following is a list of minimum requirements for spill kits:

- Protective clothing, eyewear, and gloves;
- Adsorptive clay, “kitty litter”, or other commercial adsorbent;
- Plastic bags and buckets;
- Shovel;
- Fiber brush and screw-in handle;
- Dust pan;
- Caution tape
- Highway flares; and
- Detergent

Response to spills will vary with their size and location, but general procedures will include the following:

- Controlling traffic;
- Dressing the clean-up team in protective clothing;
- Stopping leaks
- Containing spilled materials

- Cleaning up and removing spilled herbicide and contaminated adsorptive materials and soil; and
- Transporting spilled herbicide and contaminated material to an authorized disposal site.

Appendix I
Biological Resources Conservation Measure Plan

Construction and Operation Mitigation

This appendix outlines minimum conservation measures for construction and operation of pipeline projects to reduce impacts to vegetative communities, wildlife, and fisheries resources. Proponents may be required to implement additional measures for site specific impacts. Conservation and mitigation measures for federal threatened and endangered species will be addressed in a separate Biological Assessment (BA) developed through the project specific NEPA process. Mitigation approaches described in this appendix should be used for impacts associated with any pipeline construction and operation activities that will occur in the WPCI.

Through the NEPA process, lists of target species will be developed to focus field survey efforts. These lists will be developed based on known habitats and historic ranges of species that will be derived from literature, agency communication, and best professional judgment.

Numerous mitigation measures and BMPs have been developed and will be implemented by Proponents during pipeline construction to reduce impacts to sensitive plants, fisheries and wildlife. These BMPs may include:

- Throughout the permitting process, the various regulatory agencies, including the the Bureau of Land Management (BLM), and the U.S. Fish and Wildlife Service (USFWS) may require additional resource protection measures in addition to those presented in the following sections to ensure that federally listed and proposed species are not adversely affected.
- Standard construction techniques would be used unless conditions warranted special methods, including those required to minimize environmental damage and any other special methods determined through consultation with federal and state agencies.
- The Proponent would minimize impacts to paved roadways, wetlands and waterbodies, and railroads by using appropriate crossing methods.
- Prior to any construction activities, survey crews would stake the outside limits of the construction ROW, the centerline of the pipeline trench, and temporary workspace areas. Sensitive areas to be avoided would be flagged as appropriate, and wetland boundaries would be clearly delineated using easily identifiable temporary signage.
- Substantive cutting of steep terrain (as defined by the orientation and angle of the slope) would not be performed unless needed for the safe operation of the equipment and safety of personnel.
- During periods of precipitation when soil compaction and excessive rutting become significant, many construction activities may be required to cease.
- In other areas where compaction and rutting are unavoidable, measures would be taken to adequately prepare soils for successful reclamation, including replacement of topsoil with topsoil from a local source acceptable to the landowner or land management agency.
- In areas where segregation of soils is required, topsoil and subsoil would be separated using a two-pass excavation process. The native seed base is contained in the topsoil,

the depth of which varies along the project route. Therefore, topsoil would be removed in a manner that minimizes dilution of this seed base.

- The Proponent would adhere to its Noxious and Invasive Weed Control Plan (Appendix H of this POD) to minimize noxious weeds and invasive plants from establishing on the areas disturbed by construction activities.
- When trench dewatering is necessary, the Proponent would adhere to its Procedures to prevent heavily silt-laden water from flowing into wetlands or waterbodies. The rate of flow from dewatering pumps would be regulated to prevent erosion from runoff, and dewatering would be conducted in a manner designed to ensure that water is allowed to infiltrate into the ground rather than flow over the surface whenever possible.
- After backfilling is complete, disturbed areas would be final-graded, and erosion controls would be implemented, including site-specific contouring and reseeding with native species.
- The surface of the ROW would be graded to conform to preexisting contours, to the greatest extent possible.
- Erosion control measures would be implemented in accordance with Appendix E of this POD), other federal, state, and local agency requirements or landowner requirements, as applicable.
- The Proponent's Restoration and Revegetation Plans (Appendix E of this POD) would be implemented in accordance with applicable federal, state, local regulations, and landowner agreements.
- To the greatest extent possible, streambeds would be returned to their preconstruction contours, and stream and river banks would be restored to their preconstruction condition.
- Periodic aerial and ground inspections of the project route would be conducted, and further restoration measures would be implemented as needed.
- All test water used for pipeline hydrostatic testing would be discharged in accordance with the National Pollutant Discharge Elimination System permit.
- Wetlands would be crossed following the methods outlined by the U.S. Army Corps of Engineers.
- All disturbed stream channels would be restored with salvaged materials (plants and substrate where practical) from construction, or with similar local materials.

It is anticipated that some of these measures and BMPs will be modified during the NEPA process.

Sensitive Plants

Proponents will survey their proposed construction ROWs, ETWS, roads, and aboveground facility locations prior to construction for sensitive plant species identified during the NEPA process. Observed plants will be mitigated during construction activities either by relocating the plants or the pipeline facilities or developing equivalent off-site mitigation in consultation with land management agencies, landowners and, where appropriate, the U. S. Fish and Wildlife Service (FWS).

Fisheries Resources

In-Water Work Windows

Proponents will adhere to in-water work windows developed by the WGFD, described below:

- July 1 – August 31 for coldwater fisheries.
- July 1 – November 15 for coolwater and warmwater fisheries.

A list of streams crossing subject to these in-water work windows will be developed during the NEPA process. If extraordinary events arise that require construction through waterbodies outside of an in-water work window, Proponents will consult with WGFD and the land management agency to obtain approval. Boring and horizontal directional drilling will not be subject to these in-water windows.

Stream Crossings

- Proponents will implement their waterbody crossing plans consistent with FERC's Wetland and Waterbody Construction and Mitigation Plan (see Appendix G).
- Proponents will install pipelines at a vertical elevation in streambeds that will not be scoured, where practical.
- Proponents will locate ETWS at least 50 feet from waterbody boundaries.
- Proponents will maintain adequate flow rates throughout construction for aquatic life and to prevent interruption of existing downstream uses following FERC's Procedures.
- Proponents will restrict spoil placement within 10 feet of waterbodies.
- Proponents will be prohibited from storing hazardous materials within 500 feet of a wetland, waterbody, water supply well, spring, or designated municipal watershed.
- Proponents will be prohibited from refueling vehicles and equipment within 500 feet of a wetland, waterbody, water supply well, spring, or designated municipal watershed except as described in Appendix C.
- Proponents will return all waterbody banks to preconstruction contours.

Potential trapping of fish in isolated work areas, or inhibition of fish passage, could occur at stream crossings. The following mitigation measures will be employed to limit this impact:

- Experienced fish biologists, familiar with fish capture and handling techniques, will relocate fish that become trapped in isolated work areas to areas within the main channel or downstream of stream crossings;
- Proponents will attain necessary permits for fish capture and relocation activities;
- Uninhibited fish passage will be maintained around isolated work areas at all times; and
- Stress and mortality will be minimized through appropriate fish handling techniques.

Wildlife Resources

Mitigation measures for habitat fragmentation fall into two broad categories: avoidance and vegetation management. Proponents will employ both measures, and use the following mitigation measures (at a minimum) to minimize fragmentation impacts to species:

- Limit the width of maintained ROW to the greatest extent possible;
- Minimize vegetation removal associated with construction to the greatest extent possible;
- Implement reclamation/restoration methods to enhance wildlife habitat within ROWs;
- Minimize "hard" edges in forested habitats by using "zig-zag" clearing patterns;
- Remove shrubs and saplings in prairie-grassland habitats in a manner that minimizes "hard" edges; and
- Prohibit mowing sagebrush in ROWs where it has been re-established.

Nesting migratory birds will be affected by habitat removal. The obligation to protect migratory birds under the Migratory Bird Treaty Act (MBTA) will be addressed through the NEPA process and site-specific mitigation strategies will be developed.

Proponents will implement the following measures (at a minimum), as applicable, to avoid or minimize impacts to wildlife:

- Reroute sections of pipelines;
- Restrict pipeline ROW widths in environmentally sensitive locations;
- Limit length of time trenches are open;
- Restore affected habitats to the greatest extent possible;
- Minimize future disturbances in project areas; and
- Construct any pipeline communication towers in accordance with USFWS' requirements.

Special Status Species

Proponents will survey their project areas prior to construction activities at times, and utilizing techniques, prescribed by applicable regulatory agencies. Results of these surveys will inform presence or absence within ROWs.

Greater sage grouse are not a listed species under the Endangered Species Act (ESA), however, they will be afforded special status consideration for pipelines that will be constructed within the WPCI. Unless the FWS determines that the species is warranted as either a Threatened or Endangered species, Greater sage grouse will be afforded the following construction and operational stipulations as directed by the Governor's Executive Order 2015-4 (EO):

- All applicable stipulations and management prescriptions described in the most recent Wyoming Sage-Grouse Executive Order, or its accompanying guidance documents, will be implemented by project Proponents in order to minimize impacts to sage grouse.

- General Greater sage grouse stipulations include, but are not limited to, the following:

    - Sage-grouse leks: 1) Avoid surface disturbance activities or occupancy within ¼-mile (0.6 mile in Core Areas) of the perimeter of occupied sage-grouse leks. 2) Avoid human activity between 6 p.m. and 8 a.m. from March 15 – May 15 within ¼-mile of the perimeter of occupied sage-grouse leks (0.6 mile in Core Areas).
    - Sage-grouse nesting/early brood rearing habitat: Avoid surface disturbing activities, geophysical surveys, and organized recreational activities (events) that require a special use permit in suitable sage-grouse nesting and early brood rearing habitat within 2 miles of the perimeter of an occupied lek or within identified sage-grouse nesting and early brood rearing habitat March 15 – June 30 (within entire delineated Core Areas).
    - Sage-grouse winter concentration areas: Where it has been designated, avoid human activity in sage-grouse winter habitat from November 30 – March 15.

Big Game

To protect big game crucial winter ranges, Proponents will comply with seasonal stipulations for construction and operation activities which prohibit construction in crucial winter ranges from November 15 to April 30. BLM can grant exceptions to seasonal stipulations if they, in consultation with WGFD biologists, determine that granting an exception will not jeopardize the population that is being protected.

In addition, Proponents will implement the following mitigation measures to protect big game crucial winter habitats, where appropriate:

- Within big game crucial winter ranges impacted by pipeline projects, Proponents will seed disturbed areas with preferred big game forage species listed in Appendix F, Table 1-3.
- Weeds will be controlled to help maintain native forage species as indicated in Appendix H.
- To minimize impacts from open trenches within crucial winter ranges, Proponents will install or leave crossovers where necessary with exit ramps. Proponents will also implement crossovers in areas around water sources and active livestock/wildlife trails. Proponents will also inspect open ditch lines daily to ensure that livestock/wildlife are not trapped in open trenches.
- A 10-foot gap will be left in spoil and topsoil stockpiles at all hard or soft plug locations, and a corresponding gap in welded pipe strings will be left in these locations.
- After construction, Proponents will install OHV barriers to reduce unauthorized public access to pipeline ROWs.

Raptors and Migratory Birds

Proponents will comply with spatial and seasonal buffers in Appendix B, Table 3, where there are data that confirm presence of applicable species. If data are not available to justify seasonal stipulations, surveys will be completed only for those species evaluated and agreed upon during the project specific NEPA process (e.g. federal T&E species and federal agency special status species).

Appendix J
Unanticipated Discoveries Plan for Cultural Resources

General

Unanticipated discoveries consist of types of archaeological remains not typically encountered in the vicinity of a project ROW. These types of remains will also be outside the scope of projects' survey design. Examples of unanticipated discoveries include basin houses, large bison kill sites, or rock shelter containing perishable materials.

Once an unanticipated discovery is identified, measures will be taken to prevent further disturbances. Depending upon the nature and location, these measures may include halting construction in the vicinity, fencing off the discovery, or posting a guard. The BLM and SHPO will be contacted. Archaeological monitors will record the discovery as per standard operating procedures. Test excavations may be necessary to evaluate discoveries. Once the nature of the discovery and its vulnerability are understood, archaeologists will consult about site treatment.

Archaeological monitors will notify BLM Field Offices within one working day and provide written follow-up within three working days after discovery. Archaeologists will recommend site eligibility and identify treatment options.

Discovery of Human Remains

The discovery of known or suspected human remains, at anytime and anywhere in project areas, will result in immediate cessation of construction activity within a 300-foot buffer around the discovery location. If construction personnel make the discovery, they will immediately notify their supervisor, who will notify the EI of the discovery. EIs will notify archaeological monitors or other archaeological staff immediately. All project personnel have authority to halt construction if human remains are discovered.

After construction has been halted, construction personnel will promptly vacate a 300-foot buffer zone. Immediate measures will be implemented to protect discoveries from further disturbance until appropriate agencies have been notified, the discovery has been fully evaluated, treatment (if necessary) has been completed, and the location has been cleared by appropriate agency personnel. Care will be taken to prevent additional disturbance of remains.

If remains are human, measures to protect them and any associated artifacts will remain in effect until Proponents have received notice from the federal Authorized Officer, for discoveries on federal lands, or applicable law enforcement personnel on non-federal lands.

Human Remains on Federal Lands

Upon discovery of suspected or confirmed human remains on federal lands, agency archaeologists and administrators will be notified immediately by phone and with follow-up written notification. Project Proponents and EIs will also be notified. BLM personnel will

determine whether the remains are archaeological or whether they are a law enforcement issue. All agency and tribal consultation will be the responsibility of applicable federal agency staff. If remains are Native American, provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) apply.

Native American Remains on Federal Lands

For Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony discovered on federal land, agencies will meet the requirements of NAGPRA in accordance with 43 CFR 10. In accordance with 43 CFR 10, work may resume at the discovery location 30 days after certification by the Authorized Officer, if the resumption is otherwise lawful [43 CRF1 0.4 (d and e)].

Human Remains on Non-Federal Lands

Upon discovery of confirmed or suspected human remains on non-federal lands, the county sheriff will be notified immediately. The sheriff may contact the coroner. The lead federal agency, SHPO, and EI will be notified as well. The sheriff and/or coroner will determine whether or not remains fall under law enforcement jurisdiction. Further work at the discovery will be at the discretion of law enforcement personnel, if there is an enforcement issue. If not, the BLM will consult with SHPO, and the landowner if on private land, to approve further work. If remains are Native American, SHPO will determine the appropriate course of action.

Coordination and Notification Procedures

Coordination among project archaeologists, construction personnel, EIs, and Proponents will be handled within projects' chain of command. Project EIs will likely be archaeologists' primary point of contact. Proponents will likely employ an archaeological contractor as a monitor and to be their lead archaeological point of contact.

Project EIs will be responsible for communicating between archaeological contractors and project construction personnel. Situations may arise where archaeological contractors need to communicate directly with construction personnel, but this will be minimal and EIs will always be notified.

Appendix K
Unanticipated Discoveries Plan for Paleontological Resources

Introduction

This Paleontological Resources Monitoring Plan provides monitoring procedures for Proponents to follow in their project areas where there are potentially significant fossil resources. Detailed guidelines are provided in BLM IM 2009-11. This plan also addresses the unanticipated discovery of significant fossil resources that may be encountered during construction.

Qualified Paleontologist

The Principal Investigator (PI), a qualified paleontologist, will be contracted by Proponents to oversee paleontological activities. Prior to construction PIs will obtain necessary Paleontological Use Permits for BLM lands. These permits will require a monitoring and recovery plan for fossils, as well as an agreement with a recognized institution for the curation and storage of scientifically significant fossils. PIs oversee the following:

- Training of construction personnel;
- Monitoring and spot checks of geologic formations classified as Potential Fossil Yield Classification (PFYC) 5 or 4, and some PFYC 3 ranked strata;
- Evaluate paleontological discoveries made by Proponents' construction contractors; and
- Determine appropriate actions regarding significant finds with BLM paleontologists and archaeologists.

Training Contractors

When qualified paleontologists are not present during construction, Proponents' EIs and contractors will be responsible for reporting fossil discoveries. Prior to constructions Proponents will train contractors to do the following:

- Understand what a fossil represents;
- Recognize a fossil;
- Know the procedures to be followed when fossils are discovered; and
- Refrain from collecting fossils, except as part of an emergency recovery procedure.
-

Training will be conducted by a qualified paleontologist.

Areas to Be Monitored or Spot Checked

In the planning and surveying stages of pipeline project development, each geologic formation along pipeline routes will be ranked according to BLM PFYC. Following literature reviews, formations ranked PFYC 3 or higher will be field surveyed, as required. Spot checks during construction activities will be conducted according to the results disclosed by Proponents.

Unanticipated Discoveries of Paleontological Resources

Fossils likely to be encountered during construction include plant compressions and petrifactions, mollusk shells, and isolated or fragmentary vertebrate remains. If fossils are encountered, they will be evaluated and addressed appropriately by PIs. There is a small possibility that scientifically significant remains of vertebrate fossils may be encountered in excavations in areas that are classified as PFYC 2 or less, but are underlain by fossil bearing formations.

Procedures at Time of Discovery of Unanticipated Paleontological Resources

In accordance with BLM IM 2009-11, if significant fossils are discovered, construction activity will cease in the immediate area of discovery, and the discovery will be immediately reported to Proponents' EI. The EI will ensure that the discovery is protected from damage and looting and will immediately report the discovery to Proponents' PI and the appropriate BLM office. Paleontologists will examine and record the paleontological resource and evaluate its significance to determine if additional mitigation is required. Construction activities will not resume in the immediate area of discovery until paleontologists concur that it can. Agencies may inform Proponents' PI of any required mitigation measures by telephone, with follow-up documentation by mail or email.

Recording Procedures for Unanticipated Paleontological Resources

Paleontological materials of scientific significance will be recorded using methods consistent with standard operating procedures, as detailed in BLM IM 2009-11. Scientifically significant fossils will be collected and curated into an acceptable museum or academic repository. Collection methods will depend on the fossil and its condition.

Emergency Salvage of Paleontological Resources

Unstable trench conditions and other unforeseen natural or work events could endanger paleontological resources discovered during construction of pipelines. In the event of imminent danger or destruction, Proponents will take prudent action to preserve as much paleontological information as possible. Salvage activities will follow standard procedures to the greatest extent possible, but human safety concerns may dictate less exact methods of material excavation.

Reporting

After completion of paleontological surveys, Proponents will report the findings, significance, and recommendations to the appropriate BLM office for review. If mitigation, and an excavation of more than one square meter is required, a paleontological excavation permit application will be filed with the appropriate BLM office.

Appendix L
Fire Prevention and Suppression Plan

Introduction

The purpose of the Fire and Prevention and Suppression Plan is to prevent and suppress fires during pipeline project construction. The plan covers responsibilities for suppressing fire ignitions and reporting emergencies. It delineates minimum requirements that should be followed by Proponents.

This plan is intended to be compatible with laws, regulations, plans, and policies of local, state, and federal agencies. Prior to construction activities, Proponents should confirm that all employees associated with their projects have been trained in the requirements and provisions of this plan. A copy of the plan will be kept on site for the duration of pipeline construction.

Objectives

The first objective of this plan is to provide an implementation strategy to facilitate immediate actions to prevent and suppress fires that may occur during pipeline construction. The plan establishes protocols and lines of communication for reporting fires and other emergencies that may occur within the ROW. The plan requires commitment to fire prevention, fire protection equipment, fire monitoring efforts, and personnel during periods of fire danger or other emergencies.

The second objective is to ensure adequate and appropriate provision of safety equipment and fire extinguishing equipment to facilitate firefighting, protect employees, and minimize damage to public and private property. Proponents will evaluate work locations to determine appropriate protection and safety requirements.

Responsibilities

Responsibility for fire suppression, management, and investigation lies with the jurisdictional agency, and the operation requirements of Proponents. Contractors are required to follow all applicable laws and regulations regarding fire prevention and suppression. All contractors will follow the requirements disclosed in this plan, with the addition of any project specific requirements.

The primary persons responsible for fire prevention and suppression during pipeline construction are described below:

Chief Inspector

The Chief Inspector is responsible for oversight of all activities along pipeline projects. Chief Inspectors are responsible for general construction operations, for ensuring all contractors adhere to this plan, and that all provisions and restrictions are implemented. Chief Inspectors will coordinate with federal, state, and local fire management personnel during periods of high or

sever fire conditions to ensure that permit conditions are met and that preventive measures are in place.

In addition, Chief Inspectors will be responsible for:

- Conducting site surveys to identify fire hazards;
- Developing fire protection strategies;
- Selecting and locating the correct type and number of firefighting apparatus, and making them accessible;
- Ensuring that fire equipment is inspected and maintained in good condition; and
- Consulting with local fire and sheriff departments.

Additional responsibilities include the following:

- Immediately reporting all uncontrolled fires to the nearest fire dispatch office and county dispatch;
- Conducting weekly inspection of tools, equipment, personal protective equipment, and first aid kits;
- Developing and maintaining a register of emergency equipment;
- Conducting weekly inspections of flammable fuels and explosives storage areas;
- Posting signs and fire rules at appropriate locations;
- Providing initial fire response and supervising suppression activities until relieved;
- Providing and gaining approval of site specific burn management plans;
- Providing weekly written burning and blasting schedules to the appropriate federal, state, and local fire control jurisdictions;
- Monitoring construction areas that may present safety issues;
- Ensuring regulatory compliance with storage and handling of hazardous substances;
- Ordering and dispatching hazardous substances and maintaining a registry;
- Establishing facilities to manage chemicals held on site, and maintaining MSDS;
- Ensuring appropriate storage of explosives;
- Training workers on the use, handling, and storage of hazardous substances; and
- Ensuring that employees are knowledgeable of this plan and follow its directives.

Fire Protection Agencies

Fire Protection Agencies are responsible for protecting the public from loss of life, property, or resources from fire. These agencies also enforce fire laws.

Emergency Notification

In the event of a fire, construction personnel on scene will notify the Chief Inspector and the appropriate fire dispatch centers immediately, while ensuring they are safe.

Emergency Fire Protocols

A major fire emergency is one requiring a coordinated response of one or more government levels, outside of pipeline contractors. When response is required, the Chief Inspector or person in charge will communicate with applicable response agencies and Proponents the circumstances of the emergency.

Fire danger rating is used by land management agencies to determine required fire prevention, control, and monitoring efforts. Based on fire danger ratings, certain activities may be restricted at the direction of the jurisdictional agency. Proponents or their contractors will be responsible for coordinating with jurisdictional agencies to ensure that their activities are appropriate for the fire restriction level.

Fire Precautions During Construction

There are areas of public lands that may be restricted from heavy equipment use for fire suppression. Proponents and their contractors will be aware of these locations, and they will seek the necessary approval from jurisdictional agencies prior these activities.

Blasting

Blasting sub-contractors will secure the required permits from applicable regulatory agencies. Following the required waiting periods after each shot, the blast area will be inspected for any indication of fire or fire hazard. Typically, explosives vaporize at the instant of detonation so there is no material left to be a source of concern. However, inspections will be conducted to ensure this is the case.

If blasting is allowed when fire danger is high, a two-person fire watch team will patrol each blast area for a period of one hour after ignition. All applicable equipment will be on-site and precautions will be followed by contractors in accordance with jurisdictional agency requirements.

Welding

During fire season, vegetation must be cleared at a minimum diameter of 30 feet around work areas when welding, cutting, or drilling of metal, unless the vegetation is watered to eliminate fire danger. Each welding crew will be equipped with fire suppression equipment, and all applicable fire restriction measures will be met.

Equipment Provisions

Contractors will develop lists of construction equipment to be used and kept on site. All equipment assigned to construction areas may be inspected by Authorized Officers, or other third party compliance inspectors prior to use. Equipment must be maintained in good operating order.

Fire extinguishers will be used in accordance with OSHA Standard 29 CFR 1910.157. Use of fire extinguishers by employees, residents, and visitors is voluntary, due to the danger to their personal safety. All extinguishers will be professionally inspected and tagged annually, or as required by regulation.

Spark Arrestors

Spark arrestors, in good working order, will be required for portable equipment such as chain saws and generators. Light trucks and cars will be required to operate with factory installed mufflers, or equivalent. Vehicles equipped with catalytic converters will be parked on areas cleared of vegetation.

Equipment Parking and Storage Areas

Equipment parking areas and small stationary engine sites will be cleared of all extraneous flammable materials. Gas and oil storage areas shall be cleared of extraneous flammable material and signed appropriately. Glass jug or bottles will not be used for gasoline or other flammable materials.

All discarded oil, oil filters, oily rags, or similar waste will be disposed of in approved and marked containers. Containers will be stored in approved locations, hauled away by licensed contractors, and disposed of at approved facilities.

Warning Devices

Highway flares, or other devices with open flames will not be allowed in project areas, due to fire danger. Only electric or battery operated warning devices will be used.

Warming and Cooking Fires

These activities will not be allowed

Smoking

Smoking is allowed only in areas designated by Chief Inspector. Smoking signs that are visible to all employees will be posted at designated areas, and they will be obeyed.

Refueling and Refueling Areas

All fuel trucks will be equipped with at least 35-pound ABC fire extinguishers. Fuel storage areas will be cleared of all extraneous flammable materials. Only approve and properly maintained containers will be used to store and transport flammable liquids.

Burning

Burning slash or other combustible debris will require an approved burn and smoke management plan, and a permit from the applicable regulatory agencies. If a burn is approved, the appropriate agencies will be notified 24 hours prior to its ignition.

Fire and EMS Equipment

Proponents and their contractors will coordinate with applicable regulatory agencies and fire authorities to ensure that they have the appropriate type and quantity of fire control equipment on-site. Based on this coordination, Proponents will design lists of equipment necessary for their project specific needs. The Chief Inspector will maintain required equipment and ensure that it is available in good working order, at all times.

Mandatory Training

Field Crew Training Requirements

All field crews must complete site specific fire prevention and suppression training, which will include the following:

- Chain of command and fire reporting process;
- Emergency contacts and numbers;
- Basic fire prevention behavior controls;
- Basic training and uses of hand tools, water backpacks, etc.;
- Specific actions and expectations when a fire occurs; and
- Evacuation procedures.

Record of the subject, date, and attendees at all trainings will be maintained.

Appendix M
Blasting Plan

Scope of Blasting Project

Blasting may be required along the WPCI corridors. Proponents will only blast in areas where rock cannot be economically excavated by conventional means. Blasting could occur at any point along the ROW where impacts to other resources do not preclude the technique.

Types of Blasting

Blasting will be used primarily for trench excavation. However, blasting may also be required during ROW grading operations. The type of explosives used will be determined by geotechnical strength of underlying rock.

Location of Shots and Proximity to Existing Facilities

No blasting will occur within 10 feet, or an agency approved distance, of existing pipelines or other structures. All blasting adjacent to powerline ROWs will be conducted in a manner that will not cause damage to the adjacent property and facilities. Blast areas will be backfilled or covered by blasting mats and/or other material to protect nearby facilities, structures, highways, railroads, or significant natural resources.

Flyrock Control Plan

All shots will be carefully designed by licensed blasters to control flyrock. All hole loading activities will be supervised by licensed blasters. Licensed blasters will also communicate with their drillers to obtain geological information for each shot. Matting and/or padding will be used at the discretion of licensed blasters.

Monitoring, Reporting, and Controlling Ground Cracking and Displacement

It is not anticipated that blasting activities will cause any kind of ground displacement. Following blasts, the area will be examined for signs of ground cracking. Any indication of overbreak will be brought to the attention of the blaster and noted on the blast report. Shot patterns and/or loading will be adjusted to minimize or eliminate overbreak.

Explosives Storage and Transportation Procedures

Explosives storage and transportation will be outlined in Proponents' safety programs, and will follow the requirements of applicable state and federal regulations.

Environmental Concerns

All residents within 750 feet of blasts will be notified 24 hours prior to blasting. All necessary measures will be taken to exclude livestock and wildlife from blasting areas. Areas will be checked prior to blasting, and detonation will not be initiated until areas are clear.

Appendix N
Fugitive Dust Control Plan

Introduction

This fugitive dust control plan is designed to identify potential dust emission sources and provide guidance to construction and field personnel on measures to control the generation of fugitive dust during pipeline construction. EIs will be responsible for identifying all activities generating fugitive dust, implementing feasible control measures, and ensuring compliance with fugitive dust regulations.

Fugitive Dust Sources

Fugitive dust could be generated directly from pipeline installation and aboveground facility construction. The following construction activities have the potential to generate fugitive dust:

- Vehicle and motorized equipment movement on access roads;
- Vegetation removal;
- Topsoil removal;
- Cutting and filling;
- Trenching;
- Backfilling;
- Blasting;
- Track-out onto roads;
- Bulk material loading, hauling, and unloading;
- Use of material storage piles; and
- Use of parking, staging, and storage areas.

All areas of pipeline construction will be monitored for fugitive dust generation. Control measures will be used to suppress dust in areas of concern. A listing of potential fugitive dust control measures is discussed later in this appendix.

Proponents will identify potential water sources that may be used for the purposes of dust control during construction of their pipelines. Proponents will obtain all necessary water rights to withdraw from these sources.

Applicable Regulatory Requirements

The Wyoming air quality fugitive dust regulations are found in Chapter 3, Section2, Subsection (f) of the WDEQ regulations.

Fugitive Dust Control Measures

Generation of fugitive dust during construction will be reduced through the application of appropriate control measures. The following abatement measures will be used where applicable:

- Apply water one or more times per day to affected unpaved roads, unpaved haul/access roads, and staging areas.
- Where appropriate, apply water/magnesium chloride mixture as a dust suppressant. The use of magnesium chloride will be restricted in sensitive vegetation areas, where alternative measures may be used.
- Reduce vehicle speeds on all unpaved roads, and unpaved haul/access roads. Proponents will set speed limits where necessary.
- Clean carry-out areas at paved road access points, a minimum of once every 48 hours.
- Cover all haul truck loads, or maintain at least six inches of freeboard space in each cargo compartment. Ensure that haul truck cargo compartments are constructed and maintained to minimize spillage and loss of materials. Haultruck loads of sand, gravel, solid trash, or other loose material will be covered.
- Apply water to active construction areas as needed. Areas will be pre-watered and soils maintained in a stabilized condition where equipment and vehicles will operate. Water disturbed soils to form a crust.
- For temporary work surfaces, during periods of inactivity, restrict vehicular access and comply with stabilized surface requirements.

Water trucks will be the primary means of dust abatement during construction. Water spray will be controlled so that over spraying and pooling will be minimized.

Inspection, Monitoring, and Recordkeeping

EIs will be primarily responsible for monitoring and enforcing implementation of needed dust control measures. EIs will also be responsible for making sure that dust control is effective and proper documentation is maintained. Construction personnel will be educated on the measures necessary for fugitive dust control.

Field inspections for dust control will occur daily. EIs will be responsible for recording the following information on a daily basis:

- Weather conditions (temperature, wind speed, direction, and precipitation);
- Number of water trucks in use;
- Cases where visible dust was at a concentration that required abatement measures be implemented;
- Condition of project soils (crusted, damp, or unstable);
- Condition of project access roads (crusted, damp, or unstable);
- Presence of track-out and when it was cleaned; and
- Overall status of dust control compliance.

The above information will be incorporated into EIs daily reports.

Appendix O
Traffic and Transportation Plan

Introduction

The Traffic and Transportation Plan is designed to:

- Describe how Proponents will use, improve, and maintain roads for construction of their pipeline projects; and
- Evaluate potential impacts of construction traffic at contractor yards, storage/staging yards, and compressor stations.

This plan also describes how Proponents will implement equipment access to and from their ROWs, drainage improvement procedures, dust control and maintenance measures, and abandonment and reclamation of roads.

After Proponents complete pipeline construction, roads will be restored to their original status, unless directed otherwise by applicable regulatory agencies and/or landowners.

Pipeline Road Crossings

Pipeline construction will require crossing paved and unpaved roads with varying levels of traffic. Crossing techniques will be determined by the appropriate regulatory authority. Typically, smaller unpaved roads are crossed by open trenching and restored back to original status. Detours, or other measures, will be implemented to permit traffic flow during construction. Proponents must coordinate road closures and detours with federal, state, and local transportation departments and emergency responders. Major paved highways, interstate highways, railroads, paved roads, and unpaved roads where traffic cannot be interrupted will be crossed by boring under the roadbed. Pipelines will be buried to depths required by applicable road crossing permits and approvals, and will be designed to withstand anticipated loads.

Construction Traffic

Vehicle movements will generally occur during daylight hours. Primary movements will occur between 5:00 and 6:00 in the morning and evening. Typically, work weeks are five days, but may be extended to six or seven depending on construction scheduling. During boring, directional drilling, and hydrostatic testing, work will be conducted 24-hours a day until the process is complete.

In some instances, access roads will need to be graded, bladed, or widened to allow for use by large trucks. Landowner or land management agency permission will be obtained prior to making any modifications to roads. Individual permission will be required from landowners in project areas.

Watering for dust control may be necessary during grading and hauling operations. On federal lands all road improvements will be in accordance with agency handbooks and manuals. At a

minimum, roads will be constructed using the crown-and-ditch method. After construction, all roads will be repaired and returned to their original status, unless directed otherwise by applicable land management agencies or landowners. It is not anticipated that construction of new roads will be required to access the WPCI Corridors.

Wear and tear may occur to unpaved roads during pipeline construction. Roads that are being used by construction crews will be inspected daily. Vehicular use of unpaved roads may be temporarily halted in the case of excessively wet soil conditions. Proponents will make appropriate repairs to roads during construction.

Wear and tear impacts to paved surfaces will be minimal. Proponents will ensure that roads are inspected and maintained in safe condition throughout construction. To limit wear and tear, Proponents will adhere to all state and county vehicle weight limit regulations. Additionally, all vehicle length, width, and height regulation will be adhered to, or special use permits will be obtained.

All vehicles associated with pipeline construction will be parked within their construction ROW boundary, ETWS, or within the boundaries of staging yards, storage yards, or other approved project areas. Personnel will not park vehicles outside of designated areas. Also, personnel will not park within 500 feet of a wetland or waterbody, unless EIs determines there is no reasonable alternative. In that instance, spill prevention measures will be on-site.

Proponents will place signs at appropriate locations to direct traffic. All signs on federal lands will require approval by the applicable agency.

Dust Control

Fugitive dust can be generated from vehicle and equipment movement on access roads. To minimize the generation of fugitive dust, Proponents will implement the measures described in Appendix N of this POD.

APPENDIX E

Resource-Specific Stipulations, Project Design Features, and Best Management Practices from Existing Resource Management Plans

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WYOMING PIPELINE CORRIDOR INITIATIVE RESOURCE MANAGEMENT PLAN STIPULATIONS, REQUIRED DESIGN FEATURES, BEST MANAGEMENT PRACTICES, AND OTHER GUIDELINES

This appendix includes stipulations, required design features, best management practices (BMPs), and other guidelines applicable to the Wyoming Pipeline Corridor Initiative (WPCI). These various measures would apply to potential projects within the Bureau of Land Management (BLM) field office planning areas overlapped by the WPCI. These measure were pulled directly from the applicable BLM field offices' resource management plans (RMPs). When the field offices' RMPs did not include specific lists of stipulations as appendices to the RMPs, the reader is referred to applicable stipulations that may be found in the RMPs' specific resource sections. This appendix is divided into sections that represent each BLM field office, and each has its own literature cited section.

BUFFALO FIELD OFFICE

Stipulations (BLM 2015a)

Management Action	Stipulation Type	Protected Resource	Stipulation Description
Soil-1004	CSU	Soil: severe erosion hazard	Surface disturbance is restricted on soils with a severe erosion hazard rating. Controlled Surface Use (CSU) (1): (a) Prior to surface disturbance on soils with a severe erosion hazard rating a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the Bureau of Land Management (BLM) by the applicant as a component of the Application for Permit to Drill (APD) (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards. • The disturbed area will be stabilized with no evidence of accelerated erosion features. • The disturbed area shall be managed to ensure soil characteristics approximate an appropriate reference site with regard to erosional features to maintain soil productivity and sustainability. • Sufficient viable topsoil is maintained for ensuring successful final reclamation. At locations where interim reclamation will be completed, this will be accomplished by respreading all salvaged topsoil over the areas of interim reclamation. • The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. On the lands described below: CSU (2) as mapped by the Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO) Order 3 soil survey and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring successful reclamation and erosion control on soils with a severe erosion hazard rating in order to meet the standards outlined in, Chapter 6 the BLM's Oil and Gas Gold Book, as revised, and the 2015 Buffalo Field Office (BFO) Resource Management Plan (RMP) Record of Decision (ROD). **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above or a BLM evaluation determines that the affected soils do not meet the severe erosion hazard rating criteria. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a NRCS soil survey or BLM evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include soils with severe erosion hazard. This determination shall be based upon NRCS mapping and/or BLM evaluation of the area.
Soil-1006	CSU	Soils: slopes greater than 25% and less than 50%	Surface disturbance is restricted on slopes greater than 25% and less than 50%. CSU (1): (a) Prior to surface disturbance on slopes greater than 25% and less than 50% a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The Plan must include designs approved and stamped by a licensed engineer. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • Slope stability is maintained preventing slope failure or mass wasting. • The disturbed area will be stabilized with no evidence of accelerated erosion features. • The disturbed area shall be managed to ensure soil characteristics approximate an appropriate reference site with regard to erosional features to maintain soil productivity and sustainability. • Sufficient viable topsoil is maintained for ensuring successful final reclamation. At locations where interim reclamation will be completed, this will be accomplished by respreading all salvaged topsoil over the areas of interim reclamation. • The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. On the lands described below: CSU (2) as mapped by the U.S. Geological Survey (USGS) 1:24,000 scale topographic maps, USGS Digital Elevation Models, and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring successful reclamation and erosion control on slopes greater than 25% and less than 50% in order to meet the standards outlined in Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2015 BFO RMP ROD. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above, or a BLM evaluation determines that the disturbed area is not located on slopes greater than 25% but less than 50%. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation of the area. The stipulation and performance standards identified above may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include slopes greater than 25% but less than 50%. This determination shall be based upon USGS mapping and/or BLM evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
Soil-1006	NSO	Soil: slopes greater than 50%	No surface occupancy (NSO) or use is allowed on slopes greater than 50%. On the lands described below: NSO (1) as mapped by the USGS 1:24,000 scale topographic maps, USGS Digital Elevation Models, and/or as determined by a BLM evaluation of the area. For the purpose of: NSO (2) preventing mass slope failure and accelerated erosion. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a mass slope failure or accelerated erosion, or if the action is located entirely within an existing surface disturbance. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation of the area. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include slopes greater than 50%. This determination shall be based upon USGS mapping and/or BLM evaluation of the area
Soil-1010	CSU	Soil: limited reclamation potential areas	Surface disturbance is prohibited or restricted on limited reclamation potential areas such as areas possessing sensitive geologic formations, extremely limiting soil conditions, biological soil crusts, badlands, rock outcrops, and slopes susceptible to mass failure. CSU (1): (a) CSU (1): (a) Prior to surface disturbance on limited reclamation potential areas a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The Plan must include designs approved and stamped by a licensed engineer. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • The disturbed area will be stabilized with no evidence of accelerated erosion features. • The disturbed area shall be managed to ensure soil characteristics approximate an appropriate reference site with regard to erosional features to maintain soil productivity and sustainability. • Slope stability is maintained preventing slope failure and erosion. • Sufficient viable topsoil is maintained for ensuring successful final reclamation. At locations where interim reclamation will be completed, this will be accomplished by respreading all salvaged topsoil over the areas of interim reclamation. • The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. On the lands described below: CSU (2) as mapped by the NRCS SSURGO Order 3 soil survey and as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring successful reclamation and erosion control on limited reclamation potential areas in order to meet the standards outlined in, Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2015 BFO RMP ROD. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above or a BLM evaluation determines that the area does not meet the limited reclamation criteria. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a NRCS soil survey and BLM evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include limited reclamation potential areas. This determination shall be based upon NRCS mapping and BLM evaluation.
Water-1014	CSU	Water: surface waters	Surface disturbance is restricted within 500 feet of springs, non-Coalbed Natural Gas (CBNG) reservoirs, water wells, and perennial streams. CSU (1): (a) CSU (1): (a) Prior to surface disturbance within 500 feet of springs, non-CBNG reservoirs, water wells, and perennial streams a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • Storm water and surface runoff will be controlled to minimize erosion (rilling, gullying, piping, mass wasting) and offsite siltation during construction, use/operations, and reclamation. • Offsite areas will be protected from accelerated soil erosion. • The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. CSU (2) as mapped by the USGS National Hydrologic Inventory and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring protection of surface waters and associated riparian habitats by meeting the standards outlined in, Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2015 BFO RMP ROD. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a USGS National Hydrologic Inventory and/or BLM evaluation, in coordination with the Wyoming Department of Environmental Quality (DEQ) and/or Wyoming State Engineer's Office (WSEO). The stipulation and performance standards identified above may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 500 feet of springs, non-CBNG reservoirs, water wells, and perennial streams. This determination shall be based upon USGS National Hydrologic Inventory and/or BLM evaluation, in coordination with the Wyoming DEQ and/or BFO.
Cave-1004	CSU	Cave and Karst: significant caves	Surface disturbance is restricted near the entrances to significant caves. CSU (1): (a) Prior to surface disturbance or disruptive activities near an entrance to a significant cave a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction that the action will not destroy, disturb, deface, mar, alter, remove, or harm any significant cave or alter the free movement of any animal or plant life into or out of any significant cave. On the lands described below: CSU (2) as mapped by the BLM. For the purpose of: CSU (3) protecting significant cave resources (any material or substance occurring naturally in caves, such as animal life, plant life, paleontological deposits, sediments, minerals, speleogens, and speleothems). **Exception:** The BLM authorized officer may grant an exception if it is determined that the significant cave resource(s) will be protected. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon on local evaluation. The stipulation and standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative of the operator subject to confirmation from BLM. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not contain significant caves. This determination shall be based upon USGS or BLM data and field evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
Coal-2002 O&G-2007	CSU	Coal: areas identified as highly likely to be considered in a Coal (LBA)	Surface use or occupancy is restricted within areas identified as highly likely to be considered in a Coal Lease by Application (LBA). CSU (1): Surface use or occupancy shall not be allowed by oil and gas lessee(s), operating rights holder(s), and/or oil and gas operator(s) on this federal oil and gas lease to conduct any oil and gas operation, including drilling for, removing, or disposing of oil and/or gas contained in federal coal lease(s) unless a plan for mitigation of anticipated impacts is developed between the oil and gas and the coal lessees, and the Plan is approved by the BLM authorized officer; On the lands described below: CSU (2) areas identified as highly likely to be considered in a Coal LBA as mapped by the U.S. Office of Surface Mining, Wyoming DEQ, USGS, and/or BLM. For the purpose of: CSU (3) protecting the first in time valid existing rights of the coal lessee, the BLM authorized officer reserves the right to alter or modify any oil and gas operations on the lands described in this lease ensuring: a.) the orderly development of the coal resource by surface and/or underground mining methods; b.) coal mine worker safety; and/or c.) coal production rates or recovery of the coal resource. The oil and gas lessee(s), operating rights holder(s), and/or oil and gas operator(s) of this federal oil and gas lease shall not hold the United States as lessor, coal lessee(s), sub-lessee(s), and/or coal operator(s) liable for any damage or loss of the oil and gas resource, including the venting of CBNG, caused by coal exploration or mining operations conducted on federal coal lease. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not interfere with coal operations. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not contain areas identified as highly likely to be considered in a coal LBA. This determination shall be based upon U.S. Office of Surface Mining, Wyoming DEQ, USGS, and/or BLM data.
Riparian-4009	CSU	Riparian and Wetlands	Surface disturbance is restricted within 500 feet of riparian systems, wetlands, and aquatic habitats. CSU (1): (a) Prior to surface disturbance within 500 feet of riparian systems, wetlands, and aquatic habitats a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • Storm water and surface runoff will be controlled to minimize erosion (rilling, gullying, piping, mass wasting) and offsite siltation during construction, use/operations, and reclamation. • Offsite areas will be protected from accelerated soil erosion. • The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. CSU (2) as mapped by the USGS National Hydrologic Inventory and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring protection of surface waters and associated riparian habitats by meeting the standards outlined in, Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2015 BFO RMP ROD. CSU (3) On the lands described below: **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a USGS National Hydrologic Inventory and/or BLM evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 500 feet of riparian systems, wetlands, and aquatic habitats. This determination shall be based upon USGS National Hydrologic Inventory and/or BLM field evaluation.
WL-4015	NSO	Wildlife: Big game habitat management areas	NSO or use is allowed within WGFD Big Game Habitat Management Areas (Ed O. Taylor, Kerns, Bud Love, and Amsden Creek). On the lands described below: NSO (1) as mapped by the WGFD. For the purpose of: NSO (2) ensuring the function and suitability of WGFD Big Game Habitat Management Areas. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function or suitability of WGFD Big Game Habitat Management Areas. **Modification:** The BLM-authorized officer may modify the area subject to the stipulation based upon a WGFD and BLM evaluation, in coordination with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within a WGFD big game habitat management area. This determination shall be based upon a BLM evaluation, in coordination with the WGFD.
WL-4017	TLS	Wildlife: big game crucial winter range	Surface-disturbing and disruptive activities are prohibited or restricted from (1) November 15 to April 30 within big-game crucial winter range, or from May 1 to June 15 within elk calving areas (WGFD 2009). On the lands described below: TLS (2) as mapped by the WGFD and evaluated by the BLM. For the purpose of: TLS (3) ensuring the function and suitability of crucial big game winter ranges. **Exception:** The BLM authorized officer may grant an exception if the operator demonstrates that the crucial habitat is not occupied during the period of concern, subject to confirmation by the WGFD and BLM; or it is determined that the action will not impair the function or suitability of the crucial habitat. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD, to determine that the big game crucial winter range is not present or boundaries of the subject winter range areas have been refined. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within big game crucial winter range or an elk calving area. This determination shall be based upon a BLM evaluation of the area, in coordination with the WGFD.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
WL-4017	TLS	Wildlife: elk calving areas	Surface-disturbing and disruptive activities are prohibited or restricted from (1) May 1 to June 15 within elk calving areas (WGFD 2009). On the lands described below: TLS (2) as mapped by the WGFD and evaluated by the BLM. For the purpose of: TLS (3) ensuring the function and suitability of elk calving areas. **Exception:** The BLM authorized officer may grant an exception if the operator demonstrates that the crucial elk calving habitat is not occupied during the period of concern, subject to confirmation by the WGFD and BLM; or it is determined that the action will not impair the function or suitability of the crucial habitat. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD, to determine that the elk calving habitat is not present or boundaries of the subject calving areas have been refined. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within an elk calving area. This determination shall be based upon a BLM evaluation of the area, in coordination with the WGFD.
WL-4017	CSU	Wildlife: big game crucial winter ranges	Surface disturbance is prohibited or restricted within WGFD designated big game crucial winter range. CSU (1): (a) Prior to surface disturbance within WGFD designated big game crucial winter range, a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the function and suitability of crucial big game winter ranges will not be impaired. On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of crucial big game winter range. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function or suitability of the crucial habitat. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within big game crucial winter range. This determination shall be based upon a BLM evaluation of the area, in coordination with the WGFD.
WL-4017	CSU	Wildlife: elk calving areas	Surface disturbance is prohibited or restricted within WGFD designated elk calving areas. CSU (1): (a) Prior to surface disturbance within WGFD designated elk calving areas a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the function and suitability of elk calving area will not be impaired. On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of elk calving areas. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function or suitability of the elk calving area. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within an elk calving area. This determination shall be based upon a BLM evaluation of the area, in coordination with the WGFD.
WL-4018 WL-4021	CSU	Wildlife: crucial elk ranges	Surface disturbance is prohibited or restricted within WGFD designated elk crucial winter range and calving areas. CSU (1): (a) Fluid mineral production and byproducts shall be piped out of and (b) permanent above ground facilities will be located outside of WGFD designated elk crucial winter range and calving areas unless a mitigation plan (Plan) submitted by the applicant and approved by the BLM as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (c) The Plan must demonstrate to the authorized officer's satisfaction that the function and suitability of elk crucial winter range and elk calving areas will not be impaired. On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of elk crucial winter range and elk calving areas. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function or suitability of the crucial habitat. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within elk crucial winter range or a calving area. This determination shall be based upon a BLM evaluation, in coordination with the WGFD.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
WL-4023	CSU	Wildlife: Fortification Creek Planning Area	Surface occupancy or use is subject to the following special operating constraints. CSU (1) Surface-disturbing and disruptive activities shall only be approved with adequate mitigation to ensure compliance with the Fortification Creek RMP Amendment (BLM 2011) performance standards. Prior to surface disturbance within the Fortification Creek Planning Area a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). On the lands described below: CSU (2) within the Fortification Creek Planning Area (Map 3-36) For the purpose of: CSU (3) protecting the viability of the Fortification elk herd and facilitating ecosystem reconstruction in the stabilization of disturbed areas. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, is sited in a location, or otherwise designed, such that the Fortification Creek Resource Management Planning Area objectives (performance standards) are not applicable (i.e., outside the elk yearlong range). **Modification:** The authorized officer may modify the area subject to the stipulation or the CSU criteria if an environmental record of review finds that a portion of the CSU area is nonessential, it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site, or the modification will meet the goals identified in the Fortification Creek Resource Management Planning Area. **Waiver:** This stipulation may be waived over the entire lease if the authorized officer determines that the described lands are not within the Fortification elk herd yearlong range or do not contain areas of limited reclamation potential (including slopes greater than 25%) and therefore the Fortification Creek Resource Management Planning Area objectives (performance standards) are not applicable. This determination shall be based upon BLM evaluation of the area. The determination may be coordinate with other agencies such as the WGFD or NRCS.
WL-4026	CSU	Wildlife: sharp-tailed grouse leks	Surface disturbance is prohibited or restricted within 0.25 mile of the perimeter of occupied sharp-tailed grouse leks. CSU (1): (a) Prior to surface disturbance within 0.25 mile of the perimeter of occupied sharp-tailed grouse leks a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the function and suitability of sharp-tailed grouse breeding habitat will not be impaired (result in physical injury; a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or lek abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior). On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of sharp-tailed grouse breeding habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function and suitability of sharp-tailed grouse breeding habitat. The determination may include consultation with the WGFD. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 0.25 mile of an occupied sharp-tailed grouse lek. This determination shall be based upon a BLM evaluation, in coordination with the WGFD.
WL-4026	TLS	Wildlife: sharp-tailed grouse nesting	Surface-disturbing and disruptive activities are prohibited or restricted from April 1 to July 15 (WGFD 2009) within 2 miles of the perimeter of occupied sharp-tailed grouse leks. On the lands described below: TLS (2) as mapped by the WGFD and evaluated by the BLM. For the purpose of: TLS (3) ensuring the function and suitability of sharp-tailed grouse nesting habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable sharp-tailed grouse habitat may be exempted from this timing limitation. The determination may include coordination with the WGFD, so that granting an exception would not adversely impact the population being protected. **Modification:** The BLM authorized officer may modify the size and shape of the TLS area or the TLS criteria if it is determined that the actual habitat suitability for seasonal sharp-tailed grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the sharp-tailed grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined, in coordination with the WGFD, that the described lands are incapable of serving the long-term requirements of sharp-tailed grouse breeding, nesting, and early brood-rearing habitat.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
WL-4028	CSU	Wildlife: non-special status species raptor nests	Surface disturbance is restricted within U.S. Fish and Wildlife Service (USFWS) Wyoming Ecological Service's recommended spatial biological buffers (Appendix Q (p. 633)) or http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/Raptors.html) of active non-special status species raptor nests. CSU (1) (a) Prior to surface disturbance within USFWS recommended spatial buffers of raptor nests a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that nesting raptors will not be disturbed. Nesting raptors will not be agitated or bothered to a degree that causes or is likely to cause: • Physical injury, • A decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or • Nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. On the lands described below: CSU (2) as mapped on the BFO Geographic Information System (GIS) database or determined by the BLM from field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: CSU (3) ensuring raptor productivity. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. The determination may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. Spatial buffers may be modified based on auditory and visual impacts, as well as the topography and other ecological characteristics surrounding the nest site. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include consultation with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include spatial buffer zones for nesting raptors. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include consultation with the WGFD or USFWS.
WL-4030	TLS	Wildlife: non-special status species raptor nesting	Surface-disturbing and disruptive activities are prohibited or restricted within (1) the USFWS Wyoming Ecological Service's recommended spatial buffers and dates of active non-special status species raptor nests. (Appendix Q (p. 633) or http://www.fws.gov/wyominges/Pages/ Species/Species_SpeciesConcern/Raptors.html). On the lands described below: TLS (2) as mapped on the BFO GIS database or determined by, BLM from field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: TLS (3) ensuring raptor nest productivity. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not disturb (likely to cause physical injury; a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior) nesting raptors. The determination may include consultation with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. Spatial buffers may be modified based on auditory and visual impacts, as well as the topography and other ecological characteristics surrounding the nest site. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. The confirmation may include consultation with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include spatial buffers for raptor nests. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM.
SS Plant-4008	NSO	SS Plants: populations	NSO or use allowed within special status species plant populations. On the lands described below: NSO (1) as mapped on the BFO GIS database, or determined by BLM from field evaluation, in coordination with the Wyoming Natural Diversity Database and/or USFWS. For the purpose of: NSO (2) protecting special status species plant populations. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not adversely affect special status species plant populations. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the USFWS. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not contain a special status species plant population. This determination shall be based upon a BLM evaluation, in coordination with the USFWS.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
SS Plant-4008	CSU	SS Plants: habitat	Surface disturbance is prohibited or restricted within special status plant species habitat. CSU (1) (a) Prior to surface disturbance within special status plant species habitat flowering season survey(s) must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that special status plant species will not be harmed and that the habitat on which they depend will be conserved. On the lands described below: CSU (2) as mapped or determined by the USFWS, Wyoming Natural Diversity Database, the BFO GIS database, or from field evaluation. For the purpose of: CSU (3) conserving special status plant species and the habitat on which they depend. **Exception:** The BLM authorized officer may grant an exception if flowering season survey(s) determine that a special status species plant population is not present or it is determined that the action is sited in a location so that the action will not harm special status plant species. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. **Waiver:** The BLM authorized officer may waive this stipulation if flowering season survey(s) determine that the entire lease area does not include populations or habitat of special status species plants. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM.
SS Plant-4008	CSU	SS Plants: Ute ladies'-tresses orchid populations	Surface disturbance is prohibited or restricted within 0.25 mile of Ute ladies'-tresses orchid populations. CSU (1) (a) Prior to surface disturbance within Ute ladies'-tresses orchid habitat flowering season survey(s) must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that Ute ladies'-tresses orchids will not be harmed and that the habitat on which they depend will be conserved. On the lands described below: CSU (2) as mapped or determined by the USFWS, Wyoming Natural Diversity Database, the BFO GIS database, or from field evaluation. For the purpose of: CSU (3) conserving Ute ladies'-tresses orchids and the habitat on which they depend. **Exception:** The BLM authorized officer may grant an exception if flowering season survey(s) determine that a Ute ladies'-tresses orchid population is not present or it is determined that the action is sited in a location so that the action will not harm special status plant species. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. **Waiver:** The BLM authorized officer may waive this stipulation if flowering season survey(s) determine that the entire lease area does not include populations or habitat of Ute ladies'-tresses orchid. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM.
SS Fish-4008	NSO	SS Fish: occupied habitat	NSO or use is allowed within 0.25 mile of any waters containing special status fish species. On the lands described below: NSO (1) as mapped on the BFO GIS database or from field evaluation, in consultation with the WGFD. For the purpose of: NSO (2) protecting special status fish populations and habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a local decline in special status species fish abundance or range. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in consultation with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 0.25 mile of any waters containing special status fish species. This determination shall be based upon WGFD mapping and field evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
SS WL-4007	CSU	SS Wildlife: special status wildlife habitat	Surface disturbance is restricted within special status species wildlife habitat. CSU (1) (a) Prior to surface disturbance within special status species wildlife habitat an occupancy survey must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that special status wildlife species will not be harmed (any act which actually kills or injures wildlife including habitat modification or degradation that substantially impairs essential behavioral patterns) and that the habitat on which they depend will be conserved. On the lands described below: CSU (2) as mapped or determined by the USFWS, WGFD, Wyoming Natural Diversity Database, or BLM from field evaluation. For the purpose of: CSU (3) conserving special status species wildlife and the habitat on which they depend (BLM 2008 - 6840 manual). **Exception:** The BLM authorized officer may grant an exception if an occupancy survey determines that special status wildlife species are not present or it is determined that the action is sited in a location so that the action will not harm special status wildlife species. Confirmation may include coordination with the WGFD and/or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include special status species wildlife habitat. This determination shall be based upon field studies of the area by a qualified representative subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS.
SS WL-4009	CSU	SS Wildlife: prairie dog colonies and dependent species	Surface disturbance is prohibited or restricted within active prairie dog colonies on BLM-administered surface. CSU (1) (a) Prior to surface disturbance within active prairie dog colonies on BLM-administered surface a special status species occupancy survey must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that activities with active prairie dog colonies on BLM surface would not adversely impact suitable habitat for special status species dependent upon prairie dog colonies. On the lands described below: CSU (2) as mapped or determined on the BFO GIS database or from field evaluation, in coordination with the USFWS and WGFD. For the purpose of: CSU (3) conserving special status species wildlife and the prairie dog colonies on which they depend. **Exception:** The BLM authorized officer may grant an exception if it is determined that special status wildlife species are not present or it is determined that the action is sited in a location so that the action will not harm special status wildlife species. This determination shall be based upon evaluation by a qualified representative, subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not occupied by prairie dog dependent special status wildlife species. This determination shall be based upon field studies of the area by a qualified representative subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS.
SS WL-4024	NSO	SS Wildlife: Greater Sage-Grouse Core Population Areas and Connectivity Corridors	Occupied Greater Sage-Grouse leks inside designated Priority Habitat Management Area (PHMA) (Core and Connectivity). This area encompasses occupied Greater Sage-Grouse leks inside designated PHMA (Core and Connectivity). NSO or use is allowed within a six-tenths (0.6) mile radius of the perimeter of occupied Greater Sage-Grouse leks inside designated Core Population Areas and Connectivity Corridors, as mapped on the BFO GIS database. **Purpose:** To protect occupied Greater Sage-Grouse leks and associated seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse in proximity to leks, from habitat fragmentation and loss and Greater Sage-Grouse populations from disturbance inside designated Core Population Areas and Connectivity Corridors. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unoccupied as determined by the State wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Stipulation Description
SS WL-4024	CSU	SS Wildlife: Greater Sage-Grouse Core Population Areas and Connectivity Corridors	Greater Sage-Grouse Core Population Areas and Connectivity Corridors (Priority Habitat). This area encompasses BLM-administered surface within Greater Sage-Grouse Core Population Areas and Connectivity Corridors (Priority Habitat). All applicable surface disturbances (existing or future, and not limited to fluid mineral disturbances) must be restored, as described in the BFO RMP, to the approval of the BLM authorized officer. **Purpose:** To restore functional Greater Sage-Grouse habitat to support core Greater Sage-Grouse populations. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the needs of the Greater Sage-Grouse. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse winter concentration areas that support nesting in Core Population Areas (Priority Habitat Area and general habitat)	Greater Sage-Grouse winter concentration areas. This area encompasses designated Greater Sage-Grouse winter concentration areas. No surface use is allowed during December 1 – March 14, within mapped Greater Sage-Grouse Winter concentration areas in designated PHMA (Core and Connectivity), and outside designated PHMA (Core and Connectivity) when supporting wintering Greater Sage-Grouse that attend leks within designated PHMA (Core only). **Purpose:** To seasonally protect Greater Sage-Grouse winter concentration areas from disruptive activities. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not impair the function and suitability of the winter concentration area, or it is determined that the winter concentration area is not occupied by concentrated populations of Greater Sage-Grouse during the period of concern. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4024	CSU	SS Wildlife: Greater Sage-Grouse Core Population Areas	Greater Sage-Grouse designated Core Population Areas. This area encompasses Greater Sage-Grouse designated PHMA (Core only). Surface occupancy or use will be restricted to no more than an average of one disturbance location per 640 acres using the Density and Disturbance Calculation Tool (DDCT), and the cumulative value of all applicable surface disturbances, existing or future, must not exceed 5 percent of the DDCT area. This lease does not guarantee the lessee the right to occupy the surface of the lease for the purpose of producing oil and natural gas within Greater Sage-Grouse designated PHMA (Core only). The surface occupancy restriction criteria identified in this stipulation may preclude surface occupancy and may be beyond the ability of the lessee to meet due to existing surface disturbance on federal, state, or private lands within designated PHMA (Core only) or surface disturbance created by other land users. The BLM may require the lessee or operator to enter into a unit agreement or drilling easement to facilitate the equitable development of this and surrounding leases. **Purpose:** To protect Greater Sage-Grouse designated Core Population Areas from habitat fragmentation and loss. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse Core Population Area nesting habitat	Greater Sage-Grouse breeding, nesting, and early brood-rearing habitats inside designated PHMA (Core only). This area encompasses Greater Sage-Grouse breeding, nesting, and early brood-rearing habitats inside designated PHMA (Core only). No surface use is allowed during March 15 – June 30, inside designated PHMA (Core only). Where credible data support different timeframes for this restriction, dates may be expanded by 14 days prior or subsequent to the above dates. **Purpose:** To seasonally protect Greater Sage-Grouse breeding, nesting, and early brood-rearing habitats from disruptive activities inside designated Core Population Areas. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Stipulation Description
SS WL-4024	CSU	SS Wildlife: Greater Sage-Grouse Connectivity Corridors	Greater Sage-Grouse Connectivity Corridors. This area encompasses Greater Sage-Grouse PHMA (Connectivity Only). The cumulative value of all applicable surface disturbances (existing or future, and not limited to fluid mineral disturbances) must not exceed an average of 5 percent of the sagebrush habitat mapped on the BFO GIS database per 640 acres, using the DDCT. This lease does not guarantee the lessee the right to occupy the surface of the lease for the purpose of producing oil and natural gas within Greater Sage-Grouse designated PHMA (Connectivity Only). The surface occupancy restriction criteria identified in this stipulation may preclude surface occupancy and may be beyond the ability of the lessee to meet due to existing surface disturbance on federal, state, or private lands within designated Connectivity Corridors or surface disturbance created by other land users. The BLM may require the lessee or operator to enter into a unit agreement or drilling easement to facilitate the equitable development of this and surrounding leases. **Purpose:** To protect Greater Sage-Grouse Connectivity Corridors from habitat fragmentation and loss. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. An exception to the stated limits may be granted when compensatory mitigation is determined to provide an overall beneficial effect to Greater Sage-Grouse habitat and populations. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse Connectivity Corridor nesting habitat	Greater Sage-Grouse breeding, nesting, and early brood-rearing habitat within PHMA (Connectivity only). This area encompasses Greater Sage-Grouse breeding, nesting, and early brood-rearing habitat within PHMA (Connectivity only). No surface use is allowed during March 15 – June 30, inside PHMA (Connectivity only), within four miles of an occupied lek (independent of habitat suitability). **Purpose:** To seasonally protect Greater Sage-Grouse breeding, nesting, and early brood-rearing habitats inside Connectivity Corridors from disruptive activities, within four miles of an occupied lek. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) Waiver: This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unoccupied as determined by the State wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4024	NSO	SS Wildlife: general Greater Sage-Grouse breeding habitat	Occupied Greater Sage-Grouse leks outside designated PHMA (Core and Connectivity). This area encompasses occupied Greater Sage-Grouse leks outside designated Core Population Areas and Connectivity Corridors. NSO or use is allowed within a one-quarter (0.25) mile radius of the perimeter of occupied Greater Sage-Grouse leks outside designated PHMA (Core and Connectivity), as mapped on the BFO GIS database. **Purpose:** To protect occupied Greater Sage-Grouse leks and associated seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse in proximity to leks, from habitat fragmentation and loss and Greater Sage-Grouse populations from disturbance outside designated Core Population Areas and Connectivity Corridors. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unoccupied as determined by the State wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Stipulation Description
SS WL-4024	TLS	SS Wildlife: general Greater Sage-Grouse nesting and early brood-rearing habitat	Greater Sage-Grouse breeding, nesting and early brood-rearing habitat outside designated PHMA (Core and Connectivity). This area encompasses Greater Sage-Grouse breeding, nesting and early brood-rearing habitat outside designated PHMA (Core and Connectivity). No surface use is allowed during March 15 – June 30, in Greater Sage-Grouse breeding, nesting and early brood-rearing habitats outside designated PHMA (Core and Connectivity), within two miles of an occupied lek. Where credible data support different timeframes for this restriction, dates may be expanded by 14 days prior or subsequent to the above dates. **Purpose:** To seasonally protect Greater Sage-Grouse nesting and early brood-rearing habitats from disruptive activities outside designated Core Population Areas and Connectivity Corridors, within two miles of an occupied lek. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unoccupied as determined by the State wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.
SS WL-4026	NSO	SS Wildlife: bald eagle nesting habitat	NSO or use allowed within 0.5 mile of bald eagle nests. On the lands described below: NSO (1) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: NSO (2) ensuring productivity of bald eagles. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not disturb (as defined by the Bald and Golden Eagle Protection Act) nesting bald eagles. Bald eagles will not be agitated or bothered to a degree that causes or is likely to cause: • Physical injury, or • A decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or • Nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 0.5 mile of a bald eagle nest. Confirmation may include coordination with the WGFD or USFWS.
SS WL-4026	TLS	SS Wildlife: bald eagle nesting	Surface-disturbing and disruptive activities are prohibited or restricted from February 1 to August 15 within 1.0 mile of active bald eagle nests. On the lands described below: TLS (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: TLS (3) ensuring productivity of bald eagles. **Exception:** The BLM authorized officer may grant an exception if a staff review determines that the action will not disturb nesting bald eagles. This determination shall be based upon field study by a qualified representative, subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 1.0 mile of a bald eagle nest. Confirmation may include coordination with the WGFD or USFWS.
SS WL-4028	NSO	SS Wildlife: bald and golden eagle winter roosts	NSO or use is allowed within 0.5 mile from the edge of consistently used bald or golden eagle winter roosts and the following consistently used riparian corridors: Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River. On the lands described below: NSO (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: NSO (3) protecting wintering bald and golden eagles. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not harm roosting eagles. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 0.5 mile of a consistently used eagle roost or riparian corridor.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
SS WL-4028	CSU	SS Wildlife: bald and golden eagle winter roosting habitat	Surface disturbance is restricted within 1.0 mile from the edge of consistently used bald or golden eagle winter roosts and the following consistently used riparian corridors: Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River. CSU (1): (a) Prior to surface disturbance within 1.0 mile of consistently used bald and golden eagle winter roosts and riparian corridors a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that wintering eagles will not be disturbed (as defined by the Bald and Golden Eagle Protection Act). Bald or golden eagles will not be agitated or bothered to a degree that causes or is likely to cause: • Physical injury, or • A decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior. On the lands described below: CSU (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: CSU (3) protecting bald and golden eagle winter roosting habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 1.0 mile of a consistently used eagle winter roost or riparian corridor.
SS WL-4028	TLS	SS Wildlife: bald and golden eagle winter roosting habitat	Surface-disturbing and disruptive activities are prohibited or restricted from (1) November 1 to April 1 within 1.0 mile from the edge of consistently used eagle winter roosts and the following consistently used riparian corridors: Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River. On the lands described below: TLS (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: TLS (3) protecting roosting eagles. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designated so that the action will not harm roosting eagles. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 1.0 mile of a consistently used bald or golden eagle winter roost or riparian corridor.
SS WL-4031	TLS	SS Wildlife: special status raptor nesting	Surface-disturbing and disruptive activities are prohibited or restricted (1) within USFWS recommended spatial buffers and dates (Appendix Q (p. 633) or http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/ Raptors.html) of active raptor nests of special status species. On the lands described below: TLS (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: TLS (3) ensuring productivity of nesting special status raptors. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not disturb nesting special status raptors. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within the USFWS recommended spatial buffer of a sensitive species raptor nest. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
SS WL-4032	NSO	SS Wildlife: special status raptor nests	NSO or use is allowed within a species-specific spatial buffer of special status species raptor nests using USFWS Wyoming Ecological Service's recommendations (Appendix Q (p. 633) or http://www.fws.gov/wyominges/Pages/Species/ Species_SpeciesConcern/Raptors.html). On the lands described below: NSO (1) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: NSO (2) protecting nest sites of special status raptors. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, or sited in a location, or a site-specific evaluation determines that nesting special status raptors will not be disturbed (agitated or bothered to a degree that causes or is likely to cause: physical injury; or a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.) The determination may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within the USFWS recommended spatial buffer of a sensitive species raptor nest. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.
SS WL-4034	CSU	SS Wildlife: amphibian habitat	Surface disturbance is restricted within 1,640 feet (500 meters) of perennial water, vernal pools, playas, and wetlands. CSU (1) (a) Prior to surface disturbance within 1,640 feet (500 meters) of perennial water, vernal pools, playas, and wetlands appropriate surveys must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions. (b) The Plan must demonstrate to the authorized officer's satisfaction that special status amphibian species will not be disturbed to a degree that causes or is likely to cause: • Physical injury, • A decrease in productivity, by substantially interfering with normal breeding, sheltering, or hibernation behavior, or • Site abandonment, by substantially interfering with normal breeding, sheltering, or hibernation behavior. On the lands described below: CSU (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: CSU (3) ensuring production of special status amphibian species breeding, sheltering, and hibernation habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the proposed action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include special status species amphibian habitat. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.
SS WL-4034	CSU	SS Wildlife: reptile habitat	Surface disturbance is restricted within 1,640 feet (500 meters) of south facing rock outcrops, perennial water, vernal pools, playas, and wetlands. CSU (1) (a) Prior to surface disturbance within 1,640 feet (500 meters) of south facing rock outcrops, perennial water, vernal pools, playas, and wetlands appropriate surveys must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions. (b) The Plan must demonstrate to the authorized officer's satisfaction that special status reptile species will not be disturbed to a degree that causes or is likely to cause: Physical injury, A decrease in productivity, by substantially interfering with normal breeding, basking, sheltering, or hibernation behavior, or Site abandonment, by substantially interfering with normal breeding, basking, sheltering, or hibernation behavior. On the lands described below: CSU (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: CSU (3) ensuring production of special status reptile species breeding, basking, sheltering, and hibernation habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the proposed action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include special status species reptile habitat. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
SS WL-4034	CSU	SS Wildlife: bat habitat	Surface disturbance is restricted within 1,640 feet (500 meters) of cave entrances, mature forest, and rock outcrops. CSU (1) (a) Prior to surface disturbance within 1,640 feet (500 meters) of cave entrances, mature forest, and rock outcrops appropriate surveys must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions. (b) The Plan must demonstrate to the authorized officer's satisfaction that special status bat species will not be disturbed to a degree that causes or is likely to cause: • Physical injury, • A decrease in productivity, by substantially interfering with normal breeding, nursery, roosting, or hibernation behavior, or • Site abandonment, by substantially interfering with normal breeding, nursery, roosting, or hibernation behavior. On the lands described below: CSU (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: CSU (3) ensuring production of special status bat species breeding, nursery, roosting, and hibernation habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the proposed action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include special status species bat habitat. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.
Cultural-5006	NSO	Cultural: historic properties	NSO or use (NSO) (1) is allowed within the following historic properties: Pumpkin Buttes, Cantonment Reno, Dull Knife Battle, Crazy Woman Battle, contributing and unevaluated segments of the Bozeman Trail, all rock art sites, all rock shelter sites, all Native American burials. On the lands described below: NSO (2) as mapped on the BFO GIS database. For the purpose of: NSO (3) protecting historic properties. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so it will not be placed within the actual boundaries of or will not disturb the site within the defined NSO area. **Modification:** The BLM authorized officer may modify the stipulation in consultation with State Historic Preservation Office (SHPO), applicable tribes, and other interested parties, if the site is no longer considered eligible under National Register of Historic Places (NRHP) or if, in consultation with SHPO, applicable Indian tribes, and other interested parties it is determined that the identified property's sacred, spiritual, and/or traditional values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined in consultation with SHPO, applicable Indian tribes, and other interested parties, that the identified site is no longer considered sacred, spiritual, and/or traditional.
Cultural-5006	CSU	Cultural: historic property setting	Surface disturbance is restricted within three miles of the following historic properties: Pumpkin Buttes, Cantonment Reno, Dull Knife Battle, Crazy Woman Battle, contributing and unevaluated segments of the Bozeman Trail, all rock art sites, all rock shelter sites, all Native American burials. CSU (1) (a) Prior to surface disturbance within three miles of the identified historic properties a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions after consultation with SHPO, applicable Indian tribes, and other interested parties. (b) The Plan must demonstrate to the authorized officer's satisfaction that there will be no adverse effects to NRHP eligible or listed historic properties (i.e., the infrastructure will either not be visible or will result in a weak contrast rating). On the lands described below: CSU (2) as mapped on the BFO GIS database. CSU (3) ensuring the setting of historic properties. **Exception:** The BLM authorized officer may grant an exception if, after consultation SHPO, applicable Indian tribes, and other interested parties, it is determined that the proposed action will result in a no adverse effect determination to the sacred, spiritual, and/or traditional nature of the property(s) (i.e., will not result in a more than a weak contrast rating). **Modification:** The BLM authorized officer if, in consultation with SHPO, applicable Indian tribes, and other interested parties, the site is no longer considered eligible under NRHP or if, in consultation with Indian tribes and/or SHPO, it is determined that the identified property's sacred, spiritual, and/or traditional values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined, in consultation with SHPO, applicable Indian tribes, and other interested parties, that the identified site is no longer considered sacred, spiritual, and/or traditional.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
Cultural-5011	NSO	Cultural: traditional cultural properties	NSO or use is allowed on lands containing traditional cultural properties. NSO (1) On the lands described below: NSO (2) as mapped on the BFO GIS database. For the purpose of: NSO (3) protecting traditional cultural properties. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so it will not be placed within the actual boundaries of or will not disturb the site within the defined NSO area. **Modification:** The BLM authorized officer if, in consultation with SHPO, applicable tribes, and other interested parties, the site is no longer considered eligible under NRHP or if, in consultation with SHPO, applicable Indian tribes, and other interested parties it is determined that the identified property's sacred, spiritual, and/or traditional values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined, in consultation with SHPO, applicable Indian tribes, and other interested parties, that the identified site is no longer considered sacred, spiritual, and/or traditional.
Cultural-5011	CSU	Cultural: traditional cultural property setting	Surface disturbance is restricted within three miles of traditional cultural properties. CSU (1) (a) Prior to surface disturbance within three miles of traditional cultural properties a mitigation plan (Plan) must be submitted by the applicant. The Plan must be approved or approved with conditions by the BLM authorized officer prior to surface-disturbing activities after consultation with SHPO, applicable Indian tribes, and other interested parties. (b) The Plan must demonstrate there will be no adverse effects to NRHP eligible or listed historic properties (i.e., proposed infrastructure is either not visible or will result in a weak contrast rating) On the lands described below: CSU (2) as mapped on the BFO GIS database. For the purpose of: CSU (3) ensuring the setting of traditional cultural properties. **Exception:** The BLM authorized officer may grant an exception, after consultation SHPO, applicable Indian tribes, and other interested parties, it is determined that the proposed action will result in a no adverse effect determination to the sacred, spiritual, and/or traditional nature of the property(s). **Modification:** The BLM authorized officer may modify the stipulation, if in consultation with SHPO, applicable Indian tribes, and other interested parties, the site is no longer considered eligible under NRHP or if, in consultation with Indian tribes and/or SHPO, it is determined that the identified property's sacred, spiritual, and/or traditional values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined, in consultation with SHPO, applicable Indian tribes, and other interested parties, that the identified site is no longer considered sacred, spiritual, and/or traditional.
Paleo-5007	NSO	Paleontology: high quality or important resources	NSO or use is allowed on lands containing paleontological resources of high quality or importance. On the lands described below: NSO (1) as mapped on the BFO GIS database. For the purpose of: NSO (2) protecting paleontological resources of high quality or importance. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will protect paleontological resources of high quality or importance. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not contain paleontological resources of high quality or importance.

Management Action	Stipulation Type	Protected Resource	Stipulation Description
VRM-5005	CSU	Visual: Class II and Special Emphasis Area	Surface disturbance is restricted within Visual Resource Management (VRM) Class II areas. CSU (1) Prior to surface disturbance within VRM Class II areas, a site-specific plan must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • A visual contrast rating must demonstrate that VRM Class II objectives will be met. • Where required by the BLM authorized officer, a visual simulation must be prepared and must demonstrate that VRM Class II objectives will be met through practices such as siting of permanent facilities. • Where present and feasible, existing surface disturbances shall be utilized; new surface disturbances shall be minimized to the extent practicable. • All permanent above-ground facilities (such as production tanks or other production facilities) not having specific coloration requirements for safety must be painted or designed using a BLM-approved color. On the lands described below: CSU (2) as mapped on the BFO GIS database. For the purpose of: CSU (3) protecting Class II VRM Areas. **Exception:** The BLM authorized officer may grant an exception if it is demonstrated through a BLM-approved visual simulation and contrast rating worksheet that the project or identified mitigation will meet or exceed VRM Class II objectives. This restriction does not apply to temporary structures such as drilling rigs. **Modification:** The BLM authorized officer may modify the area subject to the stipulation if it is demonstrated that VRM Class II objectives have been modified through appropriate RMP planning procedures, or if a portion of the lease is not located within a VRM Class II area. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire leasehold is no longer managed for VRM Class II objectives based on planning, or if the entire leasehold is not located within a Class II area.
Rec-6019	CSU	Recreation: Special Recreation Management Areas	Surface disturbance is restricted within the Special Recreation Management Areas (SRMA) available for leasing (Weston Hills). CSU (1) (a) Prior to surface disturbance within SRMAs available for leasing a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA. On the lands described below: CSU (2) as mapped or determined by BLM. For the purpose of: CSU (3) ensuring the recreational opportunities and setting of the SRMA. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will meet the management objectives, the recreational opportunities, and setting of the SRMA. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on monitoring results, or if a portion of the area is no longer located within a SRMA. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within a SRMA.
ACEC-7003	NSO	ACEC: Pumpkin Buttes	NSO or use is allowed within the Pumpkin Buttes Area of Critical Environmental Concern. On the lands described below: NSO (2) as mapped or determined by BLM. For the purpose of: NSO (3) protecting the relevant and important values. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to protect the relevant and important values. The Plan may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on monitoring results, or if a portion of the lease is no longer located in the Pumpkin Buttes ACEC. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not contain relevant and important Area of Critical Environmental Concern (ACEC) values, subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties.

Required Design Features (BLM 2015b)

Fluid Minerals

- Locate new compressor stations outside priority habitats and design them to reduce noise that may be directed towards priority habitat.
- Locate man camps outside priority Greater Sage-Grouse habitats.
- Roads (Priority Habitat Area)
  - Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
  - Locate roads to avoid important areas and habitats.
  - Coordinate road construction and use among ROW holders.
  - Construct road crossing at right angles to ephemeral drainages and stream crossings.
  - Establish slow speed limits on BLM system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
  - Establish trip restrictions (Lyon and Anderson 2003) or minimization through use of telemetry and remote well control (e.g., Supervisory Control and Data Acquisition).
  - Do not issue ROWs to counties on newly constructed energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document.
  - Restrict vehicle traffic to only authorized users on newly constructed routes (use signing, gates, etc.).
  - Apply dust abatement practices on roads and pads.
  - Close and rehabilitate duplicate roads.
- Roads (General Habitat)
  - Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
  - Do not issue ROWs to counties on energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document.
  - Establish speed limits to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds. ○ Coordinate road construction and use among ROW holders.
  - Construct road crossing at right angles to ephemeral drainages and stream crossings.
  - Apply dust abatement practices on roads and pads.
  - Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.
- Reclamation
  - Include objectives for ensuring habitat restoration to meet sage-grouse habitat needs in reclamation practices/sites (Pyke 2011). Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve Greater Sage-Grouse habitat needs.
  - Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling and revegetating cut and fill slopes.
  - Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.

- Implement irrigation during interim or final reclamation for sites where establishment of seedlings has been shown or is expected to be difficult due to dry conditions.
- Use mulching, soil amendments, and/or erosion blankets to expedite reclamation and to protect soils

Rights-of-Ways and Corridors

- Where new ROWs are necessary, co-locate new ROWs within existing ROWs where possible.

Best Management Practices

No BMPs listed in RMP.

Literature Cited

Bureau of Land Management (BLM). 2015a. *Appendix B. Fluid Mineral Lease Notices; Lease Stipulations; and the Process for Exceptions, Modifications, and Waivers*. In *Bureau of Land Management Buffalo Field Office Approved Resource Management Plan*. Buffalo, Wyoming: BLM Buffalo Field Office. Available at https://eplanning.blm.gov/epl-front-office/projects/lup/36597/20009049/250010641/BFO_ARMP_2015_0914_full_print.pdf. Accessed March 9, 2020.

———. 2015b. *Appendix C. Best Management Practices and Required Design Features*. In *Bureau of Land Management Buffalo Field Office Approved Resource Management Plan*. Buffalo, Wyoming: BLM Buffalo Field Office. Available at https://eplanning.blm.gov/epl-front-office/projects/lup/36597/20009049/250010641/BFO_ARMP_2015_0914_full_print.pdf. Accessed March 9, 2020.

CASPER RESOURCE MANAGEMENT PLAN

Stipulations

Refer to individual resource sections of the Record of Decision and Approved Casper Resource Management Plan for any applicable stipulations (BLM 2007).

Required Design Features

No required design features listed in RMP.

Best Management Practices

No BMPs listed in the RMP.

Wyoming BLM Mitigation Guidelines for Surface-Disturbing and Disruptive Activities (BLM 2007)

Surface Disturbance Mitigation Guideline

Surface disturbance will be prohibited in any of the following areas or conditions. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the authorized officer.

- Slopes in excess of 25 percent.
- Within important scenic areas (Class I and II Visual Resource Management Areas).
- Within 500 feet of surface water and/or riparian areas.
- Within either one-quarter mile or the visual horizon (whichever is closer) of historic trails.
- Construction with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur.

Wildlife Mitigation Guideline

- To protect important big game winter habitat, activities or surface use will not be allowed from November 15 to April 30 within certain areas encompassed by the authorization. The same criteria apply to defined big game birthing areas from May 1 to June 30.
- Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.
- Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.
- To protect important raptor and/or sage and sharp-tailed grouse nesting habitat, activities or surface use will not be allowed from February 1 to July 31 within certain areas encompassed by the authorization. The same criteria apply to defined raptor and game bird winter concentration areas from November 15 to April 30. Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.

- Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.
- No activities or surface use will be allowed on that portion of the authorization area identified within (legal description) for the purpose of protecting (e.g., sage/sharp-tailed grouse breeding grounds, and/or other species/activities) habitat. Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.
- Portions of the authorized use area legally described as (legal description), are known or suspected to be essential habitat for (name) which is a threatened or endangered species. Prior to conducting any onsite activities, the lessee/permittee will be required to conduct inventories or studies in accordance with BLM and U.S. Fish and Wildlife Service guidelines to verify the presence or absence of this species. In the event that (name) occurrence is identified, the lessee/permittee will be required to modify operational plans to include the protection requirements of this species and its habitat (e.g., seasonal use restrictions, occupancy limitations, facility design modifications).

Cultural Resource Mitigation Guideline

When a proposed discretionary land use has potential for affecting the characteristics which qualify a cultural property for the National Register of Historic Places (NRHP), mitigation will be considered. In accordance with Section 106 of the Historic Preservation Act, procedures specified in 36 Code of Federal Regulations (CFR) Part 800 will be used in consultation with the Wyoming State Historic Preservation Officer and the Advisory Council on Historic Preservation in arriving at determinations regarding the need and type of mitigation to be required.

Special Resource Mitigation Guideline

To protect (resource value), activities or surface use will not be allowed (i.e., within a specific distance of the resource value or between date to date) in (legal description).

Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.

Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.

Example Resource Categories (Select or identify category and specific resource value):

- Recreation areas.
- Special natural history or paleontological features.
- Special Management Areas.
- Sections of major rivers.
- Prior existing rights-of-way.
- Occupied dwellings.
- Other (specify).

No Surface Occupancy Guideline

No Surface Occupancy (NSO) will be allowed on the following described lands (legal description) because of (resource value).

Example Resource Categories (Select or identify category and specific resource value):

- Recreation Areas
- Major reservoirs/dams
- Special Management Areas (e.g., known threatened or endangered species habitat, areas suitable for consideration for wild and scenic rivers designation)
- Other (specify)

Literature Cited

Bureau of Land Management (BLM). 2007. *Appendix I. Wyoming Bureau of Land Management Mitigation Guidelines for Surface-Disturbing and Disruptive Activities*. In *Record of Decision and Approved Casper Resource Management Plan*. Casper, Wyoming: BLM Casper Field Office. Available at https://eplanning.blm.gov/epl-front-office/projects/lup/63199/77980/87303/06_appx_i-MitigationGuidelines.pdf. Accessed March 23, 2020.

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CODY RESOURCE MANAGEMENT PLAN

Stipulations (BLM 2015a)

Record Number	Stipulation Type	Protected Resource	Stipulation Description
1042	CSU	Public Water Supply areas	Surface occupancy or use is restricted within ¼ mile of water resources, public water supply wells and up to 10 miles upstream of public water supply intake areas. (1) Prior to surface disturbance within ¼ mile of water resources, public water supply wells and up to 10 miles upstream of public water supply intake areas, a site-specific plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • Reserve pits are eliminated through the use of closed-loop drilling techniques, unless a pit is needed for critical safety reasons. Any necessary pits should be designed to prevent possible contamination of soil and groundwater. • Evaporation ponds are not sited within this area. • All oil and gas related infrastructure is set back a minimum of 500 feet from a public water supply well or intake area. • Drill pad sites should be designed to disperse storm water runoff onto upland sites using proper erosion and sediment control techniques. • Design drilling programs for water resource and public water supply protection. (2) as mapped by the WDEQ or Cody Field Office GIS database; (3) to protect water resources and public water supplies. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the proposed action would not result in a risk to public water supplies. **Modification:** The BLM authorized officer may grant a modification if it is determined that a portion of the lease is no longer located within ¼ mile of public water supply resources. **Waiver:** This stipulation may be waived if the BLM authorized officer determines that the entire leasehold is not located within ¼ mile of public water supply wells or public water supply intake areas.
2040	NSO	Big Horn Front MLP analysis area: Wildlife migration corridors	No surface occupancy is permitted (1) within ½ mile of big game migration corridors within the Big Horn Front MLP analysis area; (2) as mapped by the WGFD. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of big game. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. **Modification:** The authorized officer may modify the area subject to the stipulation if an environmental record of review finds that a portion of the area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of big game migration. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, if it is determined that the entire leasehold is greater than ½ mile from big game migration corridors within the Big Horn Front MLP Analysis Area or if there are no big game migration corridors within the lease boundary. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes.
2041	TLS	Big Horn Front MLP analysis area – Big game winter range	Avoid surface-disturbing and disruptive activities within big game winter range (1) from November 15 to April 30; (2) as mapped by the WGFD; (3) protecting big game winter range. **Exception:** The BLM authorized officer may grant an exception if the operator demonstrates that the big game winter range areas are not occupied during the period of concern, subject to confirmation by the BLM, in coordination with WGFD. **Modification:** The BLM authorized officer may modify the area subject to the stipulations based upon BLM evaluation in coordination with WGFD to determine that the big game winter range is not present or boundaries of the subject winter range areas have been refined. The BLM authorized officer may modify the area subject to the stipulations based upon BLM evaluation in coordination with WGFD to determine that big game winter range is not present or boundaries of the subject winter range areas have been refined. **Waiver:** The BLM authorized officer may grant a waiver if it is determined that the entire lease area is no longer within big game winter range, in coordination with WGFD
4036	NSO	Water, Riparian/Wetland: Within 500 feet perennial surface water, and riparian/wetland areas	No surface occupancy (1) within 500 feet of perennial surface water, riparian/wetland areas, and playas; (2) as mapped on the Cody Field Office GIS database. **Exception:** The authorized officer may grant an exception if, based upon an evaluation by the BLM, it is determined that the proposal would not adversely affect perennial surface waters, riparian/wetland areas and/or playas. **Modification:** The authorized officer may modify the area subject to the stipulation if, based upon an evaluation by the BLM, it is determined that portion of the lease is not located within 500 feet of perennial surface waters, riparian/wetland areas and/or playas or if impacts can be adequately mitigated. **Waiver:** The authorized officer may grant a waiver if it is determined that the entire lease area is not within 500 feet of perennial surface waters, riparian/wetland areas and/or playas. This determination will be based upon an evaluation by the BLM.

Record Number	Stipulation Type	Protected Resource	Stipulation Description
4054	NSO, CSU	Water, Riparian/Wetland, Fish and Wildlife	Surface occupancy or use is restricted within ¼ mile of waters rated by the WGFD as Class 1 or 2 fisheries. (1) Prior to surface disturbance within ¼ mile of waters rated by the WGFD as Class 1 or 2 fisheries, a site-specific plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • Reserve pits should be designed to prevent possible contamination of soil and groundwater. • Drill pad sites should be designed to disperse storm water runoff onto upland sites using proper erosion and sediment control techniques. • Design road crossing of streams to allow fish passage at all flows. • Design crossings such that they do not destabilize the channel or increase water velocity. • Limit surface-disturbing activities within water channels during spring and fall spawning periods. (2) as mapped by the WGFD; (3) to protect designated Blue Ribbon and Red Ribbon fisheries habitat and fish populations. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the proposed action would not result in a decline in fish abundance or range. **Modification:** The BLM authorized officer may grant a modification if it is determined that a portion of the lease is no longer located within ¼ mile of WGFD-designated Blue or Red Ribbon fisheries. **Waiver:** This stipulation may be waived if the BLM authorized officer determines that the entire leasehold is not located within ¼ mile of WGFD-designated Blue or Red Ribbon fisheries
4061	NSO	Fish and Wildlife: Bighorn River HMP/RAMP tracts and the BLM-administered tracts in Yellowtail WHMA	No surface occupancy is permitted (1) within Bighorn River HMP/RAMP tracts and the BLM-administered tracts in Yellowtail WHMA (2) protecting fish and wildlife resources. **Exception:** The BLM authorized officer may grant an exception if, in coordination with the WGFD, it is determined that the action as proposed or conditioned would meet the HMP/RAMP and/or WHMA management objectives. **Modification:** The BLM authorized officer may modify the area subject to the stipulation or surface occupancy criteria if, in coordination with the WGFD, it is determined that a portion of the lease is not located within the Bighorn River HMP/RAMP tracts or BLM-administered tracts in Yellowtail WHMA. **Waiver:** The BLM authorized officer may grant a waiver if, in coordination with the WGFD, it is determined that the entire lease area is no longer located within the Bighorn River HMP/RAMP tracts or BLM-administered tracts in Yellowtail WHMA.
4075	TLS	Fish and Wildlife: Big game crucial winter range habitat outside of Oil and Gas Management Areas	No surface use is allowed during the following time periods. Timing Limitation Stipulation (TLS) (1) November 15 to April 30; (2) as mapped by WGFD; (3) protecting big game on crucial winter range. **Exception:** The BLM authorized officer may grant an exception if the operator demonstrates that the crucial winter range areas are not occupied during the period of concern. This determination shall be based upon a BLM evaluation of the area in coordination with WGFD. **Modification:** The BLM authorized officer may modify the area subject to the stipulations based upon a BLM evaluation of the area, in coordination with WGFD, to determine any change in boundary/status of big game crucial winter range(s). **Waiver:** The BLM authorized officer may grant a waiver if it is determined that the entire lease area is no longer supports crucial winter range. This determination shall be based upon a BLM evaluation of the area in coordination with WGFD.
4076	TLS	Fish and Wildlife: Federal mineral estate within the Absaroka Front Management Area	No surface use is allowed during the following time periods. Timing Limitation Stipulation (TLS) (1) November 15 to April 30; (2) as mapped on the Cody Field Office GIS database; (3) protecting big game on crucial winter range. (1) within overlapping migration corridors and big game crucial winter range in the Absaroka Front Management Area (2) as mapped on the Cody Field Office GIS database. **Exception:** The BLM authorized officer may grant an exception if the operator demonstrates that the crucial winter range areas or migration corridors are not occupied during the period of concern, subject to confirmation by the BLM, in coordination with WGFD. **Modification:** The BLM authorized officer may modify the area subject to the stipulations based upon BLM evaluation in coordination with WGFD to determine any change in boundary/status of big game crucial winter range(s) or migration corridors or portions that are not within the Absaroka Front Management Area. **Waiver:** The BLM authorized officer may grant a waiver if it is determined that the entire lease area is no longer managed as crucial winter range or does not contain migration corridors, in coordination with WGFD, or is no longer within the Absaroka Front Management Area.
4076	CSU	Fish and Wildlife: Federal mineral estate within the Absaroka Front Management Area	Surface occupancy or use is restricted within the Absaroka Front Management Area. (1) Prior Description to surface disturbance within big game crucial habitat, a site-specific plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • Design oil and gas development to avoid or reduce unnecessary disturbances, wildlife conflicts, and habitat impacts. • Plan the pattern and rate of development to avoid the most important habitats and generally reduce the extent and severity of impacts. • Cluster drill pads, roads and facilities in specific, "low-impact" areas, if geologically feasible. • Consider "liquid gathering systems" to eliminate surface storage tanks and reduce truck trips for removal of liquids. • To the extent practicable, place infrastructure within or near previously disturbed locations. • Minimize infrastructure development and operational activity during life of field by using consolidation (e.g., "unitized") development techniques. (2) as mapped in Cody Field Office GIS database; (3) to protect big game crucial habitat. **Exception:** An exception may be granted by the authorized officer if, in coordination with the WGFD, the operator submits a plan that demonstrates that impacts from the proposed action can be fully mitigated or there are not practical alternatives. **Modification:** The authorized officer may, in coordination with the WGFD, modify the boundaries of the stipulation area if (1) a portion of the area is not being used as protected range by the identified species, (2) habitat outside of stipulation boundaries is being used and needs to be protected, or (3) the migration patterns have changed causing a difference in the season of use. **Waiver:** This stipulation may be waived, if the authorized officer determines, in coordination with the WGFD, that the entire leasehold can be occupied without adversely affecting the resources or if the lease is not located within the Absaroka Front Management Area.

Record Number	Stipulation Type	Protected Resource	Stipulation Description
4107	NSO	Special Status Species: Within 0.6-mile radius of the perimeter greater sage-grouse leks within PHMAs	No surface occupancy is allowed within an 0.6-mile radius of the perimeter of occupied greater sage-grouse leks inside designated PHMA (Core only) (1) as mapped by the WGFD; (2) to seasonally protect Greater Sage-Grouse breeding, nesting and early brood-rearing habitats from disruptive activities. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unoccupied as determined by the State wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.
4107	NSO	Special Status Species: Within ¼-mile radius of the perimeter of greater sage-grouse leks outside of PHMAs	No surface-disturbing activities or surface occupancy is allowed within an 0.25-mile radius of Description the perimeter of occupied greater sage-grouse leks outside PHMA (Core only) (1) as mapped by the WGFD; (2) to protect occupied greater sage-grouse leks and associated seasonal habitat, life-history, or behavioral needs of greater sage-grouse in proximity to leks from habitat fragmentation and loss, and protect greater sage-grouse populations from disturbance outside designated PHMA (Core only). **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unoccupied as determined by the State wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4108	TLS	Special Status Species: Greater sage-grouse nesting and early brood-rearing habitats inside PHMAs	Surface-disturbing and disruptive activities are prohibited (1) March 1 – June 30; (2) as mapped by the WGFD; (3) to seasonally protect Greater Sage-Grouse breeding, nesting and early brood-rearing habitats from disruptive activities inside PHMA (Core only). Where credible data support different timeframes for this restriction, dates may be expanded by 14 days prior or subsequent to the above dates. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** No Waiver.
4108	TLS	Special Status Species: Greater Sage-Grouse nesting and early brood-rearing habitat outside PHMAs Decision	Surface-disturbing and disruptive activities are prohibited within 2 miles of occupied Greater Sage Grouse lek outside of designated PHMA (Core only) (1) from March 1 to June 30; (2) as mapped by the WGFD; (3) to seasonally protect Greater Sage-Grouse breeding, nesting and early brood-rearing habitats from disruptive activities. Where credible data support different timeframes for this restriction, dates may be expanded by 14 days prior or subsequent to the above dates. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unoccupied as determined by the State wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4109	TLS	Special Status Species: Greater Sage-Grouse winter habitats/concentration areas	Surface-disturbing and disruptive activities are restricted or prohibited (1) December 1 – March 14; (2) as mapped by the WGFD (3) to seasonally protect Greater Sage-Grouse winter concentration areas. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not impair the function and suitability of the winter concentration area, or it is determined that the winter concentration area is not occupied by concentrated populations of Greater Sage-Grouse during the period of concern, or it is determined the project area is within unsuitable habitat. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse. **Waiver:** No Waiver

Record Number	Stipulation Type	Protected Resource	Stipulation Description
4110	CSU	Special Status Species: Density Disturbance within PHMAs	Surface occupancy or use will be restricted (1) to no more than an average of one disturbance location per 640 acres using the DDCT, and the cumulative value of all applicable surface disturbances, existing or future, must not exceed 5 percent of the DDCT area, as described in the Disturbance Density Calculation Tool manual (DDCT); (2) To protect Greater Sage-Grouse designated PHMAs (Core only) from habitat fragmentation and loss. This lease does not guarantee the lessee the right to occupy the surface of the lease for the purpose of producing oil and natural gas within Greater Sage-Grouse designated PHMA (Core only). The surface occupancy restriction criteria identified in this stipulation may preclude surface occupancy and may be beyond the ability of the lessee to meet due to existing surface disturbance on federal, state, or private lands within designated PHMA (Core only) or surface disturbance created by other land users. The BLM may require the lessee or operator to enter into a unit agreement or drilling easement to facilitate the equitable development of this and surrounding leases. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that, the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** No Waiver
4119	TLS	Special Status Species: Nesting Raptors	No surface use is allowed within ¼ mile of active raptor nests and ½ mile of active golden eagle, bald eagle, northern goshawk, merlin, and prairie and peregrine falcon nests and 1 mile of active ferruginous hawk nests during specific species nesting period or until young birds have fledged. This stipulation does not apply to operation and maintenance of production facilities. Timing Limitation Stipulation (1) during the following time periods: • American Kestrel April 1 – August 15 • Bald Eagle January 1 – August 15 • Boreal Owl February 1 – July 31 • Burrowing Owl April 1 – September 15 • Common Barn Owl February 1 – September 15 • Cooper's Hawk March 15 – August 31 • Eastern Screech-owl March 1 – August 15 • Ferruginous Hawk March 15 – July 31 • Golden Eagle January 15 – July 31 • Great Gray Owl March 15 – August 31 • Great Horned Owl December 1 – September 31 • Long-eared Owl February 1 – August 15 • Merlin April 1 – August 15 • Northern Goshawk April 1 – August 15 • Northern Harrier April 1 – August 15 • Northern Pygmy-Owl April 1 – August 1 • Northern Saw-whet Owl March 1 – August 31 • Osprey April 1 – August 31 • Peregrine Falcon March 1 – August 15 • Prairie Falcon March 1 – August 15 • Red-tailed Hawk February 1 – August 15 • Sharp-shinned Hawk March 15 – August 31 • Short-eared Owl March 15 – August 1 • Swainson's Hawk April 1 – August 31 • Western Screech-owl March 1 – August 15 • All other raptors February 1 – July 31 (2) as mapped by the WGFD, on the Cody Field Office GIS database or as determined by field evaluation; (3) protecting active raptor nests. **Exception:** The BLM authorized officer may grant an exception if it is determined that the raptor nest(s) are not active or the proposed action is of a scale, sited in a location, or otherwise designed so that the proposed action would not disturb (be likely to cause: physical injury; a decrease in productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior) nesting raptors of conservation concern. The determination may include consultation with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulations based upon a BLM evaluation in coordination with WGFD and/or USFWS, as necessary. The stipulation may be modified based on negative or positive monitoring results; or if it is determined that the action will not impair the function or the suitability of the habitat, or cause nest abandonment. **Waiver:** The stipulation may be waived if the BLM authorized officer determines that the entire lease area does not include seasonal buffer zones for nests of raptor species of conservation concern. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM, in coordination with the WGFD and/or USFWS, as necessary.

Record Number	Stipulation Type	Protected Resource	Stipulation Description
4119	CSU	Special Status Species: ¼ mile from raptor nest sites	Surface occupancy or use within ¼ mile of raptor nest sites will be restricted. (1) Prior to surface disturbance within ¼ mile of raptor nests a mitigation plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan or approved it with conditions. The plan must demonstrate to the BLM authorized officer's satisfaction that nesting raptors of conservation concern would not be agitated or bothered to a degree that causes or is likely to cause: • physical injury; • a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or • nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior, or preclude nest reoccupation; (2) as mapped by the WGFD, on the Cody Field Office GIS database, or determined by BLM field evaluation; (3) protecting raptor nest sites. **Exception:** The BLM authorized officer may grant an exception if a staff review determines that the proposed action is of a scale, sited in a location, or otherwise designed so that the proposed action would not result in a failure to meet the performance standards above. The determination may include coordination with the WGFD and/or USFWS. **Modification:** A modification may be granted if the BLM authorized officer determines that portions of the leasehold can be occupied without adversely affecting the nest site or suitable nesting habitat, based on topography, species, season of use, and other pertinent factors. The determination may include coordination with the WGFD and/or USFWS. **Waiver:** The stipulation may be waived if the BLM authorized officer determines that the entire lease area is not within ¼ mile of a raptor nest or suitable nesting habitat. This determination shall be based upon a field evaluation of the area by a qualified representative and subject to confirmation from the BLM. Confirmation may include coordination with the WGFD and/or USFWS.
4121 and 7052	NSO	Special Status Species: Chapman Bench Management Area	No surface occupancy or use is allowed (1) within the Chapman Bench Management Area as mapped on the Cody Field Office GIS database; (2) protecting mountain plover, long-billed curlew, and other sensitive species habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action, as proposed or conditioned, would not impair the function or utility of sensitive species habitats, in coordination with the WGFD. **Modification:** The BLM authorized officer may modify the area subject to the stipulation or surface occupancy criteria if after coordination with the WGFD is the BLM determines that the NSO area is not located in habitat for sensitive species. **Waiver:** The BLM authorized officer may grant a waiver if it is determined by the BLM, in coordination with the WGFD, that the lease area is not located within the Chapman Bench Management Area.
4123	CSU	Special Status Species	Surface occupancy or use is restricted within the Meeteetse prairie dog complex. (1) Prior to surface disturbance within the Meeteetse prairie dog complex, a site-specific plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • Verify the presence or absence of prairie dogs within the colony boundary. • New access roads should avoid intersecting a prairie dog colony or bisecting two adjacent colonies. • For multiple –well programs, if geologically and technically feasible, drill from the same pad using directional drilling technologies. • Salvage topsoil from all facilities and re-apply during interim and final reclamation. Native seed mixes will be required to re-establish short grass prairie vegetation during reclamation. (2) as mapped by the WGFD or Cody Field Office GIS database; (3) to retain habitat characteristics within the Meeteetse prairie dog complex for black-footed ferret reintroduction. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the proposed action would not impair the function or utility of the site for reoccupation by black-footed ferret. **Modification:** The BLM authorized officer may modify the area subject to the stipulation or surface occupancy criteria if, in consultation with the USFWS, it is determined that a portion of the NSO area is nonessential for possible reintroduction of black-footed ferret, or is determined not to be located within the Meeteetse prairie dog complex. **Waiver:** The BLM authorized officer may grant a waiver if it is determined by the BLM, in consultation with the USFWS, that the entire lease area is nonessential for possible reintroduction of black-footed ferret, or it is determined the entire lease area is not located within the Meeteetse prairie dog complex.
4127	NSO	Special Status Species: Sage Creek Prairie Dog Town	No surface occupancy is permitted within the Sage Creek Prairie Dog Town (1) as mapped on the Cody Field Office GIS database; (2) protection of black-tailed prairie dog habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action, as proposed or conditioned, would not impair the function or utility of sensitive species habitats, in coordination with the WGFD. **Modification:** The BLM authorized officer may modify the area subject to the stipulation or surface occupancy criteria if after coordination with the WGFD is the BLM determines that the NSO area is not located in habitat for sensitive species. **Waiver:** The BLM authorized officer may grant a waiver if it is determined by the BLM, in coordination with the WGFD, that the lease area is not located within complexes are suitable for black-footed ferret reintroduction.
4132	CSU	Surface Water: Riparian habitat supporting special status fish species	Surface occupancy or use within ¼ mile of perennial surface water, and riparian/wetland areas will be restricted where determined to support special status fish species. (1) Prior to surface disturbance within ¼ mile of perennial surface water, and riparian/wetland areas where determined to support special status fish species, a site-specific plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • Prevent contamination of soil and groundwater. • Upland sites are protected from storm water runoff using proper erosion and sediment control techniques. • Stabilization of channel crossings. (2) as mapped by the WGFD; (3) to protect perennial surface water, and riparian/wetland areas. **Exception:** An exception may be granted by the authorized officer if the operator submits a plan that demonstrates that impacts from the proposed action can be fully mitigated or there are not practical alternatives. **Modification:** Consider modifications if it is determined the proposed project is not located within ¼ mile of perennial surface waters and riparian/wetland areas. **Waiver:** This stipulation may be waived, if the authorized officer determines that the entire leasehold can be occupied without adversely affecting riparian resources.

Record Number	Stipulation Type	Protected Resource	Stipulation Description
4151	TLS	Wild Horses: McCullough Peaks HMA foaling season	No surface use is allowed (1) February 1 to July 31; (2) McCullough Peaks HMA as mapped on the Cody Field Office GIS database; (3) protecting McCullough Peaks HMA foaling season. **Exception:** The BLM authorized officer may grant an exception the BLM determines the area is not likely to be occupied during the period of concern and the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated. **Modification:** The BLM authorized officer may modify the area subject to the stipulations based upon BLM determination that suitable foaling range is not present or boundaries of the HMA have changed. **Waiver:** The BLM authorized officer may grant a waiver if it is determined that the entire lease area is not within the HMA, or is not located within suitable foaling range.
5019	CSU	Cultural Resources: Foreground of important cultural sites (defined in Glossary) up to 3 miles or the visual horizon	Controlled Surface Use (1) Prior to surface disturbance within 3 miles or the visual horizon of important cultural sites, whichever is closer, a site-specific plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-4) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer, in consultation with appropriate Native American tribes and the SHPO, has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • There will be no adverse effects to NRHP eligible or listed historic properties (2) as mapped on the Cody Field Office GIS database; (3) protecting cultural and scenic values of important cultural sites. **Exception:** The BLM authorized officer may grant an exception if, after consultation with Native American tribes and/or SHPO, it is determined that the proposed action will result in a no adverse effect determination to the cultural property(s). **Modification:** This stipulation may be modified by the BLM authorized officer if, in consultation with Native American tribes and/or SHPO, the site is no longer considered eligible for NRHP or if, in consultation with Native American tribes and/or SHPO, it is determined that the identified property's important values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. **Waiver:** The BLM authorized officer may grant a waiver if it is determined, in consultation with Native American tribes and/or SHPO, that the identified cultural site is no longer considered or managed as an important cultural site.
5046	CSU	VRM: Class II	Controlled Surface Use (CSU) – Surface occupancy or use will be restricted within Class I and/or Class II VRM areas. (1) Prior to surface disturbance within Visual Resource Management Class I and/or II areas, a site-specific plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • A visual contrast rating must demonstrate that VRM Class I and/or II objectives will be met. • Where required by the BLM authorized officer, a visual simulation must be prepared and must demonstrate that VRM Class I and/or II objectives will be met through practices such as siting of permanent facilities. • Where present and feasible, existing surface disturbances shall be utilized; new surface disturbances shall be minimized to the extent practicable. • All permanent above-ground facilities (such as production tanks or other production facilities) not having specific coloration requirements for safety must be painted or designed using a BLM-approved color. (2) as mapped in the Cody Field Office GIS database; (3) protecting Class II Visual Resource Management Areas. **Exception:** The BLM authorized officer may grant an exception if it is demonstrated through a BLM-approved visual simulation and contrast rating worksheet that the project or identified mitigation will meet or exceed VRM Class I or II objectives. This restriction does not apply to temporary structures such as drilling rigs. **Modification:** The BLM authorized officer may modify the area subject to the stipulation if it is demonstrated that VRM Class I or II objectives have been modified through appropriate RMP planning procedures, or if a portion of the lease is not located within a VRM Class II area. **Waiver:** The BLM authorized officer may grant a waiver if it is determined that the entire leasehold is no longer managed for VRM Class I or II objectives based on planning, or if the entire leasehold is not located within a Class I or II area.
6065	NSO	Recreational Resources: Campgrounds, trailheads, day use areas, and similar recreation sites	No surface occupancy or use is permitted (1) on developed recreation sites (2) for the protection of designated campgrounds, trailheads, day use areas, and similar recreation sites. **Exception:** An exception to this stipulation may be granted by the BLM authorized officer if the BLM determines that the function and utility of the recreational resources are not adversely affected. **Modification:** The BLM authorized officer may modify the stipulation if the boundaries of recreational sites are changed or a portion of the lease area is determined not to be located within a designated recreational site. **Waiver:** This BLM authorized officer may waive this stipulation if it is determined that the entire leasehold no longer contains developed recreation areas.
6075	NSO	Scenic and Recreational Resources: Areas within the Bighorn River SRMA	No surface occupancy is permitted (1) on lands within the Bighorn River SRMA (2) protecting the Bighorn River SRMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Bighorn River SRMA are changed. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. **Waiver:** A waiver may be granted if the lease is not located within the Bighorn River SRMA.
6093	NSO	Scenic and Recreational Resources: Within ¼ mile of campgrounds, trailheads, day use areas, river access sites, and similar recreational sites in The Rivers SRMA	No surface occupancy is permitted (1) Within ¼ mile of campgrounds, trailheads, day use areas, river access sites, and similar recreational sites in The Rivers SRMA (2) for protection of developed recreation sites. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of The Rivers SRMA are changed. **Waiver:** A waiver may be granted if the lease is not located within The Rivers SRMA.
6100	NSO	Scenic and Recreational Resources: McCullough Peaks SRMA	No surface occupancy is permitted (1) within the McCullough Peaks SRMA (2) for the protection of Scenic and Recreational Resources. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the McCullough Peaks SRMA are changed. **Waiver:** A waiver may be granted if the lease is not located within the McCullough Peaks SRMA.

Record Number	Stipulation Type	Protected Resource	Stipulation Description
6108	CSU	Scenic and Recreational Resources: Beck Lake SRMA	Surface occupancy or use will be restricted or prohibited within the Beck Lake SRMA (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA. (2) as mapped on the Cody Field Office GIS database; (3) protecting Scenic and Recreational Resources and ensuring the recreational opportunities and setting of the SRMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Beck Lake SRMA are changed. **Waiver:** A waiver may be granted if the lease is not located within the Newton Lake Ridge SRMA.
6116	CSU	Scenic and Recreational Resources: Newton Lake Ridge SRMA	Surface occupancy or use will be restricted or prohibited within the Newton Lake Ridge SRMA (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA. (2) as mapped on the Cody Field Office GIS database; (3) protecting Scenic and Recreational Resources and ensuring the recreational opportunities and setting of the SRMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Newton Lake Ridge SRMA are changed. **Waiver:** A waiver may be granted if the lease is not located within the Newton Lake Ridge SRMA.
7009	NSO	Special Designations (Geologic Resources): Center of the Sheep Mountain Anticline ACEC	No surface occupancy is permitted (1) within the center of the Sheep Mountain Anticline ACEC (2) protection of geologic resources. **Exception:** An exception to this restriction or stipulation may be granted by the authorized officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Sheep Mountain Anticline ACEC are changed. **Waiver:** This stipulation may be waived, if the authorized officer determines that the entire leasehold is no longer within a designated ACEC.
7009	CSU	Special Designations (Geologic Resources): Northern and southern portions of the Sheep Mountain Anticline ACEC	Surface occupancy or use will be restricted or prohibited within the Northern and southern portion of the Sheep Mountain Anticline ACEC (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; (2) as mapped on the Cody Field Office GIS database; (3) protecting Special Designations (Geologic Resources). **Exception:** An exception to this restriction or stipulation may be granted by the authorized officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated. **Modification:** The stipulated area may be modified by the authorized officer if the Sheep Mountain Anticline ACEC boundaries are changed. **Waiver:** This stipulation may be waived, if the authorized officer determines that the entire leasehold is no longer within an ACEC.
7073	NSO	Special Designations (Geologic; Paleontological): Paleocene, Eocene Thermal Maximum ACEC	No surface occupancy is permitted (1) within the PETM ACEC (2) protection of geologic and paleontological resources. **Exception:** An exception to this restriction or stipulation may be granted by the authorized officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated. **Modification:** The stipulated area may be modified by the authorized officer if the Paleocene, Eocene Thermal Maximum ACEC boundaries are changed. **Waiver:** This stipulation may be waived, if the authorized officer determines that the entire leasehold no longer within a designated ACEC.
7090	CSU	Special Designations (Cultural Resources): Within the viewshed from the Heart Mountain Relocation Camp National Historic Landmark toward Heart Mountain	Surface occupancy or use will be restricted or prohibited within the viewshed of the Heart Mountain Relocation Camp National Historic Landmark (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; (2) as mapped on the Cody Field Office GIS database; (3) protecting the viewshed from the Heart Mountain Relocation Camp National Historic Landmark toward Heart Mountain. **Exception:** An exception to this restriction or stipulation may be granted by the authorized officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated. **Modification:** The stipulated area may be modified by the authorized officer if a portion of the lease is found to not be within the viewshed of the Heart Mountain Relocation Camp National Historic Landmark. **Waiver:** A waiver may be granted if the lease is not within the viewshed from t
7093	CSU	Special Designations (Scenic and Cultural Resources): Up to 3 miles from the Nez Perce (Neeme-poo) NHT	Surface occupancy or use will be restricted or prohibited within 3 miles from the Nez Perce (Neeme-poo) NHT or the visual horizon whichever is closer (the SCZ) where setting is an important aspect of the integrity for the trail (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate proposed infrastructure is either not visible or will result in a weak contrast rating. (2) as mapped on the Cody Field Office GIS database; (3) protecting Special Designations (Scenic and Cultural Resources) the Nez Perce (Neeme-poo) NHT **Exception:** The authorized officer may consider a lease stipulation exception within the National Trails Management Corridor if 1) an action is at least 3 miles from a National Trail, a significant National Trail historical or recreational site, or Trail-related recreational activities; or, 2) all components and effects of the action are in compliance with the RMP-designated VRM standard in consultation with appropriate federal agency. The proposal must be capable of attaining a no adverse-affect determination in consultation with SHPO. **Modification:** The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if it is determined by the BLM, after consultation with the appropriate federal and/or agency that a portion of the NSO area does not contribute, as determined by Section 106, to the trails' nature and purpose or their setting or if the proposed action can be developed in a way that meets the management objectives for the NHTs. This determination shall be based upon field evaluation of the area by a qualified archaeologist/historian and subject to confirmation by the BLM. **Waiver:** The authorized officer may grant a waiver if it is determined, in consultation with the appropriate federal and/or state agency, that the area is no longer considered to contribute to the trails' nature and purpose or setting or if the proposed action can be developed in a way that meets the management objectives for the NHTs. This determination shall be based upon field evaluation of the area by a qualified archaeologist/historian and subject to confirmation by the BLM.

Record Number	Stipulation Type	Protected Resource	Stipulation Description
7097	CSU	Special Designations (Scenic and Cultural Resources): Up to 2 miles from Other Trails	Surface occupancy or use will be restricted or prohibited up to 2 miles where setting is an important aspect of the integrity for the trail. (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate proposed infrastructure is either not visible or will result in a weak contrast rating. (2) as mapped on the Cody Field Office GIS database; (3) protecting other historic trails. **Exception:** The authorized officer may grant an exception if surveys determine that other historic trail remnants are not present or it is determined that the section of trail is sufficiently compromised that the action will not result in an adverse effect to the trail. **Modification:** If surveys determine that a portion of the lease area does not contain contributing trail segments, then the stipulation may be modified. This determination shall be based upon field evaluation of the area by a qualified archaeologist/historian and subject to confirmation by the BLM. **Waiver:** The authorized officer may grant a waiver if surveys determine that the entire lease area does not contain contributing trail segments. This determination shall be based upon field evaluation of the area by a qualified archaeologist/historian and subject to confirmation by the BLM.

Required Design Features (BLM 2015b)

Roads

- Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
- Locate roads to avoid important areas and habitats.
- Coordinate road construction and use among federal fluid mineral lessees and ROW or Surface Use Agreement (SUA) holders.
- Construct road crossings of ephemeral, intermittent, and perennial streams to minimize impacts to the riparian habitat, such as by crossing at right angles to ephemeral drainages and stream crossings.
- Establish slow speed limits on BLM and Forest Service system-administered roads or design roads for slower vehicle speeds to reduce Greater Sage-Grouse mortality.
- Establish trip restrictions or minimization through use of telemetry and remote well control (e.g., Supervisory Control and Data Acquisition).
- Do not issue ROWs or SUAs to counties on energy development roads, unless for a temporary use consistent with all other terms and conditions including this document.
- Restrict vehicle traffic to only authorized users on newly constructed routes (using signage, gates, etc.)
- Apply dust abatement on roads, well pads, and other surface disturbances.
- Close and rehabilitate duplicate roads by restoring original landform and establishing a desirable plant community.
- Do not issue ROWs to counties on newly constructed energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document

Operations

- Site and/or minimize linear ROWs or SUAs to reduce disturbance and fragmentation of sagebrush habitats.
- Place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.
- Collocate powerlines, flowlines, and small pipelines under or immediately adjacent to existing roads/transportation corridors.
- Control the spread and effects of invasive non-native plant species, including treating weeds prior to surface disturbance and washing vehicles and equipment at designated wash stations when constructing in areas with weed infestations.
- Clean up refuse.
- Place infrastructure in already disturbed locations where the habitat has not been fully restored.
- Apply a phased development approach with concurrent reclamation.
- Pipelines must be under or immediately adjacent to the road.
- Design or site permanent structures to minimize impacts to Greater Sage-Grouse, with emphasis on locating and operating facilities that create movement (e.g., pump jacks) or attract frequent human use and vehicular traffic (e.g., fluid storage tanks) in a manner that will minimize disturbance of Greater Sage-Grouse or interference with habitat use.

Noise

- Limit noise to less than 10 decibels above ambient measures (20 to 24 decibels) at sunrise at the perimeter of a lek during active lek season.
- Require noise shields when drilling during the lek, nesting, brood-rearing, or wintering season.
- Locate new compressor stations outside priority habitats and design them to reduce noise that may be directed towards priority habitat.

Reclamation

- Include objectives for ensuring habitat restoration to meet Greater Sage-Grouse habitat needs in reclamation practices/sites. Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve Greater Sage-Grouse habitat needs.
- Maximize the area of interim reclamation on long-term access roads and well pads, including reshaping, topsoiling, and revegetating cut-and-fill slopes.
- Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.
- Implement irrigation during interim or final reclamation for sites where establishment of seedlings has been shown or is expected to be difficult due to dry conditions. Utilize mulching techniques to expedite reclamation.
- Use mulching, soil amendments, and/or erosion blankets to expedite reclamation and to protect soils.
- Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve Greater Sage-Grouse habitat needs.
- Minimize surface-disturbing or disrupting activities (including operations and maintenance) where needed to reduce the impacts of human activities on important seasonal Greater Sage-Grouse habitats. Apply these measures during project level planning.
- When conducting NEPA analysis for wild horse and burro management activities, water developments or other rangeland improvements for wild horses in priority Greater Sage-Grouse habitat, address (and apply conservation measures as appropriate) the direct and indirect effects to Greater Sage-Grouse populations and habitat.
- During activity level planning, where appropriate, designate routes with current administrative/agency purpose or need to administrative access only.
- Identify and work with partners to increase native seed availability and work with plant material centers to develop new plant materials, especially the forbs needed to restore Greater Sage-Grouse habitat.
- Consider potential changes in climate when proposing seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed.
- Use Ecological Site Descriptions (ESDs) or other protocols could be used (e.g., TEUI or LSI) to identify the understory species and sagebrush subspecies needed to restore desirable habitat conditions.

Best Management Practices (BLM 2015b)

Important Cultural Resource and Trail Settings

The BLM should use standard measures to reduce the visual impact of proposed actions within trail settings, where setting is a contributing element of eligibility to the National Register of Historic Places and the setting has integrity. Standard measures should be used as stipulations or conditions of approval attached to authorizations. Standard measures, or BMPs, for reducing the visibility of proposed actions include, but are not limited to:

- Apply a controlled surface use (CSU) stipulation to surface-disturbing activities or surface occupancy.
- Visual Contrast Ratings and, as appropriate, require visual simulations.
- Consolidate project facilities among oil and gas developers; maximize use of existing locations.
- Develop coordinated road and pipeline systems.
- Reduce the amount of surface development by consolidating facilities.
- Use low-profile facilities.
- Locate projects to maximize the use of topography and vegetation to screen development.
- Design projects to blend with topographic forms and existing vegetation patterns.
- Use environmental coloration or camouflage techniques to reduce the visual impact of facilities that cannot be completely hidden.
- Use broken linear patterns for road developments to screen roads as much as possible. This can include feathering or blending of the edges of linear ROWs to soften the dominant line form.
- Design linear facilities and seismic lines to run parallel to key observation points rather than perpendicular.
- Position facilities to present less of a visual impact (e.g., a facility with several tanks lined up so that one obscures the visibility of the others).

Aquatic Invasive Species

To prevent the spread of aquatic invasive species, the Wyoming Game and Fish Department recommends following the guidelines outlined in the Aquatic Invasive Species in Wyoming brochure (link below). Specific BMPs to aquatic invasive species spread prevention include, but are not limited to:

- Decontamination should first occur before arrival at a project site, so aquatic invasive species are not transferred from the last visited area. Decontamination should occur again before leaving a project site, so aquatic invasive species are not transferred to the next site.
- Decontamination may consist of either:
    - Drain all water from equipment and compartments, clean equipment of all mud, plants, debris, or animals, and dry equipment for five days in summer (June, July, and August); 18 days in spring (March, April, and May) and fall (September, October, and November); or three days in winter (December, January, and February) when temperatures are at or below freezing, -or
    - Use a high pressure (2,500 pounds per square inch [psi]) hot water (140°F) pressure washer to thoroughly wash equipment and flush all compartments that may hold water.

Reseeding

The following recommendations may be required depending on the project size and location.

- Proposed actions where native brush species located on lands proposed to be disturbed are unique and desirable for interim and final reclamation purposes, and the seed supply for these desirable brush species is not commercially available, will be collected from the area and stored using the procedures of the Seeds of Success program. Seedlings or plugs of common dominant species will be propagated, preferably locally, in preparation for use in portions of area to be reclaimed to expedite vegetation recovery.
- Areas of sustainable plant communities and populations (where they do not conflict with other allowable resource uses) will be identified as sources for native plant material and will be managed under consideration of the need to consistently produce seed stocks of non-commercially available materials for use in reclamation and restoration work (e.g., to support reclamation of abandoned mine lands or well pads or to supplement commercially available seeds in high fire years).

Engineering

Road maintenance, construction, and any other related travel and transportation management will be mandated by BLM Manual 9113. BLM Manual 9113 provides for BMPs to be used in evaluating, maintaining, and constructing BLM travel and transportation routes. As stated in Manual 9113, "Bureau roads must be designed to an appropriate standard no higher than necessary to accommodate their intended functions adequately (timber hauling administrative access, public travel); and design, construction, and maintenance activities must be consistent with national policies for safety, aesthetics, protection and preservation of cultural, historic, and scenic values, and accessibility for the physically handicapped. The following is a list of BMPs that are recommended but not binding for road maintenance practices:

- Design roads to minimize total disturbance, to conform with topography, and to minimize disruption of natural drainage patterns.
- Base road design criteria and standards on road management objectives such as traffic requirements of the proposed activity and the overall transportation planning, economic analysis, safety requirements, resource objectives, and minimizing damage to the environment.
- Locate roads on stable terrain such as ridge tops, natural benches, and flatter transitional slopes near ridges, and valley bottoms, and moderate side slopes and away from slumps, slide prone areas, concave slopes, clay beds, and where rock layers dip parallel to the slope. Locate roads on well-drained soil types; avoid wet areas when possible.
- Construct cut and fill slopes to be approximately 3 horizontal (h):1 vertical (v) or flatter where feasible. Locate roads to minimize heights of cutbanks. Avoid high, steeply sloping cutbanks in highly fractured bedrock.
- Avoid headwalls, midslope locations on steep, unstable slopes, fragile soils, seeps, old landslides, side slopes in excess of 70 percent, and areas where the geologic bedding planes or weathering surfaces are inclined with the slope. Implement extra mitigation measures when these areas cannot be avoided.
- Construct roads for surface drainage by using outslopes, crowns, grade changes, drain dips, waterbars and in-sloping to ditches as appropriate.
- Sloping the road base to the outside edge for surface drainage is normally recommended for local spurs or minor collector roads where low-volume traffic and lower traffic speeds are anticipated.

This is also recommended in situations where long intervals between maintenance will occur and where minimum excavation is wanted. Out-sloping is not recommended on steep slopes. Sloping the road base to the inside edge is an acceptable practice on roads with steep side slopes and where the underlying soil formation is very rocky and not subject to appreciable erosion or failure.

- Crown and ditching is recommended for arterial and collector roads where traffic volume, speed, intensity and user comfort are considerations. Recommended gradients range from 0 to 15 percent where crown and ditching may be applied, as long as adequate drainage away from the road surface and ditch lines is maintained.
- Minimize excavation, when constructing roads, through the use of balanced earthwork, narrowing road widths, and end hauling where side slopes are between 50 and 70 percent.
- If possible, construct roads when soils are dry and not frozen. When soils or road surfaces become saturated to a depth of 3 inches, BLM-authorized activities should be limited or ceased unless otherwise approved by the authorized officer.
- Consider improving inadequately surfaced roads that are to be left open to public traffic during wet weather with gravel or pavement to minimize sediment production and maximize safety.
- Retain vegetation on cut slopes unless it poses a safety hazard or restricts maintenance activities. Roadside brushing of vegetation should be done in a way that prevents disturbance to root systems and visual intrusions (i.e., avoid using excavators for brushing).
- Retain adequate vegetation between roads and streams to filter runoff caused by roads.
- Avoid riparian/wetland areas where feasible; locate in riparian/wetland areas only if the roads do not interfere with the attainment of resource objectives.
- Minimize the number of unimproved stream crossings. When a culvert or bridge is not feasible, locate drive-through (low water crossings) on stable rock portions of the drainage channel. Harden crossings with the addition of rock and gravel if necessary. Use angular rock if available.
- Locate roads and limit activities of mechanized equipment within stream channels to minimize their influence on riparian areas. When crossing a stream is necessary, design the approach and crossing perpendicular to the channel, where practicable. Locate the crossing where the channel is well defined, unobstructed, and straight.
- Avoid placing fill material in floodplain unless the material is large enough to remain in place during flood events.
- Use drainage dips instead of culverts on level 2 roads where gradients will not present a safety issue. Locate drainage dips in such a way so that water will not accumulate or where outside berms prevent drainage from the roadway. Locate and design drainage dips immediately upgrade of stream crossings and provide buffer areas and catchment basins to prevent sediment from entering the stream.
- Construct catchment basins, brush windrows, and culverts in a way to minimize sediment transport from road surfaces to stream channels. Install culverts in natural drainage channels in a way to conform with the natural streambed gradients with outlets that discharge onto rocky or hardened protected areas.
- Design and locate water crossing structures in natural drainage channels to accommodate adequate fish passage, provide for minimum impacts to water quality, and to be capable of handling a 100-year event for runoff and floodwaters.
- Use culverts that pass, at a minimum, a 25-year storm event or have a minimum diameter of 24 inches for permanent stream crossings and a minimum diameter of 18 inches for road cross drains.

- Replace undersized culverts and repair or replace damaged culverts and downspouts. Provide energy dissipaters at culvert outlets or drainage dips.
- Locate culverts or drainage dips in such a manner as to avoid discharge onto unstable terrain such as headwalls or slumps. Provide adequate spacing to avoid accumulation of water in ditches or road surfaces. Culverts should be placed on solid ground to avoid road failures.
- Proper sized aggregate and riprap should be used during culvert construction. Place riprap at culvert entrance to streamline waterflow and reduce erosion.
- Establish adapted vegetation on all cuts and fill immediately following road construction and maintenance.
- Remove berms from the downslope side of roads, consistent with safety considerations.
- Leave abandoned roads in a condition that provides adequate drainage without further maintenance. Close abandoned roads to traffic. Physically obstruct the road with gates, large berms, trenches, logs, stumps, or rock boulders as necessary to accomplish permanent closure.
- Abandon and rehabilitate roads that are no longer needed. Leave these roads in a condition that provides adequate drainage. Remove culverts.
- When plowing snow for winter use of roads, provide breaks in snow berms to allow for road drainage. Avoid plowing snow into streams. Plow snow only on existing roads.
- Maintenance should be performed to conserve existing surface material, retain the original crowned or out-sloped self-draining cross section, prevent or remove rutting berms (except those designed for slope protection) and other irregularities that retard normal surface runoff. Avoid wasting loose ditch or surface material over the shoulder where it can cause stream sedimentation or weaken slump-prone areas. Avoid undercutting back slopes.
- Do not disturb the toe of cut slopes while pulling ditches or grading roads. Avoid sidecasting road material into streams.
- Grade roads only as necessary. Maintain drain dips, waterbars, road crown, in-sloping and outsloping, as appropriate, during road maintenance.
- Maintain roads in special areas according to special area guidance. Generally, retain roads within existing disturbed areas and sidecast material away from the special area.
- When landslides occur, save all soil and material usable for reclamation or stockpile for future reclamation needs. Avoid sidecasting of slide material where it can damage, overload, and saturate embankments, or flow into down-slope drainage courses. Reestablish vegetation as needed in areas where vegetation has been destroyed due to sidecasting.
- Strip and stockpile topsoil ahead of construction of new roads, if feasible. Reapply soil to cut and fill slopes prior to revegetation.

Visual Resources

The following BMPs would be considered to reduce impacts to all visual resource management classes within the planning area:

- Burying of distribution power lines and flow lines in or adjacent to access roads;
- Repeating elements of form, line, color, and texture to blend facilities and access roads with the surrounding landscape;

- Painting all above-ground structures, production equipment, tanks, transformers, and insulators not subject to safety requirements to blend with the natural color of the landscape, using paint that is a non-reflective "standard environmental color" approved by the BLM visual resource management (VRM) specialist:
    - All new equipment brought onto the sites should be painted the same color(s);
    - Semi-gloss paints will stain and fade less than flat paints;
    - Typically, the background is a vegetated background, and seldom a solid background;
    - The selected color should be one or two shades darker than the background; and
    - Consider the predominant season of public use; however, never paint an object to match snow.
- Performing final reclamation recontouring of all disturbed areas, including access roads, to the original contour or a contour that blends with the surrounding topography;
- Avoiding facility placement on steep slopes, ridge tops, and hilltops;
- Screening facilities from view;
- Following contours of the land to reduce unnecessary disturbance;
- Recontouring and revegetating disturbed areas to blend with the surrounding landscape;
- Reclaiming unnecessary access roads as soon as possible to the original contour;
- Using gravel of a similar color to adjacent dominant soil and vegetation colors for road surfacing;
- Use dust abatement to reduce fugitive dust, as well as minimize the light colors of the routes;
- Using subsurface or low-profile facilities to prevent protrusion above horizon line when viewed from any primary road;
- Locating facilities far enough from the cut and fill slopes to facilitate recontouring for interim reclamation;
- Completing an annual transportation plan for entire area before beginning construction, and making a layout that will minimize disturbance and visual impact;
- Designing and constructing all new roads to a safe and appropriate standard "no higher than necessary" to accommodate their intended use;
- Locating roads far enough off the back of ridgelines so they aren't visible from state, county, or BLM roads;
- Using remote monitoring to reduce traffic and road requirements;
- Removing unused equipment, trash, and junk immediately.

Literature Cited

Bureau of Land Management (BLM). 2015a. *Appendix B. Oil and Gas Lease Notices and Lease Stipulations, including Exception, Modification, and Waiver Criteria*. In *Bureau of Land Management Cody Field Office Approved Resource Management Plan*. Cody, Wyoming: BLM Cody Field Office. Available at https://eplanning.blm.gov/epl-front-office/projects/lup/9506/63298/68540/CYFO_Final_ARMP.pdf. Accessed March 9, 2020.

———. 2015b. *Appendix C. Required Design Features and Best Management Practices*. In *Bureau of Land Management Cody Field Office Approved Resource Management Plan*. Cody, Wyoming: BLM Cody Field Office. Available at https://eplanning.blm.gov/epl-front-office/projects/lup/9506/63298/68540/CYFO_Final_ARMP.pdf. Accessed March 9, 2020.

KEMMERER RESOURCE MANAGEMENT PLAN

Stipulations

Refer to individual resource sections of the Record of Decision and Approved Kemmerer Resource Management Plan for any applicable stipulations (BLM 2010).

Required Design Features

No required design features listed in RMP.

Best Management Practices

No BMPs listed in RMP.

Wyoming BLM Mitigation Guidelines for Surface Disturbing and Disruptive Activities (BLM 2010)

Surface Disturbance Mitigation Guideline

Surface disturbance will be prohibited in any of the following areas or conditions. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the authorized officer.

- Slopes in excess of 25 percent.
- Within important scenic areas (Class I and II Visual Resource Management Areas).
- Within 500 feet of surface water and/or riparian areas.
- Within either one-quarter mile or the visual horizon (whichever is closer) of historic trails.
- Construction with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur.

Wildlife Mitigation Guideline

- To protect important big game winter habitat, activities or surface use will not be allowed from November 15 to April 30 within certain areas encompassed by the authorization. The same criteria apply to defined big game birthing areas from May 1 to June 30.
- Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.
- Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.
- To protect important raptor and/or sage and sharp-tailed grouse nesting habitat, activities or surface use will not be allowed from February 1 to July 31 within certain areas encompassed by the authorization. The same criteria apply to defined raptor and game bird winter concentration areas from November 15 to April 30.

- Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.
- Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.
- No activities or surface use will be allowed on that portion of the authorization area identified within (legal description) for the purpose of protecting (e.g., sage/sharp-tailed grouse breeding grounds, and/or other species/activities) habitat.
- Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.
- Portions of the authorized use area legally described as (legal description), are known or suspected to be essential habitat for (name) which is a threatened or endangered species. Prior to conducting any onsite activities, the lessee/permittee will be required to conduct inventories or studies in accordance with BLM and U.S. Fish and Wildlife Service guidelines to verify the presence or absence of this species. In the event that (name) occurrence is identified, the lessee/permittee will be required to modify operational plans to include the protection requirements of this species and its habitat (e.g., seasonal use restrictions, occupancy limitations, facility design modifications).

Cultural Resource Mitigation Guideline

When a proposed discretionary land use has potential for affecting the characteristics, which qualify a cultural property for the National Register of Historic Places (NRHP), mitigation will be considered. In accordance with Section 106 of the Historic Preservation Act, procedures specified in 36 Code of Federal Regulation (CFR) 800 will be used in consultation with the Wyoming State Historic Preservation Officer and the Advisory Council on Historic Preservation in arriving at determinations regarding the need and type of mitigation to be required.

Special Resource Mitigation Guideline

To protect (resource value), activities or surface use will not be allowed (i.e., within a specific distance of the resource value or between date to date) in (legal description).

Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.

Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.

Example Resource Categories (Select or identify category and specific resource value):

- Recreation areas.
- Special natural history or paleontological features.
- Other management areas.
- Sections of major rivers.
- Prior existing rights-of-way.
- Occupied dwellings.
- Other (specify).

No Surface Occupancy Guideline

No Surface Occupancy (NSO) for fluid minerals will be allowed on the following described lands (legal description) because of (resource value).

Example Resource Categories (Select or identify category and specific resource value):

- Recreation Areas (e.g., campgrounds, historic trails, national monuments).
- Major reservoirs/dams.
- Other management area (e.g., known threatened or endangered species habitat, areas suitable for consideration for wild and scenic rivers designation).
- Other (specify).

Literature Cited

Bureau of Land Management (BLM). 2010. *Appendix N. Wyoming Bureau of Land Management Mitigation Guidelines for Surface-Disturbing and Disruptive Activities*. In *Record of Decision and Approved Kemmerer Resource Management Plan*. Kemmerer, Wyoming: BLM Kemmerer Field Office. Available at https://eplanning.blm.gov/epl-front-office/projects/lup/63198/77650/86677/AppendixN-Guidelines_Surface_Disturbing_Activities.pdf. Accessed March 9, 2020.

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LANDER RESOURCE MANAGEMENT PLAN

Stipulations (BLM 2014a)

Decision	Stipulation Type	Protected Resource	Stipulation Description
1013	CSU	Limited reclamation potential soils	Surface occupancy or use will be restricted in areas identified as limited reclamation potential soils (1) as mapped on the Lander Field Office GIS database and (2) to protect sensitive soil resources. Exception: The Authorized Officer may grant an exception if it is determined that the action will meet the designated RMP performance standards identified in Appendix B (p. 185). Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) Modification: The Authorized Officer may modify the area subject to the stipulation based on a NRCS soil survey or BLM evaluation or monitoring results, or if it is determined that the lease action(s) is/are not located within identified limited reclamation potential soils. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) Waiver: The Authorized Officer may grant a waiver if it is determined that the entire lease area does not include limited reclamation potential soils as determined from NRCS mapping and/or BLM evaluation of the area. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
1014	CSU	Slopes between 15 and 24 percent	Surface occupancy or use will be restricted on slopes between 15 and 24 percent (1) as mapped on the Lander Field Office GIS database and (2) to protect areas containing slopes between 15 and 24 percent. **Exception:** The Authorized Officer may grant an exception if it is determined that the proposed action will meet the designated RMP performance standards as identified in Appendix B (p. 185), through engineered construction and/or reclamation plans. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation based on a BLM evaluation or monitoring results that show that the action is not located within sensitive soil areas or that the action can meet the RMP-designated performance standards identified in Appendix B (p. 185). Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area does not include soils with slopes between 15 percent and 24 percent or that the lease action(s) can meet the RMP-designated performance standards identified in Appendix B (p. 185). Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
1014	NSO	Slopes greater than 25 percent	No surface occupancy or use is allowed on slopes greater than 25 percent (1) as mapped on the Lander Field Office GIS database and (2) to protect areas containing slopes greater than 25 percent. **Exception:** The Authorized Officer may grant an exception if it is determined that the proposed action will meet the RMP-designated performance standards identified in Appendix B (p. 185) through engineering, construction, and/or reclamation plans. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation based on a BLM evaluation or monitoring results that show that the lease action(s) is/are not located within sensitive soil areas or that the lease action(s) can meet the RMP-designated performance standards identified in Appendix B (p. 185). Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if a BLM evaluation of the area determines that the entire lease area does not include slopes greater than 25 percent or that the lease action(s) can meet the RMP-designated performance standards identified in Appendix B (p. 185). Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
1045	NSO	Sole source aquifers	No surface occupancy or use is allowed within identified sole source aquifers (1) as mapped on the Lander Field Office GIS database and (2) to protect identified sole source aquifers. **Exception:** The Authorized Officer may grant an exception if it is determined that the proposed action would not impair Wyoming DEQ designated uses, in coordination with the Wyoming DEQ. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation if it is determined that the lease action(s) is/are not within a mapped sole source aquifer, in coordination with the Wyoming DEQ. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area does not include sole source aquifers, in coordination with the Wyoming DEQ. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
2024	NSO	Unique plant communities, cultural sites, viewshed, and geologic resources of the Beaver Rim Master Leasing Plan area.	No surface use or occupancy is allowed on 29,567 acres of the Beaver Rim Master Leasing Plan area (1) as mapped on the Lander Field Office GIS database and (2) to protect unique plant communities, cultural sites, viewshed, and geologic resources in the Beaver Rim Master Leasing Plan area. **Exception:** The Authorized Officer may grant an exception if it is determined that the proposed action is of a scale, sited in a location, or otherwise designed so that the action will not result in adverse impacts to the unique plant communities, cultural sites, viewshed, and geologic resources within the Beaver Rim Master Leasing Plan area. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation if it is determined that the lease action(s) is/are not located within the NSO area or if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in adverse impacts to the unique plant communities, cultural sites, viewshed, and geologic resources within the Beaver Rim Master Leasing Plan area. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area is no longer located within the defined Beaver Rim Master Leasing Plan NSO area. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Decision	Stipulation Type	Protected Resource	Stipulation Description
2024	CSU	100-year floodplains within the Beaver Rim Master Leasing Plan area	No surface use or occupancy is allowed within 100-year floodplains (1) as mapped on the Lander Field Office GIS database and (2) to protect 100 year floodplains within the Beaver Rim Master Leasing Plan area. **Exception:** The Authorized Officer may grant an exception if it is determined that the proposed action is of a scale, sited in a location, or otherwise designed so that the action will not result in adverse impacts to water or riparian-wetland quality within the Beaver Rim Master Leasing Plan area 100-year floodplain, or if the proposed action is not located within a mapped 100-year floodplain based on a BLM field evaluation. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation if it is determined that the lease action(s) is/are of a scale, sited in a location, or otherwise designed so that the action will not result in adverse impacts to water or riparian-wetland quality or is not located within a mapped Beaver Rim Master Leasing Plan area 100-year floodplain based on a BLM field evaluation. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area does not include Beaver Rim Master Leasing Plan area 100-year floodplains based on a BLM field evaluation. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
2024	CSU	Unique plant communities, cultural sites, viewshed, geologic resources, wild horse migration routes, and riparian-wetland resources of the Beaver Rim Master Leasing Plan area.	Surface occupancy or use will be restricted on 121,255 acres in the Beaver Rim Master Leasing Plan area (1) as mapped on the Lander Field Office GIS database and (2) for the protection of unique plant communities, cultural sites, viewshed, geologic resources, wild horse migration routes, and riparian-wetland resources of the Beaver Rim Master Leasing Plan area. **Exception:** The Authorized Officer may grant an exception if it is determined that the proposed action will not result in loss of setting for cultural resources or degrade the viewshed or geologic resources, unique plant communities and riparian-wetland areas, or impede wild horse migration. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation if it is determined that the lease action(s) would not result in a loss of setting of cultural resources or degrade the viewshed or geologic resources, or does not contain wild horse migration areas, riparian-wetland resources, or unique plant communities, or if a portion of the leasehold is not located within the Beaver Rim Master Leasing Plan area. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area does not contain wild horse migration areas or unique plant communities, and does not contribute to the setting of cultural resources or important visual resources, or if the entire leasehold is not located within the Beaver Rim Master Leasing Plan area. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
2031	NSO	Native American spiritual and/or cultural values.	No surface use or occupancy is allowed within 0.25 mile of National Register of Historic Places-eligible Native America cultural resource sites (1) as mapped on the Lander Field Office GIS database and (2) for the protection of Native American spiritual and/or cultural values. **Exception:** The Authorized Officer may grant an exception if, after consultation with Native American tribes and the State Historic Preservation Office, it is determined that the proposed action will result in a determination of no adverse effect on the sacred, spiritual, and/or traditional nature of the property(ies). Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** This stipulation may be modified if the lease action(s) will result in a determination of no adverse effect, or if the site is no longer considered eligible under National Register of Historic Places, or if in consultation with Native American tribes and the State Historic Preservation Office, it is determined that the identified property's sacred, spiritual, and/or traditional values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined, in consultation with Native American tribes and the State Historic Preservation Office, that the identified site is no longer considered sacred, spiritual, and/or traditional, or if it is determined that the entire lease area does not include sites known to be of interest to Native American tribes and/or have spiritual or cultural values. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4031	NSO	Perennial surface waters, riparian-wetland areas, and playas in Designated Development Areas.	No surface occupancy or use is allowed within 500 feet of perennial surface waters, riparian-wetland areas, and/or playas within Designated Development Areas unless a lesser distance is determined to provide equivalent protection (1) as mapped on the Lander Field Office GIS database and (2) to protect perennial surface waters, riparian-wetland areas, and/or playas. **Exception:** The Authorized Officer may grant an exception if, based on an evaluation by the BLM, it is determined that the proposal would not adversely affect perennial surface waters, riparian-wetland areas, and/or playas. The Authorized Officer may grant an exception within Designated Development Areas if it is determined that less distance would provide equivalent protection to perennial surface waters, riparian-wetland areas, and/or playas. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation if, based on an evaluation by the BLM, it is determined that the proposal is not located within 500 feet of perennial surface waters, riparian-wetland areas, and/or playas. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area is not within 500 feet of perennial surface waters, riparian-wetland areas, and/or playas. This determination will be based on an evaluation by the BLM. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Decision	Stipulation Type	Protected Resource	Stipulation Description
4031	NSO	Perennial surface waters, riparian-wetland areas, and playas	No surface occupancy or use is allowed within 500 feet of perennial surface waters, riparian-wetland areas and/or playas (1) as mapped on the Lander Field Office GIS database and (2) to protect perennial surface waters, riparian-wetland areas, and/or playas. **Exception:** The Authorized Officer may grant an exception if, based on an evaluation by the BLM, it is determined that the proposal would not adversely affect perennial surface waters, riparian-wetland areas, and/or playas. The Authorized Officer may grant an exception outside Designated Development Areas if it is determined that less distance would provide equivalent protection to perennial surface waters, riparian-wetland areas, and/or playas. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation if, based on an evaluation by the BLM, it is determined that the proposal is not located within 500 feet of perennial surface waters, riparian-wetland areas, and/or playas. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area is not within 500 feet of perennial surface waters, riparian-wetland areas, and/or playas. This determination will be based on an evaluation by the BLM. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4045	NSO	Wildlife, viewsheds, cultural resources, and other values in the Hudson to Atlantic City area	No surface use or occupancy is allowed within the Hudson to Atlantic City area (1) as mapped on the Lander Field Office GIS database and (2) for the protection of wildlife, cultural resources, viewshed, and/or recreational use(s) in the Hudson to Atlantic City area. **Exception:** The Authorized Officer may grant an exception if it is determined that the action, as proposed or conditioned, would not adversely impact the wildlife, cultural resources, viewshed, and/or recreational use(s) of the area, in coordination with the appropriate state agency (State Historic Preservation Office and/or the WGFD). Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation or surface occupancy criteria if after consultation with the appropriate state agency (State Historic Preservation Office or WGFD) it is determined that a portion of the NSO area is not essential to the protection of the wildlife, cultural resource, viewshed and recreational use values. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined by the BLM, in coordination with the National Park Service in the case of the national historic trails, the U.S. Forest Service in connection with the national scenic trail, or the WGFD in connection with wildlife species, that the area is no longer considered to contribute to sensitive resource values. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4053	TLS	Spring spawning habitat in fish-bearing streams	Surface-disturbing and disruptive activities are prohibited within the identified bankfull channel width of fish-bearing streams (1) as mapped on the Lander Field Office GIS database, (2) from March 15 to July 31, and (3) for the protection of spring spawning habitat in fish bearing streams. **Exception:** The Authorized Officer may grant an exception if the operator demonstrates that spawning habitat is not occupied during the period of concern, subject to confirmation by the BLM, in coordination with the WGFD, as appropriate, or if it is determined that the action will not impair the function or suitability of the habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The BLM Authorized Officer may modify the area subject to the stipulations based on a determination by the BLM, in coordination with WGFD, as appropriate, that the lease area does not contain fish-bearing streams or suitable fish spawning habitat or stream segments compatible with fish passage. The stipulation may also be modified based on negative or positive monitoring results. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area does not contain fish-bearing streams, suitable fish spawning habitats, or stream segments compatible with fish passage. This determination shall be based on a BLM evaluation, in coordination with the WGFD. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4053	TSL	Fall spawning habitat in fish-bearing streams	Surface-disturbing and disruptive activities are prohibited within the identified bankfull channel width of fish-bearing streams (1) as mapped on the Lander Field Office GIS database, (2) from September 15 to November 30 and (3) to protect fall spawning habitat in fish-bearing streams. **Exception:** The Authorized Officer may grant an exception if the operator demonstrates that spawning habitat is not occupied during the period of concern, subject to confirmation by the BLM, in coordination with WGFD, as appropriate, or if it is determined that the action will not impair the function or the suitability of the habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The BLM Authorized Officer may modify the area subject to the stipulations based on a determination by the BLM, in coordination with WGFD, as appropriate, that the lease area does not contain fish-bearing streams, suitable fish spawning habitat, or stream segments compatible with fish passage. The stipulation may also be modified based on negative or positive monitoring results. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area does not contain fish-bearing streams or suitable fish spawning habitat or fish passage compatible stream segments. This determination shall be based on a BLM evaluation, in coordination with the WGFD, as appropriate. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4061	TLS	Big Game Crucial Winter Range and Parturition Areas	Surface-disturbing and disruptive activities are prohibited in identified big game crucial winter range and within big game parturition areas (1) as mapped on the Lander Field Office database, (2) from November 15 to April 30 for big game crucial winter range and (3) from May 1 to June 30 for big game parturition areas, and (4) to protect big game crucial winter range and parturition areas. **Exception:** The Authorized Officer may grant an exception if the operator demonstrates that the crucial winter or parturition areas are not occupied during the period of concern, subject to a determination by the BLM in coordination with the WGFD, in consideration of the factors described in Appendix C (p. 191). Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The BLM Authorized Officer may modify the area subject to the stipulations based on an evaluation by the BLM, in coordination with WGFD, to determine that crucial winter range or parturition areas are not present or boundaries of the subject parturition areas have been refined. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area does not contain crucial winter range or parturition areas. This determination shall be based on an evaluation by the BLM, in coordination with the WGFD. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Decision	Stipulation Type	Protected Resource	Stipulation Description
4062	TLS	Elk winter range	Surface-disturbing and disruptive activities are prohibited in identified elk winter ranges (1) as mapped on the Lander Field Office GIS database, (2) from November 15 to April 30, and (3) to protect elk winter range. **Exception:** The Authorized Officer may grant an exception if the operator demonstrates that the elk winter range areas are not occupied during the period of concern, subject to confirmation by the BLM, in coordination with the WGFD, in consideration of the factors described in Appendix C (p. 191). Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulations based on BLM evaluation, in coordination with the WGFD, to determine that the elk winter range is not present or boundaries of the subject winter range areas have been refined. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area is no longer managed as elk winter range. This determination shall be based on BLM evaluations of the area, in coordination with the WGFD. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4071 and 4093	TLS	Raptors	Surface-disturbing and disruptive activities are restricted or prohibited within 1 mile of bald eagle and ferruginous hawk nests and 0.75 mile of all other active raptor nests (1) as mapped on the Lander Field Office GIS database, (2) during the following time periods: • April 1 to August 31 for northern goshawk • April 1 to September 15 for burrowing owl • February 1 to August 15 for bald and/or golden eagles • February 1 to July 31 for all other raptors and (3) for the protection of active raptor nests. **Exception:** The Authorized Officer may grant an exception if the operator demonstrates that there are no active or occupied nests during the period of concern, subject to confirmation by the BLM, in coordination with the WGFD and/or USFWS, as necessary. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The BLM Authorized Officer may modify the area subject to the stipulations based on a BLM evaluation, in coordination with the WGFD and/or the USFWS, as necessary. The stipulation may be modified based on negative or positive monitoring results, or if it is determined that the action will not impair the function or the suitability of the habitat, or cause nest abandonment. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area does not contain active raptor nests or suitable habitat for raptors. This determination shall be based on a BLM evaluation of the area, in coordination with the WGFD and/or the USFWS, as necessary. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4084	NSO	Yermo xanthocephalu	No surface occupancy or use is allowed within desert yellowhead population management areas (1) as mapped on the Lander Field Office GIS database and (2) for the protection of desert yellowhead. **Exception:** The Authorized Officer may grant an exception only following USFWS consultation and concurrence with a BLM determination of not likely to adversely affect the species or its designated critical habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation only following USFWS consultation and concurrence with a BLM determination of not likely to adversely affect the species or its designated critical habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined by the BLM, in coordination with the USFWS, that the leasehold is no longer capable of supporting managed populations of desert yellowhead. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4088	NSO	Occupied pygmy rabbit habitat	No surface occupancy or use within 200 feet of occupied pygmy rabbit habitat (1) as mapped in the Lander Field Office GIS database and (2) for the protection of occupied pygmy rabbit habitat. **Exception:** The Authorized Officer may grant an exception if it is determined that pygmy rabbits are not present or it is determined that the action is not sited within 200 feet of occupied pygmy rabbit habitat, or if it is determined that the action is sited in a location where the action will not cause physical injury or a decrease in productivity by interfering with normal breeding, feeding, and sheltering, or cause site abandonment. This determination shall be based on evaluation by a qualified biologist, subject to confirmation by the BLM in coordination with the WGFD and/or the USFWS, as appropriate. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulations based on a BLM evaluation in coordination with the WGFD and/or the USFWS, as appropriate, if it is determined that a portion of the NSO area is not occupied. The stipulation may be modified based on negative or positive monitoring results. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area does not contain occupied pygmy rabbit habitat. This determination shall be based on a BLM evaluation of the area in coordination with the WGFD and/or the USFWS, as appropriate. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4094	TLS	Mountain plover nesting habitat	Surface-disturbing and disruptive activities are restricted or prohibited within 0.25 mile of identified mountain plover habitat (1) as mapped on the Lander GIS database, (2) from April 10 to July 10, and (3) for the protection of mountain plover nesting habitat. **Exception:** The Authorized Officer may grant an exception if the operator demonstrates that there are no active or occupied mountain plover nests during the period of concern, subject to confirmation by the BLM, in coordination with the WGFD, as appropriate. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulations based on a BLM evaluation, in coordination with the WGFD and/or the USFWS, as necessary. The stipulation may be modified based on negative or positive monitoring results, or if it is determined that the action will not impair the function or the suitability of the habitat, or cause nest abandonment. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area does not contain suitable mountain plover habitat. This determination shall be based on a BLM evaluation of the area in coordination with WGFD and/or USFWS, as necessary. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Decision	Stipulation Type	Protected Resource	Stipulation Description
4095	NSO	Identified bat maternity roosts and hibernation sites	No surface occupancy or use within 0.25 mile of bat maternity roosts and hibernation sites, (1) as mapped in the LFO database, (2) for the protection of identified bat maternity roosts and hibernation sites. **Exception:** The Authorized Officer may grant an exception if it is determined that bat species are not present or it is determined that the action is not sited within 0.25 mile of identified maternity roosts and/or hibernation sites. Or if it is determined that the action is sited in a location where the action will not cause physical injury or a decrease in productivity by interfering with normal breeding, feeding, sheltering, or cause site abandonment. This determination shall be based on evaluation by a qualified biologist, subject to confirmation by the BLM in coordination with the WGFD and/or USFWS, as appropriate. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulations based on a BLM evaluation, in coordination with the WGFD and/or the USFWS, as appropriate, if it is determined that a portion of the NSO area is not occupied. The stipulation may be modified based on negative or positive monitoring results. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire lease area does not contain suitable bat maternity or hibernation habitat. This determination shall be based on a BLM evaluation of the area in coordination with the WGFD and/or the USFWS, as appropriate. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4104	NSO	Occupied greater sage-grouse leks inside designated Core Area	No surface-disturbing activities or surface occupancy is allowed within an 0.6-mile radius of the perimeter of occupied greater sage-grouse leks in Core Area (1) as mapped on the Lander Field Office GIS database and (2) to protect occupied greater sage-grouse leks and associated seasonal habitat, life-history, or behavioral needs of greater sage-grouse in proximity to leks from habitat fragmentation and loss, and protect greater sage-grouse populations from disturbance inside designated Core Area. **Exception:** The Authorized Officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the as seasonal habitat. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD and in consideration of the factors identified in Appendix C (p. 191), determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is not essential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the habitat needs of the greater sage-grouse. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the site is no longer considered in the land use plan to be within greater sage-grouse designated Core Area, or if greater sage-grouse are no longer a BLM sensitive or special status species and is not listed by the USFWS as threatened or endangered under the Endangered Species Act. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4104	NSO	Occupied greater sage-grouse leks outside Core Area	No surface occupancy activities or surface occupancy is allowed within an 0.25-mile radius of the perimeter of occupied greater sage-grouse leks (1) as mapped on the Lander Field Office GIS database and (2) to protect occupied greater sage-grouse leks and associated seasonal habitat, life-history, or behavioral needs of greater sage-grouse in proximity to leks from habitat fragmentation and loss, and to protect greater sage-grouse populations from disturbance outside designated Core Area. **Exception:** The Authorized Officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site as seasonal habitat. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD and in consideration of the factors identified in Appendix C (p. 191), determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is not essential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for seasonal habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are incapable of serving the long-term requirements of greater sage-grouse breeding, nesting, or brood-rearing habitat and that these ranges no longer warrant consideration as components of greater sage-grouse breeding, nesting, or brood-rearing habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4105	TLS	Greater sage-grouse breeding, nesting, and early brood-rearing habitat inside designated Core Area	Surface-disturbing and disruptive activities are restricted or prohibited in Core Area (1) as mapped on the Lander Field Office GIS database, (2) from March 15 to June 30, and (3) to seasonally protect greater sage-grouse breeding, nesting, and early brood-rearing habitats from disruptive activities inside designated Core Area. **Exception:** The Authorized Officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable greater sage-grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the size and shape of the Timing Limitation Stipulation area or the Timing Limitation Stipulation criteria if an environmental record of review indicates the actual habitat suitability for seasonal greater sage-grouse activities is more or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of greater sage-grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are no longer considered in the land use plan to be within a greater sage-grouse designated Core Area or are incapable of serving the long-term requirements of greater sage-grouse breeding, nesting, or early brood-rearing habitat, and that these ranges no longer warrant consideration as components of greater sage-grouse breeding, nesting, or brood-rearing habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Decision	Stipulation Type	Protected Resource	Stipulation Description
4105	TLS	Greater sage-grouse breeding, nesting and early brood-rearing habitat outside designated greater sage-grouse Core Area	Surface-disturbing and disruptive activities are restricted or prohibited within 2 miles of the perimeter of occupied greater sage-grouse leks outside of Core Area (1) as mapped on the Lander Field Office GIS database, (2) from March 15 to June 30, and (3) to seasonally protect greater sage-grouse breeding, nesting and early brood-rearing habitats from disruptive activities within 2 miles of an occupied lek outside designated Core Area. **Exception:** The Authorized Officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable greater sage-grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the size and shape of the Timing Limitation Stipulation area or the Timing Limitation Stipulation criteria if an environmental record of review indicates the actual habitat suitability for seasonal greater sage-grouse activities is more or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of greater sage-grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are incapable of serving the long-term requirements of greater sage-grouse breeding, nesting, or brood-rearing habitat and that these ranges no longer warrant consideration as components of greater sage-grouse breeding, nesting, or brood-rearing habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4108	TLS	Greater sage-grouse winter concentration areas	Surface-disturbing and disruptive activities are restricted or prohibited in greater sage-grouse winter concentration areas (1) as mapped on the Lander Field Office GIS database, (2) from December 1 to March 14, and (3) to seasonally protect greater sage-grouse winter concentration areas. **Exception:** The Authorized Officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not impair the function and suitability of the winter concentration area, or it is determined that the winter concentration area is not occupied by concentrated populations of greater sage-grouse during the period of concern. Actions designed to enhance the long-term utility or availability of suitable greater sage-grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the size and shape of the Timing Limitation Stipulation area or the Timing Limitation Stipulation criteria if an environmental record of review indicates the actual habitat suitability for seasonal greater sage-grouse activities is more or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of greater sage-grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are incapable of serving the long-term requirements of greater sage-grouse winter habitat and that these ranges no longer warrant consideration as components of greater sage-grouse winter habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4109	CSU	Greater sage-grouse designated Core Area	Surface occupancy or use will be restricted to no more than an average of one oil and gas or mining locations per 640 acres using the Density and Disturbance Calculation Tool, and the cumulative value of all applicable surface disturbances, existing or future, must not exceed 5 percent of the Density and Disturbance Calculation Tool area, as described in the Disturbance Density Calculation Tool manual (1) as mapped on the Lander Field Office GIS database and (2) to protect greater sage-grouse designated Core Area from habitat fragmentation and loss. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) This lease does not guarantee the lessee the right to occupy the surface of the lease for the purpose of producing oil and natural gas within greater sage-grouse designated Core Area. The surface occupancy restriction criteria identified in this stipulation may preclude surface occupancy and may be beyond the ability of the lessee to meet due to existing surface disturbance on federal, state, or private lands within designated Core Area, or surface disturbance created by other land users. The BLM may require the lessee or operator to enter into a unit agreement or drilling easement to facilitate the equitable development of this and surrounding leases. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Exception:** The Authorized Officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of greater sage-grouse. An exception to the stated limits may be granted when offsite mitigation is determined to provide an overall beneficial impact to greater sage-grouse habitat and populations. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is not essential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of greater sage-grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined by the BLM, in coordination with the WGFD, that the site is no longer considered in the land use plan to be within a greater sage-grouse designated Core Area, or greater sage-grouse are no longer a BLM sensitive or special status species and are not listed by the USFWS as threatened or endangered under the Endangered Species Act. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
5018	CSU	RHT&EHs and their settings	Surface use or occupancy will be restricted within a 2-mile buffer of RHT&EHs (1) as mapped on the Lander Field Office GIS database and (2) for the protection of the RHT&EHs and their settings. **Exception:** An exception may be granted if the Authorized Officer, in consultation with the State Historic Preservation Office, determines that the action, as proposed or conditioned, would not adversely impact RHT&EHs and their settings. No exception will be granted unless the BLM, in consultation with the State Historic Preservation Office, determines that granting an exception would not adversely impact trails' settings. The Authorized Officer may grant an exception if it is determined that a proposed action would not result in an adverse effect on the integrity of the trail. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** This stipulation may be modified if, in consultation with the State Historic Preservation Office, the BLM determines that modification would not affect the trail, and that the area no longer contributes to the setting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived if, in consultation with the State Historic Preservation Office, the BLM determines that waiver would not affect the trail and that the area no longer contributes to the trail's setting. The stipulation may be waived if, in consultation with the State Historic Preservation Office, the BLM determines that the property is no longer considered National Register eligible. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Decision	Stipulation Type	Protected Resource	Stipulation Description
5024	NSO	Cedar Ridge TCP	No surface use or occupancy is allowed within the Cedar Ridge TCP, (1) as mapped on the Lander Field Office GIS database and (2) for the protection of the Cedar Ridge TCP. **Exception:** An exception may be granted if the Authorized Officer, in consultation with Native American tribes and the State Historic Preservation Office, determines that the action, as proposed or conditioned, would not adversely affect the sacred, spiritual, and/or traditional nature of the Cedar Ridge TCP. No exception will be granted unless the BLM, in consultation with the appropriate Native American tribes and the State Historic Preservation Office, determines that granting an exception would not adversely affect the area's spiritual and cultural resources and their settings. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** This stipulation may be modified if, in consultation with the appropriate tribes and the State Historic Preservation Office, the BLM determines that a modification would not adversely affect the TCP, and that the area no longer contributes to the TCP's important values. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined by the BLM, in consultation with the appropriate Native American tribes and the State Historic Preservation Office, that a waiver would not affect the TCP, and that the area no longer contributes to the TCP's important values or that the TCP is no longer considered sacred, spiritual, and/or traditional. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
5025	CSU	Cedar Ridge TCP periphery	Surface use or occupancy will be restricted within the designated Cedar Ridge TCP periphery (1) as mapped on the Lander Field Office GIS database and (2) for the protection of the Cedar Ridge TCP periphery. **Exception:** An exception may be granted if the Authorized Officer in consultation with Native American tribes and the State Historic Preservation Office, determines that the action, as proposed or conditioned, would not adversely affect the sacred, spiritual, and/or traditional nature of the Cedar Ridge TCP and periphery. No exception will be granted unless the BLM, in consultation with the appropriate tribes and the State Historic Preservation Office, determine that granting an exception would not adversely impact the area's spiritual and cultural resources and their settings. The Authorized Officer may grant an exception if the BLM determines that a proposed action would not result in an adverse effect on the integrity of the property. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** This stipulation may be modified if, in consultation with the appropriate tribes and State Historic Preservation Office, the BLM determines that modification would not affect the TCP periphery, and that the area no longer contributes to the TCP's sacred, spiritual, and/or traditional values. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived if, in consultation with the appropriate tribes and State Historic Preservation Office, the BLM determines that waiver would not affect the TCP, and that the area no longer contributes to the TCP's important values. The stipulation may be waived if consultation with Native American tribes and State Historic Preservation Office determines that the property is no longer considered sacred, spiritual, and/or traditional. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
5034 and 5035	NSO	Castle Gardens cultural site	Surface use or occupancy will be restricted within the Castle Gardens site and periphery (1) as mapped on the Lander Field Office GIS database and (2) for the protection of the Castle Gardens cultural site. **Exception:** An exception may be granted if the Authorized Officer in consultation with Native American tribes and the State Historic Preservation Office, determines that the action, as proposed or conditioned, would not adversely affect the sacred, spiritual, and/or traditional nature of the Castle Gardens site and periphery. No exception will be granted unless the BLM, in consultation with the appropriate tribes and the State Historic Preservation Office, determine that granting an exception would not adversely impact the area's spiritual and cultural resources and their settings. The Authorized Officer may grant an exception if the BLM determines that a proposed action would not result in an adverse effect on the integrity of the property. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** This stipulation may be modified if, in consultation with the appropriate tribes and State Historic Preservation Office, the BLM determines that modification would not affect the Castle Gardens site and periphery, and that the area no longer contributes to the site's sacred, spiritual, cultural and/or traditional values. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived if, in consultation with the appropriate tribes and State Historic Preservation Office, the BLM determines that waiver would not affect the Castle Gardens site, and that the area no longer contributes to the site's important values. The stipulation may be waived if consultation with Native American tribes and State Historic Preservation Office determines that the property is no longer considered sacred, spiritual, and/or traditional. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
5050	NSO	Sacred, Spiritual, and TCPs.	No surface occupancy or use is allowed within designated Sacred, Spiritual, and TCPs, (1) as mapped on the Lander Field Office GIS database, (2) for the protection of Sacred, Spiritual, and TCPs. **Exception:** The Authorized Officer may grant an exception if consultation with Native American tribes or appropriate cultural group for the TCP, and the State Historic Preservation Office, determines that a proposed action would not result in an adverse effect to the sacred, spiritual, and/or traditional nature of the property. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation if consultation with Native American tribes, or appropriate cultural group for the TCP, and the State Historic Preservation Office, determine that the identified property's sacred, spiritual, and/or traditional values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined, in consultation with Native American tribes, or appropriate cultural group for the TCP, and the State Historic Preservation Office, that the identified site is no longer considered sacred, spiritual, and/or traditional. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
5058	CSU	Very high or high potential fossil areas	Surface use or occupancy will be restricted within designated "very high" or "high" potential fossil yield classification areas (1) as mapped on the Lander Field Office GIS database and (2) for the protection of fossil resources. **Exception:** An exception may be granted if the Authorized Officer determines that the action, as proposed or conditioned, would not adversely affect fossil resources. The Authorized Officer may grant an exception if the BLM determines that a proposed action would not result in an adverse effect on the integrity of the property. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** This stipulation may be modified if the BLM determines that modification would not affect the fossil resources, and that the area no longer contains fossil resource values. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** This stipulation may be waived if the BLM determines that waiver would not affect fossil resources. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Decision	Stipulation Type	Protected Resource	Stipulation Description
5066	CSU	VRM Class I and II areas	Surface occupancy or use is restricted within designated VRM Class I and II areas (1) as mapped on the Lander Field Office GIS database and (2) for the protection of VRM Class I and II areas. **Exception:** The Authorized Officer may grant an exception if it is demonstrated through a BLM-approved visual simulation and contrast rating worksheet that the project or identified mitigation will meet or exceed VRM Class I or II objectives. This restriction does not apply to temporary structures such as drilling rigs. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation or use restriction if it is demonstrated that VRM Class I or II objectives have been modified through appropriate RMP planning procedures, or if a portion of the lease is not located within a VRM Class I or II area. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the entire leasehold is no longer managed for VRM Class I or II objectives based on planning, or if the entire leasehold is not located within a Class I or II area. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
6086 and 6092	NSO	Recreation Areas and Developed Recreation Sites	No surface use or occupancy is allowed within developed recreation sites (1) as mapped on the Lander Field Office GIS database and (2) for the protection of developed recreation sites. **Exception:** The Authorized Officer may grant an exception if the action can be developed in a way that meets the management objectives for the developed recreation site. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation if the lease action(s) is/are no longer located within the mapped boundary of the subject recreation site, or if the proposed action can be developed in a way that meets the management objectives for the developed recreation site. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the area is no longer managed under the Lander Approved RMP as a developed recreation site. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
6124	CSU	Sweetwater Rocks Periphery	Surface use or occupancy is restricted within the Sweetwater Rocks viewshed (1) as mapped on the Lander Field Office GIS database and (2) to protect the Sweetwater Rocks periphery **Exception:** The Authorized Officer may grant an exception if the proposed project will maintain or enhance the scenic values of the Sweetwater Rocks periphery. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the stipulation, or the area subject to the stipulation, if the lease action(s) can be shown to maintain or enhance the scenic values of the Sweetwater Rocks periphery. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the Sweetwater Rocks periphery is no longer managed under the Lander Approved RMP to maintain the scenic values of the area or if it is found that the entire leasehold is not located within the Sweetwater Rocks periphery. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
7002	NSO	National Trails Management Corridor	No surface use or occupancy is allowed within the designated National Trails Management Corridor (1) as mapped on the Lander Field Office GIS database and (2) for the protection of Congressionally Designated Trails and their settings. **Exception:** The Authorized Officer may consider a lease stipulation exception within the National Trails Management Corridor if (1) an action is at least 3 miles from a Congressionally Designated Trail, a significant Congressionally Designated Trail historical or recreational site, or Congressionally Designated Trail-related recreational activities or (2) all components and effects of the action are in compliance with the RMP-designated VRM standard in consultation with appropriate federal agencies. The proposal must be capable of attaining a no adverse-affect determination in consultation with the State Historic Preservation Office. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation or surface occupancy criteria if it is determined by the BLM, after consultation with the appropriate federal and/or state agency, that a portion of the NSO area does not contribute, as determined by Section 106 of the National Historic Preservation Act, to the Congressionally Designated Trails' nature and purpose or their settings, or if the proposed action can be developed in a way that meets the management objectives for the National Trails Management Corridor. This determination shall be based on field evaluation of the area by a qualified archeologist/historian, landscape architect, and recreation specialist and is subject to confirmation by the BLM. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined, in consultation with the appropriate federal and/or state agency, that the area is no longer considered to contribute to the Congressionally Designated Trails' nature and purpose or settings, or if the proposed action can be developed in a way that meets the management objectives for the National Trails Management Corridor. This determination shall be based on field evaluation of the area by a qualified archeologist/historian, landscape architect, and recreation specialist and subject to confirmation by the BLM. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
7059, 7068, 7095, 7106, 7117, 7126	NSO	ACECs	No surface use or occupancy is allowed within designated ACECs (1) as mapped on the Lander Field Office GIS database and (2) for purposes of protecting the relevant and important ACEC values. **Exception:** The Authorized Officer may grant an exception if it is determined that the action, as proposed or conditioned, would not adversely impact the relevant and important values of the ACEC. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification:** The Authorized Officer may modify the area subject to the stipulation or surface occupancy criteria if it is determined that a portion of the NSO area is not essential to the protection of the ACEC's relevant and important values. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver:** The Authorized Officer may grant a waiver if it is determined that the area is no longer considered to contribute to the ACEC's relevant and important values or if the entire leasehold is no longer managed as an ACEC. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Required Design Features (BLM 2014b)

Greater Sage-Grouse Protection Required Design Features for All Projects

The following measures, and others as they are identified, will be required for all BLM-authorized development. As appropriate, they may be required as part of the design of the project or as a mandatory condition of approval. Other greater sage-grouse protections are identified below as BMPs, which will be evaluated on a site-specific basis for inclusion as a mandatory condition of approval.

General:

- In applying protections for greater sage-grouse, all projects must evaluate (1) whether the conservation measure is reasonable (see 43 Code of Federal Regulations [CFR] 3101.1-2 for the definition of "reasonable" for fluid mineral leases) and consistent with valid existing rights, and (2) whether the action is in conformance with the RMP. Each conservation measure will be evaluated on a site-specific basis for likely effectiveness on a cost-benefit basis.
- In Core Area, where development would result in the long-term loss of greater sage-grouse habitat, identify effective mitigation that will be applied for a sufficient term as to constitute replacement habitat. Example: Purchase private land and mineral rights in the priority area and deed to the United States, or obtain a conservation easement in perpetuity. Consider compensatory mitigation and monitoring of significant direct, indirect, and cumulative impacts on, and loss of habitat for, greater sage-grouse.
- When additional mitigation is necessary, conduct it in Core Area, in the same greater sage-grouse population area. If Core Area does not provide appropriate mitigation, conduct offsite mitigation in general greater sage-grouse habitat with the ability to increase greater sage-grouse populations.
- Designate a qualified biologist who will be responsible for overseeing compliance with all design features related to the protection of ecological resources throughout all project phases, particularly in areas requiring avoidance or containing concentrated greater sage-grouse populations. This person shall be approved by the BLM.

Facilities and Surface Disturbance:

- Give overall consideration to minimizing the adverse impact to greater sage-grouse through a project design that avoids, minimizes, reduces, rectifies, and/or adequately compensates for direct and indirect impacts to greater sage-grouse habitat or use. Apply a phased development approach with concurrent interim reclamation. Locate and design individual project facilities to minimize disruption of animal movement patterns and connectivity of habitats.
- Subject to topographic and other environmental constraints, require development for a project wholly or partially in Core Area to be placed in the area least harmful to greater sage-grouse based on vegetation, topography, or other habitat features.
- Co-locate new development (facilities, pipelines, etc.) in existing disturbances or in areas where reclamation success has not been fully achieved unless the proponent establishes that this is technically infeasible. Cluster disturbances, operations (hydraulic fracture stimulation, liquids gathering, etc.), and facilities. Co-locate powerlines, flow lines, and small pipelines under or immediately adjacent to existing roads. Design or site permanent structures to minimize impacts to greater sage-grouse, with emphasis on locating and operating facilities that create movement (e.g., pump jacks) or attract frequent human use and vehicular traffic (e.g., fluid storage tanks) in a manner to minimize disturbance of greater sage-grouse or interference with habitat use.

- Locate new compressor stations outside priority habitats and require a design that reduces noise directed toward priority habitat unless the proponent can establish that this requirement would preclude development of the lease.
- Properly contain and promptly remove refuse to avoid attracting predators.
- Use mats for drilling activities where topography permits to reduce vegetation disturbance, and as temporary roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment.
- Restrict the construction of tall facilities, distribution powerlines, fences, and other infrastructure to the minimum number and amount needed. Place facilities, such as tanks, which could serve as greater sage-grouse predator perches, outside of Core Area unless the proponent establishes that this is technically infeasible. Equip tanks and other aboveground facilities with structures or devices that discourage nesting of ravens and raptors.
- Site and/or minimize linear features to reduce disturbance and fragmentation of greater sage-grouse habitats.
- Install greater sage-grouse safe fences around sumps, pits, and other trenching.
- Evaluate whether the benefits to greater sage-grouse from burying powerlines would outweigh the potential loss of habitat from the disturbance associated with burying the line, considering the potential threat from invasive nonnative species, low reclamation potential, and other factors. If the benefits outweigh potential adverse impacts, require that the powerlines be buried unless the applicant establishes that burying the lines is not technically feasible.
- Use remote monitoring techniques for production facilities, where applicable, and develop a plan to reduce vehicular traffic and human presence.
- Properly contain and promptly remove refuse to avoid attracting predators.
- Cover all fluid-containing pits and open tanks with netting (maximum 1.5-inch mesh size).
- Locate all residential development for employees and contractors (“man camps”) outside of Core Area.
- When a well is plugged and abandoned, avoid the use of above ground dry hole markers.

Reclamation

- Where native shrubs located on lands proposed to be disturbed are unique and desirable for interim and final reclamation purposes, and the seed supply for these desirable brush species is not commercially available, seeds will be collected from the area and stored using the procedures of the Seeds of Success program. Seedlings or plugs of common dominant species will be propagated, preferably locally, in preparation for use in portions of area to be reclaimed to expedite vegetation recovery.
- Maximize the area of interim reclamation on long-term access roads and well pads, including reshaping, topsoiling, and revegetating cut-and-fill slopes.
- Identify areas of sustainable plant communities and populations appropriate for the project as sources for native plant material and manage for use in reclamation and restoration work. Prioritize native seed allocation for use in priority greater sage-grouse habitat in years when preferred native seed is in short supply.

- Utilize enhanced reclamation if needed to support more rapid interim and final reclamation including irrigation, mulching, soil amendments, and erosion blankets.
- When reseeding, use appropriate seed mixes and consider the use of appropriate subspecies of sagebrush seed. Continue to evaluate seed mixtures over time, considering potential changes in climate (Miller et al. 2011) when proposing seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed (Kramer and Havens 2009).
- Include reclamation or post-fire restoration objectives requiring that greater sage-grouse habitat needs are adequately addressed, and monitoring protocol to verify that the objectives are accomplished. Include greater sage-grouse habitat parameters as defined by Connelly et al. (2000), Hagen et al. (2007), or if available, state greater sage-grouse conservation plans and appropriate local information in habitat restoration objectives. Make maintaining these objectives in priority greater sage-grouse habitat areas a high restoration priority.
- Identify and work with partners to increase native seed availability and work with plant material centers to develop new plant materials, especially the forbs needed to restore greater sage-grouse habitat.
- Choose native plant seeds for vegetation treatments based on availability, adaptation (site potential), probability for success, and the vegetation management objectives for the area covered by the treatment. Prioritize native seed allocation for use in Core Area in years when preferred native seed is in short supply.
- Make reestablishment of sagebrush and desirable understory plant cover (relative to ecological site potential) a high priority for restoration efforts. Write specific vegetation objectives to reestablish sagebrush cover and desirable understory cover.
- Implement interim reclamation as soon as feasible for all disturbed soils to the side of roadways and other long-term disturbances, reducing the disturbance to the smallest area possible.
- Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.
- Maximize the area of interim reclamation on long-term access roads and well pads, including reshaping, topsoiling, and revegetating cut-and-fill slopes.

Roads

- Locate roads to avoid important habitats for greater sage-grouse and other wildlife. Construct, improve, and maintain access roads to minimize potential wildlife/vehicle collisions and facilitate wildlife movement through the project area.
- Apply dust abatement on roads, well pads, and other surface disturbances. Use of dust abatement with limited adverse impacts to vegetation, cultural resources, water quality, and other resources.
- When responding to a request for a road, develop a transportation plan on a landscape scale so as to consider all parties who will be authorized to use the road.
- Limit route construction to realignments of existing designated routes if that realignment has a minimal impact on greater sage-grouse habitat, eliminates the need to construct a new road, or is necessary for motorist safety.
- Identify measures to reduce the use of motorized vehicles to reduce adverse impacts to wildlife.

- Design roads to minimize total disturbance to the smallest amount possible and to the lowest standard while meeting road objectives or purpose including safety. Establish speed limits that will reduce vehicle speed to reduce greater sage-grouse mortality.
- If road crossings of linear water features (such as ephemeral, intermittent, and perennial streams) cannot be avoided, construct crossings to minimize impacts to the riparian-wetlands habitat. Usually this will mean crossing the feature at right angles. Temporary, portable bridges should be considered.
- Limit the use of new roads associated with development including not making it part of the public road network or implementing seasonal closures. Restrict motorized vehicle use to authorized users using signage, gates, and other devices.
- Establish slow speed limits on BLM-administered roads or design roads for slower vehicle speeds to reduce greater sage-grouse mortality and other wildlife conflicts.

Mineral Development

- Give overall consideration to impacts to greater sage-grouse in applying technically feasible conditions of approval. Selection and application of these measures shall be based on current science and research on the effects to important breeding, nesting, brood-rearing, and wintering areas. The Plan of Development or Plan of Operations, as applicable, shall address, at a minimum, the anticipated noise, density and amount of disturbance, mechanical movement (e.g., pump jacks), permanent and temporary facilities, traffic, phases of development over time, offsite mitigation, and expected periods of use associated with the proposed project. The NEPA analysis and authorization should identify seasonal habitats or typical project features related to potential greater sage-grouse impacts, such as drill mats that are not made a part of the conditions of approval, based on site-specific or project-specific considerations and the explanation of why these protections were not included.
- Where feasible, co-locate new development (facilities, pipelines, etc.) in existing disturbances. Cluster disturbances, operations (hydraulic fracture stimulation, liquids gathering, etc.), and facilities. Use drilling techniques to reduce surface disturbance in relation to the number of wells, where feasible. Place liquid-gathering facilities and compressor stations outside Core Area, unless the proponent can establish that this requirement would preclude development of the lease. Identify measures to reduce traffic in Core Area.
- To ensure comprehensive planning relative to greater sage-grouse conflicts, complete Master Development Plans or Plans of Development during planning and review of projects involving multiple proposed disturbances in Core Area.
- In Core Area, require closed-loop systems for drilling operations, with no reserve pits unless technically infeasible.
- Require noise shields or other noise abatement devices when drilling during the lek, nesting, brood-rearing, and wintering seasons. Locate new compressor stations outside of Core Area if feasible, and require a design directed toward priority habitat that reduces noise.

Best Management Practices

No BMPs listed in RMP.

Literature Cited

Bureau of Land Management (BLM). 2014a. *Appendix I. Stipulations and Conditions of Approval in Designated Development Areas and in Non-Designated Development Areas*. In *Record of Decision and Approved Resource Management Plan for the Lander Field Office Planning Area*. Lander, Wyoming: BLM Lander Field Office. Available at https://eplanning.blm.gov/epl-front-office/projects/lup/18602/84390/100999/Ch._5-6,_Gloss,_and_Apndx_LFO_PRMP_FEIS_Feb_2013.pdf. Accessed March 9, 2020.

———. 2014b. *Appendix E. Exception, Modification, and Waiver Criteria, Avoidance Criteria, and Special Management for Designated Corridors*. In *Record of Decision and Approved Resource Management Plan for the Lander Field Office Planning Area*. Lander, Wyoming: BLM Lander Field Office. Available at https://eplanning.blm.gov/epl-front-office/projects/lup/18602/84390/100999/Ch._5-6,_Gloss,_and_Apndx_LFO_PRMP_FEIS_Feb_2013.pdf. Accessed March 9, 2020.

PINEDALE RESOURCE MANAGEMENT PLAN

Stipulations

Refer to individual resource sections of the Record of Decision and Approved Pinedale Resource Management Plan for any applicable stipulations (BLM 2008a).

Required Design Features

No required design features listed in RMP.

Best Management Practices (BLM 2008a)

Big Game Crucial Winter Range

- Transportation planning (i.e., to reduce road density and traffic volumes)
- Habitat enhancement
- Seasonal restriction of public vehicular access
- Using Bureau of Land Management (BLM) standard wildlife fences
- Compensation mitigation

Sage-Grouse Habitat

- Seasonal restriction of public vehicular access
- Reduce truck traffic via car-pooling or transportation planning within sage grouse habitats to reduce human disruptive activities
- Noise reduction techniques and designs
- Installation of raptor anti-perch devices
- Habitat enhancement
- Avoidance of surface disturbance or occupancy within one-quarter mile of the perimeter of occupied sage-grouse leks
- Avoidance of human activity between 8:00 p.m. and 8 a.m. from March 1 through May 15 within one-quarter mile of the perimeter of occupied sage-grouse leks
- Avoidance of surface disturbing and disruptive activities in suitable sage-grouse nesting and early brood-rearing habitat within 2 miles of an occupied lek, or in identified sage-grouse nesting and early brood-rearing habitat outside the 2-mile buffer from March 15 through July 15.
- Avoidance of disturbance and disruptive activities in sage-grouse winter habitat from November 15 through March 14

Wildlife Habitat

- Seasonal restriction of public vehicular access
- Noise reduction techniques and designs
- Installation of raptor anti-perch devices
- Limiting pipeline crossings to 1 corridor to limit habitat fragmentation for pygmy rabbits
- Avoiding known white-tailed prairie dog, burrowing owl, and pygmy rabbit burrowing systems
- Habitat enhancement
- Transportation planning to reduce road density

Visual Resource Management Class II, III, and IV Areas

- Burying of distribution power lines and flow lines in or adjacent to access roads
- Repetition of elements of form, line, color, and texture to blend facilities with the surrounding landscape
- Painting of all new facilities a color, or colors that best allow the facility to blend with the background, typically a vegetated background
- Final reclamation recontouring of all disturbed areas, including access roads, to the original contour or a contour that blends with the surrounding topography
- Avoidance of facility placement on steep slopes, ridge tops, and hilltops
- Screening of facilities from view
- Following of the contours of the land to reduce unnecessary disturbance
- Recontour and revegetation of disturbances to blend with the surrounding landscape
- Reclamation of unneeded roads to the original contour
- Thinning and feathering of vegetation to disrupt linear lines created by clearing activities.
- Site selection adjustment to minimize visibility
- Other BMPs as applicable from Gold Book and BLM BMP website

Air Quality

- Use water and dust suppressant on roads to achieve 50% control of road dust on 90% of BLM resource roads
- Consider air quality levels in the approval of current actions
- Post speed limits on roads
- Implement transportation planning to reduce/vehicle traffic

Fluid Mineral Construction, Operation, and Reclamation

- Transportation planning (i.e., to reduce road density and traffic volumes)
- Burying of distribution power lines and flow lines in or adjacent to access roads

- Design and construction of all new roads to a safe and appropriate standard, "no higher than necessary" to accommodate their intended use
- Avoidance of facility placement on steep slopes, ridge tops, and hilltops
- Removal of trash, junk, waste, and other materials not in current use

Mitigation Guidelines and Operating Standards Applied to Surface Disturbing and Disruptive Activities (BLM 2008b)

Air Quality

Air quality mitigation will be voluntary or required by the BLM.

In accordance with Wyoming Air Quality Standards and Regulations, Chapter 3, Section 2(f), the emission of fugitive dust will be limited by all persons handling, transporting, or storing any material to prevent unnecessary amounts of particulate matter from becoming airborne to the extent that ambient air standards described in these regulations are exceeded.

Necessary air quality permits to construct, test, and operate facilities will be obtained from the Wyoming Department of Environmental Quality-Air Quality Division (WDEQ-AQD). All internal combustion equipment will be kept in good working order. Best available control technology (BACT) will be implemented as required by WDEQ-AQD.

Operators will comply with all applicable local, state, tribal, and federal air quality laws, statutes, regulations, standards, and implementation plans, including Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS).

To avoid the incremental risk of exposure to carcinogenic toxins from producing wells, no well will be located closer than 0.25 mile from a dwelling or residence. At 0.25 mile, the incremental risk increase for the most likely exposure scenario is below the designated threshold level of less than 1 additional person per million.

To avoid incremental risk of exposure to carcinogenic toxins from compressor facilities, any compressor facility located closer than 4 miles to a dwelling or residence will require additional NEPA analysis prior to the final selection of the site and authorization to construct.

Cultural/Paleontological Resources

If effects to paleontological values, or objects of historic or scientific interest are observed, the operator will be required to immediately contact the BLM and the operator will be required to cease any operations that would result in the destruction of or adverse impact to these values.

In areas of paleontological sensitivity, the BLM will make a determination as to whether a survey by a qualified paleontologist is necessary prior to the disturbance. In some cases, construction monitoring, project relocation, data recovery, or other mitigation will be required to ensure that significant paleontological resources are avoided or recovered during construction.

If paleontological resources are uncovered during surface-disturbing activities, operators will suspend operations at the site that would further disturb such materials and immediately contact the BLM AO, who will arrange for a determination of significance, and, if necessary, recommend a recovery or avoidance plan. Mitigation of impacts to paleontological resources will be conducted on a case-by-case basis, and operators will either avoid or protect paleontological resources.

Areas underlain by either the Wasatch or Green River formations have a high potential for containing vertebrate paleontological resources (fossils) and must be surveyed by a qualified paleontologist before surface disturbing activities will be authorized. Based on the results of the paleontological survey, additional monitoring and/or mitigation will be necessary. All major pipelines (12" and larger) will have paleontological open trench inspections and geologic research to resolve mapping issues discovered during the paleontological overview in the Jonah Field. Other actions, such as onsite project monitors by professional paleontologists while surface disturbing activities are occurring, and/or spot-checks of spoil piles, pits, and trenches prior to backfilling will become more common and will be considered standard stipulations within the Blue Rim-Ross Butte Management Area.

Operators will follow the Section 106 compliance process prior to any surface-disturbing activity and will either avoid or protect cultural resource properties as determined through consultation with the Wyoming State Historic Preservation Office (SHPO).

Operators will halt construction activities at the site of previously undetected cultural resources discovered during construction. The BLM will be notified immediately, and consultation with SHPO and, if necessary, the Advisory Council, will be initiated to determine proper mitigation measures pursuant to 36 Code of Federal Regulations (CFR) 800.11 or other treatment plans, programmatic agreements, or discovery plans that may direct such efforts. Construction will not resume until a Notice to Proceed is issued by the BLM.

In culturally sensitive soils, if cultural resources are located within frozen soils or sediments precluding the ability to adequately record or evaluate the find, construction work will cease and the site will be protected for the duration of frozen soil conditions. Following natural thaw, recordation, evaluation and recommendations concerning further management will be made to the BLM AO, who will consult with affected parties. Construction work will be suspended until management of the threatened site has been finalized.

Should future work identify any traditional Native American religious or sacred sites, consultation among the BLM, the affected Native American group, the Wyoming SHPO and the project proponent will occur to resolve conflicts. This consultation will occur on a case-by-case basis or in conformance with an approved Native American Concerns Agreement Document.

Operators should inform their employees, contractors, and subcontractors about relevant federal regulations intended to protect archaeological and cultural resources. All personnel should be informed that collecting artifacts (including arrowheads) is a violation of federal law and that employees engaged in this activity may be subject to disciplinary action, which could include dismissal.

Equipment operators should be informed that a cultural resource could be found anywhere; and if they uncover a site during construction, surface disturbing activities at the site must be halted immediately and the BLM notified.

Historic trails will be avoided. Surface disturbing activities will avoid areas within one-quarter mile of a trail unless such disturbance will not be visible from the trail or will occur in an existing visual intrusion area. Historic trails will not be used as haul roads. Placement of facilities outside one-quarter mile that are within view of the Lander Trail will be located to blend the site and facilities in with the background.

The selective use of locked gates, where practicable, could be used to protect any significant cultural sites found during inventories. This approach is more commonly used as a seasonal restriction to protect wildlife during winter months, but some applications may also present themselves from a cultural resources standpoint.

Roads and Transportation

The project proponent could be required to develop a coordinated travel management plan before surface disturbing activities are authorized.

Transportation plans will be required to maintain the largest undisturbed blocks of habitat possible and to minimize the acres of disturbance from roads, pipelines, power lines, and other facilities within and/or associated with the proposed project area.

Closure and reclamation of unnecessary roads will be required to reduce fragmentation and restore habitat integrity while reducing the potential for wildlife disturbances.

All new roads will be constructed to meet the design requirements of the BLM Manual 9113. New main artery roads will be designed to reduce sediment, salt, and phosphate loading to the Green and New Fork Rivers. Where necessary, running surfaces of the roads will be graveled if the base does not already contain sufficient aggregate.

If necessary, roads will be treated to suppress dust. Treatment could include gravel, mag-water, or in rare cases, paving of roads.

The use of existing two-track and unconstructed roads will be encouraged where such roads would withstand the proposed access activity, would provide a safe route for ingress and egress, would not result in offsite sediment discharge, could be effectively reclaimed, and would result in minimal, if any, new surface disturbance.

The operator will regularly maintain all lease roads in a safe, usable condition. A regular maintenance program will include, but not be limited to, blading, ditching, culvert installation, drainage installation, surfacing, and cattleguards, as needed. Design, construction, and maintenance of the road will be in compliance with the standards contained in BLM Manual, Section 9113 (Roads), and in the latest version of the "Gold Book," Oil and Gas Surface Operating Standards for Oil and Gas Exploration and Development.

At the discretion of the BLM AO, road construction may be required to be monitored by a qualified individual agreed to by the BLM AO and the operator. A certified civil engineer is to submit a statement that the road was built as designed within 15 days after the road has been constructed. Compaction of the subgrade with water and heavy equipment to a density higher than the surrounding subsurface is required during construction.

Project-related travel will be limited to only that necessary for efficient project operation during periods when soils are saturated and excessive rutting could occur.

Where deemed necessary and effective by the BLM AO, locked gates will be installed on oil field roads (with structures added to prevent drive-arounds) to reduce traffic and protect other resources (e.g., wildlife, cultural resources) from impacts caused by increased vehicle traffic and human presence. The need and location of locked gates will be determined during the transportation planning process. To control or reduce sediment from roads, guidance involving proper road placement and buffer strips to stream channels, graveling, proper drainage, seasonal closure, and in some cases, redesign or closure of old roads will be developed when necessary. Construction may also be prohibited during periods when soil material is saturated, frozen, or when watershed damage is likely to occur.

Available topsoil will be stripped from all road corridors prior to commencement of construction activities and will be redistributed and reseeded on backslope areas of the borrow ditch after completion of road construction activities. Borrow ditches will be reseeded in the first appropriate season after initial disturbance.

On newly constructed roads and permanent roads, the placement of topsoil, seeding, and stabilization will be required on all cut and fill slopes unless conditions prohibit this (e.g., rock). No unnecessary sidecasting of material (e.g., maintenance) on steep slopes will be allowed. Snow removal plans may be required so that snow removal does not adversely affect reclamation efforts or resources adjacent to the road.

Reclamation of abandoned roads will include requirements for reshaping, recontouring, resurfacing with topsoil, installation of water bars, and seeding on the contour. Road beds, well pads, and other compacted areas will be ripped to a 2-foot depth on 1.5-foot centers to reduce compaction prior to spreading the topsoil across the disturbed area. Stripped vegetation will be spread over the disturbance for nutrient recycling, where practical. Fertilization or fencing of these disturbances will not normally be required. Additional erosion control measures (e.g., fiber matting) and road barriers to discourage travel may be required. As deemed necessary by the BLM AO, graveled roads, well pads, and other sites will be stripped of usable gravel and hauled to new construction sites prior to ripping. The removal of structures such as bridges, culverts, cattleguards, and signs usually will be required.

Road closures may be implemented during crucial periods (e.g., wildlife winter periods, spring runoff, calving and fawning seasons, saturated soil conditions).

Individual road design plans for new and/or improved roads will be submitted for approval as components of APDs or ROW permits. Plans must be approved prior to initiation of work. Operators will schedule a review of plans with sufficient time to obtain BLM approval prior to commencement of work.

Existing roads will be used to the maximum extent possible and upgraded as necessary.

Operators will comply with existing federal, state, and county requirements and restrictions to protect road networks and the traveling public.

Roads and pipelines will be located adjacent to existing linear facilities wherever practical.

As deemed necessary by the BLM AO, operators and/or their contractors will post appropriate warning signs and require project vehicles to adhere to appropriate speed limits on project-required roads.

The application of produced water on roads for use in dust suppression activities on BLM-administered public lands will not be allowed unless total dissolved solids (TDS) are less than 400 mg/l (state standard for the Colorado River drainage), the water does not contain hazardous material, and prior approval is obtained from BLM and WDEQ.

Appropriate dust suppressants will be applied to oil and gas field and other roads as necessary. Depending on the site and amount of traffic, suppressants could include water or mag water. In some cases, paving of roads could be required to control dust, provide all-weather access, and reduce road maintenance.

Pipelines

Channel crossings by pipelines will be constructed so that the pipe is buried at a depth sufficient to ensure the pipeline does not become exposed.

Channel crossings by roads and pipelines will be constructed perpendicular to flow. Streams/channels crossed by roads will have culverts installed at all appropriate locations as specified in the BLM Manual 9112-Bridges and Major Culverts (USDI, BLM 1990) and Manual 9113-Roads (USDI, BLM 1985). All stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.

Wetland areas will be crossed during dry conditions (i.e., late summer, fall, or dry winters); winter construction activities will occur only prior to soil freezing or after soils have thawed.

On ditches exceeding 24 inches in width, 6 to 12 inches of surface soil will be salvaged where possible on the entire right-of-way. When pipelines and communication lines are buried, at least 30 inches of backfill will be on top of the pipe. Backfill should not extend above the original ground level after the fill has settled. Guides for construction and water bar placement are found in "Surface Operating Standards for Oil and Gas Exploration and Development" (USDA 1978). Bladed surface materials will be re-spread on the cleared route once construction is completed. Disturbed areas that have been reclaimed may need to be fenced when the route is near livestock watering areas.

Pipeline ROWs will be located to minimize soil disturbance. Mitigation will include locating pipeline ROWs adjacent to access roads to minimize ROW disturbance widths, or routing pipeline ROWs directly to minimize disturbance lengths. In some cases, it may be appropriate to place pipelines directly on the surface.

Existing crowned and ditched roads will be used for access where possible to minimize surface disturbances. Clearing of pipeline and communication line rights-of-way will be accomplished with the least degree of disturbance to topsoil. Where topsoil removal is necessary, it will be stockpiled (windrowed) and re-spread over the disturbance after construction and backfilling are completed. Vegetation removed from the right-of-way will also be re-spread to provide protection, nutrient recycling, and a seed source.

Temporary disturbances that do not require major excavation (e.g., small pipelines and communication lines) may be stripped of vegetation to ground level using mechanical treatment, leaving topsoil intact and root mass relatively undisturbed.

Trees, shrubs, and ground cover (not to be cleared from rights-of-way) will require protection from construction damage. Backfilling to preconstruction condition (in a similar sequence and density) will be required. The restoration of normal surface drainage also will be required.

To promote soil stability, the compaction of backfill over the trench will be required (not to extend above the original ground level after the fill has settled). Wheel or other method of compacting the pipeline trench backfill will be required at two levels to reduce trench settling and water channeling; once after 3 feet of fill has been replaced and once within 6 to 12 inches of the surface. Water bars, mulching, and terracing will be required, as needed, to minimize erosion. In-stream protection structures (e.g., drop structures) may be required in drainages crossed by a pipeline to prevent erosion. The fencing of linear disturbances near livestock watering areas may be required.

During saturated soil conditions vehicular activity will be confined to roads designed and constructed for all-weather access (e.g., paved, graveled, and "mag-water" surfaced roads).

Crossings of ephemeral, intermittent, and perennial streams associated with road and utility line construction will generally be restricted until after spring runoff, when normal flows are established.

Pipeline projects should be conducted to allow natural movement of livestock through the field. Gaps should be provided in the trenching process to allow cows to move, or get pipeline projects completed while cattle are not on the allotment.

Project Siting and Operation

Wells, pipelines, and ancillary facilities will be designed and constructed such that they will not be damaged by moderate earthquakes. Any facilities defined as critical according to the Uniform Building Code will be constructed in accordance with applicable Uniform Building Code Standards for Seismic Risk Zone 2B.

Slope, grade, and other construction control stakes (e.g., exterior boundary centerline) will be placed, as necessary, to ensure construction in accordance with the surface use plan. The cut and fill slopes and spoil storage areas will be marked with a stake and/or lath at a minimum of 50-foot intervals. The tops of the stakes or laths will be painted or flagged in a distinctive color. All boundary stakes and/or laths will be maintained in place until final construction cleanup is completed. If stakes are disturbed, they will be replaced before proceeding with construction.

Recreation

Operators will restrict off-road vehicle (OHV) activity by employees and contract workers to the immediate area of authorized activity or existing roads and trails.

Soils

Soil retention measures, such as silt fencing, contour furrows, or hydromulching, shall be implemented on erosive soils at the time of disturbance.

Revegetation shall be initiated on exposed soils on portions of the disturbance no longer needed for operations (e.g., cut and fill slopes, portions of well pads not needed for production operations) within one growing season of the time the disturbance is no longer needed for operations. Interim reclamation (i.e., site stabilization/soil retention seeding) shall be conducted on disturbed areas that are needed for future planned operations but will not be occupied for one or more growing seasons.

Upland soils classified as highly erodible in the order three soil survey will be avoided.

Slopes greater than 10 percent and with south-facing aspects with sensitive or highly erosive soils and areas with biological crusts will be avoided.

Before a surface disturbing activity is authorized, topsoil depth will be determined. The amount of topsoil to be removed, along with topsoil placement areas, will be specified in the authorization. The uniform distribution of topsoil over the area to be reclaimed will be required, unless conditions warrant a varying depth. On large surface-disturbing projects (e.g., gas processing plants) topsoil will be stockpiled and seeded to reduce erosion. Where feasible, topsoil stockpiles will be designed to maximize surface area to reduce impacts to soil microorganisms. Stockpiles remaining less than 2 years are best for soil microorganism survival and native seed viability.

Emphasis will be placed on the reduction of soil erosion and sediment into the Green River Basin watershed. Of particular importance will be those areas with saline soils or those areas with highly erodible soils. Critical erosion condition areas will continue to be identified during soil surveys, monitoring, site specific project analysis, and activity plan development for the purpose of avoidance and special management.

Operators will avoid adverse impacts to soils by—

- Minimizing disturbance, avoiding construction with frozen soil material
- Avoiding areas with high erosion potential (e.g., unstable soil, dunal areas, slopes greater than 25 percent, floodplains), where possible
- Salvaging and selectively handling topsoil from disturbed areas
- Adequately protecting stockpiled topsoil and replacing it on the surface during reclamation
- Leaving the soil intact (scalping only) during pipeline construction, where possible
- Using appropriate erosion and sedimentation control techniques, including, but not limited to, diversion terraces, riprap, and matting
- Promptly revegetating disturbed areas using adapted species
- Applying temporary erosion control measures (e.g., temporary vegetation cover)
- Applying biodegradable mulch, netting, or soil stabilizers
- Constructing barriers as appropriate in certain areas to minimize wind and water erosion and sedimentation prior to vegetation establishment.

Management of the soil resource will continue to be based on the following: 1) evaluation and interpretation of soils in relation to project design and development; 2) identification and inventory of soils for baseline data; and 3) identification and implementation of methods to reduce accelerated erosion.

Evaluation and interpretation involve identifying soil properties that influence their use and recommendations for development while minimizing soil loss. Projects will be examined on a site-specific basis, evaluating the potential for soil loss, and the compatibility of soil properties with project design. Stipulations and mitigating measures are provided on a case-by-case basis to ensure soil conservation and practical management. Projects requiring soil interpretations include construction of linear right-of-way facilities (i.e., pipelines, roads, railroads, and power transmission lines); construction of water impoundments; rangeland manipulation through fire or mechanical treatments; construction of plant site facilities, pump stations, well pads and associated disturbances; and reclamation projects.

BLM will require each individual right-of-way, APD, or other application to include a reclamation plan approved by the BLM. Each Master Development Plan for projects that cumulatively disturb more than 10 acres will be required to submit an Erosion, Revegetation and Restoration Plan (ERRP) consistent with BLM guidance. Prior to new disturbance, ERRPs will be approved by the BLM Authorized Officer.

Notice of any spill or leakage, as defined in BLM NTL 3A, will be immediately reported by the operator to the AO and other such federal and state officials (e.g., WDEQ) as required by law. Verbal notice will be given as soon as possible, but within 24 hours, and verbal notices will be confirmed in writing within 72 hours of any such occurrence. Any accidental soil contamination by spills of petroleum products or other hazardous materials will be cleaned up and the soil disposed of or rehabilitated according to WDEQ Solid Waste Guidelines (#2) for petroleum contaminated soils.

Visual Resource Management

Visual Resource Management (VRM) class objectives and design considerations should be considered early in the project planning process. Approval of well pad locations, new roads, buried pipelines, or other facilities will be conditioned upon the operator developing a visual resource protection plan, acceptable to BLM, for the mitigation of anticipated impacts. To minimize visual impacts, authorization of well pad

locations, new roads, CPFs, buried pipelines, etc. will require the operator to demonstrate to the AO's satisfaction that the location and/or facilities have reasonably incorporated visual design considerations that mitigate unnecessary visual impacts.

Within VRM Class II and III areas, during onsite reviews, the BLM and the operator will evaluate potential disturbances and impacts to visual resources using the VRM Contrasting Rating Process and forms as required and described in Handbook H-8431-1. Identify appropriate mitigation and reevaluate until it is demonstrated that VRM management class objectives are met. Three-dimensional design and visual analysis software could be used to analyze impacts, develop mitigation plans, and prepare visual simulations. Digital terrain information could cover the project area viewshed with engineered site plans being entered into the Geographic Information System (GIS) 3D model allowing for comprehensive analysis and determining cumulative impacts. Mitigation techniques will include, but not be limited to new roads that are designed so that they conform with the landscape, incorporating curves to eliminate distant, straight line impacts; every opportunity will be taken to reclaim existing road ROWs that are not used when new roads are designed over them; revegetation will be initiated as soon as possible after disturbance; pipeline ROWs will be located within existing ROWs whenever possible; and aboveground facilities not requiring safety coloration will be painted with appropriate BLM-specified nonreflective standard environmental colors (i.e., Carlsbad Canyon, Shale Green or Desert Brown, or other specified standard environmental color). Topographic screening, vegetation manipulation, project scheduling, and traffic control procedures will all be employed as deemed appropriate by the BLM to further reduce visual impacts.

Low profile tanks will be required wherever visual sensitivity is an issue and/or wherever deemed appropriate mitigation to help maintain the visual integrity and basic characteristics of the landscape.

Within VRM Class IV areas, the BLM and operators will implement BMPs including, but not limited to the following: utilize existing topography to screen roads, pipeline corridors, drill rigs, wells, and production facilities from view, where practical. Operators will paint all aboveground production facilities with appropriate colors (Carlsbad Canyon, Shale Green or Desert Brown, or other specified standard environmental color) specified by the BLM to blend with adjacent terrain, except for structures that require safety coloration in accordance with OSHA requirements.

Avoid the introduction of new, linear visual intrusions on the landscape. New roads and pipeline corridors, to the extent practicable, will follow contours and use topography as screening. New pipelines will be combined with existing or proposed roads and, wherever possible, new cross-county pipeline corridors will be avoided.

If BLM allows a well pad to be developed in any area managed for visual resources, roads and well pads may need to be surfaced with materials that reduce visual contrast. For example, in the VRM Class II area near Pinedale, the subsoil material (Wasatch Formation) can be very light in color and thus contrasts with surrounding undisturbed areas. Mixing topsoil with gravel (1-inch deep) in highly visible areas will help to reduce contrast. Operators will be required to investigate the feasibility of applying this opportunity of surfacing roads and well pads with materials closer in color and texture to the surrounding landscape.

Watershed and Water

Approved surface disturbing management actions in stream corridors (within the "high bank" of any ephemeral or intermittent stream course, or within the high bank +50 feet of any perennial stream) shall be designed and implemented to protect fish spawning, fry, and other important fish life stages and habitats within the stream or connected streams and to maintain fish passage.

All disturbance occurring within the high bank +50 feet shall be reclaimed to meet the PFC standards.

Crossings of perennial streams will be located within existing "linear disturbance corridors" where possible. Should such a corridor not exist on a particular stream or with a reasonable distance of the proposed crossing, the crossing shall be located at a point to minimize disturbance to the stream channel and associated riparian habitat and maintain an adequate amount of unrestricted water flow to maintain fish passage during and after construction.

Upland erosion from surface disturbing activities must be controlled effectively and not allowed to be transported to stream systems.

Prudent use of erosion control measures, including diversion terraces, riprap, matting, temporary sediment traps, and water bars will be employed as necessary. The type and location of sediment control structure, including construction methods, will be described in APD and ROW plans. If necessary, to reduce suspended sediment loads and remove potential contaminants, Operators may treat diverted water in detention ponds prior to release to meet applicable state or federal standards.

BMP project proponents/operators/permittees will be required to control sediment from all construction sites.

Operators will prepare Stormwater Pollution Prevention Plans (SWPPP) for their respective areas of field development as required by WDEQ National Pollution Discharge Elimination System (NPDES) permit requirements.

Any industrial water wells and any tanks, pumps, hoses, pipes, or other associated connections will include check valves, backflow preventers, or other devices that secure the well against discharge of fluids into the well.

All water used in association with this project will be permitted through the Wyoming State Engineer's Office.

Wetlands, Riparian Areas, and Floodplains

All surface disturbance, permanent facilities, etc., will remain a minimum of 500 feet away from the edge of surface waters, riparian areas, wetlands, and 100-year floodplains unless it is determined through site-specific analysis, approved in writing by the BLM AO, that no practicable alternative to the proposed action exists. If such a circumstance exists, then all practicable measures to mitigate possible harm to these areas must be employed. These mitigating measures will be determined on a case-by-case basis and may include, but are not limited to, diking, lining, screening, mulching, terracing, and diversions.

Floodplains by their very nature are unsafe locations for permanent structures. With an inundation of flood waters, soils disturbed by construction could experience a rate of erosion greater than undisturbed sites. Additional concern exists over the potential for floodwaters to aid in the dispersal of hazardous materials that may be stored within such structures. Therefore, floodplains will have no permanent structures constructed within their boundaries unless it can be demonstrated on a case-by-case basis that there is no physically practical alternative. In cases in which floodplain construction is approved, additional constraints could be applied.

Floodplain Executive Order 11988 (Section 2.a.(2)) states in summary that if the HEAD OF THE AGENCY finds that the only practicable alternative consistent with the law and the policy set forth in the Order requires siting in a floodplain, the agency will, prior to taking action, 1) design or modify its action in order to minimize potential harm...and 2) prepare and circulate a notice containing an explanation of why the action proposed is to be located in the floodplain.

Floodplain Executive Order 11988 (Section 3), in reference to federal real property and facilities, states that agencies will, if facilities are to be located in a floodplain (i.e., no practicable alternative), apply flood protection measures to new construction or rehabilitate existing structures, elevate structures rather than fill the land, provide flood height potential markings on facilities to be used by the public, and when the property is proposed for lease, easement, right of way, or disposal, the agency has to attach restriction on uses in the conveyance, etc., or withhold from such conveyance.

Any disturbances to wetlands and/or waters of the U.S. will be coordinated with the COE, and 404 permits will be secured as necessary prior to disturbance.

Operators will evaluate all project facility sites for occurrence of waters of the U.S. special aquatic sites, and wetlands, per COE requirements. All project activities will be located outside these sensitive areas, where practical.

Where disturbance of wetlands, riparian areas, streams, and ephemeral/intermittent stream channels cannot be avoided, COE Section 404 permits will be obtained by the operator as necessary.

Wildlife

GENERAL WILDLIFE

Avoid activities and facilities that create barriers to the seasonal movements of big game and livestock.

Wildlife-proof fencing will be used on reclaimed areas, in accordance with standards specified in BLM Fencing Handbook 1741-1, if it is determined that wildlife species are impeding successful vegetation establishment.

ROW fencing associated with this project will be kept to a minimum; if necessary, fences will consist of four-strand barbed wire meeting WGFD approval and BLM Fencing Handbook 1741-1 standards for facilitating wildlife movement.

For all breeding birds observed, additional surveys will be conducted immediately prior to construction activities to search for active nest sites.

To avoid potentially significant noise impacts, compressor engines will be located 2,500 feet or more from a dwelling or residence and from sage-grouse leks.

Activities in crucial habitats will be avoided when practicable.

Wildlife habitat mitigation will be carried out as quickly as possible or at the same time as the disturbance.

Crucial wildlife winter ranges and nesting habitats could be treated with nitrogen fertilizers.

For additional wildlife mitigation measures, the Wyoming Game and Fish's document titled Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats (WGFD 2004) may be consulted.

T&E AND SPECIAL STATUS SPECIES

If while conducting operations, substantial unanticipated environmental effects to listed, proposed, or candidate species are observed (whether effects are direct or indirect), formal consultation with U.S. Fish and Wildlife Service (USFWS) will be initiated immediately in addition to cessation of all such operations.

USFWS and WGFD consultation and coordination will be conducted for all mitigation activities relating to raptors and threatened and endangered (T&E) species and their habitats, and all permits required for movement, removal, and/or establishment of raptor nests will be pursued if they meet USFWS migratory bird office requirements.

Areas containing open, streamside deciduous woodlands with low scrub vegetation, deciduous riparian woodlands, cottonwood stands or willow thickets must be surveyed for the Yellow-billed cuckoo. A minimum of three and a maximum of five censuses should be carried out from June 15 to August 10, with at least 12 days between successive census attempts.

Surveys for T&E and candidate wildlife species will be implemented in areas of potential habitat by a qualified biologist prior to disturbance. Findings will be reviewed by the BLM prior to or as components of ROW applications and APD review processes. If T&E and/or candidate species are found in the area, consultation with the USFWS will be initiated, and construction activities will be curtailed until there is concurrence between BLM and USFWS, on what activities can be authorized.

Proposed construction sites in the development area will be examined prior to surface-disturbing activities to confirm the presence or absence of prairie dog colonies. Confirmation will be made of white-tailed prairie dog colony/complex size, burrow density, and any other data to indicate whether the criteria for black-footed ferret habitat, established in the USFWS guidelines, are present. If prairie dog colony/complex meets the USFWS criteria, a qualified biologist will locate all project components to avoid direct, indirect and cumulative impacts to the colony/complex. If this is not practical or possible, black-footed ferret surveys of the prairie dog colony/complex, where required by the USFWS, will be conducted in accordance with USFWS guidelines and requirements. The results of the survey will be provided to the USFWS in accordance with Section 7 of the ESA, as amended, and Interagency Cooperation Regulations. If a black-footed ferret or its sign is found during the survey, the BLM AO will stop all action on the application in hand. New roads and trails should not cross colonies.

A survey for black-footed ferret is required prior to approval of construction activities within nonblock cleared habitats.

The USFWS has determined that any withdrawal of water from the Colorado River System (surface or groundwater) will jeopardize the endangered Colorado pikeminnow, humpback chub, bonytail, and razorback sucker. The USFWS Colorado River Endangered Fish Recovery Program requires a depletion fee be paid by the proponent to help support the recovery program. The fee is required for each acre-foot of water depletion where the depletion of water is in excess of 100 acre-feet from the Colorado River system.

Operators will finance site-specific surveys for special status plant species (SSPS) prior to any surface disturbance in areas determined by the BLM to contain potential habitat for such species (Directive USDI-BLM 6840). These surveys will be completed by a qualified botanist as authorized by the BLM and this botanist will be subject to BLM's SSPS survey policy requirements. Data from these surveys will be provided to the BLM, and if any SSPS or habitats are found, BLM recommendations for avoidance or mitigation will be implemented.

Areas containing moist soils in mesic or wet meadows, sub-irrigated or seasonally flooded soils in valley bottoms, gravel bars, old oxbows, or floodplains bordering springs, lakes, rivers or perennial streams between 1,780 and 6,800 feet in elevation must be avoided for Ute ladies' tresses.

MIGRATORY BIRDS

Bald eagles roost, perch, feed, and nest along the Green and New Fork Rivers. To ensure continued protection of this species, no surface disturbing or human activities will be authorized between November 1 and April 1 within 1 mile of known bald eagle winter use areas. All surface-disturbing or human activity, including construction of roads, pipelines, well pads, drilling, completion, or workover operations, will be seasonally restricted from February 1 through August 15 within 1.0 mile of all active eagle nests. An active eagle nest is one that has been occupied once in the past 5 years.

Permanent (life of the project) and high profile structures such as well locations, roads, buildings, storage tanks, overhead power lines, etc., and other structures requiring repeated human presence will not be constructed within 1,000 feet (1,400 feet for ferruginous hawks; 2,600 feet for bald eagles) of active raptor nests. Wells that must be located closer than 2,600 feet (but will not be allowed closer than 2,000 feet) of a bald eagle nest will be out of the direct line of sight of the nest; will have no human activity at the well site from February 1 through August 15 except in the case of an emergency; and will locate production facilities off-site or at a central production facility location at a distance of 2,600 feet or more from the nest. In these cases, the USFWS will be contacted to ensure compliance under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

All surface-disturbing activity (e.g., road, pipeline, well pad construction, drilling, completion, workover operations) will be seasonally restricted from February 1 through July 31 within a 0.5-mile radius of all active raptor nests, except that ferruginous hawk nests will be seasonally restricted from March 1 through July 31 and the seasonal buffer will be 1.0 mile. An active raptor nest is defined as a nest that has been occupied within the past 3 years. The seasonal buffer distance and exclusion dates applicable may vary depending on such factors as the activity status of the nest, species involved, prey availability, natural topographic barriers, line-of-site distance(s), and other conflicting issues such as cultural values, steep slopes, etc.

Raptor nest surveys will be conducted for active nests within a 0.5- to 1.0-mile radius of proposed surface use or activity areas if such activities are proposed to be conducted between February 1 and July 31 or as required in the Pinedale Field Office raptor survey protocol.

The buffer distance for raptors may vary depending on the species involved, prey availability, natural topographic barriers, line-of-sight distances, and other conflicting issues (e.g., cultural values, steep slopes). Linear disturbances such as pipelines and seismic activity could be granted exceptions as long as they will not adversely affect the raptor(s).

Surface disturbing and human activities are not allowed between November 1 and April 1 within one mile of known bald eagle winter use areas.

Surface disturbing and human activities within one mile of an active bald eagle nest will be restricted from February 1 to August 15.

Activities or surface use are not allowed from March 15 to August 15 for the protection of migratory bird nests in accordance with the Migratory Bird Treaty Act. A nest survey must be conducted prior to construction from March 15 to August 15. If a nest is present and active, monitoring will need to be done until the young have fledged. Contact a BLM wildlife biologist prior to conducting nest surveys.

Habitat alterations within 2.5 miles of a bald eagle nest, or 0.5 miles from the stream bank of all streams within 2.5 miles of the nest, will be restricted to protect bald eagle foraging/concentration areas year-round.

Surface disturbing and disruptive activities will be prohibited within 0.5 miles of burrowing owl nesting habitat from April 1 through August 15.

For surface disturbing activities, surveys will be conducted within suitable plover habitat by a qualified biologist in accordance with USFWS 1999 guidelines. (A copy of the guidelines may be obtained from the USFWS, BLM, or WGFD). Two types of surveys may be conducted: 1) surveys to determine the presence/absence of breeding plovers (i.e., displaying males and foraging adults), or 2) surveys to determine nest density.

If surface disturbing activity is requested to take place in mountain plover habitat between April 10 and July 10, presence/absence surveys are required. Survey results will determine when activities are proposed.

Surveys to determine presence/absence of the plover will be conduct between April 10 through July 10 throughout the breeding range.

Visual observation of the area should be made within 0.25 mile of the proposed action to detect the presence of plovers.

A site must be surveyed for plover three times during the survey window, with each survey separated by at least 14 days.

Initiation of the project should occur as near to completion of the plover survey as possible (within 2 days for seismic exploration; a 14-day period may be appropriate for other projects.

If active plover nest is found in the survey area, the planned activity should be delayed 37 days, or one-week post-hatching. If a brood of flightless chicks is observed, activities should be delayed at least 7 days.

Plover surveys will be conducted during early courtship and territorial establishment. Throughout the breeding range, this period extends from approximately mid-April through early July. However, the specific breeding period depends on latitude, elevation, and weather.

Plover surveys will be conducted between local sunrise and 10:00 a.m., and between 5:30 p.m. and sunset (periods of horizontal light to facilitate spotting the white breast of the adult plovers).

Drive transects within the project area to minimize early flushing. Flushing distances for mountain plovers may be within 3 meters (9 to 10 feet) for vehicles, but plovers often flush at 50 to 100 meters (164 to 328 feet) when approached by humans on foot.

In cases where an exception will be provided to the proponent during the April 10 to July 10 breeding and nesting time period, BLM personnel will adhere to approved protocols describing survey protocol for exceptions.

To control the population of mosquitos that might spread West Nile virus, larvicidal briquettes will be placed in standing water pools as appropriate. Adult mosquitos could also be treated with insecticides if necessary.

GREATER SAGE-GROUSE

No surface disturbance within one-quarter mile of an occupied greater sage-grouse lek will be permitted. Linear disturbances such as pipelines and seismic activity could be granted exceptions outside the breeding season if they are determined not to have associated long-term, continuous activity that could impact breeding success.

Permanent, high-profile structures such as buildings and storage tanks will not be constructed within 0.25 mile of an occupied greater sage-grouse lek.

In selecting a site for a compressor facility, a well pad or other permanent facility, the distance from the edge of a an occupied greater sage-grouse lek will be sufficient to result in a noise level increase from operating facilities no greater than 10 decibels (dBA) above background (i.e., 39 dBA background + 10 dBA = 49 dBA). Further restrictions may be required if the species is determined by the USFWS to be eligible for listing as either threatened or endangered pursuant to the Endangered Species Act. Monitoring will be required by BLM to determine which leks in the PAPA are occupied and which have been abandoned.

If existing information is not current, field evaluations for greater sage-grouse leks and/or nests will be conducted by a qualified biologist prior to the start of activities in potential greater sage-grouse habitat. These field evaluations for leks and/or nests will be conducted if project activities are planned in potential greater sage-grouse habitat between March 15 and July 15. BLM wildlife biologists will ensure that such surveys are conducted using proper survey methods.

Wyoming Executive Order 2008-2, and the Wyoming Stipulations for Development in Core Sage-Grouse Population Areas, will be considered when permitting activities.

Reclamation

All disturbances will be limited to the minimum necessary to enable production of the resource.

All disturbances will be returned to the approximate pre-disturbance contour of the land.

Pre-disturbance land use will be returned to the maximum extent practicable.

Where approved disturbance prohibits maintenance of use, offsite mitigation could be considered.

Reclamation will be designed to restore the affected lands to pre-disturbance land uses once a project is completed. While surface-disturbing or disruptive activities continue, land uses will be mitigated using revegetation, stabilization, erosion control, and habitat enhancement.

Experimental methods to maintain or reclaim wildlife habitat or improve reclamation science are encouraged to be tested on small areas within the planning area. When scientifically proven effective for a reclamation objective, these methods may be incorporated into proven reclamation methods.

All reclamation of disturbed lands will be conducted with a diverse mix of noninvasive, certified weed-free seed demonstrated effective for post-disturbance land uses and approved by the AO. In designated crucial and important wildlife habitats, this seed mix should be designed to restore pre-disturbance wildlife use.

A site-specific reclamation plan should be prepared for each well pad, pipeline, road, or other surface disturbing activities prior to authorization and should include the following:

- Topsoil storage techniques
- Description of native vegetation disturbed, including species and composition
- Need to collect native seed
- Need for irrigation and fertilization

- Need for fencing
- Proposed recontouring plans and seeding/planning procedures
- Definition of success
- Plans for reseeding if reclamation fails.

BLM will require each individual right-of-way, APD, or other application to include a reclamation plan approved by the BLM.

Site Stabilization

Disturbed channel beds will be reshaped to their approximate original configuration.

Streams, wetlands, and riparian areas disturbed during project construction will be restored to as near pre-project conditions as practical, and if impermeable soils contributed to wetland formation, soils will be compacted to reestablish impermeability.

Areas will be recontoured and BLM-approved species will be used for reclamation.

Reclamation activities will begin on disturbed wetland areas immediately after completion of project activities.

Upon completion of construction and/or production activities, operators will restore the topography to near preexisting contours at well sites, access roads, pipelines, and other facility sites.

All roads on federal lands not required for routine operation and maintenance of producing wells, ancillary facilities, livestock grazing administration, or necessary recreation access will be reclaimed as directed by the BLM. These roads will be permanently blocked, recontoured, reclaimed, and revegetated by the operators, as will disturbed areas associated with permanently plugged and abandoned wells.

Disturbances should be reclaimed or managed for zero sediment discharge. All excavations and pits should be closed by backfilling and contouring to conform to surrounding terrain. On well pads and larger locations, the surface use plan will include objectives for successful reclamation such as soil stabilization, plant community composition, and desired vegetation density and diversity.

All reclamation is expected to be accomplished as soon as possible after the disturbance occurs with efforts continuing until a satisfactory revegetation cover is established and the site is stabilized (3 to 5 years). Only areas needed for construction will be allowed to be disturbed.

On all areas to be reclaimed, seed mixtures will be required to be site specific and composed of native species. Seed mixtures also will be required to include species promoting soil stability. A pre-disturbance species composition list must be developed for each site if the project encompasses an area in which several different plant communities present. Livestock palatability and wildlife habitat needs will be given consideration in seed mix formulation. BLM guidance for native seed use is BLM Manual 1745 (Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants), and Executive Order No. 11987 (Exotic Organisms).

If deemed necessary, approved sterile seed mix could be considered for use in site stabilization during reclamation.

Interseeding, secondary seeding, or staggered seeding may be required to accomplish revegetation objectives. During rehabilitation of areas in important wildlife habitat, provision will be made for the establishment of native browse and forb species, if determined to be beneficial for the habitat affected. Follow-up seeding or corrective erosion control measures may be required on areas of surface disturbance which experience reclamation failure.

Any mulch and mineral material (sand and gravel) used will be certified weed free and free from mold or fungi. Mulch may include native hay, small grain straw, wood fiber, live mulch, cotton, jute, synthetic netting, and rock. Straw mulch should contain fibers long enough to facilitate crimping and provide the greatest cover.

Noxious Weeds

Operators will monitor noxious weed occurrence on the project area and implement a noxious weed control program in cooperation with the BLM and Sublette County to ensure noxious weed invasion does not become a problem. Weed-free certification by county extension agents will be required for grain or straw used for mulching revegetated areas. Gravel and other surfacing materials used for the project will be free of noxious weeds.

The operator, grantee, or lessee will be responsible for the control of all noxious weed infestations on surface disturbances. Prior to any treatment, the operator, grantee, or lessee will be responsible for submission of Pesticide Use Proposals and subsequent Pesticide Use Reports. Control measures will adhere to those allowed in the Final Vegetation Treatments Using Herbicides on BLM in 17 Western States Programmatic EIS (June 2007) and ROD (September 2007), Rock Springs District Noxious Weed Control EA (USDI 1982a), or the Regional Northwest Area Noxious Weed Control Program EIS (USDI 1987). Herbicide approvals and treatments will be monitored by the BLM AO. Herbicide applications will be kept at least 500 feet from known SSPS populations. Aerial application of chemicals is prohibited within one-quarter mile of special status plant locations, or other distance deemed safe by the BLM AO.

Hazardous Waste Disposal

In accordance with 29 CFR 1910.1200, a Material Safety Data Sheet for every chemical or hazardous material brought on-site will be kept on file at the operator's field office.

Chemical and hazardous materials will be inventoried and reported in accordance with the SARA Title III (40 CFR 335). If quantities exceeding 10,000 pounds or the threshold planning quantity are to be produced or stored, the appropriate Section 311 and 312 forms will be submitted at the required times to the State and County Emergency Management Coordinators and the local fire departments.

Any hazardous wastes, as defined by the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, will be transported and/or disposed of in accordance with all applicable federal, state, and local regulations.

SPCC Plans will be implemented and adhered to in a manner such that any spill or accidental discharge of oil will be remediated. An orientation should be conducted by the operators to ensure that project personnel are aware of the potential impacts that can result from accidental spills and that they know the appropriate recourse if a spill occurs. Where applicable and/or required by law, streams at pipeline crossings will be protected from contamination by pipeline shutoff valves or other systems capable of minimizing accidental discharge. If reserve pit leakage is detected, operations at the site will be curtailed, as directed by the BLM, until the leakage is corrected.

Literature Cited

Bureau of Land Management (BLM). 2008a. *Appendix 5. Fluid Mineral Best Management Practices*. In *Record of Decision and Approved Pinedale Resource Management Plan*. Pinedale, Wyoming: BLM Pinedale Field Office Available at https://eplanning.blm.gov/epl-front-office/projects/lup/63200/78620/89700/Appendix05_BestManagementPractices.pdf. Accessed March 9, 2020.

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RAWLINS RESOURCE MANAGEMENT PLAN

Stipulations

Refer to individual resource sections of the Record of Decision and Approved Rawlins Resource Management Plan for any applicable stipulations (BLM 2008a).

Required Design Features

No required design features listed in RMP.

Best Management Practices (BLM 2008a)

Big Game Crucial Winter Range

The following BMPs will be considered to reduce impacts to big game crucial winter range:

- Transportation planning (to reduce road density and traffic volumes)
- Compensation mitigation
- Seasonal restriction of public vehicular access

Sage-Grouse Habitat

The following BMPs will be considered to reduce impacts to sage-grouse habitat:

- Seasonal restriction of public vehicular access
- Noise-reduction techniques and designs
- Transportation planning to align roads out of sight and sound of leks, and to schedule traffic to avoid sage-grouse activity periods
- Roads designed to minimum safe standard for intended use
- Partial reclamation of high-standard roads needed for project construction to lower standards necessary for maintenance operations
- Prohibition of surface disturbance or occupancy within one-quarter mile of the perimeter of occupied sage-grouse leks
- Avoidance of human activity between 6:00 p.m. and 9:00 a.m. from March 1 through May 20 within one-quarter mile of the perimeter of occupied sage-grouse leks. These times and dates reflect recommendations from the Wyoming Game and Fish Department (WGFD) based on site-specific data for the Resource Management Plan Planning Area (RMPPA)
- Avoidance of surface disturbance or other disruptive activity from March 1 through July 15 up to 2 miles from an “active” lek in suitable greater sage-grouse nesting habitat. These dates reflect recommendations from WGFD based on site-specific data for the RMPPA.

Wildlife Habitat

The following BMPs will be considered to reduce impacts to wildlife habitat:

- Seasonal restriction of public vehicular access
- Noise reduction techniques and designs
- Installation of raptor anti-perch devices
- Implementation of the Wyoming Bird Conservation Plan from Wyoming Partners In Flight.

The Bureau of Land Management (BLM) will consider management actions in the WGFD Minimum Programmatic Standards Recommended by the WGFD to sustain important wildlife habitats affected by oil and gas development.

Visual Resource Management Class II and III Areas

The following BMPs will be considered to reduce impacts to visual resource management Class II and III areas:

- Burying of distribution power lines and flow lines in or adjacent to access roads
- Repeating elements of form, line, color, and texture to blend facilities and access roads with the surrounding landscape
- Painting all above-ground structures, production equipment, tanks, transformers, and insulators not subject to safety requirements to blend with the natural color of the landscape, using paint that is a nonreflective "standard environmental color" approved by BLM's visual resource management (VRM) specialist
- Performing final reclamation recontouring of all disturbed areas, including access roads, to the original contour or a contour that blends with the surrounding topography
- Avoiding facility placement on steep slopes, ridge tops, and hilltops
- Screening facilities from view
- Following contours of the land to reduce unnecessary disturbance
- Recontouring and revegetating disturbed areas to blend with the surrounding landscape
- Reclaiming unnecessary access roads as soon as possible to the original contour
- Using gravel of a similar color to adjacent dominant soil and vegetation colors for road surfacing
- Using subsurface or low-profile facilities to prevent protrusion above the horizon line when viewed from any primary road
- Locating facilities far enough from the cut and fill slopes to facilitate recontouring for interim reclamation
- Completing an annual transportation plan for the entire area before beginning construction, and making a layout that will minimize disturbance and visual impact
- Designing and constructing all new roads to a safe and appropriate standard "no higher than necessary" to accommodate their intended use
- Locating roads far enough off the back of ridgelines so they are not visible from state, county, or BLM roads
- Using remote monitoring to reduce traffic and road requirements
- Removing unused equipment, trash, and junk immediately.

Fluid Mineral Construction, Operation, and Reclamation

The following BMPs will be considered to reduce impacts from fluid mineral construction, operation, and reclamation:

- Transportation planning (to reduce road density and traffic volumes)
- Burying of distribution power lines and flow lines in or adjacent to access roads
- Design and construction of all new roads to a safe and appropriate standard "no higher than necessary" to accommodate their intended use
- Avoidance of facility placement on steep slopes, ridge tops, and hilltops
- Removal of trash, junk, waste, and other materials not in use.

Wyoming BLM Mitigation Guidelines for Surface Disturbing and Disruptive Activities (BLM 2008b)

Surface Disturbance Mitigation Guideline

Surface disturbance will be prohibited in any of the following areas or conditions. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the authorized officer.

- Slopes in excess of 25 percent.
- Within important scenic areas (Class I and II Visual Resource Management Areas).
- Within 500 feet of surface water and/or riparian areas.
- Within either one-quarter mile or the visual horizon (whichever is closer) of historic trails.
- Construction with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur.

Wildlife Mitigation Guideline

- To protect important big game winter habitat, activities or surface use will not be allowed from November 15 to April 30 within certain areas encompassed by the authorization. The same criteria apply to defined big game birthing areas from May 1 to June 30.
- Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.
- Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.
- To protect important raptor and/or sage and sharp-tailed grouse nesting habitat, activities or surface use will not be allowed from February 1 to July 31 within certain areas encompassed by the authorization. The same criteria apply to defined raptor and game bird winter concentration areas from November 15 to April 30.
- Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.

- Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.
- No activities or surface use will be allowed on that portion of the authorization area identified within (legal description) for the purpose of protecting (e.g., sage/sharp-tailed grouse breeding grounds, and/or other species/activities) habitat.
- Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.
- Portions of the authorized use area legally described as (legal description), are known or suspected to be essential habitat for (name) which is a threatened or endangered species. Prior to conducting any onsite activities, the lessee/permittee will be required to conduct inventories or studies in accordance with BLM and U.S. Fish and Wildlife Service guidelines to verify the presence or absence of this species. In the event that (name) occurrence is identified, the lessee/permittee will be required to modify operational plans to include the protection requirements of this species and its habitat (e.g., seasonal use restrictions, occupancy limitations, facility design modifications).

Cultural Resource Mitigation Guideline

When a proposed discretionary land use has potential for affecting the characteristics, which qualify a cultural property for the National Register of Historic Places (NRHP), mitigation will be considered. In accordance with Section 106 of the Historic Preservation Act, procedures specified in 36 Code of Federal Regulation (CFR) 800 will be used in consultation with the Wyoming State Historic Preservation Officer and the Advisory Council on Historic Preservation in arriving at determinations regarding the need and type of mitigation to be required.

Special Resource Mitigation Guideline

To protect (resource value), activities or surface use will not be allowed (i.e., within a specific distance of the resource value or between date to date) in (legal description).

Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.

Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.

Example Resource Categories (Select or identify category and specific resource value):

- Recreation areas.
- Special natural history or paleontological features.
- Other management areas.
- Sections of major rivers.
- Prior existing rights-of-way.
- Occupied dwellings.
- Other (specify).

No Surface Occupancy Guideline

No Surface Occupancy (NSO) for fluid minerals will be allowed on the following described lands (legal description) because of (resource value).

Example Resource Categories (Select or identify category and specific resource value):

- Recreation Areas (e.g., campgrounds, historic trails, national monuments).
- Major reservoirs/dams.
- Other management area (e.g., known threatened or endangered species habitat, areas suitable for consideration for wild and scenic rivers designation).
- Other (specify).

Literature Cited

Bureau of Land Management (BLM). 2008a. *Appendix 15. Best Management Practices For Reducing Surface Disturbance And Disruptive Activities*. In *Record of Decision and Approved Rawlins Resource Management Plan*. Rawlins, Wyoming: BLM Rawlins Field Office Available at https://eplanning.blm.gov/epl-front-office/projects/lup/63197/78289/88531/Appendix15_Best_Management_Practices.pdf. Accessed March 9, 2020.

———. 2008b. *Appendix I. Wyoming Bureau Of Land Management Mitigation Guidelines For Surface Disturbing And Disruptive Activities*. In *Record of Decision and Approved Rawlins Resource Management Plan*. Rawlins, Wyoming: BLM Rawlins Field Office Available at https://eplanning.blm.gov/epl-front-office/projects/lup/63197/78289/88518/Appendix01_Wyoming_Mitigation_Guidelines.pdf. Accessed March 9, 2020.

ROCK SPRINGS RESOURCE MANAGEMENT PLAN

Stipulations

Refer to individual resource sections of the Record of Decision and Green River Resource Management Plan for any applicable stipulations (BLM 1997).

Required Design Features

No required design features listed in RMP.

Standard Practices, Best Management Practices, and Guidelines for Surface Disturbing Activities (BLM 1997)

Pipelines and Communication Lines

On ditches exceeding 36 inches in width, 6 to 12 inches of surface soil should be salvaged where possible on the entire right-of-way. When pipelines and communication lines are buried, there should be at least 30 inches of backfill on top of the pipe. Backfill should not extend above the original ground level after the fill has settled. Guides for construction and water bar placement are found in "Surface Operating Standards for Oil and Gas Exploration and Development" (USDI 1978). Bladed surface materials would be re-spread upon the cleared route once construction is completed. Disturbed areas that have been reclaimed may need to be fenced when the route is near livestock watering areas.

Existing crowned and ditched roads would be used for access where possible to minimize surface disturbances. Where possible, clearing of pipeline and communication line rights-of-way would be accomplished with the least degree of disturbance to topsoil. Where topsoil removal is necessary, it would be stockpiled (wind-rowed) and re-spread over the disturbance after construction and backfilling are completed. Vegetation removed from the right-of-way would also be required to be re-spread to provide protection, nutrient recycling, and a seed source.

To promote soil stability, the compaction of backfill over the trench would be required (not to extend above the original ground level after the fill has settled). Water bars, mulching, and terracing would be required, as needed, to minimize erosion. Instream protection structures (e.g., drop structures) may be required in drainages crossed by a pipeline to prevent erosion. The fencing of linear disturbances near livestock watering areas may be required.

Reclamation

Current BLM policy recognizes that there may be more than one correct way to achieve successful reclamation, and a variety of methods may be appropriate to the varying circumstances. BLM should continue to allow applicants to use their own expertise in recommending and implementing construction and reclamation projects. These allowances still hold the applicant responsible for final reclamation standards of performance.

BLM reclamation goals emphasize: 1) protection of existing native vegetation; 2) minimal disturbance of existing environment; 3) soil stabilization through establishment of ground cover; and 4) establishment of native vegetation consistent with land use planning.

All reclamation is expected to be accomplished as soon as possible after the disturbance occurs with efforts continuing until a satisfactory revegetation cover is established and the site is stabilized (3 to 5 years).

Only areas needed for construction would be allowed to be disturbed. Reclamation (by the lessee or grand holder) would be initiated as soon as possible after a disturbance occurs.

On all areas to be reclaimed, seed mixtures would be required to be site-specific, composed of native species, and would be required to include species promoting soil stability. A pre-disturbance species composition list must be developed for each site if the project encompasses an area where there are several different plant communities present. Livestock palatability and wildlife habitat needs would be given consideration in seed mix formulation. BLM guidance for native seed use is BLM Manual 1745 (Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants), and Executive Order 11987 (Exotic Organisms).

Interseeding, secondary seeding, or staggered seeding may be required to accomplish revegetation objectives. During rehabilitation of areas in important wildlife habitat, provision would be made for the establishment of native browse and forb species, if determined to be beneficial for the habitat affected. Follow-up seeding or corrective erosion control measures may be required on areas of surface disturbance which experience reclamation failure.

Trees, shrubs, and ground cover (not to be cleared from rights-of-way) would require protection from construction damage. Backfilling to preconstruction condition (in a similar sequence and density) would be required. The restoration of normal surface drainage would also be required.

Any mulch used would be free from mold, fungi, or noxious weed seeds. Mulch may include native hay, small grain straw, wood fiber, live mulch, cotton, jute, synthetic netting, and rock. Straw mulch should contain fibers long enough to facilitate crimping and provide the greatest cover.

The grantee or lessee would be responsible for the control of all noxious weed infestations on surface disturbances. Aerial application of chemicals would be prohibited within ¼ mile of special status plant locations, and hand application would be prohibited within 500 feet. Control measures would adhere to those allowed in the Rock Springs District Noxious Weed Control EA (USDI 1982a) or the Regional Northwest Area Noxious Weed Control Program EIS (USDI 1987). Herbicide application would be monitored by the BLM authorized officer.

Roads

Roads would be constructed as described in BLM Manual 9113. New main artery roads would be designed to reduce sediment, salt, and phosphate loading to the Green River. Where necessary, running surfaces of the roads would be graveled if the base does not already contain sufficient aggregate.

Existing roads would be upgraded where necessary.

Recognized roads, as shown on the Rock Springs District Office Transportation Plan, would be used when the alignment is acceptable for the proposed use. Generally, roads would be required to follow natural contours; provide visual screening by constructing curves etc.; and be reclaimed to BLM standards.

To control or reduce sediment from roads, guidance involving proper road placement and buffer strips to stream channels, graveling, proper drainage, seasonal closure, and in some cases, redesign or closure of old roads would be developed when necessary. Construction may also be prohibited during periods when soil material is saturated, frozen, or when watershed damage is likely to occur.

On newly constructed roads and permanent roads, the placement of topsoil, seeding, and stabilization would be required on all cut and fill slopes unless conditions prohibit this (e.g., rock). No unnecessary side-casting of material (e.g., maintenance) on steep slopes would be allowed. Snow removal plans may be required so that snow removal does not adversely affect reclamation efforts or resources adjacent to the road.

Reclamation of abandoned roads would include requirements for reshaping, recontouring, resurfacing with topsoil, installation of water bars, and seeding on the contour. The removal of structures such as bridges, culverts, cattleguards, and signs usually would be required. Stripped vegetation would be spread over the disturbance for nutrient recycling, where practical. Fertilization or fencing of these disturbances would not normally be required. Additional erosion control measures (e.g., fiber matting) and road barriers to discourage travel may be required.

Main artery roads, regardless of primary user, would be crowned, ditched, drained, and surfaced with gravel to reduce sediment, salt, and phosphate loading to the Green River.

Road closures may be implemented during crucial periods (e.g., wildlife winter periods, spring runoff, and calving and fawning seasons).

Soils

Current objectives focus on soil conservation planning for surface disturbance actions. Soil conservation should be addressed during the initial phase of any surface disturbing action, thereby maintaining soil productivity and stability levels through the use of existing guidelines and techniques. Some areas may require more thorough soil management practices than others, however, this is dependent on the type and duration of the action and the effect on site-specific soil characteristics.

Some examples of standards applied throughout the Resource Area based on soil management criteria are:

1. Closures due to saturated soil conditions when soil resource damage would occur due to wheel rutting or compaction on wet soils.
2. Salvage and subsequent replacement of topsoil whenever possible on surface disturbing activities.
3. Limiting disturbance on slopes greater than 25 percent.

Emphasis should continue to be placed on the reduction of soil erosion and sediment into the Green River Basin watershed. Of particular importance would be those areas with saline soils such as the Little Colorado Desert or those areas with highly erodible geology and soils such as Red Creek drainage.

Management of the soil resource would continue to be based upon the following: 1) Evaluation and interpretation of soils in relation to project design and development; 2) Identification and inventory of soils for baseline data; and 3) Identification and implementation of methods to reduce accelerated erosion.

Evaluation and interpretation involve identification of soil properties which would influence their use and recommendations for development while minimizing soil loss. Projects would be examined on a site-specific basis, evaluating the potential for soil loss and the compatibility of soil properties with project design. Stipulations and mitigating measures are provided on a case-by-case basis to ensure soil conservation and practical management. Projects requiring soil interpretations include: construction of linear right-of-way facilities (i.e., pipelines, roads, railroads, and power transmission lines); construction of water impoundments; rangeland manipulation through fire or mechanical treatments; construction of plant site facilities, pump stations, well pads and associated disturbances; and reclamation projects.

The current Order 3 soil survey is designed to update general soils information and provide data to those areas lacking soil inventories. A baseline soil inventory is ongoing to provide information on productivity, soil engineering properties, and soil erosion potentials. Proposed "T" category allotments and areas impacted by oil and gas projects receive priority in the soil survey process.

Identification of critical erosion condition areas would continue during soil surveys, monitoring, site specific project analysis, and activity plan development for the purpose of avoidance and special management.

Before a surface disturbing activity is authorized, topsoil depth would be determined. The amount of topsoil to be removed, along with topsoil placement areas, would be specified in the authorization. The uniform distribution of topsoil over the area to be reclaimed would be required, unless conditions warrant a varying depth. On large surface-disturbing projects (e.g., gas processing plants) topsoil would be stockpiled and seeded to reduce erosion. Where feasible, topsoil stockpiles would be designed to maximize surface area to reduce impacts to soil microorganisms. Stockpiles remaining less than two years are best for soil microorganism survival and native seed viability. It is recommended that stockpiles be no more than 3 to 4 feet high. Areas used for spoil storage would be stripped of topsoil before spoil placement. The replacement of topsoil after spoil removal would be required.

Temporary disturbances which do not require major excavation (e.g., small pipelines and communication lines) may be stripped of vegetation to ground level using mechanical treatment, leaving topsoil intact and root mass relatively undisturbed.

In support of the Bureau's mission, soil management is committed to sustaining the productivity of soils.

Watershed

Stream sediment, phosphate, and salinity load would be reduced where possible.

To protect watershed resource during wet periods, vehicle travel, particularly large or heavy truck traffic, would not be allowed unless travel occurs on roads that are graveled for all-season use.

Crossings of ephemeral, intermittent, and perennial streams associated with road and utility line construction would generally be restricted until after spring runoff and normal flows are established.

Floodplains by their very nature are unsafe locations for permanent structures. With an inundation of flood waters, soils disturbed by construction could experience a rate of erosion greater than undisturbed sites. There is an additional concern over the potential for flood waters to aid in the disbursal of hazardous materials that may be stored within such structures. Therefore, floodplains should have no permanent structures constructed within their boundaries unless it can be demonstrated on a case-by-case basis that there is no physically practical alternative. In cases where floodplain construction is approved, additional constraints could be applied.

Section 2.a.(2) of Executive Order 11988 states in summary that "…if the HEAD of THE AGENCY finds that the only practicable alternative consistent with the law and with the policy set forth in the Order requires siting in a floodplain, the agency shall, prior to taking action, 1) design or modify its action in order to minimize potential harm…and 2) prepare and circulate a notice containing an explanation of why the action proposed is to be located in the floodplain.

Also, Section 3 of Executive Order 11988, in reference to Federal real property and facilities states that agencies shall, if facilities are to be located in a floodplain (i.e., no practicable alternative), flood protection measures are to be applied to new construction or rehabilitate existing structures, elevate

structures rather than fill the land, provide flood height potential markings on facilities to be used by the public, and when the property is proposed for lease, easement, right-of-way, or disposal, the agency has to attach restriction on uses in the conveyance, etc., or withhold from such conveyance.

Disturbances to the soils, such as roads and well pads, can easily concentrate the flow of water increasing its erosive potential. A 500-foot buffer provides an opportunity for such flows to be disbursed before they reach a stream and often precludes construction in riparian zones. Therefore, there should be no construction within 500 feet of a stream unless it can be demonstrated on a case-by-case basis that there is no physically practical alternative. In cases where construction within the 500-foot zone is approved, additional constraints could be applied.

All surface disturbance, permanent facilities, etc., shall remain a minimum of 500 feet away from the edge of surface waters, riparian areas, wetlands, and 100-year floodplains unless it is determined through site specific analysis and the Area Manager approves in writing, that there is no practicable alternative to the proposed action. If such a circumstance exists, then all practicable measures to mitigate possible harm to these areas must be employed. These mitigating measures would be determined case by case and may include, but are not limited to, diking, lining, screening, mulching, terracing, and diversions.

Well Pads and Facilities

No surface disturbance is recommended on slopes in excess of 25 percent unless erosion controls can be ensured and adequate revegetation is expected. Engineering proposals and revegetation and restoration plans would be required in these areas.

No sour gas lines would be located closer than one mile to a populated area or sensitive receptor. The applicants must use the best available engineering design (e.g., alignment, block valve type and spacing, pipe grade), and best construction techniques (e.g., surveillance, warning signs) as approved by the Authorized Officer to minimize both the probability of rupture and radius of exposure in the event of an accidental pipeline release of sour gas. A variance from the one-mile distance may be granted by the Authorized Officer based on detailed site-specific analysis that would consider meteorology, topography, and special pipeline design and (or) construction measures. This analysis would ensure that populated areas and sensitive receptors would not be exposed to an increased level of risk.

Wilderness

A controlled surface use stipulation would be applied for activities within 1.4 mile or the visual horizon of the WSA boundary. Actions within or adjacent to the WSAs would be evaluated on a case-by-case basis to determine if appropriate mitigation would be necessary.

Literature Cited

Bureau of Land Management (BLM). 1997. *Appendix 5-1 Standard Practices, Best Management Practices, and Guidelines for Surface Disturbing Activities*. In *Record of Decision and Green River Resource Management Plan*. Available at https://eplanning.blm.gov/epl-front-office/projects/lup/63096/75581/83689/greenriver-rmp.pdf. Accessed March 9, 2020.

WORLAND FIELD OFFICE RESOURCE MANAGEMENT PLAN

Stipulations (BLM 2015a)

Record Number	Stipulation Type	Protected Resource	Stipulation Description
1042	CSU	Public Water Supply Areas	Controlled Surface Use (CSU). Surface occupancy or use is restricted within ¼ mile of water resources, public water supply wells and up to 10 miles upstream of public water supply intake areas. (1) Prior to surface disturbance within ¼ mile of water resources, public water supply wells and up to 10 miles upstream of public water supply intake areas, a site-specific plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • Reserve pits are eliminated through the use of closed loop drilling techniques, unless a pit is needed for critical safety reasons. Any necessary pits should be designed to prevent possible contamination of soil and groundwater. • Evaporation ponds are not sited within this area. • All oil and gas related infrastructure is set back a minimum of 500 feet from a public water supply well or intake area. • Drill pad sites should be designed to disperse storm water runoff onto upland sites using proper erosion and sediment control techniques. • Design drilling programs for water resource and public water supply protection. (2) as mapped by the WDEQ or Worland Field Office GIS database; (3) to protect water resources and public water supplies. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the proposed action would not result in a risk to public water supplies. **Modification:** The BLM authorized officer may grant a modification if it is determined that a portion of the lease is no longer located within ¼ mile of public water supply resources. **Waiver:** This stipulation may be waived if the BLM authorized officer determines that the entire leasehold is not located within ¼ mile of public water supply wells or public water supply intake areas
2036	TLS	Absaroka Front MLP analysis area: Recreation	Timing Limitation Stipulation (TLS). Avoid surface-disturbing and disruptive activities within Absaroka Mountain Foothills SRMA (1) September 1 to November 15; (2) as mapped on the Worland Field Office GIS database; (3) protecting recreational settings. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resource use, considering health and safety. **Modification:** This stipulation may be modified if a portion of the lease is determined by the BLM authorized officer to not be located within the Absaroka Mountain Foothills SRMA. **Waiver:** This stipulation may be waived if the BLM authorized officer determines that the entire lease is no longer managed for recreational settings for hunting or is not located within the Absaroka Mountain Foothills SRMA.
2042 and 4078	NSO	Big Horn Front MLP analysis area: Wildlife migration corridors	No surface occupancy (NSO). No surface occupancy is permitted (1) within ½ mile of big game migration corridors within the Big Horn Front MLP analysis area; (2) as mapped on the Worland Field Office GIS database. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of big game. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. **Modification:** The authorized officer may modify the area subject to the stipulation if an environmental record of review finds that a portion of the area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of big game migration. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, if it is determined that the entire leasehold is greater than ½ mile from big game migration corridors within the Big Horn Front MLP Analysis Area or if there are no big game migration corridors within the lease boundary. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes.
2043	TLS	Big Horn Front MLP analysis area – Big game winter range	Timing Limitation Stipulation (TLS). Avoid surface-disturbing and disruptive activities within big game winter range (1) from Nov 15 to Apr 30; (2) as mapped on the Worland Field Office GIS database; (3) protecting big game winter range. **Exception:** The BLM authorized officer may grant an exception if the operator demonstrates that the big game winter range areas are not occupied during the period of concern, subject to confirmation by the BLM, in coordination with WGFD. **Modification:** The BLM authorized officer may modify the area subject to the stipulations based upon BLM evaluation in coordination with WGFD to determine that the big game winter range is not present or boundaries of the subject winter range areas have been refined. The BLM authorized officer may modify the area subject to the stipulations based upon BLM evaluation in coordination with WGFD to determine that big game winter range is not present or boundaries of the subject winter range areas have been refined. **Waiver:** The BLM authorized officer may grant a waiver if it is determined that the entire lease area is no longer within big game winter range, in coordination with WGFD.
4035	NSO	Water, Riparian/Wetland: Within 500 feet perennial surface water, and riparian/wetland areas	No surface occupancy (NSO). No surface occupancy (1) within 500 feet of perennial surface water, riparian/wetland areas, and playas; (2) as mapped on the Worland Field Office GIS database. **Exception:** The authorized officer may grant an exception if, based upon an evaluation by the BLM, it is determined that the proposal would not adversely affect perennial surface waters, riparian/wetland areas and/or playas. **Modification:** The authorized officer may modify the area subject to the stipulation if, based upon an evaluation by the BLM, it is determined that portion of the lease is not located within 500 feet of perennial surface waters, riparian/wetland areas and/or playas or if impacts can be adequately mitigated. **Waiver:** The authorized officer may grant a waiver if it is determined that the entire lease area is not within 500 feet of perennial surface waters, riparian/wetland areas and/or playas. This determination will be based upon an evaluation by the BLM.

Record Number	Stipulation Type	Protected Resource	Stipulation Description
4053	CSU	Water, Riparian/Wetland, Fish and Wildlife	Controlled Surface Use (CSU). Surface occupancy or use is restricted within ¼ mile of waters rated by the WGFD as Class 1 or 2 fisheries. (1) Prior to surface disturbance within ¼ mile of waters rated by the WGFD as Class 1 or 2 fisheries, a site-specific plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • Reserve pits should be designed to prevent possible contamination of soil and groundwater. • Drill pad sites should be designed to disperse storm water runoff onto upland sites using proper erosion and sediment control techniques. • Design road crossing of streams to allow fish passage at all flows. • Design crossings such that they do not destabilize the channel or increase water velocity. • Limit surface-disturbing activities within water channels during spring and fall spawning periods. (2) as mapped on the Worland Field Office GIS database; (3) to protect designated Blue Ribbon and Red Ribbon fisheries habitat and fish populations. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the proposed action would not result in a decline in fish abundance or range. **Modification:** The BLM authorized officer may grant a modification if it is determined that a portion of the lease is no longer located within ¼ mile of WGFD-designated Blue or Red Ribbon fisheries. **Waiver:** This stipulation may be waived if the BLM authorized officer determines that the entire leasehold is not located within ¼ mile of WGFD-designated Blue or Red Ribbon fisheries.
4053	NSO	Water, Riparian/Wetland, Fish and Wildlife	No surface occupancy (NSO). No surface occupancy (1) within 500 feet waters rated by the WGFD as Class 1 or 2 fisheries; (2) as mapped on the Worland Field Office GIS database. **Exception:** The authorized officer may grant an exception if, based upon an evaluation by the BLM, it is determined that the proposal would not adversely affect perennial surface waters, riparian/wetland areas and/or playas. **Modification:** The authorized officer may modify the area subject to the stipulation if, based upon an evaluation by the BLM, it is determined that portion of the lease is not located within 500 feet of perennial surface waters, riparian/wetland areas and/or playas or if impacts can be adequately mitigated. **Waiver:** The authorized officer may grant a waiver if it is determined that the entire lease area is not within 500 feet of perennial surface waters, riparian/wetland areas and/or playas. This determination will be based upon an evaluation by the BLM.
4060	NSO	Fish and Wildlife: Bighorn River HMP/RAMP tract	No surface occupancy (NSO). No surface occupancy is permitted (1) within Bighorn River HMP/RAMP tracts (2) protecting fish and wildlife resources. **Exception:** The BLM authorized officer may grant an exception if, in coordination with the WGFD, it is determined that the action as proposed or conditioned would meet the HMP/RAMP management objectives. **Modification:** The BLM authorized officer may modify the area subject to the stipulation or surface occupancy criteria if, in coordination with the WGFD, it is determined that a portion of the lease is not located within the Bighorn River HMP/RAMP tracts. **Waiver:** The BLM authorized officer may grant a waiver if, in coordination with the WGFD, it is determined that the entire lease area is no longer located within the Bighorn River HMP/RAMP tracts.
4074	TLS	Fish and Wildlife: Big game crucial winter range habitat outside of Oil and Gas Management Areas	Timing Limitation Stipulation (TLS). No surface use is allowed during the following time periods. (1) Nov 15 to Apr 30; (2) as mapped on the Worland Field Office GIS database; (3) protecting big game on crucial winter range. **Exception:** The BLM authorized officer may grant an exception if the operator demonstrates that the crucial winter range areas are not occupied during the period of concern. This determination shall be based upon a BLM evaluation of the area in coordination with WGFD. **Modification:** The BLM authorized officer may modify the area subject to the stipulations based upon a BLM evaluation of the area, in coordination with WGFD, to determine any change in boundary/status of big game crucial winter range(s). **Waiver:** The BLM authorized officer may grant a waiver if it is determined that the entire lease area is no longer supports crucial winter range. This determination shall be based upon a BLM evaluation of the area in coordination with WGFD.
4075	NSO	Fish and Wildlife: Federal mineral estate within the Absaroka Front Management Area	No surface occupancy (NSO). No surface occupancy (1) within overlapping wildlife migration corridors and big game crucial winter range in the Absaroka Front Management Area (2) as mapped on the Worland Field Office GIS database. **Exception:** The BLM authorized officer may grant an exception if, in coordination with the WGFD, it is determined that the action as proposed or conditioned would meet wildlife management objectives. **Modification:** The BLM authorized officer may modify the area subject to the stipulation or surface occupancy criteria if, in coordination with the WGFD, it is determined that a portion of the lease is not located within migration corridors or overlapping big game crucial winter range or within the Absaroka Front Management Area. **Waiver:** The BLM authorized officer may grant a waiver if, in coordination with the WGFD, it is determined that the entire lease area is no longer located within migration corridors or overlapping big game crucial winter range or within the Absaroka Front Management Area.
4106	NSO	Special Status Species: Within 0.6-mile radius of the perimeter Greater Sage-Grouse leks within PHMAs	No surface occupancy (NSO). (1) as mapped on the Worland Field Office GIS database; (2) to protect occupied greater sage-grouse leks and associated seasonal habitat, life-history, or behavioral needs of greater sage-grouse in proximity to leks from habitat fragmentation and loss, and protect greater sage-grouse populations from disturbance within an 0.6-mile radius of the perimeter of occupied greater sage-grouse leks inside designated PHMAs (Core). **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unoccupied as determined by the State wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Record Number	Stipulation Type	Protected Resource	Stipulation Description
4106	NSO	Special Status Species: Within ¼-mile radius of the perimeter of Greater Sage-Grouse leks outside of PHMAs	No surface occupancy (NSO). (1) as mapped on the Worland Field Office GIS database; (2) to protect occupied greater sage-grouse leks and associated seasonal habitat, life-history, or behavioral needs of greater sage-grouse in proximity to leks from habitat fragmentation and loss, and protect greater sage-grouse populations from disturbance within an 0.25-mile radius of the perimeter of occupied greater sage-grouse leks outside designated PHMAs (Core) **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unoccupied as determined by the State wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4107	TLS	Special Status Species: Greater Sage-Grouse nesting and early brood-rearing habitats inside PHMAs	Timing Limitation Stipulation (TLS). (1) Mar 15 to Jun 30; (2) as mapped on the Worland Field Office GIS database; (3) no surface use to seasonally protect Greater Sage-Grouse breeding, nesting and early brood-rearing habitats (independent of habitat suitability) inside designated PHMAs (Core only). Where credible data support different timeframes for this restriction, dates may be expanded by 14 days prior or subsequent to the above dates. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** No Waiver.
4107	TLS	Special Status Species: Greater Sage-Grouse nesting and early brood-rearing habitat outside PHMAs	Timing Limitation Stipulation (TLS). (1) Mar 15 to Jun 30; (2) as mapped on the Worland Field Office GIS database; (3) no surface use to seasonally protect Greater Sage-Grouse breeding, nesting and early brood-rearing habitats outside designated PHMA (Core), within two miles of an occupied lek. Where credible data support different timeframes for this restriction, dates may be expanded by 14 days prior or subsequent to the above dates. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** This stipulation may be waived over the entire lease if, in coordination with the State wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unoccupied as determined by the State wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
4108	TLS	Special Status Species: Greater Sage-Grouse winter habitats/concentration areas	Timing Limitation Stipulation (TLS). (1) Dec 1 to Mar 14; (2) as mapped by the WGFD; (3) no surface use to seasonally protect Greater Sage-Grouse winter concentration areas in designated PHMAs (Core only), and outside designated PHMAs (Core only) when supporting wintering Greater Sage-Grouse that attend leks within designated PHMAs (Core only). **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not impair the function and suitability of the winter concentration area, or it is determined that the winter concentration area is not occupied by concentrated populations of Greater Sage- Grouse during the period of concern, or it is determined the project area is within unsuitable habitat. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse. **Waiver:** No Waiver
4109	CSU	Special Status Species: Density Disturbance within PHMAs	Controlled Surface Use (CSU). (1) Surface occupancy or use will be restricted to no more than an average of one disturbance location per 640 acres using the DDCT, and the cumulative value of all applicable surface disturbances, existing or future, must not exceed 5 percent of the DDCT area, as described in the Disturbance Density Calculation Tool manual (DDCT); (2) as mapped on the Worland Field Office GIS database; (3) To protect Greater Sage-Grouse designated PHMA (Core only) from habitat fragmentation and loss. This lease does not guarantee the lessee the right to occupy the surface of the lease for the purpose of producing oil and natural gas within Greater Sage-Grouse designated PHMAs (Core only). The surface occupancy restriction criteria identified in this stipulation may preclude surface occupancy and may be beyond the ability of the lessee to meet due to existing surface disturbance on Federal, State, or private lands within designated PHMAs (Core only) or surface disturbance created by other land users. The BLM may require the lessee or operator to enter into a unit agreement or drilling easement to facilitate the equitable development of this and surrounding leases. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that, the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. **Modification:** The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** No Waiver

Record Number	Stipulation Type	Protected Resource	Stipulation Description
4118	TLS	Special Status Species: Nesting Raptors	Timing Limitation Stipulation (TLS). No surface use is allowed within ¼ mile of active raptor nests and ½ mile of active golden eagle, bald eagle, northern goshawk, merlin, and prairie and peregrine falcon nests and 1 mile of active ferruginous hawk nests during specific species nesting period or until young birds have fledged. This stipulation does not apply to operation and maintenance of production facilities. Timing Limitation Stipulation (1) during the following time periods: • American Kestrel April 1 – August 15 • Bald Eagle January 1 – August 15 • Boreal Owl February 1 – July 31 • Burrowing Owl April 1 – September 15 • Common Barn Owl February 1 – September 15 • Cooper's Hawk March 15 – August 31 • Eastern Screech-owl March 1 – August 15 • Ferruginous Hawk March 15 – July 31 • Golden Eagle January 15 – July 31 • Great Gray Owl March 15 – August 31 • Great Horned Owl December 1 – September 31 • Long-eared Owl February 1 – August 15 • Merlin April 1 – August 15 • Northern Goshawk April 1 – August 15 • Northern Harrier April 1 – August 15 • Northern Pygmy-Owl April 1 – August 1 • Northern Saw-whet Owl March 1 – August 31 • Osprey April 1 – August 31 • Peregrine Falcon March 1 – August 15 • Prairie Falcon March 1 – August 15 • Red-tailed Hawk February 1 – August 15 • Sharp-shinned Hawk March 15 – August 31 • Short-eared Owl March 15 – August 1 • Swainson's Hawk April 1 – August 31 • Western Screech-owl March 1 – August 15 • All other raptors February 1 – July 31 (2) as on the Worland Field Office GIS database or as determined by field evaluation; (3) protecting active raptor nests. **Exception:** The BLM authorized officer may grant an exception if it is determined that the raptor nest(s) are not active or the proposed action is of a scale, sited in a location, or otherwise designed so that the proposed action would not disturb (be likely to cause: physical injury; a decrease in productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior) nesting raptors of conservation concern. The determination may include consultation with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulations based upon a BLM evaluation in coordination with WGFD and/or USFWS, as necessary. The stipulation may be modified based on negative or positive monitoring results; or if it is determined that the action will not impair the function or the suitability of the habitat, or cause nest abandonment. **Waiver:** The stipulation may be waived if the BLM authorized officer determines that the entire lease area does not include seasonal buffer zones for nests of raptor species of conservation concern. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM, in coordination with the WGFD and/or USFWS, as necessary.
4118	CSU	Special Status Species: ¼ mile from raptor nest sites	Controlled Surface Use (CSU). Surface occupancy or use within ¼ mile of raptor nest sites will be restricted. (1) Prior to surface disturbance within ¼ mile of raptor nests a mitigation plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan or approved it with conditions. The plan must demonstrate to the BLM authorized officer's satisfaction that nesting raptors of conservation concern would not be agitated or bothered to a degree that causes or is likely to cause: • physical injury; • a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or • nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior, or preclude nest reoccupation; (2) as mapped on the Worland Field Office GIS database or determined by BLM field evaluation; (3) protecting raptor nest sites. **Exception:** The BLM authorized officer may grant an exception if a staff review determines that the proposed action is of a scale, sited in a location, or otherwise designed so that the proposed action would not result in a failure to meet the performance standards above. The determination may include coordination with the WGFD and/or USFWS. **Modification:** A modification may be granted if the BLM authorized officer determines that portions of the leasehold can be occupied without adversely affecting the nest site or suitable nesting habitat, based on topography, species, season of use, and other pertinent factors. The determination may include coordination with the WGFD and/or USFWS. **Waiver:** The stipulation may be waived if the BLM authorized officer determines that the entire lease area is not within ¼ mile of a raptor nest or suitable nesting habitat. This determination shall be based upon a field evaluation of the area by a qualified representative and subject to confirmation from the BLM. Confirmation may include coordination with the WGFD and/or USFWS.

Record Number	Stipulation Type	Protected Resource	Stipulation Description
4128	CSU	Surface Water: Riparian habitat supporting special status fish species	Controlled Surface Use (CSU). Surface occupancy or use within ¼ mile of perennial surface water, and riparian/wetland areas will be restricted where determined to support special status fish species. (1) Prior to surface disturbance within ¼ mile of perennial surface water, and riparian/wetland areas where determined to support special status fish species, a site-specific plan must be submitted to the BLM by the applicant as a component of the Application for Permit to Drill (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: • Prevent contamination of soil and groundwater. • Upland sites are protected from storm water runoff using proper erosion and sediment control techniques. • Stabilization of channel crossings. (2) as mapped on the Worland Field Office GIS database; (3) to protect perennial surface water, and riparian/wetland areas. **Exception:** An exception may be granted by the authorized officer if the operator submits a plan that demonstrates that impacts from the proposed action can be fully mitigated or there are not practical alternatives. **Modification:** Consider modifications if it is determined the proposed project is not located within ¼ mile of perennial surface waters and riparian/wetland areas. **Waiver:** This stipulation may be waived, if the authorized officer determines that the entire leasehold can be occupied without adversely affecting riparian resources.
4128	NSO	Surface Water: Riparian habitat supporting special status fish species	No surface occupancy (NSO). No surface occupancy (1) within 500 feet of perennial surface water, riparian/wetland areas, and playas; (2) as mapped on the Worland Field Office GIS database. **Exception:** The authorized officer may grant an exception if, based upon an evaluation by the BLM, it is determined that the proposal would not adversely affect perennial surface waters, riparian/wetland areas and/or playas. **Modification:** The authorized officer may modify the area subject to the stipulation if, based upon an evaluation by the BLM, it is determined that portion of the lease is not located within 500 feet of perennial surface waters, riparian/wetland areas and/or playas or if impacts can be adequately mitigated. **Waiver:** The authorized officer may grant a waiver if it is determined that the entire lease area is not within 500 feet of perennial surface waters, riparian/wetland areas and/or playas. This determination will be based upon an evaluation by the BLM.
4148	TLS	Wild Horses: Fifteenmile HMA foaling season	Timing Limitation Stipulation (TLS). No surface use is allowed (1) Feb. 1 to July 31; (2) within Fifteenmile HMA as mapped on the Worland Field Office GIS database; (3) protecting Fifteenmile HMA foaling season. **Exception:** The BLM authorized officer may grant an exception the BLM determines the area is not likely to be occupied during the period of concern and the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated. **Modification:** The BLM authorized officer may modify the area subject to the stipulations based upon BLM determination that suitable foaling range is not present or boundaries of the HMA have changed. **Waiver:** The BLM authorized officer may grant a waiver if it is determined that the entire lease area is not within the HMA, or is not located within suitable foaling range.
5014	NSO	Cultural Resources: Legend Rock Petroglyph Site	No Surface Occupancy (NSO) (1) within the designated Legend Rock Petroglyph site as mapped on the Worland Field Office GIS database; (2) for the protection of cultural resources. **Exception:** The BLM authorized officer may grant an exception if, after consultation with Native American tribes and SHPO, it is determined that the proposed action will result in a no adverse effect determination to the sacred, spiritual, and/or traditional nature of the property(s). **Modification:** This stipulation may be modified by the BLM authorized officer if, in consultation with Native American tribes and SHPO, the site is no longer considered eligible for NRHP or if, in consultation with Native American tribes and SHPO, it is determined that the identified property's sacred, spiritual, and/or traditional values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. **Waiver:** The BLM authorized officer may grant a waiver if it is determined, in consultation with Native American tribes and SHPO, that the identified site is no longer considered sacred, spiritual, and/or traditional.
6059	NSO	Recreational Resources: Campgrounds, trailheads, day use areas, and similar recreation sites	No surface occupancy (NSO). No surface occupancy or use is permitted (1) on developed recreation sites (2) for the protection of designated campgrounds, trailheads, day use areas, and similar recreation sites. **Exception:** An exception to this stipulation may be granted by the BLM authorized officer if the BLM determines that the function and utility of the recreational resources are not adversely affected. **Modification:** The BLM authorized officer may modify the stipulation if the boundaries of recreational sites are changed or a portion of the lease area is determined not to be located within a designated recreational site. **Waiver:** This BLM authorized officer may waive this stipulation if it is determined that the entire leasehold no longer contains developed recreation areas.
6069	CSU	Scenic and Recreational Resources: Absaroka Mountain Foothills SRMA and Absaroka ERMA.	Controlled Surface Use (CSU). Surface occupancy or use will be restricted within the Absaroka Mountain Foothills SRMA and Absaroka ERMA (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA. (2) as mapped on the Worland Field Office GIS database; (3) protecting Scenic and Recreational Resources and ensuring the recreational opportunities and setting of the SRMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Absaroka Mountain Foothills SRMA or Absaroka ERMA are changed. **Waiver:** A waiver may be granted if the lease is not located within the Absaroka Mountain Foothills SRMA or Absaroka ERMA.

Record Number	Stipulation Type	Protected Resource	Stipulation Description
6077	NSO	Scenic and Recreational Resources: Areas within the Bighorn River ERMA	No surface occupancy (NSO). No surface occupancy is permitted (1) on lands within the Bighorn River ERMA (2) protecting the Bighorn River ERMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Bighorn River ERMA are changed. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. **Waiver:** A waiver may be granted if the lease is not located within the Bighorn River ERMA.
6098	CSU	Scenic and Recreational Resources: Tatman Mountain RMZ	Controlled Surface Use (CSU). Surface occupancy or use will be restricted or prohibited within the Tatman Mountain RMZ (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA. (2) as mapped on the Worland Field Office GIS database; (3) protecting Scenic and Recreational Resources and ensuring the recreational opportunities and setting of the SRMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Tatman Mountain RMZ are changed. **Waiver:** A waiver may be granted if the lease is not located within the Tatman Mountain RMZ.
6108	CSU	Scenic and Recreational Resources: Canyons RM	Controlled Surface Use (CSU). Surface occupancy or use will be restricted or prohibited within the Trapper Creek Area of the Canyons RMZ (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA.(2) as mapped on the Worland Field Office GIS database; (3) protecting Scenic and Recreational Resources and ensuring the recreational opportunities and setting of the SRMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Canyons RMZ are changed. **Waiver:** A waiver may be granted if the lease is not located within the Canyons RMZ
6129	CSU	Scenic and Recreational Resources: Brokenback/Logging Road RMZ	Controlled Surface Use (CSU). Surface occupancy or use will be restricted or prohibited within the Brokenback/Logging Road RMZ (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA.(2) as mapped on the Worland Field Office GIS database; (3) protecting Scenic and Recreational Resources and ensuring the recreational opportunities and setting of the SRMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Brokenback/Logging Road RMZ are changed. **Waiver:** A waiver may be granted if the lease is not located within the Brokenback/Logging Road RMZ.
6140	CSU	Scenic and Recreational Resources: Middle Fork of the Powder River SRMA	Controlled Surface Use (CSU). Surface occupancy or use will be restricted or prohibited within the Middle Fork of the Powder River SRMA (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA. (2) as mapped on the Worland Field Office GIS database; (3) protecting Scenic and Recreational Resources and ensuring the recreational opportunities and setting of the SRMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Middle Fork of the Powder River SRMA are changed. **Waiver:** A waiver may be granted if the lease is not located within the Middle Fork of the Powder River SRMA.
6151	CSU	Scenic and Recreational Resources: Canyon Creek SRMA	Controlled Surface Use (CSU). Surface occupancy or use will be restricted or prohibited within the Canyon Creek SRMA (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA. (2) as mapped on the Worland Field Office GIS database; (3) protecting Scenic and Recreational Resources and ensuring the recreational opportunities and setting of the SRMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Canyon Creek SRMA are changed. **Waiver:** A waiver may be granted if the lease is not located within the Canyon Creek SRMA.
6168	CSU	Recreational Resources: Basin Gardens Play Area SRMA	Controlled Surface Use (CSU). Surface occupancy or use will be restricted or prohibited within the Basin Gardens Play Area RMZ (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA. (2) as mapped on the Worland Field Office GIS database; (3) protecting Recreational Resources and ensuring the recreational opportunities and setting of the SRMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Basin Gardens Play Area RMZ are changed. **Waiver:** A waiver may be granted if the lease is not located within the Basin Gardens Play Area RMZ.

Record Number	Stipulation Type	Protected Resource	Stipulation Description
6186	CSU	Recreational Resources: Horse Pasture SRMA.	Controlled Surface Use (CSU). Surface occupancy or use will be restricted or prohibited within the Horse Pasture SRMA (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA. (2) as mapped on the Worland Field Office GIS database; (3) protecting Recreational Resources and ensuring the recreational opportunities and setting of the SRMA. **Exception:** Consider exceptions if exploration and development would not impair identified scenic and primitive or semi primitive recreational resources. **Modification:** The stipulated area may be modified by the authorized officer if the boundaries of the Horse Pasture SRMA are changed. **Waiver:** A waiver may be granted if the lease is not located within the Horse Pasture SRMA.
7007	NSO	Special Designations (Paleontological Resources): Fossil concentration area in the Big Cedar Ridge ACEC	No surface occupancy (NSO). No surface occupancy is permitted (1) on the 264-acre fossil concentration area in the Big Cedar Ridge ACEC (2) protection of paleontological resources. **Exception:** An exception to this restriction or stipulation may be granted by the authorized officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated. **Modification:** The stipulated area may be modified by the authorized officer if the Big Cedar Ridge ACEC boundaries are changed. **Waiver:** This stipulation may be waived, if the authorized officer determines that the entire leasehold is no longer within a designated ACEC.
7021	NSO	Special Designations (Paleontological Resources): Sundance Formation of the Red Gulch Dinosaur Tracksite ACEC	No surface occupancy (NSO). No surface occupancy is permitted (1) within Sundance Formation of the Red Gulch Dinosaur Tracksite ACEC (2) protection of paleontological resources. **Exception:** An exception to this restriction or stipulation may be granted by the authorized officer, if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be adequately mitigated. **Modification:** The stipulated area may be modified by the authorized officer if the Red Gulch Dinosaur Tracksite ACEC boundaries are changed. **Waiver:** This stipulation may be waived, if the authorized officer determines that the entire leasehold is no longer within designated ACEC.
7044	CSU	Special Designations (Scenic and Cultural Resources): Up to 2 miles from Other Trails	Controlled Surface Use (CSU). Surface occupancy or use will be restricted or prohibited up to 2 miles where setting is an important aspect of the integrity for the trail. (1) unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts; The Plan must demonstrate proposed infrastructure is either not visible or will result in a weak contrast rating.(2) as mapped on the Worland Field Office GIS database; (3) protecting other historic trails. **Exception:** The authorized officer may grant an exception if surveys determine that other historic trail remnants are not present or it is determined that the section of trail is sufficiently compromised that the action will not result in an adverse effect to the trail. **Modification:** If surveys determine that a portion of the lease area does not contain contributing trail segments, then the stipulation may be modified. This determination shall be based upon field evaluation of the area by a qualified archaeologist/historian and subject to confirmation by the BLM. **Waiver:** The authorized officer may grant a waiver if surveys determine that the entire lease area does not contain contributing trail segments. This determination shall be based upon field evaluation of the area by a qualified archaeologist/historian and subject to confirmation by the BLM.

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Required Design Features (BLM 2015b)

General

- Evaluate and take advantage of opportunities to remove or modify existing power lines within priority Greater Sage-Grouse habitat areas. When possible, require perch deterrents on existing or new overhead facilities. Encourage installation of perch deterrents on existing facilities.
- Where existing leases or rights-of-way (ROWs) have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat.
- Locate man camps outside priority Greater Sage-Grouse habitats.
- Work cooperatively with permittees, lessees, and other landowners to develop grazing management strategies that integrate both public and private lands into single management units.
- Coordinate BMPs and vegetative objectives with the Natural Resources Conservation Service (NRCS) for consistent application across jurisdictions where the BLM and NRCS have the greatest opportunities to benefit Greater Sage-Grouse, particularly as it applies to the NRCS's National Sage-Grouse Initiative: (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/initiatives/?cid=STELDEVB1027671).
- When conducting NEPA analysis for water developments or other rangeland improvements address the direct and indirect effects to Greater Sage-Grouse populations and habitat.
- Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to priority Greater Sage-Grouse habitats to determine if they should be restored to sagebrush or habitat of higher quality for Greater Sage-Grouse. If these seedings are part of an Allotment Management Plan/Conservation Plan or if they provide value in conserving or enhancing the rest of the priority habitats, then no restoration would be necessary. Assess the compatibility of these seedings for Greater Sage-Grouse habitat or as a component of a grazing system during land health assessments. For example, some introduced grass seedings are an integral part of a livestock management plan and reduce grazing pressure in important sagebrush habitats, or serve as a strategic fuels management area.
- Where the federal government owns the surface, and the mineral estate is in non-federal ownership, apply appropriate BMPs to surface development.

Roads

- Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
- Locate roads to avoid important areas and habitats.
- Coordinate road construction and use among federal fluid mineral lessees and ROW or Surface Use Agreement (SUA) holders.
- Construct road crossings of ephemeral, intermittent, and perennial streams to minimize impacts to the riparian habitat, such as by crossing at right angles to ephemeral drainages and stream crossings.
- Establish slow speed limits on BLM and Forest Service system-administered roads or design roads for slower vehicle speeds to reduce Greater Sage-Grouse mortality.

- Establish trip restrictions or minimization through use of telemetry and remote well control (e.g., Supervisory Control and Data Acquisition).
- Do not issue ROWs or SUAs to counties on energy development roads, unless for a temporary use consistent with all other terms and conditions including this document.
- Restrict vehicle traffic to only authorized users on newly constructed routes (using signage, gates, etc.)
- Apply dust abatement on roads, well pads, and other surface disturbances.
- Close and rehabilitate duplicate roads by restoring original landform and establishing a desirable plant community.
- Do not issue ROWs to counties on newly constructed energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document.

Operations

- Site and/or minimize linear ROWs or SUAs to reduce disturbance and fragmentation of sagebrush habitats.
- Place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.
- Collocate powerlines, flowlines, and small pipelines under or immediately adjacent to existing roads/transportation corridors.
- Control the spread and effects of invasive non-native plant species, including treating weeds prior to surface disturbance and washing vehicles and equipment at designated wash stations when constructing in areas with weed infestations.
- Require Greater Sage-Grouse-safe fences.
- Clean up refuse.
- Place infrastructure in already disturbed locations where the habitat has not been fully restored.
- Apply a phased development approach with concurrent reclamation.
- Pipelines must be under or immediately adjacent to the road.
- Restrict the construction of tall facilities, distribution powerlines, and fences to the minimum number and amount needed.
- Design or site permanent structures to minimize impacts to Greater Sage-Grouse, with emphasis on locating and operating facilities that create movement (e.g., pump jacks) or attract frequent human use and vehicular traffic (e.g., fluid storage tanks) in a manner that will minimize disturbance of Greater Sage-Grouse or interference with habitat use.

Noise

- Limit noise to less than 10 decibels above ambient measures (20 to 24 decibels) at sunrise at the perimeter of a lek during active lek season.
- Locate new compressor stations outside priority habitats and design them to reduce noise that may be directed towards priority habitat.

Reclamation

- Include objectives for ensuring habitat restoration to meet Greater Sage-Grouse habitat needs in reclamation practices/sites. Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve Greater Sage-Grouse habitat needs.
- Maximize the area of interim reclamation on long-term access roads and well pads, including reshaping, topsoiling, and revegetating cut-and-fill slopes.
- Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.
- Implement irrigation during interim or final reclamation for sites where establishment of seedlings has been shown or is expected to be difficult due to dry conditions. Utilize mulching techniques to expedite reclamation.
- Use mulching, soil amendments, and/or erosion blankets to expedite reclamation and to protect soils.
- Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve Greater Sage-Grouse habitat needs.
- Minimize surface-disturbing or disrupting activities (including operations and maintenance) where needed to reduce the impacts of human activities on important seasonal Greater Sage-Grouse habitats. Apply these measures during project level planning.
- Identify and work with partners to increase native seed availability and work with plant material centers to develop new plant materials, especially the forbs needed to restore Greater Sage-Grouse habitat.
- Consider potential changes in climate when proposing seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed.
- Use Ecological Site Descriptions (ESDs) or other protocols could be used (e.g., TEUI or LSI) to identify the understory species and sagebrush subspecies needed to restore desirable habitat conditions.

Best Management Practices (BLM 2015b)

Important Cultural Resource and Trail Settings

The BLM should use standard measures to reduce the visual impact of proposed actions within trail settings, where setting is a contributing element of eligibility to the National Register of Historic Places and the setting has integrity. Standard measures should be used as stipulations or conditions of approval attached to authorizations. Standard measures, or BMPs, for reducing the visibility of proposed actions include, but are not limited to:

- Apply a controlled surface use stipulation to surface-disturbing activities or surface occupancy.
- Visual Contrast Ratings and, as appropriate, require visual simulations.
- Consolidate project facilities among oil and gas developers; maximize use of existing locations.
- Develop coordinated road and pipeline systems.
- Reduce the amount of surface development by consolidating facilities.

- Use low-profile facilities.
- Locate projects to maximize the use of topography and vegetation to screen development.
- Design projects to blend with topographic forms and existing vegetation patterns.
- Use environmental coloration or camouflage techniques to reduce the visual impact of facilities that cannot be completely hidden.
- Use broken linear patterns for road developments to screen roads as much as possible. This can include feathering or blending of the edges of linear rights-of-way to soften the dominant line form.
- For livestock control, use electric fencing with low-visibility fiberglass posts and environmental colors.
- Design linear facilities and seismic lines to run parallel to key observation points rather than perpendicular.
- Position facilities to present less of a visual impact (e.g., a facility with several tanks lined up so that one obscures the visibility of the others).

Aquatic Invasive Species

To prevent the spread of aquatic invasive species, the Wyoming Game and Fish Department recommends following the guidelines outlined in the Aquatic Invasive Species in Wyoming brochure (link below). Specific BMPs to aquatic invasive species spread prevention include, but are not limited to:

- Decontamination should first occur before arrival at a project site, so aquatic invasive species are not transferred from the last visited area. Decontamination should occur again before leaving a project site, so aquatic invasive species are not transferred to the next site.
- Decontamination may consist of either:
    - 1. Drain all water from equipment and compartments, clean equipment of all mud, plants, debris, or animals, and dry equipment for five days in summer (June, July, and August); 18 days in spring (March, April, and May) and fall (September, October, and November); or three days in winter (December, January, and February) when temperatures are at or below freezing,
      -or-
      2. Use a high pressure (2,500 pounds per square inch [psi]) hot water (140°F) pressure washer to thoroughly wash equipment and flush all compartments that may hold water.
      https://wgfd.wyo.gov/WGFD/media/content/PDF/Fishing/AIS_INSPECTIONMANUAL.pdf

Reseeding

The following recommendations may be required depending on the project size and location.

- Proposed actions where native brush species located on lands proposed to be disturbed are unique and desirable for interim and final reclamation purposes, and the seed supply for these desirable brush species is not commercially available, will be collected from the area and stored using the procedures of the Seeds of Success program. Seedlings or plugs of common dominant species will be propagated, preferably locally, in preparation for use in portions of area to be reclaimed to expedite vegetation recovery.

- Areas of sustainable plant communities and populations (where they do not conflict with other allowable resource uses) will be identified as sources for native plant material and will be managed under consideration of the need to consistently produce seed stocks of non-commercially available materials for use in reclamation and restoration work (e.g., to support reclamation of abandoned mine lands or well pads or to supplement commercially available seeds in high fire years).

Engineering

Road maintenance, construction, and any other related travel and transportation management will be mandated by BLM Manual 9113. BLM Manual 9113 provides for BMPs to be used in evaluating, maintaining, and constructing BLM travel and transportation routes. As stated in Manual 9113, "Bureau roads must be designed to an appropriate standard no higher than necessary to accommodate their intended functions adequately (timber hauling administrative access, public travel); and design, construction, and maintenance activities must be consistent with national policies for safety, aesthetics, protection and preservation of cultural, historic, and scenic values, and accessibility for the physically handicapped. The following is a list of BMPs that are recommended but not binding for road maintenance practices:

- Design roads to minimize total disturbance, to conform with topography, and to minimize disruption of natural drainage patterns.
- Base road design criteria and standards on road management objectives such as traffic requirements of the proposed activity and the overall transportation planning, economic analysis, safety requirements, resource objectives, and minimizing damage to the environment.
- Locate roads on stable terrain such as ridge tops, natural benches, and flatter transitional slopes near ridges, and valley bottoms, and moderate side slopes and away from slumps, slide prone areas, concave slopes, clay beds, and where rock layers dip parallel to the slope. Locate roads on well-drained soil types; avoid wet areas when possible.
- Construct cut and fill slopes to be approximately 3 horizontal (h):1 vertical (v) or flatter where feasible. Locate roads to minimize heights of cutbanks. Avoid high, steeply sloping cutbanks in highly fractured bedrock.
- Avoid headwalls, midslope locations on steep, unstable slopes, fragile soils, seeps, old landslides, side slopes in excess of 70 percent, and areas where the geologic bedding planes or weathering surfaces are inclined with the slope. Implement extra mitigation measures when these areas cannot be avoided.
- Construct roads for surface drainage by using outslopes, crowns, grade changes, drain dips, waterbars and in-sloping to ditches as appropriate.
- Sloping the road base to the outside edge for surface drainage is normally recommended for local spurs or minor collector roads where low-volume traffic and lower traffic speeds are anticipated. This is also recommended in situations where long intervals between maintenance will occur and where minimum excavation is wanted. Out-sloping is not recommended on steep slopes. Sloping the road base to the inside edge is an acceptable practice on roads with steep side slopes and where the underlying soil formation is very rocky and not subject to appreciable erosion or failure.

- Crown and ditching is recommended for arterial and collector roads where traffic volume, speed, intensity and user comfort are considerations. Recommended gradients range from 0 to 15 percent where crown and ditching may be applied, as long as adequate drainage away from the road surface and ditch lines is maintained.
- Minimize excavation, when constructing roads, through the use of balanced earthwork, narrowing road widths, and end hauling where side slopes are between 50 and 70 percent.
- If possible, construct roads when soils are dry and not frozen. When soils or road surfaces become saturated to a depth of 3 inches, BLM-authorized activities should be limited or ceased unless otherwise approved by the authorized officer.
- Consider improving inadequately surfaced roads that are to be left open to public traffic during wet weather with gravel or pavement to minimize sediment production and maximize safety.
- Retain vegetation on cut slopes unless it poses a safety hazard or restricts maintenance activities. Roadside brushing of vegetation should be done in a way that prevents disturbance to root systems and visual intrusions (i.e., avoid using excavators for brushing).
- Retain adequate vegetation between roads and streams to filter runoff caused by roads.
- Avoid riparian/wetland areas where feasible; locate in riparian/wetland areas only if the roads do not interfere with the attainment of resource objectives.
- Minimize the number of unimproved stream crossings. When a culvert or bridge is not feasible, locate drive-through (low water crossings) on stable rock portions of the drainage channel. Harden crossings with the addition of rock and gravel if necessary. Use angular rock if available.
- Locate roads and limit activities of mechanized equipment within stream channels to minimize their influence on riparian areas. When crossing a stream is necessary, design the approach and crossing perpendicular to the channel, where practicable. Locate the crossing where the channel is well defined, unobstructed, and straight.
- Avoid placing fill material in floodplain unless the material is large enough to remain in place during flood events.
- Use drainage dips instead of culverts on level 2 roads where gradients will not present a safety issue. Locate drainage dips in such a way so that water will not accumulate or where outside berms prevent drainage from the roadway. Locate and design drainage dips immediately upgrade of stream crossings and provide buffer areas and catchment basins to prevent sediment from entering the stream.
- Construct catchment basins, brush windrows, and culverts in a way to minimize sediment transport from road surfaces to stream channels. Install culverts in natural drainage channels in a way to conform with the natural streambed gradients with outlets that discharge onto rocky or hardened protected areas.
- Design and locate water crossing structures in natural drainage channels to accommodate adequate fish passage, provide for minimum impacts to water quality, and to be capable of handling a 100-year event for runoff and floodwaters.
- Use culverts that pass, at a minimum, a 25-year storm event or have a minimum diameter of 24 inches for permanent stream crossings and a minimum diameter of 18 inches for road cross drains.
- Replace undersized culverts and repair or replace damaged culverts and downspouts. Provide energy dissipaters at culvert outlets or drainage dips.

- Locate culverts or drainage dips in such a manner as to avoid discharge onto unstable terrain such as headwalls or slumps. Provide adequate spacing to avoid accumulation of water in ditches or road surfaces. Culverts should be placed on solid ground to avoid road failures.
- Proper sized aggregate and riprap should be used during culvert construction. Place riprap at culvert entrance to streamline waterflow and reduce erosion.
- Establish adapted vegetation on all cuts and fill immediately following road construction and maintenance.
- Remove berms from the downslope side of roads, consistent with safety considerations.
- Leave abandoned roads in a condition that provides adequate drainage without further maintenance. Close abandoned roads to traffic. Physically obstruct the road with gates, large berms, trenches, logs, stumps, or rock boulders as necessary to accomplish permanent closure.
- Abandon and rehabilitate roads that are no longer needed. Leave these roads in a condition that provides adequate drainage. Remove culverts.
- When plowing snow for winter use of roads, provide breaks in snow berms to allow for road drainage. Avoid plowing snow into streams. Plow snow only on existing roads.
- Maintenance should be performed to conserve existing surface material, retain the original crowned or out-sloped self-draining cross section, prevent or remove rutting berms (except those designed for slope protection) and other irregularities that retard normal surface runoff. Avoid wasting loose ditch or surface material over the shoulder where it can cause stream sedimentation or weaken slump-prone areas. Avoid undercutting back slopes.
- Do not disturb the toe of cut slopes while pulling ditches or grading roads. Avoid sidecasting road material into streams.
- Grade roads only as necessary. Maintain drain dips, waterbars, road crown, in-sloping and outsloping, as appropriate, during road maintenance.
- Maintain roads in special areas according to special area guidance. Generally, retain roads within existing disturbed areas and sidecast material away from the special area.
- When landslides occur, save all soil and material usable for reclamation or stockpile for future reclamation needs. Avoid sidecasting of slide material where it can damage, overload, and saturate embankments, or flow into down-slope drainage courses. Reestablish vegetation as needed in areas where vegetation has been destroyed due to sidecasting.
- Strip and stockpile topsoil ahead of construction of new roads, if feasible. Reapply soil to cut and fill slopes prior to revegetation.

Visual Resources

The following BMPs would be considered to reduce impacts to all visual resource management classes within the planning area:

- Burying of distribution power lines and flow lines in or adjacent to access roads;
- Repeating elements of form, line, color, and texture to blend facilities and access roads with the surrounding landscape;

- Painting all above-ground structures, production equipment, tanks, transformers, and insulators not subject to safety requirements to blend with the natural color of the landscape, using paint that is a non-reflective "standard environmental color" approved by the BLM visual resource management (VRM) specialist:
    - All new equipment brought onto the sites should be painted the same color(s);
    - Semi-gloss paints will stain and fade less than flat paints;
    - Typically, the background is a vegetated background, and seldom a solid background;
    - The selected color should be one or two shades darker than the background; and
    - Consider the predominant season of public use; however, never paint an object to match snow.
- Performing final reclamation recontouring of all disturbed areas, including access roads, to the original contour or a contour that blends with the surrounding topography;
- Avoiding facility placement on steep slopes, ridge tops, and hilltops;
- Screening facilities from view;
- Following contours of the land to reduce unnecessary disturbance;
- Recontouring and revegetating disturbed areas to blend with the surrounding landscape;
- Reclaiming unnecessary access roads as soon as possible to the original contour;
- Using gravel of a similar color to adjacent dominant soil and vegetation colors for road surfacing;
- Use dust abatement to reduce fugitive dust, as well as minimize the light colors of the routes;
- Avoiding locating pads in areas visible from primary roads;
- Using subsurface or low-profile facilities to prevent protrusion above horizon line when viewed from any primary road;
- Co-locating wells when possible;
- Locating facilities far enough from the cut and fill slopes to facilitate recontouring for interim reclamation;
- Locating wells away from prominent features, such as rock outcrops;
- Completing an annual transportation plan for entire area before beginning construction, and making a layout that will minimize disturbance and visual impact;
- Designing and constructing all new roads to a safe and appropriate standard "no higher than necessary" to accommodate their intended use;
- Locating roads far enough off the back of ridgelines so they aren't visible from state, county, or BLM roads;
- Using remote monitoring to reduce traffic and road requirements;
- Removing unused equipment, trash, and junk immediately.

Literature Cited

Bureau of Land Management (BLM). 2015a. *Appendix I. Standard Oil and Gas Stipulations.* In *Bighorn Basin Resource Management Plan Revision Project Proposed Resource Management Plan and Final Environmental Impact Statement*. Cody and Worland, Wyoming: BLM Cody and Worland Field Offices. Available at https://eplanning.blm.gov/epl-front-office/projects/lup/9506/58518/63310/BB_PRMP_FEIS.pdf. Accessed March 9, 2020.

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APPENDIX F

Cultural Resource Narrative

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CULTURE HISTORY

Prehistoric Era

The area of potential effect (APE) for the Wyoming Pipeline Corridor Initiative extends across the northern portion of the Wyoming Basin physiographic province (Bighorn Basin, Wind River Basin, and Green River Basin), and the southwestern portion of the Northwestern Plains physiographic province (Powder River Basin). A prehistoric cultural chronology for the Wyoming Basin was proposed by Metcalf (1987). Though minor adjustments to the chronology have been suggested (McNees et al. 2006; McNees et al. 2010; Thompson and Pastor 1995), Metcalf's chronology remains the primary structure for discussing changes in prehistoric settlement, subsistence, and technology in the region. This chronology is based on the temporal distribution of 199 radiocarbon-dated components from southwestern Wyoming plotted on a smoothed frequency graph. Although the method may reflect biases in preservation and research foci through time, it provides a functional framework that can be refined as new data become available (Bandy 2008; McKibbin et al. 1989; McNees et al. 1994; Thompson and Pastor 1995; Wheeler et al. 1986).

For the Northwestern Plains, the cultural chronology developed by Frison (1991; Kornfeld et al. 2010) is the primary structure for discussing changes in prehistoric activities in the region. Although Metcalf's (1987) chronology was based on radiocarbon dates within the region, Frison's chronology is largely based on projectile point typology and other stone tools to identify cultural affiliation. As a frame of reference, the evolution of regional chronologies for both the Wyoming Basin and Northwestern Plains is presented in Figure F-1, which includes paleo-environmental periods and trends.

Human occupation has occurred in the Bighorn Basin, Wind River Basin, Green River Basin, and Powder River Basin for minimally the past 11,500 radiocarbon years before present (RCBP). The chronologies for the Wyoming Basin and Northwestern Plains can generally be divided into four major eras based on adaptive strategies and technological developments: Paleoindian (11,500–8000 RCBP); Archaic (8000–1500 RCBP), with Early Archaic, Middle Archaic, and Late Archaic subperiods; Late Prehistoric (1500–250 RCBP); and Protohistoric (250–150 RCBP).

Prehistoric use of the area is heavily influenced by the distribution of resources. People traversed the landscape and obtained economic resources in the river valleys, basin interiors, foothills, and mountains as they became available by season, likely overwintering with the aid of stored resources (Binford 1980). Prehistoric inhabitants accessed various resources, including widely available lithic resources.

Across the APE several sources of lithic resources are present, including lithic landscapes and quarries. The APE intersects 10 identified lithic landscapes: Washakie Basin (48CR8414/48SW15978), Elk Creek (48BH1762), Five Mile Creek (48BH1762), Fifteen Mile Creek (48BY1820/48WA1289), Bison Basin (48FR6028), Yellow Point Ridge (48LN3162/48SU1334), Black's Fork Landscape (48SW9241), Green River Terraces Archaeological Landscape (48LN2596/48SW9516), Cottonwood Creek (48WA1182), and Shute Creek (48LN2444). The APE also intersects three quarry sites (48CR872, 48FR4192, and 48SW3319). Within the Powder River Basin, although no identified lithic landscapes or quarries are identified within the APE, there is evidence of quarrying in the Bighorn Mountains (Kornfeld et al. 2010).

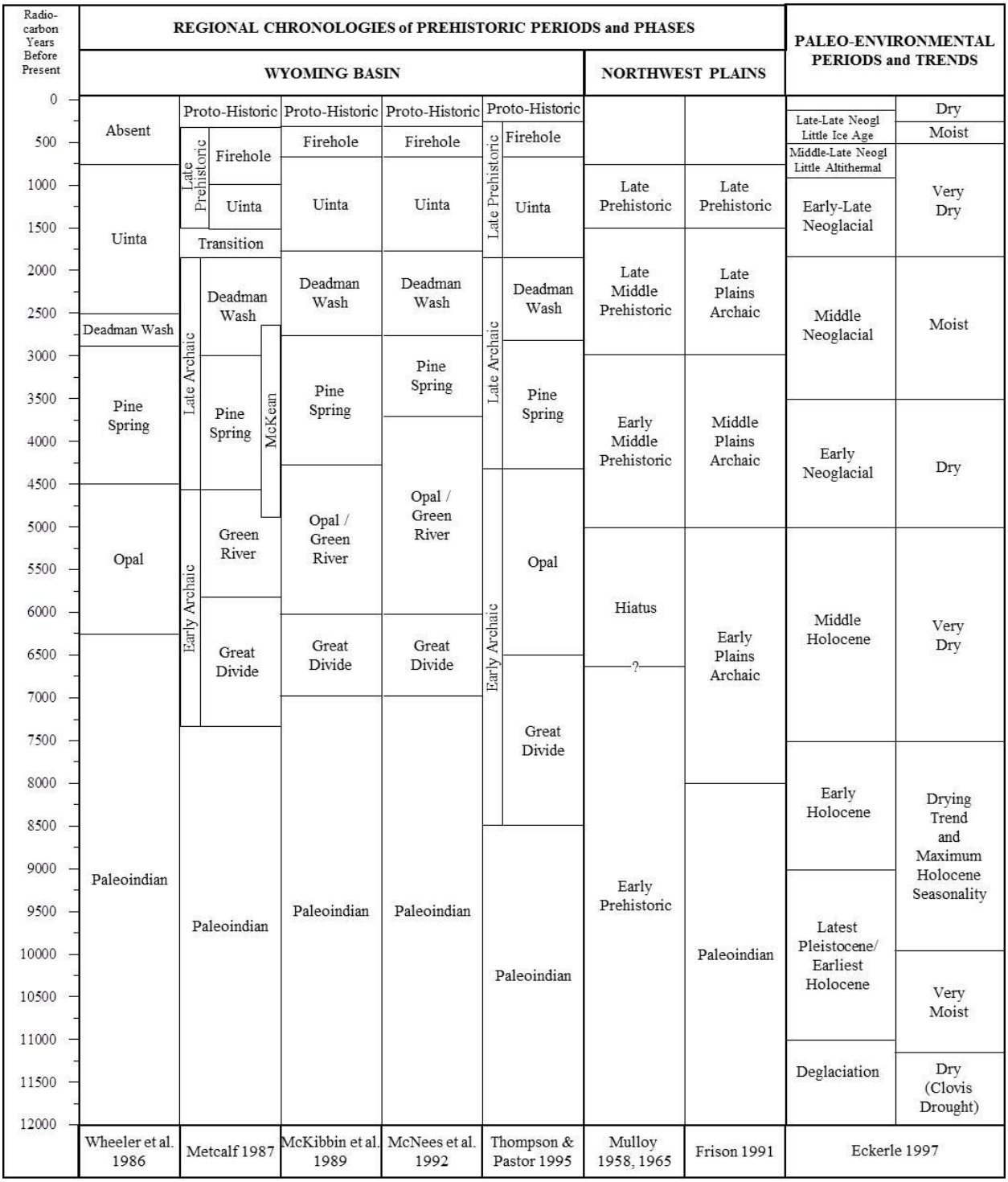

Figure F-1. Summary of cultural chronologies for the Wyoming Basin and Northwestern Plains and paleo-environmental periods and trends.

Prehistoric populations in the greater region were not restricted to low-lying basin land use. High altitude mountain and foothill settings were used throughout prehistory and protohistory. Mountain adaptations began in the Paleoindian period as recognized most notably by stylistically unique projectile points (Kornfeld et al. 2010:95–106), as well as evidence for specialized hunting techniques suited for high

elevations (Frison et al. 1986). Numerous Paleoindian and Early and Middle Archaic sites have been identified in both open and foothill rockshelters (Frison and Walker 1984; Frison and Walker 2007; Husted and Edgar 2002; Kornfeld et al. 2001), and sizeable high-altitude residential village sites have been identified dating to the Late Archaic and Late Prehistoric (Morgan et al. 2012; Stirn 2014). Specialized procurement of high-altitude materials is evidenced by obsidian quarrying throughout regional prehistory (Scheiber and Finley 2011); steatite quarrying, which may date to as early as the Middle Archaic (Frison 1982:1973); soapstone quarrying in the Late Prehistoric and Protohistoric (Adams 2006); and use of mountain sheep horns in bow manufacturing (Frison 1980). Evidence is also growing with regard to high-altitude bighorn sheep trapping (Eakin 2005) and bison hunting (Cannon et al. 2015). The diversity of high-altitude land use and site types is continually adding to a growing base of knowledge related to mountain settlement and subsistence patterns and organization of technology (Cannon et al. 2015; Eakin 2005; Finley et al. 2015; Frison and Walker 1984; Kornfeld et al. 2001; Lee et al. 2014; MacDonald and Hale 2011, 2013; Scheiber and Finley 2010, 2011; Todd 2015). As Todd (2015:355) notes, high-elevation archaeology in Wyoming presents a "record of overwhelming complexity." Acknowledging this, the following discussion of culture periods is primarily based on the better understood and more synthetically established data stemming from research on Bighorn Basin, Green River Basin, Powder River Basin, Wind River Basin, and Wyoming Basin populations. Temporal changes in adaptations associated with these groups are discussed in turn below.

Paleoindian Period

The Paleoindian period in Wyoming is dated between 11,500 and 8500 RCBP (Metcalf 1987; McKibbin et al. 1989; McNees et al. 1994), spanning the transition from terminal Pleistocene glacial conditions to the warmer and drier early Holocene epoch (Eckerle 1997). The period is typically divided into Early Paleoindian (11,500–10,000 RCBP) and Late Paleoindian (10,000–8500 RCBP). Techno-complexes of Early Paleoindians consist of Clovis, Goshen, and Folsom, whereas the Late Paleoindian consist of Agate Basin, Hell Gap, Alberta, Cody, Frederick, Lusk, Pryor Stemmed, Lovell Constricted, James Allen, and Angostura (Frison 1992; Kornfeld et al. 2010; McNees et al. 2006; Thompson and Pastor 1995). These are primarily defined by patterns of projectile point morphology and manufacturing techniques.

People have occupied the Wyoming Basin and Northwestern Plains since at least the terminal Pleistocene epoch as evidenced by surface Clovis and Folsom projectile point finds. It is assumed that Clovis groups in western North America practiced a high level of residential mobility due to a procurement focus on Pleistocene megafauna like mammoth and bison (Kelly and Todd 1988; Kornfeld et al. 2010). Direct evidence for utilization of other game animals is sparse (Cannon and Meltzer 2004). Flexible and portable toolkits based on bifacial core technology of high-quality tool stone were a hallmark of Paleoindian populations.

The Wyoming Basin region contains sites that yield radiocarbon dates contemporaneous with Paleoindian traditions (McNees et al. 2006; Thompson and Pastor 1995), although many typically lack diagnostic artifacts and contain only limited faunal remains. Evidence of large game hunting, generally viewed as a signature of Great Plains Paleoindian adaptations, is seemingly absent in the Wyoming Basin region (Thompson and Pastor 1995). Numerous isolated Paleoindian projectile points have been found in the Wyoming Basin, but most localities lack buried contexts containing preserved faunal deposits. This indicates that preservation of buried sites is a biasing factor influential to the paucity of Paleoindian-aged sites in the Wyoming Basin (Thompson and Pastor 1995).

In the greater Wyoming Basin, the Union Pacific Mammoth site (48CR182) yielded a radiocarbon age of 11,280 ± 280 RCBP but lacked diagnostic Clovis artifacts (Irwin 1971). The Pine Springs site (48SW101) yielded late Pleistocene/early Holocene dates (11,830 ± 410 RCBP and 9695 ± 195 RCBP) and multiple Pleistocene species (e.g., camel, horse, and bison) (Sharrock 1966), but geoarchaeological evidence

suggests no association between humans and these fauna (Kelly et al. 2006). The Porter Hollow site (48UT401), dated to 10,090 RCBP, contained only a single archaeological feature and a sparse assemblage of lithic artifacts, but no faunal material (Hoefer III 1987). The Morgan site (48SW773), Mud Springs site (48FR132), Krmpotich site (48SW9826), and Allen site (48SW13624) all contain Folsom materials (Thompson and Pastor 1995).

Specific to the Bighorn Basin, the Colby site (48WA322), a mammoth kill site, includes Clovis projectile points, the oldest identified in the Bighorn Basin (Frison and Todd 1986). The Hanson site (48BH329) is a Folsom secondary quarry and workshop that yielded a radiocarbon age of 10,260 ± 90 RCBP (Frison and Bradley 1980; Haynes Jr. et al. 1992; Ingbar 1992).

More recent investigations of sites within the Powder River Basin indicate that the La Prele Mammoth site (48CO1401), also known as the Hinrichs Mammoth site, contains evidence of human use of mammoth remains (Mackie et al. 2017). Also within the Powder River Basin, the Sheaman site (48NO211), contained a Clovis Complex projectile point and an ivory projectile point and was dated to about 11,400 RCBP (Reider 1982). The Folsom Complex has a more documented presence in the Powder River Basin. One notable Folsom site in the Powder River Basin is the Carter/Kerr-McGee site (48CA12), which provided a radiocarbon date of 10,400 ± 600 RCBP (Frison 1983). The Sisters Hill site near Buffalo, Wyoming, contains later Paleoindian components including Hell Gap (ca. 11,000 RCBP) and Cody components (10,300 and 9600 RCBP) (Newton et al. 2019).

The Late Paleoindian/Foothills-Mountain traditions range from approximately 10,000 to 8000 RCBP. Foothills-Mountain Paleoindians are interpreted as employing a broader, more "Archaic" subsistence base than their Plains counterparts, who were focused on bison procurement (Frison 1976, 1997; Willey and Phillips 1958:104–111). Plant gathering took on a higher importance for Foothills-mountain groups, whereas Late Paleoindians of the Plains maintained a heavier reliance on hunting. Grinding stones found in association with charred seeds, fire pits, storage pits, and parallel-oblique lanceolates in Late Paleoindian deposits at Medicine Lodge Creek are indicative of plant processing during the Foothills-Mountain era (Frison 1976). Grinding stones found at the Betty Greene site (48NO203) in eastern Wyoming were associated with Plains Late Paleoindian diagnostics (Frison 1991:67), indicating that grinding stones were not unique to the Foothills-Mountain group. The Foothills-Mountain tradition includes various named and unnamed lanceolate projectile points, often with parallel-oblique flaking. A few stemmed points are also associated with this period. Common types include Alder (Davis et al. 1988), Lovell Constricted or fishtail (Husted 1969:12–13), and Pryor Stemmed points (Husted 1969:51–52).

Large game procurement remained a facet of later Paleoindian adaptations, but these adaptations are also characterized by more diverse, spatially dependent lithic techno-complexes and a broadening and more diverse range of subsistence options. For the early Holocene epoch, Eckerle and Hobey (1995) posit that Late Paleoindian populations grew in the Green River Basin in response to the onset of warmer, drier conditions. At the same time, a collector adaptation developed, possibly contemporaneous with the Great Plains Cody Complex, in response to an increased need for winter storage of foods. This shift is aligned with what led to the adaptions that characterize the following Archaic period.

Late Paleoindian components, such as those in Component 2 at 48UT786 (Rood and Pope 1993), and 48LN373 (Wheeler et al. 1986) and the Vegan site (48LN1880) (McKern and Creasman 1991), provide evidence of small game utilization and an increased reliance on plant resources. These sites reflect a shift toward a more broad-spectrum hunting and gathering adaptation around 8,500 RCBP in western Wyoming.

In general, the Late Paleoindian record is well represented across Wyoming. Although this may reflect past land use preferences, it is likely also a reflection of oil and gas exploration and the related increase in archaeological surveys. Paleoindian components in the region include Folsom, Goshen, Hell Gap,

Scottsbluff, and possible Great Basin stemmed types (McNees et al. 2006). Agate Basin or Agate Basin-like lanceolate projectile points appear to be the most prevalent of the Paleoindian projectile point types found across the region (Bureau of Land Management [BLM] 2003).

Eckerle and Hobey (1993) suggest that as the environment became dryer and populations grew in the region in the Late Paleoindian period, a collector adaptation emerged in response to a greater need for winter storage and as a result of reduced abundance of high return rate faunal resources. This subsistence pattern continued throughout the Archaic period that followed.

Archaic Period

The Archaic period spans from the end of the Paleoindian to the Late Prehistoric period (ca. 8500–1800 RCBP). The onset of the Archaic period in Wyoming corresponds with an increase in aridity and warmer temperatures, known as the Altithermal (Späth 1989; Thompson and Pastor 1995), followed by the later more mesic Neoglacial conditions (Creasman 1987). Throughout the Archaic period, the frequency of archaeological sites increased as a result of more intensive use of the basin by resident populations. The Archaic period across Wyoming is commonly differentiated from the preceding Paleoindian period by a decrease in specialized large game hunting as people replaced that specialization with a pattern of broad-spectrum resource exploitation, including broader procurement of medium to small fauna and various plant resources (Kornfeld et al. 2010; Thompson and Pastor 1995). The Early Archaic period is further characterized in the Wyoming Basin, specifically, by the appearance of distinctive housepit structures (McNees et al. 2006).

Beginning with the Archaic period, increasing numbers of sites were created as a result of more intensive use of the region by the indigenous population, especially as evidenced in mountain/basin interface areas (Burnett 2005). A generalized seasonal round has been defined within Wyoming for the Archaic period, framed in terms of resource availability and human group size (Thompson and Pastor 1995). All environmental zones, from the high montane areas to the basin interiors, were inhabited during this period (Burnett 2005; Martin 1999). Individual "residential units" functioned as the core of each group; groups aggregated and dispersed throughout the cycle in response to resource availability. This basic pattern remained largely unchanged throughout the Archaic.

Archaic groups in Wyoming appear to have shifted between a variety of ecological settings based on resource availability. In winter, groups occupied camps situated according to the availability and accessibility of critical resources. These were concentrated in foothill and riparian settings where fuel, game, water, and natural shelter were more abundant. Seasonality is difficult to determine from the Archaic archeological record at sites across the region, although winter-to-early-spring sites have been identified at the Birch Creek housepits (48SU595), the Trappers Point site (48SU1006), the Taliaferro site (48LN1468) (Smith and Creasman 1988), Maxon Ranch (48SW2590) (Harrell and McKern 1986), and Split Rock Ranch (48FR1484) (Eakin 1987). Small winter camps were likely a more common site type than larger winter villages in the region following the assumption that groups lived off stored food, supplemented by encounter hunting and trapping. Evidence of seasonal habitation strategies is also visible in the Hawken site (48CK303) in the Powder River Basin (Kornfeld et al. 2010). Notably, the Hawken Site also has the earliest assemblage of side-notched points found in association with a bison kill in the Powder River Basin and wider Northwestern Plains region.

Spring climatic conditions exhibit drastic inter-annual variation. In high-altitude semiarid regions, extreme variability in temperature and precipitation during the early spring affects the availability, abundance, and condition of floral and faunal resources. Furthermore, elevation affects the timing of plant growth, with the earliest growth occurring in the basin interiors. Ethnographic evidence suggests that hunter-gatherer groups often used interior basin areas to procure newly sprouted edible greens and roots

(Shimkin 1947, 1986; Steward 1938). Plant growth occurs later throughout the spring with increases in elevation and latitude. As such, spring was a critical time for the Archaic hunter-gatherers in Wyoming. Locating food was of paramount importance, as was the need to replenish other supplies depleted over the course of the winter (e.g., tool stone, bone, wood, etc.).

Conditions across the Wyoming Basin and Northwestern Plains supported concentrations of critical spring and early summer resources. Roots, such as biscuitroot, wild onion, sego lily, and wild parsley, favor wet meadow or subirrigated floodplain settings. Floodplains of major drainages and tributaries of those drainages appear to have been intensively used by Archaic populations for root procurement during the spring and summer months. Archaeological evidence indicates that intensive root procurement occurred throughout the Archaic and Late Prehistoric periods, although in some areas recent agricultural cultivation has removed much of the archaeological evidence of these procurement activities (Francis 1994).

Another important Archaic resource usually available during the spring and early summer in the Wyoming Basin, in particular, was pronghorn. During the spring, pronghorn passed along a major migration corridor that led through the Green River Basin. The Trappers Point site is a pronghorn kill site west of Pinedale that provides evidence of large pronghorn kills extending back to the Early Archaic period. Pronghorn were trapped during their seasonal migration. Several other pronghorn procurement and processing sites in the region appear to be associated with migration routes between winter and summer ranges (Miller et al. 1999). Another significant finding from analysis of the Trappers Point faunal assemblage comes from the first, and perhaps only, study to date to address the potential for pronghorn size diminution over time (Adams et al. 1999:278–289). Certain elements of the Trappers Point pronghorn assemblage were compared to like elements from Protohistoric-aged pronghorn from the Eden-Farson site, located 60 miles south, and a large sample of modern pronghorn, and revealed that pronghorn did experience Holocene dwarfing, likely caused by a combination of climate change, human interaction, and animal behavior (Adams et al. 1999:289).

Access to large pronghorn herds, bison herds, and edible roots allowed Archaic populations to aggregate in areas of the Wyoming Basin and Northwestern Plains during the spring and early summer months. Whether or not Archaic groups aggregated on a few large sites or a series of smaller residential sites is unknown. In either case, during the summer, residential units appear to have dispersed into small groups in response to spatially diverse resource availability. Also, migrations between summer resource patches are thought to have been more frequent than among winter patches. A variety of subsistence resources would have been available to Archaic hunter-gatherers by summer. It is assumed that these smaller, dispersed groups engaged in encounter hunting of small and large animals; procurement of birds, reptiles, and amphibians; collection of bird eggs; fishing in mountain streams; and gathering a variety of plant resources throughout all ecological zones.

The importance of elevation to the seasonal round cannot be ignored. Archaic populations exploited resources in higher elevation locales during the summer after the snow melted. In the mountains, roots and other plants would have ripened later than in lower elevations, making a whole new suite of late-season resources available. Unfortunately, there is a paucity of investigations in high-elevation settings, thus, archaeological data to support these inferred patterns are scant.

With the autumn season, other food resources became available to Archaic residents of the Wyoming Basin and Northwestern Plains. Berries ripened in the mountains as grass and weedy seeds matured in the mountain basins. In addition, herd animals aggregated for the rut in the late summer and early fall. Human groups might have congregated again into large groups in response to the spatial concentration of critical resources. Specialized task groups might have been organized to acquire other spatially disparate resources with the goal of stockpiling for the winter months.

EARLY ARCHAIC PERIOD

The Early Archaic period in the Wyoming Basin dates to 8500 and 3600 RCBP and is divided into the Great Divide phase (8500–6000 RCBP) and the Opal (also known as Green River) phase (6000–3600 RCBP; (Metcalf 1987; Thompson and Pastor 1995). Due to a paucity of sites in the Great Divide phase, the first 2 millennia of the Archaic period are poorly understood in the Wyoming Basin. The under-representation of the Great Divide phase over much of the region may be due to harsh environmental conditions characteristic of the early-to-middle Holocene epoch as evidenced by the increase in dune activity and soil calcification during this period (Ahlbrandt et al. 1983; Eckerle 1997; Späth 1989). It was once thought that population densities were extremely low because the area was uninhabitable during this climatic episode, thus resulting in low site frequency (Reeves 1973), but subsequent interpretations indicate that, as a result of increased aridity and sediment transport, sites dating to the Early Archaic were simply less likely to be preserved (Späth 1989).

The Great Divide phase (8500–6000 RCBP) is characterized by side-notched and stemmed projectile points, the use of small mammalian fauna, and the appearance of nondescript "basin features" and housepits (Thompson and Pastor 1995). The frequency of radiocarbon dates throughout the Great Divide phase is low, suggesting small populations or poor archaeological preservation during this time (Byers and Smith 2007; McNees et al. 2006; Thompson and Pastor 1995). In the greater western Wyoming Basin, Great Divide phase cultural remains are evident at: 48UT786, dating from 8460 to 8220 RCBP (Rood and Pope 1993); 48CR4492, dated to 8020 RCBP (Creasman et al. 1983); 48LN1185, dated to 8180 RCBP (McDonald 1993); the lower levels at the Deadman Wash site (48SW1455) (Armitage et al. 1982); 48UT1447, dated to 7580 RCBP (Rood and Pope 1993); the Vegan site (48LN1880), dating from 8400 to 7570 RCBP (McKern and Creasman 1991); 48SW6911, dated to 7130 RCBP; and 48UT186, dated to 6740 RCBP (Rood and Pope 1993). Most of these Great Divide phase components consist of dated hearth remains with little associated material culture.

The Great Divide phase is well-represented in terms of housepits (McNees et al. 2006). Seven housepit sites (J. David Love [48SU4479], McKeve Ryka [48SU2094], Jonah's House [48SU2324], the Stud Horse Butte Housepit [48SU3835], 48SU3519, 48SU2317, and 48SU3291) date between 8240 and 5320 RCBP, with most predating 6920 RCBP. These represent some of the oldest residential structures in the Wyoming Basin (McNees et al. 2006). Structure D at the J. David Love housepit site also yielded a human burial dated to 7290 RCBP and appears to have been built specifically for the internment (McNees et al. 2006).

Many of the Early Archaic housepit sites in Fremont and Sublette Counties occurred adjacent to streams; Crooks Creek in the case of the Fremont County sites, and Sand Draw in the case of the Sublette County sites. But, it is also noted that many Early (and Late) Archaic sites occur within dunes, especially between 8500 and 8000 RCBP and 6000 to 3000 RCBP (Smith and McNees 2005). Dunes can contain water in the form of small playas and interdunal ponds, a trait beneficial to both plants and animals. Occupations within dunes appeared to be short duration, yet repeated reuse over millennia suggests they were important locations (Smith and McNees 2005).

There is a robust set of well-documented and well-dated sites dating to the Opal phase (6000–3600 RCBP) throughout the Wyoming Basin. Even prior to full awareness of the high site density of Early Archaic sites in the Jonah Gas Field, more than 50 housepits from approximately 30 sites in the Upper Green River Basin region had been documented by the mid-1990s (Larson 1997). After 6500 RCBP, site densities drastically increase, as do the number of radiocarbon dates obtained from the sites (Thompson and Pastor 1995). These increases may be a function of archaeological preservation, as well as cultural factors such as population increase or changes in settlement and mobility patterns. The Opal phase is characterized by an increase in the frequency of housepit structures and slab-lined basin features; the

appearance of large corner-notched and side-notched projectile points, similar to Northern Side-notched points; the appearance of large side-notched knives, named the Altithermal Knife (Creasman et al. 1983); an increase in the frequency of ground stone use; reliance on small- and medium-sized mammalian resources; and the use of a variety of plant materials (McNees et al. 2006; Späth 1989; Thompson and Pastor 1995). Opal phase housepits are generally large and basin-shaped with subfloor hearths and storage features (Späth 1989; Thompson and Pastor 1995).

Patterns of site density and radiocarbon date frequencies across the APE suggest a preferential use of interior rolling plains and upland settings by Opal phase populations rather than the riparian settings. As such, use of these areas might have been facilitated by the onset of moister Neoglacial conditions, permitting groups to expand away from the centralized riverine settings on which they may have focused during the more extreme aridity of the Altithermal.

In the Northwestern Plains, the Early Plains Archaic period dates from approximately 8000 to 5500 RCBP (Kornfeld et al. 2010). Within this region, the Early Archaic is largely recognized by side-notched projectile points, along with a changing subsistence strategy as supported by increased ground stone artifacts and stone-lined roasting pits found on sites associated with this era. Rockshelter and cave habitation sites have been documented in the Early Plains Archaic, as well as habitation sites on mountain slopes in open areas near springs (Kornfeld et al. 2010). Within the Northwestern Plains, few Early Archaic sites have been documented, though it is unknown if this is due to a low number of human populations or due to increased erosion during the period (BLM 2010a).

Diagnostic projectile points of this period are large, side-notched points with a triangular outline (i.e., "Early Side-Notched" [Frison 1991:Figure 2.4]). Although rare compared to side-notched points, large corner-notched and stemmed points have been documented in Early Archaic stratigraphic contexts at Laddie Creek (48BH345) (Frison 1991:Figure 2.45; Larson 1990), Medicine Lodge Creek (48BH499) (Frison 1991:Figure 2.46), Sorenson (24CB202) (Husted 1969:Plate 9), Southsider Cave (48BH364) (Frison 1991:Figure 2.45), Wedding of the Waters Cave (48HO301) (Frison 1962), and Mummy Cave (Husted and Edgar 2002:Plate 13).

MIDDLE PLAINS ARCHAIC PERIOD

The Middle Plains Archaic period is a Northwestern Plains designation that is omitted from the Wyoming Basin chronology (see Figure F-1). The Middle Plains Archaic is generally synonymous with the McKean complex, which dates between 5000 and 3000 RCBP on the Northwestern Plains (Kornfeld et al. 2010). On the Northwestern Plains, the McKean complex is characterized by a bison-oriented economy, but as described above, the entirety of the Archaic period in the Wyoming Basin is characterized by broad-spectrum resource exploitation involving a varied focus on medium to small fauna and plant resources. The most significant difference between the Wyoming Basin and the Northwestern Plains during this time period is the degree to which bison played into the subsistence regime. Whereas the Wyoming Basin saw a continued focus on medium and small game procurement, in addition to a high importance of plant resources, the archaeological record of the Northwestern Plains suggests a significant increase in bison kills, perhaps related to the early stages of the moist Neoglacial period. Though small-scale bison hunting continued through the Middle Plains Archaic period, there is little evidence for the large-scale hunting that occurred in the Early Plains Archaic. In addition to the bison-oriented economy of peoples during this period, the earliest stone circles recorded are attributed to the Early Archaic as well, which could indicate a change in housing structures (Kornfeld et al. 2010).

The McKean complex is associated with three projectile point styles: the McKean lanceolate, the stemmed/notched Duncan-Hanna, and the tri-notched Mallory point (Davis and Keyser 1999). McKean lanceolates and Duncan-Hanna points both have indented bases and typically co-occur in assemblages

(Davis and Keyser 1999; Frison and Walker 1984). This has led researchers to suggest that the same groups used the different point styles contemporaneously, but for different purposes (Davis and Keyser 1999). Davis and Keyser (1999) draw upon morphological and breakage patterns to suggest that the lanceolates were used on thrusting spears and the Duncan-Hanna points were atlatl dart points. Duncan and Hanna varieties were originally considered typologically distinct (Wheeler 1954), but Davis and Keyser (1999) have shown that there is morphological overlap between these varieties and that Duncan points are likely re-sharpened Hanna points. Thus, the two varieties have been compressed into the Duncan-Hanna type. Assuming that this functional dichotomy between the lanceolate and Duncan-Hanna points is correct, it appears that both thrusting spears and atlatl darts were commonly employed in McKean hunting strategies.

LATE ARCHAIC PERIOD

The Late Archaic in the Wyoming Basin dates to between 3600 and 1800 RCBP, and is divided into the Pine Springs phase (3600 to 2900 RCBP) and the Deadman Wash phase (2900 to 1800 RCBP) (see Figure F-1). The transition from the Early Archaic period to Late Archaic period in the Wyoming Basin is defined primarily by a decrease in radiocarbon dates between 4600 and 4300 RCBP. The precise cause of this is not known. It could be factors of differential preservation or changes in population density, settlement, and mobility patterns, or some combination of the two (Metcalf 1987). An interesting exception to the reduction in radiocarbon-dated sites is seen in the western APE between the Green and Big Sandy Rivers. Here, the Pine Springs phase is represented by more sites than all other prehistoric phases and periods (McNees et al. 2006); however, throughout the region as a whole, Late Archaic Pine Springs phase sites occur in relatively low frequencies.

The transition to the Late Archaic is marked by shifting climatic conditions from the warm, dry conditions typical of the Altithermal to cooler, moister conditions of the Neoglacial (Thompson and Pastor 1995). Although no profound change is seen in the subsistence record between the Early and Late Archaic in the Wyoming Basin (Thompson and Pastor 1995), Late Archaic archaeological site components generally contain more bison remains, yet still maintain large quantities of pronghorn, rabbit, and other small game. Ground stone use persists during the Late Archaic period, suggesting a continued plant-processing focus.

The Pine Springs phase is characterized by a greater diversity of architectural features, increased intensity in the exploitation of resources within defined settlement ranges, and more complex social organization. This pattern extends into the Deadman Wash phase. Medium- to small-game and plant resources continue to be exploited (Thompson and Pastor 1995). Some of the more significant Pine Spring phase sites include the Taliaferro site (48LN1468) (Smith and Creasman 1988), Cow Hollow Creek (48LN127) (Schock et al. 1982), Pine Spring (48SW101) (Sharrock 1966), and 48SW1091 (O'Brien 1982).

Deadman Wash phase (2900–1800 RCBP) sites occur at lower frequencies than Pine Spring phase sites in the western Wyoming Basin (McNees et al. 2006), although no clear cause for a corresponding reduction in resident populations exists (Metcalf 1987; Thompson and Pastor 1995). The Deadman Wash phase is characterized by moist climatic Neoglacial conditions, which may have assisted a split in subsistence focus between hunting and collecting activities (Thompson and Pastor 1995). Procurement of bison and pronghorn increased slightly during this phase.

Medium-sized corner-notched projectile points characterize the Deadman Wash phase. In the Great Basin, similar types are recognized as Elko projectile points; however, similar projectiles from the Great Plains are usually designated as Pelican Lake types. Corner-notched Elko Series points in the Great Basin are common throughout the Archaic period, whereas Pelican Lake types are presently limited to the time span between 3000 and 1500 RCBP. Cultural affiliation of Wyoming Basin corner-notched points is

problematic given the location of this basin relative to both the Great Basin and the Great Plains. These points are ubiquitous across the Wyoming Basin and it seems plausible that this is a clear indicator of increased population use or increased use of the basin interior, or both during the period. In the Wyoming Basin, key archaeological data for Deadman Wash phase sites come from the Porter Hollow site (48UT401) (Hoefer III 1987), the Arthur site (48SW1023) (Thompson and Pastor 1991), Component III at the Vegan site (48LN1880) (McKern and Creasman 1991), Component III at the Taliaferro site (48LN1468) (Smith and Creasman 1988), and Occupation I at the Mayfly site (48SW6926) (Darlington and Hoefer III 1992).

In the northern Wyoming Basin, a wider range of environmental zones was regularly exploited during the Late Archaic period. Basin sites tend to have a higher frequency of plant processing implements such as ground stone, whereas Late Archaic sites in the mountains tend to reflect a hunting focus. Sites in the Big Horn Basin that reflect combined hunting and plant processing activities include Bottleneck Cave (48BH206) (Husted 1969:62), Daugherty Cave (48WA302) (Frison 1968), Spring Creek Cave (48WA1) (Frison 1965), and Wedding of the Waters Cave (Frison 1962). These dry cave sites occasionally preserve basketry and digging sticks indicative of plant processing. Stone circles increased in both frequency and size throughout the period, perhaps even replacing housepits in some instances. One notable Late Plains Archaic stone circle site is 48NA83 (the Cedar Gap site), a multi-component stone circle site, consisting of approximately 100 stone circles, one projectile point dated to the Middle Archaic, and one Late Plains Archaic point (Späth 1988).

In the Northwestern Plains, the Late Plains Archaic period dates to between 3000 and 1450 RCBP. In the both the Northwestern Plains and the northern Wyoming Basin, the Late Archaic period is generally defined based on the appearance of corner-notched dart points, which appear to represent a continuation of point manufacture associated with the Middle Archaic McKean complex (Kornfeld et al. 2010). These points, typically referred to as Pelican Lake or Pelican Lake–like points, dominate most assemblages until the introduction of the bow and arrow around 1500 RCBP. Late Archaic Yonkee Corner-notched and Besant Side-notched projectile points typically post-date Pelican Lake varieties in the Northwestern Plains and Powder River Basin in particular, but these are not common in the northern Wyoming Basin and Big Horn Basin assemblages. This is not unexpected, given that Yonkee and Besant points are typically associated with bison hunting and bison were not known to occur in the Big Horn Basin in as great a number as they did on the plains. Yonkee points are primarily found within the Powder River Basin, with the Besant variant present across the Northwestern Plains (Kornfeld et al. 2010). Sites within the Powder River Basin that reflect the Yonkee and Besant presence in the Powder River Basin and the wider Northwestern Plains include the Powder River site (48SH312), the Mavrikaz-Bentzen site (48SH311), and the Ruby site (48CA 302).

Near the end of the Late Plains Archaic, small amounts of ceramics from the Intermountain Pottery tradition and Woodland tradition first appear in the archaeological record (Kornfeld et al. 2010). The Intermountain Pottery tradition is more prevalent in the Northwestern Plains and may be associated with Shoshonean groups (Kornfeld et al. 2010). The Woodland tradition is largely associated with Besant sites in southeastern Wyoming, near the border of Wyoming and Nebraska and northeastern Colorado (Kornfeld et al. 2010). Though both traditions are documented in Late Plains Archaic sites, both are more prevalent in the Late Prehistoric.

Late Prehistoric Period

The Late Prehistoric period in the Wyoming Basin is dated between 1800 and 300 RCBP and is segregated into the Uinta phase (1800–900 RCPB) and the Firehole phase (900–300 RCPB). Within the Northwestern Plains, the Late Prehistoric period is dated between 1500 and 275 RCBP. Although aspects of shifts in settlement and subsistence patterns play into the designation of a separate period, the most

salient key trait marking the beginning of this period is the introduction of bow and arrow technology. Otherwise, the basic patterns of seasonal land use and broad-spectrum hunting and gathering are consistent. That being the case, there is a notable spike in the number of radiocarbon-dated components. The coincidence of this trait with the introduction of bow and arrow technology and an increase in ceramics cannot be overlooked (Kornfeld et al. 2010; Metcalf 1987; McNees et al. 2006; Thompson and Pastor 1995). Environmental and technological changes usher in heightened exploitation of seeds, pronghorn procurement, and increased numbers of bison kills.

Although there is a dramatic rise in the number of sites dating to the Uinta phase in the Wyoming Basin, it is unclear how this relates to actual population increase (Byers and Smith 2007) versus factors of archaeological site preservation and visibility (Surovell and Brantingham 2007). During the Firehole phase (1000–300 RCBP), however, the number of dated components drops drastically across the region. Within the Northwestern Plains, the early portion of the Late Prehistoric also exhibits a peak in the number of radiocarbon-dated components, and ceramics begin to be introduced into the region (Frison 1991:116–122).

If there was indeed an increase in human populations in Wyoming during the Late Prehistoric period, it may have ushered in significant changes to resident group size and mobility. First, population increase likely restricted seasonal rounds compared to that experienced by earlier groups, which would have likely caused constricted access to resources (Byers and Smith 2007) and a concomitant shift toward more intensive resource exploitation. This may have necessitated more frequent residential moves by groups within previously established ranges as local resources were depleted. Furthermore, as home ranges decreased, long-distance interaction and exchange systems were probably more appealing to facilitate access to a wider array of resources.

As a result of increased territoriality, it has been postulated that groups may have employed seed broadcasting and manipulation of plant species around campsites, possibly demonstrating the first evidence of artificial husbanding of vegetal resources in the area (Smith and Creasman 1988). Furthermore, bison hunting appears to have intensified as seen at Late Prehistoric bison kills including Big Goose Creek (48SH313) (Frison et al. 1978), Piney Creek (48JO311 and 48JO312) (Frison 1967), Bessie Bottom (48UT1186) (McKern 1988), Woodruff (42RI1) (Shields 1978), Barnes (48LN350) (Thompson and Pastor 1995), and Wardell (48SU301) (Drucker 2006; Frison 1973; Kornfeld et al. 2010). Wardell represents Avonlea people who originated in Canada, made their way south through Montana and Wyoming, and on to the southwest. Coordinated bison drives and traps such as Wardell demonstrate a high degree of cohesive community organization, likely reflecting several different groups working in a coordinated fashion. With the exception of the Paleoindian Finley and Archaic Scoggins sites, most bison kills in western Wyoming date to the Uinta phase (Smith et al. 2008).

The Uinta phase may have been a time of increased inter-group tension and stress as a result of increased population density, increased territoriality, the introduction of new weaponry (e.g., the bow and arrow), regional faunal resource depression (Byers and Smith 2007), and possible incursions of foreign groups from the Eastern Woodlands, Northwestern Plains, Great Basin, and northern Colorado Plateau into the Wyoming Basin. This assumption is supported by evidence of violence at several burials, including the Robbers Gulch (48CR3595), Bairoil (48SW7101), and Deer Butte burials (48SW10878) (Gill 1991).

The archaeological record suggests that Fremont populations entered southwestern Wyoming during the Uinta phase (Thompson and Pastor 1995). This assumption is supported by the presence of calcite-tempered pottery, distinct rock art styles, manos and metates, disk beads, and farmsteads and granaries (Metcalf 1987), all of which are indicative of the introduction of exogenous Fremont populations into the region. Notably, the Mucray Rock Art site (48SW7787), located within the APE, includes three panels of petroglyphs that, although the affiliation is unknown, have been identified as possibly Fremont. The exact nature and extent of the interaction between Uinta phase and Fremont groups is unknown (Thompson and Pastor 1995).

According to Thompson and Pastor (1995), Uinta phase sites typically contain Rosegate points, Desert and Uinta Side-notched points, and small, triangular, corner-notched points. Specialized hearths are also present, interpreted as vegetal/seed processing features. Pottery is present and is interpreted to be most typically of local manufacture. Intermountain Ware ceramics were recovered at 48SU1443, and brown-gray pottery sherds with sand tempering from the site show a distinct similarity to ceramics from the nearby Wardell bison kill site.

During the subsequent Firehole phase, the paucity of cultural components does not appear to be the result of abandonment of the Wyoming Basin and Powder River Basin, but rather that populations decreased in response to climatic changes associated with the Medieval Warm Period (ca. 900–500 RCBP), prior to the Little Ice Age (Thompson and Pastor 1995). During this interval, marginal arid environments were unsuitable to support the higher human population densities experienced during the previous phase.

Firehole phase sites are characterized by Tri-notched, Desert Side-notched, and Cottonwood Triangular projectile points (Thompson and Pastor 1995). Pottery assemblages are diverse and include Intermountain Ware pottery; steatite vessels also appear during this period (Adams 1992). These artifact types are often attributed to Shoshone populations; however, the timing of the arrival of Numic groups such as the Shoshone into western Wyoming is unclear. Therefore, it is unknown if the transition from the Uinta to Firehole phase represents the arrival of Shoshone populations or the result of more complex ecological and cultural dynamics (Thompson and Pastor 1995). Key Firehole phase sites in the Wyoming Basin include Cow Hollow Creek (48LN127) (Schock et al. 1982), Skull Point (48LN317) (McGuire 1977), Archery (48SW5222) (Hakiel et al. 1987), South Baxter Brush Shelter (48SW5176) (Hoefer III et al. 1992), and Eden-Farson (Frison 1971, 1991).

Stone circle sites, many of which may date to the Late Prehistoric period, are known across the Northwestern Plains and Wyoming Basin. There are a variety of uses and a range of morphologies for these features. Some may be the remains of dwellings (tipi rings), whereas others may have served spiritual purposes. The flanks and bluffs of the major river uplands have produced numerous stone circle sites, rock alignments, cairns, and other (presumably) Late Prehistoric stone archeological sites. It is possible that these are representative of complex hunting strategies (drive lines, game observation points, blinds) involving prehistoric manipulation of game. Many of these features and sites are traditionally considered sensitive and are respected areas for modern-day Native American tribes.

Protohistoric Period (Late 1600s–Early 1800s)

The Protohistoric period in the region lacks concise beginning and ending dates. It likely began sometime in the late seventeenth or early eighteenth century when native groups in the region became aware of colonizing European empires through acquisition of European-derived trade goods and livestock. Contact with these goods and animals, as well as epidemic diseases from Europe (Dobyns 1993; Ramenofsky 1987), almost certainly preceded direct contact with Europeans in the APE. The end of the Protohistoric period is roughly coincident with the beginnings of the fur trade era, which is marked by the beginning of annual rendezvous and slightly later by the establishment of permanent trading posts, which resulted in a relatively permanent Euro-American presence.

Introduction of horses and trade goods such as glass trade beads, in all likelihood, preceded direct contact with Europeans by many decades. An articulated horse skeleton found at 48SW8319 in the Bridger Basin near Flaming Gorge Reservoir produced radiocarbon dates that indicate this animal may date to the seventeenth century (Eckles et al. 1994), although these dates are difficult to interpret given the calibration curve plateaus and reversals during this time. This animal was found with extreme hack marks and placed with three coyote skulls, which may indicate a treatment similar to early accounts from the DeSoto expedition (1540–1542), in which horses were initially killed because of association with the

Spanish (Haines 1938a:114). In the Powder River Basin, the campsite area at the Big Goose Creek (48SH313) site yielded an iron awl and brass arrow point (Frison et al. 1978). Radiocarbon dates from the site calibrate into the sixteenth and seventeenth centuries; however, it is not clear if the trade goods are associated with the dated components. Based on the pottery, this site is associated with the Crow and provides evidence of their early western expansion from the Middle Missouri Region.

Based on the historical accounts, Francis Haines (1938b) presented a model of the northward dispersal of horses and acquisition by native groups that is still the basis for understanding the development of equestrianism in western North America (Roe 1955). Horses became available in the south after the establishment of stock-raising centers around Santa Fe, New Mexico, and particularly after the Pueblo Revolt of 1680 drove out the Spanish colonists and made available large numbers of animals. Equine species were disseminated north by various means (e.g., trading and raiding). Later, John Ewers (1955:11) describes a horse-trading locus in the Wyoming Basin of Wyoming, through which horses from the south were funneled to the Shoshone and traded to northern and western groups such as the Crow and Nez Perce. The actual route by which the horses moved is hypothetical. It could be that the Comanche or Ute were funneling horses to the Shoshone or possibly to the Crow. Pekka Hämäläinen (1998) postulates that there was a Comanche trading center on the Arkansas River in the Big Timbers region whereby Southern Plains goods were traded to Central and Northern Plains groups and vice versa. Based on this model, Native American groups north of the Southern Plains and in the adjacent Rocky Mountain regions would have likely obtained horses by the early 1700s. With the acquisition of the horse, groups had increased mobility, which resulted in increased interaction with other groups, likely altering hunting strategies and political structures as well (Aaberg et al. 2006:192).

In the winter of 1787–1788, while wintering with the Piegan in the foothills of the Northern Rockies, David Thompson (1916:328–334) was told by an adopted Cree named Saukamapee, whom he estimated to be 75 to 80 years old, of battles in the 1730s against mounted Eastern Shoshone groups that were the first contact the Piegan and other northern groups had with horses. These animals were initially the property of Shoshone groups. It is believed that the Shoshone gained early access to horses through their Comanche brethren, who began to acquire equine herds on the Southern Plains at the beginning of the eighteenth century. This access allowed the Shoshone to expand their territory in the eighteenth century. This expansion was relatively short-lived, because groups to the north and east (such as the Blackfoot and Lakota) began acquiring guns, which effectively trumped the advantage that equestrian Shoshonean groups maintained by the beginning of the nineteenth century (Secoy 1953). This Shoshonean expansion may be marked by the appearance of tri-notched arrow points, which, for example, are found in the upper kill level at the Glenrock Buffalo Jump (48CO304), which postdates the fifteenth century (Frison 1970; Newton 2011:59). The River Bend site (48NA202) on the North Platte River just west of Casper is a seventeenth or eighteenth century Shoshone occupation containing iron fragments and a single horse cranium indicative of early and limited access to trade goods that characterize this period (Buff 1983; McKee 1988).

Linguistic evidence suggests that the Crow, a Siouan-speaking tribe, moved into the northern Wyoming Basin region sometime after the 1500s (during the terminal Late Prehistoric era), after splitting with the Hidatsa (Hollow Jr. and Parks 1980). They acquired horses around 1730 AD (Haines 1938b), and by the 1820s, the Mountain Crow were recorded as hunting in the Big Horn Basin and adjacent areas (Voget 2001). The introduction of the horse to the region fundamentally altered subsistence and settlement practices at this time.

Little historical evidence exists of contact between Europeans and tribes in the region. Beginning in the eighteenth century, it is likely that European traders were impinging on the region. It is clear that native groups were beginning to make sporadic contact with European traders in the eighteenth century. Cheyenne tradition indicates that traders from places such as Santa Fe and Taos, New Mexico, were

coming as far north as the Bighorn Mountains in the eighteenth century to exchange iron for bison products (Branch 1997:21). From 1742 to 1743, the Vérendrye brothers met native people in the Northern Plains who spoke Spanish (Nasatir 2002:33–34), and Jacque D'Eglise, who was the first documented Spaniard to visit the Mandan villages beginning in 1790, saw "saddles and bridles in Mexican style" (Nasatir 1927:49; 2002:161).

This trade and the effects it had on native groups in the region fall largely outside of historical documentation, because this area was basically insulated from sustained direct economic and physical contact by native groups in the intervening areas who acted as middlemen and even discouraged direct access to European trading centers. Such is the case in the Northwestern Plains and Wyoming Basin where acquisition of British, French, or Spanish, or all of the above goods was primarily through indirect trade with native middlemen such as the Lakota or Cheyenne, who, for example, were located between the Shoshone and the Middle Missouri village trading centers (Jablow 1950). But, the trading acquisition models vary, and other types of trade that relied on ethnic ties were carried out. In an account from 1805, François-Antoine Larocque describes this relationship based on an encounter with a Shoshone group near the Bighorn Mountains (Wood and Thiessen 1985). This account describes the value placed on glass trade beads as well as the various means by which goods were acquired. Larocque describes "a few of those blue Glass Beads they have from the Spaniard, and on which they set such value that a horse is given for 100 grains" and states that these beads are acquired "by the second and third han[d]" (Wood and Thiessen 1985:192, 217). Larocque later encounters a Shoshone who "had been absent since the spring and had seen part of his nation [Comanche?] who trade with the Spaniards; he brought a Spanish B[r]idle and Battle ax, a large thick blanket, striped white and black and a few other articles, such as Beads &c" (Wood and Thiessen 1985:189).

The profound effects of European-derived materials and technologies, particularly horses and metal, on native societies and economies is understood in a nominal or first-order sense; however, how specific tribes occupying the APE were particularly affected by these processes is not entirely clear.

The archaeological record of this period is elusive given its relatively short duration and light footprint compared to the archaeological record of the Prehistoric and Historic periods. Furthermore, the material culture from this period is largely homogenous and lacking in diagnostic attributes, which is compounded with the issues in radiocarbon calibration after the fifteenth century. Unequivocal evidence of a Protohistoric occupation is difficult to discern given that the most prominent and widespread trade goods, such as glass beads, changed little up even into the later Historic period. Differentiating the Protohistoric archaeological record may require directed research and particular methodologies, including metal detecting. It is also important to recognize that Protohistoric period sites may not contain European trade goods and can differ little assemblage-wise from Prehistoric sites, which appears to be the case at 48SW2590 and 48FR1419, where dated Protohistoric components contained no European trade goods (Martin 1999; Pool and Graham 2005). Of note is the Piney Creek site (48JO311 and 48JO312), which has radiocarbon dates that fall within the dates generally defined as the Protohistoric period; however, the site is considered to be Late Prehistoric due to the absence of Protohistoric artifacts (BLM 2010a). Within the Northwestern Plains and Wyoming Basin, several sites have been documented that include components with association to multiple periods. One such site is the Arapahoe and Lost Creek site (48SW4882), which is listed on the National Register of Historic places and located within the current project APE. The Arapahoe and Lost Creek site includes components from the Late Paleoindian, Early Archaic, Middle Archaic, Late Archaic, Late Prehistoric, and Protohistoric periods, with a historic component as well.

Historic Period (Early/Mid-1800s–Mid-1900s)

The advent of what can be considered the Historic period begins in earnest with the introduction of the fur trade economy in the region. Trade in animal skins in North America was the impetus behind some of the earliest native-European interactions. On the North Atlantic coast in the seventeenth century, Europeans traded metal and glass items for a variety of animal furs, which fueled exploration and colonization (Sleeper-Smith 2009). In Wyoming, Spanish trappers venturing out of Santa Fe and Taos likely carried out intermittent trapping and trading ventures, but direct accounts of these interactions are not recorded (Branch 1997; Weber 1970). The influx of Europeans and the establishment of permanent or semi-permanent trading centers, however, was not noted until the early nineteenth century (Wishart 1992).

Following the establishment of Fort Astoria along the Columbia River in 1811, which included a western overland journey by a party of trappers and traders led by Wilson Price Hunt that passed through northern Wyoming (Irving 2004a; Murray 1976), a Euro-American party led by Robert Stuart returned east overland through the Wyoming Basin and southern Powder River Basin. The passage of Stuart's group through South Pass is the first documented non-indigenous use of the travel route (Rollins 1995). Stuart, while on the left fork of Pocket Creek in October 1812, met a group of Shoshone and traded "a Pistol, a Breechclout an axe, a Knife a tin Cup two Awls and a few Beads they gave us the only Horse they had & for a few trinkets we got Buffaloe meat and leather for mogasins, an article we much want" (Rollins 1995:161).

The Astorian expedition is generally viewed as the event that ushered in the western fur trade; but even prior to this, trade was established on the upper Yellowstone River beginning with the post Manuel Lisa built in 1807 (Douglas 1964). In the northern Wyoming Basin, it is thought that John Colter's expedition into the Bighorn Basin in 1807 and 1808 was the first known Euro-American exploration into the area, at which time he described a location now known as Colter's Hell (48PA77) (National Park Service 1973). In 1824, the fur trade came directly to the Wyoming Basin with the establishment of annual trapping rendezvous initially developed by William Ashley, who was the first to bring a brigade of company trappers to the region (Dale 1991). The system developed by Ashley eschewed permanent trading posts for annual meetings where goods where brought to trappers working in the Rocky Mountain region. The Rocky Mountain Trapping System as characterized by Wishart (1992) consisted of both "company" and "free" trappers pursuing beaver and, to a lesser degree, other furbearing animals, in the central and southern Rocky Mountains, which were traded for goods at an annual rendezvous with vendors that included St. Louis companies and even occasional representatives from Hudson's Bay Company (Topham 2007). Noted mountain men and traders, including the Sublette brothers, Jedediah Smith, Jim Bridger, Thomas Fitzpatrick, Robert Campbell, and Nathaniel Wyeth attended these events (DeVoto 1947; McNees et al. 2006; Morgan and Harris 1987).

These rendezvous, which also attracted Indian groups, were held in the Wind River, Green River, or Snake River basins and lasted from 1824 to 1840 (Friedman 1988; McNees et al. 2006). A multitude of factors, including falling beaver prices and overhunting, ultimately spelled the demise of this system (Wishart 1992:198). By the early 1830s, permanent posts (albeit many short-lived) had been established in the Central and Southern Rocky Mountains, including Fort Davy Crockett (1837–ca. 1841) along the Green River in Brown's Park, and several at the confluence of the Laramie and North Platte Rivers, most notably Fort William, established by William Sublette in 1834 (Eddy 1982; Robertson 1999). Captain Benjamin Bonneville brought wagons west to the Green River Rendezvous in 1832 and established an overwintering post known as Fort Bonneville in the western Wyoming Basin (Irving 2004b). This was the first wagon train brought through South Pass, which would later be used by westering Euro-American settlers.

The fur-trade era in the region initiated an era of direct contact between tribes and Euro-Americans in the region. Trade with tribes such as the Shoshone, Crow, and Arapaho was integrated into the fur trade economy with tribes providing items such as bison robes and horses to the traders. As the beaver-based fur trade economy waned, trade in bison robes and other goods acquired from tribes became more prevalent, particularly on the western Great Plains (Newton 2012). In the Upper Green River basin, which saw a large amount of fur trade activity, the era is commemorated at the Green River Rendezvous National Monument (48SU52) and the Trappers Point Site (48SU350) located at the confluence of Horse Creek and the Green River (McNees et al. 2006).

In the late 1830s, economic difficulties, including the Panic of 1837 (McGrane 1924), led many in the eastern and midwestern United States to seek new opportunities in the Oregon and California territories. By the 1840s, emigrants followed wagon routes traversed in 1836 by the Whitman-Spaulding evangelistic mission and pioneered new routes as well (DeVoto 1947). Later, the discovery of gold in California in 1849 spurred this emigration. The main routes to the west pass through the Green River Valley, which was traversed by tens of thousands of Euro-American settlers. The main travel corridor on which collocated trails used by emigrants travelling to California, Oregon, and Utah crossed along the Platte River just south of the Powder River Basin, and through the Wyoming Basin. Beginning in the 1840s existing infrastructure such as Fort William or Fort John (1834–1849), and especially Fort Bridger (1842–1857) located in southwest Wyoming were economically dependent on these travelers (Robertson 1999). Both of these posts figured prominently in the later history of the region because both became U.S. military posts with personnel involved in the Plains Indian wars (1860s–1870s) and the campaign against the Mormons (1857–1858). Fort William became known as Fort Laramie after purchase by the military in 1849, and Fort Bridger became a military post in 1857; both lasted until 1890 (Robertson 1999). The Wyoming Basin, following the fur-trade era and up into the later nineteenth century, can be characterized by the prominent travel corridors used by American settlers.

From the 1840s through the 1860s, the east–west emigrant trail system was heavily used, and it produced the first clear evidence of historic use in the proposed corridors. These trails include the Oregon Trail (1843–1868), the California Trail (1841–1868), and the Mormon Trail (beginning 1847), as well as variations or "cutoffs" such as the Sublette Cutoff (1841–1868). The Oregon/California/Mormon Trails (48CO183, 48FR736, 48NA293, and 48SW827) and associated cutoffs—Sublette Cutoff (48LN225/48SW1841), Slate Creek Cutoff (48LN948), Baker–Davis Road (48SW4197), Kinney Cutoff (48SW4195), West-side Kinney Cutoff, Deep Sand Route (48FR736), Deep Sand Route Alternate (48FR736), Seminoe Cutoff (48FR1276), Child's Cutoff (48NA579), and Emigrant Gap Route (48NA293)—cross through the APE.

The Sublette Cutoff (48LN225/48SW1841) became the popular route after 1844, particularly by California-bound emigrants (Larson 1978:9). This cutoff departs from the main route at the Parting of the Ways (48SW4198), shortening travel distances by approximately 50 miles by crossing the waterless, rugged Little Colorado Desert. Despite being more prominently known for Oregon-bound emigrants, 9 out of 10 settlers using the Sublette Cutoff were, in fact, bound for California or Utah (Larson 1978:9). The Pony Express also used the trail from 1860 to 1861.

In 1864, the Bozeman trail (48JO134/48JO1599) was opened, turning north off the main emigrant trail system at Fort Laramie and traveling north through the Powder River Basin to eventually arrive at gold mining operations in Virginia City, Montana (Doyle 2000). An initial attempt to find a shorter trail to the Virginia City gold mines through the Powder River Basin was made by John Bozeman and a small wagon train in 1863, but they turned back just north of present day Buffalo after being stopped by a group of Northern Cheyenne and Sioux. Bozeman made a second attempt in 1864, and at that time was able to successfully complete the journey to Virginia City (Doyle 2000). To provide protection for emigrants from Cheyenne, Sioux, and Arapahoe peoples who were unhappy with the Bozeman Trail encroaching on

their homelands, the U.S. Government established Fort Reno in 1865, and Fort Phil Kearny and Fort C.F. Smith in 1866 (Doyle 2000). The military presence did not prevent the attacks, and the military closed the Bozeman Trail in 1866.

At the same time, the Bridger Trail (48BH262/48FR717/48HO207/48NA207/48PA215), an alternative route to the Bozeman Trail, was established by Jim Bridger in 1864 (Gray 1977). The Bridger Trail followed a route north to the Montana gold fields through the Wind River and Bighorn basins. "Over 700 wagons, 1,000 head of stock and 2,500 men women and children traveled over the Bridger Trail to Montana in the spring and summer of 1864. In fact, 25 percent of the population of Virginia City in 1864 arrived thereafter traveling the Bridger Trail" (Wyoming State Parks and Cultural Resources 2000). The government closed the trail to the public in 1865.

During this era, military expeditions (following the emigrant trails) explored, surveyed, and gathered information for the U.S. Government about the western portion of the continent. The first of these forays into the region were the Fremont expeditions of 1842 to 1843 that, guided by Kit Carson, surveyed the Emigrant Trail (Jackson and Spence 1970). In 1849 and 1853, respectively, the Stansbury and Simpson expeditions traveled the Emigrant Trail to the Salt Lake territory and were followed in 1857 by Alexander's Utah Expedition for the so-called Mormon War. By 1857, Frederick Lander began road surveys across the upper Wyoming Basin in development of what would be known commonly as the Lander Trail, an alternate route on the Emigrant Trail system (BLM and U.S. Forest Service [USFS] 1998). The Lander Road, as well as other trail variants, received later use as stage and express routes until the coming of the railroad, after which most stage and supply wagons ran regionally to and from the railroad arteries. Emigrant travel on the Lander Road dropped during the 1860s after the Transcontinental Railroad (Union Pacific mainline) was constructed.

Congress authorized the building of the Transcontinental Railroad in 1862, in the middle of the Civil War. The Homestead Act of 1862 followed soon after. Increasing traffic on the emigrant trails and the perceived need of the United States to protect its western citizens and maintain territories led to the establishment of military forts in the region. The Reservation system was established with policies first executed in what is now Wyoming with the 1851 Treaty of Fort Laramie (Larson 1978). It was after the building of the Transcontinental Railroad, which was completed in 1869, that effectively all Native Americans were limited to what is now western Wyoming. The Wind River Reservation was established for the Eastern Shoshone in 1868 under the Treaty of Fort Bridger; the Northern Arapaho were received there in 1877 (Larson 1978).

In 1868, Wyoming became an official U.S. Territory, following the Transcontinental Railroad's opening of the region to settlement (Larson 1978:64). Euro-American settlement in the Wyoming Basin beginning in 1870s was accompanied by the development of transportation infrastructure between towns, railheads, and outlying agrarian communities. Particularly in the APE, wagon roads are prominent as the movement of people and goods through the largely environmentally marginal area to more agriculturally viable settings in the region. These include the Bryan-South Pass Road (48SW3869), which began in the late 1860s as a stage road from the Union Pacific Railroad (Johnson 1998). By the 1880s, several wagon roads were in use through the area, including the Waltman to Sweetwater Road (48FR2623), the Rawlins–Ft. Washakie Road (48FR415), the Green River to South Pass Road (48SW3864), the Casper to Lander Road (48FR1783, 48NA4218), and the Rock Springs to Lander Road (48SW4163), which began use in 1894 (Gardner 1982). Many of these roads were stagecoach routes and had stage stations associated with them, such as the Crooks Gap Station (48FR1435), located along the Rawlins–Ft. Washakie Road, and the Bird Stage Station (48SU1715), established in 1890s along the Opal Wagon Road (48SU852). The Opal Wagon Road, which began use in 1882, was an important freight/stage wagon route between the shipping railhead in Opal to the upper Green River Valley that saw use until ca. 1924, when construction of the U.S. 189 auto route was completed (Rosenberg 1985).

Around this time gold was discovered in the area around South Pass City initiating a gold rush that brought thousands of people into the area. After decades of rumors and some limited success prospecting in the area, the South Pass area was not rushed by fortune seekers until 1867, when a party of prospectors led by Lewis Robinson returned to Salt Lake City with a substantial amount of gold that they had removed from ore in a short period of time (Bagley 2015). Although there were earlier claims in the area and even the organization of a nearby mining district, what came to be known as the Carissa Lode discovered by Robison and his partners catalyzed the development and Euro-American population of the South Pass area. The fear of Indian attacks that kept most away in the preceding decades was forgotten in the rush to stake claims.

Soon the fully equipped mining town of South Pass City (48FR434) was established near the Carissa Lode, as were the nearby towns of Atlantic City (48FR711) and Miner's Delight (48FR435), which were associated with other gold deposits. Accounts indicate that there may have been as many as 2,000 people living in the area in the summer of 1868; an 1869 summer census showed 1,517 in the mining area, followed by a regular census of 1870 that showed a population of 1,166 (Larson 1978:113). By 1872, the three towns probably each had populations of less than 100; the dwindling population reflects the lack of success most had in the area (Bagley 2015). The South Pass gold rush was small and relatively short-lived compared to those in places such as Colorado and California. Most mining ceased by 1873. The size of the gold is a direct reflection of the overall lack of gold deposits in the South Pass area and a twentieth century study indicates that no more than $2,000,000 in gold was recovered from the mines from 1867 to 1873 (Larson 1978:113).

Although short-lived, the South Pass gold rush, during its heyday, did bring considerable amounts of people into this territory and result in a permanent population base. Given the threat of Indian hostilities, this population was provided with military protection and in 1870 Camp Stambaugh (48FR436) was established near the South Pass mining towns (Miller 2012:113). The camp was strategically located near both the mining communities and the Oregon/California/Mormon trails that used South Pass. The camp was named after Lieutenant Charles Stambaugh, who was killed in a battle with some Arapahos near Miner's Delight earlier that year. The post had a 156-man garrison and a post office, but a rather uneventful history compared to the ongoing military actions elsewhere in the region. Camp Stambaugh was abandoned in 1878 (Miller 2012:113).

Much like Camp Stambaugh, Camp Augur (48FR718) was established as a subpost of Fort Bridger along the Popo Agie River in 1869 to protect peaceful Shoshone on the Wind River Reservation, as well as the mining population in the region (McDermott 1993). It was reorganized as a separate post in 1870 and renamed Camp Brown in honor of Captain Frederick Brown who was killed in the Fetterman Battle (Miller 2012:112). In 1871 the camp was relocated to the Little Wind River on the reservation where it remained and was renamed Fort Washakie (48FR430) in 1878. Fort Washakie eventually became the location of a settlement and center of commerce because it was connected to the Union Pacific Railroad via the Rawlins to Fort Washakie Road. It was turned over to the Interior Department in 1909 and became the headquarters for the Shoshone Agency (Frazer 1972).

Regional cattle ranching essentially began with Fort Bridger in 1843, when Jim Bridger bought trail-weary stock from those passing on the Emigrant Trail, grazed them back to better condition on a bounty of native grasses, and sold them at a profit to other emigrants (Rosenberg 1984). Aridity is a major reason why open-range livestock ranching was the primary industry of permanent settlement in the upper Wyoming Basin and Powder River Basin. Although dryland farming had resurged in many areas of the West by the early twentieth century, conditions of altitude and length of growing season meant this type of agriculture was largely unsuccessful in this region. The Homestead Act of 1862 and its successors, which allowed cattlemen to homestead a base ranch and pastures in prime bottomland and at water sources, aided this system. As with much of the West, area ranches tended toward consolidation into large ranches as a more sustainable way to maintain profitable herd sizes.

Early Wyoming ranchers perpetuated the system of open range livestock ranching, imported from the formerly Mexican territories of the Southwest and Texas. When ranching was initiated in the territory, cattle were generally grazed on surrounding public lands, ranging to surrounding mountains in the summers and to lowland basins in the winters. The open-range system faded after disastrous winters in 1886 and 1887 caused the deaths of an estimated 40 to 60 percent of the cattle in Wyoming (Abbot and Smith 1955; Larson 1978); coincident to this catastrophe the cattle market also plummeted, bursting a bubble of market speculation that was largely fueled by foreign and other non-local investors. When many Wyoming ranches went bust after the killing winters and market fall, small ranchers were again able to viably build independent holdings. By the 1890s, still recovering from the season of terrible winter die-offs and market collapse, cattlemen began to more widely feed their cattle through the winters, to keep them strong and to keep them from wandering too dispersedly. Ranchers accomplished this by pasturing cattle and cultivating grass hay in their bottomland holdings. This management of the range and ever-increasing population around established settlements led to both private and government fencing of the lands. In the Powder River Basin, tensions between small livestock owners and large cattle ranchers boiled over into hostilities in 1892, culminating in the Johnson County Cattle War (Larson 1978). Johnson County was known to be home to many small livestock owners who were opposed to and competitive with large cattle operations. At this time, detectives and inspectors hired by the Wyoming Stock Growers Association, who represented large cattle operations, apprehended and killed suspected cattle rustlers (usually small-scale livestock owners), often without filing charges (Larson 1978).

In many areas of Wyoming, cattle ranching originally had been established to the exclusion of any sheep herding operations. The earliest sheep herding in the Wyoming region was more focused on the mutton market, in direct competition with beef cattle, than upon wool production. Because cattle were available from cheap sources in the late 1860s and were worth much more per head than sheep, it was probably more profitable to be a cattle rancher as Wyoming Territory was settled. But, by the 1890s, most sheep ranching had reoriented toward wool production. By 1907, the University of Wyoming had a wool technology department, led by John Arthur Hill, influencing the study of wool production and processing through the 1940s (Field and Kercher 2014), when synthetic fibers began to displace wool. Sheep camps can be found throughout the area and were operated up into the second half of the twentieth century.

Range management practices, violent rancher conflicts, and public land abuses all contributed to the reservation of public lands and minerals for management purposes when it became clear that initial extractive and settlement approaches were negatively affecting broad areas of western lands. In 1895, U.S. forestlands were withdrawn into Forest Reserves; however, federal legislation was still maintained to encourage the growth of individual family agricultural holdings. Forestlands were then placed under USFS management in 1905 and the first division of (summer) grazing rights into a permitted allotment system was developed. The USFS also dictated which allotments could be used for sheep herding and which were meant for cattle herding, which were types of herding often known to come into physical conflict in the region.

Historic homesteads or ranches that reflect the range permitting system in the upper Wyoming Basin and seasonal grazing restrictions can be found throughout the region, including the Bailey Homestead (48SU941), the Mills Homestead (48SU1277), and the Morton Ranch (48NA1090). These sites date from the 1910s into the 1940s; both home ranches and associated line camps were used by ranchers as they moved their livestock to and from winter range, a process known as the Green River Drift (McNees et al. 2006). These sites contain log structures and water management features, like wells, windmills, and stock ponds.

As the livestock industry shrank in the 1890s, the oil industry was just beginning. The first oil well in the Salt Creek Oil Basin (48NA296) north of Casper was developed in 1889, with the first oil field in the Powder River Basin developed in 1887 near Moorcroft (Larson 1978). Energy development extended into

the western part of Wyoming as well in the early 1900s, with developments in the Oregon Basin Oil Field (48PA639), Byron Oil Field (48BH1616), the Garland Oil Field (48BH751), and the Sand Draw/Big Sand Draw Oil and Gas Field (48FR6135). This development is also demonstrated by the historic 1920s to 1930s oil camp (48SU1206) recorded on Birch Creek. A notable site related to energy development is the Parco Historic District (48CR1197), which the APE crosses. The town of Parco was founded to support an oil refinery built by the Producers and Refiners Oil Company in 1922 to 1923, after whom the town was named.

In 1934, the Taylor Grazing Act completed the reserve desert and other remaining non-forest lands, which were held federally by the General Land Office (GLO). GLO lands were also divided into grazing allotments with restricted range access, managed by the National Grazing Service, which was formed pursuant to the Taylor Grazing Act (Merchant 1993:321). Depression-era federal relief programs like the New Deal's Civilian Conservation Corps and the Soil Conservation Service were also established in the 1930s to perform range improvement projects and wilderness access projects, heralding a new era of progress for range and forest management practices. In 1935, the Soil Conservation Service was founded (renamed as the Natural Resources Conservation Service in 1994) and began work to assist ranch owners with range development projects such as water catchments and erosion control measures. After its inception in 1946, the BLM (formed through the federal merger of the GLO and the National Grazing Service) also began building stock tanks, water wells and pipelines, and stock ponds on its desert lands to serve the cattle industry and wildlife.

Modern highways and historic automobile roads mark a progressive improvement of earlier wagon roads, often straightening and altering their paths for the different considerations of automobile traffic as distinguished from earlier horse traffic. Modern vehicle routes often directly follow atop historic routes when possible, because the older routes commonly provide existing upgraded or improved access corridors. Often these historic routes have been reused or upgraded by other later historic routes ranging in periods from wagon trails to early to more modern automobile roads. Modern routes typically differ from previous routes based on road conditions, which are related to drainage channel crossings, erosion, and a wide range of topographical considerations.

By World War I, the "Lincoln Highway" had been built following the route of the Transcontinental Railroad through the Wyoming Basin. The Rock Springs Automobile Road extended north from the Lincoln Highway to Pinedale, as an internal combustion vehicle alternative to the New Fork Wagon Road (Huston 2000:35–36; Vlcek 1999). The highway system that had been growing since the 1920s, and was expanded after each World War, essentially replaced the need for many of the alternate rural routes. The spread of transportation and automobiles post–World War II also diminished the need for railroad networks and was complicit in the reduction of small-town populations in the West.

The Rock Springs Automobile Road (48SU3508) was used between 1907 and 1934 (McNees et al. 2006) and was first surfaced for all-weather use in 1926 (Huston 2000:40). U.S. Highway 187 (48SU1281) was later developed between 1934 and 1952, in yet another alignment similar to that of the Rock Springs Automobile Road, in response to the needs of more modern automobile traffic (McNees et al. 2006). Today that highway route has been redesignated as Highway 191, although the current Highway 191 route does not totally overlap the earlier Highway 187 route (Huston 2000:36).

The National Register of Historic Places (NRHP)–eligible Opal Wagon Road began use in 1882 as an important freight/stage wagon route between the shipping rail head in Opal to the Upper Green River Valley. It was used as a freight/stage road until 1924, when a new road was constructed providing access to the area (Rosenberg 1985). Thus, 1924 marks the end of the period of significance for the Opal Wagon Road. Following the numbering convention of the surveyors, the updated road was designated Sublette County Road No. 20, and it was named the Opal–Horse Creek Road (48SU7034). This road is

recommended as not eligible for NRHP nomination. Previous recordings of the Opal Wagon Road have falsely identified segments of the Opal to Horse Creek Road as the Opal Wagon Road, and this issue persists in the SHPO data. The correct Opal Wagon Road alignment is the eastern alignment in this area, located between the Opal to Horse Creek Road and the Green River (BLM 2010b). This road is documented as 48SU1595, and it has been recommended as not eligible for NRHP nomination. Wyoming 287 was recommissioned as U.S. 89 in 1936, and in 1939 this highway was abandoned and replaced by modern U.S. 189, which is in use today (Field and Nitzman 2009).

Other notable road sites in Wyoming are the Cody-Meeteetse-Thermopolis Freight Road (48HO472), the Lost Cabin to Nowood Road (48FR2284), and the Rock Springs to Vernal Road (48SW4164)

Well-developed transportation networks and an expanding energy (primarily hydrocarbon and uranium) market have helped the growth of larger population centers like Rock Springs and Gillette, and often helped suburbanize their immediate radii. Hard-rock mining also continued to play a role in the regional economy. From 1960 to the 1980s, U.S. Steel built and operated a 77-mile railroad spur from the Atlantic City Iron Mine at South Pass to Rock Springs. The spur transported iron ore pellets to the Union Pacific Railroad and on to the Geneva Steel Foundry in Utah. This railroad spur parallels Highways 28 and 191. To the east, the APE passes Jeffrey City, which was a center of uranium production from 1960 to 1980 (Moulton 1995:189). Reclaimed mines are in the APE vicinity north of Jeffrey City. Today, cattle ranches, fluid mineral developments, and uranium mines remain visible directly around the APE.

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APPENDIX G

Maps

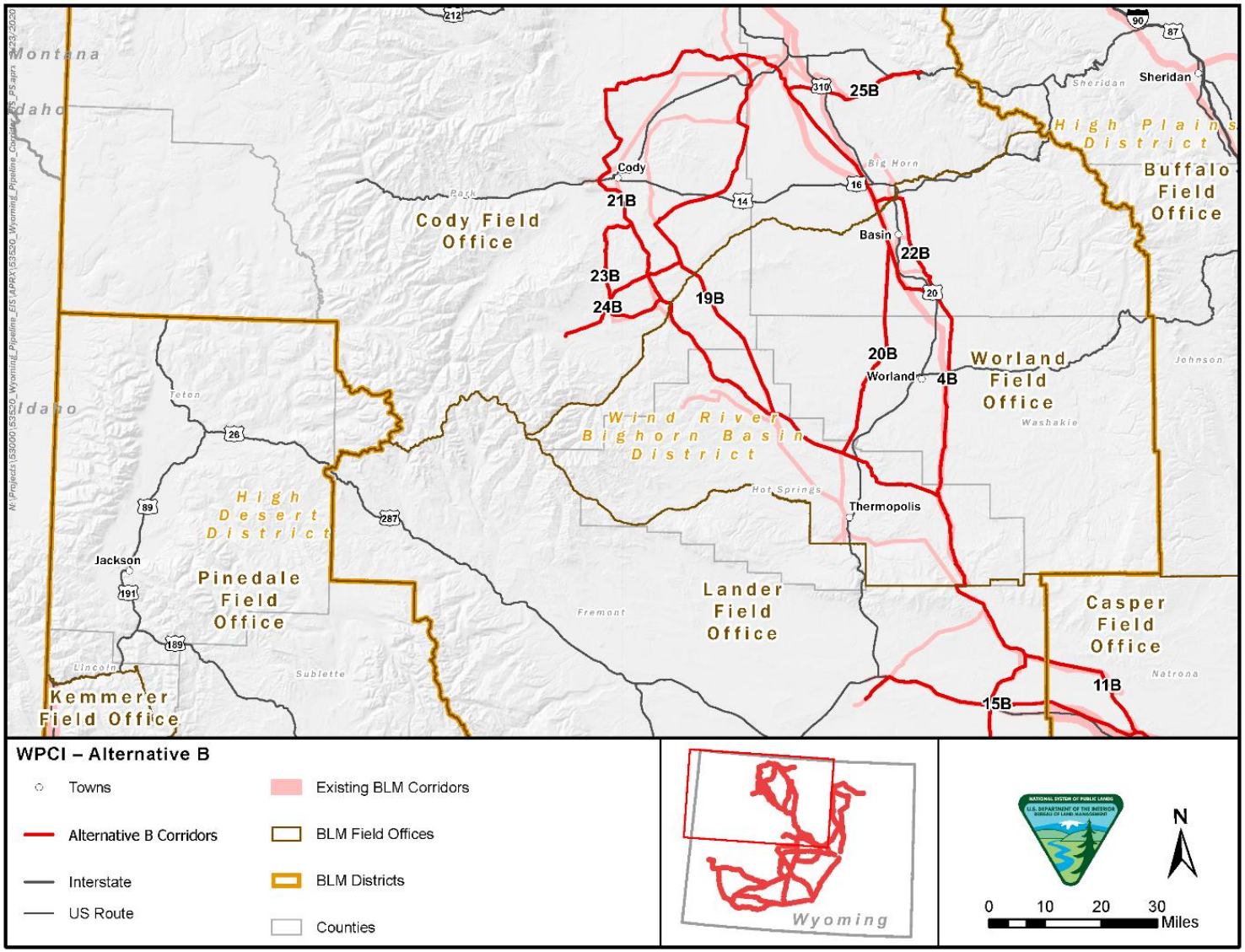


Figure G-1a. WPCI proposed corridors – Alternative B (map 1 of 4).

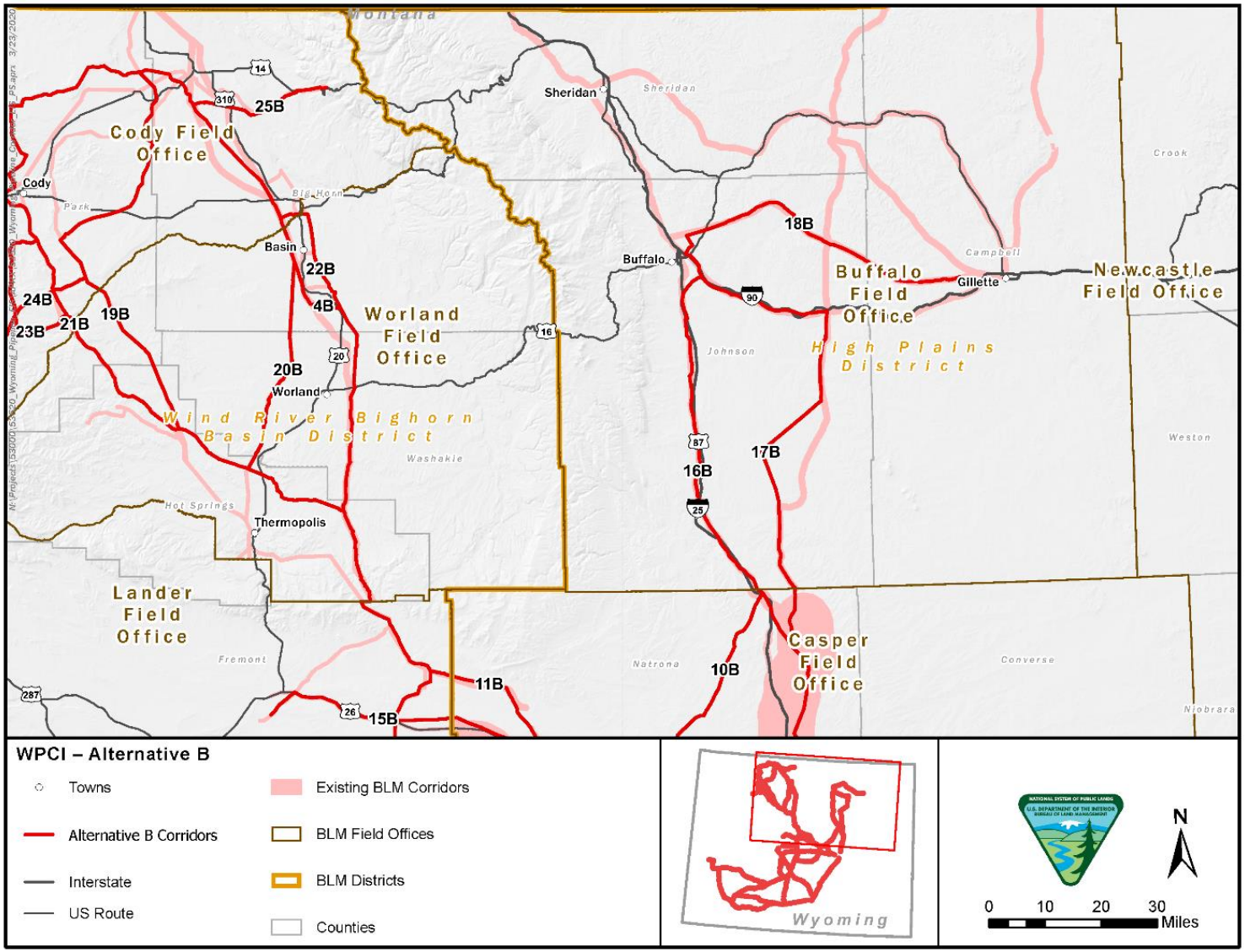


Figure G-1b. WPCI proposed corridors – Alternative B (map 2 of 4).

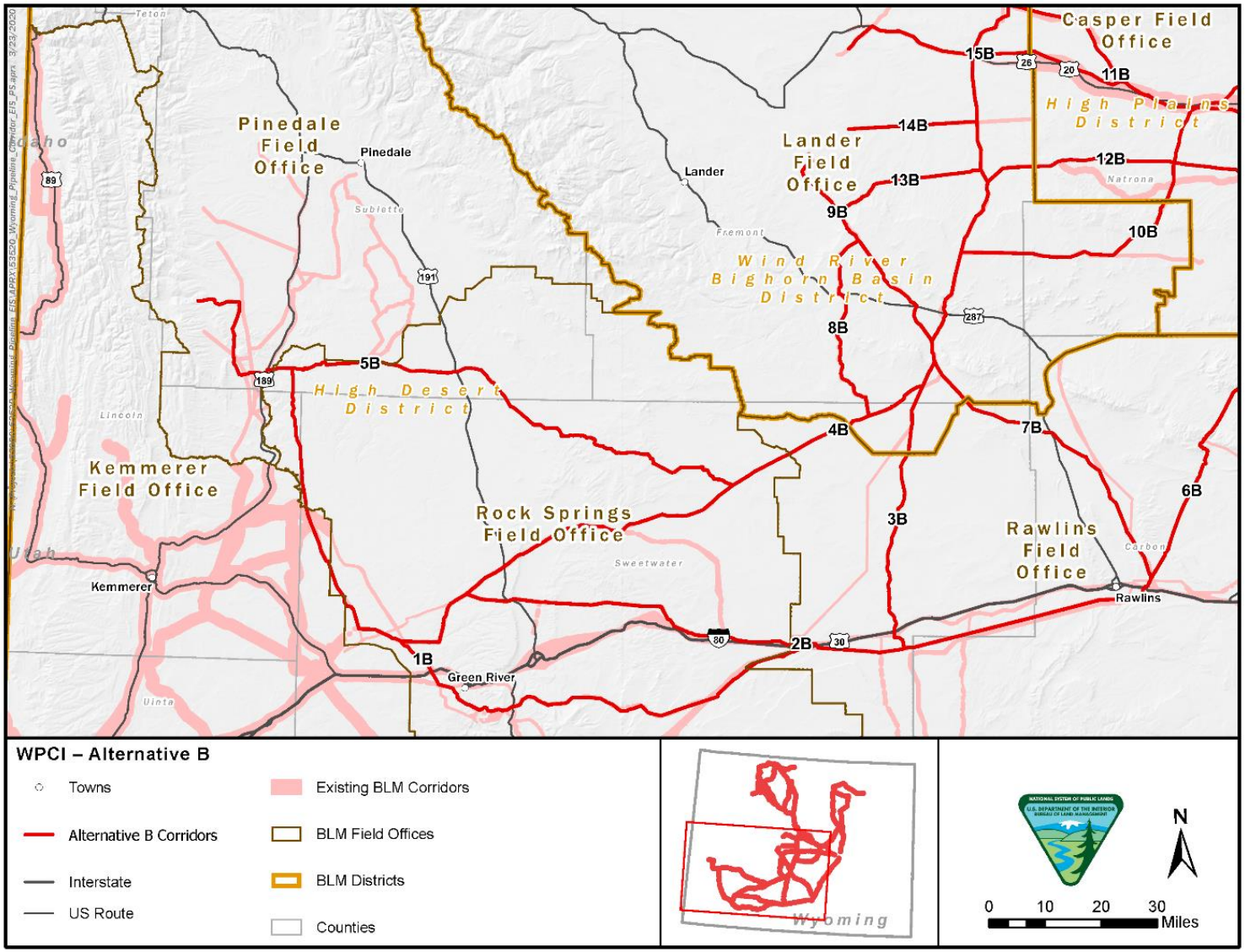


Figure G-1c. WPCI proposed corridors – Alternative B (map 3 of 4).

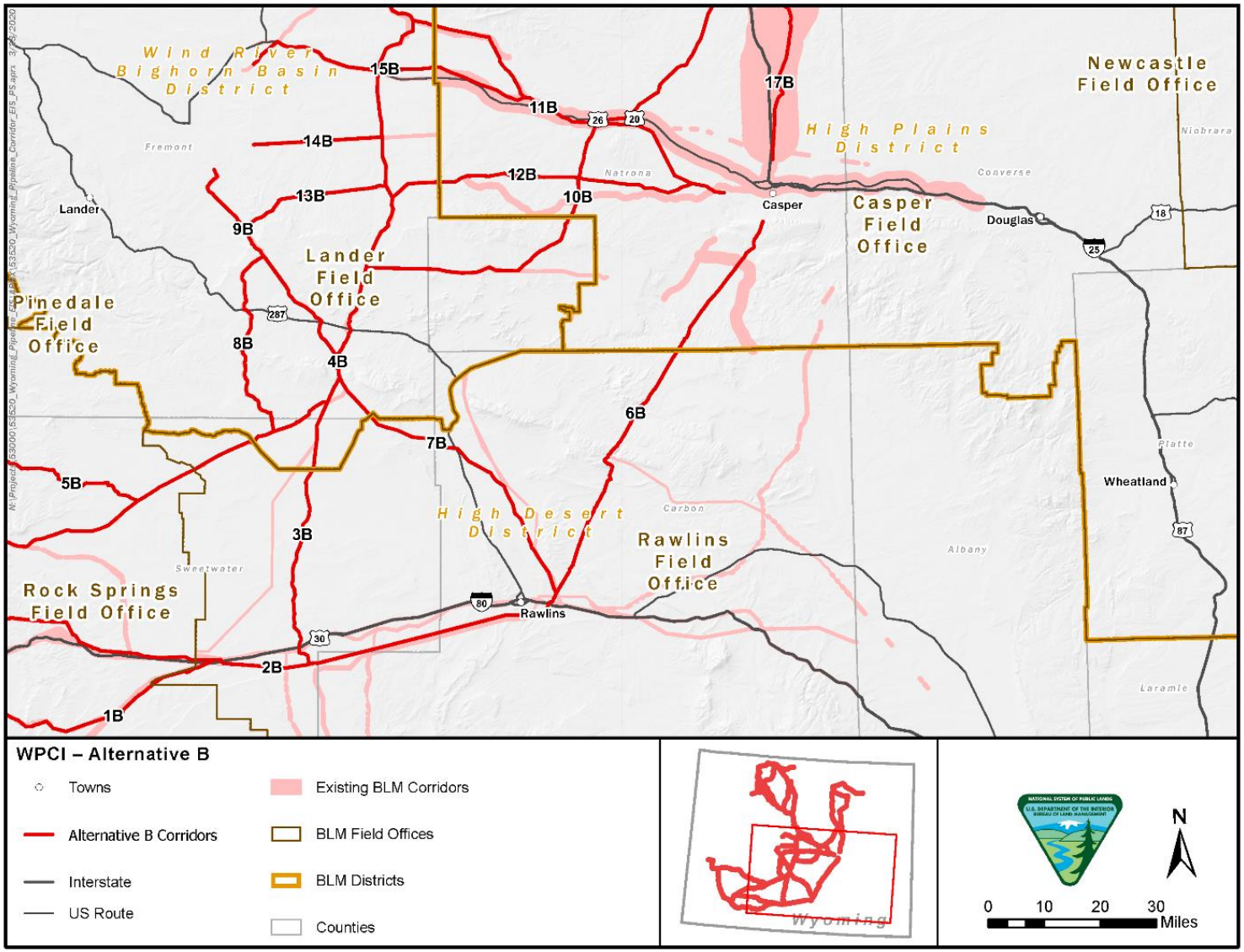


Figure G-1d. WPCI proposed corridors – Alternative B (map 4 of 4).

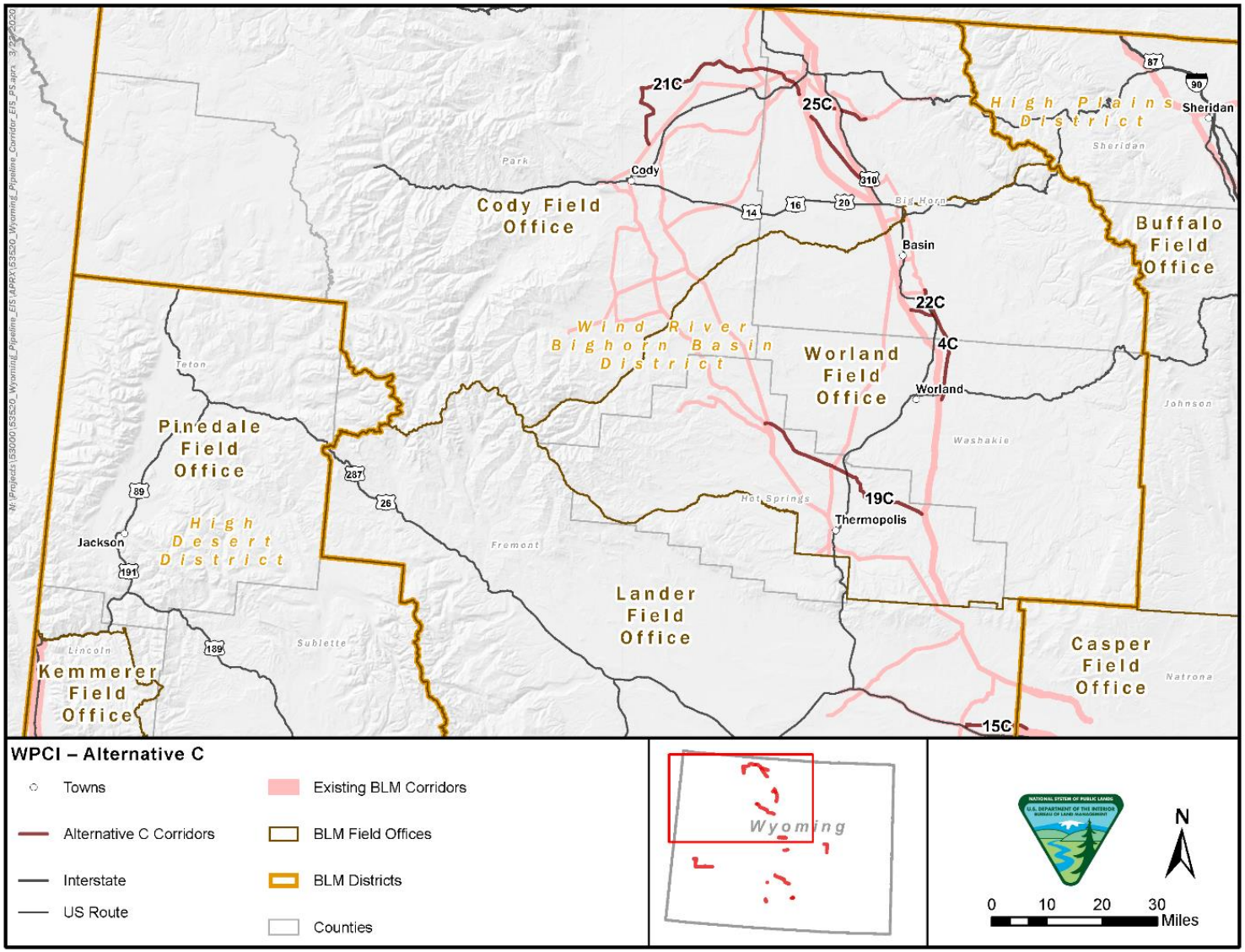


Figure G-2a. WPCI proposed corridors – Alternative C (map 1 of 4).

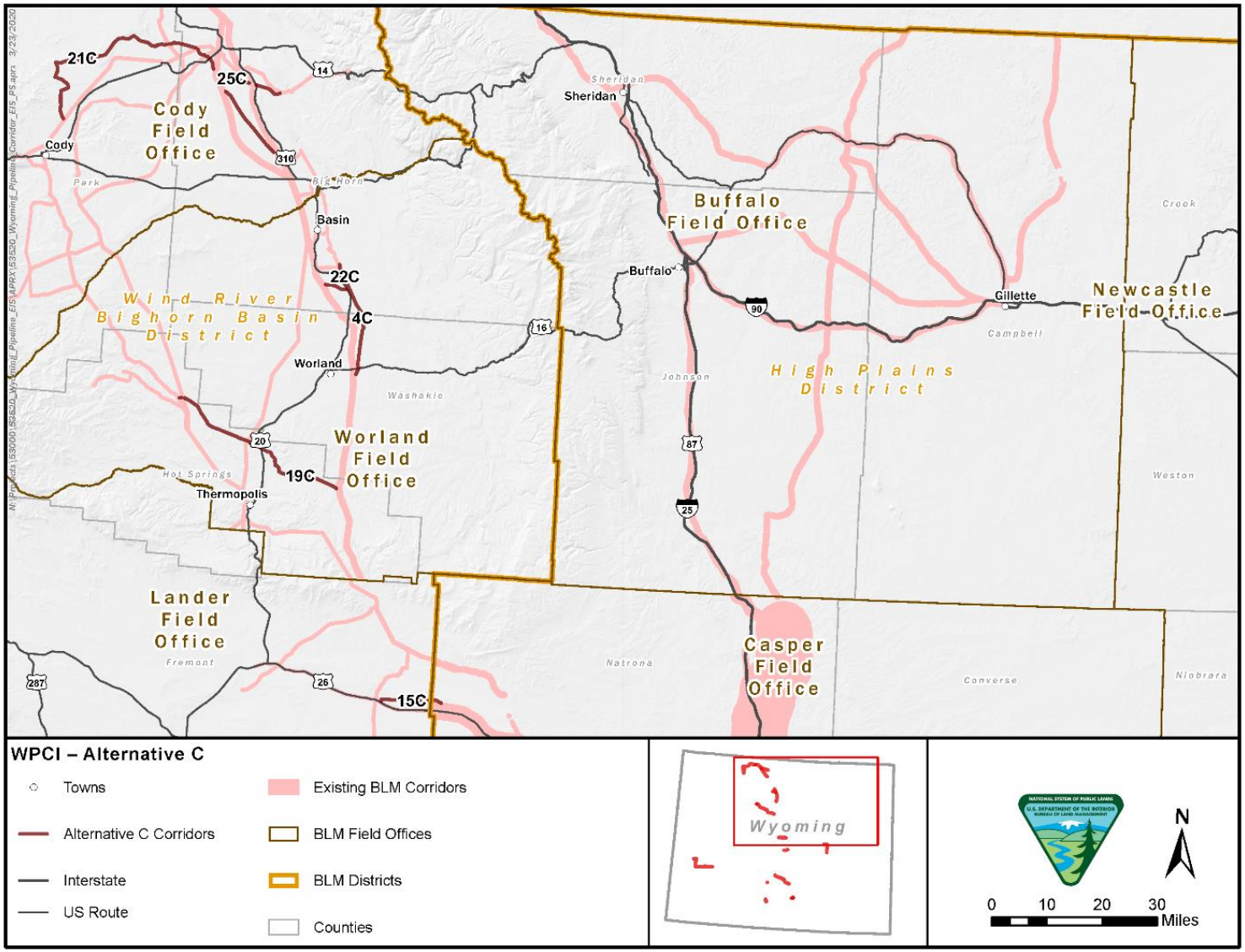


Figure G-2b. WPCI proposed corridors – Alternative C (map 2 of 4).

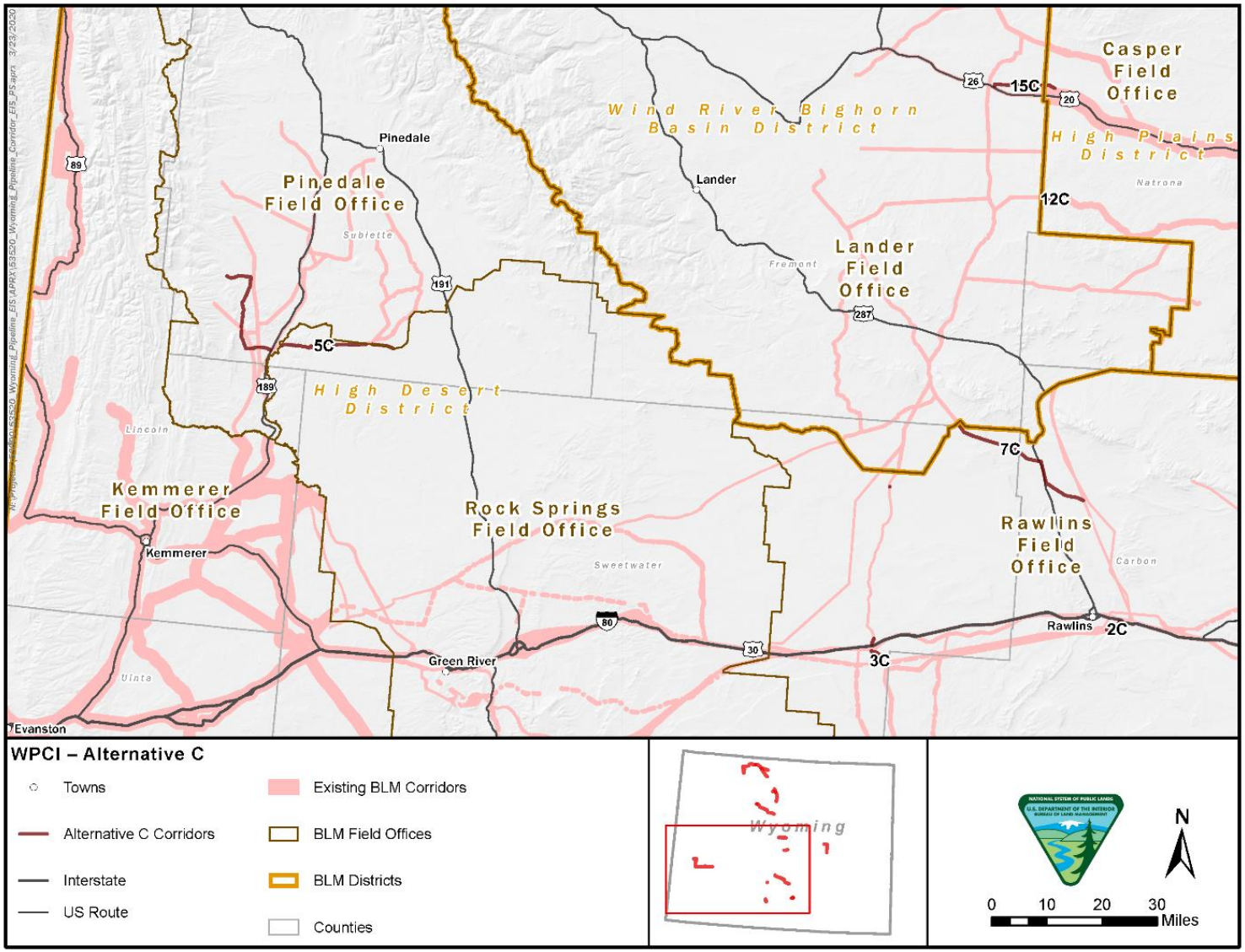


Figure G-2c. WPCI proposed corridors – Alternative C (map 3 of 4).

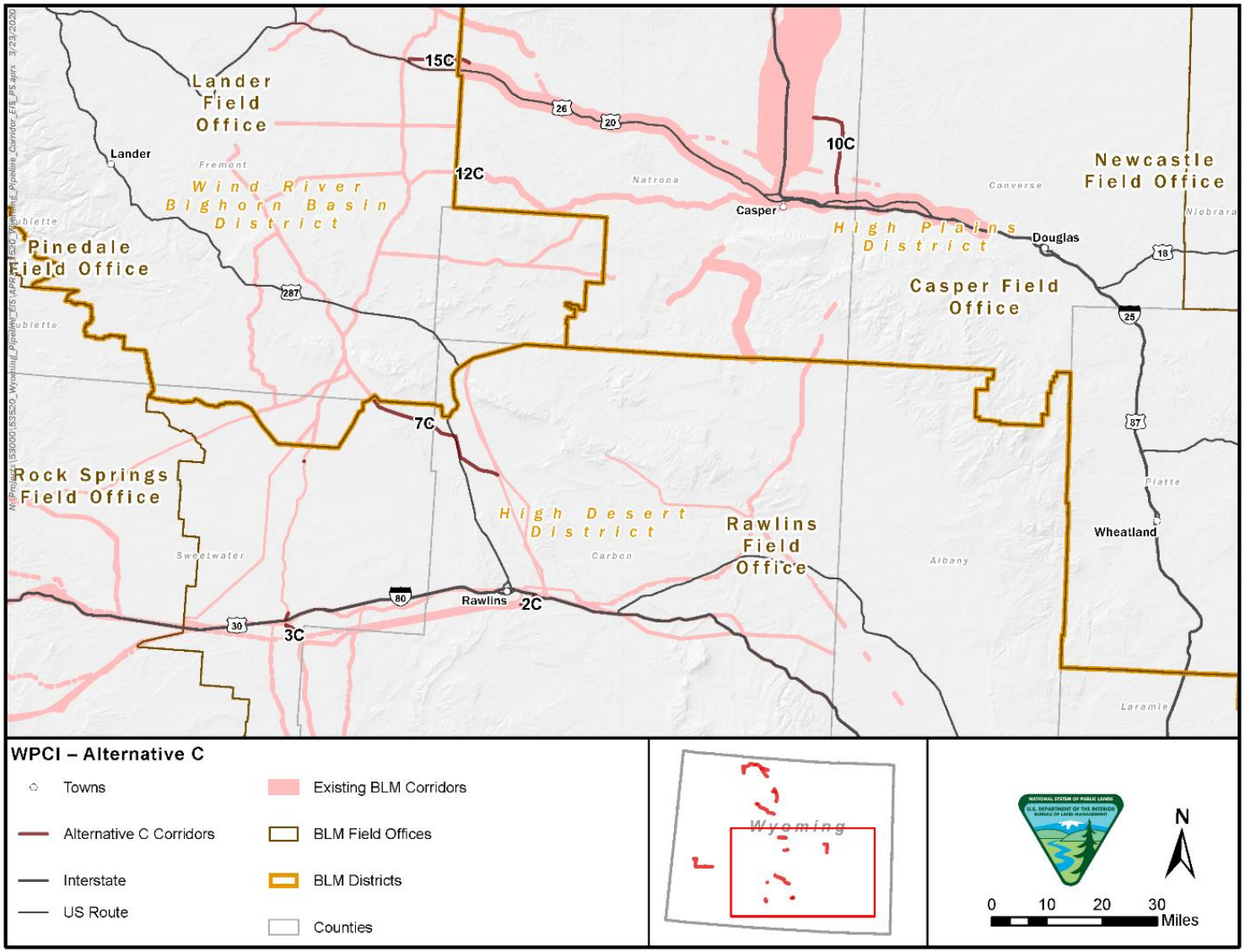


Figure G-2d. WPCI proposed corridors – Alternative C (map 4 of 4).

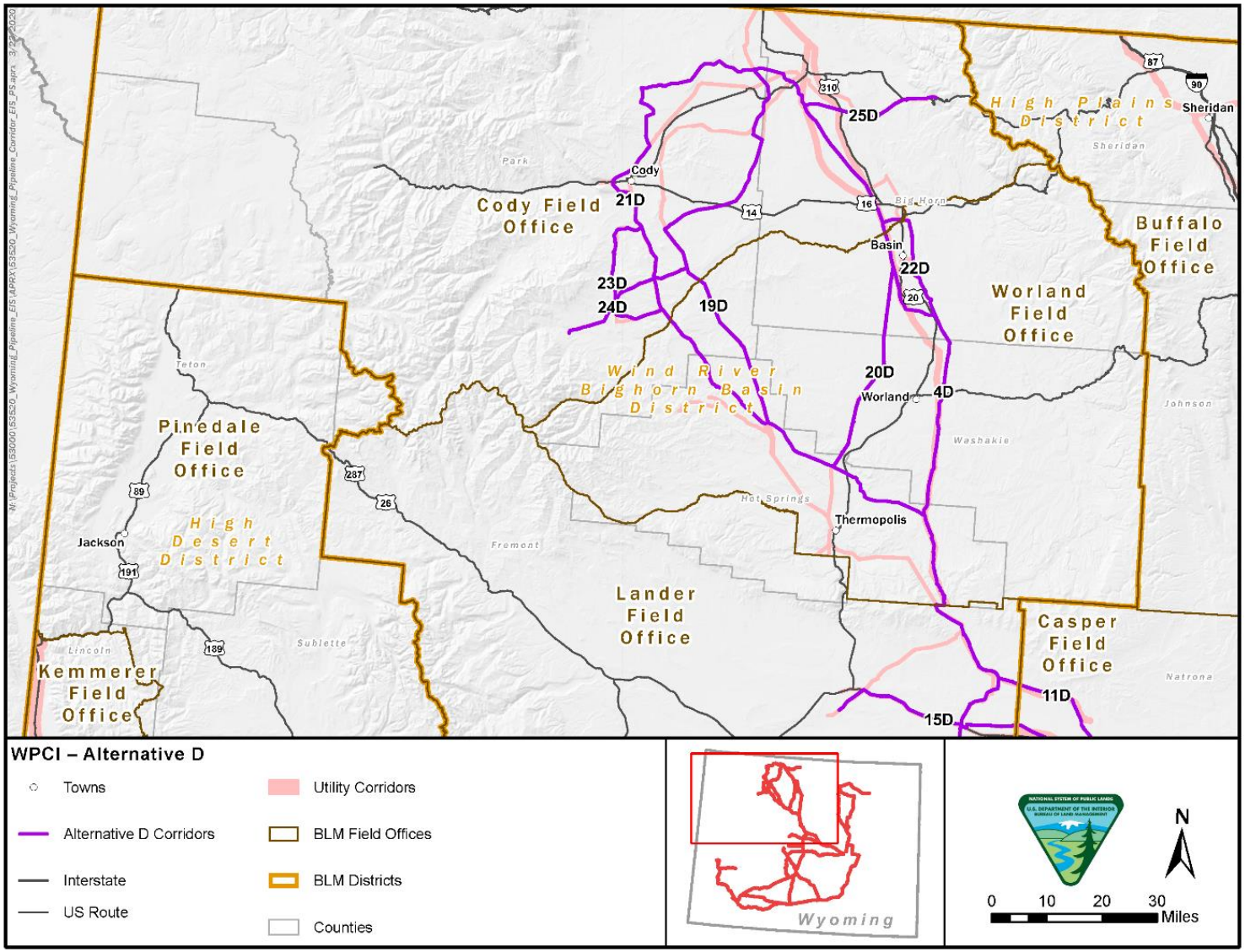


Figure G-3a. WPCI proposed corridors – Alternative D (map 1 of 4).

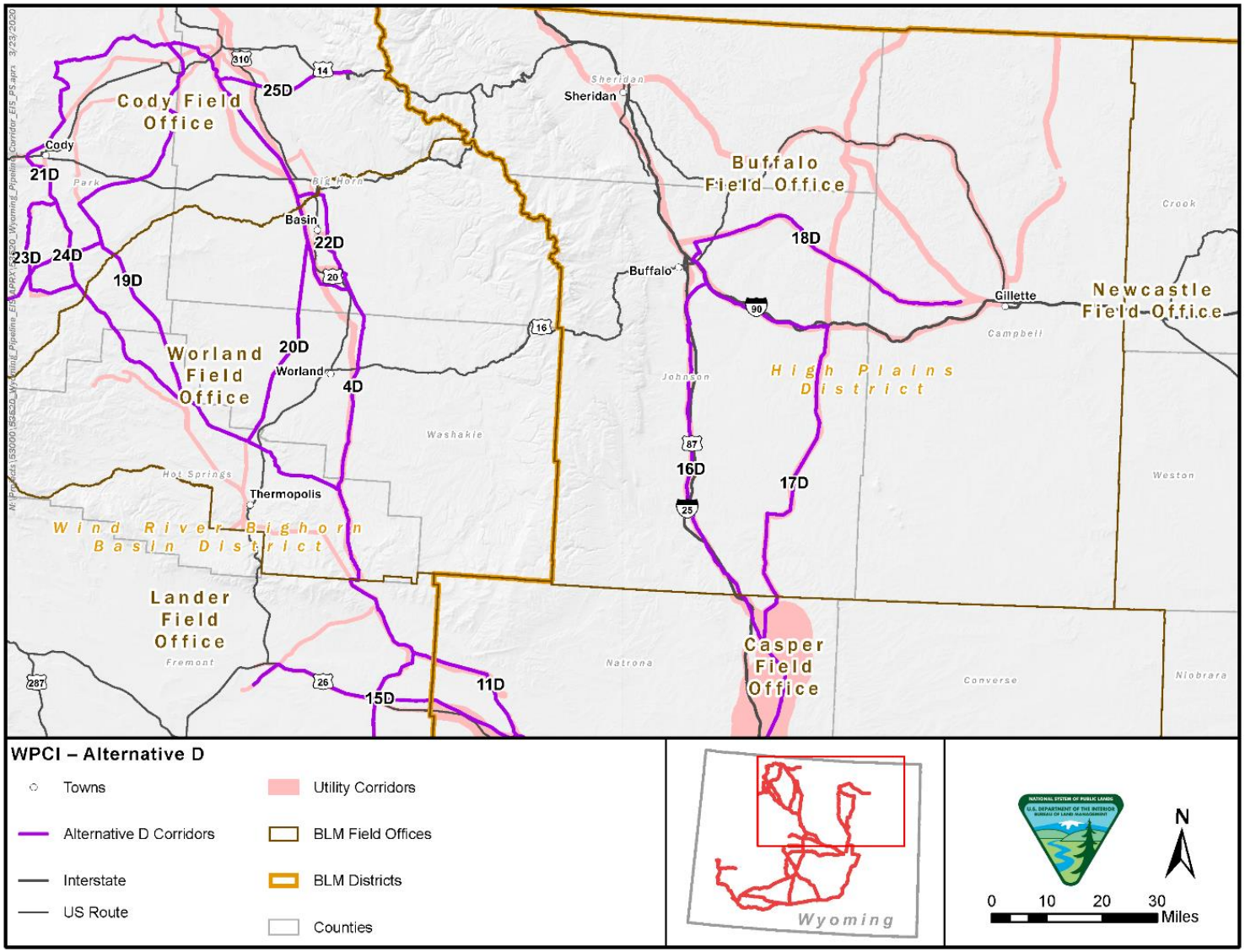


Figure G-3b. WPCI proposed corridors – Alternative D (map 2 of 4).

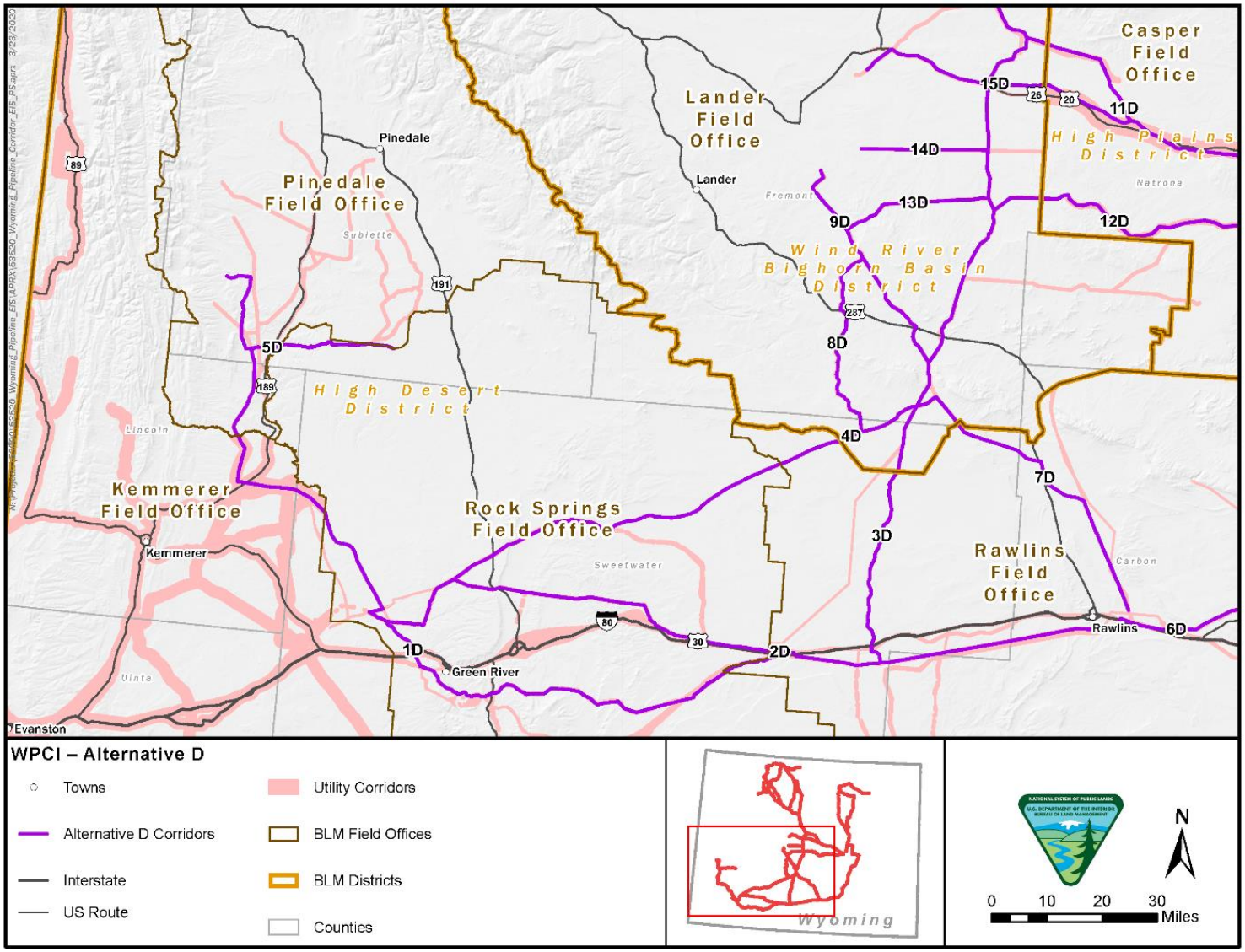
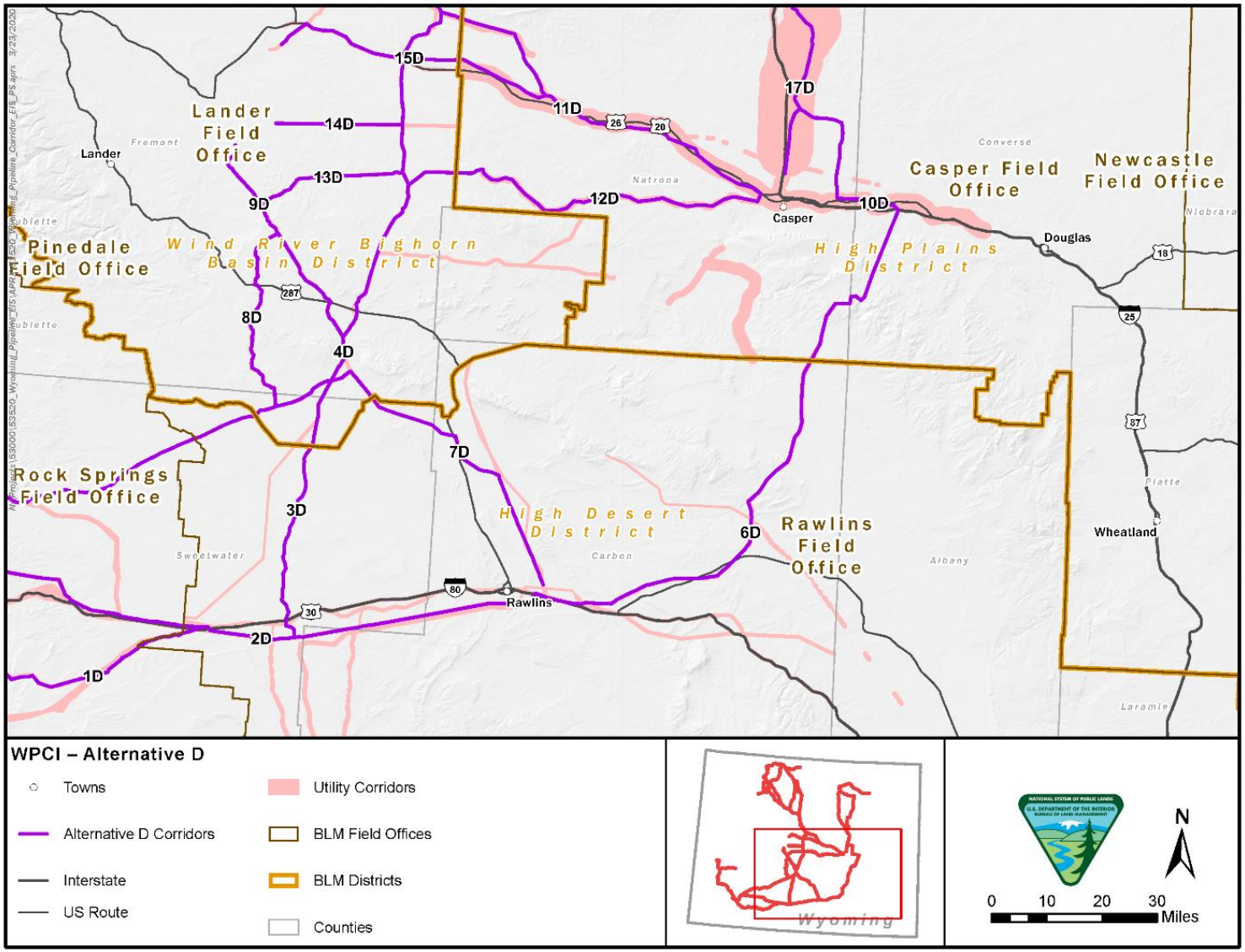


Figure G-3c. WPCI proposed corridors – Alternative D (map 3 of 4).



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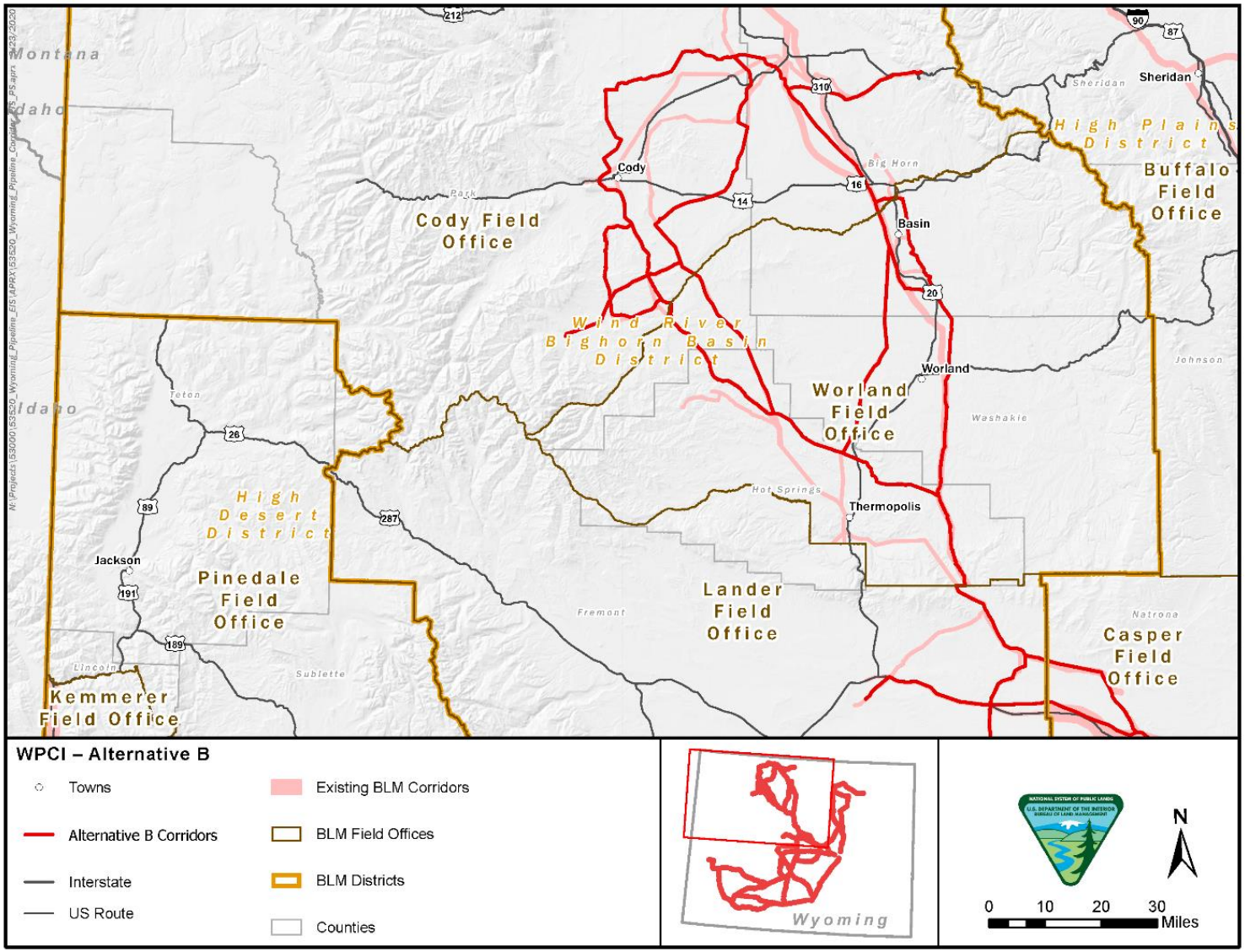


Figure G-4a. WPCI proposed corridors – Alternative B trail crossings (map 1 of 4).

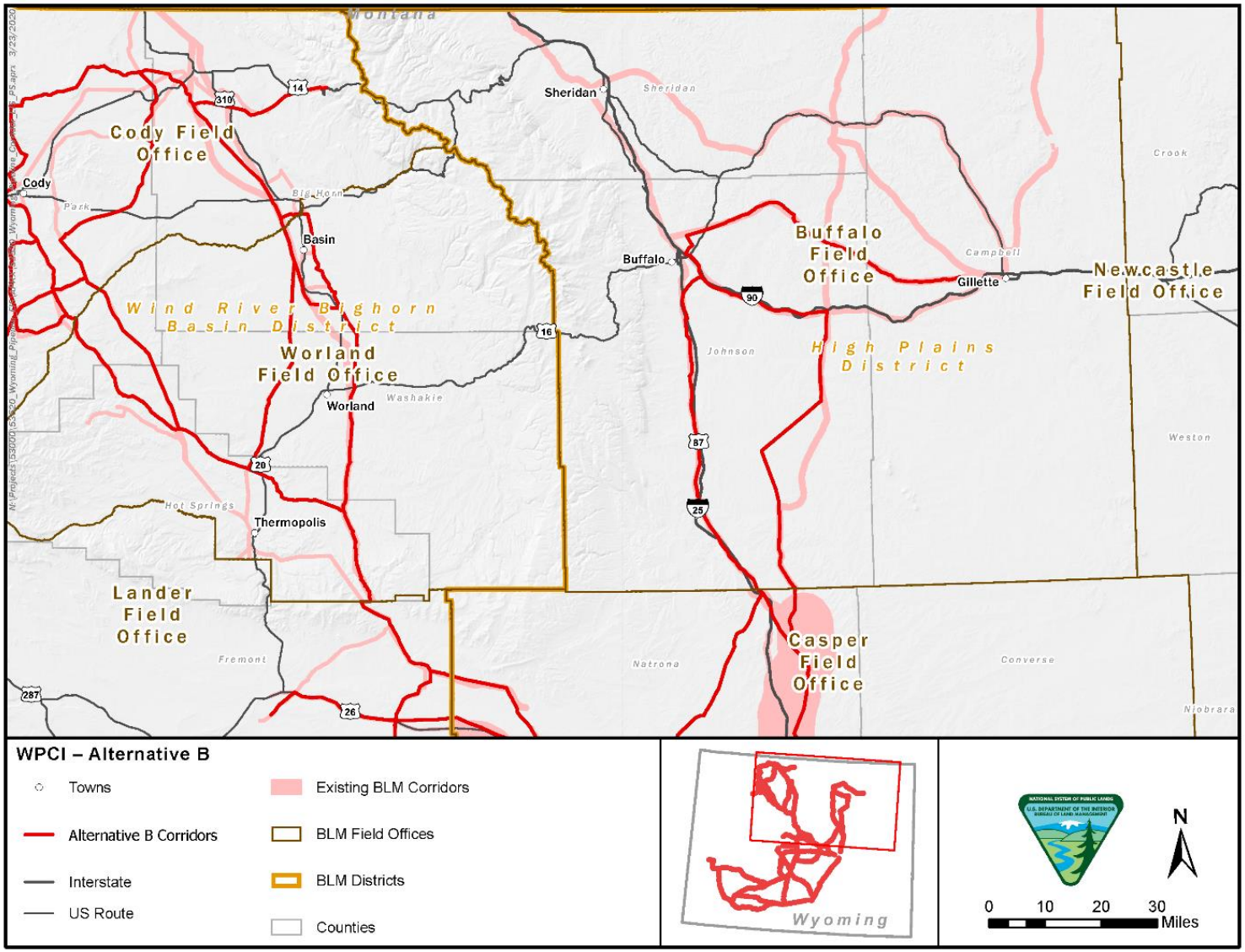


Figure G-4. WPCI proposed corridors – Alternative B trail crossings (map 2 of 4).

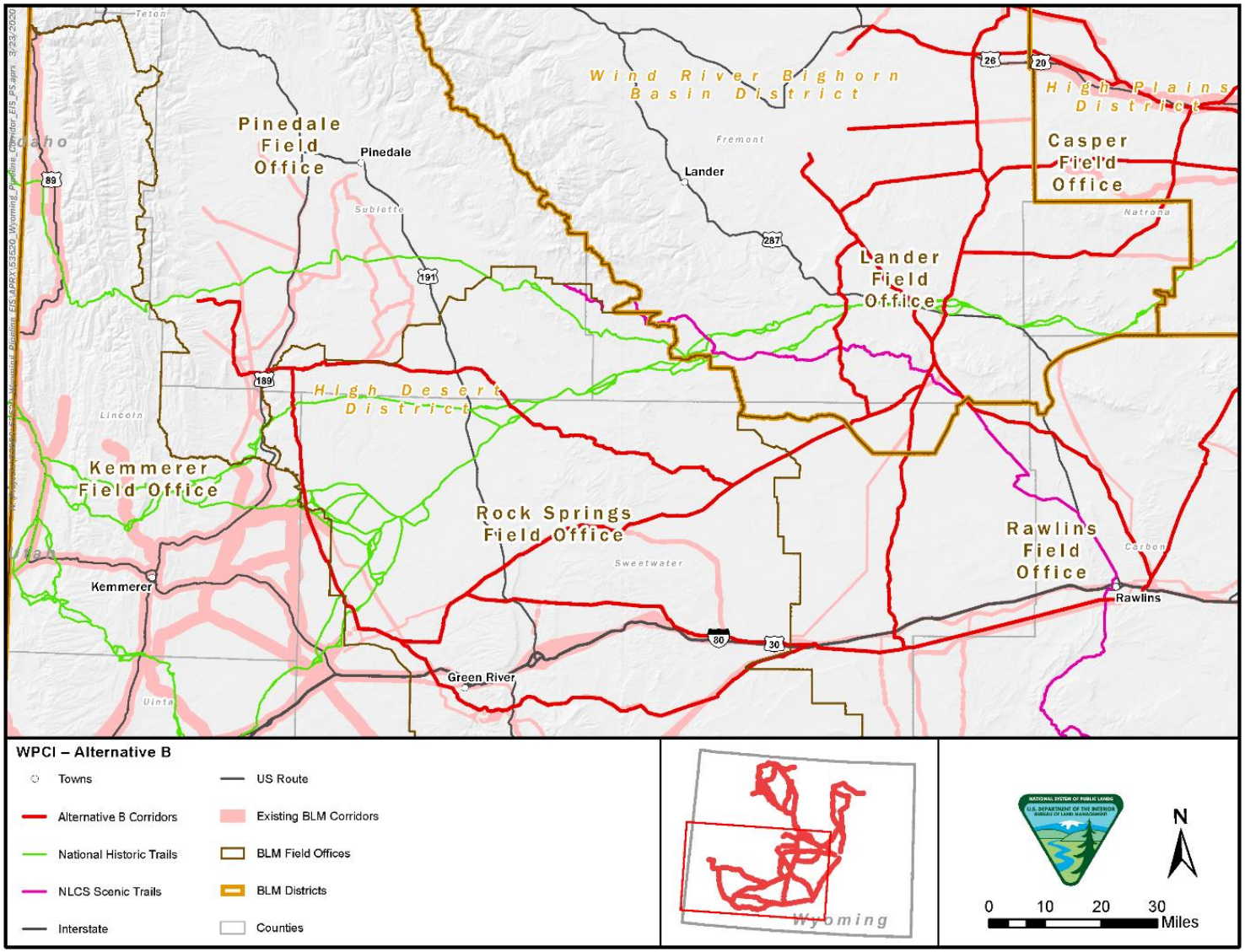


Figure G-4c. WPCI proposed corridors – Alternative B trail crossings (map 3 of 4).

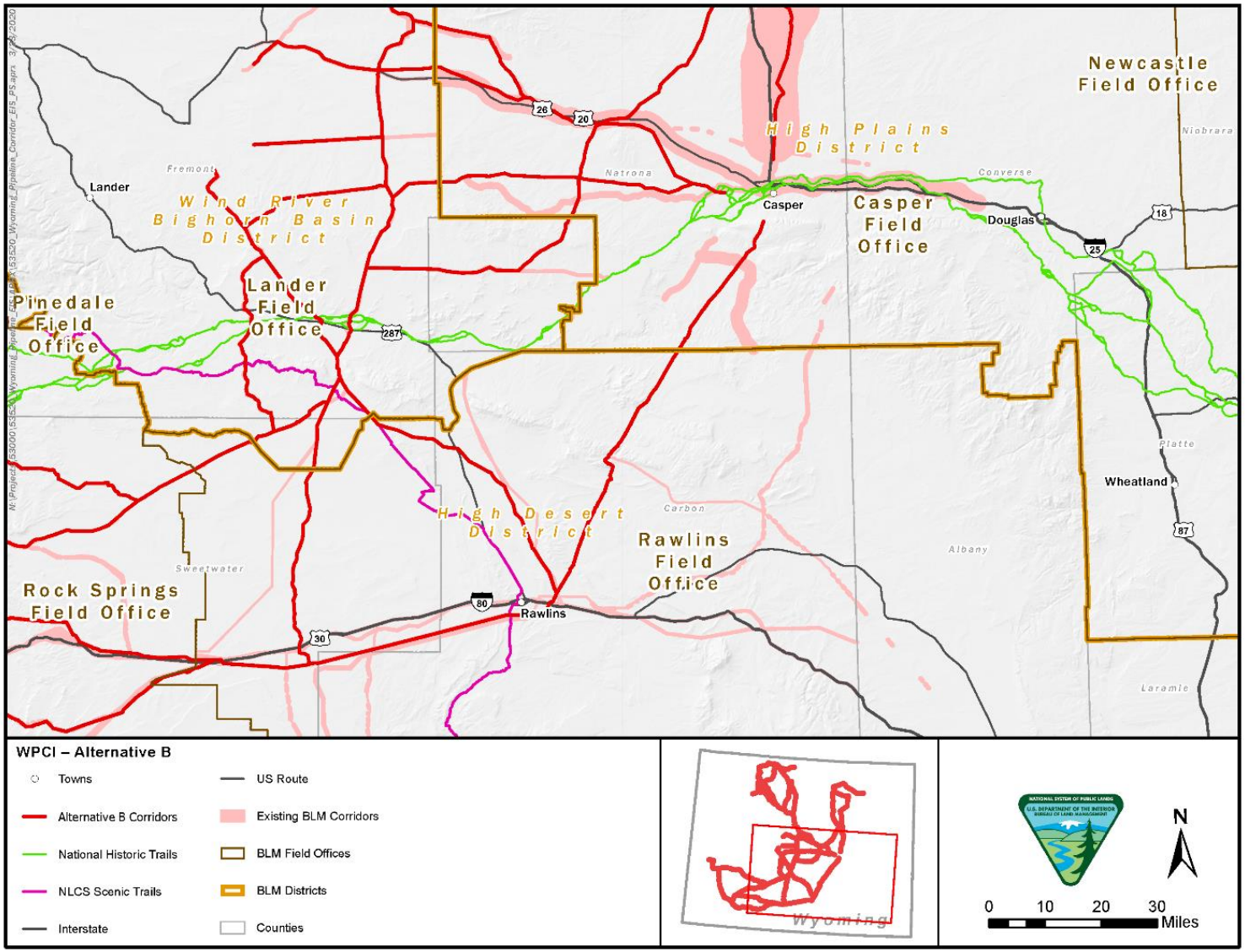


Figure G-4d. WPCI proposed corridors – Alternative B trail crossings (map 4 of 4).

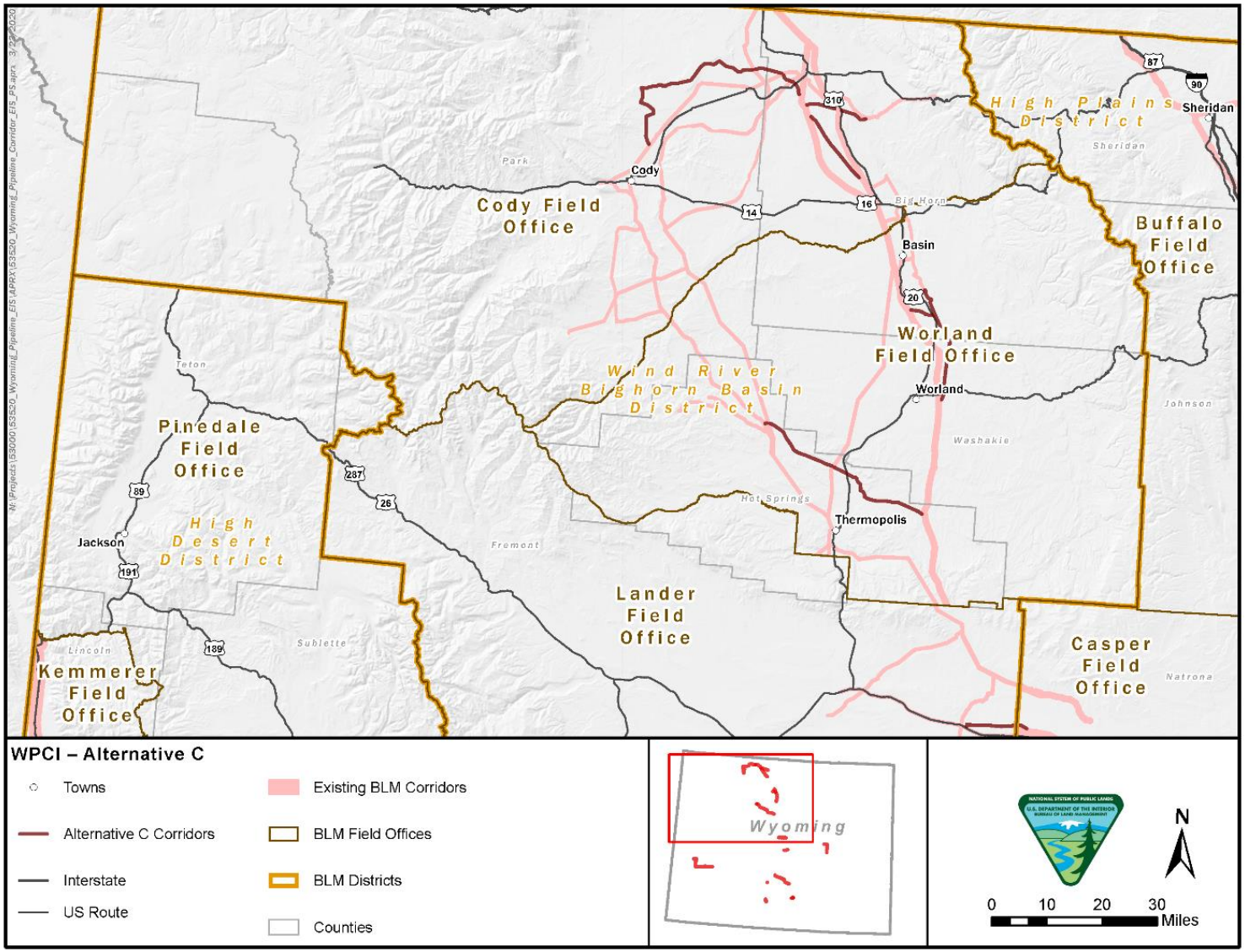


Figure G-5a. WPCI proposed corridors – Alternative C trail crossings (map 1 of 4).

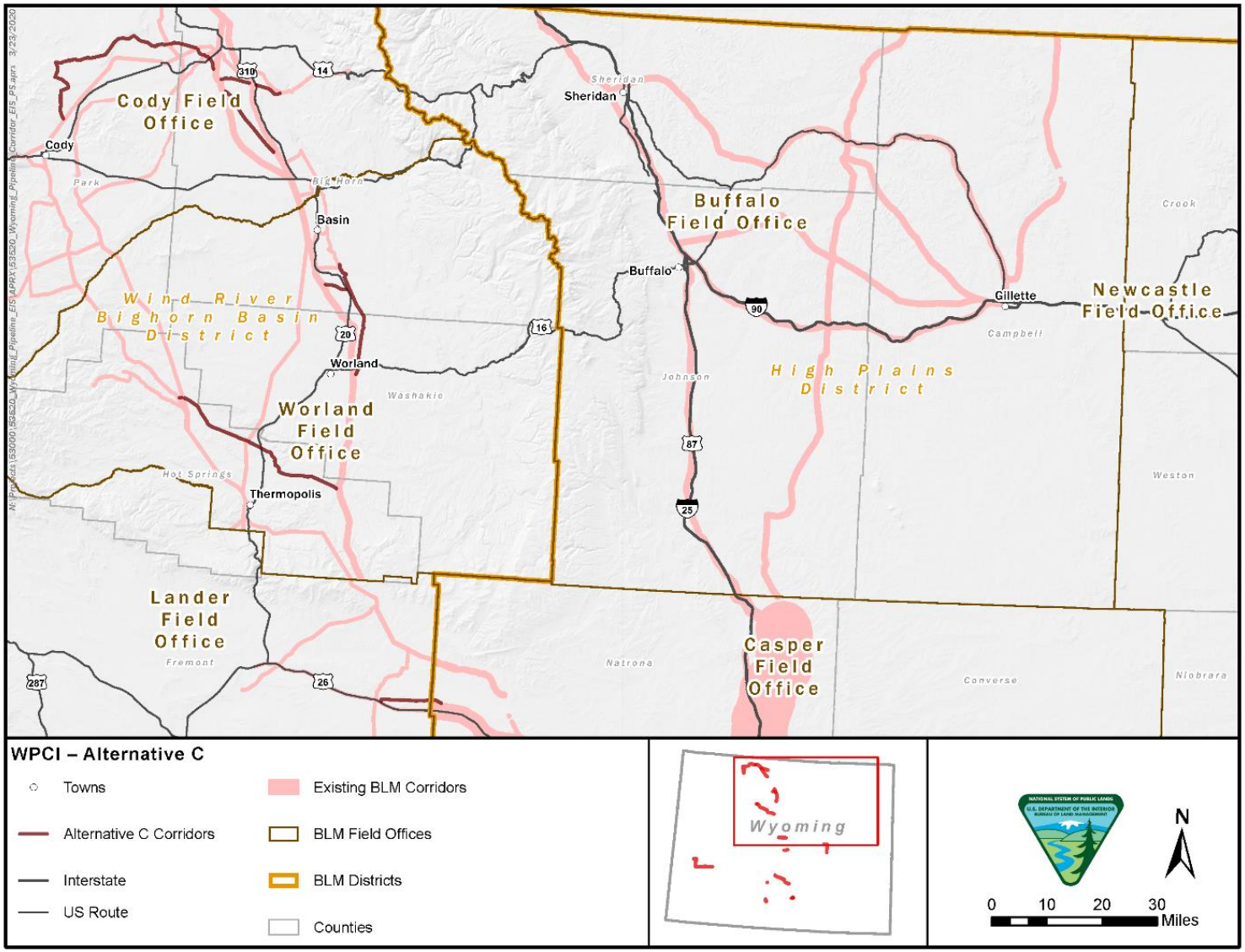


Figure G-5b. WPCI proposed corridors – Alternative C trail crossings (map 2 of 4).

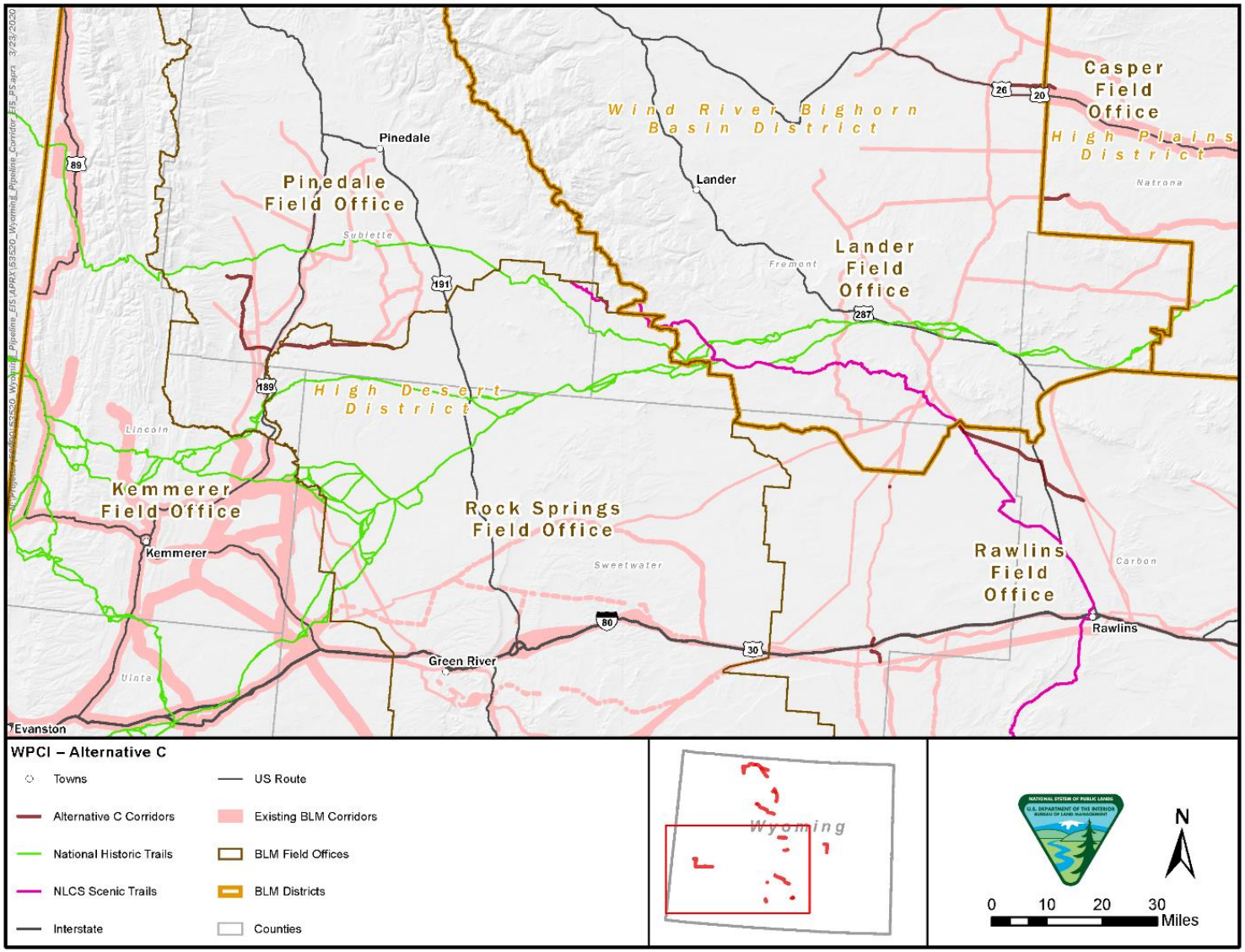


Figure G-5c. WPCI proposed corridors – Alternative C trail crossings (map 3 of 4).

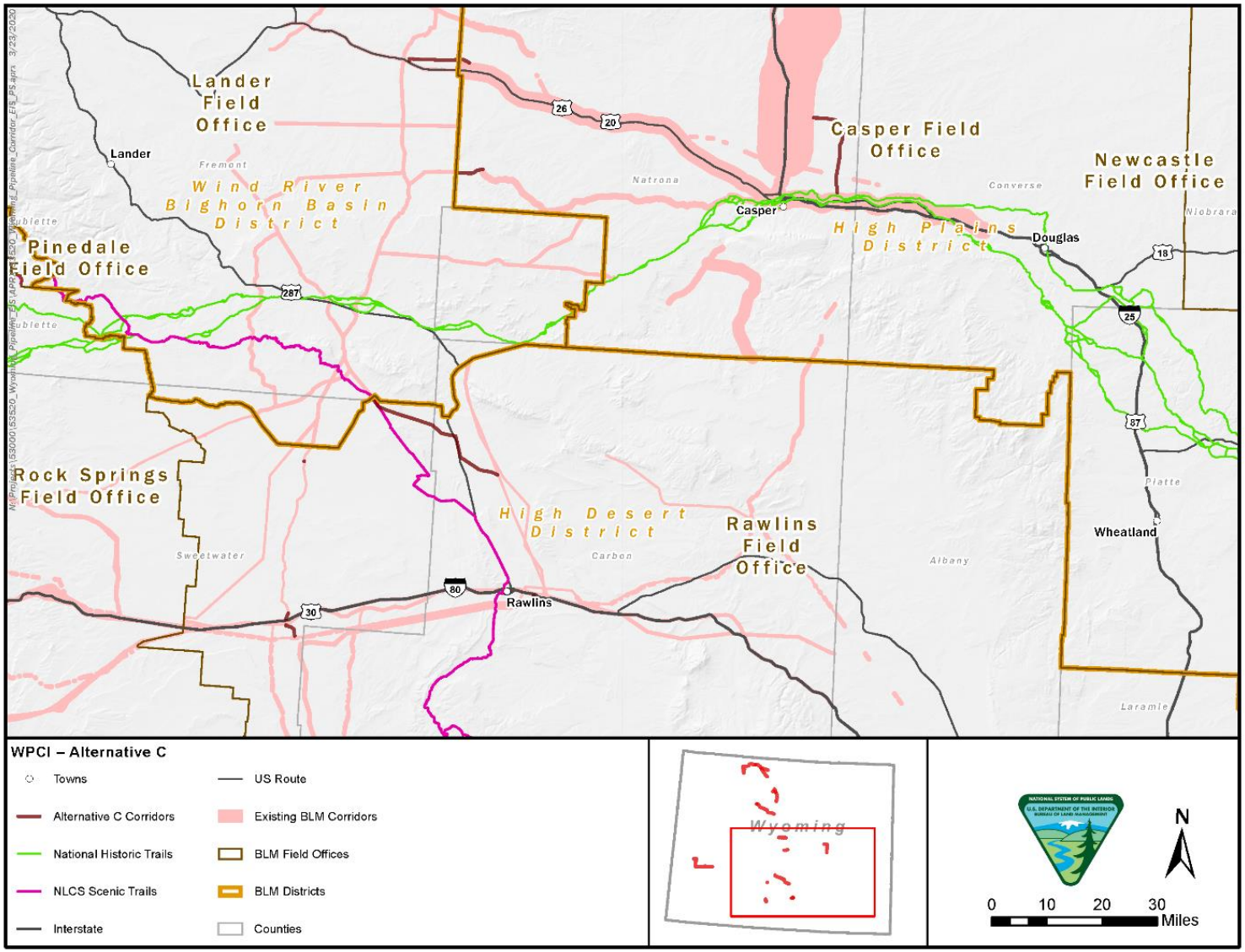


Figure G-5d. WPCI proposed corridors – Alternative C trail crossings (map 4 of 4).

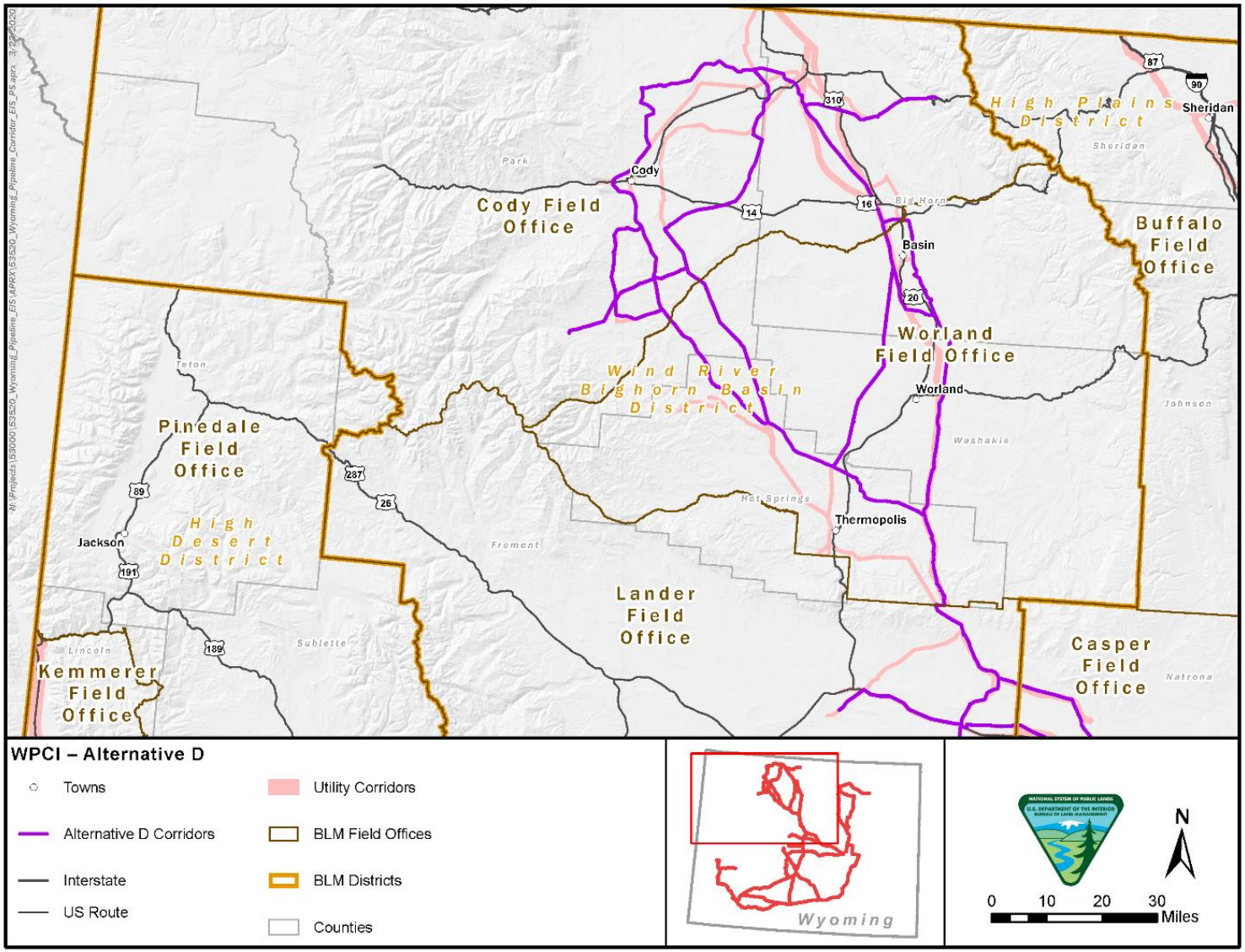


Figure G-6a. WPCI proposed corridors – Alternative D trail crossings (map 1 of 4).

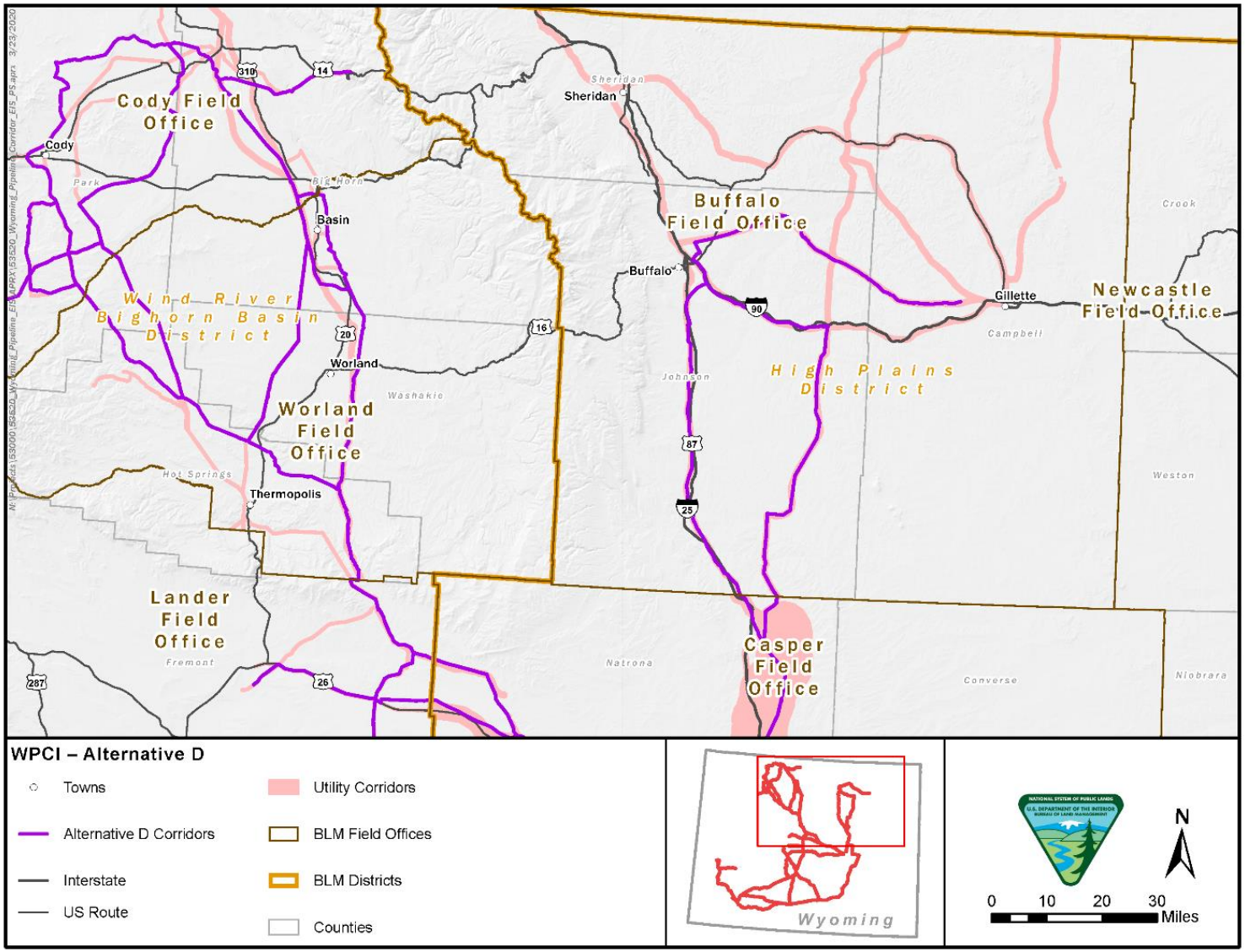


Figure G-6b. WPCI proposed corridors – Alternative D trail crossings (map 2 of 4).

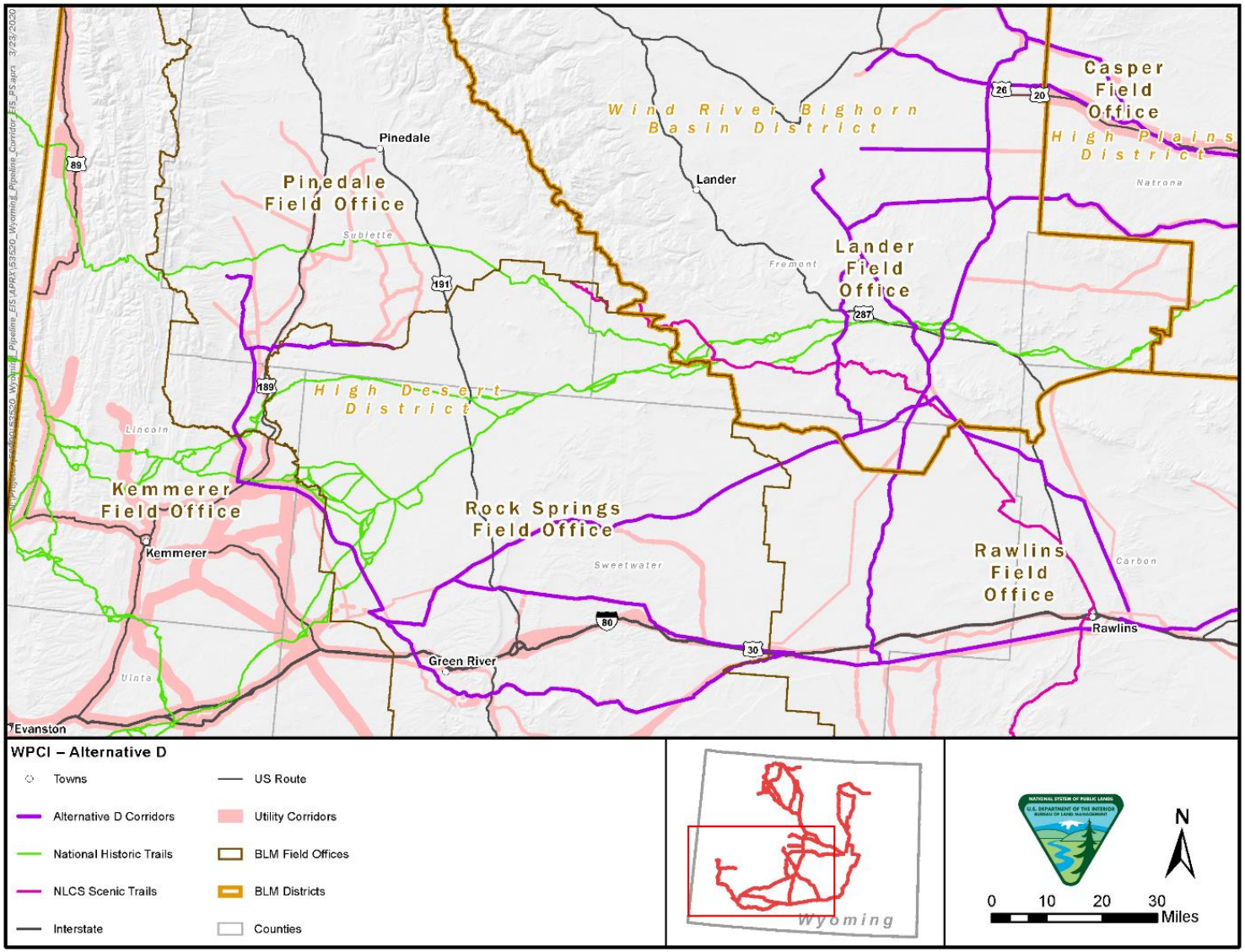


Figure G-6c. WPCI proposed corridors – Alternative D trail crossings (map 3 of 4).

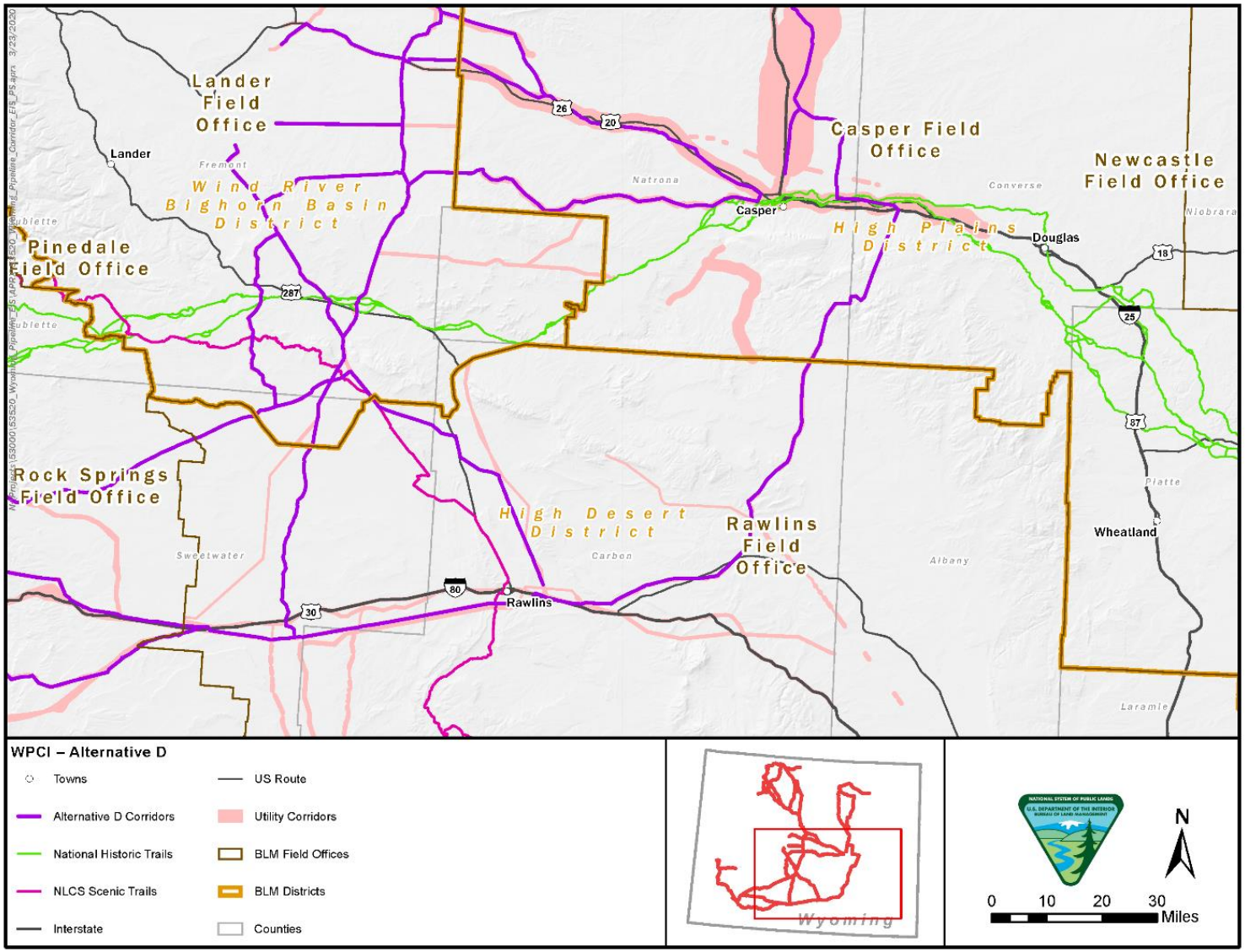


Figure G-6d. WPCI proposed corridors – Alternative D trail crossings (map 4 of 4).

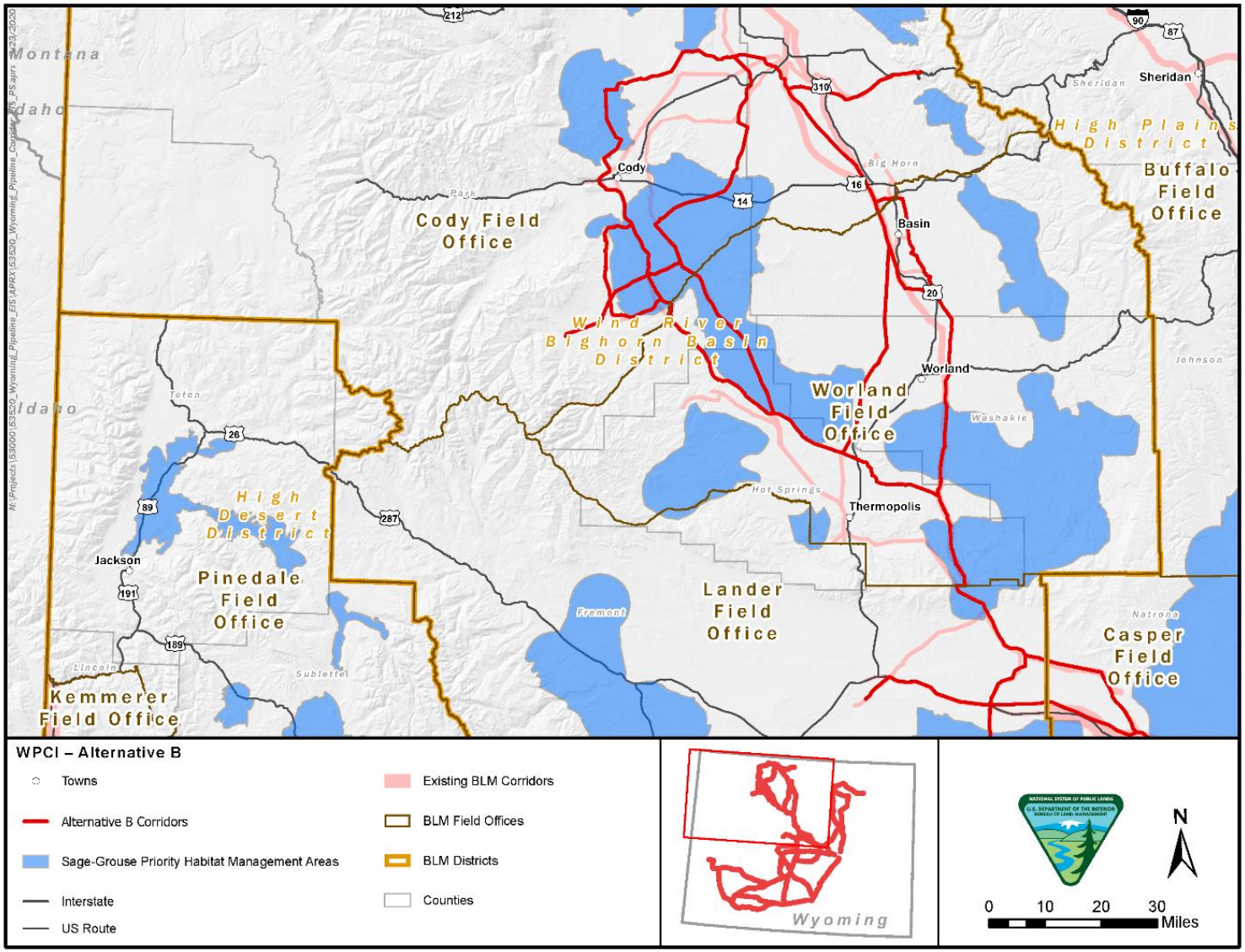


Figure G-7a. WPCI proposed corridors – Alternative B in priority habitat management areas (map 1 of 4).

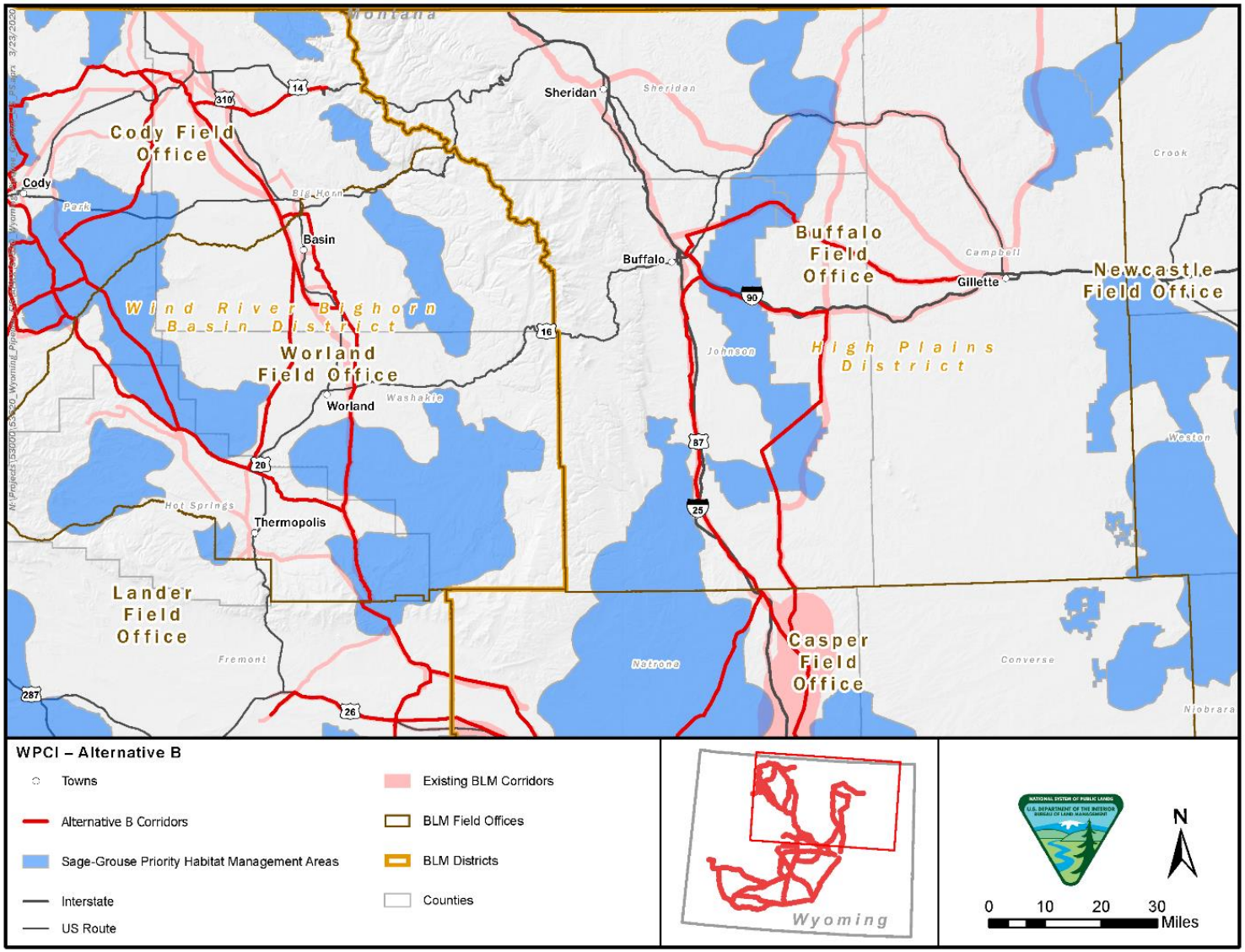


Figure G-7b. WPCI proposed corridors – Alternative B in priority habitat management areas (map 2 of 41).

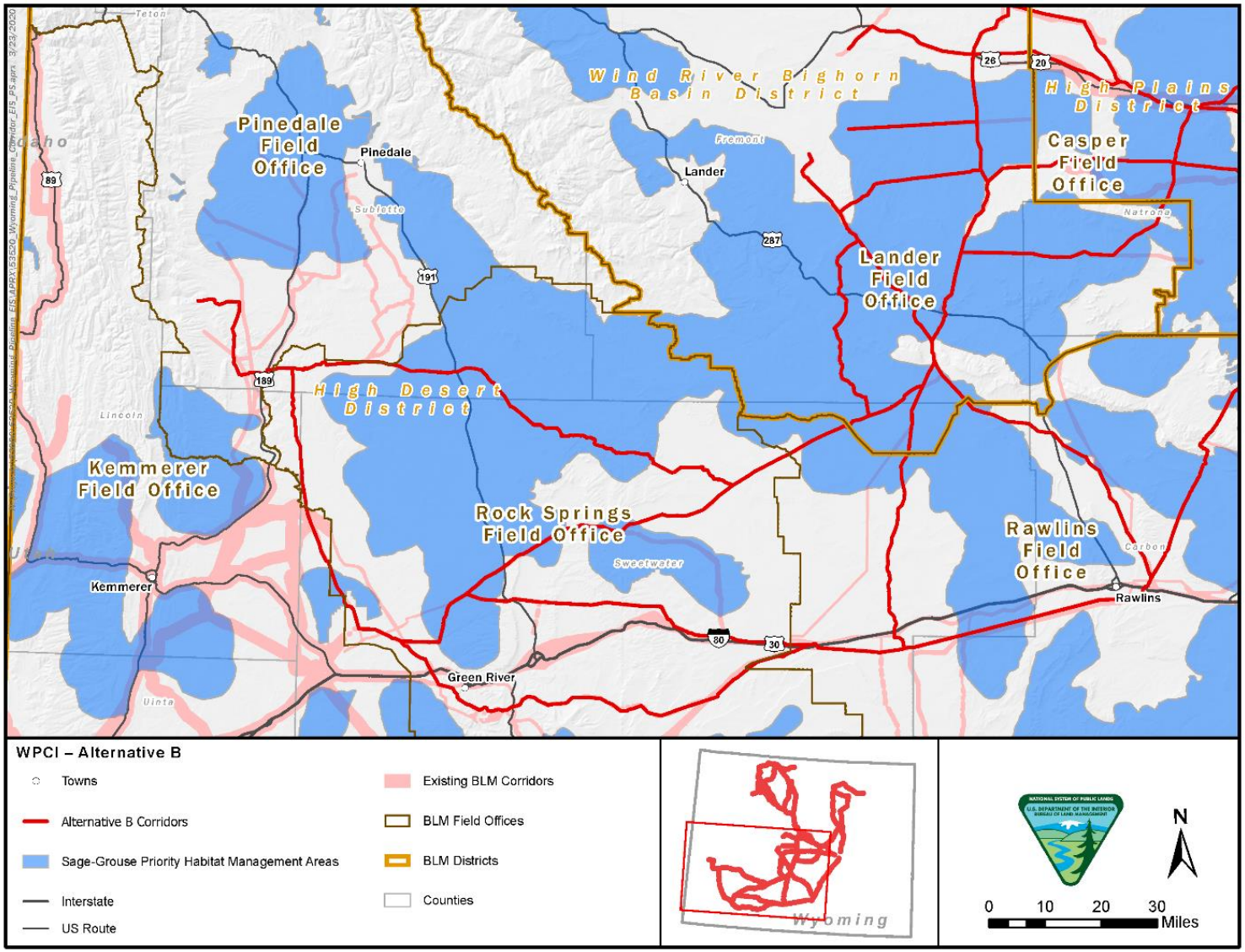
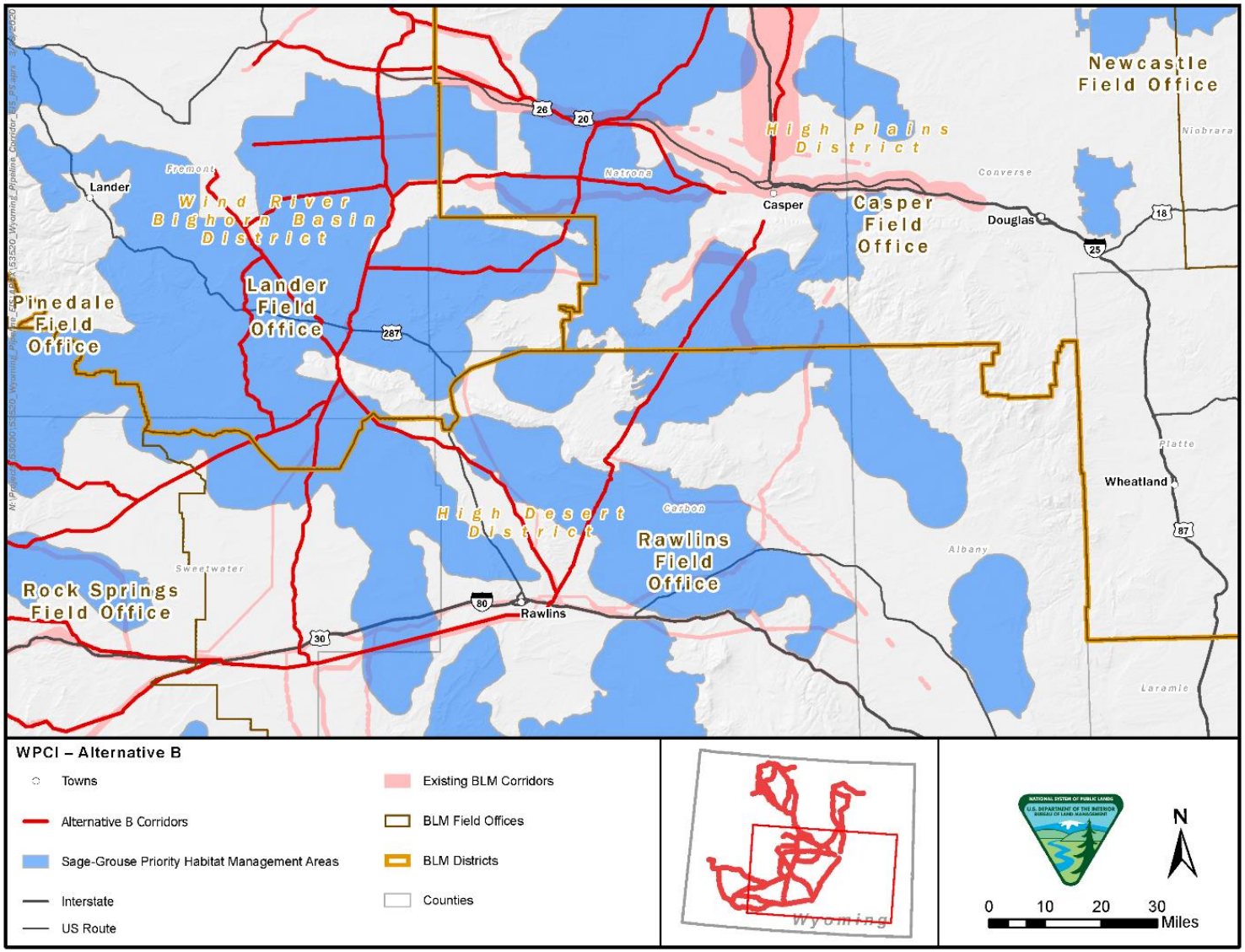


Figure G-7c. WPCI proposed corridors – Alternative B in priority habitat management areas (map 3 of 4).



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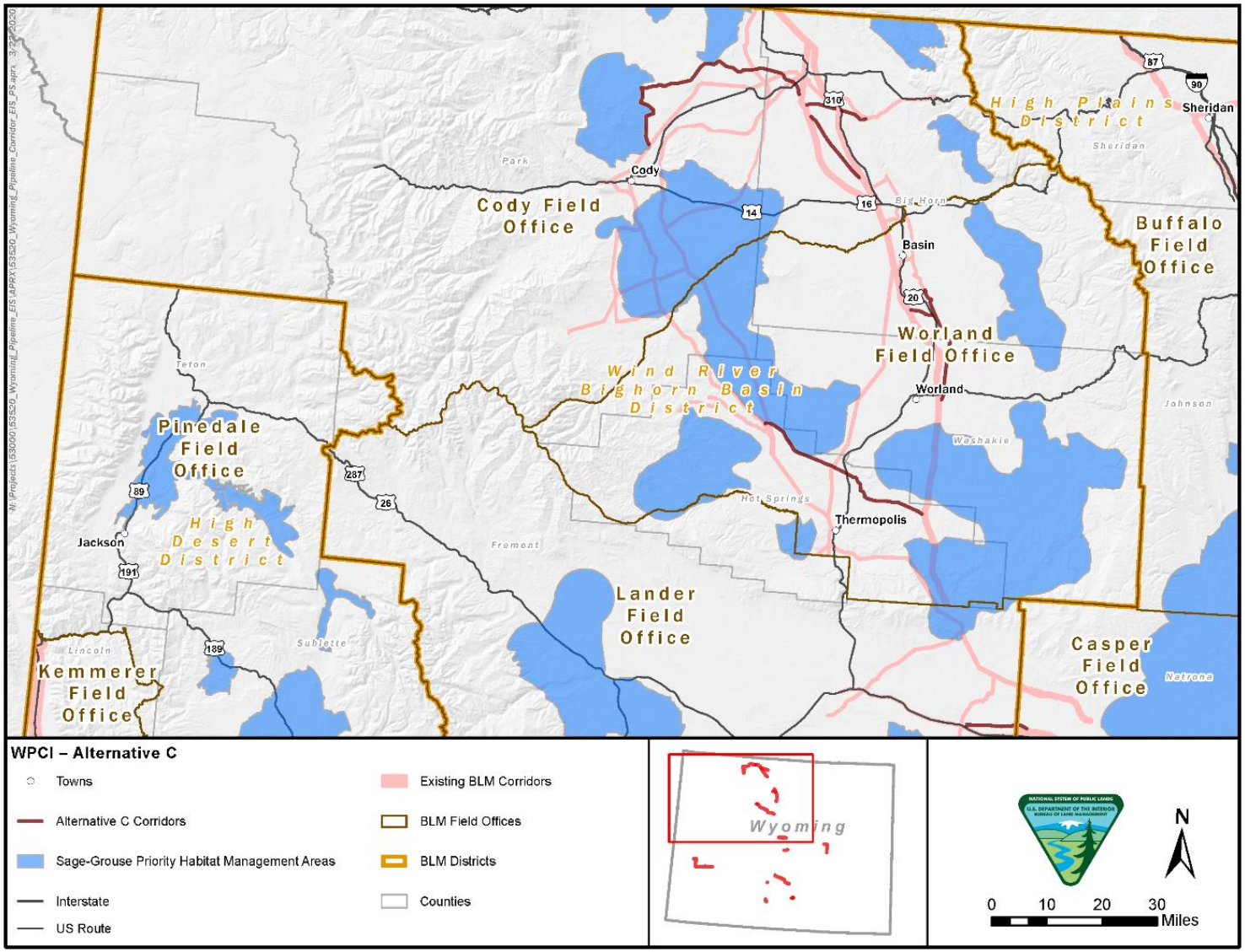


Figure G-8a. WPCI proposed corridors – Alternative C in priority habitat management areas (map 1 of 4).

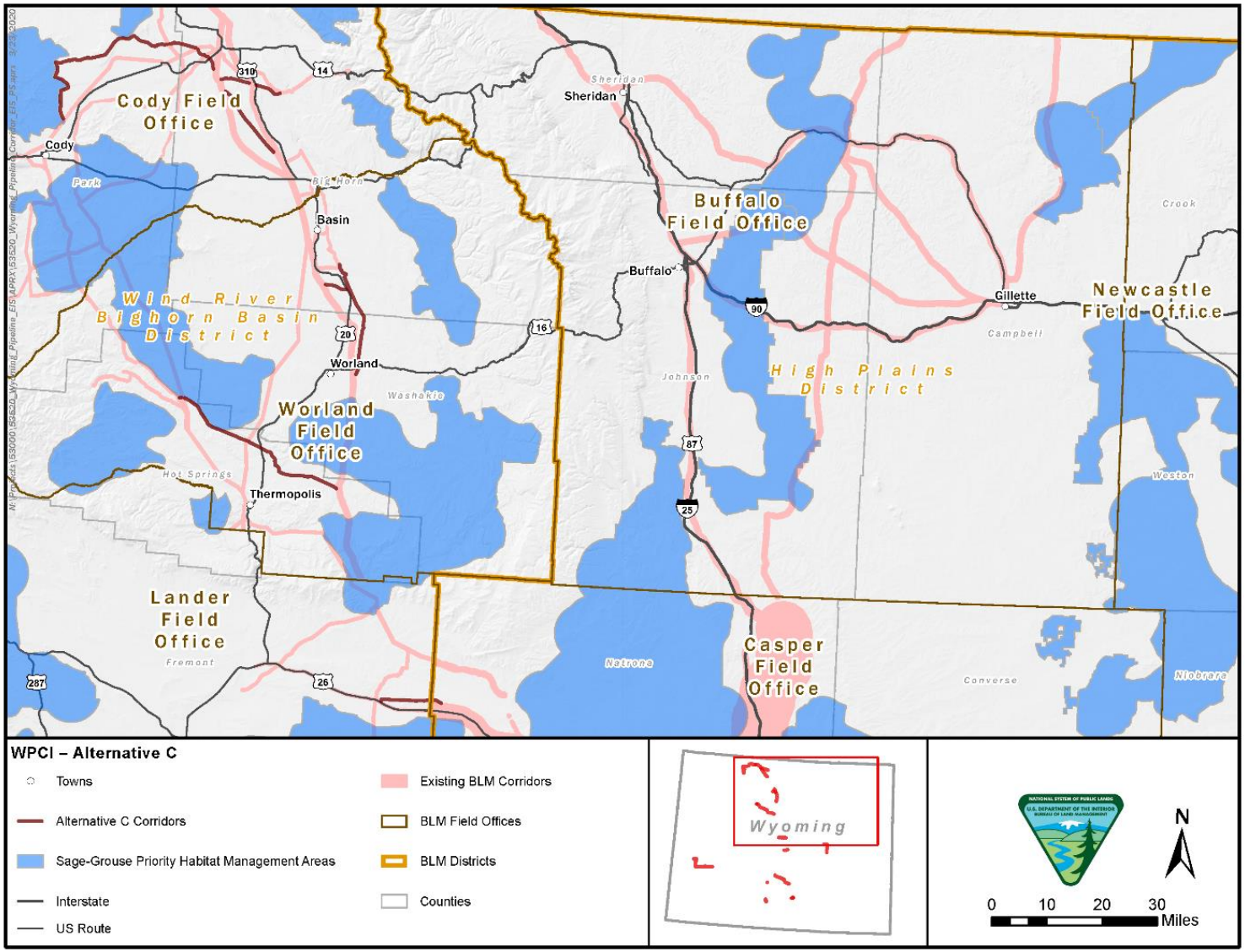


Figure G-8b. WPCI proposed corridors – Alternative C in priority habitat management areas (map 2 of 4).

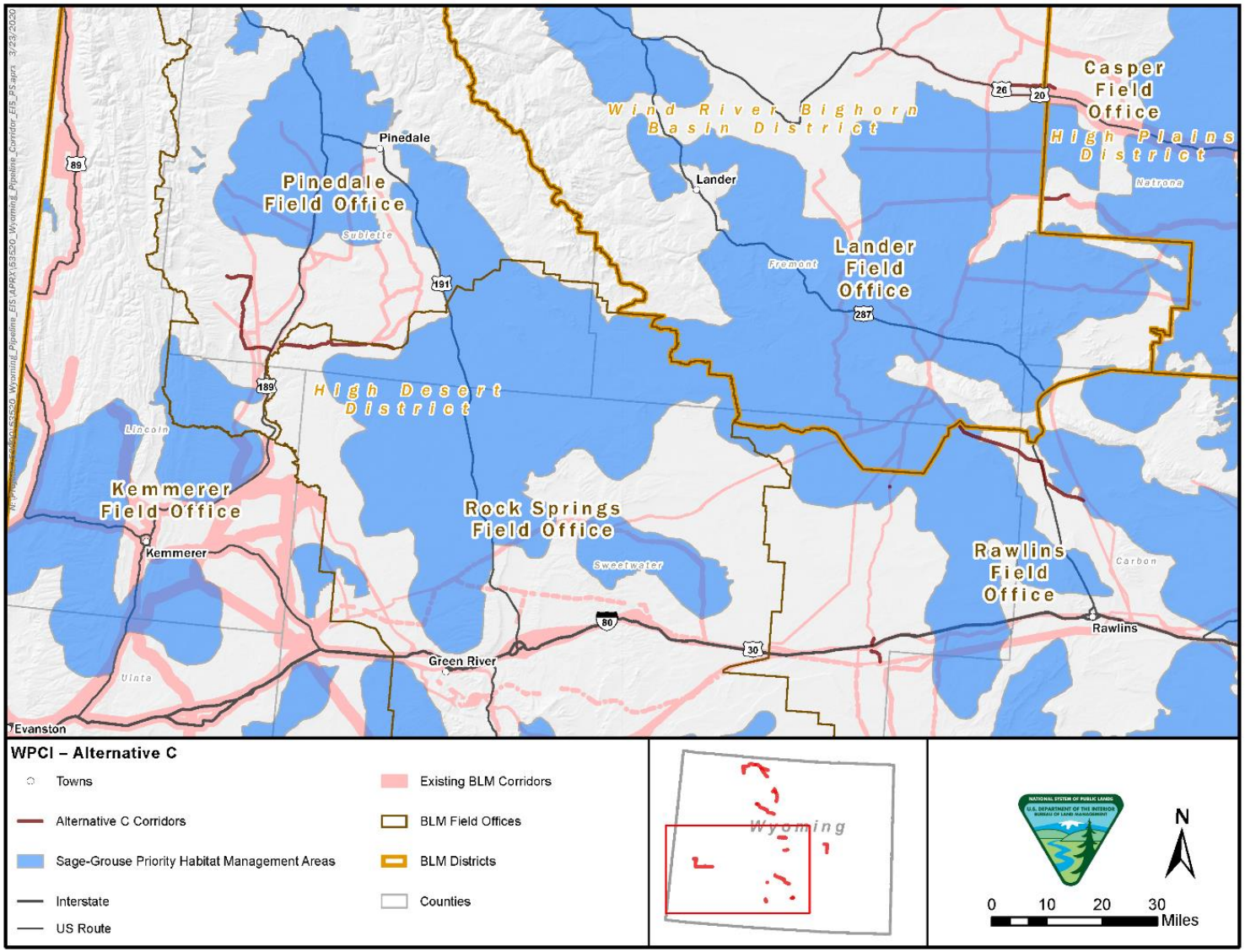


Figure G-8c. WPCI proposed corridors – Alternative C in priority habitat management areas (map 3 of 4).

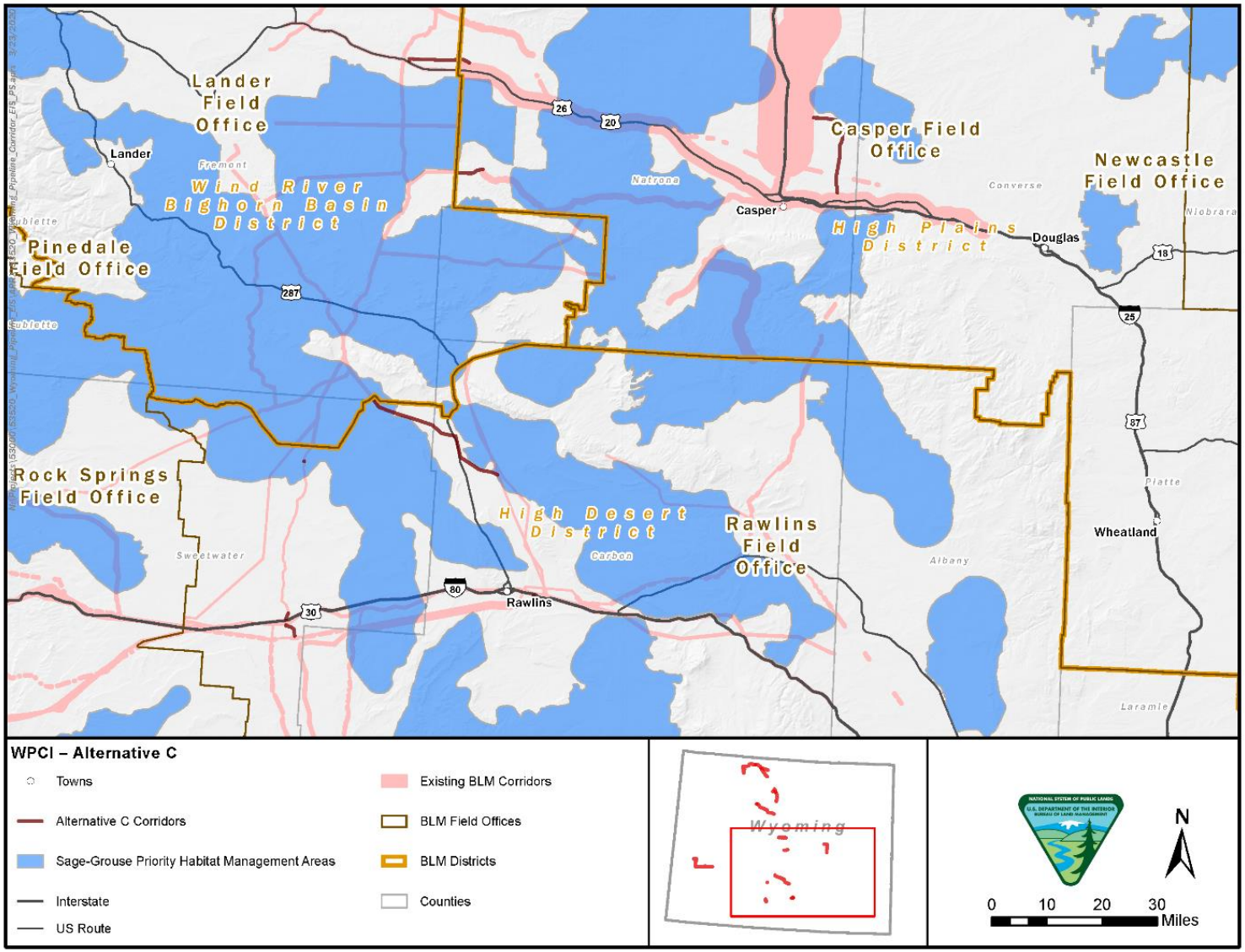


Figure G-8d. WPCI proposed corridors – Alternative C in priority habitat management areas (map 4 of 4).

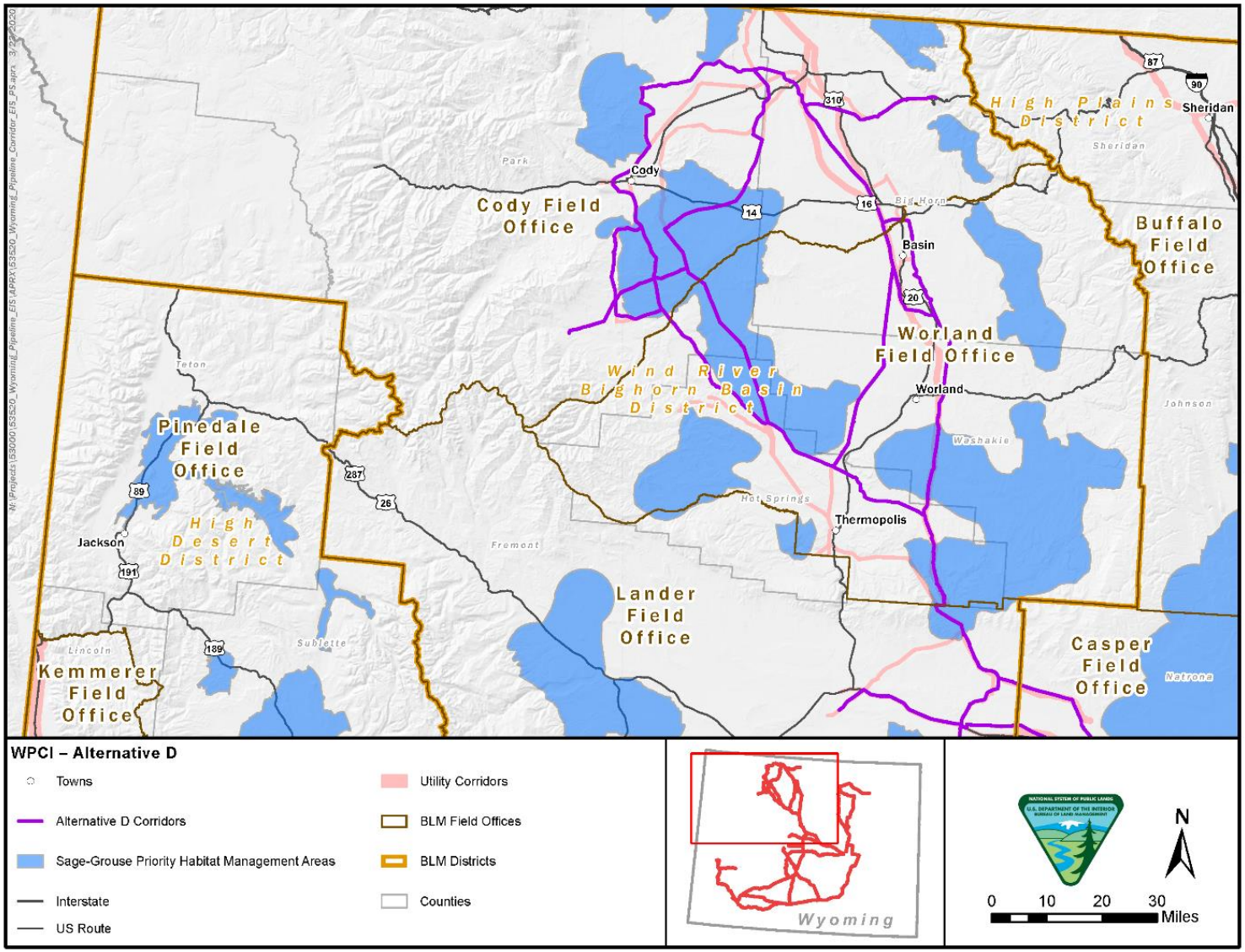


Figure G-9a. WPCI proposed corridors – Alternative D in priority habitat management areas (map 1 of 4).

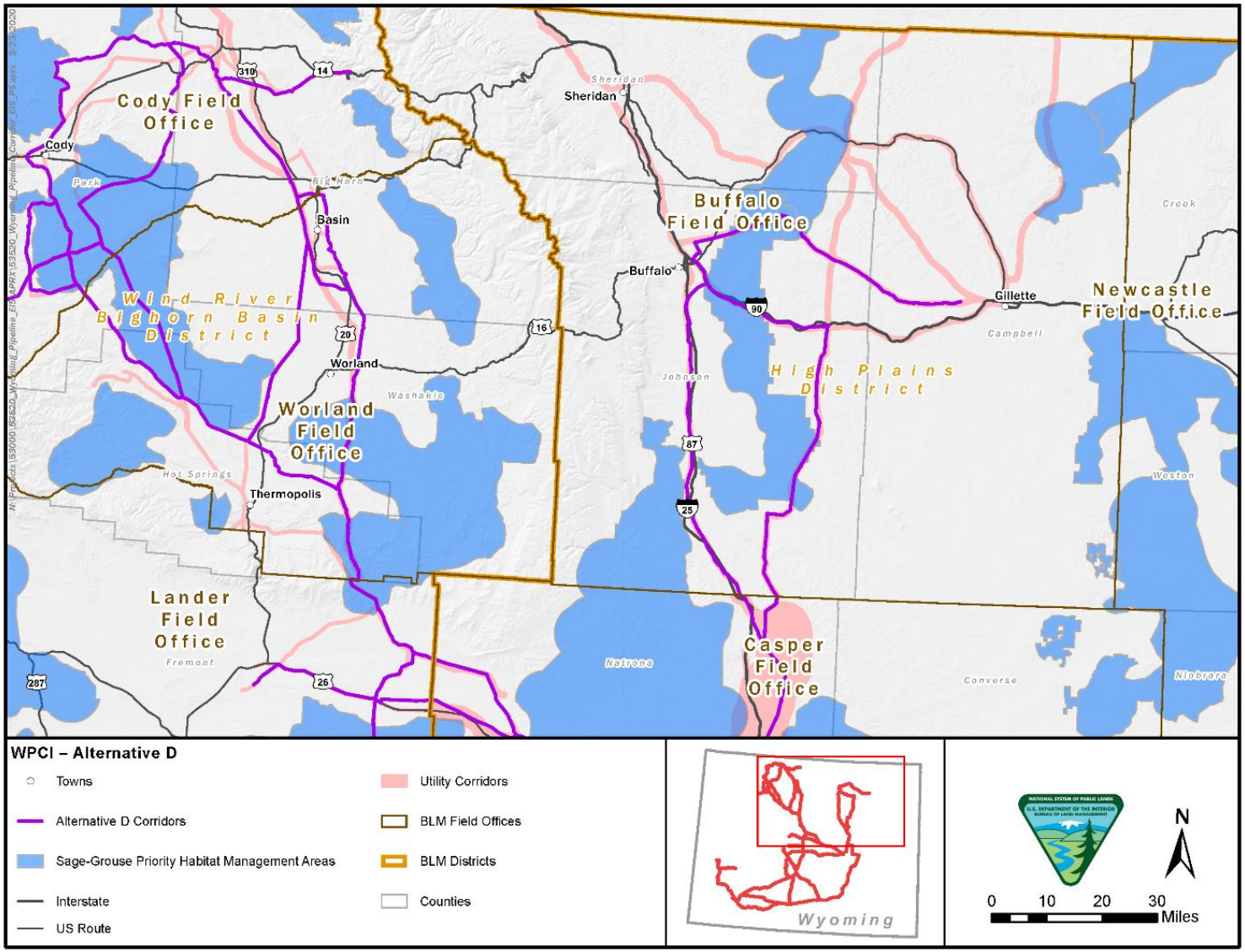


Figure G-9b. WPCI proposed corridors – Alternative D in priority habitat management areas (map 2 of 4).

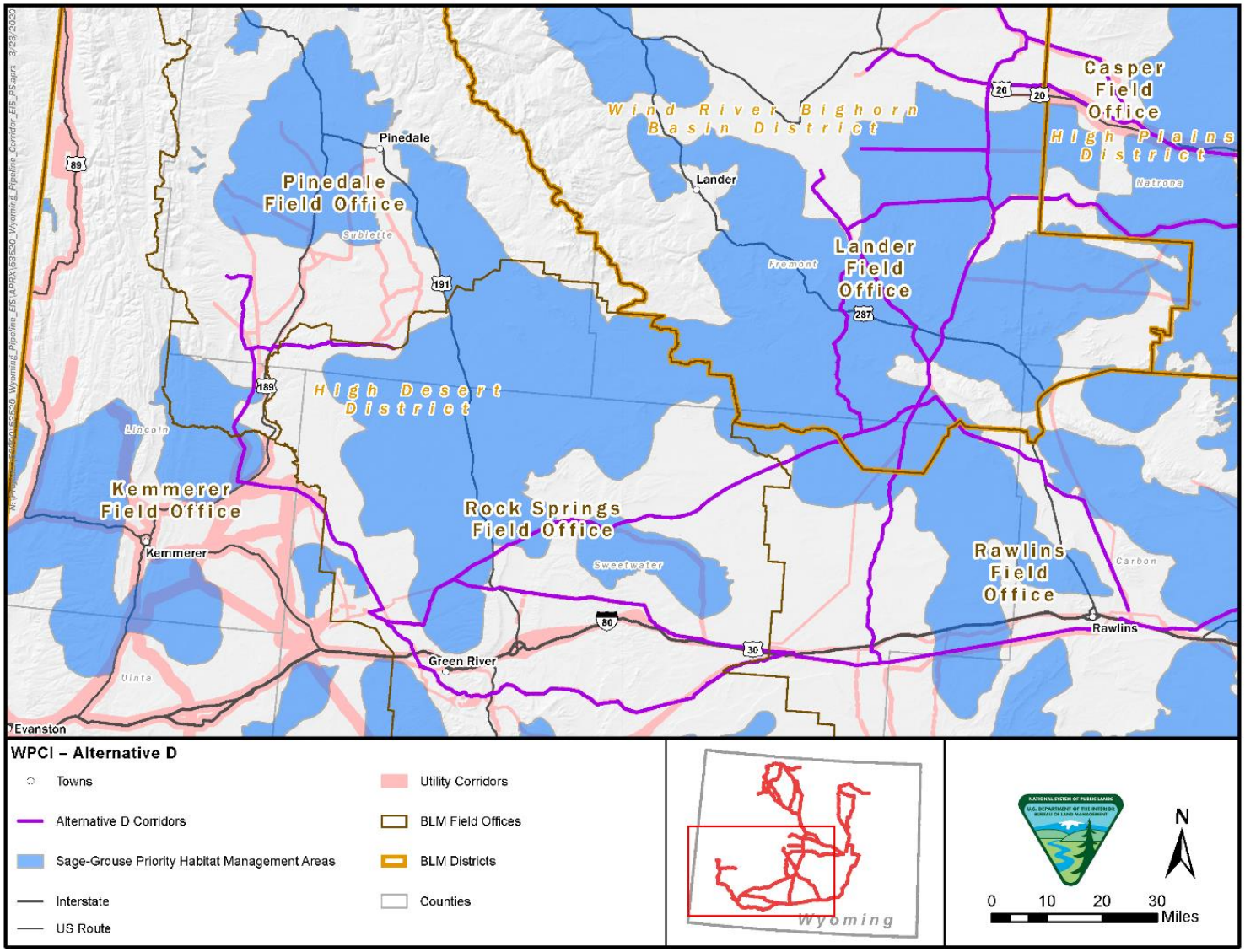


Figure G-9c. WPCI proposed corridors – Alternative D in priority habitat management areas (map 3 of 4).

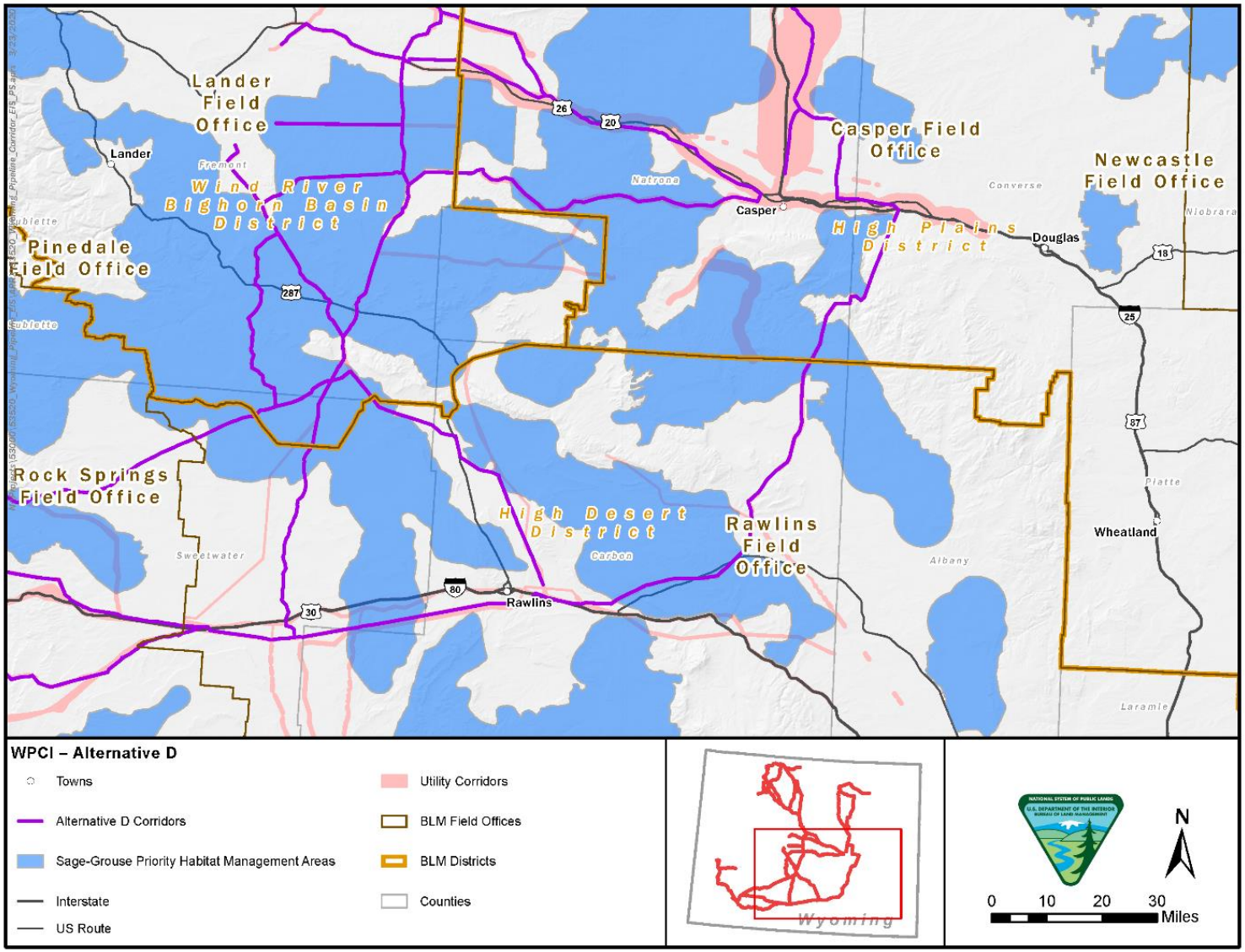


Figure G-9d. WPCI proposed corridors – Alternative D in priority habitat management areas (map 4 of 4).

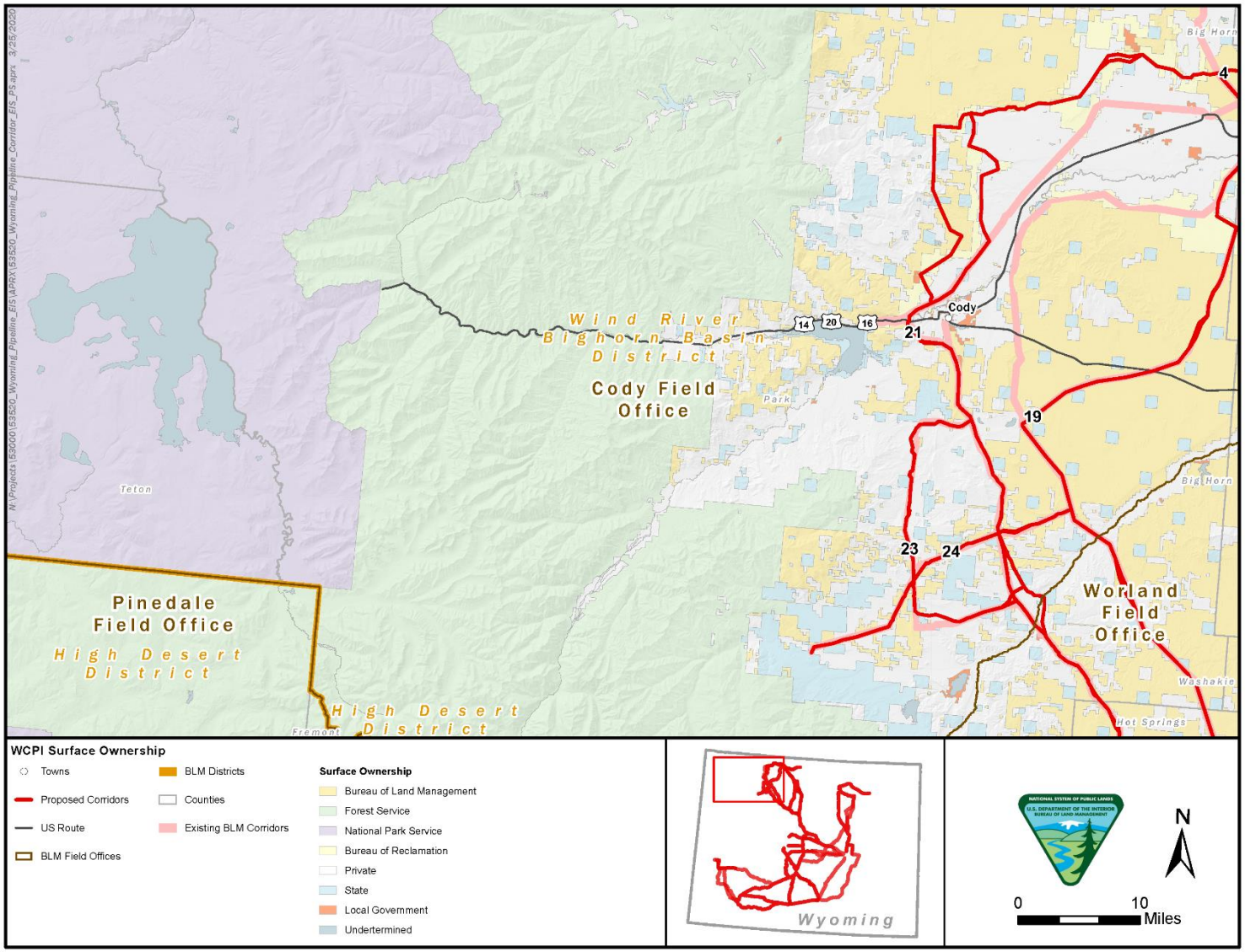


Figure G-10a. WPCI proposed corridors – Surface ownership (map 1 of 16).

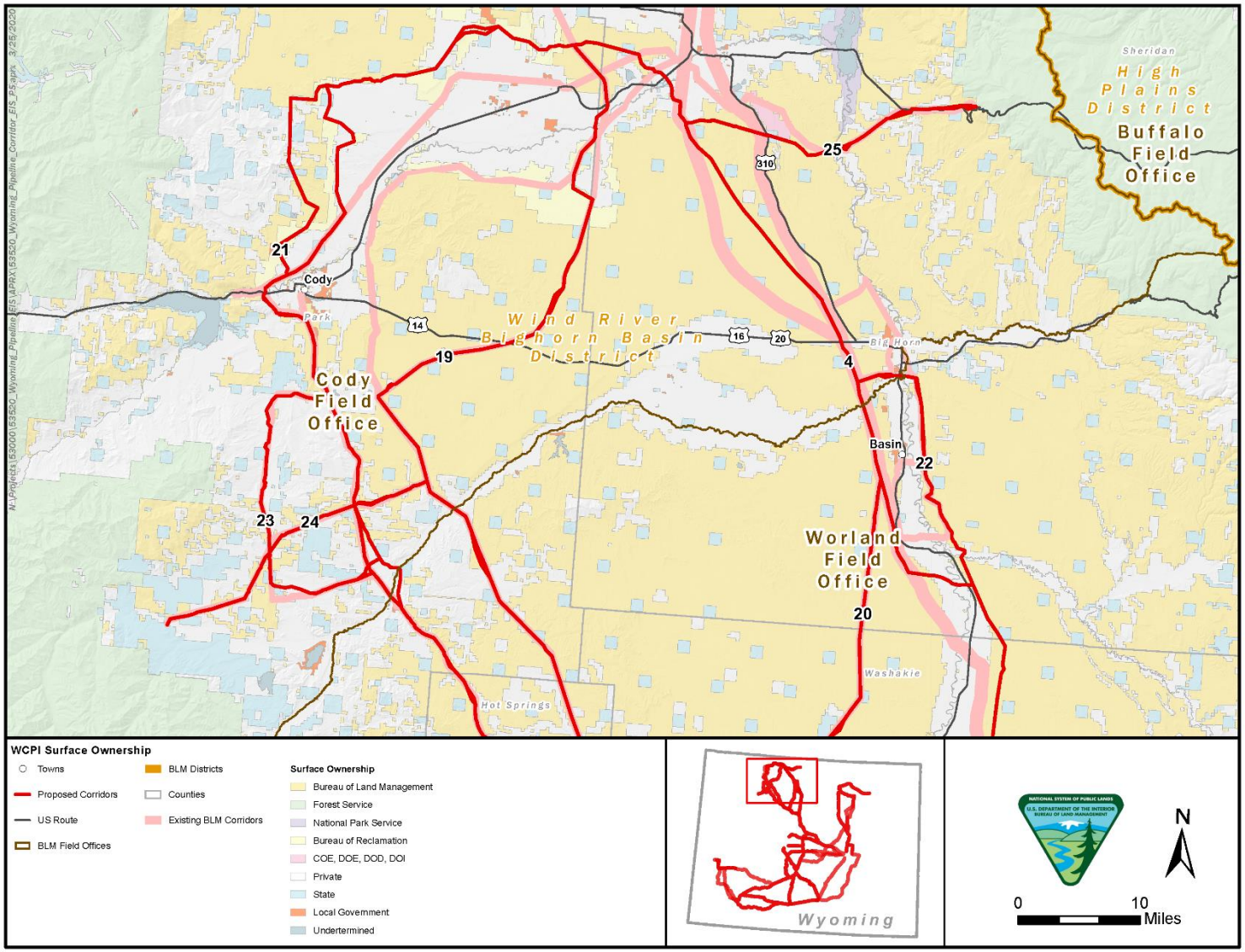


Figure G-10b. WPCI proposed corridors – Surface ownership (map 2 of 16).

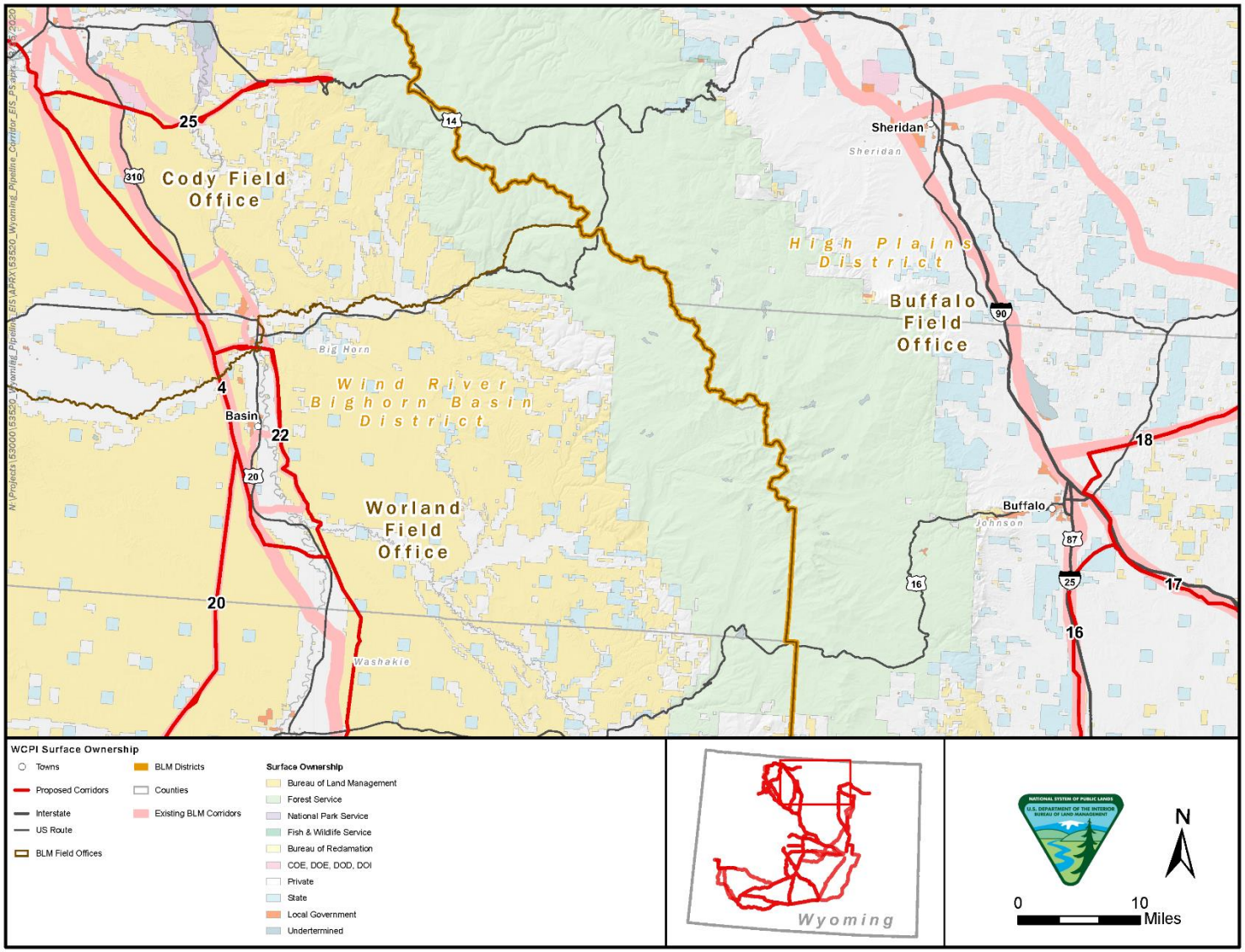
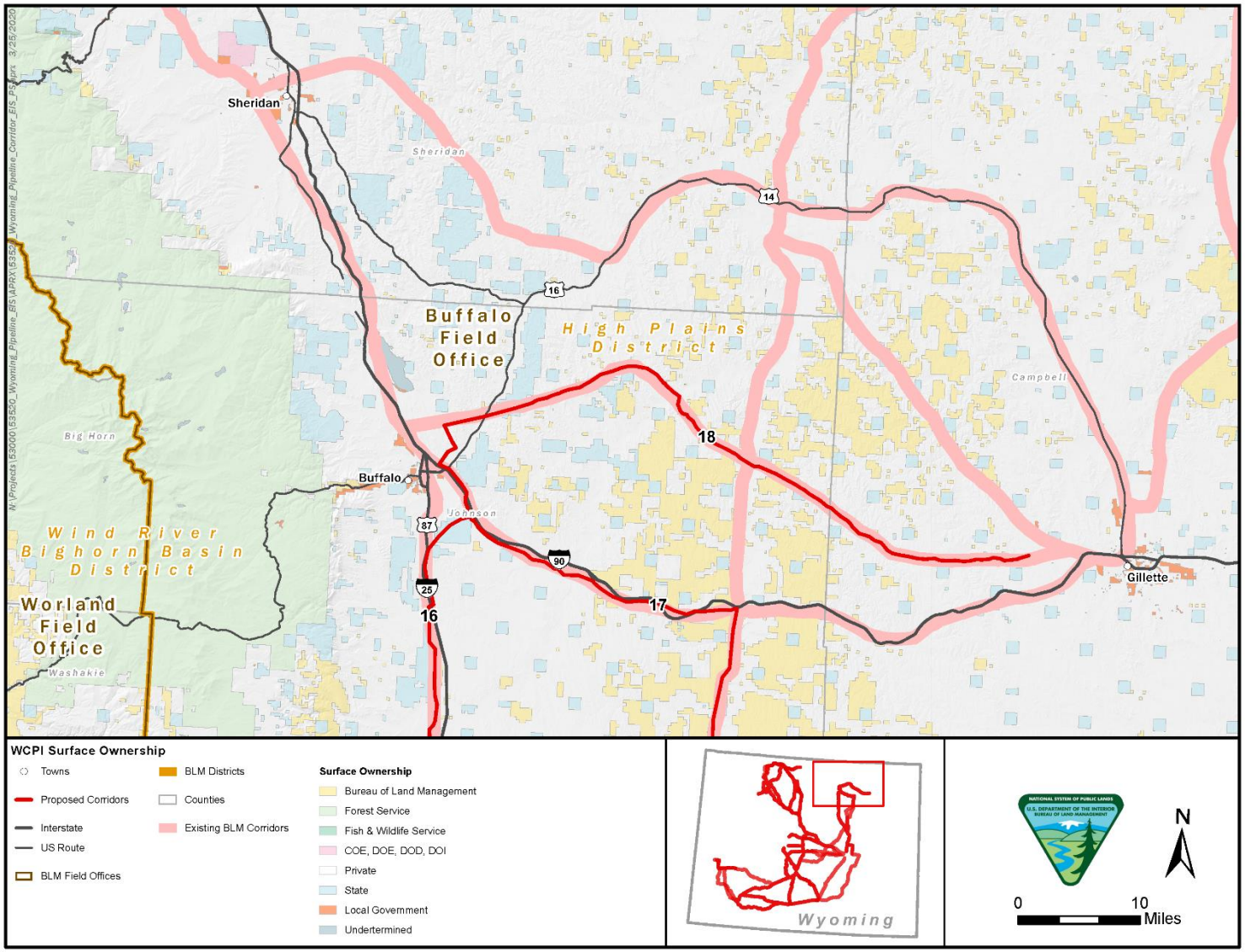


Figure G-10c. WPCI proposed corridors – Surface ownership (map 3 of 16).



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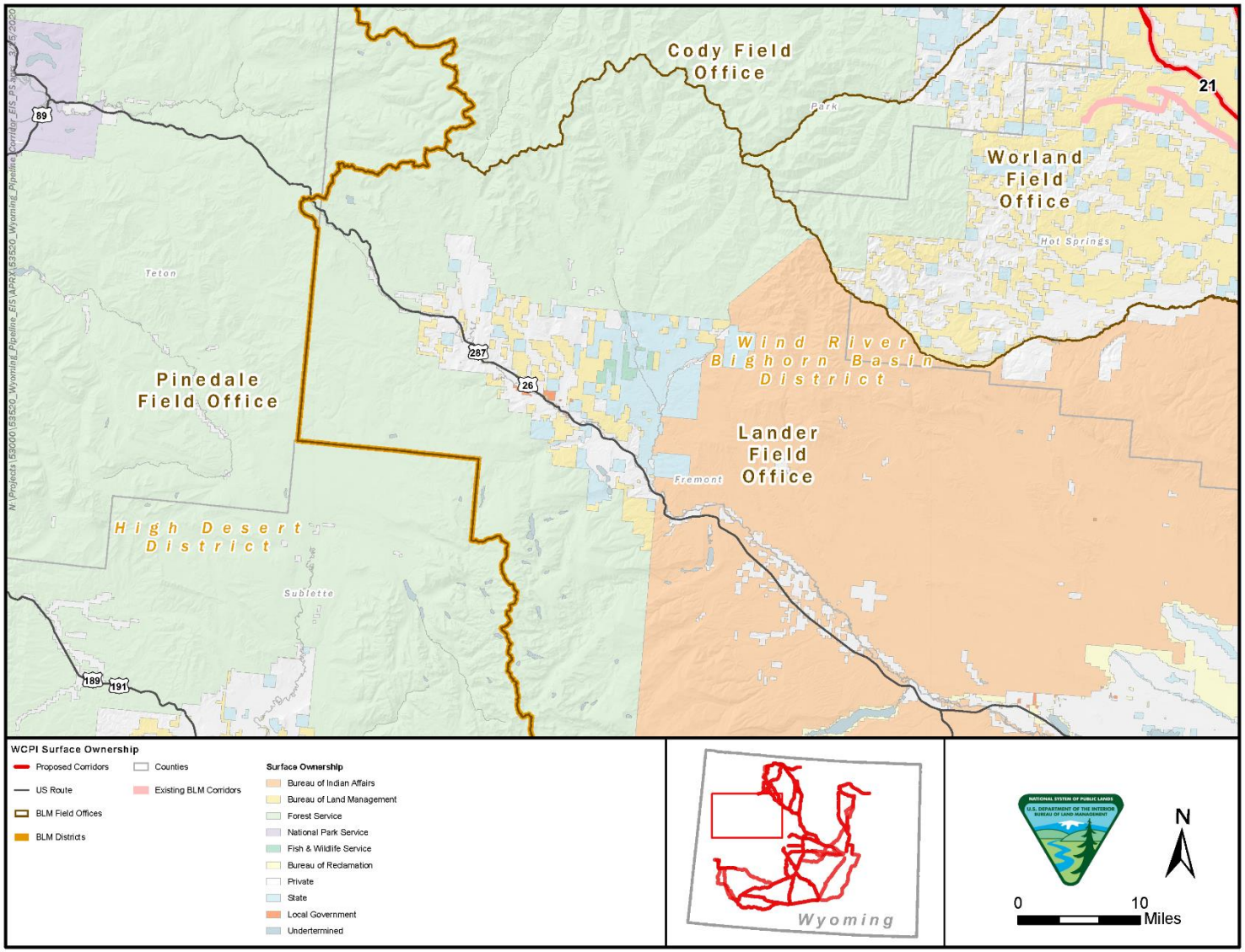

Figure G-10e. WPCI proposed corridors – Surface ownership (map 5 of 16).

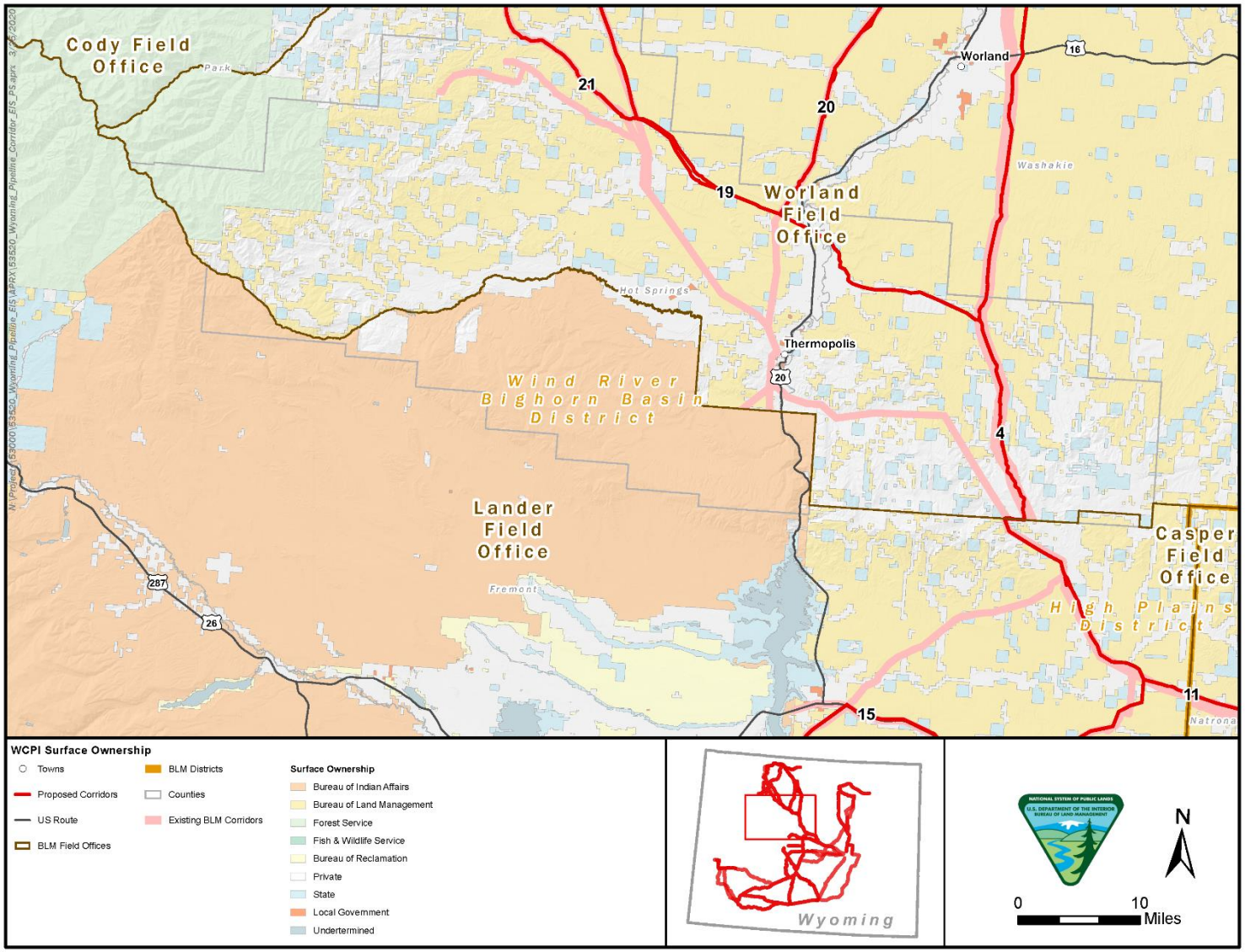

Figure G-10f. WPCI proposed corridors – Surface ownership (map 6 of 16).

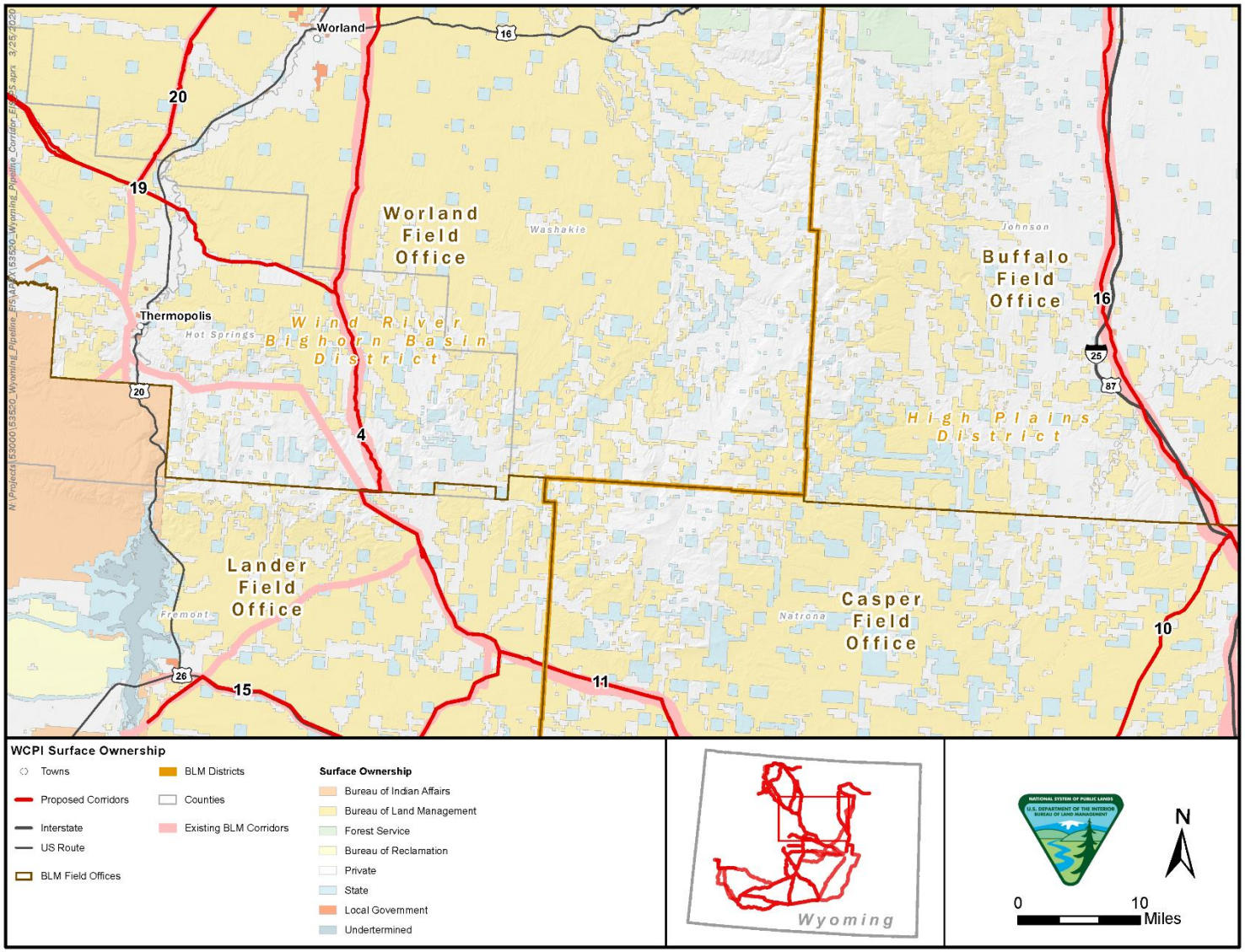

Figure G-10g. WPCI proposed corridors – Surface ownership (map 7 of 16).

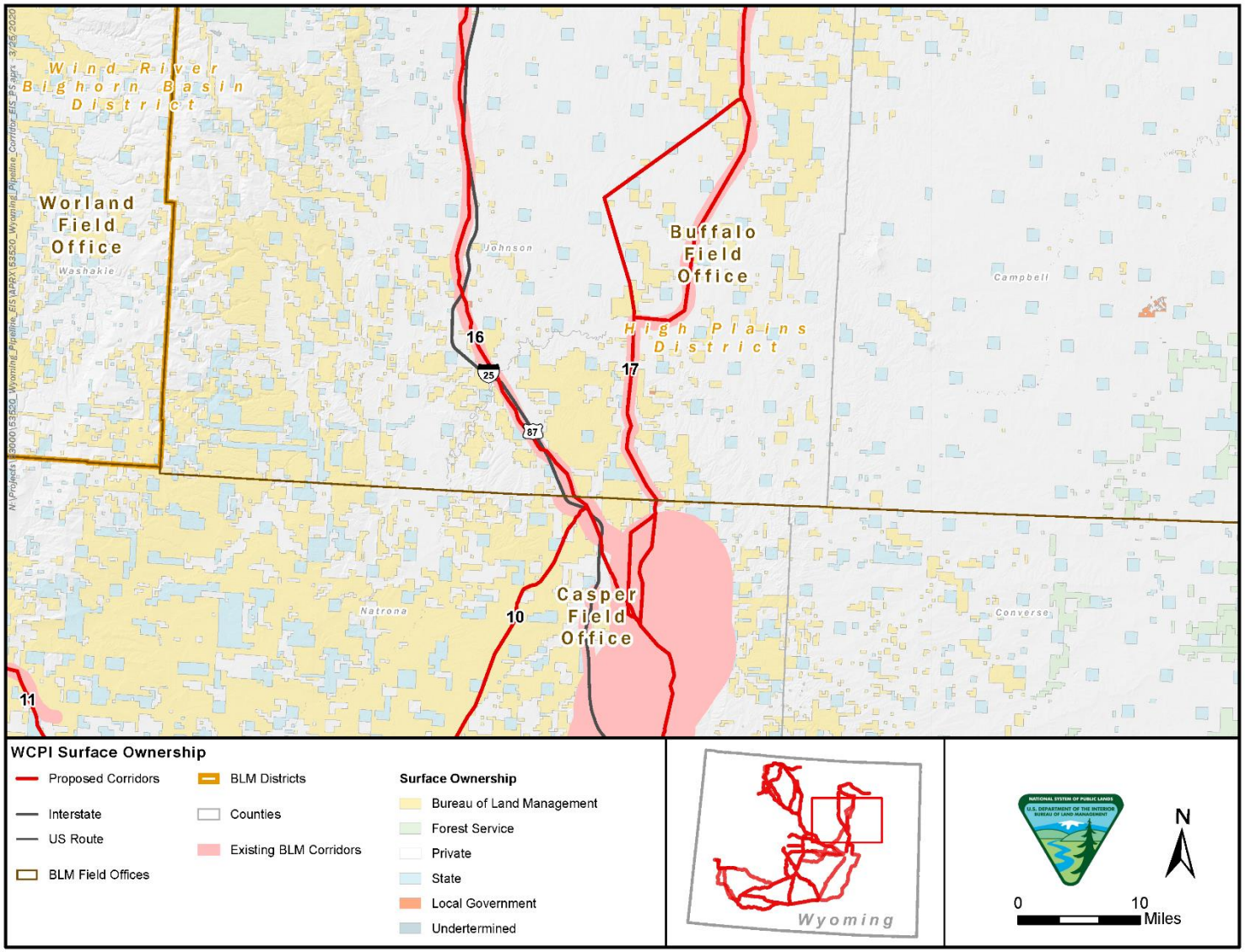

Figure G-10h. WPCI proposed corridors – Surface ownership (map 8 of 16).

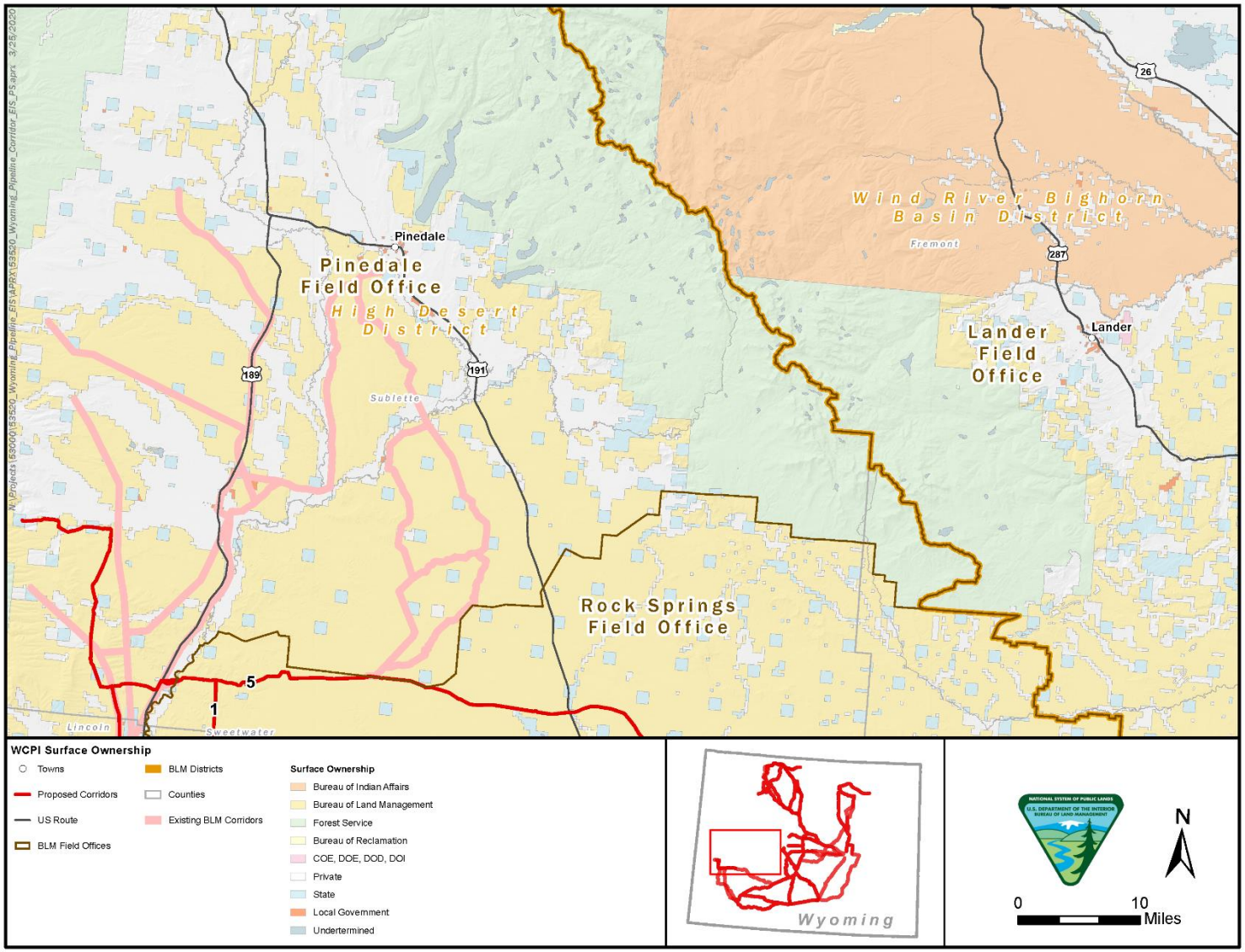

Figure G-10i. WPCI proposed corridors – Surface ownership (map 9 of 16).

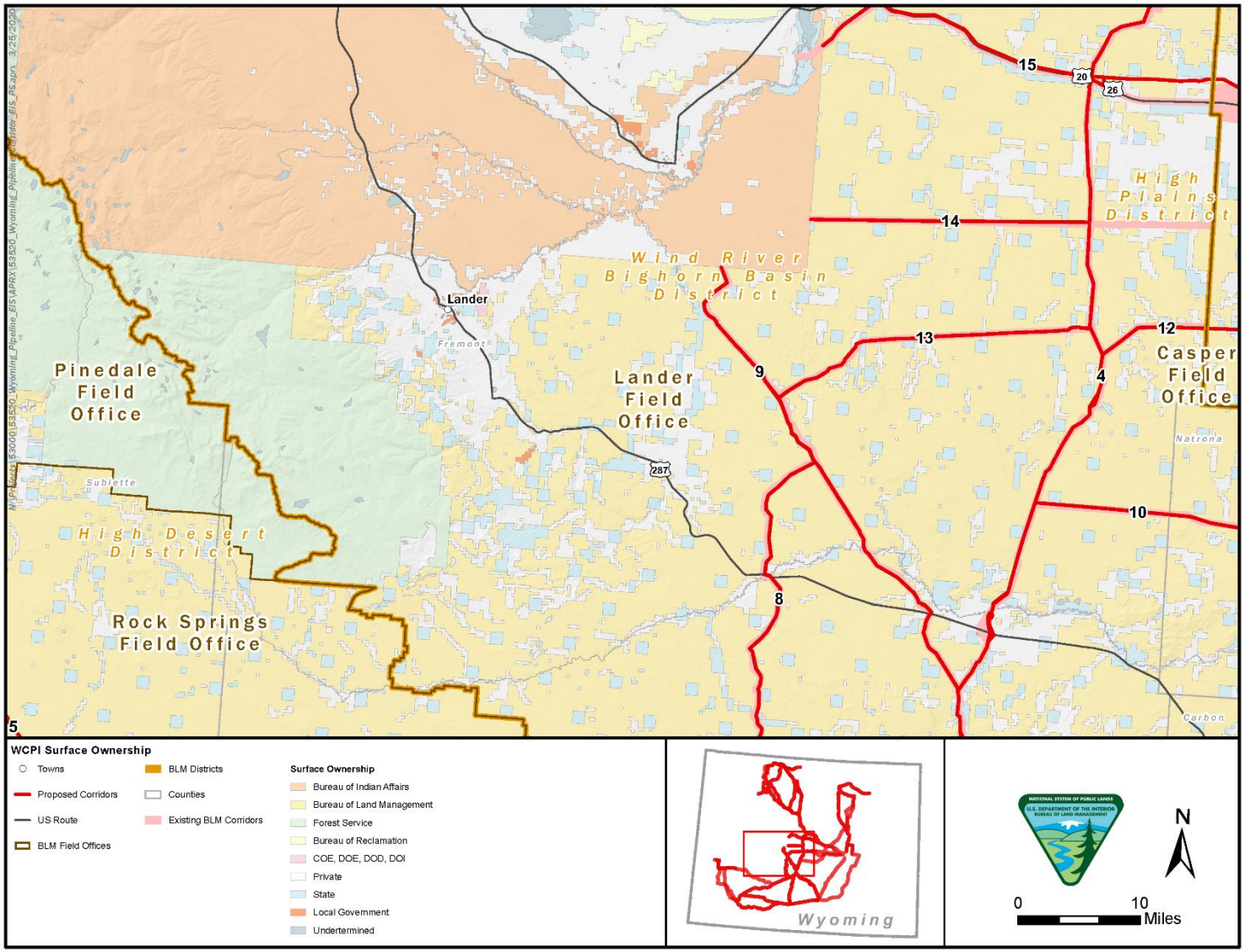

Figure G-10j. WPCI proposed corridors – Surface ownership (map 10 of 16).

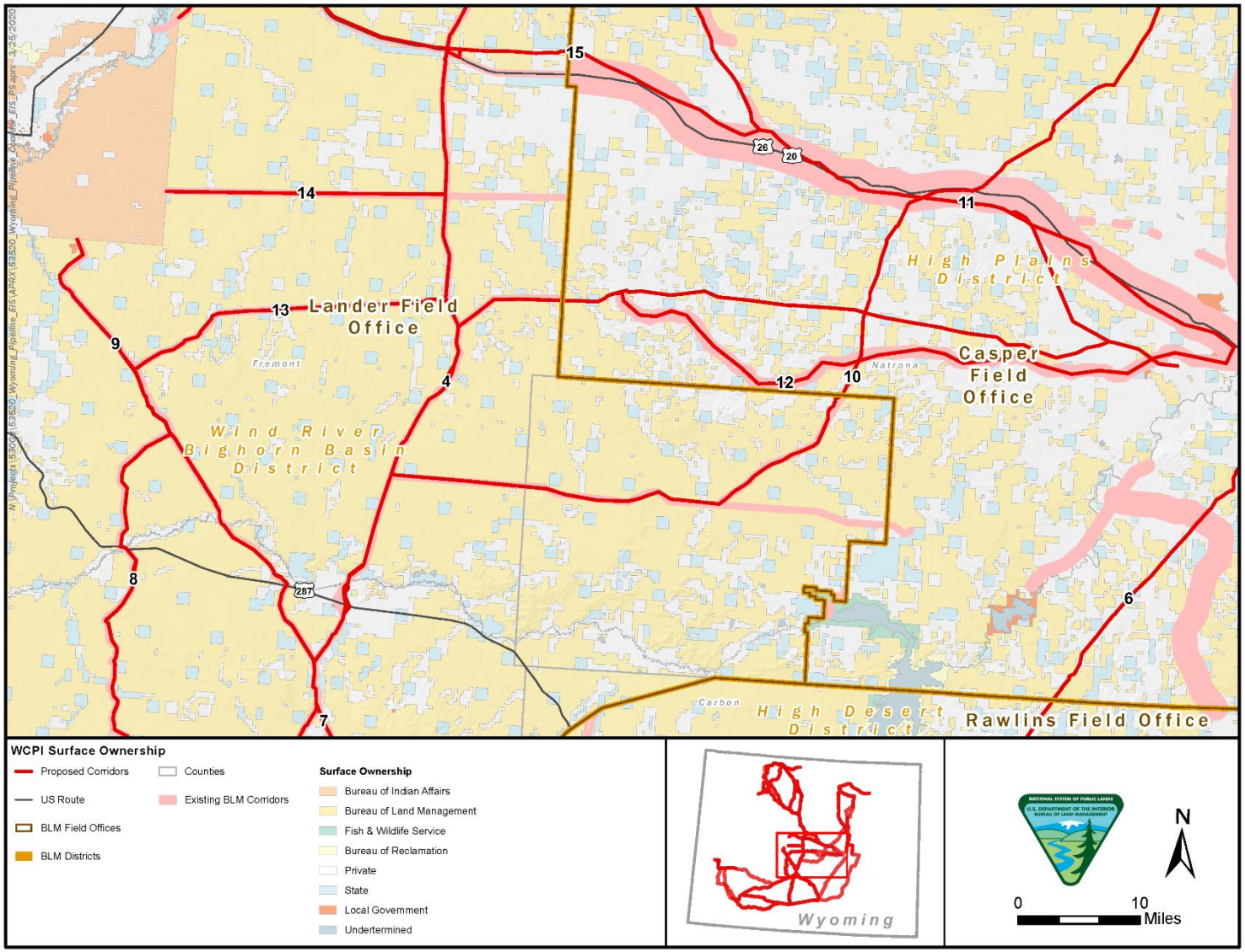

Figure G-10k. WPCI proposed corridors – Surface ownership (map 11 of 16).

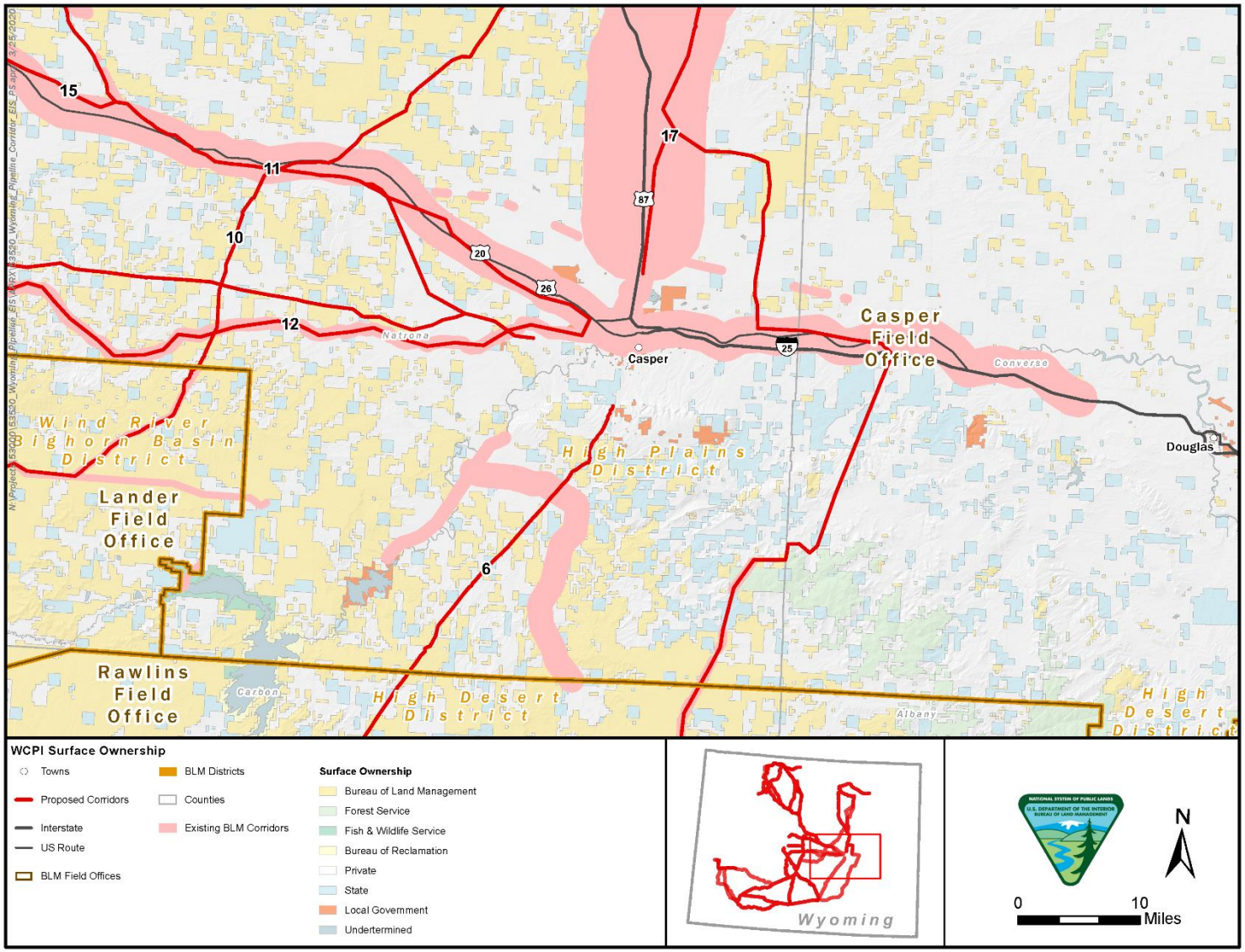

Figure G-10l. WPCI proposed corridors – Surface ownership (map 12 of 16).

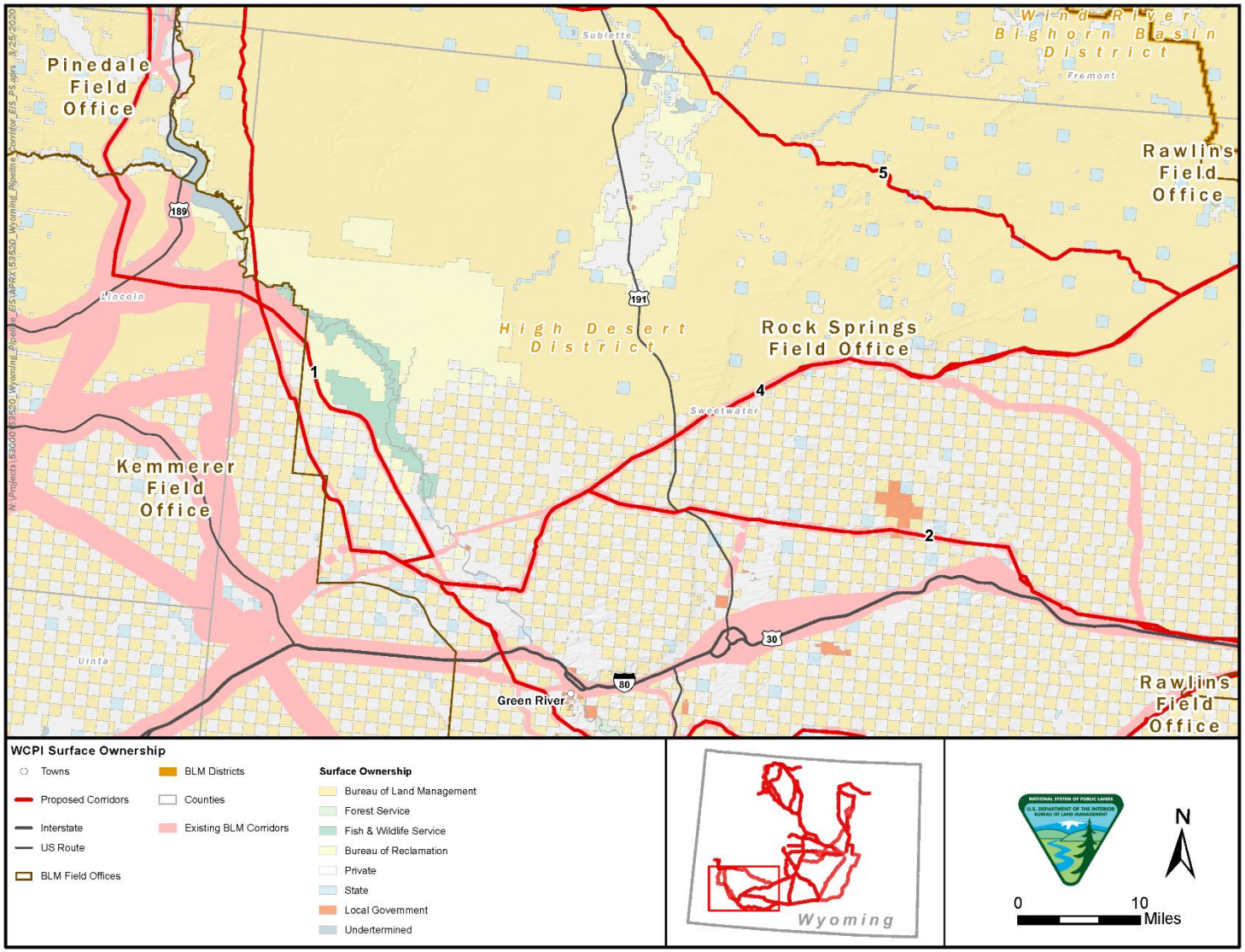

Figure G-10m. WPCI proposed corridors – Surface ownership (map 13 of 16).

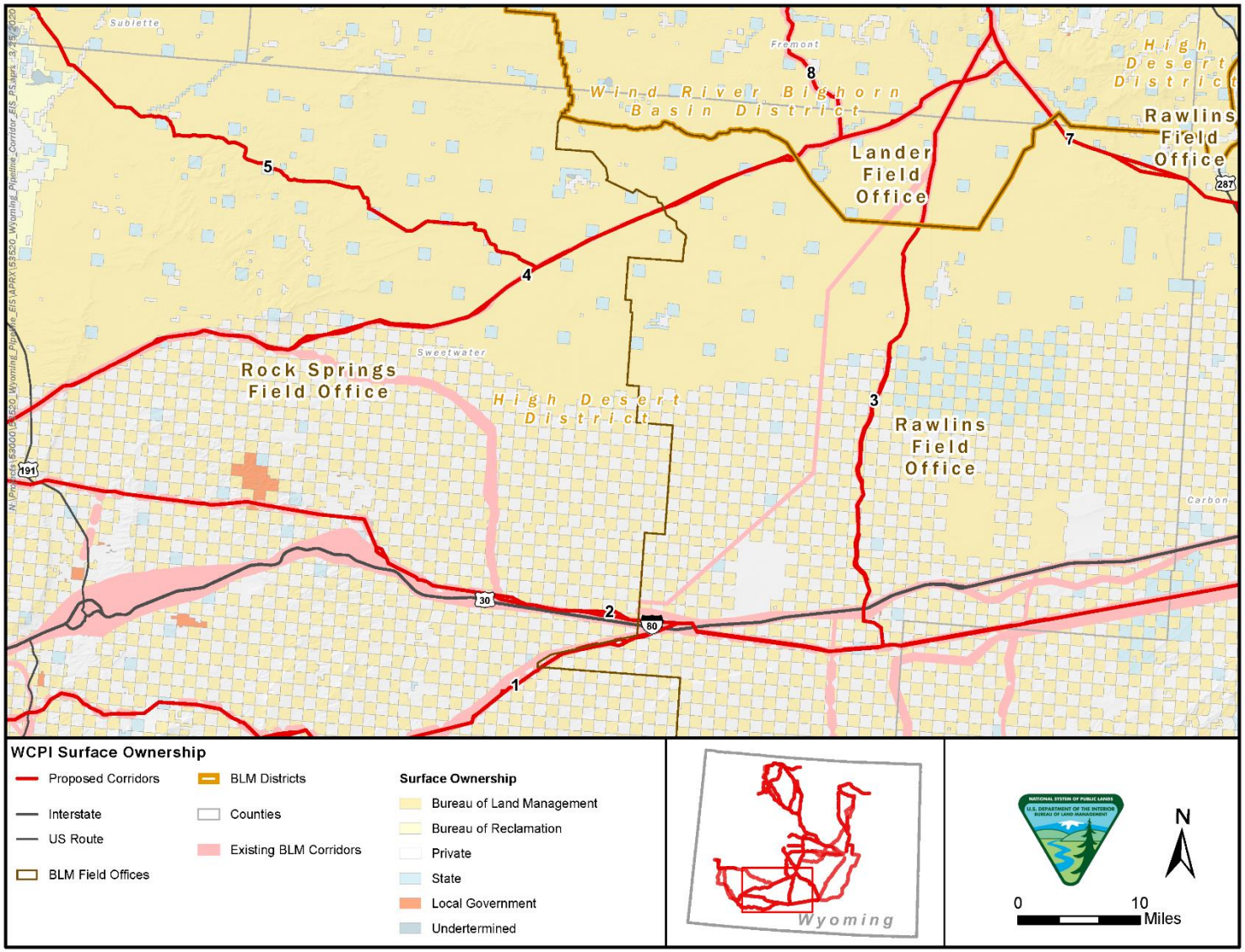

Figure G-10n. WPCI proposed corridors – Surface ownership (map 14 of 16).

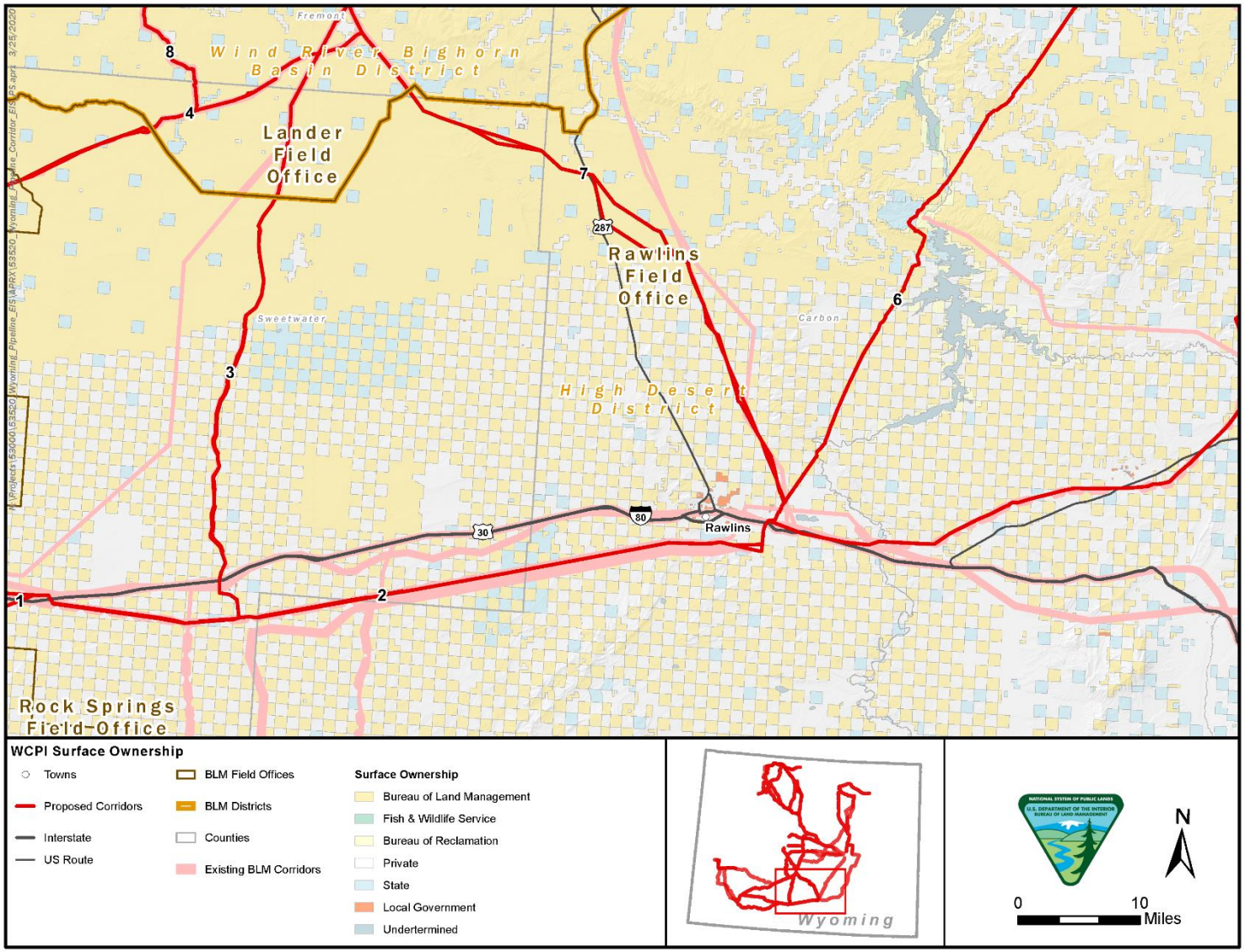

Figure G-10o. WPCI proposed corridors – Surface ownership (map 15 of 16).

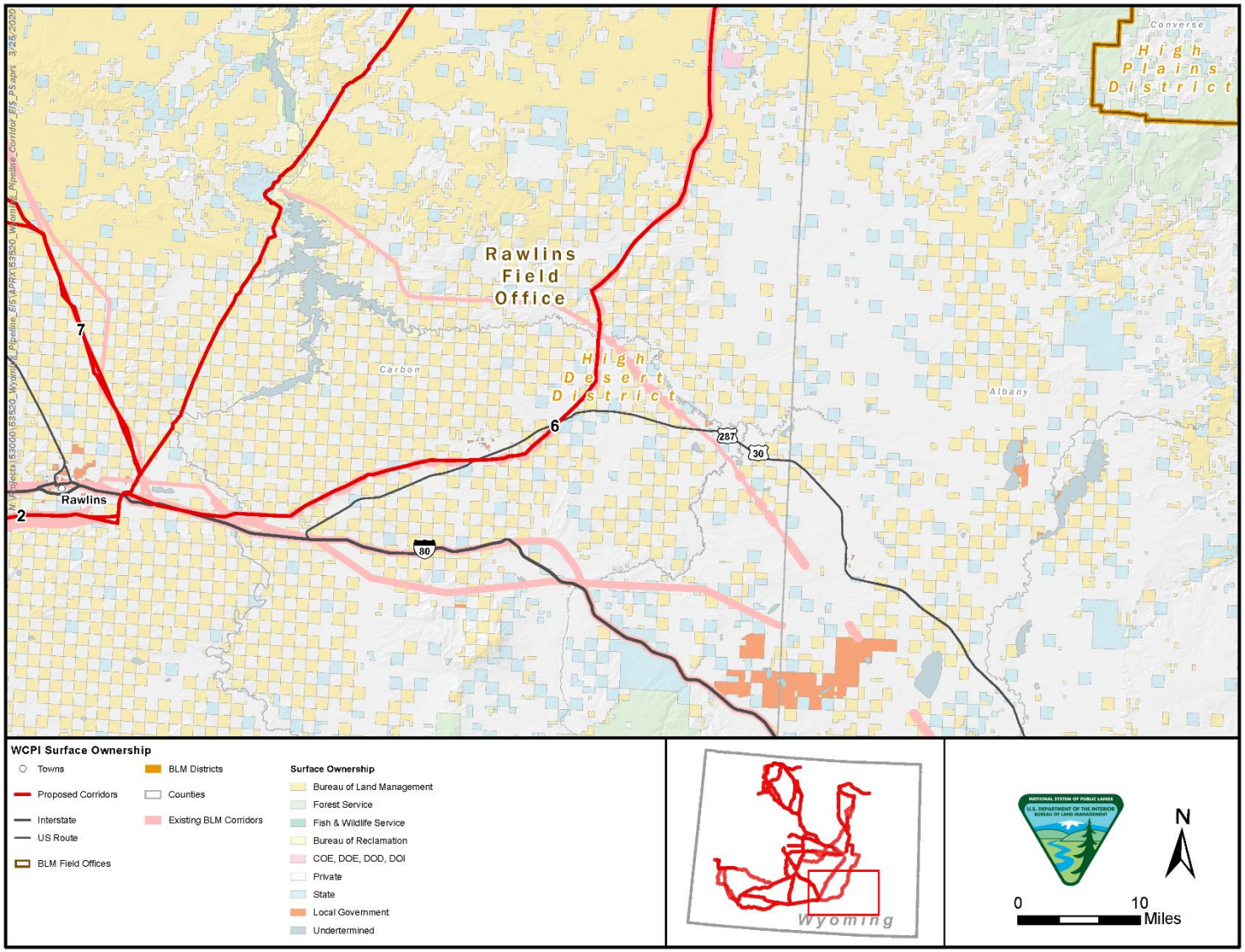

Figure G-10p. WPCI proposed corridors – Surface ownership (map 16 of 16).

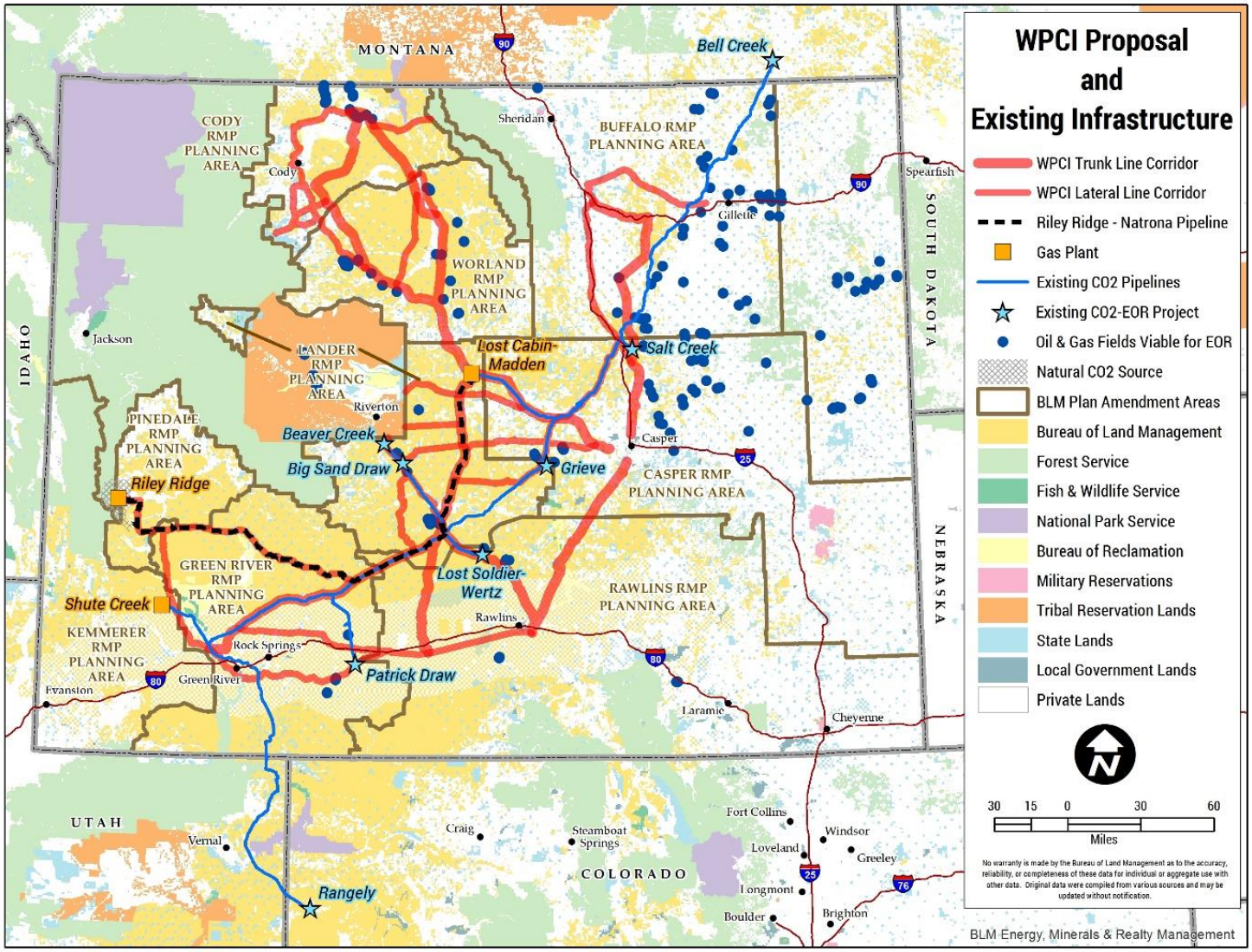

Figure G-11. Existing Infrastructure and Oil Fields that are Potential Candidates for CO_2-EOR.

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APPENDIX H

Reasonably Foreseeable Future Actions

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INTRODUCTION

This section presents the cumulative effects associated with the proposed corridors, including 1) a general definition of cumulative effects, 2) elements that were considered in the cumulative effects analysis, and 3) the assessment approach.

Cumulative impact, as defined by the Council on Environmental Quality (40 Code of Federal Regulations [CFR] 1508.7), is the effect on the environment that results from the incremental impact of the action when added to other past and present actions and reasonably foreseeable future actions (RFFAs), regardless of what agency (federal and non-federal) or person undertakes other such action. Cumulative impacts could result from individually minor, but collectively significant actions taking place over a period of time. The purpose of the cumulative effects analysis is to ensure that the decision-makers consider the full range of consequences of a Proposed Action and alternative routes, including the No Action alternative.

The Council on Environmental Quality has defined the resulting effects of a Proposed Action and its alternative routes as direct and indirect. Direct effects are caused by the Proposed Action and occur at the same time and place. Indirect effects also area caused by the Proposed Action but are later in time or farther removed in distance yet are still reasonably foreseeable (40 CFR 1508.8). Cumulative effects, discussed in this environmental impact statement (EIS), are the total effects on a given resources or ecosystem of all actions taken or proposed.

Elements Considered in Cumulative Effects Analysis

The cumulative effects assessment process considered 1) scoping and resource issues; 2) cumulative effect time frames and the resources (or receptors) that could be affected by the Proposed Action and alternative routes; 3) the geographical area in which the impacts would occur; and 4) other past and present actions and RFFAs that have, or could be expected to cause, impacts to these resources when considered with development of the proposed corridors.

Geographic and Temporal Scope

The geographic scope is the spatial extent where cumulative effects may occur on a resource. It is generally based on the natural boundaries of the resource affected. For the purposes of the analysis in this EIS, geographic scope is the state of Wyoming. The geographic scope is substantially larger for cumulative impacts than the study area for environmental consequences so that an area large enough to encompass likely effects from other projects on the same resource are considered.

The temporal scope is established by the time frame for cumulative effects issue—that is, the duration of short-term and long-term effects anticipated. The temporal scope for this analysis is the duration of potential development of the proposed corridors. Together, the geographic and temporal scopes make up the cumulative impact analysis area (CIAA).

General Study Approach

In general, quantitative analyses were performed for issues where the relevant data were available for the CIAA. For purposes of this assessment, quantitative estimates of cumulative effects on resources are based on the estimated spatial extent of development for the proposed corridors and each past and present action and other RFFAs.

Past Present and Reasonably Foreseeable Future Actions

In general, a cumulative action is a past, present, or other Proposed Action or RFFA that potentially has a cumulatively significant impact when combined with the Proposed Action. For purposes of this analysis, RFFAs are proposed projects or actions that have either applied for a permit from local, state, or federal authorities or which are publicly known. Table H-1 lists the past, present, and known RFFAs actions in the CIAA.

Table H-1. Past and Present Actions and Known Reasonably Foreseeable Future Actions

Project Name	Project Description	Location	Project Area	Disturbance Acres	Development Assumptions for Analysis and Source	Status
Buffalo Field Office						
Hornbuckle 1 and 2 Oil and Gas Field Project	Drilling a maximum of 192 additional wells on the 48 well pads previously approved and evaluated in the original Hornbuckle environmental assessment (EA). Under the Proposed Action, some of the existing 48 pads could be used to drill up to six horizontal wells per pad, resulting in up to 192 additional wells.	Converse County	Unknown	1,920 acres	Table W-1 of BLM 2020a	Approved. Finding of no significant impact (FONSI) issued 2011.
Buffalo Field Office RMP EIS	Management actions as part of the resource management plan (RMP) EIS for the Buffalo Field Office and total project surface disturbance from reasonably foreseeable actions in the Buffalo planning area.	Johnson, Campbell, and Sheridan Counties	Buffalo planning area	130,621 acres of long-term from BLM actions; 357,048 total acres of long-term disturbance from non-BLM actions	Table 212 RFA-1A Appendix G of BLM 2012	Approved. Record of decision (ROD) issued in 2015.
Casper Field Office						
Converse County Oil and Gas Project	Up to 5,000 oil and gas wells on 1,500 pads over 10 years. Although actual operations are subject to change as the project proceeds, the operators would drill wells at an average rate of approximately 500 wells per year for 10 years.	Converse County	1,413,683 acres	52,667 acres	Table W-1 of BLM 2020a, BLM 2020b	The Draft EIS was issued January 2018 and a Supplemental Draft EIS in April 2019. The Final EIS is anticipated in March 2020.
Spearhead Ranch Exploratory Oil and Gas Development Project	Fifty-six new well pads that would accommodate 79 wells using all known drilling techniques, including—but not limited to—vertical, directional, and horizontal. The project proposal also includes installing equipment necessary to produce the resource if it proves to be commercially productive.	Converse County	240,268 acres	540 acres	Table W-1 of BLM 2020a	FONSI and decision record (DR) signed November 20, 2012.
Salt Creek Fieldwide Expansion, 2012 Update	Continued field-wide expansion in the Salt Creek Field through tertiary enhanced oil recovery using CO2 injection. The proposed project would be similar to existing waterflood activities; therefore, many of the existing facilities and infrastructure would be used as part of the Proposed Action.	Natrona County	10,917 acres	–	Table W-1 of BLM 2020a	EA published June 2012. FONSI and DR signed August 7, 2012.

Project Name	Project Description	Location	Project Area	Disturbance Acres	Development Assumptions for Analysis and Source	Status
Samson Scott Field Development Project	Up to 40 additional well pads on lands with primarily private surface and federal minerals, with 2 to 6 wells drilled from each pad, up to a maximum of 150 wells.	Converse County	44,619 acres	1,500 acres	Table W-1 of BLM 2020a	Approved. EA published June 2012. FONSI and DR signed August 7, 2012.
Combs Ranch Northwest Complex	Construct, drill, complete, produce, and reclaim 48 horizontal and/or vertical wells from eight well pads, two production pads, and an access road.	Converse County	3,724 acres	167 acres	Table W-1 of BLM 2020a	Approved. DR and FONSI signed September 13, 2016.
Devon Energy Production Company, L.P. Robbins Unit Area Oil and Gas Development Project	Construct, complete, produce, and reclaim up to 54 wells from 17 new well pads and two existing well pads including construction of access roads, pipelines, power lines, and well pad facilities.	Converse County	19,331 acres	254 acres	Table W-1 of BLM 2020a	Approved. DR and FONSI signed June 14, 2017.
FDL Operating, LLC – Salt Creek FieldWide Expansion Environmental Assessment	Construct, drill, complete, produce, and reclaim 479 wells; includes 134 new wells, 68 reactivation wells, 177 recompletion wells, and 100 replacement wells, 128.8 miles of pipeline, and 9.5 miles of access roads.	Natrona County	21,952 acres	140 acres	Table W-1 of BLM 2020a	Approved. DR and FONSI signed July 18, 2017.
Highland Loop Road Project	Thirty-seven new well pads that would accommodate 40 wells using any and all known drilling techniques, including—but not limited to—vertical, directional, and horizontal. The project proposal would also include the installation of the necessary equipment to facilitate the production.	Converse County	385,900 acres	552 acres	Table W-1 of BLM 2020a	EA published November 2012. FONSI and DR signed November 20, 2012.
East Converse Project	Eighteen new well pads that would accommodate 21 wells using all known drilling techniques including—but not limited to—vertical, directional, and horizontal. The project proposal also includes installing equipment necessary to produce the resource if it proves to be commercially productive.	Converse and Niobrara Counties	125,520 acres	153 acres	Table W-1 of BLM 2020a	EA approved. EA published November 2012. FONSI and DR signed November 20, 2012.
Lost Springs Environmental Assessment	Balidor proposes to drill 96 horizontal oil and gas wells with nine drilling locations. Wells would be drilled from new and existing multi-well pads.	Converse and Niobrara Counties	Unknown	54 acres	Table W-1 of BLM 2020a	In NEPA process.

Project Name	Project Description	Location	Project Area	Disturbance Acres	Development Assumptions for Analysis and Source	Status
Cody Field Office						
Leavitt Reservoir Expansion Project	Expands the current reservoir from 45 to 203 surface acres with expanded capacity of 2.2 billion gallons of water to reduce late-season irrigation shortages.	Big Horn County	~150 acres	702	Table W-1 of BLM 2020a	Joint ROD issued October 2019.
Bighorn Basin Resource Management Plan Revision Proposed Resource Management Plan and Final EIS	Management actions as part of the RMP EIS for the Cody and Worland Field Office areas' total project surface disturbance from reasonably foreseeable actions in the planning area.	Big Horn, Hot Springs, Park, and Washakie Counties	Cody and Worland planning areas	140,175 total acres of short-term disturbance from BLM actions; 121,869 total acres reclaimed from BLM actions; 18,306 acres long-term disturbance from BLM actions; 357,048 total acres of long-term disturbance from non-BLM actions.	Table 4-1 of BLM 2015	Final EIS issued May 2015.
Lander Field Office						
Sheep Mountain Uranium Project	Mine will identify ore deposits and will extract approximately 1.0 to 2.0 million pounds of uranium per year during active operations. The anticipated project life is approximately 20 years from initial construction through final reclamation.	Fremont County	3,625 acres	357 acres	BLM 2018a; Table W-1 of BLM 2020a	Approved. ROD published January 6, 2017. No construction start date identified.
Gas Hills In Situ Recovery Uranium Project	Development of uranium deposits in the Gas Hills Project Area. Project involves recovery of uranium from the subsurface through chemical dissolution using wells constructed similarly to conventional water wells and requires installation of surface and subsurface infrastructure.	Freemont and Natrona counties	8,518 acres	1,300 acres	Table W-1 of BLM 2020a	Final EIS was released November 2013; ROD issued February 2014. No construction start date identified.
Grieve Unit CO2 Enhanced Oil Recovery Project	Ten crude oil and disposal wells and associated infrastructure on six new well pads in the existing Grieve Unit.	Natrona County	171 acres	171 acres		Under construction. DR and FONSI published July 2012.

Project Name	Project Description	Location	Project Area	Disturbance Acres	Development Assumptions for Analysis and Source	Status
West Bison Basin 8 Well Expansion	Richard Operation Co. submitted eight applications for permit to drill for the West Bison Basin Unit. The drilling locations would be constructed of approximately 0.75 acre each with additional 3 acres of disturbance for access roads, pipelines, and power lines that are co-located to reduce disturbance.	Fremont County	20 acres	32 acres	Table W-1 of BLM 2020a	Approved.
West Bison Basin Unit Secondary Oil Recovery	Implement a nine-well steam injection program in the West Bison Basin Unit for secondary oil recovery of an existing oil field.	Fremont County	20 acres	30 acres	Table W-1 of BLM 2020a	Approved.
Moneta Divide Natural Gas and Oil Development Project	Aethon Energy Operating LLC and Burlington Resources Oil and Gas Company LP propose to develop new and enhance existing facilities for the exploration and production of oil and gas resources.	Fremont, Natrona and Sweetwater Counties	265,758 acres	14,984 acres	4,250 pads in 265,758 acres = 1 pad per 62 acres 3.5 acres of disturbance per pad BLM 2018a; BLM 2020a	Final EIS issued February 2020; subsequent NEPA analysis, tiered to this EIS, will be required prior to construction.
Pinedale Field Office						
Jonah Infill Natural Gas Development Project	3,600 natural gas wells and associated facilities and infrastructure. The project would result in a maximum of 14,030 acres of surface disturbance at any given time, with an estimated new short-term disturbance of 16,125 acres and long-term disturbance of up to 6,020 acres.	Sublette County	30,500 acres	16,125 acres	450 wells in 30,550 acres = 1 well per 68 acres 5 acres of disturbance per well BLM 2018a; Table W-1 of BLM 2020a	Under construction from 2006 to 2019. ROD published March 14, 2006.
Pinedale Anticline Oil and Gas Exploration and Development Project	4,399 natural gas wells and associated facilities and infrastructure.	Sublette County	198,000 acres	12,886	600 pads in 197,949 acres = 1 pad per 330 acres 13.5 acres of disturbance per pad BLM 2018a; Table W-1 of BLM 2020a	Under construction from 2009 to 2025. ROD published September 2008.
Normally Pressured Lance Natural Gas Development Project	3,500 new oil and natural gas wells and associated facilities and infrastructure. Ten-year development period and 40-year project life.	Sublette County	140,940 acres	5,874 acres	1 pad per 160 acres 18 acres of disturbance per pad BLM 2018a	ROD published August 2018

Project Name	Project Description	Location	Project Area	Disturbance Acres	Development Assumptions for Analysis and Source	Status
LaBarge Platform Exploration and Development Project	838 oil and natural gas wells and associated facilities and infrastructure. The project would result in approximately 1,763 acres of short-term surface disturbance and 649 acres of long-term surface disturbance.	Lincoln and Sublette Counties	218,000 acres	1,763 acres	Table W-1 of BLM 2020a	Notice of intent (NOI) published August 3, 2009. Project on hold.
Black Swan Oil and Gas Project	Construct, drill, complete, produce, and reclaim 46 horizontal and/or vertical wells from 12 well pads and seven other production pads, including all attendant facilities.	Converse County	30,000 acres	93 acres	Table W-1 of BLM 2020a	Approved. DR and FONSI signed January 31, 2017.
Rawlins Field Office						
Rawlins RMP Amendment for Oil and Gas Leasing	The RFO has issued an NOI for an amendment to the Rawlins RMP. The EA amendment would remove an estimated 12,425 acres from future oil and gas leasing. These acres are located on federal mineral estate adjacent to the water sources for the municipalities of Rawlins, Saratoga, and Laramie, Wyoming.	Albany and Carbon Counties	12,425 acres	12,425 acres	Table W-1 of BLM 2020a	In NEPA process. NOI issued July 21, 2014.
Chokecherry and Sierra Madre Wind Farm	Two wind farm sites of mixed public and private land located about 10 miles south of Rawlins. It is estimated that each wind turbine would generate 1.5-3 megawatts of electricity, with a total capacity of 2,000 to 3,000 megawatts, which is enough energy to power nearly 1 million homes. Access roads, underground electric gathering lines, an overhead transmission line, and substations to interconnect the generated power to the electric grid are included in the proposal.	Carbon County	227,638 acres	1,545 acres	Table W-1 of BLM 2020a	EIS approved. ROD released October 9, 2012. Site-specific EAs undergoing the NEPA process. Construction anticipated to take 4 to 5 years with an estimated project life of 30 years.
Continental Divide-Creston Natural Gas Project	8,950 additional natural gas wells drilled from 5,450 well pads, including 100 to 500 coal bed natural gas wells and associated facilities and infrastructure. The project would result in an approximate new disturbance of 43,808 acres.	Carbon and Sweetwater Counties	~1.1 million acres	43,808 acres	1 pad per 40 acres 3.9 acres of disturbance per pad	Approved. ROD published September 26, 2016. Construction to take place from 2017 through 2032.
Lost Creek Uranium In Situ Recovery Project Amendment	The proposed mine expansion consists of two submittals: 1) expansion of 5,750 acres to the existing Lost Creek Project area, and 2) expansion of in-situ mining operations deeper into the KM horizon, while increasing the extent of the mining in the existing HJ horizon, adding 78 acres of additional surface disturbance.	Sweetwater County	5,750 acres	1,415 acres	Disturbance boundaries received from BLM Rawlins Field Office BLM 2018a, Table W-1 of BLM 2020a	ROD issued March 2019.

Project Name	Project Description	Location	Project Area	Disturbance Acres	Development Assumptions for Analysis and Source	Status
Desolation Flats Natural Gas Development Project and Endurance/Barricade Gas Infrastructure Project	385 natural gas wells and associated facilities and infrastructure. The project would result in an estimated 4,900 acres of short-term surface disturbance.	Sweetwater and Carbon Counties	233,542 acres	4,900 acres	Table W-1 of BLM 2020a	Under construction from 2004 through 2024. EIS ROD published July 2004. Infrastructure EA DR and FONSI published November 2013.
Atlantic Rim Natural Gas Development Project	2,000 gas wells and associated facilities and infrastructure with a surface disturbance cap of 7,600 acres at any given time, with a total estimated disturbance of 13,600 acres.	Carbon County	270,080 acres	13,600 acres	Table W-1 of BLM 2020a	Under construction from 2007 through 2027. ROD published March 2007.
Rock Springs Field Office						
Luman Rim Natural Gas Project	58 natural gas wells and associated facilities and infrastructure. The project would result in an estimated 879 acres of new short-term surface disturbance and approximately 226 acres of long-term surface disturbance.	Sweetwater County	20,828 acres	879 acres	58 wells in 17.029 acres = 1 well per 294 acres 4.4 acres of disturbance per well BLM 2018a, Table W-1 of BLM 2020a	Under construction from 2011 through 2021. DR and FONSI published December 16, 2010.
Monelle Arch Oil and Gas Development Project	125 new wells (105 oil wells, 18 carbon-dioxide injector wells, and 2 water disposal wells) and associated facilities and infrastructure.	Sweetwater County	32,781 acres	238 aces	40 wells in 12,533 acres (Arch portion only) = 1 well per 313 acres 2 acres of disturbance per pad BLM 2018a, Table W-1 of BLM 2020a	Approved. DR and FONSI published December 19, 2013. Construction anticipated to take place from 2014 through 2023.
Bird Canyon Natural Gas Development Project	348 natural gas wells and associated infrastructure. Estimated surface disturbance would depend on the alternative selected in the ROD. NEPA analysis was initiated with an NOI in 2014, but the EIS is currently on hold by the proponent.	Sublette and Lincoln Counties	17,612 acres	714 acres	1 pad per 160 acres 3.8 acres of disturbance per pad BLM 2018a, BLM 2018b	As of August 2018, the EIS is on hold.
Bitter Creek Shallow Oil and Gas Project	61 oil and natural gas wells and associated facilities and infrastructure. The project resulted in an estimated 326 acres of surface disturbance.	Sweetwater County	17,961 acres	326 acres	61 wells in 18,628 acres = 1 well per 116 acres 60,000 square feet of disturbance per well BLM 2018a	DR and FONSI published June 2005.

Project Name	Project Description	Location	Project Area	Disturbance Acres	Development Assumptions for Analysis and Source	Status
Desolation Road Environmental Assessment	Drilling of up to 17 wells on up to five well pads located within 2 miles of the Adobe Town Wilderness Study Area.	Campbell and Converse Counties	117 acres	117 acres	BLM 2018b	As of August 2018, the EIS is on hold.
Horseshoe Basin Project	Proposed action proposes 20 new wells and associated infrastructure with approximately 40 acres of surface disturbance within the Horseshoe Basin Unit.	Sweetwater County	24,972 acres	40 acres	Table W-1 of BLM 2020a	In NEPA process.
Table Rock Unit Oil and Gas Development Project	88 new wells, including 33 shallow oil wells, 20 deep gas wells, and up to 35 water disposal wells.	Sweetwater County	13,644 acres	880 acres	Table W-1 of BLM 2020a	Approved. Construction anticipated to take place from 2013 through 2027. DR and FONSI published January 24, 2012.
Black Butte Coal Lease Modification Environmental Assessment	Lease modification would add 448.6 acres of surface disturbance to the existing Black Butte coal lease.	Sweetwater County	448.6 acres	449 acres	Table W-1 of BLM 2020a, BLM 2017a	FONSI and DR issued June 2017.
Sweetwater Solar Energy Project	Sweetwater Solar, LLC, to construct, operate, maintain, and decommission the proposed Sweetwater Solar Energy Project. The 80-megawatt photovoltaic solar project would encompass approximately 703 acres, of which 638 acres are located on public land. The project would have an expected life of 30 years.	Sweetwater County	703 acres	–	Table W-1 of BLM 2020a	FONSI signed June 2018. Sweetwater Solar, LLC is set to start construction on the facility July 1, 2018, with an expected in-service date of February 2019.
Worland Field Office						
Alkali Creek Reservoir Project	Right-of-way (ROW) proposal for 294-acre reservoir on Alkali Creek and ancillary facilities across public and private land near Hyattville, Wyoming.	Big Horn County	603 acres	204 acres	BLM 2017b	ROD signed October 2019.

Project Name	Project Description	Location	Project Area	Disturbance Acres	Development Assumptions for Analysis and Source	Status
High Desert District						
Riley Ridge to Natrona CO_2 Pipeline Project	Two ROW applications have been submitted to the BLM for this project to construct and operate a CO_2 pipeline system. One application for the Riley Ridge segment would include 31 miles of 16-inch pipeline from the existing Riley Ridge Treating Plant 18 miles southwest of Big Piney to a proposed sweetening plant 12 miles northeast of LaBarge. From the sweetening plant, a 24-inch pipeline would transport the remaining CO_2 129 miles through Sublette and Sweetwater Counties to the Bairoil (Exxon) Interconnect 50 miles northwest of Rawlins. The Bairoil-to-Natrona segment would include 83 miles of 24-inch pipeline from the Bairoil Interconnect through Fremont and Natrona Counties to the existing Greencore Pipeline, where the project ends at the Natrona Hub 30 miles west of Casper.	Fremont, Sweetwater, Sublette, and Natrona Counties	243 miles	1,877 acres	Table W-1 of BLM 2020a, BLM 2019	ROD issued March 2019.
West Antelope 3 Coal Lease by Application Project	Application to lease a tract of federal coal for approximately 441 million tons of coal.	Campbell and Converse Counties	5,179,29 acres	3,508 acres	Table W-1 of BLM 2020a	In NEPA process. NOI published July 28, 2017.
Statewide						
Gateway West Transmission Line Project	Approximately 1,000 miles of new high-voltage transmission lines between the Windstar substation near Glenrock, Wyoming, and the Hemingway substation near Melba, Idaho. The project would include approximately 200 miles of 230-kilovolt lines in Wyoming and approximately 800 miles of 500-kilovolt lines in Wyoming and Idaho.	Project analysis area crosses Natrona, Carbon, Sweetwater, Lincoln, Albany, and Converse Counties	1,000 miles	2,441 acres	Table W-1 of BLM 2020a	Approved. ROD released November 14, 2013. Project scheduled for line segments to be completed in phases between 2019 and 2023.
Transwest Express Transmission Line Project	600-kilovolt, direct current transmission line designed to facilitate renewable energy delivery from Wyoming to the southwestern United States while providing an important regional upgrade to the western U.S. power grid. The project would interconnect with the existing transmission grid near Sinclair, Wyoming, and the Marketplace Hub in Boulder City, Nevada.	Carbon and Sweetwater Counties	725 miles	2,484 acres	Table W-1 of BLM 2020a	Approved. ROD released December 13, 2016. ROW grant released June 23, 2017.

Project Name	Project Description	Location	Project Area	Disturbance Acres	Development Assumptions for Analysis and Source	Status
Gateway South Transmission Line Project	500-kilovolt transmission line, approximately 400 miles in length (depending on the route that is selected), beginning at the planned Aeolus substation near Medicine Bow, Wyoming, and terminating at the Clover substation near Mona, Utah. The line would be constructed on a 250-foot-wide ROW to accommodate the construction and operation of the transmission line.	Sweetwater, Natrona, Converse, and Carbon Counties	400+ miles	1,500 acres	Table W-1 of BLM 2020a	Approved. ROD issued December 13, 2016.
Additional Lanes between Waltman and Shoshoni on U.S. Route 26 (Wyoming Department of Transportation Project No. N342047 and No. N341113)	Adding additional lanes between Waltman and Shoshoni on U.S. Route 26. Length of work: 25 miles.	Fremont County	25 miles	76 acres	25miles*5280*25 ft land width total (2 lanes)/43,560 = 76 acres Table W-1 of BLM 2020a, BLM 2018a	Construction proposed for fiscal years 2020 and 2022.
U.S. Forest Service						
Tie Flume Vegetation Management Project EA	Project to implement the 2005 Bighorn National Forest Land and Resource Management Plan by proposing vegetation treatments. Proposed action has five components: commercial harvesting, precommercial thinning, prescribed fire, wildlife habitat enhancement, and road and trail opportunities. These may include up to 4,700 acres of silvicultural harvesting treatments; up to 10 miles temporary logging roads; decommissioning up to 10.5 miles of system roads; converting 5.7 miles of roads to closed; converting 1 mile of roads to nonmotorized trails and construct 1 mile of motorized loop trail.	Big Horn National Forest	47,500 acres	–	Included based on location but no other disturbance info available. U.S. Department of Agriculture (USDA) 2020a	Draft EA released January 2020.
Invasive Plant Management EIS	Control of noxious and other invasive plants through the integration of manual, mechanical, biological, and ground and aerial herbicide control methods.	Bridger-Teton National Forest	75,000 acres	20,000 acres	USDA 2020b	Final EIS and draft ROD issued September 2019.
Snow King Mountain Resort On-mountain Improvements EIS	Snow King Resort proposes to update facilities and develop winter and summer recreation opportunities. Proposed project includes permit boundary expansion, guest service building at summit, additional lifts and ski runs, bike park, and trails.	Bridger-Teton National Forest	~160 acres	155 acres	USDA 2020c	Draft EIS released January 2020.

Project Name	Project Description	Location	Project Area	Disturbance Acres	Development Assumptions for Analysis and Source	Status
Research Natural Areas and Botanical Areas Mineral Withdrawal EA	Proposed withdrawal of research natural areas and botanical areas from mineral entry. Necessary part of RNA designation process. U.S. Forest Service recommendation to BLM, who makes the decision. Project not subject to the objection process.	Black Hills National Forest	4,828 acres in Wyoming	4,828 acres	USDA 2019	NEPA in progress.

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APPENDIX I

Reasonably Foreseeable Development Scenario and Projected Emissions

Oil and Gas Production and Carbon Dioxide Equivalent Calculations from Potential Increase in Carbon Dioxide Flooding

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REASONABLY FORESEEABLE DEVELOPMENT SCENARIO AND PROJECTED GREENHOUSE GAS EMISSIONS

Reasonably Foreseeable Development Well Projections

To analyze impacts of various alternatives in the *Resource Management Plan Amendments/Environmental Impact Statement Wyoming Pipeline Corridor Initiative* (RMPs-EIS), the Bureau of Land Management (BLM) develops reasonably foreseeable development (RFD) well projections for lands in the RMP planning areas. The EISs for RMPs approved or amended in 2015 include updated RFDs. An RFD is the result of a technical analysis that projects the total number of wells that could be developed in a field office based upon known geologic and economic conditions, current development technology, and industry-provided data about future planned development. The RFDs may include oil wells, gas wells, and coalbed natural gas wells (CBNGs) and are projections over the life of the RMP, which is generally 20 years. This information indicates that on average, statewide, approximately 998 federal wells are predicted to be developed annually. RFDs for Wyoming RMP planning areas are shown in Table I-1.

Table I-1. Reasonably Foreseeable Development for Wells for Wyoming

Planning Area	RFD Federal Mineral Estate (number of wells)	RFD All Mineral Ownership Lands (number of wells)
Lander Field Office*	1,695	4,254
Buffalo Field Office†	4,767	11,018
Bighorn Basin District‡ (Cody and Worland Field Offices)	1,141	6,054
Greater Sage-Grouse Approved Resource Management Plan (RMP) Amendment§	12,355	14,818

*2013 Lander RMP final EIS, Appendix T, pages 1649–1650

† 2015 Buffalo RMP final EIS, Appendix G

‡ 2015 Bighorn Basin final EIS at 4-107.

§ 2015 Greater Sage-Grouse Approved RMP Amendment final EIS at 4-8; includes Newcastle, Casper, Rock Springs, Rawlins, Pinedale, and Kemmerer Field Offices.

While the above estimates may include specific projections of CBNG development, CBNG plays in Wyoming are not currently active. Most CBNG wells are being plugged across the state; therefore, the RFD and any associated emission projections attributed to CBNG may be an overestimate.

Development of oil and gas in Wyoming is ongoing and continues to be a major source of emissions. Development density (wells per square mile) and the number of wells installed annually depend on a number of variables, including market trends, available technology (vertical, directional, or horizontal drilling), geology of the hydrocarbon-bearing zone, and the application of controlled surface use and no surface occupancy stipulations. As a result, the number of wells in the planning area that could potentially be put into production under a full-field development scenario is highly uncertain.

Current Drilling Activity

From 2008 through 2018, an average of 745 wells were completed annually statewide (Table I-2). The total number of wells per year, per field office, can vary as economic conditions fluctuate and as new fields and drilling technologies are explored. From 2008 to 2018, the highest annual rate of well

completions and total well completions has been in the Pinedale Field Office planning area. The second highest rate of well completions has occurred in the Buffalo Field Office planning area.

Table I-2. Federal Well Activity in Wyoming

Bureau of Land Management Federal Well Activity in Wyoming from October 1, 2008 to September 30, 2018

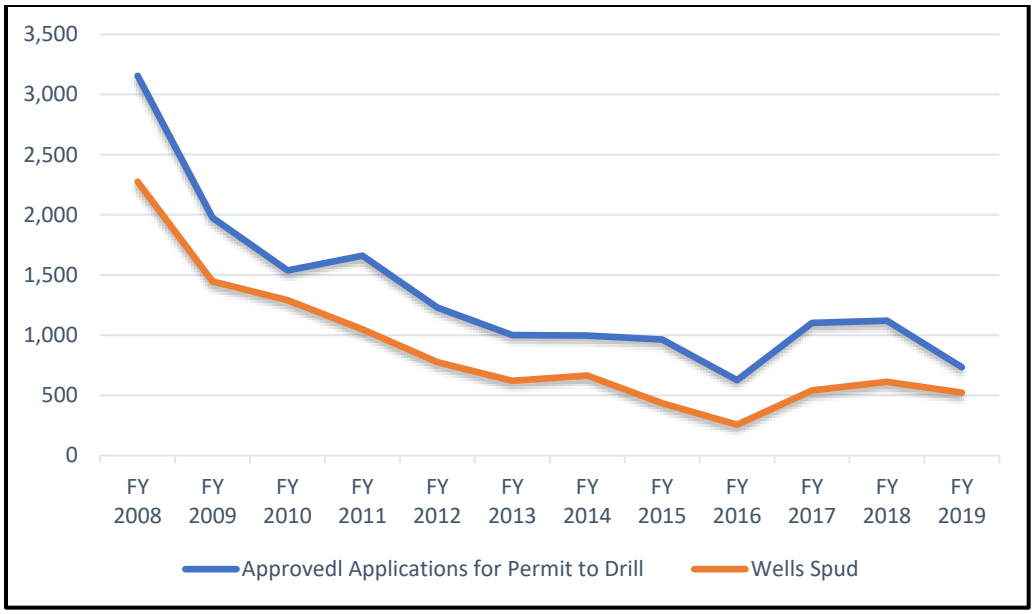
Planning Document	Field Office	Approved Applications for Permit to Drill	Wells Started	Wells Completed for Production	Average Well Completions/Year
Greater Sage-Grouse Approved Resource Management Plan (RMP) Amendment	Rock Springs Field Office	253	222	226	22.6
	Kemmerer Field Office	78	54	54	5.4
	Pinedale Field Office	3,372	3,230	3,128	312.8
	Rawlins Field Office	647	557	577	57.7
	Casper Field Office	1,956	871	554	55.4
	Newcastle Field Office	266	246	215	21.5
Buffalo RMP	Buffalo Field Office	2,168	2,208	2,450	245.0
Lander RMP	Lander Field Office	188	152	131	13.1
Bighorn Basin RMP	Cody Field Office	9	74	75	7.5
	Worland Field Office	5	55	36	3.6
Statewide Annual Average		**894.2**	**766.9**	**744.6**	**Average Number of Completions per Field Office/Year: 74.5**

Source: Automated Fluid Minerals Support System (as of September 30, 2019).

As shown in Table I-2, well completion rates (74.5 well completions at each of 10 field offices) are within current RFD projection (998 wells per year). A review of fiscal year 2019 data reveals that the annual statewide average for approved applications for permit to drill (APDs) has decreased to 877.9; wells started (spuds) has decreased to 740.6; wells completed for production has decreased to 719.2; and the annual average number of completions per field office has decreased to 71.9. Permitting levels across all field offices has decreased, with the exception of the Casper Field Office, where average annual well completions increased from 55.4 to 63.5.

The number of usable completions in the Buffalo Field Office has decreased over time as CBNG play has declined, but new horizontal drilling rates have increased in the CFO, in the southern portion of the Buffalo Field Office, and in discrete areas of the Rawlins Field Office and the Pinedale Field Office. The majority of new horizontal wells are produced from multiple mineral estates (private, state, and federal) due to the long reach of the wellbore and the large reservoir drainage area.

Similarly, as shown in Figure I-1, new wells spudded and the total number of APDs approved on federal lands in Wyoming has decreased over time and is approximately 27% of 2008 activity levels, although there was a slight increase between 2016 and 2017. The increase in permits likely corresponds to improved economic conditions during this time frame. Across the state, about 50% of federal APDs that are approved are actually spuds.



Source: https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/oil-and-gas-statistics

Figure I-1. Wyoming federal applications for permit to drill approvals and federal wells started (spuds).

Projected Wyoming Greenhouse Gas Emissions

Using the RFDs, the BLM projected direct greenhouse gas (GHG) emissions typically associated with lease operations, including emissions from drilling, completion, operation, reclamation, and plugging. For more information on how emissions were calculated, refer to the Lander RMP final EIS, Air Quality Technical Support Document. Statewide direct carbon dioxide equivalent (CO_2e) emissions from oil and gas operations for peak year 2020 are projected to be approximately 5.7 million metric tons (MMTs) (Greater Sage-Grouse Approved RMP Amendment 2015).

The BLM's RMG and field and district office staff provided information on production of oil and gas to support analysis in the RMP EISs. For each planning unit (or field office within a planning unit), the BLM developed total annual oil and gas production estimates for each RMP EIS alternative. The information used to develop these estimates included the number of wells drilled annually in each field office or planning unit by alternative (from the RFD), the percent of oil wells versus gas wells, the percent of wells completed, production decline curves for oil and gas wells, and estimates of cross-production from both oil and gas wells.

Appendix N, Social and Economic Impact Analysis Methodology of the 2015 Greater Sage-Grouse Approved RMP Amendment final EIS, describes the procedure to determine total federal production. For each year, the estimated number of wells completed was broken down into oil or gas wells based on the assumptions for the field office and planning unit provided by BLM staff. For each well type, the average first-year production rate (volume) from the annual decline curves for each field office and planning unit (as provided by RMG) was applied to determine the total production from first-year wells. For subsequent years, the appropriate average production rates from the decline curves were applied to the number of second-year wells, third-year wells, and so on. Total production was summed across all the well age cohorts for each year within the analysis period. Cross-production volume was calculated based on the numbers of wells of each type and the cross-production rates from the RMG and added to the total production volume.

Statewide projected indirect CO_2e for the year 2020 was estimated at approximately 80.5 MMT.

Existing Wyoming Greenhouse Gas Emissions

Outside of coal development, oil and gas development is the single largest contributor to total air pollutant emissions in Wyoming. The Center for Climate Strategies (CCS) prepared the *Wyoming Greenhouse Gas Inventory and Reference Case Projections 1990-2020* (2007) for the Wyoming Department of Environmental Quality. The CCS inventory report presents a draft GHG emission inventory and forecast from 1990 to 2020 for all federal and non-federal emission-generating activities in Wyoming. The inventory report provides an initial comprehensive understanding of Wyoming's current and possible future CO_2e emissions. The information presented provides a starting point for estimating statewide emissions. Initial estimates may be revised with improvements to data sources and assumptions.

According to the CCS inventory report, activities in Wyoming accounted for approximately 56 MMT of gross CO_2e emissions in 2005, an amount equal to 0.8% of total U.S. gross GHG emissions. These emission estimates focus on activities in Wyoming and are consumption based; they exclude emissions associated with electricity that are exported from the state. The inventory report concludes that Wyoming's gross GHG emissions increased 25% from 1990 to 2005, while national emissions rose by only 16% from 1990 to 2004; annual sequestration (removal) of GHG emissions due to forestry and other land uses in Wyoming were estimated at 36 MMT CO_2e in 2005. The increase in per capita emissions in Wyoming from 1990 to 2005 is mostly due to increased activity in the fossil fuel industry, while national per capita emissions changed relatively little.

The analysis in the report indicates that Wyoming's per capita emission rate is more than four times greater than the national average of 25 MMT CO_2e/year. This large difference between national and state per capita emissions occurs in most sectors, including electricity, industrial, fossil fuel production, transportation, industrial processes, and agriculture. The reasons for the higher per capita intensity in Wyoming are varied but include the state's strong fossil fuel production industry, other industries with high fossil fuel consumption intensity, large agricultural industries, large distances, and a low population base. No updates to the CCS inventory report have been completed, and it remains the best available synthesis of potential and future GHG emissions in Wyoming.

The CCS inventory report also indicates that emissions from the fossil fuel industry grew 101% from 1990 to 2005, largely attributable to the tight sand gas play in western Wyoming and the CBNG boom in the Powder River Basin. The report projected that these emissions would increase by an additional 10% between 2005 and 2020. The natural gas industry is the major contributor to both GHG emissions and emissions growth, with methane (CH_4) emissions from coal mining second in terms of their overall contribution. A significant portion of the emissions attributed to the natural gas industry are due to vented gas from processing plants, many of which process gas used for injection in enhanced oil recovery (EOR) operations (CCS 2007).

The U.S. Energy Information Administration (EIA) is one of the primary agencies in charge of producing energy outlook forecasts for the United States. The EIA includes Wyoming as part of the Rocky Mountain Region in its forecasts, which also includes Colorado, Utah, Idaho, Nevada, Arizona, and portions of New Mexico. Wyoming borders Montana, which is part of the Northern Great Plains Region; the Northern Great Plains Region also includes North Dakota and South Dakota. Both the Rocky Mountain Region and Northern Great Plains Region should be used when discussing regional oil and gas trends, Wyoming's contribution to the oil and gas industry, and associated GHG emissions. As discussed in the EIA's *Assumptions to the Annual Energy Outlook: 2019: Oil and Gas Supply Module*, total technically recoverable oil volumes in these two regions are 51.3 billion barrels (BBLS); the Rocky Mountain Region is expected to contribute 24.9 BBLS and the Northern Great Plains region is expected to contribute 26.4 BBLS. For dry natural gas, the two regions are thought to contain a total of approximately 357.4 trillion cubic feet (TCF) of technically recoverable natural gas; of this total, the

Rocky Mountain Region is estimated to contain 314.8 TCF and 42.6 TCF in the Northern Great Plains Region. The EIA estimates that current recoverable reserves in Wyoming, as of December 31, 2017, are 22,352 billion cubic feet of wet gas and 1,119 million barrels of crude oil plus lease condensate.

The Fourth National Climate Assessment (Chapter 22) projects that for the Northern Great Plains Region, which includes Wyoming, Montana, North Dakota, South Dakota, and Nebraska, conditions will become consistently warmer over the next 2 to 3 decades and coincide with less snowpack and high variability in annual water availability, with an overall small projected decrease in average streamflow. These climatic changes are projected to include an increase in the number of heavy precipitation events, excluding the mountain ranges located in southern Wyoming.

Greenhouse Gas Emissions Statewide[1] and Nationwide on Federal Lands

The U.S. Geological Survey (USGS) has developed gross GHG emission estimates for all federal mineral estates in the United States and for each of the states that contain federal minerals, including those in the Rocky Mountain and Northern Great Plains Regions (Merrill et al. 2018). According to Merrill et al. (2018),

> *The emissions estimates span a 10-year period (2005–14) and are reported for 28 States and two offshore areas. Nationwide emissions from all fossil fuels produced on Federal lands in 2014 were 1,279.0 million metric tons of carbon dioxide equivalent (MMT CO_2 Eq.) for carbon dioxide (CO_2), 47.6 MMT CO_2 Eq. for methane (CH_4), and 5.5 MMT CO_2 Eq. for nitrous oxide (N_2O). Compared to 2005, the 2014 totals represent decreases in emissions for all three greenhouse gases (decreases of 6.1 percent for CO_2, 10.5 percent for CH_4, and 20.3 percent for N_2O). Emissions from fossil fuels produced on Federal lands represent, on average, 23.7 percent of national emissions for CO_2, 7.3 percent for CH_4, and 1.5 percent for N_2O over the 10 years included in this estimate.*

Merrill et. al (2018) also found that of the total nationwide emission estimates for federal minerals (1,279.53 MMT), federal lands in Wyoming contributed approximately 727,700,000 million tons (MT) (727.7 MMT) (57%) of CO_2e in 2014. Compared to these nationwide federal totals, Wyoming's 2014 federal direct emissions from extractive activities in oil and natural gas systems were 9,089,000 MT (9.089 MMT) CO_2e[2], and indirect emissions from stationary combustion activities totaled 75,180,000 MT (75.18 MMT). In contrast, coal mining on federal lands in Wyoming in 2014 contributed approximately 3,800,000 MT (3.8 MMT) CO_2e[3], and combustion emissions from coal use and mobile combustion make up the remainder.

[1] As it relates to information presented in Merrill et al. and the Wyoming Oil and Gas Conservation Commission calculations, emissions are based on raw production information (rather than being produced from a well emission factor through an air quality analysis, which would have included specific BTU and therm information). They are generally presented in total CO_2, even though the Environmental Protection Agency (EPA) Equivalencies Calculator reports them as CO_2e. All calculated indirect emission estimates presented in this EIS were calculated using the EPA Equivalencies Calculator and are presented as CO_2e. Regional emission comparisons are also presented in CO_2e, even though they are reported as CO_2 in Merrill et al., for consistency purposes.

[2] Extractive emissions are defined as (at 22) "[e]missions of greenhouse gases from ongoing extraction activities and product transportation in the petroleum and natural gas industries," and stationary combustion emissions are defined as "greenhouse gases produced during the combustion of fossil fuels in all nontransportation sectors, including electricity generation, industrial feedstocks, and residential and commercial heating."

[3] The 2015 Buffalo RMP final EIS (at 694) estimates that in the year 2024 (year of peak emissions), direct GHGs from future coal mining in that planning area could be 10,157,051 MT of CO_2e; the Buffalo Field Office has the largest share of coal production in the continental United States.

From 2005 through 2014, the highest CO_2e emissions in Wyoming from federal fossil fuel development were in 2008 (the total was 889,500,000 MT or 889.5 MMT). Overall, nationwide emissions from federal lands decreased from 2005 levels in 2014: "The 2014 totals represent decreases in emissions for all three greenhouse gases compared to 2005 values, with reductions of 6.1 percent for CO_2, 10.5 percent for CH_4, and 20.3 percent for N_2O [nitrous oxide]."

Merrill et al. (2018) also report the following:

> *In general, as of 2014, Wyoming, offshore Gulf, New Mexico, Louisiana, and Colorado had the highest CO2 emissions from fuels produced on Federal lands. . . . The CO2 emissions attributed to Federal lands in Wyoming are 57 percent of the total from Federal lands in all States and offshore areas combined. Emissions estimates for the release of CH4 are also highest for Federal lands in Wyoming (28 percent), followed by New Mexico, offshore Gulf, Colorado, and Utah. . . .*
>
> *Unsurprisingly, the trends and relative magnitudes of the emissions estimated are roughly parallel to the Federal lands production volumes (U.S. Energy Information Administration, 2015a). States that produced the most fuel from Federal lands are associated with the highest emissions for CO2, CH4, and N2O. These relationships vary slightly relative to absolute production because different fuels require different extraction methods and fuel uses emit varying amounts of greenhouse gases.*

While Merrill et al. (2018) report that emissions from all fossil fuel development on federal lands in Wyoming totaled approximately 727,700,000 MT/year, they also note that approximately 26,200,000 MT is sequestered by natural resources, such that the net total CO_2 emissions from fossil fuel production in Wyoming is 701,500,00 MT.

Using 2014 production information from the Wyoming Oil and Gas Conservation Commission (WOGCC), the BLM calculated that total estimated indirect CO_2e emissions from all (federal, state, and private) oil and gas production in Wyoming was approximately 140,100,00 MT (140.1 MMT) CO_2e, whereas total oil production was 75,706,328 BBLs and natural gas production was 1,966,535,934 million cubic feet (MCF[4]). Using the USGS 2014 federal indirect emissions estimate, federal emissions accounted for approximately 53.6% of all indirect oil and gas emissions in Wyoming. Further, total Wyoming indirect emissions are approximately 11% of the national total (1,279 MMT) described by Merrill et al. (2018). In 2018, also based on WOGCC production information for all lands, total indirect CO_2e was 134,600,000 MT (total oil production was 83,538,577 BBLs and total natural gas production was 1,803,004,880 MCF).

National Greenhouse Gas Emissions

The EPA's *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2017* discusses total U.S. CO_2 emissions (EPA 2019):

> *In 2017, total gross U.S. greenhouse gas emissions were 6,456.7 MMT, or million metric tons, of carbon dioxide (CO_2) Eq. Total U.S. emissions have increased by 1.3 percent from 1990 to 2017, and emissions decreased from 2016 to 2017 by 0.5 percent (35.5 MMT CO_2 Eq.). The decrease in total greenhouse gas emissions between 2016 and 2017 was driven in part by a decrease in CO_2 emissions from fossil fuel combustion. The decrease in CO_2 emissions from fossil fuel combustion was a result of multiple factors, including a continued shift from coal to natural gas and increased use of renewable energy in the electric power sector, and milder weather that contributed to less overall electricity use.*

[4] Volumes converted to CO_2e using the EPA Greenhouse Gas Equivalencies Calculator.

> *Relative to 1990, the baseline for this Inventory, gross emissions in 2017 are higher by 1.3 percent, down from a high of 15.7 percent above 1990 levels in 2007. Overall, net emissions in 2017 were 13.0 percent below 2005 levels as shown in Table ES-2.*
>
> *Between 1990 and 2017, CO_2 emissions from fossil fuel combustion increased from 4,738.8 MMT CO_2 Eq. to 4,912.0 MMT CO_2 Eq., a 3.7 percent total increase over the twenty-eight-year period. Conversely, CO_2 emissions from fossil fuel combustion decreased by 832.8 MMT CO_2 Eq. from 2005 levels, a decrease of approximately 14.5 percent between 2005 and 2017. From 2016 to 2017, these emissions decreased by 49.9 MMT CO_2 Eq. (1.0 percent).*

These data coincide with information from the EIA (Comstock 2019), which found the following:

> *[I]n 2015, natural gas emissions surpassed coal emissions, and the AEO [Annual Energy Outlook] 2019 Reference case projects that natural gas CO2 emissions will continue increasing as natural gas use increases. The U.S. electric power sector—now the largest consuming sector for natural gas—has added generating capacity from natural gas in recent years and has used those power plants more often. Natural gas surpassed coal to become the most prevalent fuel used to generate electricity in the United States in 2016.*
>
> *Other sectors have also increased their consumption of natural gas. By the mid-2020s, EIA projects that the industrial sector will again become the largest consumer of natural gas, using natural gas as a feedstock in chemical industries, as lease and plant fuel, for industrial heat and power applications, and for liquefied natural gas production. The residential and commercial sectors are also expected to continue using more natural gas. For instance, EIA projects that natural gas furnaces and boilers will be used in 55% of U.S. homes in 2050, an increase from their 49% share in 2018.*
>
> *Coal CO2 emissions in the United States are almost all from the electric power sector. Only about 10% of coal CO2 emissions came from the industrial sector in 2018, and this percentage is expected to remain the same through 2050. Although the AEO2019 Reference case projects that nearly one-third of the existing coal-fired electricity generating capacity retires within the next decade, the surviving fleet is used more often, meaning coal's projected decline in electricity generation is less than the capacity retirements would suggest.*

The EPA's *Inventory of U.S. Greenhouse Gas Emissions and Sink. 1990-2017* (EPA 2019) and estimates of United States emissions from the Global Carbon Project show that on average, the United States accounts for 14.2% of the global fossil fuel CO_2 emissions on an annual basis (since 2015). According to the EIA, domestic energy production accounts for approximately 90% of all United States energy consumption. The three major fossil fuels—petroleum (28%), natural gas (31.8%), and coal (17.8%)—combined accounted for approximately 77.6% of this production, whereas renewable energy sources (12.7%) and nuclear electric power (9.6%) account for the remainder. The EIA's Annual Energy Outlook (AEO) report provides modeled projections of domestic energy markets through 2050, and includes cases with different assumptions regarding macroeconomic growth, world oil prices, technological progress, and energy policies. In general, the last few years of baseline reference case data have shown strong domestic production coupled with relatively flat energy demand. The reference case estimates that natural gas consumption will grow the most on an absolute basis (0.8% annually), and nonhydroelectric renewables will grow the most on a percentage basis. Petroleum and coal annual growth is projected to be negative over the projection period, at -0.3% and -0.2% respectively. The outlook suggests that the United States could become a net energy exporter over the projection period in most cases.

In trying to model climate changes under varying scenarios, the Fourth National Climate Assessment concludes the following:

> Ultimately, however, the magnitude of human-induced climate change depends less on the year-to-year emissions than it does on the net amount of carbon, or cumulative carbon, emitted into the atmosphere. The lower the atmospheric concentrations of CO2, the greater the chance that eventual global temperature change will not reach the high end temperature projections, or possibly remain below 3.6°F (2°C) relative to preindustrial levels.
>
> The timing and magnitude of projected future climate change is uncertain due to the ambiguity introduced by human choices (as discussed in Section 4.2), natural variability, and scientific uncertainty, which includes uncertainty in both scientific modeling and climate sensitivity.

Under various modelled scenarios where concentrations (of $CO_{2)}$] would exceed 400 parts per million sustained over long periods of time (tens of thousands of years), some of the projected changes could include increases in temperature in the range of 9 to 14 degree Fahrenheit (5 to 8 degrees Celsius) and conditions analogous to the Eocene, a time in which there were no permanent land-based ice sheets.

The assessment also found, however, that

> Net cumulative CO2 emissions in the industrial era will largely determine long-term, global mean temperature change. A robust feature of model climate change simulations is a nearly linear relationship between cumulative CO2 emissions and global mean temperature increases, irrespective of the details and exact timing of the emissions pathway . . . . Limiting and stabilizing warming to any level implies that there is a physical upper limit to the cumulative amount of CO2 that can be added to the atmosphere. [] Eventually stabilizing the global temperature requires CO2 emissions to approach zero. [] Thus, for a 3.6° F (2°C) or any desired global mean warming goal, an estimated range of cumulative CO2 emissions from the current period onward can be calculated. The key sources of uncertainty for any compatible, forward looking CO2 budget associated with a given future warming objective include the climate sensitivity, the response of the carbon cycle including feedbacks (for example, the release of GHGs from permafrost thaw), the amount of past CO2 emissions, and the influence of past and future non-CO2 species.

OIL AND GAS PRODUCTION AND CARBON DIOXIDE EQUIVALENT CALCULATIONS FROM POTENTIAL INCREASE IN CARBON DIOXIDE FLOODING

Table I-3. Total Carbon Dioxide Equivalent Calculations by Oil Field Based on 2019 Production Data

FLD_NAME	PROD 2019-Oil	Additional EOR Oil recovery based on 17.26% (Using 2019 production)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Total by Field	MMBO	BCF per MMBO (0.72 average)	MCF of CO2
ASH CREEK	3,147	543.2	3,690.2	4,233.3	4,776.5	5,319.7	5,862.9	6,406.0	6,949.2	7,492.4	8,035.5	8,578.7	8,423.7	8,268.7	8,113.8	7,958.8	7,803.8	7,648.8	7,493.8	7,338.8	7,183.8	7,028.8	138,762.4	0.13876238	0.099908914	99,908.9
BONE PILE	52,058	8,985.2	61,043.2	70,028.4	79,013.6	87,998.8	96,984.1	105,969.3	114,954.5	123,939.7	132,924.9	141,910.1	139,346.3	136,782.5	134,218.7	131,654.8	129,091.0	126,527.2	123,963.4	121,399.6	118,835.8	116,272.0	2,295,421.7	2.295421672	1.652703604	1,652,703.6
DEAD HORSE CREEK	8,617	1,487.3	10,104.3	11,591.6	13,078.9	14,566.2	16,053.5	17,540.8	19,028.1	20,515.4	22,002.6	23,489.9	23,065.6	22,641.2	22,216.8	21,792.4	21,368.0	20,943.7	20,519.3	20,094.9	19,670.5	19,246.1	379,954.1	0.379954062	0.273566924	273,566.9
GAS DRAW	10,235	1,766.6	12,001.6	13,768.1	15,534.7	17,301.2	19,067.8	20,834.4	22,600.9	24,367.5	26,134.0	27,900.6	27,396.5	26,892.5	26,388.4	25,884.3	25,380.3	24,876.2	24,372.2	23,868.1	23,364.0	22,860.0	451,297.4	0.451297415	0.324934139	324,934.1
HARTZOG DRAW	409,260	70,638.3	479,898.3	550,536.6	621,174.8	691,813.1	762,451.4	833,089.7	903,727.9	974,366.2	1,045,004.5	1,115,642.8	1,095,487.0	1,075,331.3	1,055,175.6	1,035,019.8	1,014,864.1	994,708.4	974,552.7	954,396.9	934,241.2	914,085.5	18,045,723.5	18.04572349	12.99292091	12,992,920.9
HELDT DRAW	20,235	3,492.6	23,727.6	27,220.1	30,712.7	34,205.2	37,697.8	41,190.4	44,682.9	48,175.5	51,668.0	55,160.6	54,164.1	53,167.5	52,170.9	51,174.4	50,177.8	49,181.3	48,184.7	47,188.1	46,191.6	45,195.0	892,232.8	0.892232847	0.64240765	642,407.6
HILIGHT	700,579	120,919.9	821,498.9	942,418.9	1,063,338.8	1,184,258.7	1,305,178.7	1,426,098.6	1,547,018.5	1,667,938.5	1,788,858.4	1,909,778.4	1,875,275.4	1,840,772.4	1,806,269.5	1,771,766.5	1,737,263.6	1,702,760.6	1,668,257.7	1,633,754.7	1,599,251.8	1,564,748.8	30,891,010.4	30.8910104	22.24152749	22,241,527.5
HOUSE CREEK	2,511,690	433,517.7	2,945,207.7	3,378,725.4	3,812,243.1	4,245,760.8	4,679,278.5	5,112,796.2	5,546,313.9	5,979,831.6	6,413,349.2	6,846,866.9	6,723,168.2	6,599,469.5	6,475,770.8	6,352,072.0	6,228,373.3	6,104,674.6	5,980,975.9	5,857,277.2	5,733,578.4	5,609,879.7	110,749,311.5	110.7493115	79.73950429	79,739,504.3
JEPSON DRAW	6,539	1,128.6	7,667.6	8,796.3	9,924.9	11,053.5	12,182.2	13,310.8	14,439.4	15,568.1	16,696.7	17,825.3	17,503.3	17,181.2	16,859.2	16,537.2	16,215.1	15,893.1	15,571.0	15,249.0	14,926.9	14,604.9	288,327.7	0.288327679	0.207595929	207,595.9
KITTY	19,326	3,335.7	22,661.7	25,997.3	29,333.0	32,668.7	36,004.3	39,340.0	42,675.7	46,011.3	49,347.0	52,682.7	51,730.9	50,779.1	49,827.3	48,875.5	47,923.7	46,971.9	46,020.1	45,068.4	44,116.6	43,164.8	852,151.8	0.852151816	0.613549307	613,549.3
LAZY B	8,818	1,522.0	10,340.0	11,862.0	13,384.0	14,905.9	16,427.9	17,949.9	19,471.9	20,993.9	22,515.9	24,037.9	23,603.6	23,169.3	22,735.0	22,300.8	21,866.5	21,432.2	20,997.9	20,563.6	20,129.4	19,695.1	388,816.9	0.388816864	0.279948142	279,948.1
MEADOW CREEK	12,146	2,096.4	14,242.4	16,338.8	18,435.2	20,531.6	22,628.0	24,724.4	26,820.8	28,917.2	31,013.6	33,110.0	32,511.8	31,913.6	31,315.5	30,717.3	30,119.1	29,520.9	28,922.7	28,324.5	27,726.4	27,128.2	535,560.2	0.535560176	0.385603327	385,603.3
MILL - GILLETTE	341	58.9	399.9	458.7	517.6	576.4	635.3	694.1	753.0	811.9	870.7	929.6	912.8	896.0	879.2	862.4	845.6	828.8	812.0	795.2	778.4	761.6	15,035.9	0.015035898	0.010825847	10,825.8
PINE TREE	106,602	18,399.5	125,001.5	143,401.0	161,800.5	180,200.0	198,599.5	216,999.0	235,398.5	253,798.0	272,197.5	290,597.1	285,347.0	280,096.9	274,846.9	269,596.8	264,346.7	259,096.7	253,846.6	248,596.5	243,346.5	238,096.4	4,700,459.9	4.700459892	3.384331122	3,384,331.1
PORCUPINE	11,859	2,046.9	13,905.9	15,952.7	17,999.6	20,046.5	22,093.3	24,140.2	26,187.0	28,233.9	30,280.8	32,327.6	31,743.6	31,159.5	30,575.5	29,991.4	29,407.4	28,823.4	28,239.3	27,655.3	27,071.2	26,487.2	522,905.3	0.522905329	0.376491837	376,491.8
RECLUSE	4,012	692.5	4,704.5	5,396.9	6,089.4	6,781.9	7,474.4	8,166.8	8,859.3	9,551.8	10,244.2	10,936.7	10,739.1	10,541.5	10,343.9	10,146.4	9,948.8	9,751.2	9,553.6	9,356.0	9,158.4	8,960.8	176,903.3	0.176903295	0.127370373	127,370.4
REEL	31,375	5,415.3	36,790.3	42,205.7	47,621.0	53,036.3	58,451.6	63,867.0	69,282.3	74,697.6	80,112.9	85,528.3	83,983.1	82,437.9	80,892.7	79,347.5	77,802.3	76,257.1	74,711.9	73,166.7	71,621.5	70,076.3	1,383,434.9	1.383434918	0.996073141	996,073.1
RENO	68,885	11,889.6	80,774.6	92,664.1	104,553.7	116,443.2	128,332.8	140,222.3	152,111.9	164,001.4	175,891.0	187,780.5	184,388.0	180,995.4	177,602.9	174,210.4	170,817.9	167,425.3	164,032.8	160,640.3	157,247.7	153,855.2	3,037,383.7	3.037383723	2.186916281	2,186,916.3
ROCK CREEK	14,148	2,441.9	16,589.9	19,031.9	21,473.8	23,915.8	26,357.7	28,799.7	31,241.6	33,683.6	36,125.5	38,567.4	37,870.7	37,173.9	36,477.1	35,780.3	35,083.6	34,386.8	33,690.0	32,993.2	32,296.4	31,599.7	623,835.4	0.623835449	0.449161523	449,161.5
ROCKY POINT	66,624	11,499.3	78,123.3	89,622.6	101,121.9	112,621.2	124,120.5	135,619.8	147,119.1	158,618.4	170,117.7	181,617.0	178,335.8	175,054.7	171,773.5	168,492.3	165,211.1	161,930.0	158,648.8	155,367.6	152,086.4	148,805.2	2,937,688.2	2.937688222	2.11513552	2,115,135.5
ROZET	77,127	13,312.1	90,439.1	103,751.2	117,063.4	130,375.5	143,687.6	156,999.7	170,311.8	183,624.0	196,936.1	210,248.2	206,449.8	202,651.3	198,852.9	195,054.4	191,256.0	187,457.5	183,659.1	179,860.7	176,062.2	172,263.8	3,400,802.7	3.400802706	2.448577949	2,448,577.9
SANDBAR EAST	36,815	6,354.3	43,169.3	49,523.5	55,877.8	62,232.1	68,586.3	74,940.6	81,294.9	87,649.2	94,003.4	100,357.7	98,544.6	96,731.5	94,918.4	93,105.3	91,292.1	89,479.0	87,665.9	85,852.8	84,039.7	82,226.6	1,623,303.8	1.623303793	1.168778731	1,168,778.7
SLATTERY	100,890	17,413.6	118,303.6	135,717.2	153,130.8	170,544.5	187,958.1	205,371.7	222,785.3	240,198.9	257,612.5	275,026.1	270,057.4	265,088.6	260,119.9	255,151.1	250,182.4	245,213.6	240,244.9	235,276.1	230,307.4	225,338.6	4,448,597.6	4.448597573	3.202990253	3,202,990.3
SPRINGEN RANCH	11,545	1,992.7	13,537.7	15,530.3	17,523.0	19,515.7	21,508.3	23,501.0	25,493.7	27,486.3	29,479.0	31,471.7	30,903.1	30,334.5	29,765.9	29,197.3	28,628.8	28,060.2	27,491.6	26,923.0	26,354.4	25,785.8	509,060.0	0.509059956	0.366523168	366,523.2
SUSSEX	13,745	2,372.4	16,117.4	18,489.8	20,862.2	23,234.5	25,606.9	27,979.3	30,351.7	32,724.1	35,096.5	37,468.9	36,791.9	36,115.0	35,438.1	34,761.1	34,084.2	33,407.3	32,730.4	32,053.4	31,376.5	30,699.6	606,065.8	0.606065751	0.436367341	436,367.3
SUSSEX WEST	21,435	3,699.7	25,134.7	28,834.4	32,534.0	36,233.7	39,933.4	43,633.1	47,332.8	51,032.4	54,732.1	58,431.8	57,376.2	56,320.5	55,264.8	54,209.2	53,153.5	52,097.9	51,042.2	49,986.6	48,930.9	47,875.2	945,145.1	0.945145098	0.680504471	680,504.5
TABLE MOUNTAIN	61,666	10,643.6	72,309.6	82,953.1	93,596.7	104,240.2	114,883.8	125,527.3	136,170.9	146,814.4	157,458.0	168,101.5	165,064.5	162,027.5	158,990.5	155,953.5	152,916.5	149,879.5	146,842.5	143,805.5	140,768.5	137,731.5	2,719,072.4	2.719072435	1.957732153	1,957,732.2
TIMBER CREEK	152,446	26,312.2	178,758.2	205,070.4	231,382.5	257,694.7	284,006.9	310,319.1	336,631.3	362,943.4	389,255.6	415,567.8	408,060.0	400,552.1	393,044.3	385,536.4	378,028.6	370,520.7	363,012.9	355,505.0	347,997.2	340,489.4	6,721,884.3	6.721884287	4.839756686	4,839,756.7
AUSTIN CREEK	4,529	781.7	5,310.7	6,092.4	6,874.1	7,655.8	8,437.5	9,219.2	10,000.9	10,782.6	11,564.3	12,346.1	12,123.0	11,900.0	11,676.9	11,453.9	11,230.8	11,007.8	10,784.7	10,561.7	10,338.6	10,115.6	199,699.7	0.199699657	0.143783753	143,783.8
BIG MUDDY	14,413	2,487.7	16,900.7	19,388.4	21,876.1	24,363.7	26,851.4	29,339.1	31,826.8	34,314.5	36,802.2	39,289.8	38,580.0	37,870.2	37,160.4	36,450.5	35,740.7	35,030.9	34,321.0	33,611.2	32,901.4	32,191.6	635,520.2	0.635520238	0.457574571	457,574.6

FLD_NAME	PROD 2019-Oil	Additional EOR Oil recovery based on 17.26% (Using 2019 production)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Total by Field	MMBO	BCF per MMBO (0.72 average)	MCF of CO2
COLE CREEK	19,783	3,414.5	23,197.5	26,612.1	30,026.6	33,441.2	36,855.7	40,270.3	43,684.8	47,099.4	50,513.9	53,928.5	52,954.2	51,979.9	51,005.6	50,031.3	49,057.0	48,082.7	47,108.4	46,134.1	45,159.8	44,185.5	872,302.6	0.872302565	0.628057847	628,057.8
COLE CREEK SOUTH	13,274	2,291.1	15,565.1	17,856.2	20,147.3	22,438.4	24,729.5	27,020.6	29,311.6	31,602.7	33,893.8	36,184.9	35,531.2	34,877.5	34,223.7	33,570.0	32,916.3	32,262.5	31,608.8	30,955.1	30,301.3	29,647.6	585,297.7	0.585297692	0.421414339	421,414.3
HORNBUCKLE	1,400,059	241,650.2	1,641,709.2	1,883,359.4	2,125,009.6	2,366,659.7	2,608,309.9	2,849,960.1	3,091,610.3	3,333,260.5	3,574,910.7	3,816,560.8	3,747,609.0	3,678,657.3	3,609,705.5	3,540,753.7	3,471,801.9	3,402,850.1	3,333,898.3	3,264,946.5	3,195,994.8	3,127,043.0	61,733,562.0	61.733562	44.44816464	44,448,164.6
KAYE	50,359	8,692.0	59,051.0	67,742.9	76,434.9	85,126.9	93,818.8	102,510.8	111,202.7	119,894.7	128,586.7	137,278.6	134,798.5	132,318.4	129,838.2	127,358.1	124,877.9	122,397.8	119,917.7	117,437.5	114,957.4	112,477.2	2,220,506.7	2.220506742	1.598764854	1,598,764.9
POISON SPIDER WEST	19,486	3,363.3	22,849.3	26,212.6	29,575.9	32,939.1	36,302.4	39,665.7	43,029.0	46,392.3	49,755.6	53,118.8	52,159.2	51,199.5	50,239.8	49,280.2	48,320.5	47,360.8	46,401.1	45,441.5	44,481.8	43,522.1	859,206.8	0.859206783	0.618628884	618,628.9
POWELL	87,580	15,116.3	102,696.3	117,812.6	132,928.9	148,045.2	163,161.5	178,277.8	193,394.2	208,510.5	223,626.8	238,743.1	234,429.8	230,116.6	225,803.3	221,490.1	217,176.9	212,863.6	208,550.4	204,237.1	199,923.9	195,610.6	3,861,712.5	3.861712513	2.78043301	2,780,433.0
SAGE SPRING CREEK	47,686	8,230.6	55,916.6	64,147.2	72,377.8	80,608.4	88,839.0	97,069.6	105,300.2	113,530.8	121,761.4	129,992.0	127,643.5	125,295.0	122,946.5	120,598.0	118,249.5	115,901.1	113,552.6	111,204.1	108,855.6	106,507.1	2,102,644.7	2.102644701	1.513904185	1,513,904.2
SALT CREEK EAST	370	63.9	433.9	497.7	561.6	625.4	689.3	753.2	817.0	880.9	944.8	1,008.6	990.4	972.2	954.0	935.7	917.5	899.3	881.1	862.8	844.6	826.4	16,314.6	0.016314611	0.01174652	11,746.5
SAND DUNES	38,442	6,635.1	45,077.1	51,712.2	58,347.3	64,982.4	71,617.4	78,252.5	84,887.6	91,522.7	98,157.8	104,792.9	102,899.7	101,006.4	99,113.2	97,219.9	95,326.7	93,433.5	91,540.2	89,647.0	87,753.8	85,860.5	1,695,044.0	1.695043988	1.220431671	1,220,431.7
SCOTT	1,108,980	191,409.9	1,300,389.9	1,491,799.9	1,683,209.8	1,874,619.8	2,066,029.7	2,257,439.7	2,448,849.6	2,640,259.6	2,831,669.5	3,023,079.5	2,968,463.1	2,913,846.7	2,859,230.3	2,804,614.0	2,749,997.6	2,695,381.2	2,640,764.8	2,586,148.5	2,531,532.1	2,476,915.7	48,898,857.5	48.89885754	35.20717743	35,207,177.4
SPEARHEAD RANCH	116,852	20,168.7	137,020.7	157,189.3	177,358.0	197,526.6	217,695.3	237,863.9	258,032.6	278,201.2	298,369.9	318,538.6	312,783.7	307,028.8	301,273.9	295,519.1	289,764.2	284,009.3	278,254.5	272,499.6	266,744.7	260,989.9	5,152,418.7	5.15241871	3.709741471	3,709,741.5
STEINLE RANCH	3,014	520.2	3,534.2	4,054.4	4,574.6	5,094.9	5,615.1	6,135.3	6,655.5	7,175.7	7,695.9	8,216.2	8,067.7	7,919.3	7,770.9	7,622.4	7,474.0	7,325.5	7,177.1	7,028.7	6,880.2	6,731.8	132,897.9	0.132897939	0.095686516	95,686.5
BYRON	349,511	60,325.6	409,836.6	470,162.2	530,487.8	590,813.4	651,139.0	711,464.6	771,790.2	832,115.8	892,441.4	952,767.0	935,553.8	918,340.7	901,127.6	883,914.4	866,701.3	849,488.2	832,275.0	815,061.9	797,848.8	780,635.6	15,411,178.4	15.41117838	11.09604843	11,096,048.4
ELK BASIN	876,889	151,351.0	1,028,240.0	1,179,591.1	1,330,942.1	1,482,293.2	1,633,644.2	1,784,995.2	1,936,346.3	2,087,697.3	2,239,048.4	2,390,399.4	2,347,213.3	2,304,027.3	2,260,841.2	2,217,655.1	2,174,469.0	2,131,282.9	2,088,096.8	2,044,910.8	2,001,724.7	1,958,538.6	38,665,143.0	38.665143	27.83890296	27,838,903.0
ELK BASIN SOUTH	24,493	4,227.5	28,720.5	32,948.0	37,175.5	41,403.0	45,630.5	49,858.0	54,085.4	58,312.9	62,540.4	66,767.9	65,561.7	64,355.4	63,149.1	61,942.9	60,736.6	59,530.4	58,324.1	57,117.8	55,911.6	54,705.3	1,079,983.2	1.079983154	0.777587871	777,587.9
FRANNIE	141,982	24,506.1	166,488.1	190,994.2	215,500.3	240,006.4	264,512.5	289,018.6	313,524.7	338,030.7	362,536.8	387,042.9	380,050.4	373,057.9	366,065.4	359,072.9	352,080.4	345,087.9	338,095.4	331,102.9	324,110.4	317,117.9	6,260,489.5	6.260489451	4.507552404	4,507,552.4
GARLAND	834,192	143,981.5	978,173.5	1,122,155.1	1,266,136.6	1,410,118.2	1,554,099.7	1,698,081.2	1,842,062.8	1,986,044.3	2,130,025.9	2,274,007.4	2,232,924.1	2,191,840.8	2,150,757.5	2,109,674.2	2,068,590.9	2,027,507.7	1,986,424.4	1,945,341.1	1,904,257.8	1,863,174.5	36,782,481.0	36.78248099	26.48338631	26,483,386.3
SAGE CREEK	73,313	12,653.8	85,966.8	98,620.6	111,274.5	123,928.3	136,582.1	149,235.9	161,889.8	174,543.6	187,197.4	199,851.2	196,240.6	192,630.0	189,019.4	185,408.8	181,798.2	178,187.6	174,577.0	170,966.4	167,355.8	163,745.2	3,232,629.9	3.232629933	2.327493551	2,327,493.6
Big Sand Draw	307,014	52,990.6	360,004.6	412,995.2	465,985.8	518,976.5	571,967.1	624,957.7	677,948.3	730,938.9	783,929.5	836,920.2	821,800.0	806,679.8	791,559.6	776,439.4	761,319.2	746,199.0	731,078.8	715,958.6	700,838.4	685,718.2	13,537,335.1	13.53733507	9.746881252	9,746,881.3
Grieve	92,810	16,019.0	108,829.0	124,848.0	140,867.0	156,886.0	172,905.0	188,924.0	204,943.0	220,962.0	236,981.1	253,000.1	248,429.2	243,858.4	239,287.6	234,716.8	230,146.0	225,575.2	221,004.3	216,433.5	211,862.7	207,291.9	4,092,321.7	4.092321744	2.946471656	2,946,471.7
CROOKS GAP	8,886	1,533.7	10,419.7	11,953.4	13,487.2	15,020.9	16,554.6	18,088.3	19,622.1	21,155.8	22,689.5	24,223.2	23,785.6	23,348.0	22,910.4	22,472.7	22,035.1	21,597.5	21,159.8	20,722.2	20,284.6	19,847.0	391,815.2	0.391815225	0.282106962	282,107.0
FULLER RESERVOIR	2,833	489.0	3,322.0	3,811.0	4,299.9	4,788.9	5,277.9	5,766.9	6,255.8	6,744.8	7,233.8	7,722.8	7,583.2	7,443.7	7,304.2	7,164.7	7,025.1	6,885.6	6,746.1	6,606.6	6,467.1	6,327.5	124,917.0	0.124917008	0.089940246	89,940.2
HAPPY SPRINGS	2,955	510.0	3,465.0	3,975.1	4,485.1	4,995.1	5,505.2	6,015.2	6,525.2	7,035.3	7,545.3	8,055.3	7,909.8	7,764.3	7,618.7	7,473.2	7,327.7	7,182.1	7,036.6	6,891.1	6,745.5	6,600.0	130,296.4	0.13029642	0.093813423	93,813.4
PILOT BUTTE	20,895	3,606.5	24,501.5	28,108.0	31,714.4	35,320.9	38,927.4	42,533.9	46,140.3	49,746.8	53,353.3	56,959.8	55,930.7	54,901.6	53,872.6	52,843.5	51,814.5	50,785.4	49,756.3	48,727.3	47,698.2	46,669.1	921,334.6	0.921334585	0.663360901	663,360.9
SAND DRAW NORTH	3,619	624.6	4,243.6	4,868.3	5,492.9	6,117.6	6,742.2	7,366.8	7,991.5	8,616.1	9,240.8	9,865.4	9,687.2	9,508.9	9,330.7	9,152.5	8,974.2	8,796.0	8,617.8	8,439.5	8,261.3	8,083.1	159,574.5	0.159574533	0.114893664	114,893.7
SHELDON	30,319	5,233.1	35,552.1	40,785.1	46,018.2	51,251.2	56,484.3	61,717.4	66,950.4	72,183.5	77,416.5	82,649.6	81,156.4	79,663.2	78,170.0	76,676.8	75,183.7	73,690.5	72,197.3	70,704.1	69,210.9	67,717.7	1,336,872.1	1.336872136	0.962547938	962,547.9
STEAMBOAT BUTTE	330,135	56,981.3	387,116.3	444,097.6	501,078.9	558,060.2	615,041.5	672,022.8	729,004.1	785,985.4	842,966.7	899,948.0	883,689.1	867,430.2	851,171.4	834,912.5	818,653.6	802,394.7	786,135.8	769,876.9	753,618.0	737,359.2	14,556,821.9	14.55682188	10.48091176	10,480,911.8
ANT HILLS NORTH	32,111	5,542.4	37,653.4	43,195.7	48,738.1	54,280.4	59,822.8	65,365.2	70,907.5	76,449.9	81,992.2	87,534.6	85,953.1	84,371.7	82,790.3	81,208.8	79,627.4	78,045.9	76,464.5	74,883.1	73,301.6	71,720.2	1,415,887.8	1.415887766	1.019439191	1,019,439.2
BUCK CREEK	18,555	3,202.6	21,757.6	24,960.2	28,162.8	31,365.4	34,568.0	37,770.6	40,973.2	44,175.7	47,378.3	50,580.9	49,667.1	48,753.3	47,839.5	46,925.7	46,011.8	45,098.0	44,184.2	43,270.4	42,356.6	41,442.7	818,155.7	0.818155694	0.5890721	589,072.1
CLARETON	53,939	9,309.9	63,248.9	72,558.7	81,868.6	91,178.5	100,488.4	109,798.2	119,108.1	128,418.0	137,727.8	147,037.7	144,381.3	141,724.8	139,068.4	136,411.9	133,755.5	131,099.0	128,442.5	125,786.1	123,129.6	120,473.2	2,378,361.6	2.378361627	1.712420371	1,712,420.4
DONKEY CREEK	27,196	4,694.0	31,890.0	36,584.1	41,278.1	45,972.1	50,666.1	55,360.2	60,054.2	64,748.2	69,442.3	74,136.3	72,796.9	71,457.5	70,118.2	68,778.8	67,439.4	66,100.0	64,760.6	63,421.2	62,081.9	60,742.5	1,199,168.0	1.199168001	0.863400961	863,401.0
KUMMERFIELD	8,497	1,466.6	9,963.6	11,430.2	12,896.7	14,363.3	15,829.9	17,296.5	18,763.1	20,229.7	21,696.2	23,162.8	22,744.4	22,325.9	21,907.4	21,488.9	21,070.5	20,652.0	20,233.5	19,815.1	19,396.6	18,978.1	374,662.8	0.374662837	0.269757242	269,757.2

FLD_NAME	PROD 2019-Oil	Additional EOR Oil recovery based on 17.26% (Using 2019 production)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Total by Field	MMBO	BCF per MMBO (0.72 average)	MCF of CO2
LANCE CREEK	41,379	7,142.0	48,521.0	55,663.0	62,805.0	69,947.1	77,089.1	84,231.1	91,373.1	98,515.1	105,657.1	112,799.2	110,761.3	108,723.4	106,685.5	104,647.6	102,609.7	100,571.9	98,534.0	96,496.1	94,458.2	92,420.3	1,824,546.7	1.824546724	1.313673641	1,313,673.6
MUSH CREEK	13,952	2,408.1	16,360.1	18,768.2	21,176.3	23,584.5	25,992.6	28,400.7	30,808.8	33,216.9	35,625.0	38,033.2	37,346.0	36,658.9	35,971.8	35,284.7	34,597.5	33,910.4	33,223.3	32,536.2	31,849.0	31,161.9	615,193.1	0.615193115	0.442939043	442,939.0
SKULL CREEK	9,266	1,599.3	10,865.3	12,464.6	14,063.9	15,663.2	17,262.6	18,861.9	20,461.2	22,060.5	23,659.8	25,259.1	24,802.8	24,346.4	23,890.1	23,433.7	22,977.4	22,521.1	22,064.7	21,608.4	21,152.0	20,695.7	408,570.8	0.408570771	0.294170955	294,171.0
Big Hand	15,475	2,671.0	18,146.0	20,817.0	23,488.0	26,158.9	28,829.9	31,500.9	34,171.9	36,842.9	39,513.9	42,184.9	41,422.7	40,660.6	39,898.5	39,136.3	38,374.2	37,612.1	36,849.9	36,087.8	35,325.7	34,563.5	682,347.6	0.682347581	0.491290258	491,290.3
Dry Gulch	22,411	3,868.1	26,279.1	30,147.3	34,015.4	37,883.6	41,751.7	45,619.8	49,488.0	53,356.1	57,224.2	61,092.4	59,988.7	58,884.9	57,781.2	56,677.5	55,573.8	54,470.0	53,366.3	52,262.6	51,158.9	50,055.1	988,180.4	0.988180397	0.711489886	711,489.9
Frisby South	27,425	4,733.6	32,158.6	36,892.1	41,625.7	46,359.2	51,092.8	55,826.3	60,559.9	65,293.4	70,027.0	74,760.6	73,409.9	72,059.2	70,708.6	69,357.9	68,007.3	66,656.6	65,305.9	63,955.3	62,604.6	61,254.0	1,209,265.4	1.209265422	0.870671104	870,671.1
Glenrock South	25,405	4,384.9	29,789.9	34,174.8	38,559.7	42,944.6	47,329.5	51,714.4	56,099.3	60,484.2	64,869.1	69,254.0	68,002.9	66,751.7	65,500.5	64,249.3	62,998.2	61,747.0	60,495.8	59,244.6	57,993.4	56,742.3	1,120,196.5	1.120196465	0.806541455	806,541.5
Halverson	40,305	6,956.6	47,261.6	54,218.3	61,174.9	68,131.6	75,088.2	82,044.9	89,001.5	95,958.1	102,914.8	109,871.4	107,886.4	105,901.5	103,916.5	101,931.5	99,946.5	97,961.5	95,976.5	93,991.5	92,006.5	90,021.5	1,777,190.3	1.777190259	1.279576986	1,279,577.0
Lake Creek	16,495	2,847.0	19,342.0	22,189.1	25,036.1	27,883.1	30,730.2	33,577.2	36,424.3	39,271.3	42,118.3	44,965.4	44,153.0	43,340.6	42,528.3	41,715.9	40,903.5	40,091.2	39,278.8	38,466.4	37,654.1	36,841.7	727,323.0	0.727322995	0.523672556	523,672.6
Luckey Ditch	82,800	14,291.3	97,091.3	111,382.6	125,673.8	139,965.1	154,256.4	168,547.7	182,839.0	197,130.2	211,421.5	225,712.8	221,635.0	217,557.1	213,479.3	209,401.5	205,323.6	201,245.8	197,168.0	193,090.1	189,012.3	184,934.5	3,650,945.4	3.650945377	2.628680671	2,628,680.7
Moorcroft West	33,696	5,815.9	39,511.9	45,327.9	51,143.8	56,959.7	62,775.6	68,591.6	74,407.5	80,223.4	86,039.4	91,855.3	90,195.8	88,536.3	86,876.8	85,217.3	83,557.8	81,898.3	80,238.8	78,579.3	76,919.8	75,260.3	1,485,776.0	1.485776032	1.069758743	1,069,758.7
Rattlesnake	19,171	3,308.9	22,479.9	25,788.8	29,097.7	32,406.7	35,715.6	39,024.5	42,333.4	45,642.3	48,951.2	52,260.1	51,316.0	50,371.8	49,427.7	48,483.5	47,539.4	46,595.2	45,651.1	44,706.9	43,762.7	42,818.6	845,317.3	0.845317317	0.608628468	608,628.5
Raven Creek	37,627	6,494.4	44,121.4	50,615.8	57,110.3	63,604.7	70,099.1	76,593.5	83,087.9	89,582.4	96,076.8	102,571.2	100,718.1	98,865.0	97,011.9	95,158.8	93,305.7	91,452.6	89,599.5	87,746.4	85,893.3	84,040.2	1,659,107.7	1.65910775	1.19455758	1,194,557.6
ESPY	23,973	4,137.7	28,110.7	32,248.5	36,386.2	40,524.0	44,661.7	48,799.4	52,937.2	57,074.9	61,212.7	65,350.4	64,169.7	62,989.1	61,808.4	60,627.8	59,447.1	58,266.5	57,085.8	55,905.2	54,724.5	53,543.9	1,057,054.5	1.057054511	0.761079248	761,079.2
MAHONEY DOME	11,274	1,945.9	13,219.9	15,165.8	17,111.7	19,057.6	21,003.5	22,949.4	24,895.2	26,841.1	28,787.0	30,732.9	30,177.7	29,622.5	29,067.2	28,512.0	27,956.7	27,401.5	26,846.3	26,291.0	25,735.8	25,180.6	497,110.6	0.497110606	0.357919636	357,919.6
QUEALY	21,649	3,736.6	25,385.6	29,122.2	32,858.9	36,595.5	40,332.1	44,068.7	47,805.3	51,541.9	55,278.6	59,015.2	57,949.0	56,882.8	55,816.6	54,750.4	53,684.2	52,618.0	51,551.8	50,485.6	49,419.4	48,353.2	954,581.1	0.954581117	0.687298404	687,298.4
BRADY	13,508	2,331.5	15,839.5	18,171.0	20,502.4	22,833.9	25,165.4	27,496.9	29,828.4	32,159.8	34,491.3	36,822.8	36,157.5	35,492.3	34,827.0	34,161.8	33,496.5	32,831.3	32,166.0	31,500.7	30,835.5	30,170.2	595,615.6	0.595615582	0.428843219	428,843.2
DESERT SPRINGS WEST	3,428	591.7	4,019.7	4,611.3	5,203.0	5,794.7	6,386.4	6,978.0	7,569.7	8,161.4	8,753.1	9,344.7	9,175.9	9,007.1	8,838.2	8,669.4	8,500.6	8,331.8	8,162.9	7,994.1	7,825.3	7,656.5	151,152.7	0.151152666	0.10882992	108,829.9
BLACK MOUNTAIN	106,201	18,330.3	124,531.3	142,861.6	161,191.9	179,522.2	197,852.5	216,182.8	234,513.0	252,843.3	271,173.6	289,503.9	284,273.6	279,043.3	273,813.0	268,582.7	263,352.4	258,122.0	252,891.7	247,661.4	242,431.1	237,200.8	4,682,778.4	4.682778381	3.371600435	3,371,600.4
COTTONWOOD CREEK	88,668	15,304.1	103,972.1	119,276.2	134,580.3	149,884.4	165,188.5	180,492.6	195,796.7	211,100.8	226,404.9	241,709.0	237,342.1	232,975.3	228,608.5	224,241.7	219,874.8	215,508.0	211,141.2	206,774.3	202,407.5	198,040.7	3,909,686.3	3.909686288	2.814974128	2,814,974.1
GEBO	116,176	20,052.0	136,228.0	156,280.0	176,331.9	196,383.9	216,435.9	236,487.9	256,539.8	276,591.8	296,643.8	316,695.8	310,974.2	305,252.6	299,531.1	293,809.5	288,087.9	282,366.3	276,644.8	270,923.2	265,201.6	259,480.0	5,122,611.5	5.122611475	3.688280262	3,688,280.3
GOLDEN EAGLE	28,685	4,951.0	33,636.0	38,587.1	43,538.1	48,489.1	53,440.2	58,391.2	63,342.2	68,293.2	73,244.3	78,195.3	76,782.6	75,369.9	73,957.2	72,544.5	71,131.7	69,719.0	68,306.3	66,893.6	65,480.9	64,068.2	1,264,823.3	1.264823287	0.910672766	910,672.8
GRASS CREEK	786,897	135,818.4	922,715.4	1,058,533.8	1,194,352.3	1,330,170.7	1,465,989.1	1,601,807.5	1,737,626.0	1,873,444.4	2,009,262.8	2,145,081.2	2,106,327.2	2,067,573.1	2,028,819.1	1,990,065.0	1,951,311.0	1,912,556.9	1,873,802.9	1,835,048.8	1,796,294.8	1,757,540.7	34,697,076.9	34.69707686	24.98189534	24,981,895.3
LITTLE SAND DRAW	21,282	3,673.3	24,955.3	28,628.5	32,301.8	35,975.1	39,648.4	43,321.6	46,994.9	50,668.2	54,341.5	58,014.7	56,966.6	55,918.5	54,870.4	53,822.2	52,774.1	51,726.0	50,677.9	49,629.8	48,581.6	47,533.5	938,398.8	0.938398786	0.675647126	675,647.1
MURPHY DOME	86,275	14,891.1	101,166.1	116,057.1	130,948.2	145,839.3	160,730.3	175,621.4	190,512.5	205,403.5	220,294.6	235,185.7	230,936.7	226,687.7	222,438.7	218,189.8	213,940.8	209,691.8	205,442.8	201,193.9	196,944.9	192,695.9	3,804,170.4	3.80417044	2.739002716	2,739,002.7
SLICK CREEK	6,360	1,097.7	7,457.7	8,555.5	9,653.2	10,750.9	11,848.7	12,946.4	14,044.2	15,141.9	16,239.6	17,337.4	17,024.1	16,710.9	16,397.7	16,084.5	15,771.2	15,458.0	15,144.8	14,831.6	14,518.3	14,205.1	280,434.9	0.280434935	0.201913153	201,913.2
TORCHLIGHT	61,214	10,565.5	71,779.5	82,345.1	92,910.6	103,476.1	114,041.7	124,607.2	135,172.8	145,738.3	156,303.8	166,869.4	163,854.6	160,839.9	157,825.1	154,810.4	151,795.7	148,780.9	145,766.2	142,751.4	139,736.7	136,722.0	2,699,142.2	2.699142153	1.94338235	1,943,382.4
	Sum		14,620,132.8	16,772,132.5	18,924,132.3	21,076,132.0	23,228,131.8	25,380,131.5	27,532,131.3	29,684,131.0	31,836,130.8	33,988,130.6	33,374,085.0	32,760,039.4	32,145,993.8	31,531,948.3	30,917,902.7	30,303,857.1	29,689,811.5	29,075,766.0	28,461,720.4	27,847,674.8	549,150,115.5		395,830,196.0	395.830196	BCF of CO_2 necessary
	CO2e		6,286,657.1	7,212,017.0	8,137,376.9	9,062,736.8	9,988,096.7	10,913,456.6	11,838,816.5	12,764,176.3	13,689,536.2	14,614,896.1	14,350,856.5	14,086,816.9	13,822,777.3	13,558,737.7	13,294,698.2	13,030,658.6	12,766,619.0	12,502,579.4	12,238,539.8	11,974,500.2	236,134,549.7			7,619,731,272.28	Mt os CO_2 necessary
	CO2e		15516606.27	17806366.53	20096126.78	22385887.04	24675647.3	26965407.56	29255167.81	31544928.07	33834688.33	36124448.59	35162419	34200389.41	33238359.82	32276330.23	31314300.64	30352271.05	29390241.47	28428211.88	27466182.29	26504152.7	566538132.8				
	Total CO2e	21,803,263.4	25,018,383.5	28,233,503.7	31,448,623.8	34,663,744.0	37,878,864.1	41,093,984.3	44,309,104.4	47,524,224.6	50,739,344.7	49,513,275.5	48,287,206.4	47,061,137.2	45,835,068.0	44,608,998.8	43,382,929.6	42,156,860.4	40,930,791.2	39,704,722.1	38,478,652.9	802,672,682.4				

Table I-4. Total CO_2e Calculations by Gas Field Based on 2019 Production Data

FLD_NAME	PROD 2019-Gas	Additional EOR Gas recovery based on 17.26% (Using 2019 production)	Annual Decline @6.2%	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
DESERT SPRINGS WEST	34960	6,034.1	2,541.6	40,994.1	47,028.2	53,062.3	59,096.4	65,130.5	71,164.6	77,198.7	83,232.8	89,266.9	95,301.0	92,759.3	90,217.7	87,676.1	85,134.4	82,592.8	80,051.2	77,509.5	74,967.9	72,426.3	69,884.6
ASH CREEK	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BYRON	12613	2,177.0	917.0	14,790.0	16,967.0	19,144.0	21,321.0	23,498.0	25,675.0	27,852.0	30,029.0	32,206.0	34,383.0	33,466.1	32,549.1	31,632.1	30,715.1	29,798.1	28,881.2	27,964.2	27,047.2	26,130.2	25,213.2
POISON SPIDER WEST	71452	12,332.6	5,194.6	83,784.6	96,117.2	108,449.8	120,782.5	133,115.1	145,447.7	157,780.3	170,112.9	182,445.5	194,778.2	189,583.5	184,388.9	179,194.2	173,999.6	168,804.9	163,610.3	158,415.6	153,221.0	148,026.3	142,831.7
Luckey Ditch	24186	4,174.5	1,758.4	28,360.5	32,535.0	36,709.5	40,884.0	45,058.5	49,233.0	53,407.5	57,582.0	61,756.5	65,931.0	64,172.7	62,414.3	60,656.0	58,897.6	57,139.3	55,380.9	53,622.6	51,864.2	50,105.9	48,347.5
BUCK CREEK	44603	7,698.5	3,242.7	52,301.5	60,000.0	67,698.4	75,396.9	83,095.4	90,793.9	98,492.3	106,190.8	113,889.3	121,587.8	118,345.1	115,102.4	111,859.7	108,617.0	105,374.3	102,131.6	98,888.9	95,646.2	92,403.6	89,160.9
MAHONEY DOME	2449	422.7	178.0	2,871.7	3,294.4	3,717.1	4,139.8	4,562.5	4,985.2	5,407.9	5,830.6	6,253.3	6,676.0	6,497.9	6,319.9	6,141.8	5,963.8	5,785.7	5,607.7	5,429.7	5,251.6	5,073.6	4,895.5
QUEALY	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPRINGEN RANCH	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STEINLE RANCH	40571	7,002.6	2,949.6	47,573.6	54,576.1	61,578.7	68,581.2	75,583.8	82,586.3	89,588.9	96,591.4	103,594.0	110,596.5	107,647.0	104,697.4	101,747.9	98,798.3	95,848.7	92,899.2	89,949.6	87,000.1	84,050.5	81,100.9
ELK BASIN SOUTH	111180	19,189.7	8,082.9	130,369.7	149,559.3	168,749.0	187,938.7	207,128.3	226,318.0	245,507.7	264,697.3	283,887.0	303,076.7	294,993.8	286,910.8	278,827.9	270,745.0	262,662.1	254,579.2	246,496.2	238,413.3	230,330.4	222,247.5
HAPPY SPRINGS	1997	344.7	145.2	2,341.7	2,686.4	3,031.0	3,375.7	3,720.4	4,065.1	4,409.8	4,754.5	5,099.1	5,443.8	5,298.6	5,153.5	5,008.3	4,863.1	4,717.9	4,572.7	4,427.5	4,282.3	4,137.2	3,992.0
SAND DRAW NORTH	20990	3,622.9	1,526.0	24,612.9	28,235.7	31,858.6	35,481.5	39,104.4	42,727.2	46,350.1	49,973.0	53,595.9	57,218.7	55,692.7	54,166.7	52,640.7	51,114.7	49,588.7	48,062.8	46,536.8	45,010.8	43,484.8	41,958.8
KUMMERFIELD	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRASS CREEK	227134	39,203.3	16,512.9	266,337.3	305,540.7	344,744.0	383,947.3	423,150.6	462,354.0	501,557.3	540,760.6	579,964.0	619,167.3	602,654.4	586,141.5	569,628.5	553,115.6	536,602.7	520,089.8	503,576.9	487,064.0	470,551.1	454,038.1
Halverson	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BONE PILE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DEAD HORSE CREEK	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAZY B	953	164.5	69.3	1,117.5	1,282.0	1,446.5	1,611.0	1,775.4	1,939.9	2,104.4	2,268.9	2,433.4	2,597.9	2,528.6	2,459.3	2,390.0	2,320.7	2,251.5	2,182.2	2,112.9	2,043.6	1,974.3	1,905.0
RENO	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUSTIN CREEK	3213	554.6	233.6	3,767.6	4,322.1	4,876.7	5,431.3	5,985.8	6,540.4	7,094.9	7,649.5	8,204.1	8,758.6	8,525.0	8,291.5	8,057.9	7,824.3	7,590.7	7,357.1	7,123.5	6,889.9	6,656.3	6,422.7
SALT CREEK EAST	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESPY	28274	4,880.1	2,055.6	33,154.1	38,034.2	42,914.3	47,794.4	52,674.5	57,554.6	62,434.6	67,314.7	72,194.8	77,074.9	75,019.4	72,963.8	70,908.3	68,852.7	66,797.2	64,741.6	62,686.0	60,630.5	58,574.9	56,519.4
JEPSON DRAW	7697	1,328.5	559.6	9,025.5	10,354.0	11,682.5	13,011.0	14,339.5	15,668.0	16,996.5	18,325.0	19,653.5	20,982.0	20,422.4	19,862.9	19,303.3	18,743.7	18,184.1	17,624.5	17,065.0	16,505.4	15,945.8	15,386.2
MILL - GILLETTE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TABLE MOUNTAIN	9343	1,612.6	679.2	10,955.6	12,568.2	14,180.8	15,793.4	17,406.0	19,018.6	20,631.2	22,243.8	23,856.4	25,469.0	24,789.8	24,110.5	23,431.3	22,752.0	22,072.8	21,393.5	20,714.3	20,035.0	19,355.8	18,676.5
CROOKS GAP	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Big Hand	10318	1,780.9	750.1	12,098.9	13,879.8	15,660.7	17,441.5	19,222.4	21,003.3	22,784.2	24,565.1	26,346.0	28,126.9	27,376.7	26,626.6	25,876.5	25,126.3	24,376.2	23,626.1	22,876.0	22,125.8	21,375.7	20,625.6
Moorcroft West	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HELDT DRAW	722	124.6	52.5	846.6	971.2	1,095.9	1,220.5	1,345.1	1,469.7	1,594.3	1,718.9	1,843.6	1,968.2	1,915.7	1,863.2	1,810.7	1,758.2	1,705.7	1,653.2	1,600.7	1,548.2	1,495.8	1,443.3
FRANNIE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DONKEY CREEK	529	91.3	38.5	620.3	711.6	802.9	894.2	985.5	1,076.8	1,168.1	1,259.4	1,350.7	1,442.1	1,403.6	1,365.1	1,326.7	1,288.2	1,249.8	1,211.3	1,172.8	1,134.4	1,095.9	1,057.5
GOLDEN EAGLE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dry Gulch	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

FLD_NAME	PROD 2019-Gas	Additional EOR Gas recovery based on 17.26% (Using 2019 production)	Annual Decline @6.2%	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Raven Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SANDBAR EAST	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SLATTERY	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COLE CREEK SOUTH	91	15.7	6.6	106.7	122.4	138.1	153.8	169.5	185.2	200.9	216.7	232.4	248.1	241.5	234.8	228.2	221.6	215.0	208.4	201.8	195.1	188.5	181.9
SAGE CREEK	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GAS DRAW	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROZET	4958	855.8	360.5	5,813.8	6,669.5	7,525.3	8,381.0	9,236.8	10,092.5	10,948.3	11,804.0	12,659.8	13,515.5	13,155.1	12,794.6	12,434.2	12,073.7	11,713.2	11,352.8	10,992.3	10,631.9	10,271.4	9,911.0
TIMBER CREEK	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glenrock South	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SAGE SPRING CREEK	22434	3,872.1	1,631.0	26,306.1	30,178.2	34,050.3	37,922.4	41,794.5	45,666.7	49,538.8	53,410.9	57,283.0	61,155.1	59,524.1	57,893.1	56,262.1	54,631.2	53,000.2	51,369.2	49,738.2	48,107.3	46,476.3	44,845.3
GARLAND	336615	58,099.7	24,472.3	394,714.7	452,814.5	510,914.2	569,014.0	627,113.7	685,213.5	743,313.2	801,413.0	859,512.7	917,612.5	893,140.2	868,667.9	844,195.5	819,723.2	795,250.9	770,778.6	746,306.3	721,834.0	697,361.7	672,889.3
LITTLE SAND DRAW	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rattlesnake	24297	4,193.7	1,766.4	28,490.7	32,684.3	36,878.0	41,071.6	45,265.3	49,459.0	53,652.6	57,846.3	62,040.0	66,233.6	64,467.2	62,700.8	60,934.4	59,167.9	57,401.5	55,635.1	53,868.7	52,102.3	50,335.8	48,569.4
SHELDON	22910	3,954.3	1,665.6	26,864.3	30,818.5	34,772.8	38,727.1	42,681.3	46,635.6	50,589.9	54,544.1	58,498.4	62,452.7	60,787.1	59,121.5	57,455.9	55,790.3	54,124.7	52,459.2	50,793.6	49,128.0	47,462.4	45,796.8
MURPHY DOME	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SLICK CREEK	28001	4,833.0	2,035.7	32,834.0	37,666.9	42,499.9	47,332.9	52,165.9	56,998.8	61,831.8	66,664.8	71,497.8	76,330.7	74,295.0	72,259.3	70,223.6	68,187.9	66,152.2	64,116.5	62,080.8	60,045.1	58,009.4	55,973.7
MEADOW CREEK	181897	31,395.4	13,224.1	213,292.4	244,687.8	276,083.3	307,478.7	338,874.1	370,269.5	401,665.0	433,060.4	464,455.8	495,851.2	482,627.1	469,403.0	456,178.8	442,954.7	429,730.6	416,506.4	403,282.3	390,058.2	376,834.1	363,609.9
BIG MUDDY	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COLE CREEK	9936	1,715.0	722.4	11,651.0	13,365.9	15,080.9	16,795.8	18,510.8	20,225.7	21,940.7	23,655.6	25,370.6	27,085.5	26,363.2	25,640.8	24,918.5	24,196.1	23,473.7	22,751.4	22,029.0	21,306.7	20,584.3	19,861.9
SAND DUNES	164744	28,434.8	11,977.1	193,178.8	221,613.6	250,048.4	278,483.3	306,918.1	335,352.9	363,787.7	392,222.5	420,657.3	449,092.1	437,115.1	425,138.0	413,160.9	401,183.8	389,206.7	377,229.6	365,252.5	353,275.5	341,298.4	329,321.3
TORCHLIGHT	11926	2,058.4	867.0	13,984.4	16,042.9	18,101.3	20,159.7	22,218.1	24,276.6	26,335.0	28,393.4	30,451.8	32,510.3	31,643.2	30,776.2	29,909.2	29,042.1	28,175.1	27,308.1	26,441.0	25,574.0	24,707.0	23,839.9
Frisby South	13582	2,344.3	987.4	15,926.3	18,270.5	20,614.8	22,959.0	25,303.3	27,647.5	29,991.8	32,336.0	34,680.3	37,024.5	36,037.1	35,049.7	34,062.2	33,074.8	32,087.4	31,100.0	30,112.5	29,125.1	28,137.7	27,150.3
Lake Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STEAMBOAT BUTTE	48241	8,326.4	3,507.2	56,567.4	64,893.8	73,220.2	81,546.6	89,873.0	98,199.4	106,525.8	114,852.2	123,178.6	131,505.0	127,997.8	124,490.6	120,983.4	117,476.3	113,969.1	110,461.9	106,954.7	103,447.5	99,940.4	96,433.2
MUSH CREEK	6947	1,199.1	505.1	8,146.1	9,345.1	10,544.2	11,743.2	12,942.3	14,141.3	15,340.4	16,539.4	17,738.5	18,937.5	18,432.5	17,927.4	17,422.4	16,917.3	16,412.2	15,907.2	15,402.1	14,897.1	14,392.0	13,887.0
BLACK MOUNTAIN	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROCKY POINT	17576	3,033.6	1,277.8	20,609.6	23,643.2	26,676.9	29,710.5	32,744.1	35,777.7	38,811.3	41,844.9	44,878.6	47,912.2	46,634.4	45,356.6	44,078.8	42,801.0	41,523.2	40,245.4	38,967.6	37,689.8	36,412.0	35,134.2
SUSSEX WEST	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FULLER RESERVOIR	90803	15,672.6	6,601.5	106,475.6	122,148.2	137,820.8	153,493.4	169,166.0	184,838.6	200,511.2	216,183.8	231,856.4	247,529.0	240,927.5	234,326.0	227,724.5	221,123.0	214,521.5	207,920.1	201,318.6	194,717.1	188,115.6	181,514.1
GEBO	3636	627.6	264.3	4,263.6	4,891.1	5,518.7	6,146.3	6,773.9	7,401.4	8,029.0	8,656.6	9,284.2	9,911.7	9,647.4	9,383.1	9,118.7	8,854.4	8,590.0	8,325.7	8,061.3	7,797.0	7,532.7	7,268.3
POWELL	1025352	176,975.8	74,544.3	1,202,327.8	1,379,303.5	1,556,279.3	1,733,255.0	1,910,230.8	2,087,206.5	2,264,182.3	2,441,158.0	2,618,133.8	2,795,109.6	2,720,565.2	2,646,020.9	2,571,476.6	2,496,932.3	2,422,387.9	2,347,843.6	2,273,299.3	2,198,755.0	2,124,210.7	2,049,666.3
PILOT BUTTE	12035	2,077.2	875.0	14,112.2	16,189.5	18,266.7	20,344.0	22,421.2	24,498.4	26,575.7	28,652.9	30,730.2	32,807.4	31,932.5	31,057.5	30,182.5	29,307.6	28,432.6	27,557.7	26,682.7	25,807.7	24,932.8	24,057.8
LANCE CREEK	36294	6,264.3	2,638.6	42,558.3	48,822.7	55,087.0	61,351.4	67,615.7	73,880.1	80,144.4	86,408.8	92,673.1	98,937.4	96,298.8	93,660.2	91,021.6	88,383.0	85,744.4	83,105.7	80,467.1	77,828.5	75,189.9	72,551.3
BRADY	341327	58,913.0	24,814.9	400,240.0	459,153.1	518,066.1	576,979.2	635,892.2	694,805.2	753,718.3	812,631.3	871,544.4	930,457.4	905,642.5	880,827.6	856,012.8	831,197.9	806,383.0	781,568.1	756,753.2	731,938.3	707,123.5	682,308.6
RECLUSE	9645	1,664.7	701.2	11,309.7	12,974.5	14,639.2	16,303.9	17,968.6	19,633.4	21,298.1	22,962.8	24,627.5	26,292.3	25,591.1	24,889.9	24,188.7	23,487.5	22,786.3	22,085.1	21,383.8	20,682.6	19,981.4	19,280.2
SKULL CREEK	241	41.6	17.5	282.6	324.2	365.8	407.4	449.0	490.6	532.2	573.8	615.4	657.0	639.4	621.9	604.4	586.9	569.4	551.8	534.3	516.8	499.3	481.8

FLD_NAME	PROD 2019-Gas	Additional EOR Gas recovery based on 17.26% (Using 2019 production)	Annual Decline @6.2%	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
KAYE	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
SUSSEX	42123	7,270.4	3,062.4	49,393.4	56,663.9	63,934.3	71,204.7	78,475.1	85,745.6	93,016.0	100,286.4	107,556.9	114,827.3	111,764.9	108,702.5	105,640.1	102,577.7	99,515.3	96,452.9	93,390.5	90,328.2	87,265.8	84,203.4	
ELK BASIN	3204628	553,118.8	232,980.3	3,757,746.8	4,310,865.6	4,863,984.4	5,417,103.2	5,970,222.0	6,523,340.8	7,076,459.5	7,629,578.3	8,182,697.1	8,735,815.9	8,502,835.6	8,269,855.3	8,036,875.0	7,803,894.7	7,570,914.4	7,337,934.1	7,104,953.8	6,871,973.5	6,638,993.2	6,406,012.9	
CLARETON	112908	19,487.9	8,208.5	132,395.9	151,883.8	171,371.8	190,859.7	210,347.6	229,835.5	249,323.4	268,811.4	288,299.3	307,787.2	299,578.7	291,370.1	283,161.6	274,953.0	266,744.5	258,535.9	250,327.4	242,118.8	233,910.3	225,701.7	
PORCUPINE	207067	35,739.8	15,054.0	242,806.8	278,546.5	314,286.3	350,026.1	385,765.8	421,505.6	457,245.3	492,985.1	528,724.9	564,464.6	549,410.6	534,356.6	519,302.6	504,248.6	489,194.5	474,140.5	459,086.5	444,032.5	428,978.5	413,924.4	
HARTZOG DRAW	100968	17,427.1	7,340.5	118,395.1	135,822.2	153,249.2	170,676.3	188,103.4	205,530.5	222,957.5	240,384.6	257,811.7	275,238.8	267,898.3	260,557.8	253,217.3	245,876.8	238,536.3	231,195.8	223,855.3	216,514.8	209,174.3	201,833.8	
KITTY	2287	394.7	166.3	2,681.7	3,076.5	3,471.2	3,865.9	4,260.7	4,655.4	5,050.2	5,444.9	5,839.6	6,234.4	6,068.1	5,901.8	5,735.6	5,569.3	5,403.0	5,236.8	5,070.5	4,904.2	4,738.0	4,571.7	
COTTONWOOD CREEK	207828	35,871.1	15,109.3	243,699.1	279,570.2	315,441.3	351,312.5	387,183.6	423,054.7	458,925.8	494,796.9	530,668.0	566,539.1	551,429.8	536,320.4	521,211.1	506,101.7	490,992.4	475,883.1	460,773.7	445,664.4	430,555.0	415,445.7	
HILIGHT	3596116	620,689.6	261,441.9	4,216,805.6	4,837,495.2	5,458,184.9	6,078,874.5	6,699,564.1	7,320,253.7	7,940,943.4	8,561,633.0	9,182,322.6	9,803,012.2	9,541,570.3	9,280,128.3	9,018,686.4	8,757,244.4	8,495,802.5	8,234,360.5	7,972,918.6	7,711,476.6	7,450,034.7	7,188,592.7	
HOUSE CREEK	2691904	464,622.6	195,704.7	3,156,526.6	3,621,149.3	4,085,771.9	4,550,394.5	5,015,017.2	5,479,639.8	5,944,262.4	6,408,885.0	6,873,507.7	7,338,130.3	7,142,425.7	6,946,721.0	6,751,016.4	6,555,311.7	6,359,607.0	6,163,902.4	5,968,197.7	5,772,493.1	5,576,788.4	5,381,083.8	
PINE TREE	220834	38,115.9	16,054.9	258,949.9	297,065.9	335,181.8	373,297.8	411,413.7	449,529.7	487,645.6	525,761.6	563,877.5	601,993.5	585,938.6	569,883.7	553,828.8	537,773.9	521,719.0	505,664.1	489,609.2	473,554.3	457,499.4	441,444.5	
REEL	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ROCK CREEK	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
HORNBUCKLE	3434807	592,847.7	249,714.6	4,027,654.7	4,620,502.4	5,213,350.1	5,806,197.8	6,399,045.4	6,991,893.1	7,584,740.8	8,177,588.5	8,770,436.2	9,363,283.9	9,113,569.3	8,863,854.7	8,614,140.1	8,364,425.5	8,114,710.9	7,864,996.3	7,615,281.7	7,365,567.2	7,115,852.6	6,866,138.0	
SCOTT	1865588	322,000.5	135,630.5	2,187,588.5	2,509,589.0	2,831,589.5	3,153,590.0	3,475,590.4	3,797,590.9	4,119,591.4	4,441,591.9	4,763,592.4	5,085,592.9	4,949,962.4	4,814,331.9	4,678,701.4	4,543,070.9	4,407,440.5	4,271,810.0	4,136,179.5	4,000,549.0	3,864,918.5	3,729,288.0	
SPEARHEAD RANCH	620337	107,070.2	45,099.2	727,407.2	834,477.3	941,547.5	1,048,617.7	1,155,687.8	1,262,758.0	1,369,828.2	1,476,898.3	1,583,968.5	1,691,038.7	1,645,939.4	1,600,840.2	1,555,740.9	1,510,641.7	1,465,542.4	1,420,443.2	1,375,344.0	1,330,244.7	1,285,145.5	1,240,046.2	
ANT HILLS	64400	11,115.4	4,682.0	75,515.4	86,630.9	97,746.3	108,861.8	119,977.2	131,092.6	142,208.1	153,323.5	164,439.0	175,554.4	170,872.4	166,190.5	161,508.5	156,826.6	152,144.6	147,462.7	142,780.7	138,098.7	133,416.8	128,734.8	
NORTH																								
Big Sand Draw	0	15,829.4	981.4	15,829.4	31,658.8	47,488.2	63,317.5	79,146.9	94,976.3	110,805.7	126,635.1	142,464.5	158,293.9	157,312.4	156,331.0	155,349.6	154,368.2	153,386.8	152,405.3	151,423.9	150,442.5	149,461.1	148,479.6	
Grieve	11321640	1,954,115.1	823,096.8	13,275,755.1	15,229,870.1	17,183,985.2	19,138,100.3	21,092,215.3	23,046,330.4	25,000,445.4	26,954,560.5	28,908,675.6	30,862,790.6	30,039,693.8	29,216,597.0	28,393,500.2	27,570,403.4	26,747,306.6	25,924,209.8	25,101,112.9	24,278,016.1	23,454,919.3	22,631,822.5	
			Sum	36,085,130.9	41,410,154.7	46,735,178.6	52,060,202.4	57,385,226.3	62,710,250.1	68,035,274.0	73,360,297.8	78,685,321.7	84,010,345.5	81,773,067.4	79,535,789.3	77,298,511.2	75,061,233.1	72,823,955.0	70,586,676.9	68,349,398.8	66,112,120.6	63,874,842.5	61,637,564.4	1,317,530,541.3
			CO2e	1,988,290.7	2,281,699.5	2,575,108.3	2,868,517.2	3,161,926.0	3,455,334.8	3,748,743.6	4,042,152.4	4,335,561.2	4,628,970.0	4,505,696.0	4,382,422.0	4,259,148.0	4,135,873.9	4,012,599.9	3,889,325.9	3,766,051.9	3,642,777.8	3,519,503.8	3,396,229.8	72,595,932.8

APPENDIX J

Grazing Allotment Supporting Data

LIVESTOCK GRAZING ALLOTMENTS IMPACTED

The following tables list the grazing allotments crossed by each of the three action alternatives. This information supports the Livestock Grazing analysis, found in Section 3.8 of the *Resource Management Plan Amendments/Environmental Impact Statement Wyoming Pipeline Corridor Initiative*. Information to support this analysis was acquired from the Bureau of Land Management (BLM) Rangeland Administration System[1].

Table 1. Alternative A: Grazing Allotments Impacted

Allotment Name	Allotment Number
NORTH BASIN GROUP	578
TORCHLIGHT	181
SOUTH BASIN	577
EAST BASIN DRAW	201
MANDERSON	36
SCHOOLHOUSE GULCH	99
SOUTH SLEEPER	683
BADGER GULCH	652
SAND CREEK	91
WEST FIVE MILE	651
ALAMO CREEK	664
RIMROCK BASIN	526
COW PASTURE	663
LAWLER SEC 15	2,555
LOWER SAND CREEK	73
10 MILE	671
NO. GOOSEBERRY	508
ENRIGHT	662
RATTLESNAKE RIDGE	34
GRASS POINT	545
SLICK WATER	162
SO. GOOSEBERRY GROUP	507
HOME	616
WORLAND CATTLE GROUP	7
NORTH GRASS CREEK	621
DENVER JAKE DRAW	153
GRASS CREEK	522
LOWER COTTONWOOD	521
D & LM IND	548

[1] Bureau of Land Management (BLM). 2020. Rangeland Administration System. Allotment Information Report. Available at: https://reports.blm.gov/report/RAS/1/Allotment-Information. Accessed February 25, 2020.

Allotment Name	Allotment Number
NELSON	665
NOWATER	105
LITTLE SAND DRAW	590
LOWER NOWATER	15
FREEMAN DRAW	625
SOUTH LUCERNE GROUP	502
EAST TANNER	511
GARDNER BADLANDS	562
KIRBY CREEK	589
RED SPRINGS DRAW	570
BLUE SPRINGS	501
ROCK SPRINGS DRAW	602
V PASTURE	2,547
SWALLOW	2,543
V-H DRAW	2,514
BLUE HILL	2,536
STUMP	2,542
COPPER MTN	655
REED CREEK	2,554
GRANGER LEASE	11,302
SEEDSKADEE	11,112
Cantril Jack Allot.	1,301
NORTH OF CB&Q R.R.	1,302
South of CB&Q RR	1,303
NORTH OF TRACKS	1,312
Moneta Hills Pasture	1,314
DITCH PASTURE	1,315
MADDEN RANCH PASTURE	1,316
BRANDAU RANCH ALLOT	1,317
ST.CLAIR SOUTH PAST.	1,322
HOODOO CREEK ALLOT	1,324
EAST OF RANCH	1,325
BOW & ARROW	1,332
DE PASS RANCH	1,337
PICARD PRIVATE ALLOT	1,339
SCOTT DRAW	1,351
CAMPBELL	1,353
LOOKOUT HILL	1,355
RAMAGE RANCH	1,359

Allotment Name	Allotment Number
CABIN PASTURE	1,366
RIM PASTURE	1,401
DELFELDER ALLOTMENT	1,402
CONANT CREEK COMMON	1,403
WM HERBST WINTER	1,404
POISON CREEK	1,406
MUSKRAT AMP	1,407
MUSKRAT OPEN	1,409
SHOSHONI ROAD	1,411
PIPELINE PASTURE	1,413
ANDERSON WINTER	1,414
HAYBARN HILL	1,417
LITTLE BUG PASTURE	1,518
Circle Bar Allotment	1,614
NORTH OF DRIFT FENCE	1,615
KEESTER	1,616
CABIN CREEK PASTURE	1,620
JJ WINTER PASTURES	1,629
TRAM ROAD PASTURE	1,630
GRANITE MOUNTAIN OPEN	1,636
GARSON RANCH	1,640
BIG PASTURE	1,703
BREEDING PASTURE	1,704
ICE SLOUGH	1,707
HAY MEADOW PASTURE	1,711
WHITLOCK FENCED	1,713
FENCED INDIVIDUAL	1,717
EAST BEAVER COMMON	1,801
SAND DRAW AMP	1,802
CROOKS GAP	2,023
MITCHELL PASTURE	2,028
MUSKRAT-LINN	11,501
FRASER DRAW	11,502
DIAMOND SPRINGS	11,509
NORTH DOBIE FLAT	11,511
BLACKJACK RANCH	11,513
BASIN PASTURE	11,516
BUG MEADOWS PASTURES	11,517
GREEN MT.FENCED	12,004

Allotment Name	Allotment Number
EAST ALLOTMENT	12,012
FENCED ALLOTMENT	12,013
ARAPAHOE CREEK	17,056
ANTELOPE HILLS	17,055
ALKALI CREEK SHEEP	17,057
SCHNOOR	140
SOUTH FORK CASPER CREEK	241
WYATT DRAW	244
WHEATFIELD	289
ROBINETT	455
POWDER RIVER DRAW	10,007
WALTMAN	10,008
HILAND	10,012
RAILROAD	10,013
CAMEL'S HUMP	10,014
CANTRIL-TODD	10,019
SUMMER BREWER	10,022
BECK PLACE	10,027
SOUTH HILAND	10,030
ERVAY BASIN	10,044
POISON SPIDER	10,045
POTTER	10,053
LITTLE RED CREEK	10,054
SHAMROCK	10,056
SULLIVAN	10,066
TEAPOT	10,068
PAUL PLACE	10,094
FENTON	10,095
FORGEY	10,096
HAUGHTON	10,107
SMOKEY GAP II	10,115
SMOKY GAP-H.JARRARD	10,118
MANNING	10,124
FORGEY PLACE	10,129
MILLER	10,130
PINE MOUNTAIN	10,134
BARKER	10,135
DEADHORSE II	10,137
TTT-SCOTTS PLACE	10,139

Allotment Name	Allotment Number
OKIE TRAIL	10,148
WEIDT	10,159
ELLIS DRAW	12,991
ECCLES	20,523
WYATT PLACE	20,530
TWENTYMILE HILL	31,004
G.L.	706
DALEY RANCH	605
NORTH TIPTON	715
NORTH WAMSUTTER	716
HAYSTACK RIVER PAST	708
MONUMENT LAKE	711
HAYSTACK	707
BROWNS CANYON	741
SLATE CREEK	11,113
Smith Cut	2,383
FLYNN DRAW	12,148
4Mile Creek/RC	12,182
Crazy Woman Creek	12,094
Montgomery	12,140
South Fork Powder R	2,389
Julio Draw	32,019
Michelena	12,227
Kingsbury/Wild Horse	22,202
Schiermiester	12,185
Clear Creek	2,093
Gosney, Elmer	2,395
Fourmile Ranch	2,379
Crooked Creek	2,426
NURSE DRAW	12,190
BEKEBREDE DRAW	22,127
West Timber Draw	2,170
Sussex Cutoff	12,167
Schoonover Ranch	22,214
South Fork	2,451
Hoe Ranch	12,169
Hepp Charles	12,153
Mitchell Draw	2,429
Rattlesnake Springs	12,098

Allotment Name	Allotment Number
Wall (East)	12,146
Grub Draw	2,469
Maycock Draw	22,221
T.W.	2,438
Flats	32,006
Powder River Ranch	2,260
Timber Draw	12,199
Salt Creek	2,411
Crenshaw Hill	12,218
Mark Gordon	2,368
Reno	2,385
Billy Creek	2,262
Dugout Creek	2,453
Gammon Draw	12,079
V Bar F	2,284
Lawrence Land Co. Inc.	12,188
Cat Creek	2,376
S. Fork Otter Creek	2,386
Vanderhoff	2,345
South Sussex StkRst	2,467
Sussex Stockrest	2,420
Falxa	12,139
Pumpkin Creek	12,138
Little Poison Creek	32,007
KURTLEY DRAW	12,056
CASTLE CREEK	10,144
Daley Reservoir	15,990
MATADOR	10,020
NORTH DAVIS	17,677
M & D	10,123
GAS HILLS	11,508
SMOKY GAP-SHEPPERSON	254
UPPER POISON SPIDER CREEK	14,289
ORMSBY	10,082
HIGHWAY JUNCTION	523
SUMMER ALLOTMENT	1,357
MARTON	40
33 MILE SDW	1,000
BLACK CANYON	323

Allotment Name	Allotment Number
DRY CREEK	321
LEO	320
INDIAN SPRINGS	315
ANDA	338
CANYON CREEK	303
LU	604
HILLBERRY RIM	579
FERRIS MOUNTAIN	10,207
PINE GROVE/BOLTEN	10,623
TIPTON	10,621
SOUTH RED DESERT	10,619
LAZY Y S RANCH	10,626
STEWART CREEK	10,102
ECHO SPRINGS	10,607
SIXTEEN MILE	10,616
Beaver Cr. Meadow Ind	2,142
SEMINOE	10,218
South Desert Allot.	2,040
SOUTH WAMSUTTER	10,620
CYCLONE RIM	10,103
S Piney Ranch Ind	2,074
Sand Draw Allotment	2,156
RINER	10,615
Beaver Cr. Ind	2,141
Labarge Unit Ind	2,194
STONE	10,221
N. Labarge Com	2,077
Horse Center	3,114
Polecat Bench	1,071
HOGG (GCRA)	3,033
Greenwald	3,045
East/West	1,060
GOULD NORTH IND	2,511
Holding Pasture	3,117
Lovell Group 5	1,050
Foster Gulch	1,039
Turnell	3,107
Oilwell	3,113
Big Horn River Riparian Tracts	1,081

Allotment Name	Allotment Number
Sand Hills 1043	1,043
Dump (WRA)	1,515
Badlands	1,087
Pitchfork	2,532
Cedar Mountain	2,528
Greybull Group	1,051
Meeteetse Rim	3,096
Homestead/Avent	2,564
Tonopah Ridge	2,544
Eagle Pass	3,035
Little Sheep Mountain	1,053
Kukla Section 15	2,523
Heart Mountain South 3099	3,099
Dry Creek Wildlife	14,243
Lovell Group 1	1,032
Red Cabin	3,079
South Lovell Group	1,052
Rush Creek	3,119
Heart Mountain South 3116	3,116
Meeteetse Creek 2561	2,561
Coal Creek	3,006
Stone Barn 15	3,112
Thumper	1,059
Little Dry Creek	3,061
Sand Hills 1054	1,054
Osborn	3,010
Cottonwood Creek	3,051
Meeteetse Creek 3031	3,031
Rawhide	3,098
91 Ranch	2,545
Trailing Pasture	3,065
Winniger	2,553
Chapman Bench 3086	3,086
Himes Group	1,031
Red Point	3,067
Big Trap	1,070
Oregon Basin	3,029
Individual 1061	1,061
SOUTH PHINNEY DRAW	16,896

Allotment Name	Allotment Number
NORTH PHINNEY DRAW	12,159
EMIGRANT GAP	10,050
BURKE	10,009
GOWIN	10,097
BATES HOLE SDW	1,500
GARRETT	10,032
SOUTH CAVE GULCH	10,006
F.L. RANCH	10,031
SOUTH DAVIS	10,039
NORTH WALCOTT	819
Hoodoo Base	3,048
Heart Mountain North	3,011
Himes-Spence	1,037
BYRON OIL FIELD	1,016
TWO BAR	10,002
EAGLE RIDGE	10,142
Red Desert	13,012
Little Sandy	13,003
Reservoir	13,006
Sublette	13,027
Sands	13,015
Rock Springs	13,018
Lombard	13,022
Bush Rim	13,013
Fourth of July	3,016
Eighteen Mile	13,017
Pacific Creek	13,007
Figure 4	13,023

Table 2. Alternative B: Grazing Allotments Impacted

Allotment Name	Allotment Number
SCHOOLHOUSE GULCH	99
SAND CREEK	91
WEST FIVE MILE	651
ALAMO CREEK	664
LOWER SAND CREEK	73
RATTLESNAKE RIDGE	34
SLICK WATER	162

Allotment Name	Allotment Number
GRASS CREEK	522
NELSON	665
LITTLE SAND DRAW	590
SWING INDIVIDUAL	641
FREEMAN DRAW	625
SOUTH LUCERNE GROUP	502
EAST TANNER	511
KIRBY CREEK	589
RED SPRINGS DRAW	570
BLUE SPRINGS	501
ROCK SPRINGS DRAW	602
Cantril Jack Allot.	1,301
BRANDAU RANCH ALLOT	1,317
MUSKRAT-LINN	11,501
ARAPAHOE CREEK	17,056
MCKENZIE DRAW	379
CANTRIL-TODD	10,019
ERVAY BASIN	10,044
COLE CREEK	10,087
SEVEN L	10,161
GEARY DOME	14,056
STRAND 2	14,057
NORTH WAMSUTTER	716
MATADOR	10,020
GAS HILLS	11,508
ORMSBY	10,082
LU	604
PINE GROVE/BOLTEN	10,623
STEWART CREEK	10,102
Beaver Cr. Meadow Ind	2,142
South Desert Allot.	2,040
SOUTH WAMSUTTER	10,620
CYCLONE RIM	10,103
S Piney Ranch Ind	2,074
Sand Draw Allotment	2,156
Beaver Cr. Ind	2,141
Labarge Unit Ind	2,194
STONE	10,221
N. Labarge Com	2,077

Allotment Name	Allotment Number
Polecat Bench	1,071
Lovell Group 5	1,050
Foster Gulch	1,039
Sand Hills 1043	1,043
Badlands	1,087
Little Sheep Mountain	1,053
Heart Mountain South 3099	3,099
South Lovell Group	1,052
Thumper	1,059
Sand Hills 1054	1,054
Big Trap	1,070
Individual 1061	1,061
Heart Mountain North	3,011
Himes-Spence	1,037
BYRON OIL FIELD	1,016
Sublette	13,027
Figure 4	13,023

Table 3. Alternative C: Grazing Allotments Impacted

Allotment Name	Allotment Number
NORTH BASIN GROUP	578
TORCHLIGHT	181
SOUTH BASIN	577
EAST BASIN DRAW	201
MANDERSON	36
SCHOOLHOUSE GULCH	99
SOUTH SLEEPER	683
BADGER GULCH	652
SAND CREEK	91
WEST FIVE MILE	651
ALAMO CREEK	664
RIMROCK BASIN	526
COW PASTURE	663
LAWLER SEC 15	2,555
LOWER SAND CREEK	73
10 MILE	671
NO. GOOSEBERRY	508
ENRIGHT	662

Allotment Name	Allotment Number
RATTLESNAKE RIDGE	34
GRASS POINT	545
SLICK WATER	162
SO. GOOSEBERRY GROUP	507
HOME	616
WORLAND CATTLE GROUP	7
NORTH GRASS CREEK	621
DENVER JAKE DRAW	153
GRASS CREEK	522
D & LM IND	548
NELSON	665
NOWATER	105
LITTLE SAND DRAW	590
SWING INDIVIDUAL	641
LOWER NOWATER	15
FREEMAN DRAW	625
SOUTH LUCERNE GROUP	502
EAST TANNER	511
GARDNER BADLANDS	562
KIRBY CREEK	589
RED SPRINGS DRAW	570
BLUE SPRINGS	501
ROCK SPRINGS DRAW	602
V PASTURE	2,547
SWALLOW	2,543
V-H DRAW	2,514
BLUE HILL	2,536
STUMP	2,542
COPPER MTN	655
REED CREEK	2,554
GRAHAM	11,111
Cantril Jack Allot.	1,301
NORTH OF CB&Q R.R.	1,302
South of CB&Q RR	1,303
NORTH OF TRACKS	1,312
Moneta Hills Pasture	1,314
DITCH PASTURE	1,315
MADDEN RANCH PASTURE	1,316
BRANDAU RANCH ALLOT	1,317

Allotment Name	Allotment Number
ST.CLAIR SOUTH PAST.	1,322
HOODOO CREEK ALLOT	1,324
EAST OF RANCH	1,325
BOW & ARROW	1,332
DE PASS RANCH	1,337
PICARD PRIVATE ALLOT	1,339
SCOTT DRAW	1,351
CAMPBELL	1,353
LOOKOUT HILL	1,355
CABIN PASTURE	1,366
RIM PASTURE	1,401
DELFELDER ALLOTMENT	1,402
CONANT CREEK COMMON	1,403
WM HERBST WINTER	1,404
POISON CREEK	1,406
MUSKRAT AMP	1,407
MUSKRAT OPEN	1,409
SHOSHONI ROAD	1,411
PIPELINE PASTURE	1,413
ANDERSON WINTER	1,414
HAYBARN HILL	1,417
JJ WINTER PASTURES	1,629
TRAM ROAD PASTURE	1,630
GRANITE MOUNTAIN OPEN	1,636
BIG PASTURE	1,703
BREEDING PASTURE	1,704
ICE SLOUGH	1,707
HAY MEADOW PASTURE	1,711
WHITLOCK FENCED	1,713
FENCED INDIVIDUAL	1,717
EAST BEAVER COMMON	1,801
SAND DRAW AMP	1,802
CROOKS GAP	2,023
MITCHELL PASTURE	2,028
MUSKRAT-LINN	11,501
FRASER DRAW	11,502
GREEN MT.FENCED	12,004
EAST ALLOTMENT	12,012
FENCED ALLOTMENT	12,013

Allotment Name	Allotment Number
ARAPAHOE CREEK	17,056
ANTELOPE HILLS	17,055
ALKALI CREEK SHEEP	17,057
SOUTH FORK CASPER CREEK	241
WYATT DRAW	244
CASPER CANAL	373
MCKENZIE DRAW	379
ROBINETT	455
POWDER RIVER DRAW	10,007
WALTMAN	10,008
HILAND	10,012
RAILROAD	10,013
CANTRIL-TODD	10,019
SUMMER BREWER	10,022
SOUTH HILAND	10,030
ERVAY BASIN	10,044
POISON SPIDER	10,045
STONE RANCH	10,052
SULLIVAN	10,066
TEAPOT	10,068
STONE CABIN	10,070
COLE CREEK	10,087
DODDS	10,089
FENTON	10,095
FORGEY	10,096
SMOKEY GAP II	10,115
MANNING	10,124
FORGEY PLACE	10,129
MILLER	10,130
PINE MOUNTAIN	10,134
BARKER	10,135
OKIE TRAIL	10,148
SEVEN L	10,161
V R	10,164
OIL MOUNTAIN	10,453
GEARY DOME	14,056
STRAND 2	14,057
ECCLES	20,523
TWENTYMILE HILL	31,004

Allotment Name	Allotment Number
G.L.	706
DALEY RANCH	605
NORTH TIPTON	715
NORTH WAMSUTTER	716
HAYSTACK RIVER PAST	708
MONUMENT LAKE	711
HAYSTACK	707
BROWNS CANYON	741
SLATE CREEK	11,113
Smith Cut	2,383
FLYNN DRAW	12,148
Crazy Woman Creek	12,094
Montgomery	12,140
Ninemile	2,425
South Fork Powder R	2,389
Julio Draw	32,019
Michelena	12,227
Kingsbury/Wild Horse	22,202
Schiermiester	12,185
Clear Creek	2,093
Little Willow	2,310
Gosney, Elmer	2,395
Fourmile Ranch	2,379
Farm	17,300
Crooked Creek	2,426
NURSE DRAW	12,190
BEKEBREDE DRAW	22,127
West Timber Draw	2,170
Sussex Cutoff	12,167
Dry Fork P.R.	2,341
Schoonover Ranch	22,214
South Fork	2,451
Hoe Ranch	12,169
Hepp Charles	12,153
Mitchell Draw	2,429
Rattlesnake Springs	12,098
Wall (East)	12,146
Grub Draw	2,469
Maycock Draw	22,221

Allotment Name	Allotment Number
T.W.	2,438
Flats	32,006
Powder River Ranch	2,260
Timber Draw	12,199
Salt Creek	2,411
Crenshaw Hill	12,218
Mark Gordon	2,368
Reno Draw	2,268
Billy Creek	2,262
Dugout Creek	2,453
Gammon Draw	12,079
V Bar F	2,284
Lawrence Land Co. Inc.	12,188
Cat Creek	2,376
Vanderhoff	2,345
South Sussex StkRst	2,467
Sussex Stockrest	2,420
Falxa	12,139
Pumpkin Creek	12,138
Little Poison Creek	32,007
Soldier Creek Ranch	2,294
KURTLEY DRAW	12,056
BUCKNUM	10,081
ICE CAVE MOUNTAIN	10,042
Daley Reservoir	15,990
MATADOR	10,020
NORTH DAVIS	17,677
M & D	10,123
GAS HILLS	11,508
SMOKY GAP-SHEPPERSON	254
UPPER POISON SPIDER CREEK	14,289
ORMSBY	10,082
HIGHWAY JUNCTION	523
SUMMER ALLOTMENT	1,357
BATES CREEK	10,003
DIFFICULTY	800
MINE	314
MOSS AGATE	309
ANTELOPE SPRINGS	310

Allotment Name	Allotment Number
BATES BENCHMARK	311
LU	604
HILLBERRY RIM	579
SULLIVAN	328
PINE GROVE/BOLTEN	10,623
Eubank S Labarge Ind	2,061
Ellis Block/Petes Gap	811
Fontenelle MDW Ind	22,010
DANA MEADOWS SOUTH	829
TIPTON	10,621
SOUTH RED DESERT	10,619
LAZY Y S RANCH	10,626
STEWART CREEK	10,102
Bonduraunt Individual	12,125
CHACE BLOCK	830
ECHO SPRINGS	10,607
SIXTEEN MILE	10,616
PASS CREEK RIDGE	827
Beaver Cr. Meadow Ind	2,142
DANA BLOCK NORTH	822
South Labarge Common	22,005
South Desert Allot.	2,040
FT STEELE BREAKS	816
SOUTH WAMSUTTER	10,620
CYCLONE RIM	10,103
S Piney Ranch Ind	2,074
Sand Draw Allotment	2,156
RINER	10,615
Beaver Cr. Ind	2,141
Labarge Unit Ind	2,194
STONE	10,221
N. Labarge Com	2,077
Horse Center	3,114
Polecat Bench	1,071
HOGG (GCRA)	3,033
Greenwald	3,045
East/West	1,060
GOULD NORTH IND	2,511
Cottonwood	2,551

Allotment Name	Allotment Number
Lovell Group 5	1,050
Foster Gulch	1,039
Turnell	3,107
Oilwell	3,113
Big Horn River Riparian Tracts	1,081
Sand Hills 1043	1,043
Dump (WRA)	1,515
Badlands	1,087
Pitchfork	2,532
Cedar Mountain	2,528
Greybull Group	1,051
Meeteetse Rim	3,096
Homestead/Avent	2,564
Tonopah Ridge	2,544
Eagle Pass	3,035
Little Sheep Mountain	1,053
Kukla Section 15	2,523
Heart Mountain South 3099	3,099
Dry Creek Wildlife	14,243
Lovell Group 1	1,032
Red Cabin	3,079
South Lovell Group	1,052
Rush Creek	3,119
Meeteetse Creek 2561	2,561
Coal Creek	3,006
Stone Barn 15	3,112
Thumper	1,059
Little Dry Creek	3,061
Sand Hills 1054	1,054
Osborn	3,010
Meeteetse Creek 3031	3,031
Rawhide	3,098
91 Ranch	2,545
Trailing Pasture	3,065
Winniger	2,553
Himes Group	1,031
Red Point	3,067
Big Trap	1,070
Oregon Basin	3,029

Allotment Name	Allotment Number
Individual 1061	1,061
EMIGRANT GAP	10,050
BATES HOLE SDW	1,500
SOUTH CAVE GULCH	10,006
F.L. RANCH	10,031
SOUTH DAVIS	10,039
BIG MUDDY	10,152
Hoodoo Base	3,048
Heart Mountain North	3,011
Himes-Spence	1,037
BYRON OIL FIELD	1,016
Red Desert	13,012
Sublette	13,027
Sands	13,015
Rock Springs	13,018
Fourth of July	3,016
Figure 4	13,023
SMITH CREEK	10,083

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