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EXECUTIVE SUMMARY

INTRODUCTION

The Wyoming Pipeline Corridor Initiative (WPCI) is a proposal from the State of Wyoming Governor's Office (applicant) to designate approximately 1,958 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 carbon dioxide (CO_2) and other compatible infrastructure viable to the state's economy. Approximately 1,104 miles of the proposed corridors are located on BLM-administered lands under the jurisdiction of 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, 2) pipelines and facilities associated with enhanced oil recovery (EOR), and 3) 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 designation of the proposed corridors is a federal planning 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, future site-specific ROW projects using the corridors could 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 before starting construction within the corridors. Additionally, the proponents of 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 and EOR products and for 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 and 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 Proposal and to support future development of carbon capture, utilization, and storage and EOR through the development of infrastructure connecting 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 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 proposed corridors 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 proposed corridors 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 proposed 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 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 proposed corridors affect existing corridors, ROWs, and other land use authorizations? How would the proposed corridors 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 proposed corridors impact the various range improvements they intersect 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 proposed corridors 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 proposed corridors affect existing transportation corridors or public access?
Vegetation	How would vegetation within the proposed corridors recover over time after potential future construction? How would potential future ROW maintenance affect vegetative cover during the life of the WPCI? Would future potential projects 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 potential future 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 the proposed 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 WPCI (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 during 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 of Wyoming 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 three additional 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) and EOR products and for 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 1,958 miles of proposed corridors that would connect oil and gas fields that are candidates for EOR and sources of CO_2. Of this total, 1,104 miles of proposed corridors would cross BLM lands managed by the Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland BLM Field Offices. Approximately 64% of the proposed corridors would be located in existing designated BLM utility corridors, and the remainder would be within 0.5 mile of existing pipeline ROW to the extent possible.

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 corridor 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 minimize 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. Alternative C would consist of 237 miles of proposed corridors that would connect oil and gas fields that are candidates for EOR and sources of CO_2. Of this total, 151 miles of proposed corridors would cross BLM lands managed by the Casper, Cody, Lander, Pinedale, Rawlins, Rock Springs, and Worland BLM Field Offices. Of the 151 miles of proposed corridors on BLM lands, none would be located in currently designated BLM utility corridors and would require an amendment to one or more BLM RMPs. The amendments would designate new corridors reserved for the transport of CO_2 and EOR products and for 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 minimize 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. Alternative D would consist of 1,860 miles of proposed corridors that would connect oil and gas fields that are candidates for EOR and sources of CO_2. Of this total, 968 miles of proposed corridors would cross BLM lands managed by the Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland BLM Field Offices. Approximately 82% of the proposed corridors would be located in existing designated BLM utility corridors. 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 and EOR products and for 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 E (*Enhanced Development Opportunity with Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use)* would use existing designated corridors as possible to reduce resource impacts, address conflicts with valid existing rights, and collocate infrastructure to minimize impacts across the landscape. As with Alternatives B, C, and D, existing stipulations for each respective RMP would apply to any new corridors within each BLM field office. Under Alternative E, the BLM would designate pipeline corridors on BLM-administered lands only. Alternative E would consist of 1,970 miles of proposed corridors that would connect oil and gas fields that are candidates for EOR and sources of CO_2. Of this total, 1,111 would cross BLM lands managed by the Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland BLM Field Offices. Approximately 74% of the proposed corridors would be located in existing designated BLM utility corridors. 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 and EOR products and for 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.

Management of the proposed corridors under each alternative would permit uses determined by the appropriate BLM field office as compatible with the transport of CO_2 and EOR products. This determination would be made by the BLM field office on a case-by-case basis upon receipt of project

applications. Compatible uses could include but are not limited to projects with small disturbance footprints such as range improvements, fencing projects, or projects that can avoid conflicts with pipelines such as broadband infrastructure or roads.

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 the environmental effects of implementing the alternatives 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	Alternative E: Enhanced Development Opportunity with 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 may have the potential to generate the slightly less fugitive dust, combustion emissions, and GHGs than Alternative E. Emissions of GHGs and production from EOR under the alternatives are not expected to differ significantly.	Alternative C may 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.	Alternative D is similar to Alternative B in terms of potential to generate fugitive dust, combustion emissions, and GHGs. Emissions of GHGs and production from EOR under the alternatives are not expected to differ significantly.	Alternative E may 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.
Cultural resources	Alternative B has the largest amount of potential surface disturbance and the greatest number of both known (2,102) and estimated (8,191) cultural resources present. Alternative B would have a greater potential for impacting cultural resources sites of specific concern to Native Americans (115 known and 448 projected) than Alternative D. Alternative B has the potential to affect five national historic trails (NHT) and other historic trails.	Alternative C would have the least potential for affecting cultural resources because of less potential surface disturbance and because the alternative contains the fewest cultural resources (275 known and 1,062 projected) of the four action alternatives, and it specifically lacks any NHTs and other historic trails within its proposed corridor. However, Alternative C has the greatest potential to affect sites of specific concern to Native Americans (119 known and 473 projected).	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 1,927 known cultural resources and 7,968 projected cultural resources, including seven resources currently listed on the National Register of Historic Places; 95 known resources of Native American concern; and 370 projected resources of Native American concern. However Alternative D has the potential to impact five NHTs and other historic trails.	Alternative E would be similar to Alternative B due to approximately similar numbers of cultural resources present in the proposed corridors. Alternative E has 2,101 known cultural resources and 8,153 projected cultural resources, including seven resources currently listed on the National Register of Historic Places; 113 known resources of Native American concern; and 439 projected resources of Native American concern. However Alternative E has the potential to impact five NHTs and other historic trails.
Fire and fuel loads	Increased risk of fires and changes to fuels because of development associated with 57,452 acres of new corridor.	Comparatively less than Alternative B, because of development associated with 7,060 acres of new corridor.	Similar to Alternative B because of development associated with 55,120 acres of new corridor.	Similar to Alternative B because of development associated with 57,776 acres of new corridor.
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 a 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 the alternative 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 2,527 acres of soils in the corridors that would have a high wind erodibility potential and 1,932 acres that would have a high water erodibility potential. The potential for temporary reduction in soil productivity with approximately 2,040 acres of these soils would be droughty soils, 5,537 acres would have a potential for shallow bedrock, and 1,357 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 26,939 acres of soils that would have a high wind erodibility potential and 14,849 acres that would have a high water erodibility potential. The potential for temporary reduction in soil productivity with approximately 17,444 acres of these soils would be droughty soils, 48,661 acres would have a potential for shallow bedrock, and 9,449 acres would be hydric soils.	Alternative E 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 111.8 acres of land prone to landslides. Alternative E would have the greatest potential impact on soil compaction, erosion, soil productivity, and biological soil crusts compared to Alternative B, with approximately 28,789 acres of disturbed soils that would have a high wind erodibility potential and 15,248 acres that would have a high water erodibility potential. The potential for temporary reduction in soil productivity with 19,746 acres of these soils would be droughty soils, 51,536 acres would have a potential for shallow bedrock, and 9,403 acres would be hydric soils.
Hazardous materials and wastes	Minimal indirect impacts from the management of nonproject-related hazardous wastes.	Same as Alternative B.	Same as Alternative B.	Same as Alternative B.
Land use and realty	Alternative B is similar to Alternative D in terms of landownership; however, it would use fewer acres of existing ROWs and utility corridors: 36,990 acres (64%) as compared to Alternative D. Alternative B is the second largest in terms of total acreages and mileage, 57,452 and 1,958, respectively. Alternative B would result in less acquisition of agricultural lands as Alternative D (313 acres or 0.5% of corridor).	Alternative C would not overlap existing ROWs and utility corridors (0 acres %). Alternative C is the smallest and would affect the fewest acres and miles, 7,060 and 237, respectively. Alternative C would result in the smallest indirect impact acquisition of agricultural lands (270 acres); however, this would result in the greatest percentage of agricultural land acquisition for the energy corridor (3.8%).	Alternative D would use the most existing ROWs and utility corridors in terms of total acreage (45,560 acres; 83%). Alternative D is smaller than Alternative B (55,120 acres and 1,860 miles) by approximately 2,000 acres and shorter by 90 miles. Alternative D would result in the greatest indirect impact acquisition of agricultural lands (813 acres) for ROW; however, this only constitutes approximately 1.5% of the proposed corridor.	Alternative E is similar to Alternative D in terms of landownership; however, it would use fewer acres of existing ROWs and utility corridors: 42,746 acres (74%) as compared to Alternative D. Alternative E is the largest in terms of total acreages and mileage 57,810 acres and 1,970 miles, respectively. Alternative E would result in less acquisition of agricultural lands as Alternative D (350 acres or 0.6% of corridor).
Livestock grazing	Impacts would be similar to those under Alternative D with temporary removal of up to 32,950 acres of potential forage on BLM lands (6,229 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, in terms of acreage, with temporary removal of up to 4,612 acres of potential forage on BLM lands (621 AUMs), which represents a loss of up to 0.30% 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 29,751 acres of potential forage on BLM lands (6,196 AUMs), which represents a loss of up to 0.43% of available AUMs across all field offices. No permanent impacts anticipated.	Acreage-wise, the greatest impacts would occur under Alternative E with temporary removal of up to 34,135 acres of potential forage on BLM lands (3,291 animal unit months [AUMs]), which represents a loss of up to 0.50% 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, similar to Alternative E, would result in the largest amount of potential future surface disturbance in active coal permits and trona areas (144 and 1,038, respectively).	Alternative E 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 5,561 acres of oil and gas fields and 15,837 acres of existing oil and gas leases (approximately 0.2% of total area in the planning area). Alternative E, similar to 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).

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	Alternative E: Enhanced Development Opportunity with Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
Noise	Alternative B would be similar to Alternative E but with fewer noise impacts.	Alternative C proposed the fewest acres of new corridors and would, therefore, affect the smallest area.	Alternative D would be similar to Alternative E but with fewer noise impacts.	Alternative E proposes the largest acreage and greatest noise because of development activities
Paleontological resources	Alternative B has a similar frequency of potential ground-disturbing impacts to paleontological resources to Alternative E, as noted by acres of higher potential fossil yield classification (PFYC) (50,457). Alternative B also 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 the action alternatives. Alternative C would cross substantially less private land with higher PFYC (5,653).	Corridor acreage available to future ground-disturbing construction projects under Alternative D would include fewer acres of higher PFYC than Alternative E, and a greater percentage of the Alternative D proposed corridors are within currently defined corridors (47,735). Alternative D has the same frequency of potential impacts as Alternative C because the footprint and geologic units crossed would be identical.	Alternative E 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) (51,120). Alternative E 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.
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.	Same as Alternative B.
Recreation	Alternative B contains the most recreational resources (90) and the second most recreational acres (16,918), which constitutes approximately 29% of the proposed corridor.	Alternative C contains the fewest recreational resources (17) and would result in 2,192 acres of disturbance to recreational resources, which constitutes approximately 31% 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 14,552 acres of recreational resources, which comprises approximately 26% of the proposed corridor.	Alternative E would result in similar impacts to recreational resources as Alternative B because it has slightly fewer recreational resources (85) but has the greatest potential disturbance (16,952 acres) to recreational resources, which comprises approximately 29% of the proposed corridor.
Socioeconomics	Alternative B could temporarily disrupt private landowners' private enjoyment of their properties and could affect property values. There could also be minor temporary impacts to farm and ranching economics as well as non-market values associated with farming and ranching lifestyles. Non-market environmental values could also be impacted. Five potential environmental justice populations would be crossed by the proposed corridor.	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 D would have similar impacts to environmental justice populations as Alternative B.	Alternative E would have the greatest potential to conflict with future development of other linear infrastructure than the other action alternatives. Impacts to the agricultural economy would be similar to Alternative B and impacts to recreation-related opportunities and nonmarket values would be less than Alternative B. Alternative E would have similar impacts to environmental justice populations as Alternative B.
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 within 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 affected by the proposed corridors.	Alternative D would result in up to 6.9 acres of surface disturbance within ACECs in the analysis area. Under Alternative D, up to 8,366.5 acres within four WSAs could be affected by the proposed corridors.	Alternative E would result in up to 6.9 acres of surface disturbance within ACECs in the analysis area. Under Alternative E, up to 14,835.3 acres within four WSAs could be affected by the proposed corridors.
Transportation	Alternative B would cross 2,450 roads and routes. Alternatives B, D, and E would have similar effects on traffic volumes.	Alternative C would cross 314 roads and routes. Alternative C would affect fewer miles of routes and have less of an effect on traffic volumes.	Alternative D would cross 2,402 roads and routes. Alternatives B, D, and E would have similar effects on traffic volumes.	Alternative E would cross 2,278 roads and routes. Alternatives B D, and E would have similar effects on traffic volumes.
Vegetation	Alternative B would affect 49,957acres of shrubland, desert scrub, and grassland within the proposed corridors and 732 acres of developed/disturbed land. Impacts from invasive plants and noxious weeds for Alternative B would be similar to Alternative E. Impacts to special state plant species are provided in Tables 3.17-5 and 3.17-6.	Alternative C would affect 5,704acres of shrubland, desert scrub, and grassland within the proposed corridors and 199 acres of developed/disturbed land. Alternative C would have less potential to spread invasive plants and noxious weeds because of less potential surface disturbance. Impacts to special state plant species are provided in Tables 3.17-5 and 3.17-6.	Alternative D would affect 45,913acres of shrubland, desert scrub, and grassland within the proposed corridors and 1,251 acres of developed/disturbed land. Impacts from invasive plants and noxious weeds for Alternative D would be similar to Alternative E. Impacts to special state plant species are provided in Tables 3.17-5 and 3.17-6.	Alternative D would affect 49,786 acres of shrubland, desert scrub, and grassland within the proposed corridors and 1,251 acres of developed/disturbed land. Alternative B has the largest area of potential disturbance that could lead to an increase in invasive plants and noxious weed establishment Impacts to special state plant species are provided in Tables 3.17-5 and 3.17-6
Visual resources	Alternative B would have the most Class I lands intersected which would result in the greatest impact to Class I Visual Resource Management (VRM) lands (22,845acres).	Alternative C, the shortest of the alternatives (237 miles), would result in the least impacts to VRM Class I lands (4,377 acres).	Alternative D would result in less impacts to Class I lands than Alternative B and would result in impacts to 13,595acres of Class I VRM lands.	Alternative E would result in less impacts to Class I lands than Alternative B and would result in impacts to 21,704 acres of Class I VRM lands.

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	Alternative E: Enhanced Development Opportunity with Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use
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 similar to Alternative E with a similar but slightly smaller 360 hydrologic unit code (HUC)-12 subwatersheds, 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 less potential for erosion and resulting diminutions of water quality resulting from sedimentation, turbidity, and salinity because the alternative's 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 66 HUC-12 subwatersheds. Alternative C has the smallest area of wetlands within new corridors across 56 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 E with a very similar but slightly smaller area (342 HUC-12 subwatersheds) 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 (Alternative D crosses 317 HUC-12 subwatersheds) and net wetlands lost, therefore, their potential impacts are similar.	Alternative E has slightly less potential for erosion and resulting diminutions of water quality resulting from sedimentation, turbidity, and salinity compared to Alternative B and D. Surface disturbance in subwatersheds would be highest under Alternative E, which has the most areas, 365 HUC-12 subwatersheds, designated as proposed corridors across subwatersheds. Alternative E would affect area of wetlands and number of subwatersheds containing values slightly less than Alternative D.
Wild horses	Alternative B would affect 15 herd management areas (HMAs), potentially impacting 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, potentially impacting 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, potentially impacting 362,205 acres out of 3,200,135 acres within the HMAs. Alternative D would have less area that could need reclamation and revegetation compared to Alternatives B and E, with up to 8,204 acres impacted within the HMAs.	Alternative E would affect 15 HMAs, potentially impacting 399,547 acres out of 3,200,135 acres within the HMAs. Alternative E would have an amount of area that could need reclamation and revegetation between that of Alternative B and Alternative D, with up to 8,806 acres impacted within the HMAs.
Wildlife and fisheries	Alternatives B, D, and E would affect a similar 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 49,957acres of shrubland, desert scrub; 1,570 acres of grasslands; 869acres of riparian; 2,208 acre of marsh, meadow; 466 acres of forest and woodland; and 754 acres of cliff, rock, and scree. Alternative B includes 1,958 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 E. . Alternative B crosses 22,558 acres of sage-grouse priority habitat management area (PHMA) and 34,898.8 acres of general habitat management area (GHMA).	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 5,704 acres of shrubland, desert scrub; 61 acres of grasslands; 155 acres of riparian; 443 acres of marsh, meadow; and 24 acres of forest and woodland. Alternative C includes 237 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. Alternative C crosses 0 acres of sage-grouse PHMA and 7,053.4 acres of GHMA.	Alternatives B, D, and E would affect a similar amount of big game seasonal habitat. Alternative D could impact a variety of migratory bird nesting habitats, including 45,913 acres of shrubland, desert scrub; 1,900 acres of grasslands; 974 acres of riparian; 106,574 acres of marsh, meadow; 592 acres of forest and woodland; and 754 acres of cliff, rock, and scree. Alternative D includes 1,860 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 E. Alternative D crosses 16,954.8 acres of sage-grouse PHMA and 37,823.5 acres of GHMA.	Alternatives B, D, and E would affect a similar amount of big game seasonal habitat. Alternative E could impact a variety of migratory bird nesting habitats, including 49,786 acres of shrubland, desert scrub; 1,749 acres of grasslands; 889 acres of riparian; 2,329 acre of marsh, meadow; 397 acres of forest and woodland; and 767 acres of cliff, rock, and scree. Development of 1,970 miles of corridors under Alternative E would lead to an increase in vehicle traffic, human presence, and water use that could affect special-status species. Alternative E crosses 21,516.9 acres of sage-grouse PHMA and 36,162.9 acres of GHMA.

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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 to participate as cooperating agencies for this EIS are listed in Appendix A. The list of cooperating agencies is dynamic, and cooperating agencies status may change as the WPCI moves forward. Cooperating agencies may request a change in their official status, and the BLM will likely support this change in requested status.

Letters to initiate tribal consultation were sent to the 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 associated notice of intent (NOI) in the *Federal Register*. The BLM also issued media releases and emails that announced 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 at 2:00 p.m. Mountain Standard Time in in Cheyenne, Casper, Thermopolis, and Rock Springs on December 9, 10, 11, and 12, 2019, respectively. Formal public scoping meetings followed directly 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 BLM received a total of 33 submissions from members of the public and the cooperating agencies during the scoping period.

The Notice of Availability for the draft EIS was published in the *Federal Register* on April 17, 2020. The BLM held two virtual public meetings on May 28, 2020, one from 11:00 a.m. to 1:00 p.m. Mountain Daylight Time and the other from 5:00 p.m. to 7:00 p.m. Mountain Daylight Time. The 90-day public comment period concluded on July 16, 2020. The BLM received a total of 29 submissions from members of the public and cooperating agencies. Responses to the comments are in Appendix K.

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CHAPTER 1. PURPOSE AND NEED

1.1 INTRODUCTION

The Bureau of Land Management (BLM) Wyoming State Office has prepared these final resource management plan (RMP) amendments with an associated environmental impact statement (EIS) to analyze the potential direct, indirect, and cumulative effects of 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, Kemmerer, Pinedale, Rawlins, and Green River RMPs (BLM 1997, 2007, 2008a, 2008b, 2010a, 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-seven federal and state agencies as well as county commissions and conservation districts were invited to be cooperators (Appendix C). Twenty-one accepted the invitation (Appendix A).

1.2 BACKGROUND

The goal of the WPCI is to establish corridors on public lands dedicated to future use for enhanced oil recovery (EOR) and carbon dioxide (CO_2) pipelines and other compatible uses. The initiative's objective is to stimulate economic development by connecting oil fields that are favorable candidates 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 and previously disturbed fields while possibly offering a bridge to a reduced carbon emissions future (U.S. Department of Energy [DOE] 2010). The acceleration of retirement of coal- fired plants and state law mandating their sale provide the opportunity to convert these plants to capture the CO_2. EOR projects help reduce carbon emissions by capturing CO_2 emitted from anthropogenic sources and permanently sequestering the CO_2 underground. Geologic sequestration of CO_2 emissions by EOR projects accounts for approximately 9 million metric tons of carbon, or approximately 80 percent of the industrial use of CO_2, every year. Although approximately 20% of CO_2 in EOR currently comes from natural gas processing plants, the majority comes from natural underground sources and does not represent a net reduction in CO_2 emissions. However, carbon capture and storage offer the potential to alter this situation (DOE 2010).

If land use plan amendments are approved by the BLM, 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 and EOR products and for 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 EOR and CO_2 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 of the BLM action is to designate corridors for the preferred location of future pipelines associated with the transport of CO_2 and EOR products and with 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 Proposal and to support future development of carbon capture, utilization, and storage and EOR through the development of infrastructure connecting 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 right-of-way (ROW) corridors. The designation of corridors would streamline environmental reviews of potential projects proposed within the corridors because NEPA documents could reference this analysis. The BLM action responds to the State's need to reverse the downward trend of declining oil production by stimulating economic development through EOR.

The BLM would limit the amendment of RMPs to changes indicated by the action alternatives and would not address other uses or the management of other resources, although the BLM would consider and analyze effects from increased use on other managed resources. The BLM would 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 would 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 (NHPA) requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. The BLM has a national programmatic agreement with the ACHP and the National Conference of State Historic Preservation Officers regarding the manner in which the BLM will meet its responsibilities under the NHPA. Section 5 of the national programmatic agreement lists thresholds for ACHP notification. The BLM has determined that this undertaking does not meet any of those thresholds.

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 proposed corridors, 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 proposed corridors, no further action by the BLM is necessary. The BLM decided that a biological assessment was necessary (see Appendix L).

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 the FLPMA and regulations at 43 CFR 1600. The planning area includes land administered by the following:

- Buffalo Field Office approved RMP (as amended) (BLM 2015b)
- ROD and approved Casper RMP (as amended) (BLM 2007)
- Bighorn Basin Resource Management Plan Revision Project (as amended), which covers the Cody and Worland Field Offices (BLM 2015a)
- ROD and approved Kemmerer RMP (as amended) (BLM 2010a)
- ROD and approved RMP for the Lander Field Office (as amended) (BLM 2014a)
- ROD and approved Pinedale RMP (as amended) (BLM 2008a)
- ROD and approved Rawlins RMP (as amended) (BLM 2008b)
- ROD and Green River RMP (as amended) (BLM 1997)

The WPCI has been reviewed by the BLM and is in conformance with the listed RMPs.

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 that the decision resulting from this analysis will affect 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 Local Government Land Use Plans

Local government 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 local government 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, future site-specific ROW projects using the corridors could 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 before starting construction within the corridors. Additionally, the proponents of 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 WPCI 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 the 25 segments that make up the proposed corridors. The State of Wyoming 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 three 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 (Table 2.3-1).

Table 2.3-1. Alternatives Considered but Eliminated from Detailed Analysis

Alternative	Description
Consistent mitigation within corridors	This alternative would include the routes as described in the Proposed Action, and stipulations and design features would be consistently applied; however, the stipulations and design features would be modified and refined. Corridor segments would be dedicated for ROWs associated with the transportation of CO_2, EOR products, or other compatible uses as determined on a case-by-case basis.

Alternative	Description
Only include corridors that do not have conflicts with existing uses or critical resource values	This alternative would only include those corridors that do not have conflicts with existing uses or resource values. Management stipulations and design features would be the same as the exiting RMPs. Corridors that intersect incompatible existing uses or critical resource values would be removed. Examples of exiting uses or resources that would be potentially incompatible include active mine operations, wilderness areas, improved recreation sites, within RHMA and outside existing designated corridors, or authorized ROWs that are incompatible for collocation with a pipeline.
Modify routes to include additions to avoid incompatible uses	Instead of eliminating corridors that intersect with existing uses or resource values, this alternative would re-route corridors to avoid incompatible uses or resources. Corridors would be dedicated for ROWs associated with the transportation of CO_2, EOR products, or other compatible uses as determined on a case-by-case basis.
Update corridors for all types of linear ROW projects	This alternative would update corridors in all the RMPs to create an updated corridor network; however, corridors would not be dedicated for ROWs associated with the transportation of CO_2, EOR products, or other compatible uses, and applications for any type of use could be authorized.
Change in corridor widths	This alternative would include corridors from the proposed action, except corridor widths would vary and could be wider than 200 feet or 300 feet. Corridors would be dedicated for ROWs associated with the transportation of CO_2, EOR products, or other compatible uses as determined on a case-by-case basis.

The alternatives analyzed in detail include pieces of those alternatives that were dismissed and 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 and EOR products and for other compatible uses. Potential project ROW applications and the specific routes for infrastructure would be evaluated on a case-by-case basis.

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. The use of naturally occurring sources of CO_2 versus human-made sources of CO_2 for EOR can result in different lifecycle carbon emissions.

Alternative B would consist of 1,958 miles of potential corridors that would facilitate potential projects that would connect oil fields that are candidates for EOR and producing CO_2. Of this total, 1,104 miles

would cross BLM lands managed by the Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland BLM Field Offices. Approximately 64% of the proposed corridors would be located in existing designated BLM utility corridors, and the remainder would be within 0.5 mile of existing pipeline ROW to the extent possible.

Under Alternative B, the BLM would amend the current RMPs by designating new corridors both within and outside of existing designated corridors, on BLM-administered lands only. This amendment would also reserve a portion of the existing designated corridors exclusively for CO_2 and EOR product pipelines or other compatible uses.

Management of the proposed corridors under Alternative B would permit uses determined by the appropriate BLM field office as compatible with the transport of CO_2 and EOR products on a case-by-case basis when a project application is submitted. Compatible uses could include but are not limited to projects with small disturbance footprints such as range improvements, fencing projects, or projects that can avoid conflicts with pipelines such as broadband infrastructure or roads.

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. The proponents would fund the cost of site-specific NEPA, and the BLM and State of Wyoming would require the 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 corresponding BLM field office (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 by providing connecting segments to existing designated corridors, address conflicts with valid existing rights (e.g., transmission substations or active mines), and collocate infrastructure to minimize 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 and EOR products and for 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 under BLM Visual Resource Management (VRM) II classification, 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 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.

Alternative C would consist of 237 miles of proposed corridors that would facilitate potential projects that would connect oil fields that are candidates for EOR and sources of CO_2. Of this total, 151 miles would cross BLM lands managed by the Casper, Cody, Lander, Pinedale, Rawlins, Rock Springs, and Worland BLM Field Offices. Of the 151 miles on BLM lands, 0 miles would be located in currently BLM-designated BLM utility corridors. Approximately 179 miles would be within 0.5 mile of existing pipeline ROWs.

Under Alternative C, the BLM would amend the current RMPs by designating new corridors outside of existing designated corridors, BLM-administered lands only. This amendment would designate a new pipeline corridor reserved for transportation of CO_2, EOR products, or other compatible uses.

Management of the proposed corridors under Alternative C would permit uses determined by the BLM field office as compatible with the transport of CO_2 and EOR products on a case-by-case basis upon receipt of project applications. Compatible uses could include projects with small disturbance footprints such as range improvements, fencing projects, or projects that can avoid conflicts with pipelines such as broadband infrastructure or roads.

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 lie 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, NHTs, 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 NEPA process. The corridor width would be 300 feet for trunk lines and 200 feet for lateral lines.

Alternative D would consist of 1,860 miles of proposed corridors that would connect oil fields that are candidates for EOR and sources of CO_2. Of this total, 968 miles would cross BLM lands managed by the Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland BLM Field Offices. Approximately 82% of the proposed corridors would be located in existing designated BLM utility corridors. Approximately 230 miles would be within 0.5 mile of existing pipeline ROWs.

Under Alternative D, the BLM would amend the current RMPs by designating new corridors both within and outside existing designated corridors, BLM-administered lands only. This amendment 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.

Management of the proposed corridors under Alternative D would permit uses determined by the appropriate BLM field office as compatible with the transport of CO_2 and EOR products on a case-by-case basis upon receipt of project applications. Compatible uses could include projects with small disturbance footprints such as range improvements, fencing projects, or projects that can avoid conflicts with pipelines such as broadband infrastructure or roads.

2.4.5 Alternative E: Enhanced Development Opportunity with Resource Conflict Minimization and Dedicated Carbon Capture, Utilization, and Storage; Enhanced Oil Recovery; and Other Compatible Use

Alternative E is a combination of segments from Alternative B and Alternative D to maximize development opportunities and minimize resource conflicts by utilizing existing designated corridors and collocating with existing infrastructure to minimize impacts across the landscape (see Table 2.4-1). As with Alternatives B, C, and D, existing stipulations for each respective RMP would apply to any new proposed corridors within each BLM field office.

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 NEPA process. The corridor width would be 300 feet for trunk lines and 200 feet for lateral lines.

Alternative E would consist of 1,970 miles of proposed corridors that would connect oil fields that are candidates for EOR and serving as sources of CO_2. Of this total, 1,111 miles would cross BLM lands managed by the Buffalo, Casper, Cody, Kemmerer, Lander, Pinedale, Rawlins, Rock Springs, and Worland BLM Field Offices. Approximately 73% of the proposed corridors would be located in existing designated BLM utility corridors. Approximately 595 miles would be within 0.5 mile of existing pipeline ROWs.

Under Alternative E, the BLM would amend the current RMPs by designating new corridors both within and outside existing designated corridors, on BLM-administered lands only. This amendment would designate new corridors reserved for the 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.

Management of the proposed corridors under Alternative E would permit uses determined by the appropriate BLM field office as compatible with the transport of CO_2 and EOR products on a case-by-case basis upon receipt of project applications. Compatible uses could include projects with small disturbance footprints such as range improvements, fencing projects, or projects that can avoid conflicts with pipelines such as broadband infrastructure or roads.

Table 2.4-1. 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	Alternative E: Enhanced Development Opportunity with 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. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped because of resource conflicts and existing corridor in nearby vicinity.	157 miles in Lincoln, Sublette, and Sweetwater Counties. Primarily in existing designated corridors; partial re-route of existing designated corridor to avoid PHMA, VRMII, and National Historic Trails. Dedicated use to transport CO_2 and EOR products and other compatible uses.	157 miles in Lincoln, Sublette, and Sweetwater Counties. Primarily in existing designated corridors; partial re-route of existing designated corridor to avoid PHMA, VRMII, and National Historic Trails. 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. Dedicated for the transport of CO_2 and EOR products and for 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	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. Dedicated for the transport of CO_2 and EOR products and for 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.	50 miles in Fremont and Sweetwater Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
4	Trunk	Cody, Lander, Rawlins, Rock Springs, Worland	323 miles in Big Horn, Hot Springs, Fremont, Sweetwater, and Washakie Counties. Dedicated for the transport of CO_2 and EOR products and for 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.	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. Dedicated for the transport of CO_2 and EOR products and for 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.	123 miles in Sublette and Sweetwater Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
6	Trunk	Casper, Rawlins	85 miles in Carbon and Natrona Counties. Dedicated for the transport of CO_2 and EOR products and for 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.	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.
7	Trunk	Lander, Rawlins	59 miles in Carbon, Fremont, and Sweetwater Counties. Dedicated for the transport of CO_2 and EOR products and for 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.	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. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped as it lies within an existing designated corridor.	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.	38 miles in Fremont and Sweetwater Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
9	Lateral	Lander	44 miles in Fremont County. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped as it lies within an existing designated corridor.	44 miles in Fremont County. In an existing designated corridor. Dedicated use to transport CO_2 and EOR products and other compatible uses.	44 miles in Fremont County. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
10	Lateral	Casper, Lander	104 miles in Fremont and Natrona Counties. Dedicated for the transport of CO_2 and EOR products and for 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.	104 miles in Fremont and Natrona Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
11	Trunk	Casper, Lander	69 miles in Fremont and Natrona Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped because of resource conflicts and existing corridor in nearby vicinity.	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	69 miles in Fremont and Natrona Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
12	Lateral	Lander, Casper	56 miles in Fremont and Natrona Counties. Dedicated for the transport of CO_2 and EOR products and for 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	56 miles in Fremont and Natrona Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
13	Lateral	Lander	28 miles in Fremont County. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped as it lies within an existing designated corridor.	28 miles in Fremont County. In an existing designated corridor. Dedicated use to transport CO_2 and EOR products and other compatible uses.	28 miles in Fremont County. Dedicated for the transport of CO_2 and EOR products and for 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	Alternative E: Enhanced Development Opportunity with 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. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped as it lies within an existing designated corridor	23 miles in Fremont County. In an existing designated corridor. Dedicated use to transport CO_2 and EOR products and other compatible uses.	23 miles in Fremont County. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
15	Lateral	Casper, Lander	53 miles in Fremont and Natrona Counties. Dedicated for the transport of CO_2 and EOR products and for 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.	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. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped as it lies within an existing designated corridor	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.	75 miles in Johnson and Natrona Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
17	Trunk	Buffalo, Casper	123 miles in Johnson and Natrona Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped because of resource conflicts and existing corridor in nearby vicinity.	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.	123 miles in Johnson and Natrona Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
18	Lateral	Buffalo	65 miles in Campbell and Johnson Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped as it lies within an existing designated corridor.	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.	65 miles in Campbell and Johnson Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
19	Trunk	Cody, Worland	118 miles in Big Horn, Hot Springs, and Park Counties. Dedicated for the transport of CO_2 and EOR products and for 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.	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. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped as it lies within an existing designated corridor.	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.	39 miles in Big Horn, Hot Springs, and Washakie Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
21	Lateral	Cody, Worland	105 miles in Hot Springs and Park Counties. Dedicated for the transport of CO_2 and EOR products and for 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.	105 miles in Hot Springs and Park Counties. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
22	Lateral	Cody, Worland	24 miles in Big Horn County. Dedicated for the transport of CO_2 and EOR products and for 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.	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. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped as it lies within an existing designated corridor.	30 miles in Park County. Primarily in existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses.	31 miles in Park County. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.
24	Lateral	Cody	26 miles in Park County. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.	Segment dropped as it lies within an existing designated corridor.	26 miles in Park County. In existing designated corridors. Dedicated use to transport CO_2 and EOR products and other compatible uses.	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. Dedicated for the transport of CO_2 and EOR products and for 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.	26 miles in Big Horn County. Dedicated for the transport of CO_2 and EOR products and for other compatible uses.

2.5 AGENCY PREFERRED ALTERNATIVE

In accordance with BLM planning regulations at 43 CFR 1610.4–7 and based on the analysis completed, the BLM is proposing a combination of segments from Alternatives B and D to create an Alternative E as the agency preferred alternative. Table 2.5-1 summarizes the segments included in Alternative E and the rationale for including those segments.

Table 2.5-1. Agency Preferred Alternative

Segment	Alternative	Rationale
1	D	Alternative D avoids mining interests and minor mapping variations are of concern but not when re-routes go outside existing corridor and cross PHMA.
2	D	Variations in Alternative D avoids some existing rights for those that are in conflict with Alternative B.
3	B	Alternatives B is within an existing designated corridor.
4	D	Alternative D avoids cultural resources.
5	B	Alternative D is not consistent with the Riley Ridge CO_2 ROW. Alternative B is parallel to the Riley Ridge CO_2 line, for the entire length and resource issues were previously analyzed as part of that project's site-specific NEPA.
6	D	Alternative B has multiple resource issues that would be avoided in Alternative D.
7	D	Alternative D includes only minor re-route deviations avoid the Continental Divide National Scenic Trail and a uranium mine.
8	B	Alternatives B is within an existing designated corridor.
9	B	Alternatives B accounts for present infrastructure and parallels it whereas Alternative D conflicts with current infrastructure.
10	B	Segment 10 is entirely within existing designated corridors, but 2.4 miles of the segment cross a ROW exclusion area. The Casper Field Office determined that facilities in the designated corridor, as they cross the exclusion area, are consistent with the Casper RMP.
11	B	Proposed Segment 11, initially outside the existing designated corridors in several locations, was realigned by the State of Wyoming to lie inside the existing designated corridors.
12	B	Alternative B avoids Poison Spider congestion.
13	B	Alternatives B is within an existing designated corridor.
14	B	Alternatives B is within an existing designated corridor.
15	D	Alternative D has only minor mapping variations that avoid sensitive cultural resources.
16	B	Alternatives B is within an existing designated corridor.
17	B	Alternatives B is mostly within an existing designated corridor and where it deviates is to avoid existing conflicts.
18	B	Two portions of proposed Segment 18, initially outside of existing designated corridors, were realigned by the State of Wyoming to lie inside the existing designated corridors.
19	D	Alternative D includes only minor mapping variations and these variations are acceptable to the Field Office.
20	B	Alternatives B is within an existing designated corridor.
21	B	Alternative B avoids issues with private land and a historic site.
22	D	Alternative D includes only minor mapping variations and re-route deviations avoid sensitive resources.
23	B	Alternatives B is within an existing designated corridor with a few minor revisions.
24	D	Alternative D includes only minor mapping variations and re-route deviations avoid sensitive resources.
25	B	Alternatives B is within an existing designated corridor with a few minor revisions.

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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 three additional alternatives, Alternatives C, D, and E, and discloses the potential effects of all alternatives. The RMPs for the affected BLM jurisdictions provide detailed descriptions of the local field office environments and these as well as data collected from agency geospatial datasets, field studies, and modeled scenarios based on the historic data that were used to describe the affected environment and to disclose environmental effects. Designated corridors are intended to reduce resource and land use conflicts to the extent possible. 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, and the analysis includes all areas that would be potentially affected by corridor designation on BLM lands, including adjacent lands owned or managed by different entities, to the extent possible. 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, approved, and completed. Application of various mitigation measures and best management practices (BMPs) as provided in the nine RMPs would further reduce the potential impacts of proposed corridor development (see Appendix E). Additionally, application of other BLM resource mitigation measures and BMPs, as well as the State of Wyoming's construction and installation BMPs (see Appendix D) would further reduce the impact of potential future projects. Impacts from designation of corridors are described in terms of direct or indirect and short term (generally within 5 years of project implementation) or long term to describe the duration of the impacts, when applicable. Potential irreversible and irretrievable commitments also are discussed in this chapter.

Under Alternative B, D, and E, all proposed corridors, both outside and within existing designated corridors, would be designated exclusively for the transport of CO_2 and EOR products and for other compatible uses. By reserving this right within existing corridors, the area of these newly designated corridors would be developed specifically for the transport of CO_2 and EOR products and for 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 and EOR products and for other compatible uses; therefore, those segments that would lie 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. WPCI design features, 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, available data 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.

Appendix M contains all the Chapter 3 tables.

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 proposed corridors (as related 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 2020).

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 consist of air quality rules that are applicable to specific stationary sources. Wyoming has established air quality standards for hydrogen sulfide (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, the EPA's proposed determination of attainment has not been finalized yet and the 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.

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).

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. 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

[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.

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 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).

Newer climate change models and assessments have an improved ability to minimize some of the uncertainty in evaluating complex systems 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 2017:36–37)

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

> The 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 per 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) . . . 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:S195)

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. Annual 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)."

In 2018 in the United States, the transportation sector generated the largest share (28.2%) of GHG emissions, primarily from burning fossil fuels for cars, trucks, ships, trains, and planes (EPA 2020). The electricity production sector generated the next largest share (26.9%) of GHG emissions (approximately 63% of the nation's electricity comes from burning fossil fuels, mostly coal and natural gas). The industrial sector generated the third largest share of United States GHG emissions in 2018, primarily from the burning of fossil fuels for energy (EPA 2020).

To assess the potential for and effects of climate change, the standard approach is to measure and predict emissions of GHGs. GHGs consist 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 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 each GHG's 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 2016).
- 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 2016).

- 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 2016).

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. 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, D, and E.

3.2.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to designate 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 and EOR products and for 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, D, and E, which all consist of corridor designation for CO_2-EOR projects. CO_2-EOR projects can store large quantities of CO_2, and CO_2 used during EOR is recycled continuously in reservoirs rather than vented to the atmosphere. EOR projects maximize oil recovery from previously disturbed existing fields while reducing carbon emissions. 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 the action alternatives, pipeline construction, operation, and maintenance activities, along with future potential EOR 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 four 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 the 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 (HAPs), volatile organic compounds (VOCs), and GHGs. Emissions would depend on engine type and size, fuel used, operating hours, and other factors.

Absent project-specific information, the relative amount of fugitive dust 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, 55,481 acres under Alternative D, and 57,776 acres of surface disturbance under Alternative E.

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. Table 3.2-2 includes combustion emissions from the Riley Ridge to Natrona Project Final Environmental Impact Statement (Riley Ridge EIS; BLM 2018a) to estimate combustion emissions from construction of a future similar pipeline project within the designated corridors. The Riley Ridge to Natrona Project included a 243-mile-long, 24-inch-diameter CO_2 pipeline from Sublette County in southwest Wyoming to Natrona County near Casper, Wyoming. The emissions in Table 3.2-2 are calculated using a multiplier based on the total pipeline length of Segment 2 of the Riley Ridge to Natrona Project when compared to the total pipeline length of the alternatives.

The data in Table 3.2-2 indicate that Alternative E would have the highest combustion emissions from pipeline construction. Emissions from Alternatives B and D would be slightly less than Alternative E, and emissions from Alternative C significantly less than Alternatives B, D, or E. Emissions estimates for the action alternatives are based entirely on the assumption that construction methods, type and quantity of construction equipment, duration of equipment use, and emission factors would be the same as those associated with the Riley Ridge to Natrona Project. It is likely that a specific project proposed for the designated corridors would not have the same construction requirements as the Riley Ridge to Natrona Project, and, as a result, emissions would differ from those shown in Table 3.2-2. In addition, other compatible uses with significantly different combustion emissions may be approved in the designated corridors. Individual potential projects in the designated corridors 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 dropped or shortened. This would mean less construction and operation activity and lower combustion emissions in the UGRB for Alternative C than for Alternatives B, D, and E; 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 when compared to Alternatives B, D, and E.

Alternative B's fugitive dust control plan (which would be applied to all four 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 respective planning areas

(BLM 2008a, 2014a, 2015a, 2019a). The use of the fugitive dust control plan and Pinedale BMPs under all the 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 requires 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, 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 the 2019 production levels included in the BLM analysis contained in Appendix I, 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. 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 2.05 Mmt CO_2 would be required, assuming 0.072 BCF of CO_2 would be necessary to produce 1 million barrels of oil (Jones and Freye 2019). Over 20 years, at projected production levels, 40.9 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 4.00 Mmt CO_2 per year. It is estimated that approximately 2.05 Mmt CO_2 used on an annual basis would be sequestered under the WPCI.

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 CO_2 reported by the EPA for total U.S. combustion emissions in 2017, approximately 20.5% of the U.S. Geological Survey (USGS) 2014 combustion emissions for federal lands in Wyoming and approximately 11.4% of the statewide 2018 production estimate of 134.6 Mmt CO_2 (see Appendix I). The net annual GHG indirect emissions reduction would be the equivalent of approximately 1.62 million passenger vehicles driven for 1 year, the energy use from 867,374 homes in 1 year, or approximately two coal-fired power plants. These emissions would contribute to and exacerbate the climate change impacts described in Section 3.2.2.3. Collectively, the incremental addition of GHG emissions from numerous currently proposed and future projects would have a large impact on a global scale.

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 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 WPCI as a whole.

3.2.6 Summary of Effects

Because no specific potential pipeline projects are proposed, emissions by alternative cannot be quantified at this time; however, using surface disturbance and the Riley Ridge to Natrona Project as a proxy for fugitive dust and combustion emissions and GHGs, Alternative E 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, HAPs, 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. CO2 used during EOR is recycled continuously in reservoirs rather than vented to the atmosphere, which reduces carbon emissions.

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 proposed corridors 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 proposed corridors 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 proposed corridors 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 effects (APE) (defined as a 0.25-mile-wide corridor centered on the proposed corridors)
- Impact of the proposed corridors on the setting of historic trails, specifically focused on NHTs; 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 NHPA (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. A historic property must hold significance of association and possess integrity in order to meet the criteria for the National Register of Historic Places (NRHP) (36 Code of Federal Regulations §60.4). The Section 106 process is separate from but often conducted concurrently with the preparation of an EIS. BLM acknowledges that APE is a Section 106-specific designation, and while the WPCI is not limited to Section 106, BLM is using the term herein to define the analysis area (36 Code of Federal Regulations §800.16(d)). 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 of Wyoming 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:

- The Wyoming Antiquities Act of 1935 (Wyoming State Lands Title 36-1-114-116) requires project proponents to obtain a permit from the State of Wyoming to survey, conduct limited testing, or excavate (archaeological data recovery or extensive testing) on any lands owned or controlled by the State of Wyoming.
- The Wyoming Environmental Quality Act of 1973 requires the Wyoming Department of Environmental Quality (WDEQ) Land Quality Division and 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 proponents take steps in the construction and use of easements to protect and preserve archaeological, paleontological, historical, and any other cultural resources on State of Wyoming land.
- Wyoming Statute 7-4-106 (Archaeological Human Burial Sites) requires proponents to follow a process upon discovering human remains on State of Wyoming or private lands.

Federal undertakings may take place on lands under the jurisdiction of the state. In accordance with Section 101(b)(3) of the NHPA, 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 considered 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, occurred at least 50 years ago, and may or may not be considered significant and therefore eligible for the 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. Cultural resources 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 WPCI 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 was conducted (Campbell et al. 2020) 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 3,812 previous cultural resource investigations that have occurred within the WPCI APE between 1955 and 2019 (Campbell et al. 2020:33). Approximately 91% (n = 3,466) 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 and 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.

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).

The Class III investigations that have occurred within the WPCI APE to date have recorded 2,409 cultural resources within the APE (Campbell et al. 2020). Approximately 73% of the sites are prehistoric in age, 15% are historic in age, and 9% possess both a prehistoric and historic component of some type; approximately 3% 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 tribally significant 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 identified in the APE to date have been identified as dating to 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 to the Territorial era to the Modern era. Native American site types found within the APE generally are prehistoric, and some 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.

Each BLM field office has delineated field office–specific protection zones for historic properties. These protection zones include 1) no surface occupancy (NSO) 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 in which 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, NSO zones have been identified by the BLM Buffalo Field Office for two historic forts, Cantonment Reno and Fort Reno, both of which are listed on the NRHP.

3.3.2.2 Historic Trails

NHTs are "extended trails that closely follow a historic trail or route of travel of national significance" (BLM 2020a). Wyoming features other trails that are not formally designated and their federal protection depends on their physical and contextual integrity. 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 NHTs and/or trails that are undergoing feasibility studies to become NHTs.

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 have spiritual or cultural meaning specific to one or more Native American tribes. 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 (Parker and King 1998).

There are 153 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 consist of 1) NSO 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 in which 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, NSO zones have been identified by the BLM Lander Field Office for two Native American sacred sites. No known 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 proposed corridors 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 would 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, including historic trails, and resources of Native American concern that could be impacted by the proposed corridors, an intensive literature review of existing information was conducted (Campbell et al. 2020) 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, including historic trails and sites of Native American concern. The information was compiled from Wyoming SHPO Cultural Records Office and BLM databases; from current published and unpublished literature, chronologies, cultural and historical contexts, ethnographies, regional Class I overviews; and through 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 consist of incomplete, incorrect, or missing attribute or spatial data in the Wyoming SHPO 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 potential future 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 Wyoming State Director and State Historic Preservation Officer 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 future 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 in 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 (BLM Wyoming State Director and Wyoming State Historic Preservation Officer 2014), the Section 106 regulations at 36 CFR 800, and the statewide historic preservation plan (Wyoming SHPO 2016).
- NHTs would be managed under the guidelines and stipulations in BLM Manual 6280 (BLM 2012a) and 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).
- 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 NHPA, Executive Order 13007 (Sacred Sites Act), the Native American Graves Protection and Repatriation Act, the Archaeological Resources Protection Act of 1979, Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and other relevant laws.
- Under the recognition that the 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 the NSO or controlled surface occupancy areas identified in each affected BLM RMP (see Appendix E).
- Potential visual effects on the setting of historic trails, including NHTs; 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 would 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, 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 designate 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 NHPA and under existing stipulations in the BLM 8100 Manual Series (BLM 2004a); BLM field office–specific RMPs (see Appendix E); the State Protocol (BLM Wyoming State Director and State Historic Preservation Officer 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; therefore, 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 the action alternatives would lead to the designation of corridors and potential future projects and activities in these corridors have the potential to create surface disturbance that could result in potential impacts to cultural resources as a whole. The designation of corridors would not restrict other compatible uses within the corridor; it would merely identify preferred routes for the placement of ROWs. However, potential future construction in the proposed corridors could make areas unavailable for certain types of development within the designated corridors.

If the corridors were developed, potential future impacts to cultural resources would consist of indirect impacts related to permanent ground disturbance associated with the construction of pipelines and associated ancillary facilities, staging stations, and access roads. Indirect permanent disturbances could also result from changes in public accessibility (i.e., the introduction of new or improved access roads).

Potential future 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.

3.3.5.2 National Historic Trails and Other Historic Trails

Impacts to NHTs 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. 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 importance of historic trails; and the introduction of visual or audible elements out of character with historic trail or that alter their 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. Only those segments that are known to retain integrity to meet the criteria for eligibility for the NRHP are listed in the table. The BLM cannot regulate trail segments that do not meet the criteria for eligibility for the NRHP.

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 WPCI infrastructure could physically disturb or destroy the tread of these trails, and in the case of the historic trails, associated cultural materials or resources.

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 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

If the corridors were developed, additional potential future impacts to sites of specific concern to Native Americans would be 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. Potential impacts to sacred sites that would affect the characteristics that make such sites sacred include changes to 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 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.

3.3.6 Environmental Effects – Alternative B (Proposed Action)

3.3.6.1 Cultural Resources

Under Alternative B, 2,102 known cultural resources and a projected total of 8,191 cultural resources could be directly and indirectly impacted by potential future project activities (see Table 3.3-3). These resources consist of prehistoric (74%), historic (14%), multicomponent (9%), and unknown age (3%) sites. Of the known resources, 24% are eligible for the NRHP, 59% are not eligible, 15% are unevaluated, and 1% 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 potential future 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 projected total of 448 resources of Native American concern could be impacted by potential future project activities specifically through physical and visual, auditory, and olfactory effects (see Table 3.3-6). 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 sites sacred to Native Americans in the Wind River Basin that are crossed by and could be impacted by potential future development. These sacred sites are within NSO 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, 275 known cultural resources and a projected total of 1,062 cultural resources could be directly and indirectly impacted by potential future project activities (see Table 3.3-3). These resources comprise prehistoric (77%), historic (14%), multicomponent (4%), and unknown age (5%) sites. Of the known resources, 17% are eligible for the NRHP, 59% are not eligible for the NRHP, 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, 19 known resources of Native American concern and a projected total of 73 resources of Native American concern could be impacted by potential future project activities specifically through physical and visual, auditory, and olfactory effects (see Table 3.3-6). Of the known resources, 21% are eligible for the NRHP, 53% are not eligible for the NRHP, and 26% are unevaluated for the NRHP.

3.3.8 Environmental Effects – Alternative D

3.3.8.1 Cultural Resources

Under Alternative D, 1,927 known cultural resources and a projected total of 7,968 cultural resources could be directly and indirectly impacted by potential future project activities (see Table 3.3-3). These resources comprise prehistoric (73%), historic (16%), multicomponent (7%), and unknown age (3%) sites. Of the known resources, 22% are eligible for the NRHP, 60% are not eligible for the NRHP, 16% are unevaluated, and 2% have unknown eligibilities. Seven resources within the Alternative D WPCI APE are listed on the NRHP. Alternative D crosses NSO zones identified by the BLM Buffalo Field Office for two historic forts, Cantonment Reno and Fort Reno.

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 potential future 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, 95 known resources of Native American concern and a projected total of 370 resources of Native American concern could be impacted by potential future project activities specifically through physical and visual, atmospheric, and auditory effects (see Table 3.3-6). Of the known resources, 37% are eligible for the NRHP, 38% are not eligible for the NRHP, and 25% 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 NSO zone designated by the BLM to prevent development-related surface-disturbing activities from occurring in this area (BLM 2014a).

3.3.9 Environmental Effects – Alternative E

3.3.9.1 Cultural Resources

Under Alternative E, 2,101 known cultural resources and a projected total of 8,153 cultural resources could be directly and indirectly impacted by potential future project activities (see Table 3.3-3). These resources comprise prehistoric (73%), historic (15%), multicomponent (9%), and unknown age (3%) sites. Of the known resources, 23% are eligible for the NRHP, 60% are not eligible for the NRHP, 15% are unevaluated, and 2% have unknown eligibilities. Four resources within the Alternative E WPCI APE are listed on the NRHP.

3.3.9.2 National Historic Trails and Other Historic Trails

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

3.3.9.3 Sites of Specific Concern to Native Americans

Under Alternative E, 113 known resources of Native American concern and a projected total of 439 resources of Native American concern could be impacted by potential future project activities specifically

through physical and visual, auditory, and olfactory effects (see Table 3.3-6). Of the known resources, 36% are eligible for the NRHP, 35% are not eligible for the NRHP, and 29% are unevaluated for the NRHP.

3.3.10 Summary of Effects

Corridors that follow existing ROWs contain more known sites since more surveys have been completed in those areas, while corridors that do not follow existing infrastructure are more likely to contain unknown resources. Of the action alternatives, Alternatives B and E have both the largest amount of potential surface disturbance and the greatest number of both known and estimated cultural resources within the WPCI APE. Alternative B would have the most potential for impacting cultural resources, including NHTs, other historic trails, and sites of specific concern to Native Americans. The effects of Alternative E would be similar. The effects of Alternative D would be slightly reduced in comparison to Alternatives B and E 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 it would result in less potential surface disturbance than Alternatives B, D, and E and because it contains the fewest cultural resources of the four action alternatives and specifically lacks any NHTs and other historic trails within the proposed corridors.

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

New utility corridor designation or dedication 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 potential construction and operation of pipeline projects. Activities associated with all the action alternatives have the potential to cause surface disturbance and impact cultural resources over both the short term and the long term were these corridors 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 the action alternatives would also cause potential visual, auditory, or atmospheric effects to cultural resources by introducing modern industrial elements, which could adversely affect the traditional setting, feeling, and association of the resources 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 loads for the alternatives were then qualitatively evaluated in the context of 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 designate 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 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

The designation of corridors would not restrict other compatible uses within the corridor; it would merely identify preferred routes for the placement of ROWs. However, potential future construction in the proposed corridors could make areas unavailable for certain types of development within the designated corridors. The potential future development of all the 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 measures such as 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 the 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 an herbaceous type may create fires of lesser intensity but with the potential to spread 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 designate 57,452 acres, 32,534 acres of which are on BLM-administered lands, for new corridors. Construction and operation of pipelines may occur within these areas. Fire risk and fuels would increase because of construction and operation activities. 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 construction and operation activities. Similarly, restoration and revegetation of the 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 designate 7,060 acres, 4,589 acres of which are on BLM-administered lands, for new corridors. Fire and fuels impacts associated with potential future construction and operation activities 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 construction and operation activities. Restoration and revegetation of 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 designate 55,120 acres, 29,268 acres of which are on BLM-administered lands, for new corridors. Fire and fuels impacts associated with potential future construction and operation activities 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 construction and operation activities. Restoration and revegetation of the 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 Environmental Effects – Alternative E

Alternative E would designate 57,776 acres, 32,726 acres of which are on BLM-administered lands, for new corridors. Fire and fuels impacts associated with potential future construction and operation activities 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 construction and operation activities. Restoration and revegetation of the corridors following construction would promote plant reestablishment and native species, reducing the risk of additional fuels in the form of non-native invasive vegetation.

3.4.10 Summary of Effects

Alternatives B, D, and E would designate similar acreages of new pipeline corridors, both in total and on BLM-administered lands; Alternative C would designate a substantially smaller area for new pipeline corridors. Increases in fire risks and fuels associated with future pipelines 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, D, and E.

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

New utility corridor designation or dedication 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 USGS data, since January 1, 2012, approximately 1,500 earthquakes have been recorded in of Wyoming (USGS 2020a). However, no earthquakes in the proposed corridors have been recorded 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 consists of the portions of 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 designate 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 as a result of 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 designate 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 proposed corridors could occur, particularly 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 potential effects on future projects. Potential effects include loss of equipment or injury to personnel, 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 mitigation guidelines would apply to any future surface disturbance within 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 10 reclamation requirements that must be addressed when developing reclamation proposals for all surface-disturbing activities (Instructional Memorandum [IM] No. WY-2012-032) (BLM 2012b). This reclamation policy would apply to any future surface disturbance within the proposed corridors.

3.5.5.2 Soils Resources

Impacts to soil resources resulting from construction of potential future projects in the proposed corridors are associated with ground-disturbing activities that could result in soil compaction, loss of soil because of 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 soil crust is present, all the 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 (U.S. Forest Service [USFS] 2020). Disturbance to biological soil crusts can reduce soil stability, soil productivity, and erosion-resistance (USFS 2020). Disturbance to biological soil crusts can also result in a higher risk of the spread of invasive plant species, likely because lichen dominated biocrusts provide a physical barrier to establishment of non-native annual grasslands and other invasive species (Condon and Pyke 2018).

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%. These mitigation guidelines would apply to any future surface disturbance within the proposed corridors. 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 10 reclamation requirements that must be addressed when developing reclamation proposals for all surface-disturbing activities (IM No. WY-2012-032) (BLM 2012b). This reclamation policy would apply to any future surface disturbance within the proposed corridors. Appendix E includes stipulations, required design features, BMPs, and other guidance from each applicable BLM field office, which would apply to any future surface disturbance within the proposed corridors.

3.5.6 Environmental Effects – Alternative B (Proposed Action)

3.5.6.1 Geologic Hazards

Under Alternative B, approximately 0.4 mile of faults would overlap 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. Approximately 123.4 acres of land prone to landslides (slopes of 25% or above) would overlap 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 potential for temporary reduction in soil productivity within 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 preceding 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). Approximately 4.9 acres of land prone to landslides (slopes of 25% or above) would overlap 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 2,527 acres of soils in the corridors would have a high wind erodibility potential, and 1,932 acres would have a high-water erodibility potential (NRCS 2013).

Under Alternative C, there would be a potential for temporary reduction in soil productivity within soils in the corridors as a result of potential future construction. Approximately 2,040 acres of these soils would be droughty soils, 5,537 acres would have a potential for shallow bedrock, and 1,357 acres would be hydric soils (NRCS 2013). These characteristics, along with the high erodibility discussed in the preceding 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, approximately 0.4 mile of faults would overlap 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. Approximately 137.9 acres of land prone to landslides (slopes of 25% or above) would overlap 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 26,939 acres of these soils would have a high wind erodibility potential, and 14,849 acres would have a high-water erodibility potential (NRCS 2013).

Under Alternative D, there would be a potential temporary reduction in soil productivity within soils in the corridors as a result of potential future construction. Approximately 17,444 acres of these soils would be droughty soils, 48,661 acres would have a potential for shallow bedrock, and 9,449 acres would be hydric soils (NRCS 2013). These characteristics, along with the high erodibility discussed in the preceding 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 Environmental Effects – Alternative E

3.5.9.1 Geologic Hazards

Under Alternative E, approximately 0.4 mile of faults would overlap 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. Approximately 111.8 acres of land prone to landslides (slopes of 25% or above) would overlap the proposed corridors. Potential future construction in these areas could contribute to slope destabilization. The expected increase in oil and gas development under Alternative E would include the continued possibility for seismic activity associated with hydraulic fracturing.

3.5.9.2 Soils Resources

Under Alternative E, approximately 57,775 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 approximately 262 acres more 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 28,789 acres of these soils would have a high wind erodibility potential, and 15,248 acres would have a high-water erodibility potential (NRCS 2013).

Under Alternative E, there would be a potential temporary reduction in soil productivity within soils in the corridors as a result of potential future construction. Approximately 19,746 acres of these soils would be droughty soils, 51,536 acres would have a potential for shallow bedrock, and 9,403 acres would be hydric soils (NRCS 2013). These characteristics, along with the high erodibility discussed in the preceding 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.

3.5.10 Summary of Effects

3.5.10.1 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 E overlaps less land prone to landslides than both Alternatives B and D. Alternatives B, D, and E are overlapped by the same number 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 because no faults overlap the proposed corridors.

3.5.10.2 Soils Resources

Of the action alternatives, Alternative E would have the greatest potential impact on soil compaction, erosion, soil productivity, and biological soil crusts, followed by Alternative B (Table 3.5-1). With a 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.

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

New utility corridor designation or dedication 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 the 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 such as water resources, biological resources, air quality, and health and safety from hazardous materials and wastes are described in their 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 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:

- Spill or other inadvertent release of project-related hazardous materials, hazardous wastes, or solid wastes
- Presence of nonproject-related hazardous waste sites or 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.

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.
- Information on existing hazardous waste sites within the affected environment was 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 potential future project preparedness and response planning.

It is assumed that the proponents of all potential future 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 designate the proposed corridors under any of the action alternatives would not be approved, and there would be no potential future construction within the proposed corridors and no impacts associated with hazardous materials and wastes.

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 hazardous materials or wastes.

However, construction and operations of potential future projects, whether established through project-specific ROWs (Alternative A) or through corridors (Alternatives B, C, D, and E), 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 future projects, hazardous materials such as natural gas and crude oil would be transported through pipelines. Indirect impacts from the management of hazardous materials and wastes would occur during construction or operations in the event of an accidental spill or other inadvertent release of hazardous materials.

Hazardous materials and wastes for potential future projects would be transported, stored, handled, and disposed in accordance with applicable federal, state, and local regulations (EPG 2015). As described in Table 3.6-1, the four hazardous waste sites within the affected environment are in compliance with applicable regulations.

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 future projects under all alternatives.

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 potential future project 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. However, risks related to hazardous materials and wastes cannot be avoided altogether because of the potential for accidental release and exposure.

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

New utility corridor designation or dedication 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 proposed corridors affect corridors, ROWs, and other land use authorizations?
- How would the proposed corridors affect agricultural lands?

Indicators of impacts to lands and realty are as follows:

- Acres of BLM-administered land, State of Wyoming 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 consists of the proposed corridors. Most of these corridors are within pipeline corridors that were established in existing BLM RMPs (Table 3.7-1). The proposed corridors would have segments outside 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 collocating multiple linear ROWs, such as gas pipelines and power lines. The 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 of Wyoming land-management agencies and private lands. Land jurisdiction in the corridors is listed in Table 3.7-1 by alternative.

The proposed corridors could potentially cross or are located near federal lands managed by the USFS, BLM, NPS, DOE, Department of Defense (DOD), and U.S. Bureau of Reclamation (BOR); State of Wyoming 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 an 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 crossed by the proposed 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 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 proposed corridors 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 designate 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.

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 the action alternatives, the designation of corridors dedicated for the transport of CO_2 and EOR products and for 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, landownership, and land use. Note that corridors would only be designated on BLM lands. Non-BLM lands could be indirectly impacted if future proposed projects were routed onto adjacent lands as shown in Table 3.7-1.

Under these circumstances, the proponents of future proposed projects would be required to work with other landowners and agencies to meet legal obligations and requirements.

The proposed corridors would result in temporary changes to land use and landcover, which is described in more detail under each proposed corridor environmental effects below. Local government 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. If the corridor is developed, the potential indirect impacts to land use and landcover would be in place for the lifetime of the proposed corridors and associated development and until reclamation is successfully accomplished. Potential changes to land use, landcover, and landownership were identified and analyzed in existing RMPs/EISs; however, the designation of the corridors for the transport of CO_2 and EOR products and for other compatible uses would mean potential projects may have to develop elsewhere. Projects that are not compatible with the WPCI, i.e., overhead transmission lines, would not be authorized in the corridor, therefore displacing those impacts to other locations outside the corridor.

Per Section 503 of the FLPMA, for the establishment of a ROW corridor, the width must 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. 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) become involved in a proposed project and if the project is 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 impacts similar to those discussed above. The future clearing of the corridors before development with construction vehicles (drive and crush) and the surface disturbance from the potential development would temporarily remove productive cropland within the ROW. Potential future 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 damage to crops. Land required for future development within the proposed corridors could be removed from production temporarily during the construction and possible reclamation activities of a potential project. The loss of productive cropland during construction and reclamation activities would be temporary and minor under any proposed project because of the relatively small acreages of agricultural lands available within the corridors compared to the acreages of the proposed energy corridors in their entireties. 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)

Under Alternative B, proposed designated corridors for the transport of CO_2 and EOR products and for other compatible uses encompass 57,452 acres, and future development within the corridors could indirectly impact federally managed lands, State of Wyoming and local government lands, and private lands. Of this total, 36,990 acres (64%) would be within existing ROWs or designated utility corridors.

3.7.7 Environmental Effects – Alternative C

Under Alternative C, proposed designated corridors for the transport of CO_2 and EOR products and for other compatible uses encompass 7,060 acres, and future development within the corridors could indirectly impact federally managed lands, State of Wyoming lands, and private lands. Alternative C is significantly smaller in acreage compared to the other action alternatives because it does not include existing designated corridors. No acres within Alternative C would be within existing ROWs or designated utility corridors.

3.7.8 Environmental Effects – Alternative D

Under Alternative D, proposed designated corridors for the transport of CO_2 and EOR products and for other compatible uses overlap 55,120 acres, and future development within the corridors could indirectly impact federally managed lands, State of Wyoming and local government lands, and private lands. Of this total, 45,560 acres (83%) would be within existing ROWs or designated utility corridors.

3.7.9 Environmental Effects – Alternative E

Under Alternative E, proposed designated corridors for the transport of CO_2 and EOR products and for other compatible uses encompass 57,810 acres, and future development within the corridors could indirectly impact federally managed lands, State of Wyoming and local government lands, and private lands. Of this total, 42,746 acres (74%) would be within existing ROWs or designated utility corridors.

3.7.10 Summary of Effects

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

Alternative D would utilize the most existing corridors in terms of total acreage (45,560) and percentage of proposed corridors (83%), followed by Alternative E, which would utilize 42,746 acres, which comprises 74% of the proposed corridors. Alternative C would use the fewest existing ROW and utility corridors, consistent with the design of Alternative C, the purpose of which is to avoid re-designating existing utility corridors. Overall, Alternatives B, D, and E 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 (26,990 comprising 64%) compared to Alternatives D and E.

3.7.10.2 Agricultural Land Use

Overall, agricultural land comprises approximately 1% to 4% of all acreage available for energy use per alternative. Alternative D would result in the greatest potential acquisition of agricultural lands (813 acres) for corridor designation; this constitutes only approximately 1.5% of the proposed corridors proposed for this alternative. Alternative C would result in the smallest potential acquisition of agricultural lands (270 acres); however, this would result in the greatest percentage of agricultural land acquisition per corridor at 3.8%. Alternatives B and E would result in similar impacts to those of Alternative D with the potential acquisition of 313 and 350 acres respectively, which comprises 0.5% and 0.6% of the corridor.

3.7.10.3 Land Uses and Land Use Plans

The Alternative E corridor is the largest in terms of total acreages and mileage, 57,776 and 1,970, respectively, followed by Alternative B with 57,452 acres and 1,958 miles. Compared to Alternative E, Alternative D is smaller by approximately 2,200 acres and 110 miles. The proposed corridors under

Alternative C are the smallest and would potentially affect the fewest acres and miles, 7,060 and 237, respectively. Therefore, Alternatives B and D would result in potentially 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 fewer impacts because of its smaller footprint.

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

New corridor designation for the transport of CO_2 and EOR products and for other compatible uses in existing utility corridors would preclude other land use authorizations, such as ROW for an overhead transmission line or other types of pipelines (an irretrievable impact) until the designations are changed.

Future potential development in new corridors would result in the conversion of some lands from existing uses to use as potential ROW. In areas where reclamation activities may have limited success, some vegetation communities could take many years to reestablish (more than 50 years), and some areas may never return to their pre-disturbance 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 WPCI could result in adverse impacts to agriculture during surface-disturbing activities and during decommissioning. In the short term, the current productivity of lands for agricultural uses could be reduced. Overall, impacts to long-term productivity resulting from these activities would be minimal because of 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 proposed corridors impact the various range improvements they intersect during construction?

This section discusses the anticipated effects of the proposed corridors 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-disturbing 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 define the areas of livestock use by individual permittees. Grazing provides an important economic opportunity within local communities; within the proposed corridors the activity includes the grazing of domestic cattle and other livestock. Grazing on federal lands is governed under the Taylor Grazing Act of 1934, the FLPMA, and the Public Rangelands Improvement Act of 1978. All impacted allotments are listed by alternative in Appendix J.

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 1 month. Table 3.8-1 shows the total combined federal acres and AUMs of allotment that occurs partially or completely within the corridor for each alternative. The table also includes the combined actual AUMs and acres of allotments within the corridor for each alternative.

3.8.3 Methods of Analysis

The analysis area for livestock grazing consists of the allotments that are crossed by the action alternatives. The proposed corridors 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 (i.e., federal acres) available for livestock grazing by allotment under each alternative (see Table 3.8-1). The number of AUMs in the proposed corridors was calculated by multiplying the total federal 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 postconstruction 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.

3.8.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to designate 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, including existing designated corridors, recreation activities, and vegetation treatments, would continue similarly 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 the action alternatives, the designation of corridors dedicated to future use would cause indirect impacts to livestock grazing. Indirect impacts to grazing allotments from subsequent construction, operation, and decommissioning activities could include the loss of forage, potential disruptions to calving and lambing 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 proposed corridors 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 proposed corridors 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 because of 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 vehicle 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 permits associated with individual grazing allotments. The permitted AUMs for grazing allotments would be adjusted if it is determined 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. Specific RMP stipulations, BMPs, and design features that would reduce impacts to livestock grazing can be found in Appendices D and E.

3.8.5.2 Range Improvements

Under all the action alternatives, range improvements, which include fences, gates, cattle guards, and stock tanks, could be directly removed or disturbed as a result of surface-disturbing 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-disturbing 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 (6,229 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 4,612 acres of potential forage (621 AUMs). Across all field offices, this represents a loss of up to 0.30% 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 29,751 acres of potential forage (6,196 AUMs). Across all field offices, this represents a loss of up to 0.43% of available AUMs.

3.8.9 Environmental Effects – Alternative E

Under Alternative E, future potential development of the proposed corridors would temporarily remove up to 34,135 acres of potential forage (3,291 AUMs). Across all field offices, this represents a loss of up to 0.50% of available AUMs.

3.8.10 Summary of Effects

Livestock grazing impacts from Alternative B, Alternative D, and Alternative E would be similar. Acreage-wise, the greatest impacts would occur as a result of Alternative B, and the fewest as a result of 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.

3.8.11 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. Construction and operation of future potential development and subsequent maintenance in new and existing corridors would temporarily reduce the forage productivity and available AUMs until the disturbances were successfully reclaimed and therefore would not result in irretrievable or irreversible impacts. Any loss of land acreage for livestock grazing as a result of development within the proposed corridor would temporarily occur for project-specific portions, and grazing opportunities would resume once vegetation is reestablished. No unavoidable adverse effects to range improvements or structures are anticipated. Overall, impacts to long-term productivity of grazing management would be minimal because of the limited overall percentages that would be impacted by all the action alternatives and the assumption that reclamation would return forage productivity and available AUMs.

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 much of that production occurs in the planning area (WSGS 2020b). Approximately 8,230,159 acres of the planning area are under oil and gas lease, and 2,498,601 acres of oil and gas fields are in the planning area. The overall acreage of oil and gas leases comprises the federal mineral estate. The BLM has control only 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 of Wyoming, has resulted in significant reductions in revenues and adverse impacts to local government and Wyoming workers. The State of Wyoming has identified roughly 2,000 miles of proposed pipeline corridors throughout the central and western portions of the state deemed important to future oil production and distribution of natural resources vital to the state's economy. Most of these corridors (1,104 miles) cross BLM-administered lands. Large economically significant oil reserves in "played-out" reservoirs might be good candidates for CO_2-EOR.

CO_2-EOR in Wyoming began in the late 1980s and gained more traction in the 2000s, when new CO_2-EOR projects came online. The development of supercritical CO_2 at ExxonMobil's Shute Creek Gas Plant in LaBarge, Wyoming, precipitated EOR (Jones and Freye 2019) (see Appendix I). 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 of potential CO_2 production include Riley Ridge north of Shute Creek and sources potentially from carbon capture at coal-fired power plants.

CO_2 from the Shute Creek Gas 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 injected 229 million tons of CO_2 into legacy oil fields. Additionally, 43,000 barrels of incremental oil production were 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.

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. Active coal permits cover approximately 416,322 acres in the planning area (WDEQ 2020). In addition, approximately 1,004,640 acres of trona areas are 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 on maps of known active mining operations and mineral locations using BLM spatial data. The designation of corridors would not restrict other types of uses within the corridor. It would merely identify preferred routes for the placement of ROWs. However, potential future construction in the proposed corridors could make some areas unavailable for certain types of mineral development within the footprint of the construction. 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 I). EORI reports that "the 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; however, some of these existing sources may require retrofitting to capture CO_2 and that could be cost prohibitive. CO_2-EOR production is underway in seven of the fields.

For purposes of analysis, the BLM has reviewed the list of 100 fields identified by EORI and, based on existing annual production data, has calculated the reasonably foreseeable annual emissions over the next 20 years. 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. 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. All data calculations can be found in Appendix I.

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 experiencing 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 obtain average annual production. 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 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 the EORI, the BLM filtered out records where no production in 2010 and in 2019 occurred; this resulted in the removal of records for four fields—Hawk Point, Grieve North, Meadow Creek North, and Neiber Dome—from use in the calculations.

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 because of their relatively short records) 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 calculate future year production amounts on a field basis. This method likely overestimates additional recovery on an annual and 20-year basis but provides a reasonable method for estimating future production and activity levels.

Key assumptions for this analysis include the following: The existing well network is sufficient to produce any additional incremental production, and there are sufficient reservoir reserves 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.

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, the availability of CO_2 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 being exported for EOR projects in Colorado (i.e., 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 designate 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 the action alternatives.

3.9.5 Environmental Effects – Common to All Action Alternatives

The designation of corridors would not restrict other compatible uses within the corridor. It would merely identify preferred routes for the placement of ROWs. However, potential future construction in the proposed corridors could make areas unavailable for certain types of development within the designated corridors. Potential impacts to potential mineral development operations under all the action alternatives would result from the footprint of potential future construction in the proposed corridors being potentially inaccessible to mineral development or the large capital investments necessary for supporting CO_2-EOR, which may not occur as a result. The proposed corridors may reduce the surface occupancy of existing leases in areas of overlap in the planning area, but the proposed corridors cannot negatively affect valid existing rights. The designation of corridors would not impact valid existing rights within existing leases and permit areas. Potential future construction within the proposed corridors would not be allowed to impact valid existing rights within existing leases and permit areas.

The proposed corridors would not be allowed to make any existing authorized fluid, geothermal, locatable mineral, salable mineral, coal, or non-energy leasable mineral (trona, phosphate, etc.) development operations inaccessible. Any potential impacts to existing authorized fluid, geothermal, locatable mineral, salable mineral, coal, or non-energy leasable mineral (trona, phosphate, etc.) development operations would need to be addressed during site-specific authorization through rerouting or other means.

Because of the expected increase in oil and gas production under all the action alternatives, there would be an increased need for the use of sand and gravel 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 2020) 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 miles of existing pipelines.

Assuming the corridors are developed, it is reasonably foreseeable that CO_2-EOR could be used in approximately 93 existing oil fields, most of which are located in the Powder River and Big Horn Basins (including the existing Grieve and Big Sand Draw fields), with some additional potential in the Rock Springs Field Office and Lander Field Office planning areas. Using the aforementioned methodology, total new production over the life of the oil fields 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. The projections of additional resource recovery also assume that an adequate supply of CO_2 is available for use. It is not expected that the surface footprint of these existing fields would be expanded beyond what is currently in place. Although there may be a short-term increase in the intensity of activity in these fields as new pipelines are installed, new incremental production as a result of EOR is not expected to result in a long-term change in intensity because EOR production is simply extending the life of the field(s).

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 miles of existing pipelines. Where existing corridors are full, new construction would be limited unless the proponent 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 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 2020) 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 miles of existing pipelines.

Other impacts would be similar to those identified as resulting from Alternative B projected production and similar to those identified as resulting from 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 developments that also require the installation of new major transportation pipelines. This could result in delays in delivering product to market and may also temporarily delay new development and limit royalty payments until new pipeline corridors could be identified.

3.9.9 Environmental Effects – Alternative E

Under Alternative E, approximately 5,561 acres of oil and gas fields and 15,837 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 2020) 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 357 miles of existing pipelines.

Other impacts would be similar to those identified as resulting from Alternative B projected production and similar to those identified as resulting from Alternatives C and D as they relate 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 developments that also require the installation of new major transportation pipelines. This could result in delays in delivering product to market and may also temporarily delay new development and limit royalty payments until new pipeline corridors could be identified.

3.9.10 Summary of Effects

Of the action alternatives, Alternative B would result in the greatest potential future surface disturbance in existing oil and gas fields and oil and gas leases. This potential surface disturbance would be unlikely to 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, potential future construction of pipelines in the proposed corridors could 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 E would result in the second to least amount of potential future surface disturbance in existing oil and gas fields and oil and gas leases.

Alternatives D and E 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 change to potential 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.

Under all the action alternatives, potential future construction in the proposed corridors would not affect valid existing rights such as authorized leases and approved mine plans and permits, as this would represent an unlawful federal taking.

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

The proposed corridors would not result in irretrievable and irreversible effects on acres available for discretionary development (undeveloped oil and gas, coal leases, trona leases, and salable minerals) or nondiscretionary mineral development (locatable minerals) in the planning area. This is because a new utility corridor designation does not result in the closure of an area to mineral development. The BLM could still consider any proposal for mineral development within the proposed corridors, and any facilities proposed would need to be re-routed around facilities already approved.

3.10 NOISE

This section describes effects the noise generated by the potential 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 loudness (decibel) and type of noise, the perceived importance of the noise, the appropriateness of the noise in the setting, the time of day and 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 proposed corridors 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 loudness and type of noise, the perceived importance of the noise, the appropriateness of the noise 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 3.21, Wildlife and Fisheries, noise is known to disrupt the 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 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; however, the BLM does limit noise levels at the perimeter of greater sage-grouse leks in PHMA to a maximum of 10 dBA above ambient noise (BLM 2015c). 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 associated with 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 the 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. Noise levels for various types of equipment are programmed into the RCNM 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 construction equipment likely to be in operation.

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 the project's effects on ambient noise levels.

3.10.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to designate 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

All the action alternatives would lead to the designation of corridors and potential projects associated with activities that may create or have the potential to create surface disturbance that would result in potential indirect impacts. The designation of corridors would not restrict other compatible uses within the corridor; it would merely identify preferred routes for the placement of ROWs. However, potential future construction in the proposed corridors could make areas unavailable for certain types of development within the designated corridors.

Potential future impacts resulting from 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 given 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 construction and maintenance activities, but given the temporary nature of the construction noise, no adverse or long-term effects are anticipated.

The primary noise sources during operations in a corridor would come from compressor/pump operations. Estimated noise levels from a single pump/compressor at 0.25 mile and 0.50 mile from the property boundary of these facilities would be about 50 and 44 dBA, respectively. Assuming continuous operation, the corresponding day-night average sound level would be about 57 dBA and 51 dBA, respectively (DOE and BLM 2008). Receptor locations within approximately 1,700 feet (0.3 mile) could experience noise levels in excess of the EPA's 55-dBA guideline for residential zones (EPA 1974). 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 Summary of Effects

Noise impacts associated with future potential 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 E would affect the largest area; therefore, noise impacts from development of the corridors would be higher for Alternative E than for Alternatives B, C, or D. Alternative C proposes the fewest acres of new corridors and would therefore affect the smallest area.

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

New utility corridor designation or dedication 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 add to the knowledge in a specific area of science. The types of fossils in a specific area can generally be predicted before 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 NEPA, the 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), IM 2009 011 (BLM 2008c), IM 2012-141 (BLM 2012c), and IM 2016-124 (BLM 2016c); the USFS's *Training Guide for Management of Paleontological Resources* (USFS 2005), and *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 and USFS plans establish practices and guidelines for the long-term management of paleontological resources on BLM and USFS lands. 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 WPCI'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 scientifically important fossils within the corridors (e.g., areas of Potential Fossil Yield Classification [PFYC] U, 3, 4, and 5). 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, specifically, the 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 are primarily composed of Precambrian, Paleozoic, and Mesozoic rocks but also contain remnants of late Tertiary rivers. The extensive geologic history evidenced by 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 and 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 discussed 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. Fossils may occur in any unknown or moderate to very high potential formation underlying the proposed corridors.

It is not usually possible to determine the exact location of exposed fossils in an area without a pedestrian field survey. Systematic paleontological resource survey has not been conducted within most of the analysis area; thus, locality search results represent only 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 associated with 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 designate 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 direct 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 potential development of the corridors and ground-disturbing activities and increased access associated with future development within the corridors.

Future potential impacts during ground-disturbing activities associated with construction (e.g., vegetation removal, grading, trenching, heavy equipment traffic) could cause damage to or loss of scientifically important fossil resources through 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 development, 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.

Potential future 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. Potential future postconstruction, 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, before 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 the action alternatives because disturbance could result in the loss and destruction of scientifically valuable or important fossils. Alternative E has a higher frequency of potential ground-disturbing impacts to paleontological resources than any of the other action alternatives, as noted by acres of higher PFYC in Table 3.11-1 (BLM 2019c). Corridor acreage available to future ground-disturbing construction projects under Alternative D would include fewer acres of higher PFYC than Alternative B or E, 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 the action alternatives. Outside current corridors, Alternative C would cross substantially less private land with higher PFYC, whereas Alternatives B, D, and E 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, D, and E. The amount of federal acreage that would be crossed by Alternatives B, D, and E 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, D, and E. Compared to Alternatives B and D, Alternative E would parallel more existing pipeline routes or

disturbed areas and would therefore require fewer new or improved roads. Therefore, Alternative E could have less ground disturbance that potentially could impact paleontological resources.

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

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

For all the action alternatives, access to the proposed corridors 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. Alternatives B and E have 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. Yet, 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 potential future construction and operations of development of the corridors. 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 direct hazards from the proposed corridors and indirect hazards from construction and operations of potential future projects were analyzed to determine increased risks to worker and public health and safety.
- Potential effects from degradation of resources from the construction and operations of potential future projects that would lead to increased risks to worker and public health and safety were analyzed.

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 3.6-1) 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 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 designate 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, and 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 future 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 future projects would be subject to federal (Federal Energy Regulatory Commission [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 in the case that they occur. This information would be reviewed and considered by the BLM to inform the agency's 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 in the management of hazardous materials and wastes. In addition, potential projects would meet 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 future 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 accesses a project site, worker health and safety protections and industry standards implemented during construction and operations would also offer protections to that person. 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 future projects, inadvertent spills of hazardous materials in water resources would degrade surface water, groundwater, 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.

Future potential pipeline projects would implement SPCC plans and meet industry standards to proactively plan and respond to spills (e.g., by implementing 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 alternatives. Indirect impacts to worker and public health and safety could occur from potential future construction and operations of pipeline projects. All potential future 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. However, risks related to health and safety cannot be avoided altogether because of the unavoidable nature of accidents or other unforeseen circumstances.

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

New utility corridor designation or dedication 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 SRMAs, 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 of Wyoming agencies that regulate recreation uses, 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 proposed corridors are listed in Chapter 1. In addition, the BLM prepares a variety of planning documents related to the agency's recreation and visitor services program, including interpretive plans and travel management plans.

Recreational opportunities in the proposed corridors include hunting and fishing, hiking, mountain biking, horse packing and riding, wildlife viewing and photography, and OHV use. 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 proposed corridors 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 recreationists. 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 BLM Manual H-8320-1 (2014b), 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 proposed 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 the 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 designate 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, and local regulations. The OFM in the SRMAs and ERMAs would continue 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 and EOR products and to 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 potential 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 potential 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 the 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 potential 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 the proposed corridors during future development. It is not anticipated that new road construction would be required, but if required, potential constructed roads on BLM lands would be left in place or completely reclaimed under the direction of the BLM field office. Before the construction of new roads, minor repairs would take place on roads that require any surface disturbance activities outside the existing disturbed area. On public lands, this work would be authorized by temporary ROWs. Overall, the potential construction of access roads could lead to impacts to public access resulting in limited public access to those new roads. Future 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 WPCI. 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), whereas Alternative E has the greatest potential acreage of disturbance to recreational resources at 16,953 acres (compared to 16,918 under Alternative B); these acreages each constitute approximately 29% of the proposed corridors. Alternative D would result in similar impacts to recreational resources (14,724 acres) because it has slightly fewer recreational resources (86) and would result in slightly fewer impacts to those resources when compared to Alternative B (26%). Alternative C has the smallest footprint and contains the fewest recreational resources (17). Alternative C would result in 2,192 acres of disturbance to recreational resources, which constitutes approximately 31% of the proposed corridors. Per BLM Manual H-8320-1 (2014b), 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 Alternatives B and E, 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 SRMAs or ERMAs. Alternatives B and E would result in the greatest acreage impact to recreational resources from the construction, operation, and maintenance of pipeline infrastructure within the proposed energy corridors.

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 and EOR products and for 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 consists of 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 more than 18% of the jobs within the three counties, almost 34% of total labor income (Table 3.14-2), and more than 33% of the sales and use tax revenues in the region, and those industries generate substantial revenue from severance and property taxes (Table 3.14-3).

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 those five counties (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 more than 3% of the jobs in the region and almost 8% of the labor income. Tourism provides approximately 15% of the jobs and more than 11% of the labor income (see Table 3.14-2).

3.14.2.3 Central Region

The analysis area in the Central Region consists of 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 Interstate 80 (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 2020). Mining and oil and gas activity provides more than 5% of the employment within the Central Region analysis area counties and more than 10% of the annual wages. Travel and tourism provide more than 9% of the jobs within these counties and almost 6% of the wages (see Table 3.14-2).

3.14.2.4 Northeast Region

The analysis area in the Northeast Region consists of 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 and oil and gas sector (see Table 3.14-2). More than 26% of sales and use tax revenues were associated with mining and 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.

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 area, 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 the purposes of this EIS, comparative assessment of the potential effects of the

alternatives on nonmarket values was 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 corridor designations are not authorization for any ground-disturbing activities. Indirect socioeconomic impacts could result from corridor designations in the future if the BLM were to receive ROW applications for proposed projects within the designated corridors. Because the specifics of potential future pipeline development within the designated corridors (e.g., the number of pipelines, their length and locations) are unknown, future indirect impacts associated with pipeline development within the designated corridor cannot be estimated.

To provide insight into the types of potential impacts that could be associated with future development, per mile and/or per worker effects from 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, are used as proxies for potential socioeconomic impacts that could result from a similar-sized development project within the designated corridor (BLM 2018a). Estimates of potential impacts are reported in current-year (2020) dollars.

Similarly, the degree to which pipeline designation and potential future development of pipelines within the designated corridors will induce greater adoption of EOR technology is unknown. Furthermore, the oil industry is highly volatile and firms' decisions relating to capital expenditures to recover oil are largely influenced by trends and forecasts for oil prices. Although a 2013 report on the economic contributions of EOR in Wyoming was prepared by the University of Wyoming (Cook 2013), the analysis was conducted when average annual spot prices for crude oil were at historically high levels (> $100 per barrel) for the second year in a row. Annual average crude oil spot prices between 2014 and 2019, however, were approximately $52 per barrel. Since there is great uncertainty as to whether oil prices will ever recover to the 2011–2012 high prices used in the 2013 EOR study, estimates of employment, tax revenue, and other metrics from the 2013 study likely significantly overestimate the economic impacts that EOR could generate in Wyoming in the future.

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 the 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 designate 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 and EOR products and for other compatible uses could 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 socioeconomic effects by streamlining environmental reviews for future ROW applications within the designated corridors. However, any project proposed to take place within the designated corridors would still be subject to environmental review under NEPA.

3.14.5.1 Potential Indirect Effects from Pipeline Construction

Construction of future pipelines within the designated corridors 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) during the construction phase. The analysis for the Riley Ridge to Natrona Project estimated that each mile of pipeline constructed would support an estimated $782,000 in total regional economic output and $277,000 in total labor earnings and would generate an estimated $6,000 in annual state and local tax revenues from sales taxes and lodging taxes (BLM 2018a).

Information provided to the BLM by the proponent of the Riley Ridge to Natrona Project indicates that approximately 75% of the project's total construction workforce, or about 1.5 nonlocal workers per mile of pipeline constructed, was not anticipated to live in the commuting area. It was also estimated that these nonlocal workers would temporarily move to the area with approximately 0.3 dependents on average (BLM 2018a).

Although it is uncertain how representative the anticipated construction workforce for the Riley Ridge project would be of future pipeline projects within the designated corridor, it is highly likely that at least a portion of the construction workforce for any pipeline project within the designated corridor would include a percentage of workers who did not live within commuting distance, and that some of these nonlocal workers would temporarily relocate to communities near a project area with dependents. 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. Increased EOR development and extraction facilitated by future pipeline projects within the designated corridor would have a positive economic impact on the economies of the study area, but the magnitude of these impacts are unknown because economic impacts are largely influenced by development costs and market prices for EOR products. 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 since they could market captured CO_2 to the oil and gas industry. More than 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).

3.14.5.3 Potential Environmental Justice Effects

Although corridor designation alone would not create any high and adverse effects on environmental justice communities, comments received during the public review of the draft EIS raised concern that environmental justice communities, including tribal members, could be disproportionately affected by adverse impacts of future projects within the proposed corridors under all of the action alternatives. Although the degree to which pipeline designation and potential future development of pipelines within the designated corridor are unknown, future development has the potential to adversely impact surrounding environmental justice communities.

Some adverse impacts, such as crime, are likely to result in disproportionately high adverse effects. For example, recent studies documenting impacts of non-resident workers on tribal communities found that the influx of workers burdened communities by increasing housing costs and living expenses, decreasing housing availability, and straining healthcare providers supporting the additional population (Jokinen et al. 2017) Additionally, the increase in non-resident workers was also linked to increases in industrial accidents and illness, vulnerability for women and youth in the area, and traffic. Evidence from the Bakken oil-producing region in North Dakota shows that the arrival of non-resident workers supporting the region's oil and gas boom coincided with increased crime rates, including increased incidence of aggravated assault (Martin et al. 2019). The study also found that Native Americans in the region were 2.5 times more likely to be victims of violent crime compared to whites.

Crime against Native Americans in oil and gas producing regions is also possible in the State of Wyoming. This was noted in the FEIS for the Moneta Divide Natural Gas and Oil Development Project in Wyoming, published by the Bureau of Land Management, which, in its evaluation of potential adverse effects on tribal members, concluded that it was possible "that tribal members, especially women, may experience increased violent crime due to the influx of non-local oil and gas workers" (BLM 2020g).

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 of the presence of CO_2 pipelines on private property values. 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). The 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 associated with future pipeline development within a designated corridor. Private landowners could also be affected by having fewer opportunities to sell easements to developers of other types of energy or infrastructure projects in the proposed corridor.

3.14.6.2 Potential Effects on Other Industries and Nonmarket Values

Among the four action alternatives, Alternative B would have the most potential for 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, based on the linear distance of the proposed corridor and because all the proposed corridors—including those within existing corridors—would be reserved for CO_2, product transportation and other compatible uses. Should potential future conflicts occur, they could result in lost jobs and revenue from the construction and operation of other linear infrastructure.

Under Alternative B, there could be a minor temporary loss of productive cropland (see Section 3.7.5) and a potential temporary disturbance to 6,539 AUMs of forage 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). However, the temporary impact would not affect all 6,539 AUMs at once, as permittees would likely move herds to other areas of their allotment unaffected by potential future construction. Still, under Alternative B, nonmarket values associated with farming and ranching lifestyles and environmental quality could be affected.

The proposed corridors under Alternative B would cross the Badlands SRMA; the NHTs; the 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; 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. Non-market environmental values in areas outside special management and recreational areas could also be affected.

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), which covers approximately 3,337 square miles in the western third of Carbon County; tract 9681 in Carbon County (16.6% of individuals living in poverty), which covers approximately 2,667 square miles in the northeast corner of Carbon County; tract 9402.02 in Fremont County (more than 68% minority residents and more than 23% residents living in poverty), which covers 460 square miles in the Wind River Reservation; tract 9706.01 in Sweetwater County (more than 28% minority residents), which covers 34 square miles south of I-80 between Green River and Rock Springs;

and tract 9707 in Sweetwater County (more than 18% of residents living in poverty), which covers approximately 1,024 square miles and runs from the border of Uinta County to the west, I-80 to the north, the Utah border to the south, and Green River to the east. The Eastern Shoshone and Northern Arapahoe tribes are also environmental justice communities under CEQ guidance (CEQ 1997). Future development within the designated corridor would be subject to subsequent NEPA reviews, during which environmental justice populations would have additional opportunities to participate in the planning process for projects that may affect their respective communities.

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 ranching economy, with a projected temporary reduction of approximately 629 AUMs (see Section 3.8). However, the temporary reduction would not impact all 629 AUMS at once, as permittees would likely move herds to areas of their respective allotments unaffected by potential future construction.

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. Non-market values associated with farming and ranching lifestyles would also be least impacted under Alternative C.

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). As with Alternative B, future development within the designated corridor would be subject to subsequent NEPA reviews, during which environmental justice populations would have additional opportunities to participate in the planning process for projects that may affect their respective communities.

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 those under Alternative B and greater than those under 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 and EOR products and to other compatible uses under Alternative D, this alternative would have more potential for 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 minor effects on the agricultural economy, similar to Alternative B.

Alternative D would have effects on the agricultural economy similar to those resulting from Alternative B, including temporarily impacting 6,447 AUMs within the proposed corridors during the construction of potential future projects (see Section 3.8). However, the temporary reduction would not impact all 6,447 AUMS at once, as permittees would likely move herds to areas of their respective allotments unaffected by potential future construction. By avoiding NHTs 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 greater effects than Alternative C. Alternative D would also have slightly less effect on nonmarket values associated with farming and ranching lifestyles compared to Alternatives B and 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. As with Alternatives B and C, future development within the designated corridor would be subject to subsequent NEPA reviews, during which environmental justice populations would have additional opportunities to participate in the planning process for projects that may affect their respective communities.

3.14.9 Environmental Effects – Alternative E

3.14.9.1 Potential Indirect Effects on Private Land Values

The designated corridors under Alternative E would be connected by approximately 20,082 acres of private land, similar to the acreage under Alternative B and Alternative D and substantially more than the private land acreage under Alternative C. In aggregate, any effects on private land values under Alternative E would be similar to those under Alternative B and Alternative D and greater than those under Alternative C.

3.14.9.2 Potential Effects on Other Industries and Nonmarket Values

Because segments re-routed into existing corridors would be dedicated to the transport of CO_2 and EOR products and to other compatible uses under Alternative E, this alternative would have more potential for conflict with the future development of other linear infrastructure than Alternative B, Alternative C, and Alternative D. The impacts to the agricultural economy under Alternative E would be similar to those under Alternative B and Alternative D, although fewer grazing units would be impacted (see Section 3.8.10). Alternative E would temporarily impact 3,291 AUMs within the proposed corridors during the construction of potential future projects (see Section 3.8). However, the temporary reduction would not impact all 3,291 AUMS at once, as permittees would likely move herds to areas of their respective allotments unaffected by potential future construction and other areas with special designations. Alternative E would have the least effect on recreation-related opportunities, economic activity, and nonmarket values of any of the action alternatives because of its emphasis on using existing corridors.

3.14.9.3 Environmental Justice

From an environmental justice standpoint, Alternative E would be the same as Alternative B and Alternative D, with the same potential environmental justice populations living in the same census tracts traversed by or bordering the proposed corridors. As with Alternatives B, C, and D, future development within the designated corridor would be subject to subsequent NEPA reviews, during which environmental justice populations would have additional opportunities to participate in the planning process for projects that may affect their respective communities.

3.14.10 Summary of Effects

The designation of new corridors or designation of existing corridors for the transport of CO_2 and EOR products and for other compatible uses would not result in any direct socioeconomic effects. Any future application for ROW within the designated corridor would be subject to environmental review under NEPA. If future development within the designated corridor were to occur, construction of pipelines or pipeline compatible uses could serve as a short-term economic stimulus for communities surrounding a given project area but may adversely affect nonmarket values associated with natural resources and resource uses. The influx of nonlocal workers and their dependents to support construction within the corridor may pose challenges for affected communities, who may struggle to accommodate increased demand for housing and public services. Increased demand for hotel and motel rooms, and recreational vehicle spaces by nonlocal workers would increase competition with tourists during the summer months and may increase rental rates or cause shortages in some communities.

Future development within the designated corridor also has the potential to displace other economic activity as a result of conflicts with other land uses, including livestock grazing, recreation, and siting of other linear projects. Conflicts with livestock grazing and recreation are likely to be localized and temporary during the construction phase of a project. Adverse economic impacts resulting from these conflicts may be avoided if there are no net changes in forage use or visitation. The designation of a corridor for the transport of CO2 and EOR products and for other compatible uses may require the routing of some incompatible linear projects around the pipeline corridor in the future. Depending on the project proponent's preferred alignment, routing around the corridor could increase construction costs and displace the economic activity that may have occurred in some communities along the preferred route. Since there are no ROW applications for projects that are compatible or incompatible with ROW designation, it is unknown whether conflicts with siting other linear projects that could displace economic activity could arise.

If future pipeline projects for transport CO2 were to increase the adoption of EOR technology, the extraction of previously uneconomical minerals could generate additional economic impacts and fiscal revenues; however, the magnitude of these economic effects are unknown, as they are dependent upon development costs and market prices for oil and gas. Alternatives B and D would generally have similar indirect socioeconomic effects, while 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.

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

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

Future potential development of some corridors may affect recreation and tourism-related economic activity and nonmarket values and would also result in small, temporary reductions in agricultural use. Potential future development on lands adjacent to federal public lands could affect the uses and land values of associated private properties, particularly during project construction. Landowners may negotiate, however, to be made whole for all damages under their easement agreements with project proponents. If future development within the corridor requires nonlocal workers to temporarily relocate to communities close to project areas, there may be increased demand for temporary housing and public services during a project's construction phase. These impacts would be irretrievable but would stop when construction is completed or until the corridor is reclaimed, or both.

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 WPCI. 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 visual and noise impacts. 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. The 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 designated only 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. 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.

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 the 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.

3.15.3 Methods of Analysis

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

The analysis area for ACECs comprises all ACECs with portions of land within a 150-foot buffer on each side of the proposed corridors. A 150-foot buffer was selected because it encompasses all surface disturbances from construction of the proposed corridors as well as development of other construction support facilities and temporary disturbance from access road construction. 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 disturbances from construction of the potential development of the proposed corridors which could include noise and visual disturbances from construction and maintenance activities. 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 lie 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 designate 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 proposed corridors would result in the use of some ACEC lands as designated corridors. The designation of corridors would not restrict other compatible uses within the corridor; it would merely identify preferred routes for the placement of ROWs. However, potential future construction in the proposed corridors could make areas unavailable for certain types of development within the designated corridors. Impacts to ACECs from the WPCI would primarily come from surface disturbance and vegetation removal associated with potential construction activities. In cases where access road development in ACECs would not be fully avoided but instead would be 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 the action alternatives, the scenery of the landscapes that are intersected by the proposed corridors could be affected through the construction, operation, and maintenance of the proposed corridors, 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, 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 WPCI.

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. The Jackson Canyon ACEC is a ROW exclusion area; as such, an amendment to the Casper Field Office RMP would be necessary under this alternative to allow for a corridor designation for Segment 6 in this ACEC. Proposed corridor development would result in up to 146 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 the 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 6.9 acres (or less than 1%) of surface disturbance and construction activities in the Greater Sand Dunes ACEC that could affect the area's outstanding geologic features, prehistoric and historic values, and recreation values. The Greater Sand Dunes ACEC is a ROW avoidance area; as such, no amendment to the Rock Springs Field Office RMP would be necessary to allow for a corridor designation in this ACEC. The design features discussed in Section 3.5, Geology and Soils, would reduce impacts to the outstanding geologic features in the area. The design features discussed in Section 3.3, Cultural Resources, would reduce impacts to the prehistoric and historic values. The 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 WPCI 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. The Greater Sand Dunes ACEC is a ROW avoidance area; as such, no amendment to the Rock Springs Field Office RMP would be necessary to allow for a corridor designation in this ACEC. Impacts to the Greater Sand Dunes ACEC would be the same as those expected under Alternative B.

3.15.9 Environmental Effects – Alternative E

Under Alternative E, the proposed corridors (and 150-foot-wide buffer) would cross the Greater Sand Dunes ACEC. The Greater Sand Dunes ACEC is a ROW avoidance area; as such, no amendment to the Rock Springs Field Office RMP would be necessary to allow for a corridor designation in this ACEC. Impacts to the Greater Sand Dunes ACEC would be the same as those expected under Alternative B.

3.15.10 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 152.9 acres of surface disturbance within the ACECs in the analysis area, Alternatives D and E would result in 6.9 acres of surface disturbance within the ACECs in the analysis area, and Alternative C would not impact ACECs in the analysis area (Table 3.15-3). An amendment to the Casper Field Office RMP would be necessary under Alternative B to allow for a corridor designation for Segment 6 in the Jackson Canyon ACEC.

As stated in Section 3.15.5, no proposed corridors would cross a WSA. Under Alternative B, up to 15,269.3 acres across five WSAs could be indirectly impacted by the proposed corridors; under Alternative C, up to 2,591.1 acres of the Cedar Mountain WSA could be indirectly impacted by the proposed corridors; under Alternative D, up to 8,366.5 acres within four WSAs could be indirectly impacted by the proposed corridors; and under Alternative E, up to 14,835.3 acres within four WSAs could be indirectly impacted by the proposed corridors (Table 3.15-4). Indirect 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.

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

New utility corridor designation or dedication in existing corridors would not result in any irretrievable and irreversible impacts to special designations. 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 proposed corridors affect existing transportation corridors or public access?

This section discusses the potential effects of the proposed corridors 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 potential construction, operation, and

maintenance activities, 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 of Wyoming highways; paved and dirt or gravel county roads; and BLM-administered roads, which include roads[4] and primitive roads[5].

Existing traffic along the major routes, highways, arterials, and local roads includes oil and gas exploration and development workers, mining operators, regional and interstate through-traffic, residential and/or private landowners, livestock grazing permittees, and participants in 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, where there is 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 (see Appendix D).

3.16.3 Methods of Analysis

Future 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 potential 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 potential 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 potential construction-related traffic as a result of potential 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 designate 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 WPCI. The management of existing corridors would remain under existing management plans; guidelines; and federal, state, and local regulations.

[4] Per BLM Technical Note 422, a *road* is defined as a linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use (BLM 2006b). The BLM defines *routes* as a group or set of roads, trails, and primitive roads that represents less than 100% of the BLM transportation system. Generically, components of the transportation system are described as routes (BLM 2006b).

[5] Per BLM Technical Note 422, a *primitive road* is defined as a linear route managed for use by four-wheel drive or high-clearance vehicles. Primitive roads do not normally meet any BLM road design standards (BLM 2006b).

3.16.5 Environmental Effects – Common to All Action Alternatives

Most of the 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 corridors are likely to experience the most traffic volume increases (Table 3.16-1).

Vehicle trips associated with 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 last 6 or 7 days depending on construction scheduling. During boring, directional drilling, and hydrostatic testing, work would take place 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 of Wyoming 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 the 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 WPCI, these impacts would decrease and be limited to maintenance and operations following construction and development. After construction, 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 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 development activities under all the action alternatives would increase traffic temporarily on the road network in the analysis area, primarily during construction and decommissioning activities. Alternatives B, D, and E 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 (see 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 WPCI.

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

Under all the 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 WPCI 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

This 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 related activities.

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

- How would vegetation within the proposed corridors recover over time after potential future construction?
- How would potential future ROW maintenance affect vegetative cover during the life of the WPCI?
- Would future potential projects 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?

The analysis area for vegetation is the proposed designated corridors plus a 1-mile buffer. Indicators that can be used to evaluate impacts to vegetation include:

- acres of vegetation that could be removed or disturbed within designated corridors by type,
- acres of vegetation types within the analysis area that could be subject to indirect impacts, and
- acres of potentially suitable habitat for special-status plant species within corridors and within the analysis area.

As described in Section 3.1, the analysis assumes that future potential development of the corridors would result in the entire length and 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 pipeline projects are proposed. In addition, portions of the 1-mile buffer are within existing pipeline ROWs and/or contain existing disturbance; this varies by alternative.

3.17.2 Affected Environment

The vegetation technical report prepared for the WPCI describes the vegetation resources present within the proposed corridors and evaluates the types of impacts to vegetation resources that could result from the effort (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 were used to determine habitats present within the corridors and within the 1-mile analysis area. The GAP vegetation classification is listed in Table 3.17-1; because of the large size of the WPCI, the classifications are grouped into nine general habitat categories for analysis. Shrubland-desert scrub is the dominant category. The analysis area includes vegetation that is disturbed by existing development, including pipelines, roads, and oil and gas fields, as described in Section 3.9, Mineral Resources, and Section 3.16, Transportation.

BLM-administered forest resources are present, primarily in the northwestern part of the proposed corridors. The 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 (Wyoming Game and Fish Department [WGFD] 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 in the nine BLM field offices overlapping the proposed corridors (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 the 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). Threats to the special-status plants in Wyoming include habitat loss (e.g., conversion to cropland, filling wetlands, intensive mowing) as well as introduced invasive plants, fire suppression, and overgrazing. A discussion of threats specific to ESA-listed plant species is detailed in the Biological Assessment associated with this EIS (Appendix L).

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 1 mile 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 the Wyoming Natural Diversity Database (WYNDD). When a WYNDD range map was not available, the range was the counties were the species are known to occur (USGS 2011; WYNDD 2020). 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 seed policy states these mixes can contain up to 2% non-noxious weed seed (WO IM 2006-073 [BLM 2006a]). Weed management plans at the project level would address objectives and goals for specific noxious and invasive weed species and may be more restrictive than the minimum BLM policy. Plans would include site-specific analysis that covers the 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 designate 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, 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 WGFD, 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.

Potential 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 the loss and alteration of seed banks, which could result in the long-term reduction of productivity and the introduction of noxious and invasive weeds. Soil contamination from equipment spills and/or leakage of fuels, lubricants, and coolants could damage or prevent vegetation growth.

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 the quantity required to be removed would be determined during future 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 reestablish in a disturbed ROW through natural propagation (Baker 2006).

Potential projects within the proposed corridors would implement design features and BMPs that would reduce impacts based on site-specific characteristics (see Appendix E). The WPCI'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 reestablishment.
- 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.

Disturbed areas would be restored at final reclamation to the pre-disturbance landforms and desired plant community (see Reclamation Plan in Appendix D). 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. When properly applied, forestry BMPs can effectively minimize water quality degradation (Wyoming State Forestry Division 2006). Voluntary implementation of BMPs has proven to be an effective means of protecting natural resources, including water quality.

3.17.5.2 Invasive Plant Species and Noxious Weeds

Removal of vegetation and disturbance of soils are likely to result in the introduction and spread of invasive plants, including noxious weeds, in corridors and the surrounding area. 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 adjacent to disturbance would be the most susceptible to weed invasion, as wind, equipment, and wildlife spread seeds. Roads serve as vectors for invasive plant species because of the movement of vehicles and people. In Wyoming, shrub steppe and riparian ecosystems are particularly susceptible to exotic grasses such as cheatgrass. These areas can be more prone to emitting dust. Areas where weeds become established are less diverse, which can impact pollinators that are important to maintaining native plant communities. Chemical treatment of weeds can also impact pollinators. Once established, invasive plants and noxious weeds are difficult to eradicate.

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 WPCI (see Appendix D), which includes management measures such as weed surveys. Before vegetation removal, invasive plant species and noxious weeds identified during preconstruction field surveys would be treated with herbicides, as addressed in project weed management plans. 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, potentially suitable habitat for blowout penstemon (endangered), desert yellowhead (threatened), and whitebark pine (candidate) occur in the proposed corridors or within the 1-mile analysis area (see analysis in Section 3.17.9.3). A population of desert yellowhead, located within designated critical habitat, occurs within 0.5 mile of a proposed corridor in Fremont County. A second population of desert yellowhead discovered after designation of critical habitat occurs within approximately 0.25 mile of the proposed corridors in Fremont County.

Western prairie fringed orchid (*Platanthera praeclara*) occurs downstream outside the proposed corridors; however, the proposed corridors would occur in the species' USFWS 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. The USFWS uses the best available data to develop AOIs that encompass the areas where a listed species is known to exist plus areas where direct and indirect effects to the species and their habitat may occur.

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

The BLM has prepared a programmatic Biological Assessment for this EIS in coordination with the USFWS (see Appendix L). 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 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 potential project and consider the likely effects of the action. The 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).

Proposed corridors could lead to habitat loss and increased invasive plants, as described in the preceding section. Potential impacts to special-status plant species would be low as a result of implementing design features, BMPs, and RMP stipulations (see Appendix E). Special-status plant species generally fall within ROWs avoidance areas and areas subject to NSO, which would help protect special-status plants from surface-disturbing and disruptive activities. Preconstruction surveys would identify populations and be used to make the modifications needed to minimize impacts. Reclamation of all disturbed areas would promote the reestablishment of native habitats and prevent the spread of weeds.

3.17.6 Environmental Effects – Alternative B (Proposed Action)

3.17.6.1 General Vegetation

Vegetation impacts under Alternative B are primarily (87%) within shrubland-desert scrub (Table 3.17-3). In addition, marsh-meadow, grassland, forest-woodland, and riparian cover types could be impacted. See Section 3.19, Water, for discussion of the wetlands in the analysis area, as indicated by National Wetlands Inventory [NWI] data, and associated impacts. Other areas are agricultural or developed/disturbed (see Table 3.17-3). Approximately 64% of the proposed corridors would be within existing pipeline ROWs or designated utility corridors ROWs. Restoration of the disturbed areas would rely on implementation of the WPCI's upland restoration and revegetation plan (see Appendix D) and the use of species that correspond to adjacent undisturbed areas. Approximately 2.1 million acres of shrubland-desert scrub cover are within 1 mile of the Alternative B proposed corridors and may be indirectly impacted by construction activities. However, 291 miles of corridors have been sited within 0.5 mile of existing pipeline ROWs, and other existing disturbance (roads, oil and gas fields) is present within the analysis area. Some trees within the forest-woodland habitats in the proposed corridors under Alternative B would

potentially be removed, and, under BLM forest management policy, the BLM would receive revenue from the sale of the trees at fair market value.

3.17.6.2 Invasive Plant Species and Noxious Weeds

Up to 57,514 acres of vegetation could be removed or disturbed under Alternative B. Existing populations of weeds could spread into disturbed areas. BLM data indicate that weed species prevalent in the Alternative B proposed corridors include cheatgrass, Canada thistle (*Cirsium arvense)*, saltlover (*Halogeton glomeratus*), Scotch cottonthistle (*Onopordum acanthium*), and prickly Russian thistle (*Salsola tragus*) (Table 3.17-4). Most of the proposed corridor areas have not been ground surveyed for invasive plants and noxious weeds.

3.17.6.3 Special-Status Plant Species

Quantification of certain vegetation type(s) within a species' range (Tables 3.17-5 and 3.17-6) indicates that potentially suitable habitat for ESA-listed and BLM sensitive species is present within the Alternative B proposed corridors. Project-level surveys would identify and qualify the suitability of these habitats and the presence/absence of plant populations. Known plant populations would be avoided and subject to NSO stipulations. Currently, there is no designated critical habitat for listed plants in the proposed corridors that would be impacted. Critical habitat for desert yellowhead and known populations are within 1 mile of two Alternative B corridors and could be indirectly impacted by construction activities such as dust or invasive weeds. Approximately 10,725 acres of the Alternative B proposed corridors are within the western prairie fringe orchid AOI and downstream impacts would be addressed on a case-by-case basis upon receipt of potential future project applications.

3.17.7 Environmental Effects – Alternative C

3.17.7.1 General Vegetation

Under Alternative C, vegetation impacts are primarily (81%) within shrubland-desert scrub (see Table 3.17-3). In addition, marsh-meadow, grassland, forest-woodland, and riparian cover types could be impacted. See Section 3.19, Water, for discussion of the wetlands in the analysis area, as indicated by NWI data, and associated impacts. Other areas are agricultural or developed/disturbed (see Table 3.17-3). The upland restoration and revegetation plan (see Appendix D) would be implemented to restore disturbed areas using species that correspond to adjacent undisturbed areas. Approximately 271,655 acres of shrubland-desert scrub cover are within 1 mile of the Alternative C proposed corridors and may be indirectly impacted by construction activities. However, 179 miles of corridors have been sited within 0.5 mile of existing pipeline ROWs, and other existing disturbance (roads, oil and gas fields) is present within the analysis area. Fewer impacts to sagebrush shrubland would occur under Alternative C because of protection of associated sage-grouse habitats. Maximizing the use of existing corridors would decrease removal of habitat in undisturbed areas. Some trees within the forest-woodland habitats in Alternative C corridors would potentially be removed, and, under BLM forest management policy, the BLM would receive revenue from the sale of the trees at fair market value.

3.17.7.2 Invasive Plant Species and Noxious Weeds

Up to 7,266 acres of vegetation could be removed or disturbed under Alternative C. Existing populations of weeds could spread into disturbed areas. BLM data indicate that weed species prevalent in the Alternative C proposed corridors include cheatgrass and prickly Russian thistle (see Table 3.17-4). Most of the proposed corridor areas have not been ground surveyed for invasive plants and noxious weeds.

3.17.7.3 Special Status Plant Species

Quantification of certain vegetation type(s) within a species' range (see Tables 3.17-5 and 3.17-6) indicate that potentially suitable habitat for ESA-listed and BLM sensitive species could be present within the Alternative C proposed corridors. Project-level surveys would identify and qualify the suitability of these habitats and presence/absence of plant populations. Known populations would be avoided and subject to NSO stipulations. No designated critical habitat or known populations of desert yellowhead are in the proposed corridors or within 1 mile of the corridors. Approximately 545 acres of the Alternative C proposed corridors are within the western prairie fringe orchid AOI, and downstream impacts would be addressed on a case-by-case basis upon receipt of potential future project applications.

3.17.8 Environmental Effects – Alternative D

3.17.8.1 General Vegetation

Under Alternative D, vegetation impacts are primarily (83%) within shrubland-desert scrub (see Table 3.17-3). In addition, marsh-meadow, grassland, forest-woodland, and riparian cover types could be impacted. See Section 3.19, Water, for discussion of the wetlands in the analysis area, as indicated by NWI data, and associated impacts. Other areas are agricultural or developed/disturbed (see Table 3.17-3). Approximately 83% of the corridors would be within existing pipeline ROWs or designated utility corridors. The upland restoration and revegetation plan (see Appendix D) would be implemented to restore disturbed areas using species that correspond to adjacent undisturbed areas. Approximately 1.9 million acres of shrubland-desert scrub cover are within 1 mile of Alternative D proposed corridors and may be indirectly impacted by construction activities. However, 230 miles of corridors have been sited within 0.5 mile of existing pipeline ROWs and other existing disturbance (roads, oil and gas fields) is present within the analysis area. Some trees within the forest-woodland habitats in the proposed corridors under Alternative D would potentially be removed, and, under BLM forest management policy, the BLM would receive revenue from the sale of the trees at fair market value.

3.17.8.2 Invasive Plant Species and Noxious Weeds

Up to 55,535 acres of vegetation could be removed or disturbed under Alternative D. Existing populations of weeds could spread into disturbed areas. BLM data indicate that 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). Most of the proposed corridor areas have not been ground surveyed for invasive plants and noxious weeds.

3.17.8.3 Special-Status Plant Species

Quantification of certain vegetation type(s) within a species' range (see Tables 3.17-5 and 3.17-6) indicate that potentially suitable habitat for ESA-listed and BLM sensitive species could be present within the Alternative D proposed corridors. Project-level surveys would identify and qualify the suitability of these habitats and presence/absence of plant populations. Known populations would be avoided and subject to NSO stipulations. Currently, there is no designated critical habitat for listed plants in the proposed corridors that would be impacted. Critical habitat for desert yellowhead and known populations are within 1 mile of two Alternative D corridors and could be indirectly impacted by construction activities such as dust or invasive weeds. Approximately 10,826 acres of Alternative D are within the western prairie fringe orchid AOI, and downstream impacts would be addressed on a case-by-case basis upon receipt of potential future project applications.

3.17.9 Environmental Effects – Alternative E

3.17.9.1 General Vegetation

Vegetation impacts under Alternative E are primarily (86%) within shrubland-desert scrub (see Table 3.17-3). In addition, marsh-meadow, grassland, forest-woodland, and riparian cover types could be impacted. See Section 3.19, Water, for discussion of the wetlands in the analysis area, as indicated by NWI data, and associated impacts. Other areas are agricultural or developed/disturbed (see Table 3.17-3). Approximately 73% of the proposed corridors would be within existing pipeline ROWs or designated utility corridor ROWs. Restoration of the disturbed areas would rely on implementation of the WPCI's upland restoration and revegetation plan (see Appendix D) and the use of species that correspond to adjacent undisturbed areas. Approximately 2.1 million acres of shrubland-desert scrub and grassland cover are within 1 mile of the Alternative E proposed corridors and may be indirectly impacted by construction activities. However, 230 miles of corridors have been sited within 0.5 mile of existing pipeline ROWs, and other existing disturbance (roads, oil and gas fields) is present within the analysis area. Some trees within the forest-woodland habitats in the proposed corridors under Alternative E would potentially be removed, and, under BLM forest management policy, the BLM would receive revenue from the sale of the trees at fair market value.

3.17.9.2 Invasive Plant Species and Noxious Weeds

Up to 55,776 acres of vegetation could be removed or disturbed under Alternative E. Existing populations of weeds could spread into disturbed areas. BLM data indicate that weed species prevalent in the Alternative E proposed corridors include cheatgrass, Canada thistle, saltlover, Scotch cottonthistle, and prickly Russian thistle (see Table 3.17-4). Most of the proposed corridor areas have not been ground surveyed for invasive plants and noxious weeds.

3.17.9.3 Special Status Plant Species

Quantification of certain vegetation type(s) within a species' range (see Tables 3.17-5 and 3.17-6) indicate that potentially suitable habitat for ESA-listed and BLM sensitive species could be present within the Alternative E proposed corridors. Project-level surveys would identify and qualify the suitability of these habitats and presence/absence of plant populations. Known populations would be avoided and subject to NSO stipulations. Currently, there is no designated critical habitat for listed plants in the proposed corridors that would be impacted. Critical habitat for desert yellowhead and known populations are within 1 mile of two Alternative E corridors and could be indirectly impacted by construction activities such as dust or invasive weeds. Approximately 10,962 acres of Alternative E are within the western prairie fringe orchid AOI, and downstream impacts would be addressed on a case-by-case basis upon receipt of potential future project applications.

3.17.10 Summary of Effects

3.17.10.1 General Vegetation

For all the action alternatives, vegetation subject to removal would primarily result in impacts to shrubland-desert scrub, marsh-meadow, and grassland cover. Disturbed areas would be reclaimed and monitored after potential construction of future projects. During potential operation activities, 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. Note that riparian and marsh-meadow are general

GAP categories. See Section 3.19, Water, for discussion of the wetland and waterbodies in the analysis area, as indicated by NWI data. Actual wetland boundaries would be determined during project-level surveys. Impacts to sensitive habitats such as riparian and wetlands are expected to be minimal with implementation of design features (see Appendix E). The BLM standard stipulation is NSO within 500 feet of riparian and wetland areas. Surface disturbance in these areas can be avoided or reduced by narrowing the pipeline construction footprint or using alternative crossing methods (i.e., horizontal directional drilling). Approximately 64% of the Alternative B corridors, 83% of the Alternative D corridors, and 73% of the Alternative E corridors are within existing designated corridors and could be developed regardless of change in designated use.

3.17.10.2 Invasive Plant Species and Noxious Weeds

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 on disturbed areas and 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 is associated with the largest area of potential disturbance that could lead to an increase in weed cover. The effects of Alternative D and Alternative E would be similar to the effects of Alternative B, whereas Alternative C, with less potential surface disturbance, would have less potential to spread weeds. 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 within the proposed corridors have been surveyed by the BLM, and additional populations are likely present within the corridors.

3.17.10.3 Special-Status Plant Species

Table 3.17-5 compares the availability of potentially suitable habitat for ESA-listed species in the proposed corridors that could be removed or altered. The potential presence of suitable habitat is determined based on a high-level model using general GAP habitat type(s) (see Table 3.17-3) within the species' range as mapped by WYNDD. Counties where the species is known to occur were used when a WYNDD range map was not available. Suitable habitat would be surveyed before any development, and any identified populations of listed species would be avoided and subject to NSO stipulations.

Table 3.17-6 compares the availability of potentially suitable habitat for BLM-listed species in the proposed corridors that could be removed or altered. The potential presence of suitable habitat is determined based on a high-level model using general GAP habitat type(s) (see Table 3.17-3) within the species' range as mapped by WYNDD. Counties where the species is known to occur were used when a WYNDD range map was not available. Suitable habitat would be surveyed before any development, and any identified populations of BLM sensitive species would be avoided and subject to NSO stipulations.

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

New utility corridor designation or dedication 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. Wyoming big sagebrush and other sagebrush shrubs can take 35 to 120 years to reestablish in a disturbed ROW through natural propagation (Baker 2006). Ongoing, long-term weed control is likely to be needed for weed populations that become established within and near the proposed corridors. Short-term decreases in vegetation cover types through removal or through weed

proliferation could affect 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 consist of all objects (human-made and natural, moving and stationary) and features (e.g., landforms and waterbodies) 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 analyzes impacts to visual resources associated with the proposed corridors and construction and operation of potential projects. 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 potential future 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 the 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, mineral extraction, and energy development have degraded visual qualities; these types of activities are requisitely managed by the BLM to allow them to occur and, in some cases, to 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 of the analysis are to low rolling prairie in the central and eastern portions. All four VRM 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 their respective local field office landscape characters.

3.18.2.2 Regulatory Setting

The FLPMA adopts policy to guide the BLM in managing scenic values in Section 102, "Declaration of Policy" (43 U.S.C. 1701 (a)(8)). 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 of Wyoming agencies that regulate uses on state lands, and local and county governments.

The management duties of these entities include guiding VRM. 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 VRM on BLM-administered land within the field office. BLM RMPs that are pertinent to the WPCI are listed in Chapter 1.

To meet the BLM's responsibility to maintain the scenic values of public lands, the agency 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.

The BLM field offices associated with the WPCI conducted a visual resource inventory (VRI) in 2008 through 2011. The VRI classes represent the inventoried scenic value of lands administered by the BLM and have objective definitions comparable with BLM VRM class definitions, 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 consists 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/middle-ground, 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 visual landscapes are the most highly valued visual landscapes, while VRI Class IV visual landscapes 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 lie within or be close to a designated corridor would more likely be affected by future proposed project developments than would those sensitive features farther away from the 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 points, site photographs, simulations, and referenced NEPA analysis.

Spatial analysis was performed to evaluate the likelihood for impacts and to disclose potential incompatibilities with VRI and VRM objectives. The distance for foreground/middle-ground 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 the reasonable distance a viewer in the foreground/middle-ground 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 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 designate the proposed corridors under any of the action alternatives would not be approved. The designation of corridors itself would not result in impacts on visual resources; however, the construction and operation of potential projects may result in changes to visual resources. Projects would continue to be managed as described in each BLM field office's RMP and therefore would be anticipated to be in conformance with VRM class objectives.

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 future 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. NHTs (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 in RMPs, as described in Chapter 1, 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 the visual resources impact of proposed projects.

3.18.6 Environmental Effects – Alternative B (Proposed Action)

Table 3.18-1 provides the acreage of VRM classes within the analysis area for Alternative B (some lands may not be classified whose acreages are not included in tabular data below). If micrositing would not shift the corridor's footprint (300 feet wide for the trunk, 200 feet wide for laterals) outside Class I or II lands, additional alternative selection would likely be required and BMPs would need to be developed to

meet the objectives of the VRM class. Alternatively, the BLM may choose to amend a given RMP to reclassify lands.

3.18.7 Environmental Effects – Alternative C

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

3.18.8 Environmental Effects – Alternative D

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

3.18.9 Environmental Effects – Alternative E

Table 3.18-4 displays the acreage of VRM classes within the analysis area for Alternative E.

3.18.10 Summary of Effects

Overall, Alternative B would intersect the most Class I lands, followed by Alternative E and then Alternative D; Alternative C would intersect the least Class I lands. Alternative B would intersect the most Class II lands, followed by Alternative D and then Alternative E; Alternative C would intersect the least Class II lands.

3.18.11 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 changes to visual resources; however, because visual resources would be managed through RMPs and BMPs as described in Chapter 1 and as outlined in applicable State of Wyoming and local regulations or requirements, impacts on visual resources during construction (short term) and operation (long term) would be reduced. Once an area is reclaimed after the life of a project, long-term visual impacts would, in general, be minimized or avoided. As a result, there would not be irretrievable or irreversible impacts on 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 such as wild and scenic rivers from potential 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 future development of potential projects, such as during pipeline construction and operation activities.

3.19.1 Issues to be Analyzed and Impact Indicators

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 wetlands, 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 of 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 lies within the Missouri River and Upper Colorado River HUC-2 water regions. Streams, rivers, lakes, reservoirs, seeps, springs, wetlands, and groundwater sources within the analysis area are the focus of analysis for this EIS. Resource reports prepared by the applicant were used as the basis for this inventory 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 et al. 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. The WDEQ is responsible for issuing CWA Section 401 Water Quality Certifications for dredge and fill permits issued by the USACE to ensure that the permit complies with Wyoming's Surface Water Quality Standards. Conditions of the 401 Certification are included as conditions of the federal permit. 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. In accordance with Title 35, Section 11, of the Wyoming Statutes, the WDEQ is responsible for the protection and restoration of the quality of waters of the state, which it does through its Water Quality Division Surface Water Standards (WDEQ Water Quality Division 2020a).

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 geologic material (WWC Engineering et al. 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 in the State of Wyoming is administered by the Wyoming State Engineer's Office in accordance with Title 41 of the Wyoming Statutes. In accordance with Title 35, Section 11, of the Wyoming Statutes, the WDEQ is responsible for the protection and restoration of the quality of waters of the state.

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 surrounding ecosystems because many species depend on wetlands for habitat, forage, and water (WGFD and Ducks Unlimited, Inc., 2018). Pursuant to the CWA, the USACE regulates the discharge of dredge and fill materials into wetlands that are considered WOTUs. Pursuant to Title 35, Section 11, of the Wyoming Statutes and Wyoming's Water Quality Rules and Regulations, the WDEQ is responsible for the protection and restoration of the quality of waters of the state, including isolated wetlands, ephemeral drainages, and other surface waters not considered WOTUS and not regulated under the CWA. 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 WGFD 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; therefore, there is no further analysis of 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, specifically, potential construction and operation activities related to future development of the corridors
- 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 considered an impact to water resources only when a soil type classified as highly erodible by water was adjacent to (e.g., within 500 feet) an National Hydrography Dataset–defined waterway or NWI waterbody and within the proposed corridors. Highly erodible soils are more susceptible to erosion than other soil classes and, as such, are the basis for analysis of impacts associated with erosion potential. Adjacency to water features was defined per the consensus in affiliated RMPs that surface-disturbing activities should be avoided within 500 feet of surface water and/or riparian areas to minimize impacts from erosion to surface waters.

3.19.4 Environmental Effects – Alternative A (No Action)

Under the No Action alternative, the applicant's application to designate 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 Water and Groundwater

Impacts to water quality would occur only 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 because of 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 (i.e., the cloudiness 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 are adjacent to a water resource within each associated 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. The use of stormwater-control measures would minimize these effects, and reclamation of these areas after construction would return 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, depending on factors including the appropriate application of stabilization measures and the establishment of native vegetation. Timeframes for reclamation can be understood only at the potential project level.

Sedimentation also has the potential to alter channel morphology by embedding larger gravels, decreasing channel stability, filling pools, modifying channel flow paths and extending the drainage network into previously unchanneled portions, and altering the timing and magnitude of peak flows and stream discharge. This can ultimately alter channel width, depth, local gradients, and habitat features (e.g., pools, riffles) (Gucinski et al. 2001; Trombulak and Frissell 2000).

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 would adhere to WDEQ stormwater permitting requirements. 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 occur 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 most water crossings, especially in smaller streams. By boring under the waterway for pipe installation, 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 whether a waterway's underlying materials would allow a bore without rupture. These crossings would each be completed in a relatively short period (days to weeks) and would occur at site-specific locations. Crossings would be monitored as the reclamation process progresses 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 period and site-specific nature of stream-crossing disturbance, stream crossings would not be anticipated to lead to stream alterations or changes to stream classifications unless disturbance intensity is high and reclamation attempts are 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 preceding paragraph 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 FERC Wetland and Waterbody Construction and Mitigation Procedures current during the period 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 resulting from 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. Impacts from CO_2 leakage into water resources may occur with resultant impacts to water quality, as the proposed corridors would be approved for the transport of CO_2 and EOR products. During the transport of CO_2, there is potential for CO_2 leakages into aquifers and other groundwater resources (Birkholzer et al. 2008). Some of these groundwater resources may be used as sources of drinking or potable water in Wyoming. CO_2 leaks can lower the pH of water sources and increase the ratios of carbonate minerals, contaminants, and metals (Little and Jackson 2010). Much of the current research regarding impacts to water quality from CO_2 leakage relies on assessing carbon sequestration practices (long-term actions) rather than the transport of CO_2 (relatively short-term actions). However, there may exist potential for impacts to water quality from these short-term actions. Current research on short-term interactions between CO_2 leaks and groundwater is lacking and thus limits the understanding of potential associated impacts. Pipelines are typically installed just below the frost line, which in Wyoming is approximately 4 feet, so the potential for leaks to reach groundwater would be limited. Loss of pressure would be remotely monitored, and periodic valve inspections, routine pipeline corrosion surveys, and leak surveys would take place to identify any gaseous or liquid leaks (see Appendix D).

Construction and operation activities such as refueling and maintaining equipment create the potential for spills or leaks 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 and parking vehicles 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) details spill preparedness and response measures that would decrease the extent of effects, such as storage of adequate amounts of absorbent materials and containment booms near areas of construction and operation. Pipelines are typically installed just below the frost line, which in Wyoming is approximately 4 feet, so the potential for leaks to reach groundwater would be limited. Loss of pressure would be remotely monitored, and periodic valve inspections, routine pipeline corrosion surveys, and leak surveys would take place to identify any gaseous or liquid leaks (see Appendix D).

The indicator used to identify the risk to water quality resulting from the accidental release of hazardous materials or leakage of CO_2 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 the 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 in 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, the design features included in Appendix D 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 waterbody 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 the implementation 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 in 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 and compliance with any conditions of a WDEQ-issued CWA Section 401 Certification. Cumulative disturbances of more than 1 acre of isolated wetlands require compliance with WDEQ's Isolated Wetlands Mitigation General Permit. 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 the acres of wetlands that would lie within the proposed corridors.

3.19.6 Summary of Effects

3.19.6.1 Surface Water and Groundwater

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 E would have slightly less potential, while Alternative C

would have the lowest potential for erosion and resultant diminutions of water quality resulting from sedimentation, turbidity, and salinity, as acres of highly erodible soils would be approximately one-tenth of the impacts associated with Alternatives B and D (see Table 3.19-1).

Generally, surface disturbance in subwatersheds would be highest under Alternatives B, D, and E, which have similar acreages designated as proposed corridors and would cross similar numbers of HUC-12 subwatersheds. Of these three, Alternative D would have slightly smaller area designated as proposed corridors and subwatersheds crossed, while Alternatives B and E would be nearly identical. Alternative C would have the least area of proposed corridors designated across the least number of HUC-12 subwatersheds.

Alternatives B, D, and E would have similar levels of impact indicators related to the risk of channel alteration from surface- and subsurface-disturbing activities and contamination from the accidental release of hazardous materials, respectively, with more than 3,000 streams crossed by proposed corridors (see Table 3.19-1). Alternative C has far fewer streams crossed by proposed corridors, just under 400 (see Table 3.19-1). However, any potential projects would likely be sited in existing corridors that have previously been designated and in the proposed corridors analyzed here; therefore, impacts from potential projects under Alternative C would be very similar to the other alternatives. This is because Alternative C maximizes the use of existing designated corridors; any part of the proposed corridor that lie outside existing corridors but on BLM lands would be designated as new corridors under Alternative C. Therefore, the acreage of newly designated corridors is far less under Alternative C than under Alternatives B, D, and E; and as such, there would be fewer stream crossings. However, the use of existing corridors would yield impacts from stream crossings similar to those resulting from utilizing newly designated corridors. Only Alternative B would cross a stream with a Class 1 designation by the WDEQ (North Platte River).

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 happen only at the project level; therefore, this discussion of impact differences between proposed corridors is limited.

3.19.6.2 Wetlands

Alternative D would affect the greatest area of wetlands within the proposed corridors (Table 3.19-2). However, Alternative B would affect the greatest number of subwatersheds containing wetlands inside the proposed corridors but with an area of wetlands similar to that of Alternative D (see Table 3.19-2). Alternative E would affect wetlands and subwatersheds containing wetlands with values slightly less than Alternatives D. Alternative C would affect the smallest area of wetlands within the proposed corridors and would cross the fewest 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.

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 within the proposed corridors may result in some instances of unavoidable adverse impacts from erosion, such as weather events that exceed the design capacity and overcome designated erosion control barriers. Even with the implementation of design features intended to lessen

the impacts of erosion, some destabilization of soils is anticipated. Environmental monitoring would detect these events when they occur and would require corrective measures to prevent ongoing impacts, limiting irretrievable reduction in water quality to short-term durations (hours or days). Although 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. Although water-consumptive activities associated with potential projects within the proposed corridors cannot be fully quantified or mitigated, water use would be temporary, ending after construction. In summary, impacts could result in short-term disturbances to water resources but 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 the proposed 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 the agency's Wild Horse and Burro Program. The BLM uses fertility measures (e.g., birth control), periodic removal of excess individuals, and sales of animals into private care to maintain certain population levels for specific areas. The BLM has designated HMAs across 10 western states as part of this 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 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 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 more than 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 of Wyoming (BLM 2019d).

3.20.3 Methods of Analysis

Potential impacts to wild horses are analyzed by comparing the amount of potential disturbance that could occur from future development of the corridors within HMAs. The analysis area for wild horses is a 1-mile buffer around the proposed corridors for each alternative. This area of analysis was selected because

indirect impacts to horses would occur within approximately 1 mile as a result of noise and human presence during any future project activity.

3.20.4 Environmental Effects – Alternative A (No Action)

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

3.20.5 Environmental Effects – Common to All Action Alternatives

All four action alternatives cross multiple HMAs and would affect wild horses via noise and increased human activity during future pipeline construction and maintenance activities. Potential construction and maintenance activities 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 or 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.

The HMAs crossed by corridors range 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. Most of each 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 the 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 crosses 15 HMAs. The percentage of any given HMA that would be indirectly impacted by Alternative B ranges from 1.8% to 30.0%. Within these 15 HMAs, Alternative B overlaps 433,285 acres out of 3,200,135 acres. Therefore, approximately 13.5% of the total acreage in the 15 HMAs would be temporarily unavailable for use by wild horses during future potential construction and maintenance activities.

Among the alternatives, Alternative B would have the greatest area that could need reclamation and revegetation. Up to 9,659 acres within the 15 HMAs may require revegetation as part of future potential 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 acreage in the 15 HMAs.

3.20.7 Environmental Effects – Alternative C

Alternative C crosses three HMAs. The percentage of any given HMA that would be indirectly impacted by Alternative C ranges from 0.9% to 15.0%. Within these three HMAs, Alternative C overlaps 48,770 acres

out of 918,889 acres. Therefore, approximately 5.3% of the total acreage in the three HMAs would be temporarily unavailable for use by wild horses during future potential construction and maintenance activities.

Among the alternatives, Alternative C would have the smallest area that could need reclamation and revegetation. Up to 1,029 acres within the three HMAs may require revegetation as part of future potential 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 acreage in the three HMAs.

3.20.8 Environmental Effects – Alternative D

Alternative D crosses 15 HMAs. The percentage of any given HMA that would be indirectly impacted by Alternative D ranges from 1.8% to 30%. Within these 15 HMAs, Alternative D overlaps362,205 acres out of 3,200,135 acres. Therefore, approximately 11.3% of the total acreage in the 15 HMAs would be temporarily unavailable for use by wild horses during future potential construction and maintenance activities.

Among the alternatives, Alternative D would have an area that could need reclamation and revegetation that would be of a size less than that of Alternatives B and E. Up to 8,204 acres within the 15 HMAs may require revegetation as part of future potential 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 acreage in the 15 HMAs.

3.20.9 Environmental Effects – Alternative E

Alternative E crosses 15 HMAs. Within these 15 HMAs, Alternative E overlaps 399,547 of 3,200,135 acres. Therefore, approximately 12.5% of the total acreage in the 15 HMAs would be temporarily unavailable for use by wild horses during future potential construction and maintenance activities.

Up to 8,806 acres within the 15 HMAs may require revegetation as part of future potential reclamation. If wild horses were excluded from the Alternative E area to increase the chance of reclamation success, they would still be allowed to roam and graze on 99.72% of the total acreage in the 15 HMAs.

3.20.10 Summary of Effects

Impacts to wild horses from the four 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, but impacts would be temporary and after reclamation wild horses should resume using these areas. Table 3.20-1 summarizes the impacts from all the alternatives to HMAs within the corridors and a 1-mile buffer. Approximately 64% of the Alternative B proposed corridors, 83% of the Alternative D proposed corridors, and 73% of the Alternative E proposed corridors are within existing designated corridors and could be developed regardless of the change in designated use.

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

3.20.11 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). However, these impacts would last only for the 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 BLM's 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 proposed corridors 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 designating pipeline corridors. Impact indicators include acres of seasonal habitats and potentially suitable habitats that would be impacted by clearing ROWs for the corridors. 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 WPCI (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 prepared for the WPCI (WEST 2016b) provides background information on the wildlife resources present within the proposed corridors. The corridors cross 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). Section 3.17, Vegetation, describes and quantifies those habitats within the proposed corridors and within 1 mile of the proposed corridors. The analysis area includes habitats that are disturbed by existing development, such as pipelines, roads, and oil and gas fields, as described in Section 3.9, Mineral Resources, and Section 3.16, Transportation.

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. The WGFD has 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 the WGFD's population objective level over the long term. A parturition area is an area where big game calving, fawning, or lambing occurs. A migration corridor is an area used by big game for seasonal movements between summer and winter ranges. On February 14, 2020, the State of Wyoming issued Executive Order 2020-1, which designated three migration corridors for mule deer in Wyoming 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. The State of Wyoming has identified areas of high use within each designated migration corridor (areas used by 20% or more of global positioning system [GPS]–collared animals), medium use (areas used by 10% to 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.

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

For the WPCI, special-status wildlife species consist of those listed under the ESA in the 12 associated counties and those listed as sensitive by the nine associated BLM field offices (BLM 2010c; USFWS 2020a). ESA-listed species listed or proposed for listing 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*), and yellow-billed cuckoo (*Coccyzus americanus*). Critical habitat for Canada lynx is present within Fremont, Lincoln, Park, and Sublette Counties. 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 sensitive wildlife species (10 mammals, 15 birds, five fish, two amphibians, and one reptile) that may potentially occur within 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).

Because of 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 the WGFD and in cooperation with the USFWS, the BLM, the USFS, and greater sage-grouse working groups are underway to prevent federal listing of the species. The 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 and 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 of Wyoming has been divided into eight individual working group areas, and the associated groups work to facilitate and implement local conservation plans that benefit greater sage-grouse and their habitat (WGFD n.d. [2015]). In addition, the Wyoming BLM has developed several IMs and RMPs regarding management of the greater sage-grouse in Wyoming that 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 the bird 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 (WGFD 2003). Preferred nesting habitat for females is denser sagebrush that provides hiding cover and is within 4 miles of lekking areas (Holloran and Anderson 2005; WGFD 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 (WGFD 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 and denser sagebrush interspersed throughout the stand and where no more than 25% of the stand comprises small openings. Tall 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%.

The 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 miles of an occupied lek, restriction of activities that create noise, and authorization of new land uses only after demonstration that the uses will avoid and minimize impacts. PHMA have the highest conservation value to maintaining sustainable greater sage-grouse populations and areas containing breeding, nesting, early and 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 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 authorization of new land uses only after demonstration that the uses will avoid and minimize impacts (BLM 2015c).

3.21.3 Methods of Analysis

Vegetative characteristics were used as a key indicator of the likelihood of species presence. The vegetation communities and habitat types identified within the proposed corridors, as described in Section 3.17, Vegetation, provide suitable resources and habitat for a variety of common wildlife species in Wyoming, including raptors, migratory birds, big game, sensitive wildlife, and 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. 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 considers the number of Blue Ribbon and Red Ribbon stream crossings and quantifies the miles of these streams potentially impacted by the crossings. For sensitive fish, the analysis area is the acres of impacts within corridors and a 1-mile buffer by HUCs within the species range. Downstream impacts are qualified but cannot be quantified by this analysis since crossing methods and water use are unknown.

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 (analysis area). GAP vegetation classification data at the "Division" level were used to determine potentially suitable habitats present within the corridors and analysis area (see Section 3.17, Vegetation). Quantification of potentially suitable habitat for each species is based on the GAP habitat type(s) within the species range as mapped by the 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 to make supportable determinations about the magnitude or degree to which a particular species may be affected. These details would be gathered before potential projects within the proposed corridors and project modifications would be made, if needed.

Potential short-term 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 miles and acres of PHMA with 4 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 20 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 designate 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 from 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

The designation of corridors would not restrict other compatible uses within the corridor; it would merely identify preferred routes for the placement of ROWs. However, potential future construction in the proposed corridors could make areas unavailable for certain types of development within the designated corridors.

3.21.5.1 Big Game

All four action alternatives cross numerous migration routes and crucial or year-long seasonal habitats for big game. Potential construction and operations during future development of the corridors would have the potential to stress and/or displace big game 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. When activities associated with energy development displace animals from otherwise suitable habitats, the animals are

forced to utilize marginal habitat or relocate to unaffected habitats where the population density and competition increase. Consequences of such displacement and competition are lower survival, lower reproductive success, lower recruitment, and lower carrying capacity, leading ultimately to population-level impacts (WGFD 2010a). For big game, the health of the overall herd depends on the ability of all population segments to effectively utilize limiting resources. Displacement away from development is not necessarily evident if some animals remain visible near and appear acclimated to the disturbance.

Surface-disturbing and disruptive activities are prohibited or seasonally restricted in crucial ranges. Big game exhibit some population fluctuation depending on severity of winter and summer drought. In Wyoming, mule deer and moose populations are generally below the WGFD's population objectives, while pronghorn and elk populations are generally increasing or stable. The BLM manages habitat to support wildlife population objectives defined by the WGFD. Impacts to big game species would be low as a result of implementing design features, BMPs, and RMP management actions and stipulations (see Appendices D and E). In addition, the proposed designated corridors are collocated with existing utilities corridors and pipeline ROWs to reduce potential effects to wildlife; however, development would contribute to cumulative effects (see Chapter 4).

3.21.5.2 Migratory Birds Including Raptor Species

Migratory bird habitat within the proposed corridors could be removed or disturbed during development of potential projects. Migratory birds are most vulnerable to impacts and potential incidental take during the nesting season. Potential impacts to migratory birds include short-term and long-term habitat loss; nest or young abandonment resulting from 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 design features, BMPs, and RMP management actions and stipulations (see Appendix E). These include prohibiting or restricting surface-disturbing and disruptive activities within raptor seasonal nest buffers, which would protect sensitive nesting areas for raptors and other migratory bird species. Preconstruction surveys would assess seasonal nest activity and the presence of new nests and thereby inform management actions in implementing modifications needed to avoid or minimize impacts to nesting migratory birds. Reclamation of all disturbed areas would promote the reestablishment of vegetation cover; 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 reestablish habitat and cover quality and quantity. Reclamation would be monitored and considered successful when a self-sustaining, vigorous, diverse, native plant community has been established (see Appendix E).

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 as a result of fine sediments entering the water from construction activities; the severity depends upon soil type, soil moisture, and the amount of disturbance and its proximity to the watershed (see discussion in Section 3.19, Water). Salinity would be increased only 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). For example, crossing at right angles, using low water crossings, and maintaining water flow can minimize habitat impacts and allow fish passage. Seasonal restrictions prohibit surface disturbing activities within spawning habitats to reduce disruptive activities. Also, horizontal directional drilling methods would likely be used to cross under sensitive streams to minimize construction-related sedimentation and turbidity.

There is potential for water withdrawals from hydrostatic testing and dust abatement to reduce the amount of fisheries habitat; however, the withdrawals would have to be substantial in order to result in adverse consequences for the resource. Hydraulic modeling would show any potential impacts from withdrawals. Potential projects would use modeling results to determine the level of impact at the project level. Downstream impacts to listed fish species will be determined in the Biological Assessment (see Appendix L).

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 as a result of habitat removal and invasive plant establishment; and increased predation as a result of 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). Some species, such as small mammals, may become more disconnected and isolated from other populations when they cannot disperse across the landscape (Dobkins and Sauder 2004). 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. Corridors that are within or adjacent to existing ROWs would contribute less to fragmentation impacts than corridors outside these areas; however, development would contribute to cumulative effects (see Chapter 4).

Noise could disrupt the 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 the wildlife species protected under the ESA on the official species list provided by USFWS (USFWS 2020a). There is designated critical habitat for Canada lynx within the analysis area but not within any proposed corridors. Although the proposed corridors are outside the occupied range of Platte River and Colorado River fish species, the proposed corridors occur within the species' AOIs. The USFWS uses the best available data to develop AOIs that encompass the locations where a listed species is known to occur plus areas where direct and indirect effects to the species and their habitat may occur.

In the ESA listings for Canada lynx, grizzly bear, 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 threatened, endangered, proposed, and other special status species and their habitats. Effects are determined during Section 7 consultation. The BLM has prepared a Biological Assessment for species that may be affected by the designation of corridors (see Appendix L). For prospective developments that 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 designated critical habitats through additional 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. The 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.

The BLM sensitive species listed for 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.

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 during potential future development of the corridors would result in short-term habitat loss. There would be long-term increased fragmentation, reduced habitat quality, and edge effects until successful revegetation is achieved. For most special-status wildlife species, the long-term effects would be the result of the slow recovery of habitat cover during revegetation and 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 because of 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 reestablish through natural propagation (Baker 2006). Long-term impacts from the impacts of sagebrush removal and habitat fragmentation are anticipated for the pygmy rabbit, greater sage-grouse, sage thrasher, sagebrush sparrow, and other sensitive sagebrush species.

Excavations, roads, aboveground facilities and equipment, human activity, noise, and increased 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 displace 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 habitat disturbance and avoidance behaviors would depend on the scale of the human activity; some species are more sensitive to human presence than others. Impacts to wildlife resulting from construction noise and increased human activity would be short term and localized (limited to the construction area), and operational noise of possible pipelines would not have a long-term impact on local wildlife.

Designated corridors avoid known populations with NSO restrictions. Impacts to species would be minimized by implementing design features, BMPs, and RMP stipulations, including seasonal restrictions within identified/occupied habitat (see Appendix E) Surface-disturbing and disruptive activities would be restricted within areas occupied by certain special-status species. Preconstruction surveys would identify the presence/absence of special-status species, and the results would be used to implement modifications needed to avoid or minimize impacts to those species. Mortality from collisions with vehicles would be minimized through implementation of speed limits on associated roads. Reclamation of all disturbed areas would promote the reestablishment of suitable habitat, reducing residual impacts. Reclamation includes soil management, reseeding, and invasive or noxious weed control to reestablish habitat and cover quality and quantity. Reclamation would be monitored and considered successful with the establishment of a self-sustaining, vigorous, diverse, native plant community that supports wildlife habitat or forage production. See the reclamation plan in Appendix D.

3.21.5.5 Greater Sage-Grouse

Impacts from potential future development of the proposed corridors to greater sage-grouse include surface disturbance to important habitats, mortality resulting from collisions, destruction of nests and nest abandonment, 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). The WGFD (2019) has a protocol for measuring and reporting sound levels at sage-grouse leks. Noise restrictions required by the RMPs would be implemented for the WPCI 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).

Designation of corridors for the transport of CO_2 and EOR products and other compatible uses could lead to future oil and gas development in existing fields. 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 2.0 miles of oil and gas development moved farther 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 2.0 miles from active lek sites under ideal habitat conditions, 3,0 miles when habitat conditions are not ideal, and 11.0 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 installed on gas field–related structures (Andren 1994; Avery and Genchi 2004). In addition, the development of potential future 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 the predation rates of individual greater sage-grouse, nesting hens, and juveniles during brood-rearing periods. Impacts to greater sage-grouse would be minimized by implementing design features, BMPs, and RMP stipulations (see Appendix E).

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 are categorized by the WGFD as high use, 3,541 acres as medium use, and 287 acres as low use. The remaining 15,587 acres are uncategorized. Approximately 64% of the Alternative B proposed corridors are within existing ROWs or designated corridors and could be developed regardless of the change in designated use.

3.21.6.2 Migratory Birds Including Raptor Species

GAP vegetation classification data were used to determine general habitats present within the corridors and a 1-mile buffer (analysis area). Based on the analysis of GAP vegetation in Section 3.17, Vegetation, Alternative B could impact a variety of migratory bird nesting habitats, including up to 49,957 acres of shrubland, desert scrub; 1,570 acres of grasslands; 869 acres of riparian; 2,208 acre of marsh, meadow; 466 acres of forest and woodland; and 754 acres of cliff, rock, and scree (see Table 3.17-3). These habitats are also available within 1 mile of the proposed corridors as shown in Table 3.17-3; however, portions of this analysis area are also disturbed by existing pipeline ROWs and other development. Short-

term indirect impacts to those adjacent occupied habitats could occur as a result of noise and human presence. Long-term fragmentation and edge effects may make habitat less suitable; however, successful reclamation would minimize long-term effects. Approximately 64% of the Alternative B proposed corridors are within existing designated corridors and could be developed regardless of the change in designated use.

3.21.6.3 Fisheries

Alternative B would include 107 perennial stream crossings (see Table 3.19-1), which could result in impacts to water quality and therefore fisheries. Surface disturbance would occur within HUC-8 watersheds within each special-status fish species' range. Alternative B may impact the various special-status fish species within the proposed corridor and 1-mile buffer (Table 3.21-4).

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 3.21-21 and 3.21-22 quantify potential habitats for each species based on their range within the analysis area. The suitability of these areas for supporting listed species would be determined for specific projects. Alternative B would primarily impact shrubland and sagebrush habitats and therefore impact several special-status species that rely on these habitats throughout the proposed corridors. One hundred fifty-five acres of critical habitat for Canada lynx is within 1 mile of the Alternative B corridors but not within the proposed corridors (see Table 3.21-21). Listed species and critical habitat are detailed in the Biological Assessment (see Appendix L).

Potential development of 1,958 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 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.

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.

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.

3.21.7.2 Migratory Birds Including Raptor Species

GAP vegetation classification data were used to determine habitats present within the corridors and a 1-mile buffer (analysis area). Based on the analysis of GAP vegetation in Section 3.17, Vegetation, Alternative C could impact a variety of migratory bird nesting habitats, including up to 5,704 acres of shrubland, desert scrub; 61 acres of grasslands; 155 acres of riparian; 443 acre of marsh, meadow; and 24

acres of forest and woodland (see Table 3.17-3). These habitats are also available within 1 mile of the proposed corridors as shown in Table 3.17-3; however, portions of this analysis area are also disturbed by existing pipeline ROWs and other development. Short-term indirect impacts to those adjacent occupied habitats could occur as a result of noise and human presence. Long-term fragmentation and edge effects may make habitat less suitable; however, successful reclamation would minimize long-term effects.

3.21.7.3 Fisheries

Alternative C would include 25 perennial stream crossings (see Table 3.19-1), which could result in impacts to water quality and therefore fisheries. Surface disturbance would occur within HUC-8 watersheds within each special-status fish species' range. Alternative C may impact the various special-status fish species within the proposed corridor and 1-mile buffer (Table 3.21-8).

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 3.21-21 and 3.21-22 quantify potential habitats for each species based on their range within the proposed corridors. The suitability of these areas for supporting listed species would be determined for specific projects. Alternative C would primarily impact shrubland and sagebrush habitats and therefore impact several special-status species that rely on these habitats throughout the proposed corridors. No Canada lynx critical habitat is within 1 mile of Alternative C (see Table 3.21-21). Listed species and critical habitat are detailed in the Biological Assessment (see Appendix L).

Alternative C includes 237 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 design features, BMPs, and RMP stipulations (see Appendix E).

3.21.7.5 Greater Sage-Grouse

Alternative C overlaps GHMA for greater sage-grouse. Table 3.21-9 lists the number of acres within the analysis areas. There are 0 acres of PHMA and 7,053.4 acres of GHMA crossed by Alternative C. There are 228,742.3 acres of PHMA and 646,418.2 acres of GHMA within the analysis areas.

Alternative C is within 2 miles of 12 leks and within 4 miles of 20 leks. Table 3.21-10 lists the average peak male counts at those leks within the last 20 years.

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. Within mule deer migration corridors, 3,363 acres are categorized by WGFD as high use, 2,955 acres as medium use, and 113 acres as low use. The remaining 10,715 acres are uncategorized. Approximately 83% of Alternative D proposed corridors are within existing ROWs or designated corridors and could be developed regardless of the change in designated use.

3.21.8.2 Migratory Birds Including Raptor Species

GAP vegetation classification data were used to determine habitats present within the corridors and a 1-mile buffer (analysis area). Based on the analysis of GAP vegetation in Section 3.17, Vegetation, Alternative D could impact a variety of migratory bird nesting habitats, including up to 45,913 acres of shrubland, desert scrub; 1,900 acres of grasslands; 974 acres of riparian; 106,574 acre of marsh, meadow; 592 acres of forest and woodland; and 754 acres of cliff, rock, and scree (see Table 3.17-3). These habitats are also available within 1 mile of the proposed corridors as shown in Table 3.17-3; however, portions of this analysis area are also disturbed by existing pipeline ROWs and other development. Short-term indirect impacts to those adjacent occupied habitats could occur as a result of noise and human presence. Long-term fragmentation and edge effects may make habitat less suitable; however, successful reclamation would minimize long-term effects. Approximately 83% of Alternative D proposed corridors are within existing ROWs and designated corridors and could be developed regardless of the change in designated use.

3.21.8.3 Fisheries

Alternative D would include 121 perennial stream crossings (see Table 3.19-1), which could result in impacts to water quality and therefore fisheries. Surface disturbance would occur within HUC-8 watersheds within each special-status fish species' range. Alternative D may impact the various special-status fish species within the proposed corridor and 1-mile buffer (Table 3.21-12).

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 3.21-21 and 3.21-22 quantify potential habitats for each species based on their range within the proposed corridors. The suitability of these areas for supporting listed species would be determined for specific projects. Alternative D would primarily impact shrubland 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 the species that depend on those habitats, , including bats and amphibians. No Canada lynx critical habitat is within 1 mile of Alternative D (see Table 3.21-21). Listed species and critical habitat are detailed in the Biological Assessment (see Appendix L).

Alternative D includes 1,860 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 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 16,954.8 acres of PHMA and 37,823.5 acres of GHMA crossed by Alternative D. There are 2,932,712.2 acres of PHMA and 3,060,471.0 acres of GHMA within the analysis areas.

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.

3.21.9 Environmental Effects – Alternative E

3.21.9.1 Big Game

Alternative E 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 3.21-15 lists the acres and linear miles of the area of analysis for Alternative E 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, 6,913 acres are categorized by WGFD as high use, 4,507 acres as medium use, and 294 acres as low use. The remaining 16,204 acres are uncategorized. Approximately 73% of Alternative E proposed corridors are within existing ROWs or designated corridors and could be developed regardless of the change in designated use.

3.21.9.2 Migratory Birds Including Raptor Species

GAP vegetation classification data were used to determine habitats present within the corridors and a 1-mile buffer (analysis area). Based on the analysis of GAP vegetation in Section 3.17, Vegetation, Alternative E could impact a variety of migratory bird nesting habitats, including up to 49,786 acres of shrubland, desert scrub; 1,749 acres of grasslands; 889 acres of riparian; 2,329 acre of marsh, meadow; 397 acres of forest and woodland; and 767 acres of cliff, rock, and scree (see Table 3.17-3). These habitats are also available within 1 mile of the proposed corridors as shown in Table 3.17-3; however, portions of this analysis area are also disturbed by existing pipeline ROWs and other development. Short-term indirect impacts to those adjacent occupied habitats could occur as a result of noise and human presence. Long-term fragmentation and edge effects may make habitat less suitable; however, successful reclamation would minimize long-term effects. Approximately 83% of Alternative D proposed corridors are within existing ROWs and designated corridors and could be developed regardless of the change in designated use.

3.21.9.3 Fisheries

Alternative E would include 145 perennial stream crossings (see Table 3.19-1), which could result in impacts to water quality and therefore fisheries. Surface disturbance would occur within HUC-8 watersheds within each special-status fish species' range. Alternative E may impact the various special-status fish species within the proposed corridor and 1-mile buffer (Table 3.21-16).

3.21.9.4 Special-Status Wildlife Species

Impacts to special-status species would vary by species and would be determined at the project level. Tables 3.21-21 and 3.21-22 quantify potential habitats for each species based on their range within the proposed corridors. The suitability of these areas for supporting listed species would be determined for specific projects. Alternative E would primarily impact shrubland and sagebrush habitats, which would affect several special-status species that rely on these habitats throughout the proposed corridors. Alternative E crosses 889 acres of riparian habitat and potentially would impact the species that depend on those habitats, including bats and amphibians. Canada lynx critical habitat is within 1 mile of Alternative E (see Table 3.21-21). Listed species and critical habitat are detailed in the Biological Assessment (see Appendix L).

Alternative E includes 1,970 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 and D. Impacts to species would be minimized by implementing design features, BMPs, and RMP stipulations (see Appendix E).

3.21.9.5 Greater Sage-Grouse

Alternative E overlaps PHMA and GHMA for greater sage-grouse. Table 3.21-17 lists the number of acres within the analysis areas. There are 21,516.9 acres of PHMA and 36,162.9 acres of GHMA crossed by Alternative E. There are 3,533,748.8 acres of PHMA and 2,949,903.4 acres of GHMA within the analysis areas.

Alternative E is within 2 miles of 56 leks and within 4 miles of 263 leks. Table 3.21-18 lists the average peak male counts at those leks within the last 20 years.

3.21.10 Summary of Effects

3.21.10.1 Big Game

The four action alternatives would temporarily restrict big game movement and temporarily displace big game from areas of potential construction and operations within crucial winter range, parturition areas, and migration corridors for the duration of the activity. Table 3.21-19 summarizes whether each alternative would affect a big game seasonal habitat. Alternative B corridors would cross 6,897 acres of mule deer high-use migration corridors, and Alternative D would cross 3,363 acres of mule deer high-use migration corridors. Approximately 64% of the Alternative B proposed corridors, 83% of the Alternative D proposed corridors, and 73% of Alternative E proposed corridors are within existing ROWs and designated corridors and could be developed regardless of the change in designated use.

3.21.10.2 Migratory Birds Including Raptor Species

Primary effects to migratory birds and raptors under all the action alternatives may include removal of habitat; increased noise, traffic, and human activity during construction; and decreased habitat quality during reclamation. Alternative B has the potential to remove the most acres of vegetation that provides nesting and foraging habitat. Approximately 64% of the Alternative B proposed corridors, 83% of the Alternative D proposed corridors, and 73% of Alternative E proposed corridors are within existing ROWs and designated corridors and could be developed regardless of the change in designated use. For all alternatives, impacts to migratory birds if corridors are developed would be minimized by implementing design features, BMPs, and RMP stipulations (e.g., seasonal buffers around identified nests) (see Appendix E); therefore, residual impacts would be low.

3.21.10.3 Fisheries

Depending on the alternative, the WPCI may impact a range of 500 to 1,500 meters of Blue Ribbon streams (six locations on the North Platte River and two on the Shoshone River) and between 250 and 3,393 meters 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 3.21-20).

3.21.10.4 Special-Status Wildlife Species

Habitat loss, alteration, and fragmentation may occur for all the action alternatives if development of corridors occurs. This could impact special-status species populations if they occur in the proposed corridors. To minimize these impacts, the designated corridors would be within or near areas of existing disturbance that have previously altered the quality of habitats in the corridors and vicinity. 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 3.21-21 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). The suitability of these areas for supporting special-status wildlife would be determined during project-level surveys. Table 3.21-22 compares the availability of potentially suitable habitat in the proposed corridors based on a BLM sensitive species' range and required habitats (WYNDD 2020).

All alternatives could result in some level of indirect impacts to special-status wildlife species as a result of 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 design features, BMPs, and RMP stipulations. Impacts during pipeline operations would be minimal as a result of decreased traffic and human presence.

3.21.10.5 Greater Sage-Grouse

Potential impacts to greater sage-grouse that may occur if corridors are developed include surface disturbance to important habitats, mortality resulting from collisions, destruction of nests and nest abandonment, 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 3.21-23 provides a comparison of acres of PHMA and GHMA within the analysis areas. Alternative E 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 3.21-24 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; Alternatives B, D, and E have similar average peak male counts within the analysis area.

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

New utility corridor designation or dedication 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. Wyoming big sagebrush and other sagebrush shrubs can take 35 to 120 years to reestablish through natural propagation in a disturbed ROW. 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 vehicle 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 as a result of construction, and dewatering activities, which can be irreversible.

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CHAPTER 4. CUMULATIVE IMPACTS

4.1 INTRODUCTION

This section analyzes the cumulative impacts of WPCI 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.

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 past, present, and 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 action and alternatives.

4.3 AIR QUALITY

The Air Quality Technical Support Document prepared for the 2018 Converse County EIS (BLM 2018b:Appendix A) summarizes the results of CAMx modeling effort conducted in 2017 to consider the air quality resulting from a 2008 base year (existing conditions) scenario (which was assessed using a Three-State Air Quality Modeling Study (3SAQS) modeling platform) and future scenarios (year 2028) considering reasonably foreseeable future development in Wyoming, Colorado, and Utah with and without the Converse County project. The conclusions from that modeling effort have been incorporated by reference into this analysis because the model considers the same reasonably foreseeable development identified in Appendix H and considers cumulative impacts across the State of Wyoming. Key conclusions are summarized below:

- Ozone: Assessment areas predicted to exceed the NAAQS in the 2008 Base Year would generally continue to exceed the NAAQS future year scenario. The area with the highest ozone values are located in northwest Utah, southcentral and west Wyoming (in particular, Sublette County, Wyoming) and the front range of Colorado. Within Wyoming, areas that did not exceed the ozone standard are typically located in eastern Wyoming (BLM 2018b:Appendix A, Section 5, Regional Air Quality Impacts). Model-predicted cumulative ozone concentrations exceed the NAAQS at all but two Class I areas and all but eight Sensitive Class II areas (BLM 2018b:Appendix A, Section 5.3.1.1).
- PM_{10}: Model-predicted 24-hour PM_{10} concentrations exceed the NAAQS at eight Class I areas and three Sensitive Class II areas. The high 24-hour PM_{10} impacts are attributed to fires, biogenics, and windblown dust emissions (BLM 2018b:Appendix A, Section 5.3.1.3).

- NO_2, CO, SO_2, and $PM_{2.5}$: Modeling results show that the annual NO_2, CO, SO_2 and $PM_{2.5}$ concentrations are predicted to be well below NAAQS at all assessment areas, with the exception of North Absaroka WA (CO and $PM_{2.5}$) and Absaroka-Beartooth Wilderness ($PM_{2.5}$), both of which are located in northwest Wyoming. Other isolated areas of elevated $PM_{2.5}$ correspond with locations of coal-fired power plants or oil and gas projects (BLM 2018b:Appendix A, Section 5.3.1.2 and 5.3.1.3).
- Visibility: In general, the areas of best and worst visibility would remain the same as the present conditions (as represented by modeled base year impacts). Future predictions for 2028 indicate visibility improvements for both the 20 percent best and 20 percent worst days at all assessment areas except at Dinosaur NM (northeast Utah/northwest Colorado) where visibility is predicted to degrade because of increased future emissions in the Uinta Basin (BLM 2018b:Appendix A, Section 6.0).
- Deposition of nitrogen and sulfur to soils, and acidification of sensitive lakes: The model-predicted deposition impacts are lower in the cumulative model scenario relative to present conditions (modeled base year impacts), but nitrogen deposition exceeds the critical load at 11 of 15 Class I areas and 16 of the 23 Sensitive Class II areas. Of the Sensitive Class II areas, the highest model-predicted nitrogen and acidification occur at Mount Naomi WA (north Utah). The Class I and Sensitive Class II areas with the highest model-predicted sulfur are Mount Zirkel WA (northwest Colorado) and Huston Park WA (south central Wyoming), respectively (BLM 2018b:Appendix A, Section 7.0).

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, BLM 2020g). Similarly, the analysis in the Converse County EIS (BLM 2018b) 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 because of 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 potential for 2.05 Mmt CO_2e to be sequestered annually through the use of CO_2-EOR (see Section 3.2.5.1), the net effect would be an approximate reduction in emissions from 156 to 153.95 CO_2e Mmt. 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 from oil and gas activities in the United States (Global Carbon Project 2019), 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 in Appendix H (see Table H-1). Reasonably foreseeable future actions with potential to impact cultural resources include all surface-disturbing activities that could result in impacts to cultural resources and their settings, as appropriate (see Appendix F). The total amount of potential future disturbance associated with these developments is approximately 434,700 acres throughout the state. Surface disturbance with the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total, with potential to affect 285 to 2,239 sites (of which between 59 and 602 would be eligible for the NRHP, and between 12 and 115 are sites of Native American concern). Additionally, the cumulative impacts of visual impacts and noise within the viewshed or noise attenuation range of culturally sensitive areas could affect cultural setting (see Section 4.11, Noise, and Section 4.19, Visual Resources). These cumulative impacts could affect several NHTs. 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 NHPA. 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. Changes in vegetation from past and present disturbance are outlined in Appendix H. Note that disturbance acreages include those from prescribed fire, wildfire, and wildland fire use. Reasonably foreseeable future actions with potential to affect fire and fuel loads include surface-disturbing activities that would remove both fine and coarse 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 potential cumulative removal of fuels from surface disturbing activities would be approximately 434,700 acres of vegetation across the state, largely within dry shrubland/grassland cover types, which comprise 75% of the vegetation cover across the State of Wyoming (see Appendix H). Surface disturbance with the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total, also largely within shrubland, desert scrub, and grassland cover types. Disturbance 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 an herbaceous type may create fires of lesser intensity but with the potential to spread fires faster and over greater distances. All development would be required to comply with existing requirements related to management of vegetation, fire, and forestry products contained in BLM RMPs and USFS plans. Restoration and revegetation of disturbed areas would reduce the risk of additional fuels in the form of non-native invasive vegetation. Proposed vegetation improvements project on 47,500 acres would reduce fire risk in areas of treatment within the Bighorn National Forest (see Appendix H).

4.6 GEOLOGY AND SOILS

The cumulative impacts of past and present actions on geologic resources and soils in the planning area are represented by the description of the existing affected environment. Although there are no documented reasonably foreseeable future actions with the potential to affect geologic stability or sensitive geologic formations, there are areas in central southern Wyoming that are prone to landslides (see Section 3.5.2). Reasonably foreseeable future actions with potential to impact soils include all reasonably foreseeable future actions that would remove surface vegetation, disturb soils, and create the potential for soil erosion and subsequent sedimentation. The total amount of surface disturbance associated with actual developments is approximately 434,700 acres across the State of Wyoming (see Appendix H). It is unknown how many of these reasonably foreseeable future actions would occur on highly erodible soils. Additionally, past and present surface disturbance of soils occurs from existing and reasonably foreseeable grazing that occurs on virtually all of the BLM-managed lands in Wyoming. However, the total acreage grazed is not indicative of level of soil disturbance. Actual soil disturbance in grazed areas is typically localized to trailing routes, mineral and supplemental feeding areas, and riparian areas. This type of disturbance is managed through BLM rangeland health standards and guidelines. Current and past OHV use also poses a risk to geology and soils. However, most BLM lands are managed such that OHV use is limited to existing routes, which are included in the developed/disturbed acreage category disclosed in Appendix H. Surface disturbance within the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total and include areas with geologic hazards and highly erodible soils (and potentially biological soil crusts).

Development in areas with high erodibility would result in a limited reclamation potential for disturbed soils and a potential long-term reduction in soil productivity. Any disturbance to or loss of biological soil crust where it occurs would also result in a potential long-term reduction in soil productivity. The current BLM RMPs and forest plans include specific stipulations for site-specific projects to prevent cumulative long-term loss of soils or soil productivity through disturbance and subsequent erosion. RMP and forest plans also contain requirements that area management meet to meet the Wyoming Standards and Guidelines for Healthy Rangelands.

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 although the reasonably foreseeable projects identified in Appendix H would meet industry standards to minimize health and safety risks, including by 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 two spills a day (Petroleum Association of Wyoming 2019). With consideration of the number of existing wells (25,605 producing wells [Petroleum Association of Wyoming 2019]), totals spills average out to approximately 0.028 spills per well. Assuming a similar spill rate, the development of 34,863 proposed wells (see Appendix H) would result in approximately 975 spills annually, or an average of 2.6 spills per day. The total cumulative risk from spills would depend on the period in which existing and proposed well operations overlap. If all proposed wells were to be developed concurrently, and existing wells were still producing at the current rate, the annual spills could be as high as 3.14 spills per day. However, a more likely scenario is that the wells identified in Appendix H would be developed gradually over a period of 20 to 30 years and the life span of some existing wells would end during this same period. Thus, the actual cumulative risk is more likely to be between two and three spills per day.

4.8 LAND USE AND REALTY

The State of Wyoming covers more than 97,000,000 square miles; of that total, nearly half (48%) is federal public land and 5.6% is owned by the State of Wyoming. The two major categories of federal public lands in Wyoming are BLM (27,860 square miles) and USFS (14,460 square miles). BLM RMPs and forest plans guide management activities on these lands. Other land management entities include counties, cities, tribes, and private entities. 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 the FLPMA, the Mineral Leasing Act, the Recreation and Public Purposes Act, BLM Manual 6220, and other applicable BLM regulations. Alternatives B through D would 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

Across the State of Wyoming, most acreages within BLM field offices are open for livestock grazing. As noted in Appendix H, past and present actions over the last 10 years have resulted in a loss of more than 1.7 million acres of vegetation, primarily in dry shrubland/grassland cover types (which currently comprise 75% of the vegetation cover across the state; see Appendix H). 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) or result in the loss of land acreage from allotments. The total amount of reasonably foreseeable disturbance associated with these developments is approximately 434,700 acres, which represents approximately 1.4% of the total federally managed vegetation and habitat resources statewide. Surface disturbance with the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total. Impacts to grazing allotments could include the loss of forage (from both removal as well as conversion of native vegetation communities and noxious and invasive weed species invasion), 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. In areas where successful reclamation is difficult or lengthy, any loss of forage would be considered a short-term impact. This relatively low cumulative total would not remove enough forage or acreage to preclude continued livestock operations by grazing permittees; however, it may reduce the amount of authorized AUMs in some allotments.

4.10 MINERAL RESOURCES

The cumulative impacts of past and present actions on minerals in the State of Wyoming are represented by the description of the existing affected environment (see Section 3.9.2). Reasonably foreseeable future actions that would affect the minerals of the State of Wyoming include oil and gas extraction, leasable solid mineral development, locatable mineral development, and mineral materials development. There are currently 25,605 producing wells across the State of Wyoming (Petroleum Association of Wyoming 2019). Reasonably foreseeable oil and gas development totals an estimated 34,863 new wells over the life of the WPCI (an increase of 136% over existing well counts). It is difficult to estimate the production of these wells; however, 2018 production rates in Wyoming were 88 million barrels of oil and 1.6 trillion cubic feet of natural gas (Petroleum Association of Wyoming 2019). The total cumulative impact to annual oil and gas development would depend on the period in which existing and proposed well operations overlap. If all proposed wells were to be developed concurrently, and existing wells were still

producing at the current rate, annual production could more than double. However, a more likely scenario is that the wells identified in Appendix H would be developed gradually over a period of 20 to 30 years and the life span of some existing wells would end during this same period. Under this scenario, the annual production over the next 20 to 30 years would be similar or slightly higher to what is currently occurring in the analysis area. Assuming the proposed corridors are developed, CO_2-EOR could be used in approximately 93 existing oil fields, resulting in additional production upwards of 549.15 million barrels of oil and 1.3 trillion cubic feet of gas over the life of the oil fields (see Section 3.9). 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

Present noise impacts in Wyoming are centered around cities and communities, roads and highways, and resource development areas (oil and gas, coal, trona, etc.). Typical existing noise around these developed areas would be similar to that described below. Reasonably foreseeable future actions with potential to impact noise within the State of Wyoming 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 434,700 acres of estimated reasonably foreseeable future development across the state. Surface disturbance with the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total. In general terms, surrounding areas within 0.50 to 0.75 mile from areas of future development would be periodically subject to both construction and operational noise. Noise associated with the projects in Appendix H would be similar that in Section 3.10 (temporary maximum construction noise levels near 90 dBA at 50 feet and long term operations noise of 57 dBA and 51 dBA at 0.25 mile and 0.5 mile). In areas that are not previously developed, both construction and operations noise would likely increase noise beyond existing conditions. The degree to which sensitive receptors may experience noise impacts would depend on proximity to new sources of noise. Noise in these areas, particularly during construction, would also displace wildlife and impact the aesthetics for visitors to public lands in those areas where the development occurs. Long-term noise impacts across the landscape would be less discernable in areas that are already developed, although construction activities would likely increase noise beyond existing conditions. While there are no federal regulations related to noise levels, across Wyoming, the BLM does limit noise levels at the perimeter of greater sage-grouse leks in PHMA to not exceed 10 dBA above ambient noise (BLM 2015c).

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 (see Section 3.11.2). 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 434,700 acres throughout the state. Surface disturbance with the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total. Potential cumulative impacts would be similar to those described in Section 3.11 (damage or loss of scientifically important fossil resources through physical impact, erosion of fossils from exposed bedrock, and unauthorized collection or destruction of fossils by those accessing the analysis area or adjacent lands). Respective BLM field office RMPs and USFS plans include requirements to minimize or avoid impacts to paleontological resources and to maintain the long-term sustainability of this resource. These include survey requirements areas, avoidance or collection of important paleontological resources, and construction monitoring.

4.13 PUBLIC HEALTH AND SAFETY

Reasonably foreseeable future actions that would affect public safety include oil and gas extraction, leasable solid mineral development, and locatable and saleable 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 34,863 wells over the life of the WPCI. Cumulatively, travel while working in these developments is the highest cause of injuries and/or mortalities (see Section 4.17, Transportation). 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 development that would involve industrial infrastructure that would affect existing recreational experience (see Appendix H). This could include visual contrast and noise from infrastructure construction and subsequent operation that affect user groups for which a quiet environment and undisturbed viewsheds are an important part of the recreation experience. Reduced wildlife utilization areas in proximity to development could also affect recreation activities such as hunting and wildlife viewing. Total cumulative disturbance that could impact recreational experience includes approximately 434,700 acres that would be disturbed (see Appendix H). This represents approximately 1.4% of all federally managed lands available for recreation throughout the state. Surface disturbance with the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total. The degree of impacts may vary across the State of Wyoming and would depend current level of disturbance and number and type of reasonably foreseeable actions in proximity to areas with recreation activities that depend upon undisturbed landscape and wildlife and which experience high visitation. For example, the Casper and Pinedale Field Offices (each with high levels of existing disturbance, multiple RFFAs, areas of high recreation value, and nearby communities supplying recreationists) may experience greater cumulative impacts than the Worland or Buffalo Field Offices, which have fewer identified RFFAs and no large communities nearby). Respective BLM field office RMPs and USFS plans include requirements to minimize or avoid impacts to key recreation acres from mineral development through NSO stipulations or closures. Projects that withdraw lands from mineral development would have countervailing effects if they are located near important recreational areas.

4.15 SOCIOECONOMICS

The cumulative impacts of past and present actions on socioeconomics in the State of Wyoming are represented by the description of the existing affected environment. There are 25,605 producing wells in the State of Wyoming (Petroleum Association of Wyoming 2019) and approximately 7,000 employees directly employed by the oil and gas industry, resulting in estimated total payroll of approximately $668 million per year, and tax, royalties, and lease revenues of approximately $900 million per year (Center for Western Priorities 2020). Reasonably foreseeable future actions that would affect the socioeconomics of the State of Wyoming are largely driven by reasonably foreseeable mineral development in the state. Reasonably foreseeable oil and gas development identified in Appendix H includes an estimated 34,863 new wells during the same period in which the proposed corridors might be transporting EOR products. The reasonably foreseeable development identified in Appendix H is projected to create a cumulative

total of approximately 5,000 to 6,000 jobs over the life of the reasonably foreseeable projection scenario (20 to 30 years). The total cumulative impact to socioeconomics would depend on the \ period in which existing and proposed well operations overlap. If all proposed wells were to be developed concurrently, and existing wells were still producing at the current rate, employment, tax, royalties, and lease revenues could more than double. However, a more likely scenario is that the wells identified in Appendix H would be developed gradually over a period of 20 to 30 years and the life span of some existing wells would end during this same period. Under this scenario, the additional cumulative socioeconomic contributions from oil and gas development over the next 20 to 30 years would be similar or slightly higher than what is currently occurring in the analysis area. Reasonably foreseeable uranium and coal development would also contribute to this (see Appendix H). Note that socioeconomic contributions from future development over a period of this duration can vary widely based on economic conditions and the price of oil, natural gas, coal, uranium, trona, and other leasable, locatable and saleable minerals.

Conversely, reasonably foreseeable development could effectively remove approximately up to 434,700 acres of land that provide recreational opportunity in Wyoming over a period of 20 to 30 years: while access to some of these areas would still remain for recreation, the quality of the recreational experience in some areas may decline depending on the type of development that occurs. A loss of 434,700 acres represents approximately 1.4% of the federally managed land in the state. Surface disturbance with the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total. 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 the recreational value of these lands would cumulatively impact the ability of the State of Wyoming to provide that recreational opportunity and would affect that economic contribution. The degree to which recreational value would be lost may vary across the analysis area depending current and proposed level of disturbance in proximity to areas with recreation activities that depend upon undisturbed landscape and wildlife which experience high visitation (see Section 4.14).

Cumulative impacts to environmental justice communities would depend upon the location of reasonably foreseeable developments in proximity to each other and to environmental justice communities. As noted in Section 3.14.6, because of an influx of workers, potential impacts to environmental justice communities from mineral development include increased housing costs and living expenses, decreasing housing availability, and straining healthcare providers; increases in industrial accidents and illness; vulnerability for women and youth in the area (particularly Native Americans; increased crime rates, including increased incidence of aggravated assault; and traffic). Short- and long-term impacts to air quality, water quantity or quality, viewsheds, noise and quality of life may also be disproportionate if they are located near environmental justice communities. Projects that withdraw lands from mineral development would have countervailing effects if they are located near environmental justice communities.

4.16 SPECIAL DESIGNATIONS

There are not any specific known reasonably foreseeable projects that would directly impact the Greater Sand Dunes ACEC and the Jackson Canyon ACEC. Indirect impacts from reasonably foreseeable development occurring outside the ACECs include visual impacts and noise impacts from development. The degree to which this would occur would depend on the location of proposed development in relation to the ACECs, as well as slope, vegetation, aspect, and other site-specific factors. Any specific oil and gas or other permitted projects that do arise would be analyzed through site-specific NEPA at the time of their proposal. 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 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 34,863 wells. 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 25,605 existing operating wells throughout the State of Wyoming create approximately 38,408 vehicle trips per day, and reasonably foreseeable development would result in approximately 52,295 vehicle trips per day at full development. The total cumulative impact to transportation would depend on the \ period in which existing and proposed well operations overlap. If all proposed wells were to be developed concurrently, and existing wells were still producing at the current rate, traffic could more than double (90,702 trips per day). However, a more likely scenario is that the wells identified in Appendix H would be developed gradually over a period of 20 to 30 years and the life span of some existing wells would end during this same period.

4.18 VEGETATION

Appendix H provides information about historical and current vegetation coverage across the State of Wyoming. As shown in Table H-1, a loss of approximately 1.7-million acres (3%) of vegetation cover has occurred over the last 10 years, primarily in shrubland, desert scrub, grassland and forest-woodland cover types. Note that disturbances acreages include those from prescribed fire, wildfire, and wildland fire use. It should be noted that most BLM-managed lands in Wyoming have been and continue to be used for grazing. Grazing impacts depend on vegetation type and how that grazing allotment has been managed. On all of the BLM-managed lands, managers are required to monitor rangeland health and manage that grazing to meet established rangeland health standards and guidelines. 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 434,700 acres. Surface disturbance with the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total. Although cumulative disturbance would largely be in shrubland/desert scrub, grassland, which comprise over 75% of statewide vegetation both currently and historically (see Appendix H), disturbance may occur in other vegetation cover types, including riparian areas, which comprise approximately 1% of all total statewide vegetation cover types. WPCI development would comply with BMPs and reclamation guidelines contained in the RMPs and forest plans to minimize impacts to rare and unique vegetation types, important and special-status plant species. Disturbed areas would be reclaimed after construction. Grassland and herbaceous plant communities would recover relatively quickly (within 1 to 5 years, depending on precipitation), whereas shrubland and forest communities would take a comparatively longer time to regenerate (40 to 100+ years). Additionally, the proponents of reasonably foreseeable development projects that are proposed would be required to consult with the USFWS as applicable to address impacts to federally listed vegetation species and be required to comply with BLM and USFS requirements to prevent impacts that would lead to ESA listing of BLM Sensitive and Forest Sensitive vegetation species.

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 (see Section 3.18.2. Reasonably foreseeable future actions within the planning area with the potential to

impact visual resources development are those that 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 434,700 acres of disturbance. Surface disturbance with the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total. 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 RMP/EIS for each field office.

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 (see Section 3.19.2). 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 434,700 acres, which represents approximately 1.4% of the total watershed acreage that is federally managed within the state. Surface disturbance with the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total. Impacts to water quality as the result of the accidental release of hazardous materials into water resources could occur from reasonably foreseeable development. The cumulative risk to water resources would depend on proximity to or ability potential to be transported to a waterway or vulnerable aquifer. The current BLM RMPs and forest plans include specific stipulations for site-specific projects to prevent cumulative long-term impacts to water resources.

The reasonably foreseeable future actions identified in Appendix H totals would also require water use for well drilling and hydraulic fracturing, dust abatements, and other activities. Cumulative impacts to water quantity would depend on the \ period in which proposed projects were developed as well as the project-specific details on water use, such as well completion methods. 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.

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 (see Section 3.20.2). 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 86,940 acres of wild horse HMA could be cumulatively impacted over the next 20 to 30 years (20% of the totals disturbance described in Appendix H). This represents approximately 2% of the total existing HMA acreage (3,644,379 acres, see Section 3.20.2). The Proposed Action and alternatives would contribute additional disturbance to HMAs across the state. Impacts would range from 1,029 acres of disturbance in three HMAs to 9,659 acres of surface disturbance in 15 HMAs.

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. Appendix H provides information about historical and current vegetation coverage across the State of Wyoming. As shown in Table H-1, a loss of approximately 1.7-million acres (3%) of vegetation cover has occurred over the last 10 years, primarily in shrubland, desert scrub, grassland and forest-woodland cover types. 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 434,700 acres. Surface disturbance with the Proposed Action and alternatives would add an additional 7,263 to 57,457 acres to this total. Disturbance would largely be in shrubland/desert scrub, grassland, which comprise approximately 75% of all vegetation cover in the state. Wildlife species that would be cumulatively impacted include big game, nongame species, migratory bird and non-migratory bird species (including greater sage-grouse), and raptors. 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. Potential impacts to migratory birds include short-term and long-term habitat loss; nest or young abandonment as a result of 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. BLM and USFS management actions and stipulations to minimize impacts include prohibiting or restricting surface-disturbing and disruptive activities within raptor seasonal nest buffers. There is potential for soil erosion and subsequent sedimentation to nearby perennial waterbodies that 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.

Reasonably foreseeable habitat loss, alteration, and fragmentation could impact special-status species populations if they occur in areas of proposed development. As noted in Section 3.21.5, areas of existing disturbance have previously altered the quality of habitats in some portions of the state; long-term effects to special status species could occur if there is a slow recovery of habitat cover during revegetation reclamation of areas disturbed by reasonably foreseeable development. Additionally, the proponents of reasonably foreseeable development projects that are proposed would be required to consult with the USFWS as applicable to address impacts to federally listed wildlife species and be required to comply with BLM and USFS requirements to prevent impacts that would lead to ESA listing of BLM Sensitive and Forest Sensitive wildlife species.

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