United States Department of the Interior
Bureau of Land Management

Finding of No Significant Impact
for
Environmental Assessment
DOI-BLM-UT-G010-2013-0211

January 2015

Wild Horse Bench Infill Project

Proposed by Koch Exploration Company LLC
Township 10 South - Range 19 East
Sections 22, 23, 26, 27, 34, 35
Uintah County, Utah

Vernal Field Office
170 South 500 East
Vernal, Utah 84078
Phone: 435-781-4400
Fax: 435-781-4410

BLM

FINDING OF NO SIGNIFICANT IMPACT

Environmental Assessment

DOI-BLM-UT-G010-2014-0211

Koch Exploration Company, LLC proposal to drill and produce up to 135 wells on up to 37 existing well pads in the Wild Horse Bench area of Uintah County, Utah.

FINDING OF NO SIGNIFICANT IMPACT:

"Based on the analysis of potential environmental impacts contained in the attached environmental assessment, and considering the significance criteria in 40 CFR 1508.27, I have determined that Koch Exploration Company's proposal to drill and produce up to 135 wells on up to 37 existing well pads with associated drilling facilities and pipelines, in the Wild Horse Bench area of Uintah County, Utah as described in the proposed action alternative of DOI-BLM-UT-G010-2014-0211 will not have a significant effect on the human environment. An environmental impact statement is therefore not required."

Authorized Officer

JAN 20 2015

Date

United States Department of the Interior
Bureau of Land Management

Decision Record
For

Environmental Assessment
DOI-BLM-UT-G010-2013-0211

January 2015

Wild Horse Bench Infill Project

Proposed by Koch Exploration Company LLC
Township 10 South - Range 19 East
Sections 22, 23, 26, 27, 34, 35
Uintah County, Utah

Vernal Field Office
170 South 500 East
Vernal, Utah 84078
Phone: 435-781-4400
Fax: 435-781-4410

BLM

DECISION RECORD
Environmental Assessment
DOI-BLM-UT-G010-2034-0211

DECISION RECORD:

It is my decision to authorize the development of the Wild Horse Bench Infill project area as described in the Proposed Action Alternative of Environmental Assessment (EA) DOI BLM UT-G010-2013-0211. Proposed drilling would include up to one 135 wells on up to 37 existing well pads with associated facilities and pipelines to develop its underlying federal oil and gas leases in the Wild Horse Bench area of Uintah County, Utah. A detailed description of the Proposed Action Alternative is included in Section 2.2 of the EA.

This decision is contingent on meeting all applicant committed environmental protection measures and mitigation described in the EA and applicable conditions of approval identified in attachment A of this decision record.

Authorities: The Project Area lands were leased for oil or gas development under authority of the Mineral Leasing Act. A lessee operator has the right to explore for oil and gas on its leases as specified in 43 CFR 3101.1-2, and if a discovery is made, to produce oil and/or natural gas for economic gain, so long as those operations are conducted in accordance with the lease terms and 43 CFR 3160. All right-of-way development would be conducted in compliance with 43 CFR 2800.

Decision Rationale:

The subject lands were leased for oil or gas development under the authority of the Mineral Leasing Act of 1920, as modified by the Federal Land Policy and Management Act of 1976, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987. The lessee/operator has the right to explore for oil and gas on the lease as specified in 43 CFR 3102.1-2, and if a discovery is made, to produce oil and/or natural gas for economic gain.

The proposed project is consistent with the Uintah County General Plan, 2011-as amended. In general, the county plan indicates support for development proposals such as the Proposed Action through the plan's emphasis on multiple-use public land management practices, responsible use, and optimum utilization.

There are no comprehensive State of Utah plans for the vicinity of the selected alternative. However, the State of Utah School and Institutional Trust Lands Administration (SITLA) have leased much of the nearby state land for oil and gas production. Consequently, it is assumed that the selected alternative would be consistent with SITLA and the objectives of the State of Utah.

The selected alternative meets the BLM's need to acknowledge and allow development of valid existing leases. The BLM objective to reduce impacts is met by the the imposing of mitigation measures to protect other resource values.

The Wild Horse Bench Infill EA analyzed the Proposed Action and No Action Alternatives. For a detailed description of the alternatives refer to section 2.2 and 2.3 of the EA,

respectively. The selected alternative best addressed the BLM 's purpose and need for the project while responding to the Proponent 's proposal for development of these leases while minimizing potential environmental impacts. The BLM has reached a Finding of No Significant Impact Determination for the selected alternative.

The management of BLM public lands and resources in the Wild Horse Bench Infill project area is directed and guided by the Vernal Field Office Approved Resource Management Plan (RMP) and Record of Decision (ROD) (BLM 2008). The ROD and RMP allow for processing of Applications for Permit to Drill (APDs) and right-of-way (ROW) grant applications In support of oil and gas operations activities (e.g. Drilling of wells, operation of compressor station, etc.) to be analyzed on a case-by-case basis. The management objective of the RMP for energy resources is to meet local and national non-renewable and renewable energy needs while protection other resource values.

Public involvement occurred as described in Chapter 5 of the EA. A 30-day period was held for the EA from June, 9 2014 through July 9, 2014. Public comment letters have been reviewed, and substantive comments have been responded to in Appendix G of the EA. No substantial changes necessitating a further public review period were made as a result of the public comment period.

Protest/Appeal Language: This decision is effective upon the date it is signed by the Authorized Officer. The decision is subject to appeal. Under BLM regulation, this decision is subject to administrative review in accordance with 43 Code of Federal Regulations 3165. Any request for administrative review of this decision must include information required under 43 Code of Federal Regulation 3165.3(b) *State Director Review*, including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, Utah State Office, P.O. Box 45155, Salt Lake City, Utah 84145, within 20 business days of the date this decision is received or considered to have been received. If you wish to file a petition for stay, the petition for stay should accompany your notice of appeal and shall show sufficient justification based on the following standards.

(1) The relative harm to the parties if the stay is granted or denied;

(2) The likelihood of the appellant's success on the merits;

(3) The likelihood of irreparable harm to the appellant or resources if the stay is not granted; and

(4) Whether the public interest favors granting the stay

Authorized Officer

JAN 20 2015

Date

Attachment A

Conditions of Approval

Air Quality:

- The Operator will utilize drilling rig engines of Tier 2 quality or better.
- Emissions from completion operations (hydraulic fracturing) will be mitigated as required by New Source Performance Standard (NSPS) Subpart OOOO (EPA, 2011). NSPS Subpart OOOO requires that wells completed prior to 1/1/2015 direct flowback emissions to a flowline or combustion device. Wells completed on or after 1/1/2015 must route recovered liquids into one or more storage vessels or re-inject the recovered liquids into the well or another well, and route the recovered gas into a gas flow line or collection system, re-inject the recovered gas into the well or another well, use recovered gas as an on-site fuel source, or use the recovered gas for another useful purpose that a purchased fuel or raw material would serve, with no direct release to the atmosphere (EPA, 2011).
- The Operator will install dehydrator volatile organic compound (VOC) emission controls to attain +90 percent efficiency.
- If new and replacement internal combustion gas field engines are needed, the Operator will comply with RMP NOx emissions criteria. If an engine is less than or equal to 300 design-rated horsepower, it will not emit more than 2 grams of NOx per horsepower-hour. If an engine is greater than 300 design-rated horsepower, it will not emit more than 1.0 gram of NOx per horsepower-hour.
- The Operator will install 95 percent efficient VOC emission controls on production tanks with the potential to emit more than 6 tons per year (TPY) VOCs, as required by NSPS Subpart OOOO (EPA, 2011).
- The Operator will utilize low-bleed (or equivalent device that does not exceed the U.S. Environmental Protection Agency (EPA) low-bleed emissions thresholds of 6 standard cubic feet per hour) pneumatic devices at all new and existing production facilities (EPA, 2011).
- The Operator will establish a thief hatch/Enardo inspection and replacement program to minimize tank losses.
- The Operator will utilize telemetry to minimize well visits.
- The Operator will install solar-powered chemical pumps on production facilities.
- The Operator will employ measures to mitigate any potential exceedance of the 1-hour NO2 standard during drilling operations by employing effective public health buffer zones out to 200 meters (m) from the nearest emission source. Examples of an effective public health protection buffer zone include the demarcation of a public access exclusion zone by signage at intervals of every 250 feet that is visible from a distance of 125 feet during daylight hours, and a physical buffer such as active surveillance to ensure the property is not accessible by the public during drilling operations.

The Operator will employ measures to mitigate any potential exceedance of the 1-hour NO2 standard during drilling operations by employing effective public health buffer zones out to 200 meters (m) from the nearest emission source. Examples of an effective public health protection buffer zone include the demarcation of a public access exclusion zone by signage at intervals of every 250 feet that is visible from a distance of 125 feet during daylight hours, and a physical buffer such as active surveillance to ensure the property is not accessible by the public during drilling operations. Additionally, the applicant commits to developing a project-specific adaptive management strategy, to be informed by periodic emission inventory updates. Implementation of this strategy and associated application of "enhanced" ozone mitigation measures would be required once the proposed project is initiated if:

1) USEPA designates the area "nonattainment" for ozone;
2) There is a monitored ozone standard exceedance;
3) The ARMS modeling shows that additional mitigation is needed to prevent future ozone exceedances; or
4) The ARMS group establishes industry-wide mitigation requirements through ongoing modeling.

If implementation of this adaptive management strategy is triggered, the applicant commits to working with the BLM to analyze project-specific "enhanced" mitigation measures and employ them within 1 year. The measures to be considered could include, but would not be limited to, the following:

- Reducing the total number of drill rigs.
- Installing Tier 4 or better drill rig engines.
- Seasonally reducing or ceasing drilling during specified periods.
- Using only lower-emitting drill and completion rig engines during specified time periods.
- Using natural gas-fired drill and completion rig engines.
- Replacing internal combustion engines with gas turbines for natural gas compression.
- Using electric drill rig or compression engines.
- Centralizing gathering facilities.
- Limiting blow-downs or restricting them during specified periods.
- Installing plunger lift systems with smart automation.
- Employing a monthly Forward Looking Infrared, or FLIR, monitoring program to reduce VOCs.
- Enhancing a direct inspection and maintenance program.
- Employing tank load out vapor recovery.
- Employing enhanced VOC emission controls with 95 percent control efficiency on additional production equipment having a potential to emit of greater than 5 tons per year.

In addition to the commitments discussed above, the applicant commits to complying with applicable air pollution control rules and regulations.

Air quality issues are being addressed on a Utah-wide basis through the Utah Air Resource Technical Advisory Group (UTAG) and the BLM's ARMS. The actions outlined below have been designed to address ozone levels possibly associated with oil and gas operations in the Uinta Basin. The actions consist of the following elements:

- Refine air quality modeling predictions;
- Develop a Uinta Basin ozone action plan; and
- Implement a regional ozone action plan.

The first two elements of this strategy are being implemented by the BLM and other agency stakeholders, independent of the decision to be made regarding further development in the Uinta Basin. Regional operators may participate in these initial planning steps, thereby having the opportunity to contribute to the outcome of the process. The third element would require specific action by the applicant and other oil and gas operators in the Uinta Basin following the approval of the Decision Record. All three elements are described in more detail in the following paragraphs.

Cultural Resources:

- Prior to any construction-related surface disturbance, all well pad sites and access roads will be examined by an archaeologist approved by the BLM to determine the presence of cultural resources. If any are found, recommendations will be made to avoid or recover such resources. The possible need for on-site monitoring will be addressed at the onsite inspection.
- If any historic or archaeological resources are found during operations, all operations that could further disturb such materials will be suspended, and the AO will be contacted for direction.

Livestock Grazing:

- If existing range improvements were to be damaged by project operations, the Operator will contact the AO immediately for direction.
- Stock ponds in the NAPA would be avoided such that they would not be damaged by project operations. If existing stock ponds were to be functionally impaired by sedimentation resulting from project operations, the Operator will contact the AO immediately for direction and will take measures to restore the functionality of affected range improvements.

Paleontological Resources:

- In sensitive fossil areas where bedrock is exposed at or near surface (generally less than 3 feet below the soil surface), a BLM-approved paleontologist will examine well pad sites, access roads, and pipelines for paleontological resources and make recommendations regarding the disposition of such resources. The possible need for monitoring will be addressed at the onsite inspection.
- If any paleontological resources are found during operations, all operations that could further disturb such materials will be suspended, and the AO will be contacted for direction.

Migratory Birds and Raptors:

- Surveys for raptors and other migratory birds will be conducted as directed by the AO.
- Construction, drilling, and completion operations will be conducted in compliance with spatial offsets and timing limitations specified in Appendix A, Attachment 2, of the Approved RMP (BLM, 2008) unless waived by the AO.

Soils and Water:

- The Operator will comply with current RMP stipulations regarding fragile soils and slopes.
- Diversion dikes or terraces, straw bales, silt fences, weed-free mulch, soil stabilizers, or sediment basins would be utilized as determined appropriate based on the pad onsite inspection.
- Stormwater flow and sedimentation will be controlled with the implementation of Gold Book BMPs and the Operator's Post-construction Stormwater plan (SWPPP) (See Appendix E).

Threatened, Endangered, and Candidate Species:

- The USFWS conservation measures for the clay reed-mustard and Uinta Basin hookless cactus will be followed (USFWS, 2012; USFWS, 2011). Site-specific inventories will be performed by a BLM-approved biologist under the direction of the AO prior to an onsite inspection.
- Dust abatement will be employed in all potential clay reed-mustard habitat during the flowering period for the species and when the species is most vulnerable to dust-related impacts (March 1 to August 30)
    a. Only water (no chemicals, reclaimed production water or oil field brine) will be used for dust abatement measures.
    b. Dust abatement will occur weekly or as necessary as directed by the BLM Authorized Officer (AO) during construction and drilling activities, and monthly (March 1 to August 30) or as directed by the BLM AO over the life of the project.
- If an individual of a threatened, endangered, candidate, or proposed wildlife or plant species or its habitat is known to exist in the project area, or would be affected by proposed operations, the Operator will consult with the AO prior to initiating surface disturbance activities to determine appropriate procedures.
- If necessary, avoidance and/or mitigation measures will be implemented, as appropriate. As determined by the AO at the onsite inspection, site-specific mitigation measures intended to protect the clay-reed mustard or Uinta Basin hookless cactus may include strategic placement of roads and facilities and/or installation of silt fencing, straw bales, and straw batting to protect individuals or habitat.
- If water were to be drawn from the White or Green Rivers, the conservation measures for endangered fish will be followed:

a. The best method to avoid entrainment is to pump from an off-channel location – one that does not connect to the river during high spring flows. An infiltration gallery constructed in a USFWS-approved location is best.
b. If the pump head is located in the river channel the following stipulations apply:
   i. Do not situate the pump in a low-flow or no-flow area as these habitats tend to concentrate larval fishes.
   ii. Limit the amount of pumping, to the greatest extent possible during that period of the year when larval fish may be present (see above).
   iii. Limit the amount of pumping, to the greatest extent possible, during the midnight hours (10pm to 2 am), as larval drift studies indicate that this is a period of greatest daily activity. Dusk is the preferred pumping time, as larval drift abundance is lowest during this time.
c. Screen all pump intakes with 3/32" mesh material.
d. Approach velocities for intake structures should follow the National Marine Fisheries Service's document "Fish Screening Criteria for *Anadromous Salmonids*". For projects with an in-stream intake that operate in stream reaches where larval fish may be present, the approach velocity should not exceed 0.33 feet per second (ft/s).
e. Report any fish impinged on the intake screen or entrained into irrigation canals to the Service (801.975.3330) or the Utah Division of Wildlife Resources:

   Northeastern Region
   152 East 100 North
   Vernal, UT 84078
   Phone: (435) 781-9453

- Koch Exploration will make a one-time payment that has been calculated by multiplying by multiplying the project's peak annual depletion (116-acre-feet) by the depletion charge in effect at the time payment is made. For fiscal Year 2015 (October1, 2014 to September 30, 2015), the depletion charge is $20.54 per acre foot for the average annual depletion which equals a total payment of $2,382.64 for this project. The total payment will be due upon completion of a BLM Decision Record for the EA. Fifty percent of the funds will be used for acquisition of water rights to meet the in-stream flow needs of the endangered fishes (unless otherwise recommended by the Implementation Committee); the balance will be used to support other recovery activities for the Colorado River endangered fishes. All payments should be made to the Service's designated agent, the National Fish and Wildlife Foundation (Foundation), at the time of issuance of the federal approvals from the BLM.

  National Fish and Wildlife Foundation
  1133 15th Street, NW
  Suite 1100
  Washington, DC 20005

The payment is to be accompanied by a cover letter that identifies the Project and biological opinion that requires the payment, the amount of payment enclosed, check number, and any special conditions identified in the biological opinion relative to disbursement or use of the funds (there are none in this instance). A copy of the cover letter and of the check is to be sent directly to:

Fish and Wildlife Service
Utah Field Office
2369 West Orton Circle, Suite 50
West Valley City, Utah 8411

The cover letter shall identify the name and address of the payer, the name and address of the federal agency responsible for authorizing the project, and the address of the Service office issuing the biological opinion. This information will be used by the Foundation to notify the payer, the lead federal agency, and the Service that payment has been received. The Foundation is to send notices of receipt to these entities within 5 working days of its receipt of payment.

- Re-initiation of section 7 consultation with the USFWS will be sought immediately if any loss of Threatened or Endangered species is causes as a result of project activities

Vegetation:

- The Operator would implement site-specific reclamation activities based on a Reclamation Plan (Appendix D) and the Green River District Reclamation Guidelines
- The Operator would initiate an active weed management program in its WHBPA leases in the spring of 2012. The Operator would use herbicides to control infestations of weeds, using procedures described in a weed control plan.
- All herbicide treatments will follow the guidance of the ROD for the BLM Vegetation Treatments Using Herbicides (BLM, 2007) and any future local Weed Management direction received from the FO to ensure the use of safeguards with respect to approved chemicals, application rates, and BMPs.
- Weed-free mulching or other means, as determined appropriate during the onsite or reclamation inspections, will be used.

United States Department of the Interior
Bureau of Land Management

Environmental Assessment
&
Biological Assessment
DOI-BLM-UT-G010-2013-0211

January 2015

Wild Horse Bench Infill Project

Proposed by Koch Exploration Company LLC
Township 10 South - Range 19 East
Sections 22, 23, 26, 27, 34, 35
Uintah County, Utah

Vernal Field Office
170 South 500 East
Vernal, Utah 84078
Phone: 435-781-4400
Fax: 435-781-4410

BLM

TABLE OF CONTENTS

1.0 PURPOSE AND NEED 1
1.1 Introduction 1
1.2 Background 1
1.3 Need for the Action 1
1.4 Purpose for the Proposed Action 2
1.5 Conformance with BLM Land Use Plans 2
1.6 Relationship to Statutes, Regulations, or Other Plans 2
1.7 Identification of Issues 3
1.8 Issues Considered but Eliminated from Further Analysis 5
1.9 Summary 7
2.0 DESCRIPTION OF ALTERNATIVES 7
2.1 Introduction 7
2.2 Alternative A – Proposed Action 7
2.2.1 Location, Access, and Lease Stipulations 7
2.2.1.1 Location and Access 7
2.2.1.2 Lease Stipulations 7
2.2.2 Well Development 8
2.2.2.1 Construction Operations 8
2.2.2.2 Drilling, Completion, and Testing Operations 8
2.2.2.3 Materials Management during Well Development 9
2.2.2.4 Personnel Requirements and Schedule 10
2.2.3 Production and Maintenance Operations 12
2.2.3.1 Well Pad Facilities and Maintenance 12
2.2.3.2 Pipelines 12
2.2.3.3 Workovers 13
2.2.4 Reclamation 13
2.2.4.1 Initial Reclamation 13
2.2.4.2 Final Reclamation and Abandonment 13
2.2.5 Surface Disturbance Summary 14
2.2.6 Applicant-Committed Design Features 14
2.2.6.1 General 15
2.2.6.2 Air Quality 15
2.2.6.3 Cultural Resources 16
2.2.6.4 Livestock Grazing and Rangeland Health Standards 17
2.2.6.5 Paleontological Resources 17
2.2.6.6 Migratory Birds and Raptors 18
2.2.6.7 Soils and Water 18
2.2.6.8 Threatened, Endangered, Candidate, and Proposed Species 18
2.2.6.9 Vegetation 18
2.3 Alternative B – No Action 19
2.4 Alternatives Considered, but Eliminated from Further Analysis 19
2.5 Summary Comparison of Environmental Impacts 20
3.0 AFFECTED ENVIRONMENT 20
3.1 Introduction 22
3.2 General Setting 22
3.3 Resources Brought Forward for the Analysis 22
3.3.1 Air Quality and Greenhouse Gas Emissions 23

3.3.1.1 Air Quality....23
3.3.1.2 Greenhouse Gas Emissions....27
3.3.2 Cultural Resources: Archaeological Resources....28
3.3.3 Invasive Plants/Noxious Weeds, Soils, and Vegetation....29
3.3.3.1 Invasive Plants/Noxious Weeds....29
3.3.3.2 Soils....30
3.3.3.3 Vegetation....31
3.3.4 Livestock Grazing and Rangeland Health Standards....32
3.3.4.1 Livestock Grazing....32
3.3.4.2 Rangeland Health Standards....33
3.3.5 Paleontological Resources....33
3.3.6 Threatened, Endangered, Proposed, or Candidate Plant Species....34
3.3.7 Water Resources: Surface Water Quality....37
3.3.8 Wild Horses....37
3.3.9 Wildlife....38
3.3.9.1 Migratory Birds (including raptors)....38
3.3.9.2 Non-USFWS Designated Species....39
3.3.9.3 Threatened, Endangered or Candidate Wildlife Species....42
4.0 ENVIRONMENTAL IMPACTS....43
4.1 Introduction....43
4.2 General Analysis Assumptions....43
4.3 Direct and Indirect Impacts....44
4.3.1 Alternative A – Proposed Action....44
4.3.1.1 Air Quality and Greenhouse Gas Emissions....44
4.3.1.2 Cultural Resources: Archaeological Resources....48
4.3.1.3 Invasive Species/Noxious Weeds, Soils, and Vegetation....48
4.3.1.4 Livestock Grazing and Rangeland Health Standards....50
4.3.1.5 Paleontological Resources....52
4.3.1.6 Threatened, Endangered, Proposed or Candidate Plant Species....52
4.3.1.7 Water Resources: Surface Water Quality....53
4.3.1.8 Wild Horses....54
4.3.1.9 Wildlife....54
4.3.1.10 Mitigation Measures....58
4.3.1.11 Residual Impacts....58
4.3.1.12 Monitoring and/or Compliance....59
4.3.2 Alternative B – No Action....59
4.3.2.1 Air Quality Greenhouse Gases....59
4.3.2.2 Cultural Resources: Archaeological Resources....59
4.3.2.3 Invasive Plants/Noxious Weeds, Soils, and Vegetation....60
4.3.2.4 Livestock Grazing and Rangeland Health Standards....60
4.3.2.5 Paleontological Resources....60
4.3.2.6 Threatened, Endangered, Proposed, or Candidate Plant Species....60
4.3.2.7 Water Resources: Surface Water Quality....60
4.3.2.8 Wild Horses....60
4.3.2.9 Wildlife....61
4.3.2.10 Mitigation Measures....61
4.3.2.11 Residual Impacts....61
4.3.2.12 Monitoring and/or Compliance....61

4.4 Cumulative Impact Analysis 61
4.4.1 Air Quality and Greenhouse Gases 62
4.4.1.1 Cumulative Impact Area 62
4.4.1.2 Past and Present Actions 62
4.4.1.3 Reasonably Foreseeable Action Scenario 62
4.4.1.4 Cumulative Impact Analysis 62
4.4.2 Cultural Resources: Archaeological Resources 64
4.4.2.1 Cumulative Impact Area 64
4.4.2.2 Past and Present Actions 64
4.4.2.3 Reasonably Foreseeable Action Scenario 64
4.4.2.4 Cumulative Impact Analysis 65
4.4.3 Invasive Plants/Noxious Weeds, Soils, and Vegetation 65
4.4.3.1 Cumulative Impact Area 65
4.4.3.2 Past and Present Actions 66
4.4.3.3 Reasonably Foreseeable Action Scenario 66
4.4.3.4 Cumulative Impact Analysis 66
4.4.4 Livestock Grazing and Rangeland Health Standards 68
4.4.4.1 Cumulative Impact Area 68
4.4.4.2 Past and Present Actions 68
4.4.4.3 Reasonably Foreseeable Action Scenario 68
4.4.4.4 Cumulative Impact Analysis 69
4.4.5 Paleontological Resources 69
4.4.5.1 Cumulative Impact Area 69
4.4.5.2 Past and Present Actions 70
4.4.5.3 Reasonably Foreseeable Action Scenario 70
4.4.5.4 Cumulative Impact Analysis 70
4.4.6 Threatened, Endangered, Proposed, or Candidate Plant Species 70
4.4.6.1 Cumulative Impact Area 70
4.4.6.2 Past and Present Actions 70
4.4.6.3 Reasonably Foreseeable Action Scenario 71
4.4.6.4 Cumulative Impact Analysis 71
4.4.7 Water Resources: Surface Water Quality 72
4.4.7.1 Cumulative Impact Area 72
4.4.7.2 Past and Present Actions 72
4.4.7.3 Reasonably Foreseeable Action Scenario 72
4.4.7.4 Cumulative Impact Analysis 72
4.4.8 Wild Horses 74
4.4.8.1 Cumulative Impact Area 74
4.4.8.2 Past and Present Actions 74
4.4.8.3 Reasonably Foreseeable Action Scenario 74
4.4.8.4 Cumulative Impact Analysis 74
4.4.9 Wildlife 74
4.4.9.1 Cumulative Impact Area 74
4.4.9.2 Past and Present Actions 75
4.4.9.3 Reasonably Foreseeable Action Scenario 75
4.4.9.4 Cumulative Impact Analysis 75
5.0 CONSULTATION AND COORDINATION 77
5.1 Persons, Groups, and Agencies Consulted 77

5.2 Summary of Public Participation 77
5.3 List of Preparers 78
6.0 REFERENCES 79
6.1 References Cited 79
6.2 Acronyms 85

TABLES

Table 1-1: Key Federal, State, and County Permits, Approvals, and Authorizing Actions 3
Table 2-1: Location of WHBPA in T10S-R19E 8
Table 2-2: Water Sources 11
The quantification of surface disturbance displayed in Table 2-3 displays the amount of new surface disturbance that would result on an average basis per well pad. 15
Table 2-3: Surface Disturbance Summary – Average per Well 15
Table 2-4: Project Surface Disturbance Summary (acres) 15
Table 2-5: Summary Comparison of the Alternatives 21
Table 3-1: Summary of Climate Data, Ouray, Utah 22
Table 3-2: Regional Ambient Air Quality Values 24
Table 3-3: Estimated 2012 Oil and Gas Emissions in the Uinta Basin 27
Table 3-4: Soil Units and Characteristics 30
Table 3-5: Vegetation Communities 31
Table 3-6: Project Area Locations Related to T&E Plant Species Habitats 36
Table 3-7: USFWS BCC Region 16 and PIF Priority Species 38
Table 4-1: Estimated Emissions resulting from the Proposed Wells 45
Table 4-2: Comparison of Uncontrolled to Controlled Production Emissions-Total Reduction 46
Table 4-3: Comparison of Alternative A Production Emissions to Estimated 2012 WRAP Phase III Emissions 47
Table 4-4: Long-term Impacts to AUMs in the WHBPA 51
Table 4-5: Acres of Proposed Disturbance within T&E Species Habitats 52
Table 4-6: Cumulative Surface Disturbance within the WHBPA 65
Table 4-7: Reasonable Foreseeable Surface Disturbance within the Kings Canyon-Green River Watershed East of the Green River 66
Table 4-8: Cumulative Surface Disturbance within the Kings Canyon-Green River Watershed East of the Green River 67
Table 4-9: Reasonable Foreseeable Surface Disturbance within the Wild Horse Bench Allotment 69
Table 4-10: Cumulative Surface Disturbance within the Wild Horse Bench Allotment 69
Table 5-1: List of Persons, Agencies, and Organizations Consulted 77

APPENDICES

Appendix A: Interdisciplinary Team Checklist

Appendix B: Maps

Map 1: Wild Horse Bench Infill Project Area
Map 2: Project Area Soil Types
Map 3: Project Area Vegetation Communities
Map 4: Protected Plant Species Habitat
Map 5: CIA for Soil Types
Map 6: CIA for Vegetation Communities
Map 7: Well Locations in CIA for Physical Resources

Appendix C: Biological Information

Table C-1: Threatened, Endangered, Proposed and Candidate Species and BLM Utah Sensitive Species that Potentially Occur in Uintah County

Table C-2: BCC (Region 16) and PIF Priority Migratory Bird Species

Nesting Periods and Recommended Buffers for Raptors in Utah

Conservation Measures for Clay Reed-Mustard and Uinta Basin Hookless Cactus

Appendix D: Reclamation Plan for Uintah Basin Operations

Appendix E: Post-construction Stormwater Plan

Appendix F: Responses to Public Comments

1.0 PURPOSE AND NEED

1.1 Introduction

Koch Exploration Company, LLC (Operator) has proposed to drill and produce up to 135 wells on up to 37 existing well pads to develop its underlying federal oil and gas leases in the Wild Horse Bench area of Uintah County, Utah. Approximately 14.4 miles of pipelines would be upgraded to accommodate the anticipated future production requirements. The Vernal Field Office (FO) manages the Bureau of Land Management (BLM) surface lands and federal mineral estate in the project area. The BLM and State of Utah, have authority over various aspects of oil and gas development in the project area.

This Environmental Assessment (EA) assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act (NEPA) and in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" is defined by NEPA and is found in regulation 40 Code of Federal Regulation (CFR) 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI). If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a Decision Record (DR) may be signed for the EA approving the selected alternative.

This EA is a conceptual analysis of potential impacts that could result from the implementation of the Proposed Action or alternative to the Proposed Action. Although the Operator would use existing well pads, the exact number of wells that may be drilled from a well pad, locations of wells within a pad, and the acreage needed to expand a particular existing well pad have not been determined. The Operator has not submitted Applications for Permit to Drill (APD). Therefore, this EA considers and analyzes potential impacts to resources within the entire Wild Horse Bench 1,840-acre project area (WHBPA) as they relate to the existing well pads and pipeline corridors. Additional site-specific environmental documentation would be required prior to approval of an APD.

1.2 Background

On January 17, 2013, the BLM issued a FONSI for an EA for the Operator's North Alger project, DOI-BLM-UT-G010-2012-0112, which involved drilling 124 wells on 19 new pads west of the WHBPA. The North Alger project area overlaps 1,440 acres of the WHBPA. The area of overlap contains existing well pads. Since the approval of that EA in January 2013, the Operator determined all approved surface disturbance in the North Alger project area would result from the construction and operation of 19 new well pads outside of the WHBPA. Therefore, the Operator submitted the proposal under consideration by this EA to the BLM to expand the existing well pads in the WHBPA to drill directional wells.

The Operator's objectives for the project are to:

- Allow it to exercise its valid and existing lease rights by extracting the subsurface hydrocarbons;
- Optimize subsurface well spacing within the WHBPA;
- Substantiate the use of drilling and completion techniques used in oil and gas-producing areas surrounding the WHBPA;
- Provide opportunities for optimal drilling density and production from tight gas sands; and

- Contribute to the available domestic natural gas and oil supply.

1.3 Need for the Action

The BLM's issuance of federal leases conveyed to the Operator legal contractual and property rights to explore for and develop the underlying oil and natural gas resources (See Section 1.6). The Operator plans to file up to 135 APDs in the Vernal FO. The underlying need for the Proposed Action is for the BLM to respond to the operator's proposal to develop valid existing leases by drilling the proposed wells, and to produce federal minerals in the form of commercial quantities of gas and/or oil.

1.4 Purpose for the Proposed Action

The BLM is considering approval of private exploration and production from federal oil and gas leases as an integral part of BLM's leasing program. The authority for these actions falls under the Mineral Leasing Act of 1920 (MLA), as amended by the Federal Land Policy and Management Act of 1976 (FLPMA) and the Federal Onshore Oil and Gas Leasing Reform Act of 1987 (FOOGLRA). The BLM purpose in considering approval of the proposed wells is to be consistent with the lease rights granted to the Operator and to prevent unnecessary or undue degradation of the public lands avoid by reducing impacts to the affected resources.

1.5 Conformance with BLM Land Use Plans

The Proposed Action has been reviewed for conformance with the Vernal FO's Resource Management Plan (Approved RMP) (43 CFR 1610.5, BLM 1617.3). The Record of Decision (ROD) and Approved RMP (BLM, 2008) provide management direction for the public lands that include the project area. Oil and gas exploration and development are recognized as appropriate uses of public lands. Management decisions in the ROD and RMP provide for:

- MIN-2: Energy resource exploration and development surface-disturbing activities will be allowed...unless precluded by other program prescriptions. The stipulations identified for surface-disturbing activities in Appendix K will generally apply to these activities (page 96).
- MIN-8: The Approved RMP will provide for a variety of oil and gas operations and geophysical explorations... unless precluded by other program prescriptions. The stipulations identified for surface-disturbing activities in Appendix K will generally apply to these activities (page 97).

This proposal does not conflict with other decisions within the ROD. It is therefore in conformance with the RMP.

The Operator's oil and gas leases were issued prior to the issuance of the ROD and will continue to be managed under the stipulations in effect when the leases were issued; however, resources and resource values will be managed in consideration of protection measures included in the RMP. Environmental best management practices (BMPs) will be incorporated into permits and authorizations as necessary to mitigate impacts and possible conflicts with other uses.

1.6 Relationship to Statutes, Regulations, or Other Plans

This EA was prepared in accordance with the NEPA and with all applicable regulations subsequently passed, including Council of Environmental Quality regulations (40 CFR Parts 1500-1508) and Department of the Interior requirements (Department Manual 516, Environmental Quality). The Proposed Action is consistent with federal laws and citations. Key authorizations that may be applicable to this project are summarized in Table 1-1. The exploration for and production of domestic oil and gas reserves are consistent with the President's National Energy Policy, set forth in Executive Order (EO) 13212 (2001), and with the Energy Policy Act of 2005.

The MLA, FLPMA, and FOOGLRA provide the authority for the BLM oil and gas leasing program. FLPMA directs the BLM to manage federal lands under principles of multiple use and sustained yield. Multiple use is defined as the "management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people [§ 1702(c)]." Pursuant to FLPMA, the BLM has the authority to protect the environmental resources associated with federal oil and gas leases.

Table 1-1: Key Federal, State, and County Permits, Approvals, and Authorizing Actions

Issuing Agency	Name and Nature of Permit/Approval/Responsibility	Requirement
Federal Agency		
U.S. Department of the Interior – BLM	Permit to drill, deepen, or plug back on BLM-managed land or minerals (APD approval process).	MLA (30 United States [U.S.] Code [USC] 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 CFR 3162); FOOGLRA (30 USC § 181 et seq.); Onshore Orders; Gold Book.
	Onshore Oil and Gas Orders, Notices to Lessees, General Requirements for Oil and Gas Operations on Federal and Indian Lands.	43 CFR 3160, including Onshore Orders 1-9.
	Consistency with rangeland standards in grazing allotment.	BLM Rangeland Health Standards and Guidelines.
	Native American consultation regarding possibly affected traditional cultural properties.	BLM Native American Trust Resource policies as provided in H-8120-1 and Manual 8120; Department of the Interior Policy on Consultation with Indian Tribes (2011).
	Antiquities, cultural and historic resource permits to inventory, excavate, or remove such resources from federal lands; initiation of Section 106 consultation.	Antiquities Act of 1906, as amended (16 USC 431-433); Archaeological Resources Protection Act of 1979, as amended (16 USC Sections 470aa-47011); Preservation of American Antiquities, as amended (43 CFR 3); Section 106 of the National Historic Preservation Act (16 USC 470 et seq.); Executive Order 11593--Protection and enhancement of the cultural environment.
	Procedures relating to the discovery of human remains.	Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001, 43 CFR 10).
	Initiation of Section 7 consultation.	Section 7 of the Endangered Species Act, as amended (16 USC et seq.).
	Conservation of special status plant and wildlife species.	Special Status Species Management Manual 6840.
	Conservation of migratory birds.	Memorandum of Understanding (MOU) MOU-WO-230-2010-04; Instruction Memorandum 2008-050.
	Paleontological resource permits to inventory or collect data from federal lands.	FLPMA (43 USC §1701 et seq.); BLM 2007 General Procedural Guidance for Paleontological Resource Management; Paleontological Resources Preservation Act of 2009.

Issuing Agency	Name and Nature of Permit/Approval/Responsibility	Requirement
	Grant for right-of-way through federal lands for transportation of oil and gas (SF 299).	Mineral Leasing Act of 1920, as amended (30 USC 185.); 43 CFR 2880; FLPMA (43 USC 17611771); 43 CFR 2800; Hydraulic Considerations for Pipeline Crossings of Stream Channels.
	Management of noxious and invasive plant species.	Plant Protection Act of 2000 (PL 106-224; 7 USC 7701); Federal Noxious Weed Act of 1974 (USC 2801-2814); Executive Order (EO) 13112 (1999).
	Pesticide Use Permit and application record.	BLM authorization for herbicide applications on federal lands.
	Authorization for flaring and venting of natural gas on BLM-managed land or minerals	Mineral Leasing Act of 1920, as amended (30 USC 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 CFR 3162); NTL-4A.
	Mineral material sales permit to obtain construction materials from BLM-managed borrow pits.	Materials Act of 1947, as amended (30 USC 601 et seq.)
U.S. Fish and Wildlife Service	Coordination, consultation and impact review on federally listed threatened and endangered species.	Section 7 of the Endangered Species Act of 1973, as amended (16 USC. 1536).
	Consultation on protection of bald and golden eagles.	Bald and Golden Eagle Protection Act of 1940, as amended (16 USC 668-668d).
	Consultation on protection of migratory birds.	Migratory Bird Treaty Act of 1918, as amended (16 USC 703); Fish and Wildlife Coordination Act (16 USC 661-666c); MOU-WO-230-2010-04.
U.S. Army Corps of Engineers	Section 404 permit (nationwide and individual) controlling discharge of dredged or fill materials into waters of the U.S.	Clean Water Act of 1972 (33 USC 1344).
U.S. Environmental Protection Agency	Compliance with national ambient air quality standards.	Clean Air Act (42 USC 7401 et seq.).
	Issuance of emissions permits to construct and operate, including authorization for flaring or venting gas.	Clean Air Act, as amended (42 USC 7401 et seq.).
	Permits for discharge into waters of the U.S.; protection of drinking water supplies.	Federal; Water Pollution Control Act, as amended by the Clean Water Act (33 USC Section 1251-1376; PL 92-500, PL 95-217); Safe Water Drinking Act (42 USC Section 300F-300J-10, PL 93-523).
	Compliance with regulations to prevent and contain accidental releases.	Oil Pollution Act of 1990 (33 USC 2701 et seq.)
	Permits for produced water disposal.	Underground Injection Control (40 CFR 146.21-146.24).
U.S. Department of Transportation	Approval of construction and operations of natural gas pipelines.	Pipeline safety regulations (49 CFR 190-199).
State Agency		
Utah State Historic Preservation Office	Cultural resource protection, programmatic agreements, consultation.	Section 106 of National Historic Preservation Act of 1966, as amended (16 USC 470 et seq.); Advisory Council Regulations on the Protection of Historic and Cultural Properties, as amended (36 CFR Part 800).
Utah Division of Oil, Gas and Mining	Permit to drill, deepen, or plug back (APD process).	Utah Division of Oil, Gas, and Mining (UDOGM) Rules, R649-3-4 et seq.
Utah Division of Wildlife Resources	Management of big game, wildlife fish, wildlife habitat, and state-listed species.	UDWR Rules and Regulations, Rule 657 series; Utah Administrative Code (UAC) Title 23, Wildlife Resources of Utah (as adopted by the BLM).
Utah Division of Public Utilities	Approval of construction and operations of natural gas pipelines.	UAC Title 54 Chapter 13 Natural Gas Pipeline Safety; Utah Regulation R746-409-1 through R746-409-8.
Utah Department of Transportation	Permit issuance for oversize, overlength, and overweight loads.	Utah Regulations for Legal and Permitted Vehicles, Sections 400, 500 and 600.

Issuing Agency	Name and Nature of Permit/Approval/Responsibility	Requirement
Utah State Institutional Trust Lands Administration	Right-of-way grant/permit for construction and use activities on state/trust lands.	Right-of-Entry rules, Utah R850-41.
Utah Division of Water Rights	Approval to appropriate water.	UAC 73-3-2.
Utah Department of Environmental Quality	Control and management of noxious weeds.	Utah Noxious Weed Act, Rule 68-9.
Local Authorities		
Uintah County	Construction/use permits.	County Code and Zoning Resolution.
	Conditional use permits.	County Code and Zoning Resolution.
	Road use agreements/oversize trip permits.	County Code.
	County road crossing/access permits.	County Road Department.
	Noxious weed control.	County Code.

The Proposed Action is consistent with the Uintah County General Plan (Uintah County Plan) (UCPC, 2005). The Uintah County Plan, which was last amended in February 2012 to address land use issues, emphasizes multiple-use public land management practices, responsible use, and optimum utilization of public land resources. Multiple-use is defined in the plan as including, but not limited to, the following historically and traditionally practiced resource uses: grazing, recreation, timber, mining, oil and gas development, agriculture, wildlife habitat, and water resources. The county goals related to oil and gas development include continuing Uintah County's progressive, proactive approach to economic growth and development through natural resource exploration and development and encouraging responsible natural resource use and development. The Uintah County Plan supports the development of natural resources.

This EA incorporates the data and analyses contained in the documents listed below, which pertains to resources in the WHBPA. These documents are available at the Vernal FO:

- North Alger Project, DOI-BLM-UT-G010-2012-0112. Vernal Field Office. Vernal, Utah (BLM, 2013).
- Greater Natural Buttes (GNB) Final Environmental Impact Statement FES 12-8. UT-080-07-807. Vernal Field Office. Vernal, Utah (BLM, 2012), with respect to air quality.
- Gasco Uinta Basin Natural Gas Development Project Final Environmental Impact Statement FES2-5, UT-080-06-253. Vernal Field Office. Vernal, Utah (BLM, 2012a), with respect to air quality.

1.7 Identification of Issues

The BLM conducted internal reviews to identify environmental issues and concerns associated with the Proposed Action. A BLM interdisciplinary team (IDT) meeting was held on June 10, 2013, with resource specialists to identify issues and concerns and document them in Appendix A. The Vernal FO posted a notice of the Proposed Action on the Environmental Notification Bulletin Board (ENBB) on May 17, 2013, to inform the public regarding the project. No comments or inquiries were from the public in response to the ENBB posting.

The identified issues and concerns are summarized below:

Air Quality and Greenhouse Gas Emissions

- Potential effects on air quality from project operations.

Cultural Resources: Archaeological Resources

- Potential effects of construction to cultural resource sites.

Invasive Plants/Noxious Weeds, Soils, and Vegetation:

- Potential establishment or spread of non-native plant species.
- Potential effects to soils from surface disturbance.
- Potential effects to vegetation, including forest/woodland species, as a result of surface disturbance.

Livestock Grazing and Rangeland Health Standards

- Potential effects of project-related activities on the short-term and long-term viability of the livestock operation on the Wild Horse Bench Allotment.
- Potential effects to rangeland health in the Wild Horse Bench allotment.

Paleontology

- Potential effects of surface disturbance to fossil resources that may be present in the Uinta Formation, particularly in Sections 34 and 35.

Threatened, Endangered (T&E), Proposed, or Candidate Plants

- Potential effects to the threatened Uinta Basin hookless cactus (*Sclerocactus wetlandicus*) and threatened clay reed-mustard (*Schoenocrambe argillacea*) and their habitats in the WHBPA.

Water: Surface Water Quality

- Alteration of water quality due to erosion of sediments during and following construction, particularly during flash floods.
- Potential effects to water quality from spills or leaks of hydrocarbons.

Wild Horses

- Potential effects to forage, soils, and water resources that may result in harm to wild horses in the Hill Creek Herd Area.

Wildlife

- BLM Sensitive Wildlife - Potential effects to Conservation Agreement fish: bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis)*, and roundtail chub (*Gila robusta*), from water depletion and habitat degradation.
- Migratory Birds - Potential effects to migratory birds during the nesting season.
- Non-U.S. Fish and Wildlife Service (USFWS) Designated Wildlife - Potential impacts to pronghorn (*Antilocapra americana*), American bison (*Bos bison*), and Rocky Mountain bighorn sheep (*Ovis canadensis*) from surface disturbance to habitat.
- Threatened, Endangered, or Candidate Animal Species - Potential impacts to endangered Colorado River fish: bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), razorback sucker (*Xyrauchen texanus*).

1.8 Issues Considered but Eliminated from Further Analysis

All issues considered are analyzed in the EA.

1.9 Summary

This chapter presents the purpose and need for the Proposed Action as well as the relevant issues; i.e., those elements or resources that could be affected by the implementation of the Proposed Action. The Proposed Action and one alternative are described in Chapter 2. A description of the affected environment is in Chapter 3. The potential environmental impacts or consequences resulting from the implementation of each alternative are analyzed in Chapter 4 for each of the identified issues.

2.0 DESCRIPTION OF ALTERNATIVES

2.1 Introduction

Chapter 2 includes the description of the Proposed Action (Alternative A) and the No Action Alternative (Alternative B). Because the Proposed Action incorporates BMPs identified by the BLM to minimize impacts to affected resources, no other action alternatives were considered for analysis. These BMPs include the use of shared well pads, directionally drilled wells, use of emissions control equipment, and incorporation of Gold Book procedures for construction, production, and maintenance operations.

2.2 Alternative A – Proposed Action

The Operator proposes to drill, complete, produce, and eventually decommission 135 oil and gas wells to the Green River, Wasatch, and/or Mesaverde formations to develop potentially productive natural gas or oil reservoirs at depths ranging from 8,000 to 11,000 feet. Although actual operations are subject to change as conditions warrant, the Operator's plan is to drill approximately 2 to 4 wells per month over three years. The wells would be drilled on expansions of up to 37 existing well pads, all of which currently contain an active well. The Operator anticipates drilling from 1 to 16 additional vertical or directional wells on a well pad; however, the number of wells that would actually be drilled on a pad would be determined from the results of initial production. The productive life of a successful well is estimated to be 40 years. Approximately 14.4 miles of existing surface-laid pipelines would be upgraded to transport anticipated production volumes. Existing access roads would be used. Upgrades to access roads would not be needed.

All operations would be conducted in compliance with Federal Oil and Gas Onshore Orders, Utah Division of Oil, Gas, and Mining (UDOGM) rules and regulations, and applicable local rules and regulations. Descriptions of the project location, lease stipulations, and project operations are contained in the following sections.

2.2.1 Location, Access, and Lease Stipulations

2.2.1.1 Location and Access

The WHBPA consists of approximately 1,840 acres located in T10S-R19E, Salt Lake Meridian. It is located approximately 40 miles southwest of Vernal and 13 miles south-southwest of Ouray in Uintah County, Utah. The well locations would be reached by traveling west from Vernal on U.S. Highway 40,

south on State Highway 88, south on the Seep Ridge Road and southwest on a network of other roads to Wild Horse Bench west of Hill Creek and finally to the existing well pad access roads. The locations of the existing well pads, roads, and pipelines within the WHBPA are shown on Map 1.

Table 2-1: Location of WHBPA in T10S-R19E

Section	Portion of Section in WHBPA
22	SESE
23	SWSW
26	W/2
27	E/2
34	E ¾
35	All

2.2.1.2 Lease Stipulations

Most leases within the WHBPA were issued before 1985 and contain standard lease terms and conditions. The Operator is responsible for ensuring that applicable lease stipulations are followed during well development. Leases are available for review at the BLM Vernal FO and the Utah State BLM Office.

2.2.2 Well Development

2.2.2.1 Construction Operations

The expansion of existing well pads would conform to standards described in the BLM/Forest Service publication *Surface Operating Standards for Oil and Gas Exploration and Development, 4th Edition* (Oil & Gas Gold Book) (2007). The Operator and the BLM would schedule onsite inspections prior to construction operations. The objective of the onsite inspection would be to review the locations of the well pad, access road route, pipeline route, and topsoil/subsoil stockpiles in consideration of topography, natural drainage and erosion control, flora, fauna, cultural resources, paleontological resources, and other surface considerations. Site-specific BMPs would be developed at this time.

The proposed 135 wells would be drilled from up to 37 existing well pads. No new access roads would be constructed. Surface disturbing activities would occur only after approval of an APD is obtained from the BLM and UDOGM. Construction operations would generally occur during daylight hours only. Infrequent circumstances may require construction to occur outside of daylight hours. Suitable soil would be removed, segregated, and stockpiled for subsequent use in reclamation operations. Suitable soils are those soils that would facilitate reclamation. Suitable soil would be stored in piles around the perimeter of a well pad for use during reclamation activities.

Well pads would be expanded prior to drilling operations and would be sized to accommodate the additional facilities needed for production operations on multi-well pads after initial reclamation. The orientation of a well pad expansion would be chosen to balance cut and fill to the maximum extent possible and minimize the size of the location footprint. Construction practices may include blasting or ripping near-surface bedrock to achieve a level pad surface or construct a temporary reserve pit; however, the Operator would evaluate the use of a closed loop drilling system on a case-by-case basis (See Section 2.2.2.2). A reserve pit would be constructed to prevent leaks or accidental discharges. One reserve pit

would be used for all wells drilled on a pad. A 6 to 8-foot wide cellar would also typically be constructed to allow access to casing heads.

2.2.2.2 Drilling, Completion, and Testing Operations

Drilling Operations. Drilling operations would consist of drilling the surface hole, running and cementing surface casing, drilling the production hole, and running and cementing production casing. The Operator plans to use two drill rigs to drill the proposed wells. Approximately five trailers and other drilling equipment would be temporarily installed on a well pad for use by the drilling crews, mudlogger, and other personnel.

Conductor pipe would be set at a surface hole location, and a conventional, mechanically-powered mobile drilling rig would be transported to the well site and erected on the well pad. During drilling operations, a blowout preventer would be installed on the surface casing to provide protection against uncontrolled entry of reservoir fluids into the well bore, should reservoir pressures exceed the hydrostatic pressure of the well bore fluid. In addition, a flow control manifold consisting of manual and hydraulically operated valves would be installed.

Drilling fluids would consist of a water/gel mixture, with water being the main constituent. In order to achieve borehole stability and minimize possible damage to the gas-producing formations, a potassium chloride substitute and commercial clay stabilizer may be added to the drilling fluid. Drilling fluids and cuttings would be contained entirely within the reserve pit. After drilling operations are finished for a particular well, the liquid contents of the drilling mud may be used for drilling other wells where practical. Trucks would transport the used drilling fluid between well pads. No hazardous substances would be placed in the reserve pit. Cuttings would be mixed with spoils and left in the reserve pit to dry after drilling is finished on a pad.

A closed loop drilling system may be used if the Operator determines that maintaining a reserve pit is impractical. For example, the use of a closed loop system may be considered if an additional well(s) were to be drilled on a pad at a later date. In a closed loop drilling system, all drilling fluids would be contained entirely within temporary aboveground tanks. Drill cuttings would be separated from the drilling mud and then deposited in a steel catch tank. As drilling continues, the cuttings would be removed from the tank to a cuttings pile on the well pad. Cuttings from a closed loop system would be spread on the well pad and/or access road after drilling is complete.

If open hole well logs are run and an evaluation concludes that sufficient gas is present and recoverable, steel production casing would be run and cemented in place. The casing and cementing program would be designed to isolate and protect the shallower formations encountered in the well bore and to prevent pressure communication or fluid migration between zones. In addition, the cement would protect the well by preventing formation pressure from damaging the casing and retarding corrosion by minimizing contact between the casing and formation fluids. The types of casing used and the depths to which it is set would depend upon the physical characteristics of the formations that are drilled. Surface casing would be installed to protect near-surface aquifers. Intermediate and/or production casing would subsequently be run to attain total depth. All casing would be new or reconditioned and tested.

After production casing has been cemented in place, the drilling rig would be dismantled and demobilized from the location, and a completion rig would be moved in. A cement bond log would be run subsequent to setting and cementing the production casing. Additional evaluation logs may also be run.

Completion Operations. The completion of a well would generally consist of perforating the production casing, stimulating the formation(s) utilizing hydraulic fracturing technology, flowback of fracturing fluids, flow testing to determine post-fracture productivity, and installation of production equipment. The Operator plans to use one completion crew.

The fracturing fluid would consist of fresh water and sand augmented with gels and other chemical additives. The fluid would be pumped down the well bore through the perforations in the casing and into the formation. Sufficient rate and pressure would be reached to induce fractures in the target formation. Fracture proppants, such as sand, would provide the bridging for increased permeability necessary for productivity improvement. Diesel would not be used for completion operations.

Testing Operations. Post stimulation flow tests allow for recovery of stimulation fluids and evaluation of well productivity. Flow testing duration would vary depending on individual well performance but typically would be conducted only long enough for fluid rates to drop to a level that permanent production equipment can safely process. During flow testing, most wells may initially produce large volumes of fluids. The primary constituent of the fluids is water. Small volumes of natural gas and condensate may also be produced. Portable and/or permanent production equipment would be utilized to separate gas from the flowback stream, allowing recovered fluids to be directed to storage tanks and gas to a sales outlet or to a flare. Following the initial flow period, if permanent production equipment has yet to be installed, the well would be shut in until the installation of permanent production equipment.

Containment and immediate sale of natural gas may not always be practical. If necessary, temporary venting or flaring of gas would be performed at a distance from the wellhead and surface equipment to ensure personnel safety. Flaring would be facilitated through the use of vertical flare stacks or authorized temporary surface pits designed specifically for that purpose.

If the production stream does not initially contain natural gas, the fluids would be routed directly to temporary tanks on the well pad rather than through a separator. Fluids recovered during flowback operations would be transported from the storage tanks to an approved disposal facility. Condensate would be retained in tanks and ultimately sold.

2.2.2.3 Materials Management during Well Development

Water Use. Each well would require approximately 10,000 barrels of fresh water for drilling operations and 10,000 barrels for completion operations. Approximately 348 acre-feet of water would be needed to drill and complete 135 wells over a three-year period. Water use for drilling and completion operations would be transported to well pads via licensed truck. Fresh water used for drilling and completion purposes would be obtained from the sources listed in Table 2-2.

Table 2-2: Water Sources

Permittee	Water Right Number	Source	Priority Date	New or Historic Depletion	Proof Date	Location
Deseret Generation and Transmission Cooperative (Bonanza power plant)	49-225	Green River	8/31/59	Historic	01/16/1997	Sec. 1, T6S-R22E; Sec. 6, T6S-R23E
Nile Chapman	49-2231	Well	6/13/06	New	Not available	Sec. 33, T8S-R20E
A-1 Tank Rental & Brine Service	43-8496	Well	8/17/79	Historic	06/28/1982	Sec. 32, T4S-R3E (USBM)
R. N. Industries	49-1645	Well	4/10/00	New	Not available	Sec. 5, T9S-R22E

Source: Utah Division of Water Rights, 2011

Materials Used for Well Development. A variety of chemicals, including lubricants, paints, and additives would be used to drill and produce a well. Some of these chemicals can contain constituents that are hazardous. The transport, use, storage and handling of hazardous materials would be performed in accordance with all applicable federal, state, and local regulations. Transportation of the materials to the well location would be regulated by the Department of Transportation (DOT) under 49 CFR, Parts 171–180. DOT regulations pertain to the packing, container handling, labeling, vehicle placarding, and other safety aspects associated with transportation of hazardous materials. Materials used in the development or operation of wells would be kept in limited quantities on well sites and at the production facilities for short periods of time. They would not be stored at well pads.

Chemicals meeting the criteria for being an acutely hazardous material/substance or meeting the quantities criteria per BLM Instruction Memorandum (IM) No. 93-344 would not be used. Chemicals subject to reporting under Title III of the Superfund Amendments and Reauthorization Act of 1986 in quantities of 10,000 pounds or more would not be used, produced, stored, transported, or disposed of annually during the drilling, completion, or operation of a well. In addition, no extremely hazardous substance, as defined in 40 CFR 355, in threshold planning quantities, would be used, produced, stored, transported, or disposed of while producing any well.

Waste Management. Hazardous waste would not be generated in association with drilling the proposed wells. Most wastes that would result from drilling and operating the proposed wells are excluded from regulation by the Resource Conservation and Recovery Act under the exploration and production exemption in Subtitle C [40 CFR 261.4(b)(5)] and are considered solid wastes. Such wastes include those generated at the well head and through the production stream. Exempt wastes include produced water, production fluids such as drilling mud or well stimulation flow-back fluids, and soils affected by spills of these fluids.

The Operator would develop and maintain Spill Prevention Control and Countermeasure Plans (SPCCPs) for all WHBPA wells. Accidental spills of oil, produced water, or other produced fluids would be cleaned up and disposed of in accordance with appropriate regulations and the SPCCP. An accidental leak or spill in excess of the reportable quantity established by 40 CFR Part 117.3 would be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act, Section 102(b).

2.2.2.4 Personnel Requirements and Schedule

Construction, drilling, completion, and maintenance operations personnel would commute from the Vernal area daily during the estimated 3-year drilling period. Six to 8 men would comprise the construction crew. Eight to 20 men would comprise the drilling crew. Four to 30 men would be needed to perform completion operations. An existing well pad would be expanded within 5 to 7 days. Approximately 14 days would be needed to drill a well to total depth. Approximately 5 to 7 days would typically be needed to complete each well.

2.2.3 Production and Maintenance Operations

2.2.3.1 Well Pad Facilities and Maintenance

Well Pad Facilities. Well production facilities would be installed on a well pad after a successful completion. Facilities on a well pad would include wellhead valves and piping, a gas pipeline, fluid storage tanks, and combination separator/dehydrator/meter runs that would be housed in buildings. Each well would require the use of one separator, one dehydrator, and one (approximate) 300-barrel tank for storing condensate. Distinct separators and dehydrators would be needed for each well to retain separation of the production streams prior to measurement. All gas would be measured electronically, and telemetry equipment would be used. Condensate would be contained in tanks on the well pads and transported by truck from the locations.

Produced water would be confined to a storage tank prior to being transported by truck to one or more approved produced water disposal wells or to commercially-owned evaporation ponds. Produced water from all wells on a pad may be stored in a single tank, depending on the quantities produced. Additional water storage tanks would be installed on a pad if needed.

All condensate and water tanks would be surrounded by a berm of sufficient capacity to contain 110 percent of the storage capacity of the largest tank in the battery. The Operator would continually maintain the integrity of the berm. Production pits would not be used.

Plunger lift equipment would typically be installed to provide artificial lift when production volumes drop to a level that prevents efficient removal of liquids from the well bore using reservoir energy alone. Methanol tanks and pumps may be required on some well pads.

All permanent structures (on site six months or longer) constructed or installed would be painted a flat, non-reflective, earth-tone color as specified by the BLM Authorized Officer (AO). All facilities requiring paint would be painted within six months of installation.

Maintenance. Producing wells would typically be visited daily by a pumper, but possibly less frequently, depending upon well performance and maintenance requirements. Vehicle travel would be restricted to the running surface of a road. Telemetry would be installed to reduce the need for daily visits. Maintenance on access roads would be the Operator's responsibility and performed as needed to ensure safe conditions. The Operator would perform dust abatement measures with water when conditions warrant.

The Operator would control invasive and noxious weeds along road routes, pipelines, and well pads according to reclamation plan procedures. Invasive and noxious weeds would be identified by lists

obtained from the Vernal Field Office. The Operator would determine the presence of weeds by site evaluation and monitoring. The Operator would submit a Pesticide Use Proposal (PUP) to the BLM for its approval prior to the application of herbicides. The Operator would follow guidance contained in the ROD for the BLM's "*Vegetation Treatments Using Herbicides*" (BLM, 2007).

2.2.3.2 Pipelines

As needed, the existing surface-laid gathering lines and lateral lines would be replaced with larger diameter pipe to transport the anticipated increased production volumes. The larger diameter pipe would be placed on the surface within the existing approved pipeline corridor. Pipe diameters would range from 3 to 10 inches. The Operator may upsize any or all the lines in a corridor; however, the determination of what pipelines would be upsized would be based on production. Construction operations within a particular corridor would be made at one time; i.e., the Operator would not upsize one pipeline in a corridor, then go back and upsize another line(s) at a later date. Production from each well would be measured individually prior to being consolidated for transport into a single gathering line leaving a well pad. The lateral lines would transport the gas to existing centralized compression and treatment facilities. Well site compression would not be used.

2.2.3.3 Workovers

A workover operation may be periodically required to sustain production and keep a well operating as efficiently as possible. Workovers can include repairs to the well bore equipment (casing, tubing, pump, etc.), the well head, or the producing formation itself. Up to 200 thousand cubic feet of gas per event may be flared during workover events. A workover would use a rig similar to a completion rig. Workover operations would not require additional surface disturbance.

Workover operations generally occur only during daylight hours. A typical workover would require approximately three days; however, length of workover operations can range from 1 to 10 days, with a small number requiring more than 10 days. Workover operations may require 4 to 30 men, with an average manpower requirement of six persons.

2.2.4 Reclamation

As per BLM IM UTG000-2011-003, reclamation would be conducted in accordance with the Green River District Reclamation Guidelines and applicable conditions of approval (COA). The Operator has developed a reclamation plan specifically for the Green River District that outlines the goals and procedures for initial and final reclamation activities specifically developed for the WHBPA. The reclamation plan describes short-term, long-term, and final reclamation goals that address stabilization, revegetation, and return of the land to a self-sustaining and productive condition (See Appendix D). Seed mixes would be determined in cooperation with the AO and in consideration of a reference site vegetation community. They would contain native plant species designed to stabilize soils, restore production, and provide wildlife habitat.

2.2.4.1 Initial Reclamation

Initial reclamation would be performed on the portion of the well pads and pipeline routes not needed for daily production operations and would occur as soon as possible after all wells on pad are put on

production. The plastic reserve pit liners would be cut off at the mud line and disposed of at an approved disposal facility. The remaining liner would be left in the reserve pit, which would be backfilled with stockpiled subsoil and rock and re-contoured. The Operator would assess the well pad area for slope stability and erosion features and would determine if additional dirt work or soil stabilization measures would be needed prior to seeding. Stockpiled topsoil from construction would be spread over areas to be reclaimed and broadcast seeded with the prescribed seed mixture. The seeded area would be walked down and compacted. During initial reclamation, seeding would also be performed along a pipeline route that has been disturbed from pipe replacement.

2.2.4.2 Final Reclamation and Abandonment

As part of plug and abandonment operations, the Operator would cut off the well casing at the base of the cellar or three feet below the final graded ground level, whichever is deeper, and cap the casing with a metal plate with a minimum thickness of 0.25 inch. The cap would be welded in place with the well name and location engraved on the top. The cap would be constructed with a weep hole.

Final reclamation operations would be performed on a well pad, access road, and pipeline route after it is no longer needed for production operations. All surface equipment, including pipelines, would be removed from the site. The surface would be re-contoured to its original appearance to the extent possible. Before reseeding, topsoil would be distributed above the restored surface to blend the appearance of the site with its natural surroundings. Reclamation activities would be considered complete when vegetation has reached a minimum of 75 percent of background vegetation (undisturbed areas), or as approved by the AO.

2.2.5 Surface Disturbance Summary

Surface disturbance would result from the expansion of existing well pads and replacement of aboveground pipelines. Initial well pad disturbance includes the surface needed for construction of a reserve pit, placement of stock piles, temporary use by trailers and vehicles, and the area needed by a drilling rig. Short-term surface disturbance would be reduced after initial reclamation reestablishes desired vegetation, approximately five years. Residual or long-term disturbance consists of the bare ground remaining on a well pad or access road after successful initial reclamation. It consists of the amount of surface needed to conduct production operations for the lives of the wells. Surface disturbance was estimated using the following assumptions:

Well pads:

- Each of the 37 existing well pads currently occupies approximately 1.8 acres;
- Existing well pads would be expanded to approximately 4.0 acres to accommodate drilling operations;
- Average long-term disturbance of the expanded well pad would consist of 3.5 acres for each well pad after initial reclamation.

Pipelines:

- Pipeline replacement with upgrades would require a construction width of 40 feet.
- Pipelines would be installed within the 14.4 miles of existing pipeline corridors.

- No long-term disturbance would result from surface pipelines after initial reclamation.

The quantification of surface disturbance displayed in Table 2-3 displays the amount of new surface disturbance that would result on an average basis per well pad.

Table 2-3: Surface Disturbance Summary – Average per Well

Type of Disturbance	Average Size of Disturbance
Average Existing Well Pad Size	1.8 acres
Average Well Pad Expansion	2.2 acres
Average Size of Expanded Well Pad	4.0 acres
Interim Reclamation, Each Well Pad	0.5 acre
Average Size Each Well Pad after Interim Reclamation	3.5 acres
Average Additional Long-term Well Pad Disturbance	1.7 acres
Average Pipeline Construction Size	1.9 acres

The quantification of surface disturbance displayed in Table 2-4 displays the amount of new surface disturbance that would result from well pad expansion and the amount of surface needed to replace the pipelines.

Table 2-4: Project Surface Disturbance Summary (acres)

Type of Disturbance	Initial Surface Disturbance	Initial Reclamation	Long-Term Disturbance
Well Pad Expansion	81.4	18.5	62.9
Pipeline Replacement	69.8	69.8	0.0
Total Disturbance	151.2	88.3	62.9

Long-term surface disturbance would result from expansion of well pads to accommodate multiple wells Initial disturbance would consist of 151.2 acres. Long-term disturbance would be reduced to 62.9 acres after initial reclamation operations reduce the sizes of the expanded well pads and vegetation is restored along the pipeline routes.

2.2.6 Applicant-Committed Design Features

As an integral part of its proposal, the Operator commits to performing all actions described in this section.

2.2.6.1 General

According to BLM IM No. 2004-194, BMPs to be considered in nearly all circumstances include the following:

- Initial reclamation of well locations and access roads soon after the well is put into production;
- Painting of all new facilities a color which best allows the facility to blend with the background, typically a vegetated background;

- Final reclamation re-contouring of all disturbed areas, including access roads, to the original contour or a contour that blends with the surrounding topography.

Measures described in the Proposed Action include the following commitments:

- Expansion of well sites would conform to standards described in the BLM/Forest Service publication *Surface Operating Standards for Oil and Gas Exploration and Development, 4th Edition* (Oil & Gas Gold Book).

In addition to these and other measures described in the Proposed Action, the following Operator-committed design features would apply to project development unless the measures are superseded or modified by COAs. The Operator would also adhere to all procedures contained in its APD submissions.

2.2.6.2 Air Quality

- The Operator will utilize drilling rig engines of Tier 2 quality or better.
- Emissions from completion operations (hydraulic fracturing) will be mitigated as required by New Source Performance Standard (NSPS) Subpart OOOO (EPA, 2011). NSPS Subpart OOOO requires that wells completed prior to 1/1/2015 direct flowback emissions to a flowline or combustion device. Wells completed on or after 1/1/2015 must route recovered liquids into one or more storage vessels or re-inject the recovered liquids into the well or another well, and route the recovered gas into a gas flow line or collection system, re-inject the recovered gas into the well or another well, use recovered gas as an on-site fuel source, or use the recovered gas for another useful purpose that a purchased fuel or raw material would serve, with no direct release to the atmosphere (EPA, 2011).
- The Operator will install dehydrator volatile organic compound (VOC) emission controls to attain +90 percent efficiency.
- If new and replacement internal combustion gas field engines are needed, the Operator will comply with RMP NOx emissions criteria. If an engine is less than or equal to 300 design-rated horsepower, it will not emit more than 2 grams of NOx per horsepower-hour. If an engine is greater than 300 design-rated horsepower, it will not emit more than 1.0 gram of NOx per horsepower-hour.
- The Operator will install 95 percent efficient VOC emission controls on production tanks with the potential to emit more than 6 tons per year (TPY) VOCs, as required by NSPS Subpart OOOO (EPA, 2011).
- The Operator will utilize low-bleed (or equivalent device that does not exceed the U.S. Environmental Protection Agency (EPA) low-bleed emissions thresholds of 6 standard cubic feet per hour) pneumatic devices at all new and existing production facilities (EPA, 2011).
- The Operator will establish a thief hatch/Enardo inspection and replacement program to minimize tank losses.
- The Operator will utilize telemetry to minimize well visits.
- The Operator will install solar-powered chemical pumps on production facilities.
- The Operator will employ measures to mitigate any potential exceedance of the 1-hour NO2 standard during drilling operations by employing effective public health buffer zones out to 200 meters (m) from the nearest emission source. Examples of an effective public health protection

buffer zone include the demarcation of a public access exclusion zone by signage at intervals of every 250 feet that is visible from a distance of 125 feet during daylight hours, and a physical buffer such as active surveillance to ensure the property is not accessible by the public during drilling operations.

Adaptive Management

BLM, in conjunction with the Utah Division of Air Quality and the Ute Tribe, is developing a basin-wide air quality management plan which will identify those emissions controls and management strategies that will be utilized to address winter ozone exceedences. Once this management plan is finalized and made public, all operations authorized under this action will be required to comply with the emissions controls and management strategies found in the plan. The measures to be considered could include, but would not be limited to, the following:

- Reducing the total number of drill rigs.
- Installing Tier 4 or better drill rig engines.
- Seasonally reducing or ceasing drilling during specified periods.
- Using only lower-emitting drill and completion rig engines during specified time periods.
- Using natural gas-fired drill and completion rig engines.
- Replacing internal combustion engines with gas turbines for natural gas compression.
- Using electric drill rig or compression engines.
- Centralizing gathering facilities.
- Limiting blowdowns or restricting them during specified periods.
- Installing plunger lift systems with smart automation.
- Employing a monthly Forward Looking Infrared, or FLIR, monitoring program to reduce VOCs.
- Enhancing a direct inspection and maintenance program.
- Employing tank load out vapor recovery.
- Employing enhanced VOC emission controls with 95 percent control efficiency on additional production equipment having a potential to emit greater than 5 tons per year.

In addition to the commitments discussed above, the Operator commits to complying with applicable air pollution control rules and regulations.

2.2.6.3 Cultural Resources

- Prior to any construction-related surface disturbance, all well pad sites and access roads will be examined by an archaeologist approved by the BLM to determine the presence of cultural resources. If any are found, recommendations will be made to avoid or recover such resources. The possible need for on-site monitoring will be addressed at the onsite inspection.
- If any historic or archaeological resources are found during operations, all operations that could further disturb such materials will be suspended, and the AO will be contacted for direction.

2.2.6.4 Livestock Grazing and Rangeland Health Standards

- If existing range improvements were to be damaged by project operations, the Operator will contact the AO immediately for direction.

- Stock ponds in the WHBPA would be avoided such that they would not be damaged by project operations. If existing stock ponds were to be functionally impaired by sedimentation resulting from project operations, the Operator will contact the AO immediately for direction and will take measures to restore the functionality of affected range improvements.

2.2.6.5 Paleontological Resources

- In sensitive fossil areas where bedrock is exposed at or near surface, a BLM-approved paleontologist will examine well pad sites, access roads, and pipelines for paleontological resources and make recommendations regarding the disposition of such resources. The possible need for monitoring will be addressed at the onsite inspection.
- If any paleontological resources are found during operations, all operations that could further disturb such materials will be suspended, and the AO will be contacted for direction.

2.2.6.6 Migratory Birds and Raptors

- Surveys for raptors and other migratory birds will be conducted as directed by the AO.
- Construction, drilling, and completion operations will be conducted in compliance with spatial offsets and timing limitations specified in Appendix A, Attachment 2, of the 2008 RMP (BLM, 2008) unless waived by the AO.

2.2.6.7 Soils and Water

- The Operator will comply with current RMP stipulations regarding fragile soils and slopes.
- Diversion dikes or terraces, straw bales, silt fences, weed-free mulch, soil stabilizers, or sediment basins would be utilized as determined appropriate based on the pad onsite inspection.
- Stormwater flow and sedimentation will be controlled with the implementation of Gold Book BMPs and the Operator's Post-construction Stormwater plan (SWPPP) (See Appendix E).

2.2.6.8 Threatened, Endangered, Candidate, and Proposed Species

- The USFWS conservation measures for the clay reed-mustard and Uinta Basin hookless cactus will be followed (USFWS, 2012; USFWS, 2011). Site-specific inventories will be performed by a BLM-approved biologist under the direction of the AO prior to an onsite inspection.
- If an individual of a threatened, endangered, candidate, or proposed wildlife or plant species or its habitat is known to exist in the project area, or would be affected by proposed operations, the Operator will consult with the AO prior to initiating surface disturbance activities to determine appropriate procedures.
- If necessary, avoidance and/or mitigation measures will be implemented, as appropriate. As determined by the AO at the onsite inspection, site-specific mitigation measures intended to protect the clay-reed mustard or Uinta Basin hookless cactus may include strategic placement of roads and facilities and/or installation of silt fencing, straw bales, and straw batting to protect individuals or habitat.
- If water were to be drawn from the White or Green Rivers, the conservation measures for endangered fish will be followed:

a. The best method to avoid entrainment is to pump from an off-channel location – one that does not connect to the river during high spring flows. An infiltration gallery constructed in a USFWS-approved location is best.
b. If the pump head is located in the river channel the following stipulations apply:
   i. Do not situate the pump in a low-flow or no-flow area as these habitats tend to concentrate larval fishes.
   ii. Limit the amount of pumping, to the greatest extent possible during that period of the year when larval fish may be present (see above).
   iii. Limit the amount of pumping, to the greatest extent possible, during the midnight hours (10pm to 2 am), as larval drift studies indicate that this is a period of greatest daily activity. Dusk is the preferred pumping time, as larval drift abundance is lowest during this time.
c. Screen all pump intakes with 3/32" mesh material.
d. Approach velocities for intake structures should follow the National Marine Fisheries Service's document "Fish Screening Criteria for *Anadromous Salmonids*". For projects with an in-stream intake that operate in stream reaches where larval fish may be present, the approach velocity should not exceed 0.33 feet per second (ft/s).
e. Report any fish impinged on the intake screen or entrained into irrigation canals to the Service (801.975.3330) or the Utah Division of Wildlife Resources:

   Northeastern Region
   152 East 100 North
   Vernal, UT 84078
   Phone: (435) 781-9453

2.2.6.9 Vegetation

- The Operator would implement site-specific reclamation activities based on a Reclamation Plan (Appendix D) and the Green River District Reclamation Guidelines
- The Operator would initiate an active weed management program in its WHBPA leases in the spring of 2012. The Operator would use herbicides to control infestations of weeds, using procedures described in a weed control plan.
- All herbicide treatments will follow the guidance of the ROD for the BLM Vegetation Treatments Using Herbicides (BLM, 2007) and any future local Weed Management direction received from the FO to ensure the use of safeguards with respect to approved chemicals, application rates, and BMPs.
- Weed-free mulching or other means, as determined appropriate during the onsite or reclamation inspections, will be used.

2.3 Alternative B – No Action

Implementation of the No Action Alternative would deny the proposed construction and operation of 135 federal wells and associated facilities in the project area. Surface disturbance from Alternative A would not occur and the current condition of the environment (See Chapter 3) would likely persist. Approximately 66.6 acres are being used for well pad production facilities in the WHBPA and would

continue to be used for the production of 37 oil and gas wells. Future oil and gas activities may go forward in the vicinity of the WHBPA.

The No Action Alternative may not serve the purpose and need of the Proposed Action, given the Operator's contractual rights to develop its mineral leases and management guidance provided in the 2008 RMP.

2.4 Alternatives Considered, but Eliminated from Further Analysis

Identification of the issues did not suggest the consideration of additional alternatives that would mitigate impacts to the environment or resolve conflicts.

2.5 Summary Comparison of Environmental Impacts

Table 2-5 displays a quantitative comparison of the proposed new facilities among the alternatives. The quantitative comparison reflects the differences in the projected amounts of surface disturbance. A summary of the more substantial differences, as related to each alternative, is included in the column labeled "Comments." Descriptions of the impacts to specific environmental resources by alternative are discussed in detail in Chapter 4.

Table 2-5: Summary Comparison of the Alternatives

Project Component	Alternative A Proposed Action (acres)			Alternative B No Action (acres)		Comments
	Short-term Disturbance	Initial Reclamation	Long-term Disturbance	Short-term Disturbance	Long-term Disturbance	
Well Pad Expansion	81.4	18.5	62.9	0	0	Under Alternative A, 37 existing well pads would be expanded to hold 135 additional wells. 37 active wells on 37 well pads would continue to be produced under Alternative B. Other wells would likely be drilled on nearby non-federal and federal leases outside of the WHBPA.
Pipeline Upgrades / Replacement	69.8	69.8	0	0	0	Under Alternative A, existing aboveground pipelines would be replaced by greater diameter pipe to transport increased volumes of produced natural gas to existing gas processing facilities within 14.4 miles of existing pipeline corridors. Under Alternative B, existing aboveground pipelines would not be upgraded and replaced.
Total	151.2	88.3	62.9	0	0	Under the Alternative A, the amount of acreage initially disturbed would consist of 151.2 acres, most of which would result from expanding existing well pads. After initial reclamation is complete and vegetation reestablished, long-term surface disturbance would consist of 62.9 acres. Under Alternative B, the approximately 66.6 acres of bare ground required for production operations on 37 existing well pads would remain in use for the lives of the currently producing wells, approximately 40 years.

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter includes a description of the environmental resources that could be affected by the Proposed Action. Resources and resource values analyzed in this EA identified during scoping are listed in the IDT checklist, Appendix A. If a resource was not identified through scoping as potentially impacted by the proposed project, it was not brought forward for analysis.

3.2 General Setting

The WHBPA is located within the northern part of the Colorado Plateau physiographic province in the central portion of the Uinta Basin. The topography is characterized by low-gradient slopes ranging from approximately 2 to 5 percent and elevations ranging from 5,280 feet to 5,470 feet. The ground surface is thinly covered with gray-brown soils and rocks derived from the siltstone, shale, and sandstone of the Uinta Formation. Low dipping exposed sedimentary rocks form ephemeral washes that drain to the north and west toward the Green River. Kings Canyon is a well-known ephemeral tributary to the Green River that is located approximately one mile west of the WHBPA.

The climate of the Uinta Basin is characteristic of a semi-arid continental steppe environment, exhibiting low relative humidity, high evaporation, cold winters, and hot summers. Rainfall occurs sporadically throughout the year but is highest during the months of September and October. In August 2013, the Uinta Basin was experiencing a persistent drought (NOAA, 2013). Prevailing winds originate from the west to west-northwest.

Table 3-1: Summary of Climate Data, Ouray, Utah

Climate Component	Average Values (1955-2005)
Temperature	Average annual maximum: 63.9°F Average annual minimum: 31.4°F
Precipitation	Average annual rainfall: 6.83" Average annual snowfall: 15.2"
Evaporation	Average: 40" annually [1]
Wind speed	Average: 4.8 mph, from the west

Source: Western Regional Climate Center, 2013; [1] Baker and Brendecke, 1983

Atmospheric dispersion is a measure of the atmosphere's capacity to diminish the concentration of pollutants. Atmospheric dispersion is related to prevailing wind speed and direction, atmospheric stability, and mixing heights. Warmer temperatures during daylight hours tend to facilitate atmospheric dispersion; however, calm periods and nighttime cooling enhance air stability and inhibit air pollutant transport and dilution. Temperature inversions are common during the winter months in the Uinta Basin in its lower elevations. Inversions can hinder air pollutant dispersion by preventing lower altitude air masses from mixing with higher altitude air masses. Although temperature inversions can occur during the summer, daytime ground level heating rapidly leads to inversion break-up.

The WHBPA is located in the Monument Butte-Red Wash area, which has been extensively developed for oil and gas production. The area north and east of the WHBPA exhibits an industrial character resulting from the construction of well pads on a 40-acre surface density. Similar well pad density has been approved for the North Alger area immediately to the west of the WHBPA. Drilling, as described in Alternative A, would reflect the level of development in more heavily drilled areas surrounding the WHBPA. In August 2013, the WHBPA contained 37 well pads (See Map 1), approximately 12.9 miles of roads, and approximately 14.4 miles of corridors containing aboveground pipelines. The WHBPA also contains opportunities for development of mineral resources other than oil and natural gas. Gilsonite veins are present within Section 34 and 35. Oil shale and tar sand may also be present. Other historic land use in the WHBPA consists of livestock grazing.

3.3 Resources Brought Forward for the Analysis

3.3.1 Air Quality and Greenhouse Gas Emissions

3.3.1.1 Air Quality

The National Ambient Air Quality Standards (NAAQS) set the absolute upper limits for criteria air pollutant concentrations. The purpose of these standards is to allow an adequate margin of safety for the protection of public health and welfare from adverse effects resulting from pollutants in the ambient air. Criteria pollutants include particulate matter (PM) of 10 or 2.5 microns (μm) in aerodynamic diameter or less (PM_{10} or $PM_{2.5}$), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and ozone (O_3). Ambient air quality in a given location is characterized by comparing the concentration of criteria pollutants in the atmosphere to the NAAQS. Areas where criteria pollutants are measured below the standards are called "attainment" areas. Prevention of Significant Deterioration (PSD) regulations limit emissions of pollutants from new major stationary sources in attainment areas. With a PSD area, specific increments, the amount of increased pollution allowable over existing conditions, exist for PM, NO_2, and SO_2. The increments vary depending upon the pollutant and classification of an area. Allowable increments vary by location across the state. Hazardous air pollutants (HAPs) are emissions that consist of 189 pollutants that are known or suspected to cause cancer or other serious health effects. Some examples of HAPs include benzene, toluene, ethylbenzene, n-hexane, and formaldehyde. Areas in Utah that meet the NAAQS are designated as either Class I or Class II areas. PSD Class I areas allow only a small increase in pollution levels. Class II areas are other areas where some additional incremental pollution growth could occur. The WHBPA is located in a PSD Class II area. The nearest Class I area to the proposed wells is Arches National Park, approximately 75 miles to the south. Dinosaur National Monument is a sensitive Class II area, located approximately 50 miles northeast of project area. Table 3-2 displays the NAAQS and background pollutant concentrations as measured by monitoring stations in the Uinta Basin and nearby regional stations.

Table 3-2: Regional Ambient Air Quality Values

Pollutant	Averaging Period	NAAQS [2]	Concentration	Year	Monitor Location
CO (μg/m³)	1-hour	40,000	4,351 [3]	2012	Uintah County, UT (Redwash)
	8-hour	10,000	1,717 [3]	2012	Uintah County, UT (Redwash)
NO_2 (μg/m³)	1-hour	188	26.0 [3]	2012	Uintah County, UT (Ouray)
	Annual	100	9.0 [3]	2012	Uintah County, UT (Ouray)
O_3 (ppb)	8-hour	75	116 [3]	2011	Uintah County, UT (Ouray)
			70 [2]	2012	
PM_{10} (μg/m³)	24-hour	150	28 [1]	2010	Uintah County, UT
$PM_{2.5}$ (μg/m³)	24-hour	35	17.0 [3]	2010	Uintah County, UT (Redwash)
	Annual	15	4.9 [3]	2012	Uintah County, UT (Redwash)
SO_2 (μg/m³)	1-hour	197	5.7 [3]	2012	Uintah County, UT (Redwash)
	3-hour	1,300	10.1 [1]	2009	Sweetwater County, WY
	24-hour	365	2.9 [3]	2012	Uintah County, UT (Redwash)
	Annual	80	0.8 [1]	2009	Sweetwater County, WY

Source: [1] BLM, 2012; [2] EPA, 2012; [3] EPA, 2013

Ozone is the primary pollutant of concern in the Uinta Basin. Ozone is not emitted directly into the air but results from complex chemical reactions in the atmosphere between volatile organic compounds (VOCs) and nitrogen oxides in the presence of sunlight. VOCs are not regulated as criteria pollutants; however, as precursors to ozone, they are regulated.

As shown in Table 3-2, the air monitoring background value for ground-level ozone is higher than the NAAQS. Ozone is a secondary pollutant that is formed by a photochemical reaction between NOX and VOCs in the presence of sunlight. Precursor sources of ozone include oil and gas development emissions, motor vehicle exhaust, industrial emissions, gasoline vapors, some tree and other plant species emissions, wood burning, chemical solvents, and other sources. Ozone is generally considered a summertime air pollutant; however, the exceedences in the Uinta Basin occur during the wintertime.

The chemical and physical properties leading to this winter ozone formation is not currently well understood. Apparently, high concentrations of ozone are being formed under a "cold pool" process whereby stagnate air conditions with very low mixing heights form under clear skies with snow-covered ground and abundant sunlight that, combined with area precursor emissions (NOX and VOCs), create intense episodes of ozone. This phenomenon has also been observed in similar types of locations in Wyoming. Winter ozone formation is a newly recognized issue, and the methods of analyzing and managing this problem are still in development. Based on the emission inventories developed for Uintah County, the most likely dominant source of ozone precursors in the Uinta Basin are oil and gas operations in the vicinity of the monitors. The monitors are located in remote areas where impacts from other human activities are unlikely to significantly contribute to this ozone formation. While ozone precursors can be

transported large distances, the meteorological conditions under which this cold pool ozone formation is occurring tends to preclude any significant transport. At the current time ozone exceedences in this area seem to be confined to the winter months during periods of intense surface inversions and low mixing heights (ENVIRON, 2013).

Active ozone monitoring in the Uinta Basin began in the summer of 2009. Annually since winter ozone has been studied through a multi-agency effort (Lyman and Shorthill, 2012; Martin et al., 2013). Monitoring sites throughout the basin have recorded numerous exceedences of the 8 hour ozone standard during the winter months (January through March). Key findings from these studies are summarized below:

1. Maximum 8-hour average ozone concentrations measured at Ouray, which typically has among the highest readings in the Basin, reached 142 ppb during the December 2012–March 2013 winter study, exceeding the EPA 8-hour standard (75 ppb) by 89 percent. Exceedances of the standard (i.e., a daily maximum 8-hour average in excess of 75 ppb) occurred at 17 of the 20 monitoring sites operating during the study. Monitors in the major Basin population centers exceeded the standard on a total of 22 days at Vernal and 29 days at Roosevelt during 2013 with all of the exceedances occurring between January 9th and March 6th. Note that the occurrence of an exceedance does not by itself constitute a violation of the EPA standard; a violation only occurs when the three year average of the annual fourth highest daily maximum 8-hour average is greater than 75 ppb. Exceedances occurred in the Basin during seven separate multi-day ozone episodes which were separated by periods of lower ozone levels coinciding with the passage of storm systems. These observations are in sharp contrast to conditions during the 2011-2012 winter study, when daytime 8-hour average ozone levels did not exceed 63 ppb.
2. Individual ozone episodes ranged from 3 to nearly 15 days in length, with ozone concentrations generally increasing from one day to the next during each episode, indicating a lack of ventilation.
3. Daytime ozone concentrations at locations close to but outside of the Uinta Basin, at the time of high surface ozone events inside the basin, ranged from 40 to 60 ppb. Ozone concentrations measured inside the Basin above the temperature inversion during these periods were also in the 40 to 60 ppb range. These facts, combined with observations of winds around the Basin, confirms that high surface ozone concentrations within the basin are not influenced to any significant extent by transport of ozone or precursors from outside of the Basin.
4. Days with high ozone in the Basin coincide with elevated levels of methane, volatile organic compounds and odd nitrogen species. Alkane hydrocarbons constitute the main fraction of identified VOC. VOC and NO_x are the primary chemical precursors of ozone. A review of all emissions sources within the Basin (based on WRAP Phase III and Utah Division of Air Quality [UDAQ] triennial inventories) indicates that activities associated with oil and gas exploration and production are the predominant sources of ozone precursors.
5. VOC concentrations in the Basin are extremely high during ozone episodes due to large amounts of VOC emissions and limited ventilation under a strong temperature inversion. Average VOC levels at Horsepool in 2013 were 1,684 ppbC (based on C2–C7 non-methane hydrocarbons) as compared to 232 ppbC in 2012 when inversions were not present and there was more mixing.

6. Vertical profiles show that the polluted air mass associated with ozone episodes is confined to a shallow boundary layer that varies in height from 70 – 400 m (230 – 1,300 ft) above ground level.

The National Park records ozone NAAQS exceedances in many of its National Parks, including Dinosaur National Monument. There were four monitored exceedances in Dinosaur National Monument during the months of April through September in 2012 (NPS, 2014). These exceedances, and summer ozone values in general in Dinosaur National Monument, were typical of ozone values monitored throughout the intermountain west, and followed regional patterns both in frequency and concentrations.

The National Park Service's Rocky Mountain Atmospheric Nitrogen and Sulfur Study (RoMANS) researched aerosol species concentrations as well as wet deposition (NPS, 2010). The western-most study plot was Dinosaur National Monument, which was modeled and monitored. Observations were run and compared to local and national averages using IMPROVE monitoring stations as assistance. IMPROVE monitoring stations track changes in visibility and determine causal mechanism for the visibility impairment in the National Parks and Wilderness Areas. Three gas-phase species (NH3, HNO3, and SO2) and three particle-phase species (NH4+, NO3-, and SO4-2) were compared, along with total reduced (N(-III) = NH3 + NH4+) and oxidized nitrogen (N(V) = HNO3 + NO3-) and total sulfur species (S = SO4 -2 + SO2). Seasonal means and performance statistics were computed for the modeled and measured concentrations for each species at each of the sites and for each study period.

The models typically under-estimated ammonia and nitrates, where the observed values were approximately two times larger during the springtime modeling. Sulfates and oxidized nitrogen were on the opposite end of this spectrum to a smaller degree however. Nitric Acid did show up much lower in observed averages compared to the modeled estimates (Malm and Collett, 2009a, Table 5.38, Vol 2, 5-193)

RoMANS precipitation chemistry shows a pH of 6.2 in springtime; ammonia, chlorine, nitrates, and sulfates were all moderately high in the precipitation composition (Malm and Collett, 2009, Table 3.4, RoMANS Vol 1, 3-11). Nitrogen deposition was a controlling influence in the Dinosaur National Monument region. Springtime concentrations in nitrates were highest in this region and decrease to the east of Dinosaur National Monument. It was noted that aerosols were found to be an issue in early springtime when air quality can be worsened at times due to inversions capping pollution and increasing the particulate matter in a stable atmosphere.

The monitor data acquired near Vernal, Utah, indicate that during winter inversions, $PM_{2.5}$ concentrations were at or above the NAAQS standard levels. The sources of elevated $PM_{2.5}$ concentrations have yet to be specifically identified (UDAQ, 2013). Monitoring for $PM_{2.5}$ is currently ongoing.

Existing point and area sources of air pollution within the Uinta Basin include:

- Operation of drilling and completion rig engines, producing NO_X, CO, and SO_2;
- Exhaust emissions from natural gas fired compressor engines used in transportation of natural gas in pipelines, producing CO, NO_x, $PM_{2.5}$, and HAPs;
- Natural gas dehydrator still-vent emissions of CO, NO_x, $PM_{2.5}$, and HAPs;

- Working and breathing losses and flashing emissions from condensate tanks, resulting in methane (CH_4) emissions;
- Gasoline and diesel-fueled vehicle tailpipe emissions of VOCs, NO_x, CO, SO_2, PM_{10}, and $PM_{2.5}$;
- Coal-fired power plants and coal mining and processing, producing oxides of sulfur (SO_x), NO_x, and fugitive dust emissions;
- Vehicle traffic on unpaved roads, wind erosion in areas of soil disturbance, and road sanding during winter months, producing fugitive dust in the form of PM_{10} and $PM_{2.5}$;
- Products of combustion in the Vernal area, primarily from operation of diesel-powered vehicles and wood burning, producing $PM_{2.5}$; and
- Distant sources resulting in long-range transport of pollutants.

Utah has not historically calculated area source emissions from the oil and gas industry. Oil and gas industry operators estimated oil and gas emissions for the Uinta Basin for the year 2006 via an emissions inventory compiled by the Western Regional Air Partnership (WRAP), called the WRAP Phase III study. This emissions inventory is outdated. The estimated 2012 emissions shown in Table 3-3 are projections based on the 2006 inventory data and are the most representative values currently available. An updated emissions inventory is being compiled to support ongoing studies of the relationship between oil and gas emissions to recent exceedances of ozone and $PM_{2.5}$.

Table 3-3: Estimated 2012 Oil and Gas Emissions in the Uinta Basin

Location	Emission (tons per year, or TPY)				
	NO_X	CO	SO_X	VOC	PM
Uinta Basin	16,547	44,925	24	127,495	631

Source: ENVIRON, 2009

Visibility is an Air Quality Related Value (AQRV), which is a resource that may be affected by changes in air quality. AQRVs are applied to all PSD Class I and sensitive Class II areas. The EPA's Regional Haze regulations require states to establish goals for each Class I air quality area to improve visibility on the haziest days and ensure no degradation occurs on the clearest days. An AQRV reflects BLM policy and is not a legally enforceable standard. Background visibility data are not available for the Uinta Basin.

3.3.1.2 Greenhouse Gas Emissions

Rising global temperatures, generally referred to as climate change, are believed to be caused by additional heat being trapped by greenhouse gases (GHGs) in the atmosphere. Tropospheric ozone, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and naturally occurring water vapor are common GHGs. GHGs, which are relatively homogenous throughout the atmosphere, migrate around the globe via wind transport and convective mixing. GHGs trap upward-directed terrestrial radiation. Rising temperatures may produce changes in precipitation patterns, storm severity, and sea levels from melting snow and ice. Although concentrations of GHGs in the atmosphere have varied widely during the earth's history and have likely resulted in variations in climatic conditions over time, industrialization and burning of fossil fuels have caused the concentration of CO_2 to increase within the last 250 years and are believed to have contributed to more immediate climate changes. Emissions of CO_2 represented 81

percent of total U.S. anthropogenic GHG emissions in 2009 (EIA, 2012). GHG emissions generated in the U.S. have decreased 1.6 percent from 2010 to 2011. Recent trends can be attributed to multiple factors including reduced emissions from electricity generation, improvements in fuel efficiency in vehicles with reductions in miles traveled, and year-to-year changes in the prevailing weather. Greenhouse gas emissions in 2011 were 6.9 percent below 2005 levels (EPA, 2013a).

On April 2, 2007, the Supreme Court ruled that GHGs are considered regulated pollutants and are subject to the Clean Air Act (CAA) amendments and associated regulatory framework. In November 2009, the EPA issued the Final Rule for Mandatory Reporting of Greenhouse Gases from Petroleum and Natural Gas Systems – Subpart W (MRR). The MRR requires reporting of GHG emissions from large sources and suppliers in the U.S. It is intended to collect accurate and timely emissions data to inform future policy decisions regarding a potential cap and trade program. Under the rule, petroleum and natural gas systems that emit 25,000 metric tons (tonnes) or more per year of aggregated GHG emissions from all sources are required to submit annual reports to EPA. The gases covered by the rule are CO_2, CH_4, N_2O, and specific fluorinated gases. Emissions of these gases are reported as CO_2-equivalent (CO_2e) emissions. Flaring emissions, onshore production stationary and portable combustion emissions, and combustion emissions from stationary equipment involved in natural gas distribution would be reported. The GNB Final Environmental Impact Statement (FEIS) (BLM, 2012) and the Proposed Vernal RMP and FEIS), Section 3.2.6 (BLM, 2008a) contain additional discussions of GHGs and climate change.

3.3.2 Cultural Resources: Archaeological Resources

The Uinta Basin has been a region of human activity for thousands of years. Cultural affiliations include the Paleoindian period (12,000 to 8000 B.C.); early (8000 to 5000 B.C.), middle (5000 B.C. to 700 B.C.) and late (700 B.C. to A.D. 550) Archaic periods; Formative stage (A.D. 500 to 1300); Shoshonean stage (A.D. 1100 to the present; and the historic Euro-American period from 1776 to the present.

Evidence of Paleoindian use of the area has been limited to isolated projectile points recovered in non-stratigraphic contexts. Most Paleoindian points have been found along major tributaries of the Green River or in upper elevations near the edge of ridges overlooking springs. The Archaic period evolved from seasonal adaptations of a foraging lifestyle, to the introduction of small and big game hunting, and, finally to the development of domesticated agriculture. The development of agricultural groups led to a more sedentary lifestyle, which resulted in semi-permanent architecture, construction of storage features, and indications of complex burial practices. The Formative stage is characterized by the Uinta Fremont, who foraged and came to rely on domesticated corn and squash. In doing so, the Fremont became increasingly sedentary, leading to the development of substantial habitation structures, pottery, and changes in bow and arrow technology. The Ute people appeared in the region at approximately A.D. 1100. Artifacts of the early Ute culture include lithic scatters, small quantities of brown ware ceramics, rock art, and occasional wickiups. The advent of Europeans led to use of the area by trappers and the establishment of trading posts. The Uinta Basin was initially of little interest to most settlers; however, by the early 1870s, Mormon ranchers began filtering into Ashley Valley, which provided a source of excellent summer forage for grazing cattle (BLM, 2012).

Numerous Class I (file search) cultural resource inventories have been conducted within and in the vicinity of the WHBPA. The predominant site types and cultural affiliations found by previous field investigations consisted of unknown aboriginal and European/American lithic and trash scatters (BLM, 2012). Although the area that would be utilized for the project has not been entirely inventoried by a field survey, a Class I literature review of the project area determined that 32 previous cultural resource inventories have been completed since 2000. Four previously documented archaeological sites were identified within the project area, including three prehistoric sites and one historic site. Two of the prehistoric sites have been evaluated as eligible to the National Register of Historic Places (NRHP) (Montgomery, 2013).

Federal historic preservation legislation provides a legal basis for the documentation, evaluation, and protection of archaeological and historic sites that may be affected by federal undertakings or by private undertakings operating under federal license or on federally-managed lands. Mitigations enacted to ensure compliance with these authorities are non-discretionary and enforceable, even if not congruent with existing lease stipulations.

3.3.3 Invasive Plants/Noxious Weeds, Soils, and Vegetation

3.3.3.1 Invasive Plants/Noxious Weeds

The Federal Noxious Weed Act of 1975 defines a noxious weed as any living stage (including seeds and reproductive parts) of a parasitic or other non-native plant of a kind which is of foreign origin; is new to or not widely prevalent in the U.S.; and can directly or indirectly injure crops, other useful plants, livestock, poultry or other interests of agriculture, including irrigation, navigation, fish and wildlife resources, or the public health. The State of Utah noxious weed law (Rule R68-9) defines a "noxious weed" to mean any plant determined to be especially injurious to public health, crops, livestock, land, or other property. Noxious species have few natural biological controls. Given this competitive advantage, they can dominate and crowd out native species, threatening plant diversity and ecosystem integrity. As noxious weed infestation grows, wildlife, livestock, and wild horse forage and habitat deteriorate. Weeds may be spread through a variety of means, including, but not limited to, vehicles, humans, horses, livestock, wind, and water. Soil disturbance facilitates the spread of noxious weeds.

An "invasive" species is defined as a species that is non-native to an ecosystem and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (EO 13112). Invasive species that may be present within and near the WHBPA include halogeton (*Halogeton glomeratus*), cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola kali*), and tumble mustard (*Sisymbrium altissimum*). Halogeton is a weedy herbaceous species introduced from the cold desert regions of Eurasia. It is an annual plant that typically invades disturbed arid and semi-arid sites with alkaline to saline soils. Halogeton seeds may remain alive in soil for 10 years. The salts that leach from dead plant material increase topsoil salinity, subsequently furthering halogeton seed germination and establishment. Halogeton foliage can be toxic to livestock, particularly sheep, because it accumulates salt (CDFA, 2011). Cheatgrass is a winter annual that utilizes available moisture and nutrients while native plants are still dormant. This early season activity limits the growth of native perennials and inhibits establishment of native seedlings. Mature tumble mustard plants tend to break off at the base of the stem,

dry up, and propagate as seeds are dispersed when it tumbles with the wind. Russian thistle, commonly known as tumbleweed, also spreads its seeds in a similar manner. Young tender shoots of Russian thistle plants may serve as forage for mice and pronghorn. Russian thistle grows in salty, alkaline, disturbed soils but is generally outcompeted by native plants in undisturbed habitats (Whitson, 1996). Spotted knapweed *(Centaurea stoebe)*, Russian knapweed *(Acroptilon repens)*, and various other thistle species also occur in the Uinta Basin (BLM, 2008a).

3.3.3.2 Soils

Soils in the WHBPA consist primarily of mixed colluvium and alluvium over residuum derived primarily from sandstone, shales, and colluvium-covered canyon side slopes. Topsoil is limited in the WHBPA. Topsoil refers to the upper layer of soil material that typically contains organic materials that facilitate fertility. The soils in the project area may exhibit 2 to 3.2 inches (5 to 8 centimeters) of topsoil, are well drained, exhibit moderate to coarse textures, contain relatively large stones on or near the surface, and exhibit shallow depths to bedrock. The soils in the WHBPA are generally stony, channery, and/or flaggy. Channery soils contain more than 15 percent thin, flat stones as much as 6 inches long. Flaggy soils contain sedimentary rock that has split into layers from 1/2 to 2 inches thick. Bedrock exposures can be observed where soils are thin. As a result, soils in the WHBPA generally exhibit poor productivity.

Baseline soil loss in various areas in the Uinta Basin has been estimated to range from 0.2 ton per acre per year (BLM, 2005) to 1.45 tons per acre per year (BLM, 2007a), or a typical rate of approximately 1.0 ton per acre per year. A natural soil erosion of 1.0 ton of sediment per acre per year also indicates that naturally occurring soil productivity is very low. The most appropriate use for all soil units in the WHBPA is non-irrigated rangeland. Soil units present in the WHBPA and their characteristics are summarized in Table 3-4. The Motto-Casmos Complex is the dominant soil unit in the WHBPA (See Map 2).

Table 3-4: Soil Units and Characteristics

Soil Map Unit Name (Map Unit Number)	Acres in WHBPA (% of project area)	Landform	Depth	Surface Texture	General Characteristics
Motto-Casmos Complex, 2-25% slopes (152)	1,594 (87%)	Structural bench; hill.	2-21"	Very flaggy or very channery sandy loam; 65+% channers on the surface.	•Well drained. •High to very high water runoff. •Low permeability. •Very low water capacity. •Low organic content. •Slightly saline
Motto-Rock outcrop complex, 2-25% slopes (154)	124 (6%)	Structural bench; hill.	2-20"	Very flaggy loam; 10% rock outcrop	•Well drained. •High to very high water runoff. •Low permeability. •Very low water capacity. •Low organic content. •Slightly saline.

Soil Map Unit Name (Map Unit Number)	Acres in WHBPA (% of project area)	Landform	Depth	Surface Texture	General Characteristics
Cadrina Extremely Stony Loam-Rock Outcrop Complex, 25-50% slopes (36)	71 (4%)	Hill; cliff, erosion remnant, escarpment, ledge.	5-15"	Extremely stony loam; 10% stones, 10% flagstones, 40% channers on surface; rock outcrop 20%.	•Well drained. •Very high water runoff. •No to moderate permeability. •Very low water capacity. •Low organic content.
Walknolls-Rock Outcrop Complex, 2-50% slopes (264)	34 (2%)	Hill; cliff, erosion remnant, escarpment, ledge.	8-20"	Very channery sandy loam; 15-90% sandstone pebbles, channers, cobbles, or flagstones on surface; rock outcrop 15%.	•Well drained. •High to very high water runoff. •Moderate permeability. •Very low water capacity. •Low organic content.
Lanver-Walknolls association, 2-25% slopes (126)	17 (1%)	Plateau.	8-40"	Very channery sandy loam.	•Well drained. •Medium water runoff. •Moderate permeability. •Very low water capacity. •Low organic content.

Source: Leishman et al., 2003; NCSS, 2004; NCSS, 2000; NCSS, 1999.

3.3.3.3 Vegetation

Vegetation communities in the WHBPA consist of sagebrush shrublands, mixed desert shrublands, grasslands, and pinyon-juniper woodlands. The dominant communities are sagebrush and mixed desert shrublands (See Map 3). The locations of the sagebrush shrublands and mixed desert shrub communities generally correspond to slopes, elevations, and soils. In the WHBPA, the sagebrush community is found on the gently sloping uplands. Mixed desert shrub plants are found in the transition areas between sagebrush shrublands and more steeply sloping areas that define drainages. Small pockets of grasslands may be present in the southern portion of the WHBPA near existing well pads. Small pockets of pinyon-juniper trees may be present near the heads of drainages. A barren vegetation community consists of cliff faces, canyons, and open tablelands.

Table 3-5: Vegetation Communities

Vegetation Community	Acres in the WHBPA	% of the Project Area
Sagebrush shrubland	1,283	70%
Mixed desert shrub	472	25%
Grassland	49	3%
Pinyon-juniper woodland	25	1%
Barren	11	1%

Sagebrush shrublands. Sagebrush shrublands are typically populated with a cover of various sagebrush species mixed with semi-arid grasses. The rocky, shallow, and alkaline soils in the WHBPA favor the growth of Wyoming big sagebrush (*Artemisia tridentata* ssp.*wyomingensis*) as the dominant species.

Sagebrush plants reproduce by seed dispersal, approximately 90 percent of which is dispersed within 30 feet of the parent shrub and by sprouts. Seeds germinate in the spring and require at least five years for plants to be established and able to reproduce (Tirmenstein, 1999). Semi-arid grasses such as Indian ricegrass (*Achnatherum hymenoides*), purple three-awn (*Aristida purpurea*), blue grama (*Bouteloua gracilis*), needle-and-thread (*Hesperostipa comata*), galleta (*Pleuraphis jamesii*), or muttongrass (*Poa fendleriana*) may be present as an understory (USU, 2011; BLM, 2008a). Sagebrush shrublands are typically found in broad basins, on plains, and on foothills at elevations below 5,900 feet.

Mixed desert shrublands. The mixed desert shrub community consists of woody plants that tolerate low soil moisture and high soil salt concentrations. Plants in this community typically have small leaves, frequently have spines or thorns, and are adapted to tolerate extreme drought. Desert shrubs develop shallow but extensive root systems to procure rainwater and snowmelt. Trees are usually absent from this community, and vegetation is typically low-growth, though some taller vegetation may exist in sloping areas where salt is leached from the soils. Typical shrub species include shadscale (*Atriplex confertifolia*), greasewood (*Sarcobatus vermiculatus*), four-winged saltbush (*Atriplex canescens*), rabbitbrush (*Chrysothamnus* spp.), Mormon tea (*Ephedra* spp.), winterfat (*Krascheninnikovia lanata*), and littleleaf horsebrush (*Tetradymia glabrata*). The understory is generally sparse and may consist of warm season short and medium perennial grasses similar to those grasses found in sagebrush shrublands. Mixed desert shrub communities usually occur in areas between 4,980 and 7,220 feet, including saline basins, alluvial slopes, and plains (CNHP, 2005; BLM, 2008a).

Grasslands. Semi-arid perennial grasslands are characterized by grasses occurring in scattered bunches with other herbaceous vegetation and occasional woody species. Dominant grass species depend on the soil, with sandy sites typically supporting species such as Indian ricegrass *(Achnatherum hymenoides)*, sand dropseed (*Sporobolus cryptandrus*), and needle-and-thread *(Hesperostipa comata)*. Grasses readily sprout from underground root structures if they remain intact after disturbance. Indian ricegrass and sand dropseed are considered excellent plants for erosion control on semi-desert sites. They are prolific seed producers and germinate readily in the spring.

Pinyon-juniper woodlands. Colorado pinyon pine *(Pinus edulis)* and Utah juniper *(Juniperus osteosperma)* woodlands are widespread on the Colorado Plateau between 4,700 up to 7,000 feet in elevation. Both trees are generally heat and drought-resistant. They grow slowly and seldom exceed a height of 30 feet (Weisberg, 2009; Grahame and Sisk, 2002). Mature stands are typically characterized by few understory species.

Barren. A barren vegetation community may actually be very sparsely populated with scattered trees and short shrubs. Shrubs and herbaceous species that utilize moisture from cracks and pockets where soil accumulates and may occur as scattered individuals in barren communities (BLM, 2008a); however, total vegetative cover is typically less than 10 percent within barren areas.

3.3.4 Livestock Grazing and Rangeland Health Standards

3.3.4.1 Livestock Grazing

The WHBPA is located within the 43,526 acre-Wild Horse Bench grazing allotment. It includes 39,426 acres of federal lands managed by the BLM, 3,901 acres of State of Utah School and Institutional Trust Lands Administration lands, and 235 acres of Ute Tribal land. The allotment is used for sheep grazing from October 1 through May 1 and is permitted for the use of 4,619 animal unit months (AUMs), corresponding to an allocation of approximately 9.4 acres per AUM. Ideally, the WHBPA would be able to support 195.3 AUMs within the allotment. The Wild Horse Bench Allotment contains numerous range improvements, including 12 stock ponds.

The capacity of the allotment to support the allocated AUMs has been compromised from oil and gas encroachment within the allotment (surface pipelines, roads, well pads, and related infrastructure), lack of successful reclamation of disturbed areas to-date, and general range condition due to minimal topsoil and the arid climate (See Sections 3.2 and 3.3.3.2). As of November 2011, the allotment contained 568 existing and approved well locations and at least 130 miles of constructed roads. Within the WHBPA, 37 well pads and approximately 12.9 miles of access roads have been constructed. The permittee has been able to use only 2/3 of the available AUMs for this allotment. Therefore, the effective use of the allotment is approximately 3,080 AUMs. Correspondingly, the 1,840-acre WHBPA is able to effectively support 130.2 AUMs within the allotment.

Sheep are grazing herbivores that prefer forbs, grasses, and other short roughage over shrubs and other taller foliage as food. Sheep also prefer to eat invasive species such as cheatgrass and spotted knapweed over native species such as sagebrush, making grazing sheep effective for conservation grazing. Field studies have demonstrated that grazing sheep were just as effective as herbicides in controlling weeds (Bell and Guerrero, 1996).

The Wild Horse Bench allotment is also used by bison, wild horses, and trespass cattle. Bison were re-introduced by the Ute Tribe two decades ago into the Hill Creek Extension of the Uintah and Ouray Indian Reservation, portions of which are within a mile of the WHBPA to the east. Although the project area is outside of the geographic range typically inhabited by bison (UDWR, 2005), they have begun to naturally extend across historic ranges and have been known to utilize the Wild Horse Bench Allotment from late fall to May.

3.3.4.2 Rangeland Health Standards

The Utah BLM has developed *Standards for Rangeland Health and Guidelines for Grazing Management,* which provides descriptions of the desired condition of the biological and physical components and characteristics of rangelands. "Standards" spell out conditions to be achieved on BLM lands in Utah, and "guidelines" describe practices that will be applied to achieve the standards.

The current management category of the Wild Horse Bench allotment is "improve," which indicates that the lands have a need and a potential for improvement. The development of oil and gas resources in the allotment has continued to remove vegetation for the long term.

3.3.5 Paleontological Resources

The fossil record for early Tertiary time in the Uinta Basin is entirely non-marine but is well-known for a large variety of plant and animal specimens from both lake and river environments (Stokes, 1986). Exposures of the Uinta Formation are found in the WHBPA. This formation is known for the presence of vertebrate fossils of the mid-to-Late Eocene Uintan Land Mammal Age. It is formed from resistant interbedded, gradational and interlensed red sandstones, siltstones, and shales that were deposited as braided fluvial sedimentary systems, thin-bedded floodplain deposits, or lacustrine sediments inter-fingering with over-bank deposits. The Uinta Formation has been subdivided into three stratigraphic horizons: the A and B horizons are the lowest and oldest members and are referred to as the Wagonhound Member. The C horizon, the highest and youngest, is known as the Myton Member. All members of the Uinta Formation have a very high paleontological potential because of locally abundant, well-preserved, taxonomically diverse, and possibly scientifically important fossils.

The Uinta Formation is considered the type for the Uintan Land Mammal Age, preserving a rich vertebrate fossil record from 46.5 to 40 million years ago. Reptile remains, including turtles, fossil teeth, bones, and osteoderms of ancient crocodiles (bony deposits that form scales, plates or other structures in the dermal layers of the skin) are common. Known fossil mammals include carnivorous mammals and members of an extinct family of mammals distantly related to whales and even-toed hoofed mammals.

In 2007, the BLM released General Procedural Guidance for Paleontological Resource Management, which includes a classification system that provides baseline guidance for predicting, assessing, and mitigating paleontological resources. The manual classifies resource areas by ranking them into one of five Potential Fossil Yield Classification (PFYC) classes according to their potential to contain vertebrate or noteworthy invertebrate or plant fossils. The Uinta Formation has been categorized as PFYC 5, which means it is highly fossiliferous.

The Paleontological Resources Preservation Act of 2009 requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on federal lands using scientific principles and expertise. It provides authority for the protection of paleontological resources, including criminal and civil penalties for fossil theft and vandalism. It also includes provisions allowing for casual or hobby collecting of common invertebrate and plant fossils without a permit on BLM-managed lands. Paleontological resource inventories would be conducted to identify the presence of scientifically important fossils prior to any surface disturbance by checking any bedrock outcrops and erosional surfaces for the presence of fossils.

3.3.6 Threatened, Endangered, Proposed, or Candidate Plant Species

T&E, proposed, or candidate plant species that may be present or have habitat within or near the WHBPA include the threatened clay reed-mustard (*Schoenocrambe argillacea*) and the threatened Uinta Basin hookless cactus (*Sclerocactus wetlandicus*) (See Map 4). A list of all T&E, proposed, or candidate plant species in Uintah County, their habitat, and potential for occurrence in the WHBPA is contained in Appendix C, Table C-1. The USFWS has developed conservation measures for the Uinta Basin hookless cactus and clay reed-mustard, which are included in this EA in Appendix C. The locations of three well pads and/or pipeline corridors are located within a 2013 USFWS habitat polygon or the 300-foot

protective buffer for these plants. The three well pads and pipeline routes included: Old Squaw Crossing 125-34, Old Squaw Crossing 126-34, and Wild Horse Federal 107-34.

Uinta Basin hookless cactus. The Uinta Basin hookless cactus is a perennial succulent that can be found in a wide range of habitats, from clay badlands to higher elevation pinyon-juniper woodlands. It prefers gravelly hills and terraces of Quaternary and Tertiary alluvium soils salt desert shrub communities at elevations between 4,500 and 5,900 feet. Core Conservation Area 1 is located approximately 2.4 miles west of the nearest project area boundary. Core Conservation Area 2 is located approximately 2.0 miles west of the nearest project area boundary. The appropriate time for conducting an inventory for individual plants is within the growing season at a time when the plant can be detected, and during appropriate flowering periods, or at any time of the year provided there is no snow cover.

Clay reed-mustard. The clay reed-mustard grows on clay soils derived from shales and sandstones along the contact zone of the Uinta and Green River Formations. It most commonly occurs on steep north-facing slopes in mixed desert shrub communities of shadscale, Indian ricegrass, and pygmy sagebrush at elevations ranging from 4,800 to 5,650 feet (BLM, 2008a; UNPS, 2013). The appropriate time for conducting an inventory for individual plants is April 15 – June 30.

Inventories for the presence of T&E plants were performed in May 2014 according to USFWS protocols. The inventories were conducted within 600 feet of the existing well head, resulting in a survey area at least 300 feet from an expanded well pad boundary. No plant individuals were found during the inventories. Results of the inventories are summarized in Table 3-6. Because details of the Proposed Action are not yet known, including what pads would be expanded and by how much, average values were assumed to estimate possible disturbance to habitat. The acres of initial and long-term disturbance are conservative estimates. If a portion of an expanded well pad or pipeline could be located within the habitat polygon or the 300-foot buffer, then the total average acreage of new disturbance for the pad expansion and pipeline were assumed to fall within the polygon (See Table 2-3).

Table 3-6: Project Area Locations Related to T&E Plant Species Habitats

Location	Species	Individuals Found?	Inventory Area Proximity to 2013 USFWS Distribution Polygon	Initial Disturbance with USFWS 2013 Potential Habitat (acres)*	Reclamation (acres)	Long-term Disturbance with USFWS 2013 Potential Habitat (acres)*
Old Squaw Crossing 125-34 well pad and pipeline	Uinta Basin hookless cactus	No	13.19 acres within polygon	4.1	3.6	0.5
	Clay reed-mustard	No	1.61 acres within polygon	1.6	1.6	0
Old Squaw Crossing 126-34 well pad and pipeline	Uinta Basin hookless cactus	No	10.17 acres within polygon	4.1	3.6	0.5
	Clay reed-mustard	No	28.18 acres within polygon, including 6.7 acres of moderately suitable habitat	4.1	3.6	0.5
WHF 107-34 well pad and pipeline	Uinta Basin hookless cactus	No	10.75 acres within polygon	4.1	3.6	0.5
	Clay reed-mustard	No	32.01 acres within polygon, including 12.7 acres of moderately suitable habitat	4.1	3.6	0.5
Total	Uinta Basin hookless cactus	No	34.11 acres within polygon	12.3	10.8	1.5
Total	Clay reed-mustard	No	61.80 acres within polygon	9.8	8.8	1.0

* Estimate

3.3.7 Water Resources: Surface Water Quality

The WHBPA contains no perennial waters. The nearest perennially-flowing water body to the WHBPA within the watershed is the Green River, approximately three miles to the west. The WHBPA is located within the Kings Canyon-Green River watershed, a sub-watershed of the Lower Green River-Desolation Canyon watershed. This sub-watershed contains 43,266 acres on the east and west sides of the Green River.

Drainages within the WHBPA are oriented northwestward toward the Green River. Drainages in the WHBPA carry water only in direct response to precipitation events, are characteristically dry, and do not support riparian vegetation. Spring runoff from snowmelt and brief intense thunderstorms that usually occur in the late summer dominate the hydrology of the Uinta Basin in general. Drainages can be subject to flash floods during intense precipitation events.

Water quality in the semi-arid Green River watersheds has been influenced by natural geologic and geomorphic conditions, flows evaporating or seeping into the channel beds, and overall land use patterns, including oil and gas development. Water quality in the segment of the Green River nearest the WHBPA is described as generally good in that it meets applicable state-designated standards for aquatic life support, warm water game fish protection and propagation, public water supply, and agricultural use. The most common indicators of impairment to waters in the Green River are temperature, metals, and salinity, in that order (EPA, 2012a). Poor road construction practices, irrigated agriculture, surface disturbance, and natural processes affect surface water quality in the Uinta Basin (BLM, 2008a). As a tributary to the Colorado River, the Green River contributes 240,000 tons of salt annually to Colorado River basin waters (BOR, 2011). Total dissolved solids (TDS) concentrations increase in surface waters as a result of saline sediment transport from runoff and flash floods. Irrigation sources and other non-point sources have also been identified as sources of salt loading. Measurements of salinity concentrations have trended upward where irrigated and dry croplands are found in waters tributary to the Green River (BOR, 2011). In the central Uinta Basin, saline groundwater originating from depths ranging from 1.2 to 1.8 miles below the surface is discharged in some areas along the Green River, resulting from regional upwelling of saline waters (Zhang et al., 2009). Salinity data values may be more closely related to overall background conditions rather than strictly oil and gas disturbance (BLM, 2012).

3.3.8 Wild Horses

The WHBPA is considered habitat for the wild horses that comprise the Hill Creek herd. Approximately 180 to 245 wild horses inhabited the 88,173-acre Hill Creek herd area in spring 2010. The horses are present in small bands of less than 10 horses. Occasionally larger bands of 10 or more animals may be observed during the winter months. Within the portion of the herd area in the WHBPA, the herd area has been fragmented by the construction of 37 well pads, 12.9 miles of roads, and 14.4 miles of pipeline corridors. Under the interim management guidance provided by the RMP, wild or feral horses present in the area will eventually be gathered and removed (BLM, 2008).

3.3.9 Wildlife

3.3.9.1 Migratory Birds (including raptors)

Migratory birds. The Migratory Bird Treaty Act, as amended, was promulgated for the protection of migratory birds, including raptors. Some birds are also protected by the ESA, the Bald and Golden Eagle Protection Act, and/or are included in the State of Utah or BLM Sensitive Species Lists. To further purposes of these protective acts, Memorandum of Understanding WO-230-2010-04, *To Promote the Conservation of Migratory Birds*, was issued in 2010 by the BLM and the USFWS. BLM direction includes identifying species listed as the USFWS Birds of Conservation Concern (BCC) that are likely to be present in the area of a proposed action. The Utah Partners in Flight (PIF) working group completed a statewide avian conservation strategy identifying "priority species" for conservation due to declining abundance or distribution, or vulnerability to various local and/or range-wide risk factors. As part of the BLM's obligation to ensure protection to migratory birds, it must identify species listed in BCC and the PIF bird conservation plans that are likely to be present in the area of a proposed project and utilize best available population or habitat association data in the assessment of impacts to these species.

Migratory birds in Utah are generally affected by activities that occur in the spring and summer months when they breed and nest. The nesting cycle, which includes courtship, nest construction, incubation, and early brooding, is considered a high risk period. The nesting season for migratory birds in the WHBPA is generally May 1-July 31.

The Utah PIF Priority Species List for the Colorado Plateau and Wyoming Basin (Parrish et al., 2002), the BCC list for Region 16 (Colorado Plateau) (USFWS, 2008), and the Utah Conservation Data Center database were used to identify potential habitat for priority species that could utilize habitats within the project area. These birds are listed in Table 3-7, and a complete list is included in Appendix C. BLM sensitive bird species are discussed in Section 3.3.9.2.

Table 3-7: USFWS BCC Region 16 and PIF Priority Species

Species	BCC	PIF	Primary Breeding Habitat	Secondary Breeding Habitat	Winter Habitat
Black-throated grey warbler	-	X	Pinyon-Juniper	Mountain Scrub	Migrant
Brewer's sparrow	X	X	Shrubsteppe	High Desert Scrub	Migrant
Burrowing owl	X	-	High Desert Scrub	Grassland	Migrant
Ferruginous hawk	X	X	Pinyon-Juniper	Shrubsteppe	Migrant
Golden eagle	X	-	Cliff	High Desert Scrub	High Desert Scrub
Gray vireo	X	X	Pinyon-Juniper	Northern Oak	Migrant
Juniper titmouse	X		Pinyon-Juniper	Northern Oak	Migrant
Pinyon jay	X	-	Pinyon-Juniper	Ponderosa Pine	Pinyon-Juniper
Prairie falcon	X	-	Cliff	High Desert Scrub	Agriculture
Sage sparrow	-	X	Shrubsteppe	High Desert Scrub	Low Desert
Virginia's warbler	-	X	Northern Oak	Pinyon-Juniper	Migrant

Raptors. Habitats within the WHBPA have the potential to support breeding, nesting, and foraging raptors. The project area also offers suitable wintering and migration habitats for several raptor species,

including bald eagles. Raptors other than those species included in Table 3-6 that have been observed in the WHBPA and environs include red-tailed hawks and great horned owls. The nesting season for most raptors in the project area extends from March 1-August 31.

Raptor nest sites are typically located on promontory points such as cliff faces and rock outcrops in areas with slopes of 30 percent or greater, but raptors are also known to nest in pinyons, juniper, or deciduous trees. Raptors typically use the same nest site year after year. Many raptors display fidelity to nesting sites, and nearby vehicle traffic or human activity may cause nest failure or abandonment and/or displacement of individual birds. Elevated noise levels resulting from human presence and facility operation have been shown to be factors in raptor displacement (YFWMB, 2002). Responses of individual raptors, however, may vary from tolerance to avoidance of affected habitat. Sensitivity of adult and young birds to disturbance varies during the nesting cycle, with courtship, nest construction, incubation, and early brooding considered higher risk periods. During these times, adults are easily prone to desert temporarily or permanently abandon nests in response to disturbance, leaving the eggs and/or young susceptible to the effects of inclement weather, solar radiation, and predation. Temporary flushing from nests by adults due to noise during these periods can result in mortality of the young birds, which continue to be dependent on parental care (Romin and Muck, 2002). Raptor young tend to disperse to areas near the traditional nest sites.

The Bald and Golden Eagle Protection Act, which initially protected only bald eagles, was amended in 1962 to include the golden eagle because of its dwindling populations and similar appearance to bald eagles when both eagles are young. The act prohibits anyone from "taking" eagles, including their parts, nests, or eggs without a permit issued by the Secretary of the Interior. A taking also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment. The WHBPA contains known golden eagle nests. Golden eagles show strong fidelity to a particular nesting area. Human disturbance to golden eagles can cause nesting failure and permanent site abandonment, constituting a take under the Bald and Golden Eagle Protection Act (Pagel et al., 2010).

The USFWS has issued guidelines for the protection of raptors that include species-specific timing limitations and spatial offsets to active nests (Romin and Muck, 2002). As a result, an inventory for nesting raptors would be conducted prior to surface-disturbing operations so that the applicable spatial offsets and timing restrictions could be applied. These guidelines have been incorporated into the BLM RMP and are included in this EA in Appendix C.

3.3.9.2 Non-USFWS Designated Species

Non-USFWS designated species include sensitive wildlife species and big game species. Sensitive wildlife species include those species receiving special management under a Conservation Agreement in order to preclude the need for a federal listing, a BLM sensitive species, or a Utah-designated wildlife species of concern. Utah BLM sensitive wildlife species that may have habitat in the WHBPA or could be affected by the implementation of Alternative A include: white-tailed prairie dogs (*Cynomys leucurus*),

western burrowing owls (*Athene cunicularia hypugaea*), ferruginous hawks (*Buteo regalis*), bluehead sucker (*Catostomus discobolus)*, flannelmouth sucker (*Catostomus latipinnis)*, and roundtail chub (*Gila robusta*). In addition, the WHBPA lies within crucial yearlong habitat for the pronghorn antelope (*Antilocapra americana*), American bison (*Bos bison*), and Rocky Mountain bighorn sheep (*Ovis canadensis*), as designated by the Utah Division of Wildlife Resources (UDWR). Crucial value habitat is habitat upon which the local population of a wildlife species depends for survival and is essential to its life history. Degradation or unavailability of crucial value habitat leads to declines in carrying capacity and/or numbers of a wildlife species.

Bluehead sucker, flannelmouth sucker, and roundtail chub. These Colorado River system fish receive special management under a Conservation Agreement in order to preclude the need for a federal listing. These fish inhabit waters of the Colorado River system, including the Green River, and may be affected by activities that deplete or degrade the flow of waters in this river system.

Ferruginous hawk. Ferruginous hawks nest on juniper, pinyon pine, and cottonwood trees; on the ground, low ledges, bluffs, and knolls; and on man-made structures (Behle, 1981). Although potential nesting and foraging habitats for this species are present within the WHBPA, ferruginous hawks have not been observed (BLM, 2013a).

Western burrowing owl. Western burrowing owls are associated with dry, open habitat vegetation and are known as grassland specialists. They depend on the presence of fossorial mammals, whose burrows are used for nesting and roosting. Individual burrowing owls have moderate to high site fidelity to general breeding areas, prairie dog colonies, and even to particular nest burrows. Burrow and nest sites are reused at a higher rate if the bird has reproduced successfully during the previous year (Johnsgard, 2002). Primary threats to this species are habitat loss due to land conversions for agricultural and industrial development, and habitat degradation and loss due to reductions of burrowing mammal populations. The preservation of native grasslands and populations of burrowing mammals is ultimately critical for the conservation of burrowing owls (Klute et al., 2003).

White-tailed prairie dog. White-tailed prairie dogs are typically found in open shrublands, semi-desert grasslands, and mountain valleys, where they occur in loosely organized colonies that may occupy hundreds of acres in favorable sites. Similar to other prairie dogs, white-tailed prairie dogs spend much of their time in underground burrows, often hibernating during the winter. Mortality is caused by a variety of predators including eagles, hawks, badgers, coyotes, and black-footed ferrets. Prairie dog colonies provide important habitat for burrowing owls. They are an important food source for several raptor species.

American bison. Bison prefer plains, grassland, and open woodland habitats. The 1,840-acre WHBPA lies entirely within bison habitat. They are grazers that mainly feed on grasses, although other vegetation may also be consumed. Females typically give birth to one calf in early spring, but may give birth as late as mid-summer (UDWR, 2005). The Ute Tribe maintains an introduced bison population on tribal lands in the Hill Creek portion of the Book Cliffs near the WHBPA. These bison can be frequently found on BLM lands adjacent to Ute Tribal lands where suitable bison habitat has been identified.

Pronghorn antelope. Pronghorn populations occur as small groups in shrubsteppe habitat characterized by large expanses of open, low rolling or flat terrain that facilitates flight from predators. Home ranges can vary between 400 and 5,600 acres, depending on habitat quality, population characteristics, and presence of local livestock. The 1,840-acre WHBPA lies entirely within pronghorn habitat. They are most active during the day, but typically do not move more than six miles during a day. Pronghorn primarily consume shrubs, although its populations are sustained by a strong forb component in the vegetative mix, which is essential to lactating does and fawn survival during the spring and early summer (UDWR, 2005). An abundance of free water sources is important to long-term pronghorn population viability. Pronghorn range up to four miles from a water source. Breeding occurs in the fall, and females typically give birth to one or two kids in the spring. Pronghorn antelope in the WHBPA are located within UDWR Management Unit 10a. The existing population is the result of transplant efforts from various areas in Utah and western Colorado. Pronghorn populations have shown declines due to disease, habitat degradation, competition with livestock for forage, energy development, and hunting. The estimated population was 175 in 2008, and both 5 and 10-year population trends were downward (UDWR, 2009).

Rocky Mountain bighorn sheep. Rocky Mountain bighorn sheep can be found in small herds in northeastern Utah. The WHBPA contains 468.9 acres of bighorn habitat in its western portion where the heads of tributary canyons to Kings Canyon to the west of the WHBPA are found. Seventeen well pads are located on 30.6 acres within suitable bighorn habitat in the WHBPA.

Bighorn sheep prefer open rocky areas and steep rough terrain with poor cover and good visibility to facilitate flight from predators. Suitable habitat features include canyons, gulches, talus cliffs, steep slopes, mountaintops, and river benches. Although considered suitable habitat, bighorn sheep are not typically found on the flatter open terrain because of poor cover and increased distance from escape terrain. If surprised, bighorn sheep will travel down steep escarpments if surprised from above (Larson et al., 2000). Habitat patch size is relevant to long-term sheep survivorship (Schoenecker and Krausman, 2002). Escape terrain or habitat within 300 meters (984 feet) of escape terrain provide important elements of habitat patch size for the support of 125 or more bighorn sheep (Sweanor et al., 1995). Typical bighorn behaviors of grazing and scanning for predators are altered by unpredictable human activity and can result in energetic stress.

Utah has been involved in an aggressive program for the past 30 years to restore bighorn sheep to their native habitat. The existing population is the result of transplant efforts from various areas in Wyoming, Colorado, and Canada. Although bighorn sheep have experienced significant declines in numbers in the early 1900s due to disease, habitat degradation, and hunting, bighorn sheep in UDWR Management Unit 10a, which includes the WHBPA, had an estimated population of 350 sheep and exhibited an increasing population trend in 2008. Bighorn sheep are characterized by low reproductive rates, long life spans. They require separation from domestic sheep to prevent the transmission of diseases, against which they have no natural defenses (UDWR, 2008).

3.3.9.3 Threatened, Endangered or Candidate Wildlife Species

Although the WHBPA does not constitute habitat for T&E or candidate animal species and direct effects would not be incurred, habitat for the T&E animal species described in this section may be affected by implementation of Alternative A and indirect effects may result. Proposed or Candidate species are not present in the WHBPA and do not have habitat that would be affected. A list of T&E and candidate animal species, their habitat, and potential for occurrence is contained in Appendix C.

The **bonytail** (*Gila elegans*), **Colorado pikeminnow** (*Ptychocheilus lucius*), **humpback chub** (*Gila cypha*), and **razorback sucker** (*Xyrauchen texanus*) are listed as endangered by the ESA. Their habitat would be affected by water depletions used for drilling operations. These endangered fish are discussed as a group because their habitats and behavior are similar. They are found in a variety of habitat types, depending on life stage. The bonytail and Colorado pikeminnow prefer pools, eddies, and backwater habitats (USFWS, 2002; USFWS, 2002a). The humpback chub and razorback sucker prefer mid-channel runs and canyon areas with fast currents, deep pools, and boulder habitat (USFWS, 2002b; USFWS, 2002c). These fish have experienced severe population declines due to flow alterations, habitat loss or alteration, and introduction of non-native fish species. Within Uintah County, critical habitat for the endangered Colorado River fish has been designated in the Green River and its 100-year floodplain.

The USFWS has developed conservation measures intended to minimize effects to these species. The Recovery Implementation Program (RIP) for Endangered Fish Species in the Upper Colorado River Basin was established in January 1988 to mitigate for water depletion impacts to federally endangered fish species. Under this program, water depletions from tributary waters within the Colorado River drainage would jeopardize the continued existence of these fish species. In October 1993, a Recovery Implementation Program Recovery Action Plan (RIPRAP) was developed to establish a framework for conducting Section 7 (of the ESA) consultations. The RIPRAP has been reviewed and updated annually. Updates to the RIPRAP since 1997 determined that the Recovery Implementation Program has made sufficient progress to be the reasonable and prudent alternative to avoid the likelihood of jeopardy to the endangered fish and to avoid destruction or adverse modification of their critical habitat by small depletions. The provisions of the Recovery Implementation Program (RIP) were based on appropriate legal protection of the instream flow needs of the endangered Colorado River fish. Incremental withdrawals of more than 100 acre-feet (annual average) would require the water user to make a payment to the USFWS Upper Colorado River Endangered Fish RIP. Historic water depletions were permitted prior to January 22, 1988. The USFWS addresses new and historic depletions differently under the Section 7 agreement of March 11, 1993. Historic depletions, regardless of size, do not pay a depletion fee to the RIP.

4.0 ENVIRONMENTAL IMPACTS

4.1 Introduction

Chapter 4 addresses direct, indirect, and cumulative impacts of the Proposed Action (Alternative A) and No Action alternative (Alternative B). The impact analyses presented in this chapter incorporate the Applicant's environmental commitments described in Chapter 2 (Section 2.2.6) and refer to specific commitments, as appropriate, to substantiate related impact findings. Temporary impacts may remain from a period of days to less than one year. Short-term impacts are those that would persist over a period of five years or less. Long-term impacts are those that would remain from five years until the end of well life, approximately 40 years plus an additional 5 years to reestablish vegetation. A small impact means that the environmental effects are not detectable, or are so minor that they will neither destabilize, nor noticeably alter, any important attribute of the resource. A moderate impact means that the environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource. A large impact means that the environmental effects are clearly noticeable, and are sufficient to destabilize important attributes of the resource. Mitigation measures are actions that could be applied to reduce or avoid adverse impacts. Residual impacts are impacts that remain after application of the proposed mitigation measures.

4.2 General Analysis Assumptions

- The project would take place according to the proposed schedule.
- Applicant-committed measures would be implemented during project operations (See Section 2.2.6).
- Reclamation would successfully reestablish desired vegetation within the short term, or within five years of performance of reclamation operations.

The analysis of cumulative impacts was based on the following assumptions:

- Quantification of cumulative impacts was developed in consideration of surface disturbance resulting from oil and gas operations since these operations dominate past, current, and reasonably foreseeable actions in the cumulative impact areas (CIA). Other minerals actions, such as Gilsonite mining or tar sands extraction are not reasonably foreseeable at this time.
- Surface disturbance amounts were quantified to be consist with the Greater Uinta Basin Oil and Gas Cumulative Impacts Technical Support Document (BLM, 2012b); disturbance from existing well pads and access roads resulted in 2.5 acres of disturbance; foreseeable disturbance from construction operations would result in 5.2 acres of disturbance and long-term foreseeable disturbance would result in 2.6 acres of disturbance.
- Disturbance from upgrading pipelines within existing pipeline corridors would be totally reclaimed within five years so that long-term disturbance would be zero.
- Interim and final reclamation performed on existing active well pads and plugged and abandoned well pads within a CIA but outside the WHBPA would demonstrate some measure of reestablished vegetation or forage. Because of the application of procedures in the Green River

District Reclamation Guidelines, reclamation operations in progress were assumed to be successful.

- Abandoned locations not constructed were not included in the quantification of surface disturbance because lack of APD approval precludes surface disturbance.

4.3 Direct and Indirect Impacts

4.3.1 Alternative A – Proposed Action

4.3.1.1 Air Quality and Greenhouse Gas Emissions

4.3.1.1.1 Air Quality

The construction and operation of 135 oil and gas wells and approximately 14.4 miles of upgraded pipelines would result in pollutant emissions. Impacts to air quality would depend on the amount, duration, location, and emission characteristics of the sources, as well as meteorological conditions such as wind speed and direction, precipitation, and relative humidity. To evaluate impacts to air quality, project operations were assumed to proceed as planned, and emissions were quantified according to the Operator's estimated 3-year drilling schedule. Factors, such as drilling rig availability, may cause the planned schedule to be extended; however, such circumstances cannot be foreseen and were not included in the analysis of impacts to air quality. Therefore, emissions from construction, drilling, and completion operations were assumed to be temporarily generated over a period of three years (Years 1-3). All 135 wells were assumed to be in production in Year 4. Production emissions would be generated for the productive lives of the wells, approximately 40 years.

While construction and drilling operations are taking place, emissions would be generated from earth-moving equipment, drill rig engine exhaust, flaring during testing, and vehicle traffic. Fugitive dust (PM) would result from wind erosion where soils would be disturbed by construction operations and from vehicle traffic on unpaved roads and. Drill rig engine operations would produce exhaust emissions consisting mainly of NO_X and CO, with lesser amounts of SO_2. During production operations, NO_x, CO, VOCs, PM_{10} and $PM_{2.5}$, and HAPs would be emitted from the operation of condensate storage tank vents and well pad separators. Fugitive emissions from wellheads, which are not regulated by the EPA and were not quantified, would consist primarily of negligible amounts of CH_4.

Project-related emissions were estimated in an emissions inventory (EI) for criteria pollutants, HAPs, and CO_2. The EI assumed that Year 1 emissions would result from drilling 45 wells. Year 2 emissions would result from drilling an additional 45 wells and producing the 45 wells drilled in Year 1. Year 3 emissions are those that would result from drilling the final 45 wells and producing the 90 wells drilled in Years 1 and 2. The EI assumed that all 135 wells would be drilled by the end of Year 3. Year 4 emissions would result from producing the 135 wells drilled in Years 1, 2, and 3. Table 4-1 summarizes the results of the EI.

Table 4-1: Estimated Emissions resulting from the Proposed Wells

Year after Project Initiation	Emission (TPY)							
	NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	Total HAPs	CO_{2e} [1]
Year 1: 45 wells drilled.	362.26	198.05	25.68	0.47	799.68	92.23	0.38	37,199
Year 2: 45 wells drilled, 45 producing.	373.34	208.68	84.15	0.49	805.15	93.53	10.49	55,174.99
Year 3: 45 wells drilled, 90 producing.	382.64	216.50	133.69	0.49	805.86	94.24	20.59	62,179.90
Years 4-40+: 135 wells producing.	32.41	28.55	170.38	0.02	7.08	2.92	30.87	47,761

Source: CH_2MHill, 2013; [1] metric tons or tonnes

The values shown in Table 4-1 are conservative in that they assume all 135 wells would be successful producers of a constant volume of natural gas. Emissions of NO_x would be greatest during Years 1-3 while the drilling rigs would be operating. Emissions of NO_x would decrease after all the wells are drilled (Years 4-40$^+$) because drilling rig engines would not be operating and producing NO_x emissions. PM emissions would be greatest during construction operations during Years 1-3. VOC emissions over Years 1-4 would increase as wells are put on production. Small amounts of HAPs would be emitted by construction equipment in Year 1 and would also increase as wells go on production. Actual production emissions from Year 4 into the future would correspond to the volume of natural gas produced and would decrease over time as the reservoirs diminish; however, the rate of natural gas production from a particular well is influenced, in part, by reservoir characteristics, including porosity, permeability, pressure, and may not reflect a linear decrease in production volumes.

The BLM is required to comply with the CAA and to ensure that BLM-authorized activities comply with it as well. The BLM's management of air resources relates to compliance with the NAAQS, conformity of federal Actions with air quality planning requirements, and protection of visibility and other air quality related values. Emissions control technology is not required by the EPA at this time since the Uinta Basin is an attainment/unclassifiable area; however, in consideration of recent Uinta Basin monitor data, the BLM has required that oil and gas operators apply specific emissions control measures that have been incorporated into Alternative A (See Section 2.2.6.2). The listed emissions control measures are minimum standards.

Assuming that all wells were to be put on production status, Table 4-2 displays the differences between uncontrolled emissions versus controlled emissions for 135 wells during drilling/completion and production operations. Positive quantities represent the amount of emissions that would have otherwise been released to the atmosphere by the use of equipment without controls. Negative quantities represent increases in the amounts of emissions.

Table 4-2: Comparison of Uncontrolled to Controlled Production Emissions-Total Reduction

Emission	Well Drilling Operations Only Years 1-3 (total tons for a 3-year period)				Production Operations [1] Years 4-40+ (TPY; i.e., annual basis)			
	Unmitigated (No Controls)	Mitigated (Controlled)	Reduction	% Reduction	Unmitigated (No Controls)	Mitigated (Controlled)	Reduction	% Reduction
NO_x	2,157.97	1,086.78	1,071.19	49.6%	32.41	32.41	0.00	0.0%
CO	571.95	594.15	-22.20	-3.9%	28.55	28.55	0.00	0.0%
VOC	76.72	77.05	-0.34	-0.4%	3,338.65	170.38	3,168.27	94.9%
SO_2	1.37	1.40	-0.03	-2.0%	0.02	0.02	0.00	0.0%
PM_{10}	2,406.41	2,399.05	7.35	0.3%	7.08	7.08	0.00	0.0%
$PM_{2.5}$	278.71	276.70	2.01	0.7%	2.92	2.92	0.00	0.0%
Total HAPs	1.13	1.13	0.00	0.0%	379.31	30.87	348.44	91.9%
CO_2e	111,081.70	111,597.13	-515.42	-0.5%	184,998	47,761	137,237	74.2%

Source: CH_2MHill, 2013; [1] Until the end of the productive life of the well.

The pollutant that would be the most reduced as a result of using emissions controls during drilling operations would be NO_x, which would be reduced by nearly 50 percent. During production operations, emissions of all pollutants would decrease. VOCs and total HAPS would be reduced by over 90 percent. GHGs, as measured by CO_2e, would decrease in relation to decreasing VOCs. GHGs would be reduced by approximately 74 percent.

Estimated emissions for the production phase of the proposed wells were compared to the 2012 estimated WRAP Phase III regional emissions in Table 4-3. Photochemical modeling was not conducted to determine the project-specific impact of the project emissions due to the relatively low emissions associated with the project and the inability of existing photochemical models to distinguish project-specific impacts from cumulative impacts on a larger scale. The likely project-specific impacts of the emissions from the Wild Horse bench project would be well less than the mean margin of error of the model. While project-specific emissions may not result in a definable increase in ozone concentrations through photochemical modeling, these emissions will likely contribute incrementally to basin-wide ozone concentrations and potentially exacerbating ozone NAAQS exceedences. Compliance with the NAAQS for other criteria pollutants was determined based on modeling for the larger projects (BLM, 2012; Alpine and Buys, 2010).

Table 4-3: Comparison of Alternative A Production Emissions to Estimated 2012 WRAP Phase III Emissions

Emission	Proposed Action Production Emissions (TPY)	Estimated 2012 Uinta Basin Emissions [1] (TPY)	Comparison of Proposed Action to WRAP Phase III Estimated Emissions (%)
NO_x	32.41	16,547	0.20%
VOC	170.38	127,495	0.13%

[1] ENVIRON, 2009

The EPA has the primary authority to administer the CAA. Under the CAA, federal agencies cannot authorize any activity that does not comply with applicable local, state, and federal air quality laws, statutes, regulations, standards, and implementation plans. The EPA has the responsibility to approve permit applications and require control devices prior to construction and/or operation of equipment that would release pollutants into the ambient air. Permits are issued to emissions sources that are being constructed or operating above a specified threshold. Legal requirements are enforced by the EPA to ensure air pollutant concentrations will remain within specific allowable levels. Although major source permits would apply to sources of criteria emission that would be greater or equal to 100 tons per year (TPY), oil and gas wells typically emit less than that amount and are considered minor sources of pollutants. In 2011, the EPA made effective a rule establishing permit thresholds, which vary by pollutant, for new minor sources (EPA, 2011).

4.3.1.1.2 Greenhouse Gas Emissions

The Proposed Action would emit 47,761 tonnes of GHGs after the application of emissions controls. Net impacts to climate change attributable to the proposed 135 wells cannot yet be evaluated because existing climate prediction models project global changes.

4.3.1.2 Cultural Resources: Archaeological Resources

Alternative A would result in approximately 151.2 acres of surface disturbance that could potentially harm unidentified cultural resources. Cultural resources can be irreversibly damaged or destroyed by surface-disturbing activities. Many of the known prehistoric and historic archaeological sites in the Uinta Basin are shallow and vulnerable to the impacts of blading and excavation. Prior to any construction-related surface disturbance, however, all well pad expansions and pipeline routes would be inventoried by a BLM-approved archaeologist to determine the presence of cultural resources. The inventory would identify cultural resource sites eligible for inclusion on the NRHP. Site avoidance of identified eligible cultural resource sites would eliminate adverse effects to NRHP-eligible sites. The Operator committed to suspending construction operations that may affect previously unidentified cultural resources if such resources were to be found and contacting the AO for direction (See Section 2.2.6.3). Although impacts to cultural resources could include removal of surface artifacts due to illicit collection and inadvertent destruction, artifact theft is not quantifiable. The WHBPA is not easily accessible and does not attract recreational use by the public (See Appendix A). Impacts to cultural resources would be unlikely to occur as a result of illicit collection.

Section 106 of the National Historic Preservation Act requires the BLM to account for the effects of its undertakings on historic properties. Consultation with the Utah State Historic Preservation Office (SHPO) was conducted with respect to this project with submission of a project Class I literature review that identified four previously documented archaeological sites (See Sections 3.3.2 and 5.1). A consultation letter was sent on 10/1/2014. A response was received from the Hopi Tribe 10/16/2014, requesting a copy of the Class I cultural resources overview. A response was sent 11/26/2014. No other concerns were brought forth, so consultation is considered complete. Prior to construction and drilling, additional consultation would be conducted on a site-specific basis after Class III inventories have been completed and the findings documented. If Alternative A is approved, results of a field inventory conducted prior to surface disturbance would be submitted to the BLM, which would consult with the SHPO to seek concurrence of the BLM's determination of effects. If a site could not be avoided, coordination between the BLM, SHPO, and Indian Tribes would determine additional mitigation, as needed, for any cultural resource site that may be present in an area proposed for disturbance.

4.3.1.3 Invasive Species/Noxious Weeds, Soils, and Vegetation

4.3.1.3.1 Invasive Species/Noxious Weeds

Project development would provide opportunities for invasion by non-native plants on disturbed areas. Weeds reduce the productivity and health of native plant species, including special status plant species. Weed invasion has the potential to reduce the amount of suitable habitat available for native plants and may result in displacement of desirable species, decrease opportunities for seedling success, and exacerbate competition for limited moisture.

Revegetation is the best way to prevent infestation or spread of noxious or invasive weeds. Initial reclamation would reduce the 151.2 acres of initial disturbance to 62.9 acres of bare ground. Initial reclamation would follow the procedures detailed in the Green River District Reclamation Guidelines and the Operator's Reclamation Plan (Appendix D) to maximize successful reestablishment of desired

vegetation. To prevent the introduction or spread of invasive or noxious plant species, the Operator has initiated an active weed management program to control infestation. The Operator has committed to using herbicides to prevent their establishment and spread (See Section 2.2.6.9). Halogeton, Russian thistle, and tumble mustard can be controlled effectively with herbicides, especially at the pre-flowering stage in the spring. Herbicide treatment for cheatgrass is also effective, but herbicide application is more effective in the fall if this species is present. The Operator would follow the procedures of the April 2010 Vernal FO Surface Disturbance Weed Policy and the BLM "*Vegetation Treatments using Herbicides*" (BLM, 2007). Implementing such measures would discourage the introduction of noxious or invasive plant species and prevent their unimpeded encroachment on disturbed soils.

4.3.1.3.2 Soils

Construction of the well pads and access roads would result in immediate impacts to 151.2 acres of soils. Long-term disturbance to soils would result from 62.9 acres of bare ground needed to support production operations on the expanded well pads. Effects to disturbed soils may include compaction and reduced permeability, accelerated erosion, and diminished productivity.

Although using heavy equipment during construction operations tend to compact soils and reduce permeability, WHBPA soils are resistant to compaction because of the presence of a large rock/stone component, which provides resistance and reduces compressibility. The presence of rock fragments in WHBPA soils also allows them to moderately permeable (See Table 3-4). Where exposed or near the surface, bedrock precludes effects to soil permeability.

Naturally occurring soil loss can be accelerated from human activities that remove the ground cover and loosen the soil, exposing it to wind and water and accelerating the erosion process. Soil loss after surface disturbance has been estimated to be triple the baseline rate (BLM, 2007a). Using this metric, soil loss from 151.2 acres of disturbance could approach 453.7 tons annually. After reestablishment of vegetation, accelerated soil loss would correspond to the amount of bare ground and is estimated at 188.7 tons annually. The presence of bedrock and stones in WHBPA soils discourages soil transport from water or from wind erosion. Slopes within the WHBPA are greatest at the heads of drainages, where Walknolls-Rock outcrop complex and Cadrina extremely stony loam-Rock outcrop complex soils are found (See Map 2). These soils contain from 15 to 90 percent stone fragments on surface in addition to 15 to 20 percent rock outcrops. The dominating presence of stones and rock outcrops, shallow soil depths, moderate permeabilities of these soils, and the Operator's commitment to avoiding construction on steep slopes would minimize soil loss. Incorporation of site-specific erosion and sediment control BMPs as described in the Operator's SWPPP (See Appendix E) would discourage soil loss. The monitoring that would be conducted by the Operator during the life of the project would ensure that well pads and pipeline routes are stable.

Soil productivity would be decreased from existing conditions after surface disturbance. Soil viability may be compromised by topsoil removal, impairing the soil's ability to cycle nutrients and disrupting biological processes; however, all WHBPA soils intrinsically lack organic material. Because WHBPA soils are thin and lack sufficient depths to display substantial soil horizons, and contain a large rock component, mixing of soil horizons would, therefore, be minimal. Soil viability would be restored in the

short term where initial reclamation operations take place and topsoil is re-spread. Following procedures in the Green River District Reclamation Guidelines, which would be supplemented by the Operator's Reclamation Plan (See Appendix D), would facilitate soil stability through the reestablishment of vegetation. Although the loss of protective vegetation would reduce contributions to topsoil organic content, its reestablishment as a result of reclamation would restore contributions from decaying plants to the organic content of the re-spread topsoil.

Leaks or spills of fuels, condensate, and/or produced water could impair soil productivity where such releases occur. Impacts to soils from accidental releases would be minimized by following procedures specified in a SPCCP, as committed to by the Operator. Releases would be contained in accordance with SPCCP procedures and notification made according to applicable regulations. Remedial actions would be taken to restore soil quality if a release were to occur.

4.3.1.3.3 Vegetation

Construction of well pads and roads would result in initial disturbance of approximately 151.2 acres of vegetation. After initial reclamation reestablishes vegetation, approximately 62.9 acres would remain bare of vegetation for the lives of the well pads.

The interactions between surface disturbance, soil characteristics, and climate complicate the probable success of vegetation restoration after reclamation. Vegetation treatments and reclamation are usually not very successful in the types of plant communities present within the WHBPA due to shallow soils and low moisture availability. The timing of the surface disturbance with respect to events such as drought would play an important role in determining grass and shrub component recovery. Poor soils and variable precipitation amounts would slow reestablishment of shrubs, which require 5-10 years to become reestablished from seed. Grasses would regrow more quickly.

The BLM emphasizes the use and perpetuation of native species; however, non-native species are sometimes used outside of Uinta Basin hookless cactus habitat polygons during reclamation in order to achieve ecological objectives for an area. Performing reclamation operations with varieties of plants that are tolerant of drought conditions and the only slightly saline Motto-Casmos soils would facilitate vegetation regrowth. The types of seeds used for initial and final reclamation would be determined by the AO after evaluating opportunities for reestablishment of growth in the nutrient-poor soils of the WHBPA and the presence of established species, including invasive non-native plants. Following the Green River District and the Operator's Reclamation Plans, which include monitoring for reclamation success and adaptive strategies, would return soils to a stable condition on reclaimed areas and promote the growth of grasses and desirable plants.

4.3.1.4 Livestock Grazing and Rangeland Health Standards

4.3.1.4.1 Livestock Grazing

The increase in the level of general human activity and use of mechanical equipment would result in short-term impacts to livestock that utilize the portion of the Wild Horse Bench allotment in the WHBPA. Construction and drilling activities would create noise and may generally displace livestock from the WHBPA during the period of allotment use, October 1 through May 1. Livestock would likely use other

portions of the allotment, which could result in increased competition for available resources. Increased vehicle traffic during construction and drilling could heighten possibilities of vehicle-livestock collisions or facilitate the entry of trespass animals into the allotment.

Approximately 151.2 acres of forage would be removed from the WHBPA within the Wild Horse Bench allotment. Successful initial reclamation would be facilitated with conformance to the Green River District Reclamation Guidelines and implementation of the Operator's Reclamation Plan (See Appendix D), the short-term objective of which would be to restore grasses to 88.3 acres of the 151.2 acres that would be disturbed from construction operations. Approximately 62.9 acres would remain disturbed within the WHBPA for the lives of the well pads. The impacts to permitted AUMs correspond to forage removed from the WHBPA by Alternative A and are summarized in Table 4-4. The amount of AUMs lost as a result of construction operations would remain lost for the long term if reclamation operations do not achieve the desired outcome.

Table 4-4: Long-term Impacts to AUMs in the WHBPA

AUMs in the WHBPA		Disturbance from Construction Operations (acres)	AUMs Lost from Construction Operations	Long-term Disturbance with Successful Reclamation (acres)	AUMs Lost from Long-term Production Operations
Permitted AUMs	195.3	151.2	16.0	62.9	6.7
Effective AUMs	130.2		10.7		4.4

Impacts to grazing sheep from loss of forage correspond to the loss of shrubs, which would comprise their primary diet during winter months and dominate the WHBPA. Stress from over-grazing the shrubs would be offset by the large size of the allotment.

The Operator has committed to avoid range improvements and perform necessary repairs if functionality of range improvements were to be altered as a result of project operations (See Section 2.2.6.4). The Operator recognizes that blading, grading, and/or blasting may alter topographic features, which consequently may alter the surface's natural drainage characteristics such that the water-retention capability of a stock pond may be altered. Possible impacts would be identified at the onsite inspection prior to construction. Preventative measures would be identified and applied. Sedimentation into stock ponds would be controlled through the Operator's commitment to utilize Gold Book BMPs and implement a SWPPP (Appendix E). Therefore, long-term effects to range improvements would not result from expanding existing well pads or upgrading pipelines within an existing corridor.

4.3.1.4.2 Rangeland Health Standards

The current rangeland health determination of "improve" would not be likely change due to implementation of Alternative A. Surface disturbance may create opportunities for the remaining forage to be compromised by the introduction of invasive species. Implementation of a successful initial reclamation plan and an active weed management program, as committed to by the Operator, would prevent the establishment and spread of invasive plant species or noxious weeds (See Sections 2.2.6 and 4.3.1.3.1; Appendix D).

4.3.1.5 Paleontological Resources

Paleontological resources are non-renewable resources that can be irreversibly damaged or destroyed by surface-disturbing activities. Alternative A would result in approximately 151.2 acres of surface disturbance.

In sensitive fossil areas where bedrock is exposed at or near surface, the Operator has committed to employing a BLM-permitted paleontologist to examine construction sites for fossils prior to surface disturbing operations. The existing knowledge base would be supplemented by information gained from the inventories. The BLM-approved paleontologist would make recommendations as to fossil disposition if a significant fossil were to be found. Where possible, avoidance measures would be taken. Monitoring would be conducted during construction operations if necessary. If any paleontological resources were to be found during construction operations, all operations that could further disturb such materials would be suspended, and the AO would be contacted for direction (See Section 2.2.6). Therefore, project activities would not be likely to affect paleontological resources.

Other impacts to paleontological resources could include removal of fossils due to illicit collection and inadvertent destruction. Fossil removal by the public is not quantifiable. Since no new roads would be built and the WHBPA is not easily accessible, it does not attract recreational activity (See Appendix A), casual public access and illicit collection by the public would be unlikely.

4.3.1.6 Threatened, Endangered, Proposed or Candidate Plant Species

No Uinta Basin hookless cactus or clay reed-mustard individuals were found during the inventories (See Table 3-6); therefore, direct impacts would not occur to these T&E species. Table 4-5 summarizes survey results and displays the acres of disturbance within suitable habitat.

Table 4-5: Acres of Proposed Disturbance within T&E Species Habitats

Location	Species	Individual within 300 Feet?	Long-term Disturbance with USFWS 2013 Potential Habitat (acres)
Old Squaw Crossing 125-34 well pad and pipeline	Uinta Basin hookless cactus	No	0.5 acre Uinta Basin hookless cactus
	Clay reed-mustard	No	0 acre Clay reed-mustard
Old Squaw Crossing 126-34 well pad and pipeline	Uinta Basin hookless cactus	No	0.5 acre Uinta Basin hookless cactus
	Clay reed-mustard	No	0.5 acre Clay reed-mustard
WHF 107-34 well pad and pipeline	Uinta Basin hookless cactus	No	0.5 acre Uinta Basin hookless cactus
	Clay reed-mustard	No	0.5 acre Clay reed-mustard
Total	Uinta Basin hookless cactus	No	1.5 acres Uinta Basin hookless cactus
	Clay reed-mustard	No	1.0 acre Clay reed-mustard

Possible dispersed direct and indirect negative impacts that may result from implementation of the Proposed Action include: loss of suitable habitat; loss of habitat and forage opportunities for pollinators of the species; habitat modification by invasive weed species, which may compete with protected plant individuals; accidental spray or drift of herbicides used during invasive plant control; and the deposition

of fugitive dust on protected individuals from construction activities and vehicle traffic on unpaved roads. Fugitive dust has the potential to inhibit pollination and reduce success of seed set. None of the proposed well pad expansions would lie within Core Conservation areas for the hookless cactus. Alternative A would not result in increased accessibility because no new roads would be built. Illicit collection would be negligible because the WHBPA is not a recreation destination (See Appendix A).

The Operator has committed to following the USFWS conservation measures for the Uinta Basin hookless cactus and the clay reed-mustard (See Appendix C.1 and C.4). Implementing USFWS conservation measures, including spot checks, would provide offsets and mitigation measures sufficient to minimize impacts to these plants and habitat.

Application of Gold Book BMPs during construction operations and implementation of the Operator's SWPPP (Appendix E) would discourage sedimentation from disturbed areas, aide in maintain the existing hydrologic regime, and therefore minimize indirect impacts to suitable habitat. The Operator would follow the guidelines of the Vernal FO Surface Disturbance Weed Policy (April 2010) and the BLM "Vegetation Treatments using Herbicides (BLM, 2007)" in addition to applying measures detailed in the Operator's Reclamation Plan (Appendix D) to reduce the likelihood of noxious weed invasion or spread that may compromise the existing quality of the habitat for these species.

BLM conducted informal consultation with the USFWS with respect to Alternative A, which was concluded on December 28, 2014 (See Section 5.1).

4.3.1.7 Water Resources: Surface Water Quality

Poorly constructed well locations, roads, and pipeline crossings can affect surface water quality by becoming sources of non-point pollution. Sediments transported by runoff may impair surface water quality by increasing concentrations of TDS, suspended solids, and/or salts originating from saline soils. Because WHBPA soils are characteristically channery and include bedrock exposures, they are not particularly susceptible to wind or water transport. The amount and frequency of sediment transport to perennial surface waters from the WHBPA would be discouraged by the 3-mile distance to the Green River, low average seasonal precipitation, and high rate of evaporation, all of which would minimize or prevent direct effects to the surface water quality of the Green River.

Proper land use is the BLM's preferred method of achieving sedimentation control, with proper project planning being the principal mechanism for implementation and conformance with the Colorado River Basin Salinity Control Act (BLM, 2008a). The Operator has incorporated design features into Alternative A that would protect surface waters from undue sedimentation, including:

- Expanding existing well pads to minimize new surface disturbance;
- Following RMP avoidance measures on slopes greater than 40 percent;
- Utilizing diversion dikes, terraces, straw bales, mulch, soil stabilizers, or sediment basins to control or prevent the transport of sediments;
- Utilizing Gold Book BMPs; and/or
- Following procedures contained in the Operator's SWPPP (Appendix E).

Gold Book BMPs include expanding well pads to be set back from steep slopes, which would minimize sediment delivery to ephemeral drainages. Construction that would expand existing well pads would be subject to RMP conditions that include criteria for construction on slopes of varying steepness. Successful initial reclamation operations would further discourage sedimentation with the reestablishment of vegetation on 88.3 acres of disturbed ground. Project implementation, therefore, would be unlikely to impair surface water quality of the Green River or contribute to existing salt concentrations in water bodies that may ultimately affect the Colorado River Basin. Natural processes would continue to have the dominant impact on erosion and sedimentation that may affect surface water quality.

Effects to surface water resources may result from accidental spills or releases of fuels, lubricants, chemicals, and petroleum products. The Operator would, however, develop, maintain, and implement the procedures contained in required SPCCPs to contain accidental releases and minimize impacts to surface water resources. The Operator would construct berms or other containment devices to hold 110 percent of the volume of any one container or tank that would be installed on a location. Other measures, such as use of a closed loop drilling system, would be utilized as determined to be appropriate at an onsite inspection (See Section 2.2.2.1). Pipeline construction according to the BLM's *Hydraulic Considerations for Pipeline Crossings of Stream Channels* would ensure that the integrity of aboveground pipelines would not be compromised and down-channel surface water quality would not be affected by flash floods.

Consumptive water use reduces flows and may result in increased concentrations of pollutants. One possible water source for the proposed project may be the Green River (See Table 2-2). An estimated 348 acre-feet of fresh water would be taken from permitted sources for drilling and completion operations. Flow volumes in the river vary annually and are weather and snowpack dependent. Despite drought conditions, it is unlikely that the relatively small surface water withdrawal needed to support Alternative A would diminish flow volumes sufficiently to affect existing concentrations of pollutants in the surface water.

4.3.1.8 Wild Horses

Alternative A would result in approximately 151.2 acres of surface disturbance affecting wild horse habitat. Construction and drilling activities during the estimated three years would create noise and may temporarily displace wild horses from the WHBPA. Wild horses would be more likely to use adjacent undisturbed locations within the Hill Creek herd area until production operations are established. Competition between wild horses and grazing livestock for available resources in the WHBPA may increase.

4.3.1.9 Wildlife

Alternative A would result in approximately 151.2 acres of surface disturbance affecting wildlife habitat.

4.3.1.9.1 Migratory Birds (including Raptors)

Alternative A would result in an initial disturbance of 151.2 acres to nesting habitat for migratory birds, including raptors. Ground-nesting species would be subject to a long-term unavailability of 62.9 acres.

Migratory birds. Surface disturbing activities conducted during the spring and summer months when they breed and nest would be more likely to disturb migratory birds than operations that would take place in the late fall and winter months when fewer birds would be present. Most migratory birds species will have left the WHBPA by the late fall for warmer wintering grounds to the south.

The degree of disruption to the high-risk nesting cycle would typically be related to proximity to a nest. Adult birds are more easily prone to temporarily desert or permanently abandon nests in response to disturbance, which includes atypical noise. Leaving a nest could result in leaving the eggs and/or young susceptible to the effects of inclement weather, solar radiation, and predation. Temporary flushing from nests by adult birds can result in mortality of young birds, which continue to be dependent on parental care after hatching (Romin and Muck, 2002). The effects to nesting migratory birds would be generally limited to those species that nest on the ground or on cliffs since trees constitute only one percent the WHBPA (See Section 3.3.3.3). BCC and PIF conservation priority birds typically exhibit small population sizes and limited distributions; they are, therefore, more likely to disproportionately suffer impacts.

Raptors. Effects to raptors during the nesting season from project operations would depend upon proximity to nest sites, patterns of noise occurrence, and noise intensity. The Operator has committed to conduct raptor surveys if project operations would occur during the raptor nesting period. Providing a spatial buffer to active nests during nesting season would reduce the likelihood of nest abandonment or raptor displacement that may otherwise result from nearby human activity and noise during that sensitive high-risk time (See Appendix C). Therefore, impacts to nesting raptors would be avoided with the imposition of applicable timing restrictions and spatial offsets to active nests.

Construction and drilling operations occurring outside of the nesting/fledging period may cause raptors to temporarily move to undisturbed areas where forage and cover is abundant to avoid elevated noise levels and human activities (Romin and Muck, 2002). Displacement of raptors to nearby less-disturbed habitats may, however, result in increased competition between species and within individuals of a species for available resources. Implementation of Alternative A may alter or reduce prey availably or alter habitat that might render it unsuitable for future occupancy by a nesting raptor pair (Romin and Muck, 2002). Expanding existing well pads, use of existing access roads, and replacement of pipelines within an existing pipeline corridor would diminish the effects of habitat fragmentation.

4.3.1.9.2 Non-USFWS Designated Species

Bluehead sucker, flannelmouth sucker, and roundtail chub. Any depletion of waters of the Upper Colorado River Basin would result in adverse effects to the Conservation Agreement fish. Impacts to the flannelmouth sucker, bluehead sucker, and roundtail chub would be qualitatively and quantitatively similar. Fresh water use during the construction, drilling, and completion phase is estimated to be 348 acre-feet. Water depletion impacts would not be likely to result in a loss of viability of these species or their habitat because measures intended to protect endangered Colorado River fish would also protect the

flannelmouth sucker, bluehead sucker, and roundtail chub. Indirect impacts to T&E Colorado River fish may include degradation of their habitat. See Section 4.2.1.9.3 for more information.

Ferruginous hawks. Impacts to ferruginous hawks are generally described in Section 4.2.1.9.1 (Raptors). Implementation of Alternative A may affect habitat for ferruginous hawks, but seasonal restrictions and spatial offsets to active hawk nests would prevent adverse effects to this species during the nesting season. The nesting period and recommended buffer for nesting ferruginous hawks is 0.5 mile from March 1-August 1, annually (See Appendix C).

Western burrowing owls. Impacts to burrowing owls are generally described in Section 4.2.1.9.1 (Raptors). Impacts specific to this species may include reduced potential nesting habitat if white-tailed prairie dog colonies were to be disturbed by construction operations. Owls that display fealty to a particular burrow may lose that burrow if located in a pad expansion area. Alternative A would not be likely to result in a reduction of burrowing owl viability range-wide because the amount of disturbance is small in comparison with available suitable habitat. Implementation of Alternative A may affect habitat for burrowing owls, but seasonal restrictions and spatial offsets to active burrowing owl nests would prevent adverse effects to this species during the nesting season. The nesting period and recommended buffer for nesting burrowing owls is 0.25 mile from March 1-August 31, annually (See Appendix C).

White-tailed prairie dogs. If present, Alternative A may result in mortality of individuals, reductions in habitat, and destruction of portions of any existing prairie dog towns. A colony may utilize hundreds of acres, making a reduction of species viability range-wide unlikely. Expanding 37 existing well pads and upgrading pipelines within existing pipeline corridors would diminish effects to prairie dogs because they would be likely be offset from ongoing production operations. Implementation of Alternative A may affect individual white-tailed prairie dogs.

American bison. Impacts to bison would be qualitatively similar and quantitatively identical to the impacts described for pronghorn antelope. Approximately 151.2 acres of forage would be removed from suitable bison habitat in the WHBPA for the short term. Long-term removal of forage would result from 62.9 acres of bare ground. If present, construction and drilling activities would create noise and may temporarily displace bison from the WHBPA over the estimated three years of construction and drilling operations. The bison would be more likely to use adjacent undisturbed areas until production operations are established. Competition between bison and grazing livestock for available resources in the WHBPA may increase.

Pronghorn antelope. Implementation of Alternative A would result in unavailability of crucial value pronghorn habitat. Impacts to pronghorn from Alternative A would result from a short-term loss of 151.2 acres of crucial value habitat. If initial reclamation were to be successful, vegetation would be restored on 88.3 acres and 62.9 acres of disturbance would remain for the long term. Habitat fragmentation would be exacerbated by the expansion of 37 existing well pads. Pipeline upgrades would require construction in existing pipeline corridors, and effects to pronghorn from pipeline replacement after construction and successful reclamation is complete would be negligible. No new roads would be constructed and would therefore not contribute to additional habitat fragmentation within the WHBPA.

Alternative A would not affect available water sources, which has been identified as a critical factor determining population viability. Because the WHBPA is 3 miles from the perennial Green River, it lies within the 4-mile range from a consistent water source. Pronghorn would likely be temporarily displaced from the project area during construction and drilling operations over an estimated three years. Because their home range typically can be as large as 5,600 acres, sufficient suitable habitat, likely nearer to the river, would be available to meet their forage needs. During the spring after does give birth, female pronghorn and their young would require the protein supplied by an abundance of forbs. It is unlikely the project operations would compromise the viability of does and young offspring because they would prefer habitat that produces forb vegetation.

Rocky Mountain bighorn sheep. Implementation of Alternative A would involve drilling operations on 17 expanded well pads located in bighorn sheep habitat. Well pad expansion would result in short-term loss of 37.4 acres within the 468.9 acres of bighorn habitat in the WHBPA. After successful initial reclamation reestablishes vegetation, 8.5 acres would be available again for use by sheep, leaving a long-term removal of 28.9 acres of suitable habitat.

The impacts to bighorn sheep would be qualitatively similar to those that would be experienced by pronghorn antelope and bison. Effects to bighorn sheep in occupied habitat may result in displacement by fleeing from construction and drilling activities, which may be experienced as unpredictable human activities. The existing well pads that would be expanded are located above the drainages that may be used as escape terrain. Bighorn sheep would likely flee into nearby escape terrain or downward into the drainages, incurring temporary energetic stress. Bighorn may become habituated to vehicles and road traffic. Infrequent, temporary disturbances are not likely to result in harm to bighorn sheep (Papouchis, 2001); however, when bighorn sheep are continually disturbed they may abandon habitat resulting in decreased numbers and distribution. Foraging habitat would be available outside the WHBPA if the bighorns chose to use less of their range.

4.3.1.9.3 Threatened, Endangered, Proposed, or Candidate Wildlife Species

The Colorado River endangered fish species, including the Colorado pikeminnow, razorback sucker, humpback chub, and bonytail chub, would be affected by activities that deplete or degrade the flow of downstream waters into the Upper Colorado River Basin (USFWS, 2011; USFWS, 2002; USFWS, 2002a; USFWS, 2002b; USFWS, 2002c; USFWS, 1994; USFWS, 1990). Impacts to these species are discussed as a group because the impacts would be qualitatively and quantitatively similar.

Any depletion of waters of the Upper Colorado River Basin would result in adverse effects to the four T&E Colorado River fish. Fresh water use during the construction, drilling, and completion phase is estimated to be 348 acre-feet. Prior to construction and drilling operations, the Operator would pay a depletion fee according to the current payment schedule. The one-time payment would be calculated by multiplying the peak annual depletion by the depletion charge in effect at the time the payment is made. Payment would provide appropriate legal protection of the instream flow needs of the endangered Colorado River fish, would avoid the likelihood of resulting in jeopardy to the endangered fish, and would avoid destruction or adverse modification of their critical habitat.

Other indirect impacts to T&E Colorado River fish may include degradation of their habitat. While ephemeral drainages occur in and near the WHBPA, none of these drainages contains perennial waters or provides habitat elements required by the T&E Colorado River fish. Although drainages within and near the WHBPA have flashflood potential, it is unlikely that runoff originating from the WHBPA would reach the perennial water of the Green River because of the 3-mile distance to the river, low amounts of seasonal precipitation, and high rate of evaporation (See Sections 3.2 and 4.3.1.7). Degradation of T&E Colorado River fish habitat as a result of erosion or sedimentation would be unlikely. In addition, the implementation of erosion control techniques determined at the onsite inspection, Gold Book BMPs, and the Operator's SWPPP would further discourage sedimentation (See Appendix E).

BLM conducted formal consultation with the USFWS with respect to Alternative A, which was concluded on December 28, 2014, with the receipt of correspondence from the USFWS (See Section 5.1) The USFWS concluded that alternative A is not likely to jeopardize the continued existence of the endangered Colorado pikeminnow, razorback sucker, humpback chub, and bonytail chub and is not likely to destroy or adversely modify designated critical habitat.

4.3.1.10 Mitigation Measures

General:

1. All commitments in Section 2.2.6 would be adhered to by the Operator.

Invasive Plants/Noxious Weeds, Soils, and Vegetation:

2. Conduct annual monitoring of the progress of initial as well as final reclamation operations. If invasive species/noxious weeds are present, apply herbicides as appropriate to the type of species and the time most favorable for their effective use. Regular periodic monitoring for weeds and taking approved measures to eradicate them on a consistent basis would prevent weeds from becoming established or spread if they were inadvertently introduced via seed transport or opportunistically took advantage of newly disturbed surface.

4.3.1.11 Residual Impacts

Residual impacts are those impacts that remain after the proposed mitigation measures have taken effect. Residual impacts represent the degree of environmental change. Residual impacts would correspond to all phases of well development and operation during approximately 40-year well life and the time required to reestablish vegetation, approximately five years. Approximately 62.9 acres would be devoid of vegetation and unavailable for land uses other than oil and gas production while the wells are producing. Small chemical and biological changes would occur to WHBPA soils as a result of compaction, use of herbicides, and removal of vegetation cover.

Available forage would be diminished for livestock, wild horses, or wildlife as a result of 69.2 acres of bare ground for the long-term. Fragmentation of wildlife habitat would increase in the WHBPA as a result of well pad expansion. Contiguous habitat areas would be reduced in size. Wildlife and livestock

would likely be temporarily displaced during well pad expansion, drilling and completion operations, and upgrading pipelines.

Fugitive dust resulting from construction activities would be released during the estimated three years of construction and drilling activity. Emissions of criteria pollutants and GHGs from gas production equipment would continue for the estimated 40-year lives of the wells. NO_x and VOC emissions would contribute to the formation of ozone and to the concentrations measured in the Uinta Basin.

Despite clearance surveys and compliance with Section 106, surface-disturbing activities have the potential to damage or destroy unknown and undetected cultural resources. Paleontological resources could be similarly impacted. Adhering to applicable laws would provide opportunities for mitigation of the majority of these impacts.

Produced gas would be removed from the existing reserves and would be irretrievably lost to future use. Alternative uses for the land would be regained after the wells are plugged and abandoned and the land is fully reclaimed.

4.3.1.12 Monitoring and/or Compliance

Monitoring would take place periodically during the life of the project or as required by law. During construction of each expanded well pad, the dirt contractor would be checked by the BLM to ensure that the disturbance conforms to what was approved in the APD. During the lifetime of a well, surface compliance inspections would be conducted by the BLM to ensure continued protection of the environment. After a well is plugged, the site would be inspected by the BLM to determine necessary reclamation measures, and it would be inspected in accordance with the Green River District Reclamation Guidelines thereafter until it is determined that reclamation is successful and a well and/or well pad could be accepted for final abandonment.

4.3.2 Alternative B – No Action

Under Alternative B, development of the proposed 135 natural gas wells and their associated facilities would be precluded. Pipelines would not be upgraded. Selection of Alternative B would not affect the ongoing oil and gas operations currently permitted and operating in the WHBPA. The impacts associated with current land uses and existing and approved oil and gas operations would continue under this alternative.

4.3.2.1 Air Quality Greenhouse Gases

Air Quality. Emissions of 32.41 TPY NO_x, 28.55 TPY CO, 170.38 TPY VOCs, 0.02 TPY SO_2, 7.08 TPY PM_{10}, 2.92 TPY $PM_{2.5}$, and 30.87 TPY (total) HAPs from well production operations would not be released to the atmosphere.

Greenhouse Gases. GHGs from 135 wells would not be released into the atmosphere. Approximately 47,761 TPY CO_{2e} would not be released into the atmosphere.

4.3.2.2 Cultural Resources: Archaeological Resources

Approximately 151.2 acres of surface disturbance that could result in inadvertent adverse effects to cultural resources would not occur.

4.3.2.3 Invasive Plants/Noxious Weeds, Soils, and Vegetation

Invasive Species/Noxious Weeds. Possible introduction or spread of noxious weeds and/or invasive plant species would not occur as a result of expanding well pads and upgrading pipelines. Invasive plants could still be brought into the WHBPA as seeds on vehicles that access the project area.

Soils. Approximately 151.2 acres of soils would not be disturbed for construction purposes. Approximately 62.9 acres of soils would not be used for production operations for the lives of the wells and would remain in their current condition. Accelerated soil loss from 62.9 acres of bare ground would not result in approximately 188.7 tons of soil per year, an increase of 125.8 tons over the natural attrition rate for undisturbed soil.

Vegetation. Approximately 151.2 acres of plant habitat would not be disturbed for construction purposes. Approximately 62.9 acres of vegetation would not be used for production operations for the lives of the wells and would remain in their current condition.

4.3.2.4 Livestock Grazing and Rangeland Health Standards

Livestock Grazing. Approximately 151.2 acres of grazing forage would not be disturbed for construction purposes. Approximately 69.2 acres would remain available for livestock forage for the long term. Approximately 6.7 AUMs (4.4 effective AUMs) would not be lost within the WHBPA portion of the Wild Horse Bench Allotment for the 40+ years of well operation.

Rangeland Health. The rangeland health assessment of the Wild Horse Bench Allotment would not be changed by the expansion of 37 well pads or the placement of upgraded aboveground pipelines within 14.4 miles of existing pipeline corridors. The current determination of "improve" would likely remain unchanged.

4.3.2.5 Paleontological Resources

Approximately 151.2 acres of surface disturbance that could result in inadvertent adverse effects to paleontological resources would not occur.

4.3.2.6 Threatened, Endangered, Proposed, or Candidate Plant Species

Indirect impacts to the habitat of the Uinta Basin hookless cactus and clay reed-mustard would not result from project operations.

4.3.2.7 Water Resources: Surface Water Quality

Approximately 348 acre-feet would not be withdrawn from the Green River to be used for drilling operations.

4.3.2.8 Wild Horses

Approximately 151.2 acres of grazing forage for wild horses would not be disturbed for construction purposes. Approximately 62.9 acres of grazing forage would not be used for long-term production operations.

4.3.2.9 Wildlife

Migratory Birds, including Raptors. Approximately 151.2 acres of potential nesting and foraging habitat for migratory birds and raptors would not be disturbed for construction purposes. Approximately 62.9 acres of migratory bird and raptor habitat would not be used for production operations for the lives of the wells.

Non-USFWS Designated Species. Direct impacts to individuals or the 151.2 acres of habitat for white-tailed prairie dogs, burrowing owls, or ferruginous hawks would not occur from project construction operations. Impacts to the habitat of the bluehead sucker, flannelmouth sucker, and roundtail chub would not occur. Approximately 62.9 acres of habitat would not be used for production operations for the lives of the wells. Use of fresh water that may be obtained as depletions from the Colorado River system, estimated at 348 acre-feet, would not occur, preventing impacts to Conservation Agreement fish habitat from project implementation.

Approximately 151.2 acres of pronghorn antelope and bison crucial year-long habitat and 37.4 acres of bighorn sheep crucial year-long habitat would not be disturbed for construction purposes. Approximately 62.9 acres of pronghorn antelope and bison habitat and 28.9 acres of bighorn sheep habitat would not be used for production operations for the lives of the wells. Possible loss of prairie dog individuals or part of a colony would not occur. Temporary displacement of pronghorn antelope, bison, and/or Rocky Mountain bighorn sheep would not occur.

Threatened, Endangered, Proposed, or Candidate Animal Species. Impacts to the habitat of the endangered Colorado pikeminnow, razorback sucker, humpback chub, and bonytail chub would not occur. Water depletions, estimated at 348 acre-feet, would not occur from project implementation.

4.3.2.10 Mitigation Measures

Mitigation measures are not needed for the implementation of the No Action Alternative.

4.3.2.11 Residual Impacts

Because residual impacts are those impacts that remain after the mitigation measures have taken effect, and because no mitigation measures would be applied to the No Action Alternative, residual impacts would not result from Alternative B.

4.3.2.12 Monitoring and/or Compliance

Monitoring of resource conditions would continue as they are currently being conducted. No additional monitoring would be needed under Alternative B.

4.4 Cumulative Impact Analysis

Cumulative impacts are the incremental effects to specific resources that would occur from the alternatives in consideration of other reasonably foreseeable actions that may occur in the CIA, which is defined for each resource. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The assumptions used as a basis for this analysis are described in Section 4.2.

4.4.1 Air Quality and Greenhouse Gases

4.4.1.1 Cumulative Impact Area

The CIA for air quality and greenhouse gases is the 11,500-square mile Uinta Basin. Oil and gas development is currently believed by the Vernal FO to be primarily responsible for past, current, and reasonably foreseeable impacts to air quality in the Uinta Basin. Impacts to air quality resulting from the Proposed Action would add to the concentration of pollutants in this airshed, which is topographically defined by the physiography of the Uinta Basin. The higher terrain on all sides of the basin results in similar climate and dispersion conditions for pollutants within it. The time frame for the cumulative impacts analysis is 43 years, including the estimated life of a typical well plus the estimated 3-year drilling scenario.

4.4.1.2 Past and Present Actions

Cumulative impacts of potential oil and gas and other emission sources in the region of the WHBPA have been extensively evaluated in two recent Final EISs: Greater Natural Buttes (BLM, 2012) and Gasco Energy (BLM, 2012a; Alpine and Buys, 2010). Both documents evaluated the potential impact of existing, proposed, and reasonably foreseeable oil and gas development in the Uinta Basin.

4.4.1.3 Reasonably Foreseeable Action Scenario

Alternative A is contained within the modeled scope of projected oil and gas development for the GNB and Gasco EISs, which were based on WRAP III projected well activity for the year 2018. The GNB EIS analyzed the cumulative air quality impact of 8,196 gas wells (BLM, 2012, Table 3-2, Appendix G) plus the 3,675 wells proposed to be developed by GNB by calendar year 2018. The GASCO model was developed earlier than the GNB model and analyzed 1,491 wells plus a projected 11,844 wells (BLM, 2012a, Table 3-3). The 135 wells that comprise Alternative A constitute 1.6 percent of the 8,196 sources analyzed in the more recent GNB Final EIS.

4.4.1.4 Cumulative Impact Analysis

4.4.1.4.1 Air Quality

Alternative A. Cumulative impacts to air quality were evaluated based on the results of the modeling conducted for the GNB and GASCO EISs, estimates of cumulative emissions from the project compared to basin-wide oil and gas operations, and the results of the ongoing winter ozone studies described in Section 3.3.1.1. Cumulative project emissions include both drilling and construction emissions (Table 4-1) plus ongoing production emissions (Table 4-3). Basin-wide emissions from oil and gas operations are shown in Table 3-3.

Modeling performed in support of the GNB EIS determined that, with the exception of the 1-hour standard for NO_2, the NAAQS would not be exceeded from the construction and operation of 3,675 wells and that the cumulative impacts of those wells to air quality would not exceed the NAAQS (BLM, 2012). It should be noted that the photochemical modeling conducted for GNB did not evaluate winter ozone formation, which is a recognized issue in the Uinta Basin (See Section 3.3.1.1) as the ability to model for winter ozone has not been developed to date, so NAAQS determinations relating to ozone are strictly reflective of modeled summer ozone concentrations, which appear to be meeting the current NAAQS and follow a generally west-wide temporal and concentration pattern. A summary of the GNB modeling results follows:

- Cumulative impacts from criteria pollutants to ambient air quality are well below the NAAQS at Class I airsheds and selected Class II areas;
- The incremental impacts to visibility would be virtually impossible to discern and would not contribute to regional haze at the Class I areas;
- The 2018 projected baseline emissions would result in impacts of 1.0 deciview for at least 201 days per year at modeled Class II areas;
- Discernible impacts at Flaming Gorge National Recreation Area and Dinosaur National Monument were anticipated;
- Less than 1 percent would be contributed to the acid deposition in modeled Class I areas, and 4.3 percent at the Flaming Gorge Class II area;
- Acid deposition impacts at sensitive lakes would be below the U.S. Forest Service screening threshold; and
- Ozone levels would be below the current ozone standard of 75 parts per billion (ppb) for the fourth highest annual level in the Uinta Basin for the 2018 projected baseline, and the proposed action would be approximately 3.2 percent of the cumulative ozone impact within the Uinta Basin.

Similarly, modeling conducted to determine cumulative impacts to air quality for the Gasco project concluded that increases in pollutant concentrations in combination with other cumulative well development operations were predicted to occur at levels below the NAAQS (Alpine and Buys, 2010. Based on the results of these two comprehensive modeling analyses for larger projects it can be safely assumed the Wild Horse bench project will not cause or contribute to any cumulative NAAQS or AQRV issues, with the exception of winter ozone exceedences. As stated in Section 4.3.1.1, while project-specific emissions may not result in a definable increase in ozone concentrations through photochemical modeling, these emissions will likely contribute incrementally, and cumulatively, to basin-wide ozone concentrations and potentially exacerbate winter ozone NAAQS exceedences.

Alternative B. No direct or indirect impacts to air quality would occur under this alternative, so an accumulation of impacts would not occur.

4.4.1.4.2 Greenhouse Gas Emissions

Alternative A. Increasing concentrations of GHGs in the atmosphere affect climate, and the proposed wells would contribute to an increase in GHG concentrations. Production emissions from Alternative A would contribute 47,761 tonnes of CO2e to the atmosphere.

The assessment of GHG emissions and climate change is in its formative phase. The physical aspects of the climate system and climate change related to changes in GHGs are still being assessed. Climate models, climate projections, air quality feedback forcing mechanisms, and the causes and attribution of climate change are among the topics being studied on scales relating global, regional, or economic sector inputs. Economic sectors, such as energy, transport, buildings, industry, agriculture, forestry, waste management, are being assessed with respect to options for mitigating climate change through limiting or preventing GHG emissions and enhancing activities that remove them from the atmosphere. An integrated assessment model that links the world's energy, agriculture and land use systems with a climate model is used to assess world-wide policy and technology strategies over long time scales (EPA, 2013b). However, procedures for projecting how a climate system would respond within a narrow range of input parameters confined to a specific locale from a single source are currently undetermined. Therefore, estimates of GHG emissions from Alternative A would be impossible to relate to possible impacts to regional or global climate, and the net impacts to climate attributable to the proposed wells cannot yet be determined. Increasing concentrations of GHGs are likely to accelerate the rate of climate change, however, and project implementation would contribute to those increases.

Alternative B. No direct or indirect impacts to GHGs would occur under this alternative, so an accumulation of impacts would not occur.

4.4.2 Cultural Resources: Archaeological Resources

4.4.2.1 Cumulative Impact Area

The CIA for cultural resources/archaeological resources is the 1,840-acre WHBPA because impacts to cultural resources within the WHBPA would not add to similar impacts outside of the project area. Impacts to cultural resources correspond to the amount of surface disturbance. The time frame for the cumulative impacts analysis is the estimated 3-year construction time frame.

4.4.2.2 Past and Present Actions

Past and present actions within the CIA consist of the construction of 37 well pads affecting 66.6 acres and 12.9 miles of roads affecting 25.0 acres. Total past and present surface disturbance comprises 91.6 acres within the CIA.

4.4.2.3 Reasonably Foreseeable Action Scenario

Reasonably foreseeable surface disturbance within the CIA consists of the proposed well pad expansions and upgrading the pipelines within existing pipeline corridors. Expanding well pads would affect 81.4 acres. Upgrading the pipelines would affect 69.8 acres. Although the pipeline corridors would be immediately be reclaimed and, therefore, not constitute long-term disturbance, surface-disturbing operations have the potential to affect unidentified cultural resources. Thus, construction operations in

the pipeline corridors were included as reasonably foreseeable actions. Total reasonably foreseeable surface disturbance comprises 151.2 acres within the CIA.

4.4.2.4 Cumulative Impact Analysis

Past, current, and reasonably foreseeable oil and gas actions may result in the long-term disturbance of 242.8 acres, corresponding to 13.2 percent of the CIA (See Table 4-6).

Table 4-6: Cumulative Surface Disturbance within the WHBPA

Type of Surface Disturbance	Long-Term Disturbance (acres)
Past and Present Actions	91.6
Reasonable Foreseeable Actions	151.2
Total	242.8

Alternative A. Cumulative impacts to cultural resources would result from 242.8 acres of disturbance in the CIA, of which Alternative A would contribute 151.2 acres. Cumulative impacts to cultural resources would be qualitatively identical to those impacts described for the Proposed Action (See Section 4.2.1.2). Adverse effects to cultural resources would be minimized or avoided by pre-construction inventories. Identified cultural resource locations that are eligible for inclusion on the NRHP would generally be avoided. Mitigation measures would be developed by the BLM and the SHPO where necessary to minimize impacts to eligible cultural resources. The cultural resource knowledge base would be expanded as a result of the inventories.

Alternative B. No direct or indirect impacts to cultural resources would occur under this alternative, so an accumulation of impacts would not occur.

4.4.3 Invasive Plants/Noxious Weeds, Soils, and Vegetation

4.4.3.1 Cumulative Impact Area

The CIA for invasive plants/noxious weeds, soils, and vegetation is the Kings Canyon-Green River watershed east of the Green River, including approximately 24,800 acres (See Maps 5, 6, and 7). The CIA extends southward from the Green River to include both sides of Kings Canyon west of Wild Horse Bench, consisting of approximately 39 sections in T9S-R19E, T10S-R19E, and T11S-R19E. A watershed is defined by topography and is a geographic area of land, water and biota within the confines of a drainage divide. Watershed analysis provides a framework for delineating the spatial distribution and linkages for physical processes and biological communities in a physical context. Using a watershed to analyze cumulative impacts to invasive plants/noxious weeds, soils, and vegetation recognizes the interrelated needs of these resources, in consideration of water and wildlife, as they respond to social and economic pressures. Information on ecological processes, history, condition, and response potential within the defined area of a watershed provides an opportunity for balancing environmental and economic objectives in consideration of land use and the intrinsic capability and capacity of the land.

Ecological processes that take place on the east side of the Green River, rather than the entire watershed, which includes surface on the west side of the river, would be subject to cumulative effects that may

occur as a result of project implementation. Site-specific management of invasive plants/noxious weeds and vegetation considers preserving/restoring habitat and reestablishing desired forage, which influence the sustainability of vegetation within the CIA. Impacts from the introduction or spread of invasive plants/noxious weeds would add to similar impacts throughout the CIA. Site-specific management of soils considers soil loss via erosion, sedimentation, and preservation of soil viability, which influence the sustainability of soils within the CIA. Impacts to soils within the project area would add to cumulative effects to the vegetation communities found within the CIA.

The time frame for the cumulative impacts analysis is the estimated 3-year construction and drilling time frame; the 40-year estimated well life; and 5 years to achieve successful reclamation, or a total of 48 years.

4.4.3.2 Past and Present Actions

Past and present actions within the CIA consist of oil and gas development. As of August 2013, the CIA contained 211 active well pads (UDOGM, 2013). Most well pads contain a single well, resulting in a long-term disturbance of 527.5 acres.

4.4.3.3 Reasonably Foreseeable Action Scenario

Reasonably foreseeable oil and gas development in the CIA includes 28 approved APDs (UDOGM, 2013) and the proposed project. In addition, the CIA overlaps approximately 31 percent of the XTO Riverbend Unit infill project, which was approved in January 2013 (UT-080-07-772). A uniform development density within the Riverbend Unit was assumed to estimate long-term reasonable foreseeable surface disturbance within the CIA as 31 percent of the long-term disturbance analyzed in the Riverbend Unit Infill Development EA.

Table 4-7: Reasonable Foreseeable Surface Disturbance within the Kings Canyon-Green River Watershed East of the Green River

Type of Surface Disturbance	Long-Term Disturbance (acres)
28 Well Pads-Approved APDs	72.8
37 Well Pad Expansions - Alternative A	62.9
14.4 miles of Pipeline Upgrades – Alternative A	0.0
XTO Riverbend Unit Infill Project	172.1
Total	307.8

4.4.3.4 Cumulative Impact Analysis

Past, current, and reasonably foreseeable oil and gas actions may result in the long-term disturbance of 835.3 acres, corresponding to 3.4 percent of the 24,800-acre CIA (See Table 4-8).

Table 4-8: Cumulative Surface Disturbance within the Kings Canyon-Green River Watershed East of the Green River

Type of Surface Disturbance	Long-Term Disturbance (acres)
Past and Present Actions	527.5
Reasonable Foreseeable Actions	307.8
Total	835.3

Alternative A. The Proposed Action would contribute 62.9 acres to the estimated 835.3 acres of long-term surface disturbance in the CIA.

Disturbance to soils and/or vegetation may result in the introduction or expanded presence of invasive plants and/or noxious weeds if measures would not be taken for prevention. Most of the CIA supports dry vegetation and could be rapidly colonized with unwanted species without effective herbicide treatment. Site-specific reclamation plans, the requirement for oil and gas operators to follow the Vernal FO Surface Disturbance Weed Policy (April 2010), and the requirement for consistency with the BLM Green River District Reclamation Guidelines would help to overcome the inherent limitations of the soils to support new desirable vegetation. Oil and gas operators must submit pesticide use plans to the Vernal FO prior to treatment and are responsible for the control of weeds on their locations and access. Monitoring and proactive weed treatment would render negligible incremental adverse cumulative impacts from the spread or introduction of invasive/noxious species from the implementation of Alternative A.

The dominant soil unit within the CIA consists of the same soil unit that comprises the WHBPA: the Motto-Casmos Complex, 2-25 percent slopes (See Map 5). This soil unit covers 27.1 percent (6,737 acres) of the CIA. Past, current, and reasonably foreseeable actions in the CIA would result in impacts similar to the impacts described in Section 4.3.1.3.2, as they apply to this soil unit. The presence of rocks and gravels in soils, as is common in upland soils in the CIA, would diminish adverse effects to soil chemistry and texture from compaction. Removal of vegetation cover would reduce organic contributions to nutrient-poor soils within the CIA. The more productive loamy soils in the CIA are present in a narrow border along the Green River and are associated with riparian vegetation (See Maps 5 and 6). Cumulative effects to the productive soils would be made negligible by mandatory offsets of well development construction activities to riparian areas (See Maps 5, 6, and 7). Alternative A would contribute 188.7 tons of soils lost from wind and water erosion to the estimated 2,505.9 tons of soil lost annually in the CIA. Leaks or spills of fuels, condensate, and/or produced water could occur from equipment and machinery use, adversely affecting soil productivity where such releases occur. Impacts to soils from accidental releases would be minimized by following procedures specified in SPCCPs.

The dominant vegetation communities within the CIA correspond to the dominant vegetation communities in the WHBPA (See Map 6): sagebrush shrublands and mixed desert shrub communities. Together, these two communities represent over 80 percent (20,135 acres) of the vegetation in the CIA. However, in contrast to the WHBPA, mixed desert shrubs are more abundant in the CIA than the sagebrush-dominated WHBPA. Past, current, and reasonably foreseeable actions in the CIA would result in impacts similar to the impacts described in Section 4.2.1.3, as they apply to sagebrush and mixed desert

shrublands. Disturbed areas originally populated by shrubs would likely be re-populated with grasses in the short term after initial reclamation is performed. Recovery of the shrub component of the vegetation communities would occur more slowly than grasses and would be dependent on adequate rainfall.

Alternative B. The presence of noxious and invasive species present in the CIA would remain under existing influences and other future proposals. No direct or indirect impacts to soils would occur under this alternative, so an accumulation of impacts to soils would not occur. No direct or indirect impacts to vegetation would occur under this alternative, so an accumulation of impacts to vegetation would not occur.

4.4.4 Livestock Grazing and Rangeland Health Standards

4.4.4.1 Cumulative Impact Area

The CIA for livestock grazing and rangeland health standards is the 43,526-acre Wild Horse Bench Allotment. The time frame for the cumulative impacts analysis is the estimated 3-year construction and drilling time frame; the 40-year estimated well life; and 5 years to achieve successful reclamation, or a total of 48 years. Impacts to the amount of available forage to livestock within the WHBPA would add to similar impacts within the allotment, determining the amount of supportable AUMs and cumulative effects to rangeland health.

4.4.4.2 Past and Present Actions

Primary past and present actions within the CIA consist of oil and gas development. As of August 2013, the CIA contained an estimated 439 active well pads (UDOGM, 2013). Most well pads contain a single well, resulting in a long-term disturbance of 1,097.5 acres. Range improvements have resulted in an additional 24 acres of disturbance. Total past and present surface disturbance is approximately 1,121.5 acres.

4.4.4.3 Reasonably Foreseeable Action Scenario

Reasonably foreseeable oil and gas development in the CIA includes 38 approved APDs and the proposed project. In addition, the CIA overlaps approximately 78.2 percent of the XTO Riverbend Unit infill project, which was approved in January 2013 (UT-080-07-772). A uniform development density within the Riverbend Unit was assumed to estimate long-term reasonable foreseeable surface disturbance within the CIA as 78.2 percent of the disturbance acreage analyzed in the Riverbend Unit Infill Development EA; therefore, specific types of oil and gas facilities were not quantified for this project in Table 4-9.

Table 4-9: Reasonable Foreseeable Surface Disturbance within the Wild Horse Bench Allotment

Type of Surface Disturbance	Number	Long-Term Disturbance (acres)
Well Pads- Approved APDs	38 new well pads	98.8
Well Pad Expansions - Alternative A	37 expansions	62.9
Pipeline Upgrades – Alternative A	14.4 miles of corridors	0.0
XTO Riverbend Unit Infill Project	Not quantified	439.7
Total		601.4

4.4.4.4 Cumulative Impact Analysis

Past, current, and reasonably foreseeable oil and gas actions would result in the long-term disturbance of 1,722.9 acres, corresponding to 4.0 percent of the CIA (See Table 4-10).

Table 4-10: Cumulative Surface Disturbance within the Wild Horse Bench Allotment

Type of Surface Disturbance	Long-Term Disturbance (acres)	AUMs Removed	Effective AUMs Removed
Past and Present Actions	1,121.5	119.0	79.3
Reasonable Foreseeable Actions	601.4	63.8	42.6
Total	1,722.9	182.8	121.9

Alternative A. An estimated 1,722.9 acres would be unavailable for forage as a result of cumulative disturbance within the Wild Horse Bench Allotment, affecting approximately 182.8 permitted AUMs or 121.9 effective AUMs. Alternative A would contribute to the removal of 6.7 permitted AUMs or 4.4 effective AUMs.

The permitted use of the Wild Horse Bench allotment has been diminished because of poor range conditions. Future reclamation efforts would partially compensate for the removal of forage if successful. Until forage is reestablished, cumulative effects to the allotment may continue to effectively reduce the AUMs that the allotment would be able to support. The rangeland health condition of the Wild Horse Bench allotment would likely remain "improve."

Alternative B. No direct or indirect impacts to livestock grazing and rangeland health would occur under Alternative B, so an accumulation of impacts would not occur. Rangeland health in the Wild Horse Bench Allotment would remain under existing influences and other future proposals.

4.4.5 Paleontological Resources

4.4.5.1 Cumulative Impact Area

The CIA for paleontological resources is the 1,840-acre WHBPA because impacts to paleontological resources within the WHBPA would not add to similar impacts outside of the project area. Impacts to paleontological resources correspond to the amount of surface disturbance. The time frame for the cumulative impacts analysis is the estimated 3-year construction time frame.

4.4.5.2 Past and Present Actions

Past and present actions within the CIA are described in Section 4.4.2.2.

4.4.5.3 Reasonably Foreseeable Action Scenario

Reasonably foreseeable surface disturbance within the CIA are described in Section 4.4.2.3.

4.4.5.4 Cumulative Impact Analysis

Past, current, and reasonably foreseeable oil and gas actions may result in the long-term disturbance of 242.8 acres, corresponding to 13.2 percent of the CIA (See Table 4-6). Impacts to paleontological resources would be quantitatively identical and qualitatively similar to impacts described in Section 4.4.2.4.

Alternative A. Cumulative impacts to paleontological resources would result from 224.3 acres of disturbance in the CIA, of which Alternative A would contribute 151.2 acres. Cumulative impacts to paleontological resources would be qualitatively identical to those impacts described for the Proposed Action (See Section 4.2.1.5). Adverse effects to paleontological resources would be minimized or avoided by pre-construction inventories. Identified paleontological resource locations that are scientifically important would generally be avoided. Mitigation measures would be developed by the BLM where necessary to minimize impacts to paleontological resources. The paleontological resource knowledge base would be expanded as a result of the inventories.

Alternative B. No direct or indirect impacts to paleontological resources would occur under this alternative, so an accumulation of impacts would not occur.

4.4.6 Threatened, Endangered, Proposed, or Candidate Plant Species

4.4.6.1 Cumulative Impact Area

The CIA for T&E, proposed, or candidate plant species is the Kings Canyon-Green River watershed east of the Green River, encompassing approximately 24,800 acres. The CIA extends southward from the Green River to include both sides of Kings Canyon west of Wild Horse Bench, consisting of approximately 39 sections in T9S-R19E, T10S-R19E, and T11S-R19E. The rationale for the choice of the CIA is described in Section 4.4.3.1. Cumulative impacts to individual protected plants and their habitat could affect their status and the effectiveness of conservation measures taken to protect the viability of these protected species within a delineated area defined by interrelated physical processes and biological communities. The time frame for the cumulative impacts analysis is the estimated 3-year construction and drilling time frame; the 40-year estimated well life; and 5 years to achieve successful reclamation, or 48 years.

4.4.6.2 Past and Present Actions

Past and present actions within the CIA consist of oil and gas development. As of August 2013, the CIA contained 211 active well pads (UDOGM, 2013). Most well pads contain a single well, resulting in a long-term disturbance of 527.5 acres.

4.4.6.3 Reasonably Foreseeable Action Scenario

Reasonably foreseeable actions in the CIA consist of oil and gas development and are estimated to comprise 307.8 acres (See Section 4.4.3.3 and Table 4-8 for rationale).

4.4.6.4 Cumulative Impact Analysis

Past, current, and reasonably foreseeable oil and gas actions may result in the long-term disturbance of 835.3 acres, corresponding to 3.4 percent of the 24,800-acre CIA (See Section 4.4.3.4 and Table 4-9). Cumulative impacts to T&E, proposed, or candidate plant species would be qualitatively the same as the similar to the direct and indirect impacts discussed in Section 4.4.3.4 for general vegetation. Direct effects would include loss of individuals. Indirect impacts would include loss of habitat, habitat degradation from construction–related fugitive dust and dust from vehicle travel on unpaved roads, the spread and establishment of noxious and invasive species in suitable habitat, and road construction resulting in habitat fragmentation and increased access to isolated populations

Alternative A. Habitat for ESA-protected plant species may be localized or specific to certain environments. The locations of individuals of each species have been or would be mapped as project-specific inventories are performed. Only the clay-reed mustard and the Uinta Basin hookless cactus were identified as having potential to occur within the WHBPA based on habitat requirements and known distribution as delineated by the 2013 USFWS habitat polygons.

To prevent or reduce adverse impacts of habitat encroachment on protected plant species, the BLM and the USFWS developed species-specific conservation measures that moderate development in defined areas and specify protective offset distances from proposed development to plants and/or their occupied habitats (See Appendix C.1 and C.4). As these measures would be implemented under Alternatives A and B, impacts to protected plant species and their habitat would be mitigated, minimized, and monitored.

Biological inventories would be required in potential or known habitats of T&E, proposed, or candidate plant species prior to site-specific project implementation. These surveys determine the presence of any individual plants and extent of their habitat. Avoidance of T&E, proposed, or candidate plant individuals and/or performance of surface disturbing operations in accordance with conservation measures contained in Appendix C would promote the viability of these species.

BLM conducted formal consultation with the USFWS with respect to Alternative A, which was concluded on December 28, 2014, with the receipt of correspondence from the USFWS (See Section 5.1) The USFWS concluded that alternative A may affect, but is not likely to adversely affect Uintah Basin hookless cactus and clay reed-mustard based on applicant committed measures.

Uinta Basin hookless cactus. Areas outside of the WHBPA have been mapped by the USFWS as core conservation areas for the Uinta Basin hookless cactus. Management guidelines have been developed to guide the extent of energy development in the core conservation areas. Monitoring provisions for the Uinta Basin hookless cactus included in the current USFWS guidelines (USFWS, 2010) would enable a continuing assessment of impacts. Implementation of Alternative A would contribute 1.5 acres to the

long-term removal of 835.3 acres of habitat within the 24,800- acre CIA. Implementation of the Proposed Action would not be likely to change the assessment of USFWS conservation strategies.

Clay reed-mustard. Implementation of Alternative A would contribute 1.0 acres to the long-term removal of 835.3 acres of habitat within the 24,800- acre CIA, but its implementation would not likely change the assessment of conservation strategies.

Alternative B. No direct or indirect impacts to T&E, proposed, or candidate plant species would occur under this alternative, so an accumulation of impacts would not occur.

4.4.7 Water Resources: Surface Water Quality

4.4.7.1 Cumulative Impact Area

The cumulative impact area for water resources/surface water quality is the Green River Basin within the Uinta Basin because ongoing impacts from oil and gas development would affect surface water quality and its designated beneficial use criteria. The time frame for the cumulative impact analysis is the estimated 3-year construction and drilling time frame; the 40-year estimated well life; and five years to achieve successful reclamation, or a total of 48 years.

4.4.7.2 Past and Present Actions

Past and present oil and gas development actions that may have influenced surface water quality in the Green River include the construction of 6,362 well pads associated with 26,947 acres of surface disturbance (from BLM, 2012, Tables 2.2-1, 2.4-1, and 5.2-2).

4.4.7.3 Reasonably Foreseeable Action Scenario

Reasonably foreseeable oil and gas development actions that may influence surface water quality include 12,304 well pads associated with 55,886 acres of surface disturbance (from BLM, 2012, Table 5.2-3).

4.4.7.4 Cumulative Impact Analysis

Alternative A. Past, current, and reasonably foreseeable oil and gas actions may result in the development of 18,666 well pads corresponding to the disturbance of 82,833 acres. Surface disturbance in proximity to the Green River would be most likely to contribute sediments that may impair surface water quality. The 3-mile distance of the project area from the Green River and the implementation of construction BMPs suggest that Alternative A would add negligible impacts to surface water quality as a result of sedimentation.

The BLM has made a formal management decision to implement intensive management and construction measures to reduce sediment and salinity production on important watersheds, and to reduce water quality degradation of the Green River (BLM 2008). Gold Book construction and maintenance procedures would be utilized during the construction of oilfield locations, minimizing impacts to surface waters as a result of the past, current, and reasonably foreseeable oil and gas actions. An evaluation of sediment runoff from gas well sites suggests determined that sedimentation is diminished by revegetation and the implementation of BMPs (Williams et al, 2007). Construction of all-weather roads, as is typical of well

pad access roads in the Uinta Basin, is an example of a BMP that would reduce sedimentation from unpaved roads. Contributions from oil and gas construction operations to increased salinity concentrations within the Colorado River system would be minimized by the sedimentation control measures that would be finalized during the onsite inspections. As per BLM IM UTG000-2011-003, reclamation would be conducted in accordance with the Green River District Reclamation Guidelines for oil and gas operations in the Uinta Basin, which would maximize the accomplishment of successful reclamation.

In compliance with applicable regulations, oil and gas operators must develop detailed location-specific SPCCPs to respond in cases of spills or releases. Impacts to surface water would be minimized by adhering to the provisions of these plans. Additional impacts to surface waters from the Proposed Action would be unlikely.

On federal surface, well locations have been constructed near to the Green River within the CIA but outside the required offsets to floodplains and riparian areas (See Maps 6 and 7), suggesting that impacts due to sedimentation from these locations, if it occurred, may have already influenced surface water quality. Cumulative increases in sediment load from oil and gas disturbance represent less than 10 percent of the average sediment load in the Green River upstream of Desolation Canyon below the Flaming Gorge Dam., suggesting that the beneficial use criteria for the Green River would likely continue to be met despite cumulative surface disturbance from oil and gas actions in the CIA.

Consumptive losses of surface water from the cumulative oil and gas actions may affect surface water quality by increasing concentrations of pollutants as a result of decreased flow. Impacts from consumptive losses would not impair surface water quality for T&E fish, which is discussed in Section 4.4.9.4.

Alternative B. No direct or indirect impacts to surface water quality would occur under this alternative, so an accumulation of impacts would not occur.

4.4.8 Wild Horses

4.4.8.1 Cumulative Impact Area

The CIA for wild horses is the Kings Canyon-Green River watershed east of the Green River, encompassing approximately 24,800 acres. The CIA extends southward from the Green River to include both sides of Kings Canyon west of Wild Horse Bench, consisting of approximately 39 sections in T9S-R19E, T10S-R19E, and T11S-R19E. The site-specific management of soils, vegetation, and noxious weeds and invasive species affect forage availability and quality within the project area. Land uses and reclamation success would determine quality of wild horse habitat, which is comparable throughout the CIA. The presence and viability of wild horses are determined by presence of forage and water resources within a defined area. Impacts to wild horses in the WHBPA would add to cumulative effects wild horses that utilize the resources within the watershed. See Section 4.4.3.1 for additional explanation of the rationale supporting the choice of this CIA and Maps 5, 6, and 7. The time frame for the cumulative impacts analysis is the estimated 3-year construction and drilling time frame; the 40-year estimated well life; and 5 years to achieve successful reclamation, or 48 years.

4.4.8.2 Past and Present Actions

Past and present actions within the CIA consist of oil and gas development. As of August 2013, the CIA contained 211 active well pads (UDOGM, 2013). Most well pads contain a single well, resulting in a long-term disturbance of 527.5 acres.

4.4.8.3 Reasonably Foreseeable Action Scenario

Reasonably foreseeable oil and gas actions in the CIA would affect 307.8 acres (See Section 4.4.3.3 and Table 4-7).

4.4.8.4 Cumulative Impact Analysis

Past, current, and reasonably foreseeable oil and gas actions may result in the long-term disturbance of 835.3 acres, corresponding to 3.4 percent of the CIA (See Section 4.4.3.4 and Table 4-8).

Alternative A. Alternative A would contribute to a long-term removal of 62.9 acres of forage in the CIA. Competition between wild horses and other grazing species for available resources in the CIA may increase. Cumulative impacts to wild horses are not expected to jeopardize their viability since the BLM has planned for their removal from the Hill Creek Herd Area. Their extended range is not considered by the BLM to be crucial to their long-term survival.

Alternative B. No direct or indirect impacts to wild horses would occur under this alternative, so an accumulation of impacts would not occur.

4.4.9 Wildlife

4.4.9.1 Cumulative Impact Area

The CIA for wildlife is the Kings Canyon-Green River watershed east of the Green River, encompassing approximately 24,800 acres. The CIA extends southward from the Green River to include both sides of

Kings Canyon west of Wild Horse Bench, consisting of approximately 39 sections in T9S-R19E, T10S-R19E, and T11S-R19E. The site-specific management of soils, vegetation, and noxious weeds and invasive species affect habitat availability and quality within the project area. Land uses and reclamation success would determine quality of wildlife habitat, which is comparable throughout the CIA. The presence and viability of different wildlife species are determined by presence of forage and water resources within a defined area. Impacts to wildlife in the WHBPA would add to cumulative effects to wildlife that utilize the resources within the watershed. See Section 4.4.3.1 for additional explanation of the rationale supporting the choice of this CIA and Maps 5, 6, and 7. The time frame for the cumulative impacts analysis is the estimated 3-year construction and drilling time frame; the 40-year estimated well life; and 5 years to achieve successful reclamation, or a total of 48 years.

4.4.9.2 Past and Present Actions

Past and present actions within the CIA consist of oil and gas development. As of August 2013, the CIA contained 211 active well pads (UDOGM, 2013). Most well pads contain a single well, resulting in a long-term disturbance of 527.5 acres.

4.4.9.3 Reasonably Foreseeable Action Scenario

Reasonably foreseeable oil and gas actions in the CIA would affect 307.8 acres (See Section 4.4.3.3 and Table 4-7).

4.4.9.4 Cumulative Impact Analysis

Past, current, and reasonably foreseeable oil and gas actions may result in the long-term disturbance of 835.3 acres, corresponding to 3.4 percent of the CIA (See Section 4.4.3.4 and Table 4-8).

Alternative A. Historic, current, and future developments in the CIA have reduced, and will likely continue to reduce, the amount of habitat that would have otherwise been available for wildlife. The Proposed Action would contribute 62.9 acres of long-term disturbance after successful reclamation.

Any long-term surface disturbance incrementally diminishes availability of the surface to wildlife, reducing the amount of available cover, foraging opportunities, and breeding areas, and possibly resulting in overall habitat fragmentation. Loss of habitat/forage could result in increased competition between species, between wildlife and grazing livestock, and within individuals of a species for available resources. Habitat fragmentation resulting from well pad construction or expansion can be indirectly exacerbated by vehicle traffic, noise, weed invasion, and human presence. Aboveground pipelines may contribute to habitat fragmentation to some small species, especially where placed cross-country. Pipeline placement underground or adjacent to existing roads would contribute smaller effects to habitat fragmentation.

Other impacts from oil and gas development would include increased displacement of wildlife individuals, increased possibility for collisions between wildlife and vehicles, and potential poaching. Generally, impacts to wildlife from increased human activities, including construction and drilling operations and associated increased levels of vehicle traffic, depend upon the sensitivity of resident species to such activities. Some species of wildlife may be sensitive to a particular type of activity while

other species may not. Some wildlife species may utilize a particular area within the CIA seasonally, such that off-season activities may not result in impacts. Physical parameters, such as topography, forage, and cover, would be able to offset adverse impacts to some species of wildlife.

Migratory birds and raptors. Avian species appear to have acreage thresholds for habitat necessary to support healthy populations. Below this species-specific threshold, a species may still occur, but not as a healthy population, or the species may disappear altogether although habitat requirements, other than size, are seemingly being met. If more than 30 percent of the available habitat is suitable for a species, habitat loss and reduced presence of a species were the primary effects of surface disturbance (Andren, 1994). Since the reduction of available landscape for use as habitat within the CIA would not exceed 30 percent, habitat loss would not result in a fragmented landscape where the losses would be accelerated. Nesting raptors would be protected by required inventories prior to surface disturbance and imposition of USFWS spatial and seasonal restrictions.

Non-USFWS designated species. Biological surveys may be required in potential or known habitats of BLM sensitive species prior to implementation of a project. At the discretion of the AO, protective measures would be taken to avoid individuals of these species and their habitat. Oil and gas activity in the CIA is not likely to result in a loss of viability or otherwise cause a trend to federal listing of those non-listed special status wildlife species. Burrowing owls, ferruginous hawks and other sensitive raptors would be protected by required inventories prior to surface disturbance and USFWS spatial and seasonal restrictions.

The CIA contains 20,930 acres of crucial pronghorn habitat, 22,624 acres of bison habitat, and 17,770 acres of bighorn sheep habitat. The long-term unavailability of 835.3 acres corresponds to 4.0, 3.7 and 4.7 percent (respectively) of available crucial habitat within the CIA for each of these species. Although habitat loss would be compounded by drought conditions, sufficient habitat would remain available to support vegetation used for forage that would be needed for viable populations of grazing species. Scarce surface water resources would remain available to support these big game species within the CIA.

T&E, candidate, or proposed species. Depending on the precise location of future oil and gas development in the CIA, potential habitat would be lost to specific varieties of ESA-protected wildlife species. Federal laws, such as the ESA, apply to all surfaces in the CIA, regardless of ownership. Other protections exist in the form of BLM stipulations for special status species, USFWS conservation measures, and State of Utah guidelines. Impacts to the endangered Colorado River fish would be mitigated by the institution and continued reevaluation of the RIP so that these species would not be further jeopardized by consumptive withdrawals.

Alternative B. No direct or indirect impacts to wildlife would occur under this alternative, so an accumulation of impacts would not occur.

5.0 CONSULTATION AND COORDINATION

5.1 Persons, Groups, and Agencies Consulted

The issues identification section of Chapter 1 identifies the resources described in Chapter 3 and issues analyzed in detail in Chapter 4. The ID Team Checklist (Appendix A) provides the rationale for issues that were considered but not analyzed further. The issues were identified through the public and agency involvement process described in Sections 5.2 and 5.3.

Table 5-1: List of Persons, Agencies, and Organizations Consulted

Agency	Purpose & Authorities for Consultation or Coordination	Findings & Conclusions
United States Fish & Wildlife Service (USFWS)	Information on Consultation, under Section 7 of the Endangered Species Act (16 USC 1531).	Formal consultation was conducted with respect to T&E plant and wildlife species. Measures Identified in the BO can be found in the Decision Record: Appendix A, Conditions of Approval. The USFWS concurred with the BLM's effect determinations on December 28, 2014.
Utah State Historic Preservation Office (SHPO)	Consultation for undertakings, as required by the National Historic Preservation Act (16 USC 470).	Consultation with the Utah SHPO was conducted with respect to the Class I literature review with respect to the proposed project. A consultation letter was sent on 11/25/2014. The BLM received no response, so consultation is considered complete. Additional consultation(s) will be conducted on a site-specific basis when exact locations are proposed.
Native American consultation	Consultation as required by the American Indian Religious Freedom Act of 1978 (42 USC 1531) and NHPA (16 USC 470).	Letters that included the results of the Class I literature review with respect to the proposed project were sent to interested Tribes 10/1/2014. A response was received from the Hopi Tribe 10/16/2014, requesting a copy of the Class I cultural resources overview and another requesting that they remain informed on future cultural surveys of this project. A response was sent 11/26/2014. No other concerns were brought forth.

5.2 Summary of Public Participation

The public notification process was initiated with posting the proposed project on the Environmental Notification Bulletin Board on May 17, 2013. The BLM received no public inquiries regarding the project at that time.

The BLM initiated the EA public comment period on June 9, 2014. Three comment letters were received. A summary of the comments and BLM responses are contained in Appendix F.

5.3 List of Preparers

Table 5-2: List of Non-BLM Preparers (BLM Preparers are listed in Appendix A)

3rd Party Consultants		
Bonnie Carson	Environmental Engineer; Smiling Lake Consulting, Inc.	Air quality; cultural resources; invasive species, noxious weeds; soils; vegetation; livestock grazing; rangeland health; plants; surface water; wild horses, wildlife.
Scott Carson	Geologist, Environmental Compliance Specialist; Smiling Lake Consulting, Inc.	Paleontological resources; QA/QC.
Tim Horgan-Kobelski	Biologist, GIS Specialist; Grasslands Consulting	GIS; maps.
Nick Hall	Biologist, GIS Specialist; Grasslands Consulting	GIS; maps.

6.0 REFERENCES

6.1 References Cited

Alpine Geophysics, L.L.C. and Buys and Associates Environmental Consultants (Alpine and Buys). 2010. Ozone Impact Assessment for GASCO Energy Inc., Uinta Basin Natural Gas Development Project Environmental Impact Statement. Arvada, Colorado.

Andren, H. 1994. Effects of habitat fragmentation on birds and mammals in landscapes with different proportions of suitable habitat: a review. Oikos Vol. 71, No. 3 (Dec., 1994), pp. 355-366.

Baker, F.G. and C.M. Brendecke. 1983. Seepage from Oilfield Brine Disposal Ponds in Utah. GROUNDWATER, Vol. 21, No. 3, May-June 1983. Accessed 12-14-11 from http://info.ngwa.org/gwol/pdf/831522908.PDF

Behle, W. H. 1981. The Birds of Northeastern Utah. Utah Museum of Natural History. Salt Lake City, Utah.

Bell, Carl E. and Juan N. Guerrero. 1996. Sheep Grazing as a Weed Control Practice in Seedling Alfalfa. Proceedings, 27th National Alfalfa Symposium and 26th Annual California Alfalfa Symposium. University of California. Davis, California. Accessed 8-15-13 from http://alfalfa.ucdavis.edu/+symposium/proceedings/1996/96-121.Pdf

California Department of Food and Agriculture (CDFA). 2011. Halogeton. Accessed 8-18-13 from www.cdfa.ca.gov/phpps/ipc/weedinfo/halogeton.htm

CH_2MHill. 2013. Emissions inventory developed by CH2MHill for the Koch Wild Horse Bench Project. June 5, 2013. Denver, Colorado.

Colorado Natural Heritage Program (CNHP). 2005. Intermountain Basins Mixed Salt Desert Scrub. Colorado State University. Fort Collins, Colorado.

ENVIRON. 2013. Final Report 2013 Uinta Basin Winter Ozone Study. Accessed 8-14-14 from http://www.deq.utah.gov/locations/U/uintahbasin/docs/2014/03Mar/UBOS-2013-Final-Report/Title_Contents_UBOS_2013.pdf

ENVIRON. 2009. Western Regional Air Partnership Phase III, Development of the 2012 Oil and Gas Emissions Projections for the Uintah Basin. Novato, California.

Graham, R. T., R. L. Rodriguez, K. M. Paulin, R. L. Player, A. P. Heap, and R. Williams. 1999. The Northern Goshawk in Utah: Habitat Assessment and Management Recommendations. Gen. Tech. Rep. RMRS-GTR-22; U.S.DA, Forest Service, Rocky Mountain Research Station. Ogden, Utah.

Grahame, John D. and Thomas D. Sisk, ed. 2002. Canyons, cultures and environmental change: An introduction to the land-use history of the Colorado Plateau; Biotic Communities of the Colorado

Plateau; and Invasive/Exotic Species. Query site, accessed 7-28-13 from http://www.cpluhna.nau.edu

Johnsgard, P. A. 2002. North American Owls, Biology and Natural History. Smithsonian Institute Press. Washington, DC.

Klute, D. S., L. W. Ayers, M. T. Green, W. H. Howe, S. L. Jones, J. A. Shaffer, S. R. Sheffield, and T. S. Zimmerman. 2003. Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C.

Larson, Douglas W., Uta Matthes, and Peter Kelly. 2000. Cliff Ecology, Pattern and Process in Cliff Ecosystems. Cambridge University Press. New York City, New York. 343 pp.

Leishman, Garth, W., Robert H. Fish, and Randy J. Lewis. 2003. Soil Survey of Uintah Areas Utah - Parts of Daggett, Grand, and Uintah Counties. Survey, Washington, D. C.

Lentsch, L. D., B. G. Hoskins, and L. M. Lubomudrov. 2000. The White River and Endangered Fish Recovery: A Hydrological, Physical and Biological Synopsis. Publication Number 00-37. Utah Division of Wildlife Resources, Salt Lake City, Utah.

Lyman, Seth and Howard Shorthill (General Editors). 2013. Final Report, 2012 Uintah Basin Winter Ozone & Air Quality Study. Utah Department of Environmental Quality, study coordinator. Logan, Utah.

Malm, William C. and Jeffrey L. Collett, Jr. 2009. RoMANS, Rocky Mountain Atmospheric Nitrogen and Sulfur Study Report Volume 2. National Park Service, Colorado State University, University of California, Air Resource Specialists. Fort Collins, Colorado. Accessed 8-14-14 from http://www.nature.nps.gov/air/Pubs/pdf/RoMANS_V2_20100218.pdf

Malm, William C. and Jeffrey L. Collett, Jr. 2009a. RoMANS, Rocky Mountain Atmospheric Nitrogen and Sulfur Study Report Volume 1. National Park Service, Colorado State University, University of California, Air Resource Specialists. Fort Collins, Colorado. Accessed 8-14-14 from http://www.nature.nps.gov/air/Pubs/pdf/RoMANS_V1_20100218.pdf

Martin, R., K. Moore, M. Mansfield, S. Hill, K. Harper, and H. Shorthill. 2011. Final Report: Uinta Basin Winter Ozone and Air Quality Study, EDL/11-039. Energy Dynamics Lab., Utah State University Research Foundation, Bingham Research Center. Vernal, Utah. Accessed 8-14-14 from http://rd.usu.edu/files/uploads/ubos_2010-11_final_report.pdf

Montgomery Archaeological Consultants (Montgomery). 2013. Class I Review of Koch Exploration Company LLC's Proposed Wild Horse Bench Infill Project, Uintah County, Utah, MOAC Report No. 13-302. October 22, 2013. Moab, Utah.

National Oceanic and Atmospheric Administration (NOAA). 2013. U.S. Seasonal Drought Outlook, July 18-October 31, 2013. Accessed 8-12-13 from http://www.cpc.ncep.noaa.gov/products/expert_assessment/season_drought.gif

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim Golden Eagle inventory and monitoring protocols; and other recommendations. Division of Migratory Bird Management, U.S. Fish and Wildlife Service.

Papouchis, Christopher M. 2001. Responses of Desert Bighorn Sheep to Increased Human Recreation. *Journal of Wildlife Management*, Vol. 65, No. 3 (July, 2001), pp. 573-582.

Parrish, J. R., F. P Howe, and R. E Norvell. 2002. *Utah Partners in Flight Avian Conservation Strategy Version 2.0.* Utah Division of Wildlife Resources, UDWR Publication Number 02-27. Salt Lake City, Utah.

Romin, Laura A. and James A. Muck. 2002. Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances. U.S. Fish and Wildlife Service, Utah Field Office. Salt Lake City, Utah.

Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R+. Squires. 1999. Ecology and Conservation of Lynx in the United States. United States Department of Agriculture Forest Service- Rocky Mountain Research Station, Niwot, Colorado.

Schoenecker, K.A. AND P.R. Krausman 2002. Human Disturbance in Bighorn Sheep Habitat, Pusch Ridge Wilderness, Arizona. *Journal of Arizona-Nevada Academy of Science* 34(1):63-68

Stokes, W. L. 1986. Geology of Utah. Utah Geological Survey. Salt Lake City, Utah.

Sweanor, Patricia, Michelle Gudorf, and Francis Singer. 1995. Bighorn Sheep Habitat Assessment of the Greater Canyonlands/Arches National Park Area. Cooperatively by: National Park Service, Rocky Mountain Region National Biological Service, Midcontinent Ecological Science Center. Lakewood, Colorado.

Tirmenstein, D. 1999. Artemisia tridentata spp. tridentata. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Accessed 2-14-13 from http://www.fs.fed.us/database/feis/

Uintah County Planning Commission (UCPC). 2005. Uintah County General Plan, as amended. Uintah County. Vernal, Utah.

U.S. Bureau of Land Management (BLM). 2005. Final Environmental Impact Statement and Record of Decision for Castle Peak and Eight Mile Flat Oil and Gas Expansion Project, UT-080-05-1310. Vernal Field Office. Vernal Utah.

U.S. Bureau of Land Management (BLM). 2007. Record of Decision for Final Programmatic EIS Vegetation Treatments Using Herbicides. Washington Office. Washington, D.C.

U.S. Bureau of Land Management (BLM). 2007a. Enduring Resources' Saddletree Draw Leasing and Rock House Development Proposal Final EA, UT-080-2007-671. Vernal Field Office. Vernal Utah.

U.S. Bureau of Land Management (BLM). 2008. Record of Decision and Approved Resource Management Plan, October 2008, BLM-UT-PL-09-003-1610 UT-080-2005-71. Vernal Field Office. Vernal, Utah.

U.S. Bureau of Land Management (BLM). 2008a. Proposed Resource Management Plan and Final Environmental Impact Statement. Vernal Field Office. Vernal, Utah.

U.S. Bureau of Land Management (BLM). 2012. Greater Natural Buttes Final Environmental Impact Statement, UT-080-07-807. Vernal Field Office. Vernal, Utah.

U.S. Bureau of Land Management (BLM). 2012a. GASCO Energy Inc. Uinta Basin Natural Gas Development Project, Final Environmental Impact Statement, UT-080-06-253. Vernal Field Office. Vernal, Utah.

U.S. Bureau of Land Management (BLM). 2012b. Greater Uinta Basin Oil and Gas Cumulative Impacts Technical Support Document, March 2012. Vernal Field Office. Vernal, Utah.

U.S. Bureau of Land Management (BLM). 2013. Email correspondence from BLM biologist to Smiling Lake Consulting on August 19, 2013. Vernal Field Office. Vernal, Utah.

U.S. Bureau of Land Management (BLM). 2013a. North Alger Project, DOI-BLM-UT-G010-2012-0112. Vernal Field Office. Vernal, Utah (BLM, 2013).

U.S. Bureau of Reclamation (BOR). 2011. Quality of Water Colorado River Basin Progress Report No. 23. Upper Colorado Region. Accessed 7-28-13 from http://www.usbr.gov/uc/progact/salinity/pdfs/PR23final.pdf

U.S. National Cooperative Soil Survey (NCSS). 2004. Walknolls Series. Accessed 8-18-13 from https://soilseries.sc.egov.usda.gov/OSD_Docs/W/WALKNOLLS.html

U.S. National Cooperative Soil Survey (NCSS). 2000. Motto Series. Accessed 8-18-13 from https://soilseries.sc.egov.usda.gov/OSD_Docs/M/MOTTO.html

U.S National Cooperative Soil Survey (NCSS). 1999. Cadrina Series. Accessed 1-18-13 from https://soilseries.sc.egov.usda.gov/OSD_Docs/C/CADRINA.html

U.S. Energy Information Administration (EIA). 2012. Greenhouse Gases, Climate Change, and Energy. Washington, D.C. Accessed 8-12-13 from http://tonto.eia.doe.gov/energyexplained/index.cfm?page=environment_where_ghg_come_from

U.S. Environmental Protection Agency (EPA). 2011. Tribal Minor New Source Review Permitting, Region 8. Accessed 8-28-13 from http://epa.gov/region8/air/permitting/tmnsr.html

U.S. Environmental Protection Agency (EPA). 2012. National Ambient Air Quality Standards. Accessed 8-12-13 from http://www.epa.gov/air/criteria.html

U.S. Environmental Protection Agency (EPA). 2012a. Assessment Data for Utah, Lower Green-Desolation Canyon Watershed, Year 2006. National Assessment Database. Accessed 8-26-13 from http://oaspub.epa.gov/tmdl/w305b_report_v6.huc?p_huc=14060005&p_state=UT&p_cycle=2006

U.S. Environmental Protection Agency (EPA). 2013. AirData, Monitor Values Report, Uintah County, Utah. Accessed 8-12-13 from http://www.epa.gov/airdata/ad_rep_mon.html

U.S. Environmental Protection Agency (EPA). 2013a. Inventory of U.S. Greenhouse Gas Emissions and Sinks, National Greenhouse Gas Emissions Data. Accessed 8-12-13 from http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html

U.S. Environmental Protection Agency (EPA). 2013b. Climate Change, Climate Economic Modeling. Accessed 9-7-13 from http://www.epa.gov/climatechange/EPAactivities/economics/modeling.html

U.S. Fish and Wildlife Service (USFWS). 1990. Humpback Chub Recovery Plan. Denver, CO: U. S. Fish and Wildlife Service.

U.S. Fish and Wildlife Service (USFWS). 1994. Final rule: Determination of critical habitat for the Colorado River Endangered fishes: Razorback sucker, Colorado squawfish, Humpback chub, and Bonytail chub. Federal Register 59:13375-13400. Denver, Colorado.

U.S. Fish and Wildlife Service (USFWS). 2002. Bonytail *(Gila elegans)* Recovery Goals: amendment and supplement to the Bonytail Chub Recovery Plan. Amendment, Mountain-Prairie Region, Denver, Colorado.

U.S. Fish and Wildlife Service (USFWS). 2002a. Colorado Pikeminnow *(Ptychocheiluslucius)* Recovery Goals: amendment and supplement to the Colorado Squawfish Recovery Plan. Mountain-Prairie Region. Denver, Colorado.

U.S. Fish and Wildlife Service (USFWS). 2002b. Humpback chub *(Gila cypha)* Recovery Goals: amendment and supplement to the Humpback chub Recovery Plan. Mountain-Prairie Region. Denver, Colorado.

U.S. Fish and Wildlife Service (USFWS). 2002c. Razorback sucker *(Xyrauchentexanus)* Recovery Goals: amendment and supplement to the Razorback Sucker Recovery Plan. Mountain-Prairie Region. Denver, Colorado.

U.S. Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern. Accessed 8-18-13 from http://digitalmedia.fws.gov/cdm/ref/collection/document/id/1404

U.S. Fish and Wildlife Service (USFWS). 2010. RECOVERY OUTLINE for the *Sclerocactus wetlandicus* (Uinta Basin Hookless Cactus). Utah Ecological Services Field Office, Region 6, Denver, Colorado.15 pp.

U.S. Fish and Wildlife Service (USFWS). 2011. U.S. Fish and Wildlife Service (USFWS) Utah Field Office Guidelines for Conducting and Reporting Botanical Inventories and Monitoring of Federally Listed, Proposed and Candidate Plants. Memorandum dated August 31, 2011. Utah Field Office, Salt Lake City, UT.

U.S. Fish and Wildlife Service (USFWS). 2012. Memorandum of Understanding between U.S. Department of the Interior Bureau of Land Management, Vernal Field Office, Utah and U.S.Fish & Wildlife Service, Salt Lake City, Utah. May 2, 2012. Utah Field Office, Salt Lake City, UT.

U.S. National Park Service (NPS). 2013. Ozone Exceedances in National Parks, 2012. Accessed 8-14-14 from http://www.nature.nps.gov/air/monitoring/exceed2012.cfm

Utah Division of Air Quality (UDAQ). 2013. Utah's Environment: 2012: Cleaner Air: Uintah Basin: Three-State Pilot Project. Accessed 8-12-13 from http://www.deq.utah.gov/envrpt/cleanair/uintahbasin.htm

Utah Division of Oil, Gas and Mining (UDOGM). 2013. Oil and Gas Well Locator Map. Interactive map, query site. Accessed 8-16-13 from http://mapserv.utah.gov/oilgasmining/

Utah Division of Water Rights. 2013. Utah State Water Rights Query Site. Accessed 8-1-13 from http://www.waterrights.utah.gov/cgi-bin/wrprint.exe?Startup

Utah Division of Wildlife Resources (UDWR). 2005. Utah Conservation Data Center, Biotics Database, UDWR, NatureServe, and the network of Natural Heritage Programs and Conservation Data Centers. Salt Lake City, Utah. Query site, accessed 8-8-12 from http://dwrcdc.nr.utah.gov/ucdc/

Utah Division of Wildlife Resources (UDWR). 2008. Utah Bighorn Sheep Statewide Management Plan. Utah Department of Natural Resources. Salt Lake City, Utah.

Utah Division of Wildlife Resources (UDWR). 2009. Statewide Management Plan for Pronghorn. January 8, 2009. Salt Lake City, Utah. Accessed 5-1-13 from http://wildlife.utah.gov/hunting/biggame/pdf/Statewide_prong_mgmt_2009.pdf

Utah Division of Wildlife Resources (UDWR). 2011. Utah Sensitive Species List, Appendices, March 29, 2011. Accessed 4-3-13 from http://dwrcdc.nr.utah.gov/ucdc/viewreports/SSLAppendices20110329.pdf

Utah Native Plant Society (UNPS). 2013. Utah Rare Plant Guide. Query site. Accessed 8-24-13 from http://www.utahrareplants.org/rpg_species.html#All

Utah State University (USU). 2011. Range Plants of Utah, Mat Saltbush. Accessed 8-18-13 http://extension.usu.edu/rangeplants/htm/mat-saltbush/

Weisberg, Peter. 2009. Pinyon-Juniper Woodlands. Accessed 7-17-13 from http://www.onlinenevada.org/pinyon_juniper_woodlands

Whitson, T. L. 1996. *Weeds of the West, 5th Edition.* Laramie, Wyoming: University of Wyoming.

Williams, HFL, DL Havens, KE Banks and DJ Wachal. 2007. Field-based monitoring of sediment runoff from natural gas well sites in Denton County, Texas, USA. Environmental Geology 55: 1463-71.

Yukon Fish and Wildlife Management Board (YFWMB). 2002. The Effects of Oil and Gas Activity on Fish and Wildlife: a review of selected literature. Whitehorse, Yukon Territory, Y1A 2H5. 87pp.

Zhang, Ye, Carl W. Gable, George A. Zyvoloski, and Lynn M. Walter. 2009. Hydrogeochemistry and gas compositions of the Uinta Basin: A regional-scale overview. AAPG Bulletin, v. 93, no. 8 (August 2009), pp. 1087–1118.

6.2 Acronyms

µm	Microns
AO	Authorized Officer
APD	Application for Permit to Drill
AQRV	Air Quality Related Values
BCC	Birds of Conservation Concern
BHP	Base Horsepower-Hour
BLM	Bureau of Land Management
BMPs	Best Management Practices
CAA	Clean Air Act
CFR	Code of Federal Regulations
CH_4	Methane (Natural Gas)
CIA	Cumulative Impacts Area
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
COA	Condition(s) of Approval
DOT	Department of Transportation
DR	Decision Record
EA	Environmental Assessment
EI	Emissions Inventory
EIS	Environmental Impact Statement
ENBB	Environmental Notification Bulletin Board
EO	Executive Order

EPA	Environmental Protection Agency
ESA	Endangered Species Act
IDT	Interdisciplinary Team
IM	Instruction Memorandum
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy and Management Act of 1976
FO	Field Office
FONSI	Finding of No Significant Impact
FOOGLRA	Federal Onshore Oil and Gas Leasing Reform Act of 1987
GHG	Greenhouse Gas
GNB	Greater Natural Buttes
HAPs	Hazardous Air Pollutant
HP	Horsepower
IM	Instruction Memorandum
LLC	Limited Liability Company
MCF	Thousand Cubic Feet
MLA	Mineral Leasing Act of 1920
MOU	Memorandum of Understanding
MRR	Rule for Mandatory Reporting of Greenhouse Gases
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NRHP	National Register of Historic Places
NSO	No Surface Occupancy
NSPS	New Source Performance Standard
O_3	Ozone
PIF	Partners in Flight
PFYC	Potential Fossil Yield Classification
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter, 2.5 microns in diameter, or less
PM_{10}	Particulate Matter, 10 microns in diameter, or less
ppb	Parts per Billion
PSD	Prevention of Significant Deterioration

PUP	Pesticide Use Proposal
RIP	Recovery Implementation Program
RIPRAP	Recovery Implementation Program/Recovery Action Plan
RMP	Resource Management Plan
ROD	Record of Decision
RoMANS	Rocky Mountain Atmospheric Nitrogen and Sulfur Study
SHPO	State Historic Preservation Office
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
SPCCP	Spill Prevention Control and Countermeasure Plans
SWPPP	Stormwater Pollution Prevention Plan
T&E	Threatened and Endangered
TDS	Total Dissolved Solids
TPY	Tons per Year
UAC	Utah Administrative Code
UDAQ	Utah Division of Air Quality
UDOGM	Utah Division of Oil, Gas, and Mining
UDWR	Utah Division of Wildlife Resources
U.S.	United States
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
UTAG	Utah Air Resource Technical Advisory Group
VOC	Volatile Organic Compound
WHBPA	Wild Horse Bench Project Area
WRAP	Western Regional Air Partnership

APPENDIX A

Interdisciplinary Team Checklist

INTERDISCIPLINARY TEAM CHECKLIST

Project Title: Wild Horse Bench Infill Project

NEPA Log Number: DOI-BLM-UT-G010-2013-0211

Project Leader: Melissa Wardle

DETERMINATION OF STAFF: ***(Choose one of the following abbreviated options for the left column)***

NP = not present in the area impacted by the proposed or alternative actions
NI = present, but not affected to a degree that detailed analysis is required
PI = present with potential for relevant impact that need to be analyzed in detail in the EA
NC = (DNAs only) actions and impacts not changed from those disclosed in the existing NEPA documents cited in Section D of the DNA form. The Rationale column may include NI and NP discussions.

Determination	Resource/Issue	Rationale for Determination	Signature	Date
RESOURCES AND ISSUES CONSIDERED (INCLUDES SUPPLEMENTAL AUTHORITIES APPENDIX 1 H-1790-1)				
PI	Air Quality & Greenhouse Gas Emissions	Emissions from the project have the potential to affect air quality in the area.	Mark Wimmer	5/17/2013
NP	BLM Natural Areas	None Present as per GIS and RMP review	Jason R. West	5/20/2013
PI	Cultural: Archaeological Resources	Cultural resources are identified within the proposed project area. The entire project area has not been covered by cultural resource inventories. A Class I Literature Review will have to be submitted by the Arch Contractor for consultation with Tribes and SHPO. Class III cultural resource inventories as well as consultation and coordination with the Utah SHPO will be conducted prior to any surface disturbing activities.	Jimmie McKenzie	6/10/2013
NP	Cultural: Native American Religious Concerns	Consultations with Native American Tribes will be conducted on the Class I Literature Review to be submitted by Arch Contractor.	Jimmie McKenzie	6/10/2013
NP	Designated Areas: Areas of Critical Environmental Concern	None Present as per GIS and RMP review	Jason R. West	5/20/2013
NP	Designated Areas: Wild and Scenic Rivers	None Present as per GIS and RMP review	Jason R. West	5/20/2013
NP	Designated Areas: Wilderness Study Areas	None Present as per GIS and RMP review	Jason R. West	5/20/2013
NP	Environmental Justice	No minority or economically disadvantaged communities or populations would be disproportionately adversely affected by the Proposed Action or alternatives since there are none in the project area.	Mark Wimmer	5/17/2013
NP	Farmlands (prime/unique)	Prime or unique farmlands must be irrigated by definition. The project area is not located in an area where irrigation is occurring; therefore there are no prime or unique farmlands in the project area.	Mark Wimmer	5/17/2013
NI	Fuels/Fire Management	There are no planned fuels projects in the immediate area. Disturbance in this vegetation type could increase the amount of invasive plants, specifically Bromus tectorum. The increase of Bromus tectorum could lead to a change of ecosystem dynamics and an increase in fire frequency. Applying the Green River	Blaine Tarbell	5/28/2013

Determination	Resource/Issue	Rationale for Determination	Signature	Date
		District Reclamation Guidelines should prevent additional hazardous fuels.		
NI	Geology/Minerals/Energy Production	Gilsonite is present in in Sections 34 and 35. Encounters with gilsonite during any surface or drilling operation must be reported to the BLM Vernal Field Office. Please provide location and depth encountered. Natural gas, oil, gilsonite, oil shale, and tar sand are the only mineral resources that could be impacted by the project. Production of natural gas or oil would deplete reserves, but the proposed project allows for the recovery of natural gas and oil per 43 CFR 3162.1(a), under the existing Federal lease. Compliance with "Onshore Oil and Gas Order No. 2, Drilling Operations" will assure that the project will not adversely affect gilsonite, oil shale, or tar sand deposits. Due to the state-of-the-art drilling and well completion techniques, the possibility of adverse degradation of tar sand or oil shale deposits by the proposed action will be negligible. Well completion must be accomplished in compliance with "Onshore Oil and Gas Order No. 2, Drilling Operations". These guidelines specify the following: *... proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. Any isolating medium other than cement shall receive approval prior to use.*[3]	Betty Gamber	5/22/2013
PI	Invasive Plants/Noxious Weeds, Soils & Vegetation	The proposed project will result in disturbance to the native vegetation and soils within the project area, including forest/woodland species. This disturbance will also result in the establishment and spread of non-native plant species.	Melissa Wardle	6/10/2013
NI	Lands/Access	The proposed area is located within the VFO RMP/ROD area, which allows for oil and gas development with associated right-of-ways. All APDs for this project area would be reviewed on a site-specific basis and other right-of-way holders in the area would be notified, as per regulations.	Katie White Bull	5/20/2013
NP	Lands with Wilderness Characteristics (LWC)	Two inventory unites were identified, the Wild Horse Bench E unit (excluded for size limitation) found to have no wilderness character, and the Desolation Canyon Unit. The Desolation canyon unit does have wilderness character in it, but the portion that the proposed project area covers does not (approximately 7 thousand acres without wilderness character. All findings were based on existing GIS layer review.	Jason R. West	5/20/2013
PI	Livestock Grazing & Rangeland Health Standards	The proposed project may impact the livestock grazing operation on the Wild Horse Bench Allotment as well as vegetative and soil resources in a manner that cannot be mitigated. These potential impacts may affect the short term and long term viability of the livestock operation.	Dusty Carpenter	6/17/2013

Determination	Resource/Issue	Rationale for Determination	Signature	Date
PI	Paleontology	The Uinta Formation is at the surface in these locations. This formation has a general classification of PYFC 5 which has a high potential for vertebrate fossils. Paleontology localities are currently present in Sections 34 and 34. Paleontology surveys will be required for each well location before any ground disturbance takes place.	Betty Gamber	5/22/2013
PI	Plants: BLM Sensitive	The following UT BLM sensitive plant species are present or expected in the same or an adjacent sub-watershed as the proposed project: Graham's catseye (*Cryptantha grahamii*) and *Yucca sterilis*. • There is no oil shale outcrops in the vicinity of the proposed project, therefore there is no potential habitat for Graham's catseye. • Sandy soils in the vicinity of the proposed project may provide suitable habitat for *Yucca sterilis*.	Aaron Roe	6/10/2013
PI	Plants: Threatened, Endangered, Proposed, or Candidate	The following federally listed, proposed, or candidate plant species are present or expected in the same or an adjacent sub-watershed as the proposed project: Graham's penstemon (*Penstemon grahamii*), clay reed-mustard (*Schoenocrambe argillacea*), shrubby reed-mustard (*Schoenocrambe suffrutescens*), Pariette cactus (*Sclerocactus brevispinus*), and Uinta Basin hookless cactus (*Sclerocactus wetlandicus*). • There is no oil shale outcrops in the vicinity of the proposed project. Therefore, there is no potential habitat for Graham's penstemon. • There are no calcareous shale outcrops of the Green River formation in the vicinity of the proposed project. Therefore, there is no potential habitat for shrubby reed-mustard. • If there are pipelines that are replaced to the west of the identified project map as shown on the current map, there may be impacts to habitat for clay reed-mustard • As currently understood, Pariette cactus is restricted to Pariette and Castle Peak Washes and the surrounding benches. Therefore, there is no potential habitat for Pariette cactus. • A portion of the proposed project is located within the potential habitat polygon for Uinta Basin hookless cactus.	Aaron Roe	6/10/2013
NP	Plants: Wetlands/Riparian Zones	Riparian habitat is not inventoried or known within the project area and the development would not be expected to negatively impact riparian of the Green River directly, but could indirectly if tons of sediment from the proposed project area gets into the wetland and riparian functions and limits those.	Melissa Wardle Updated: James Hereford II	6/10/2013 6/11/2013
NI	Recreation	The proposed location is within the Vernal Extensive recreation management area (ERMA) General ERMAs are managed for a more primitive form of recreation with less infrastructure. Historically low recreation use is seen within the proposed project area. Recreationists primarily use roads for access to hunting in the fall/winter. Some OHV and ATV	Jason R. West	5/20/2013

Determination	Resource/Issue	Rationale for Determination	Signature	Date
		traffic occurs during Antler Shed hunting season in the spring. The primary use in this area is for minerals extraction. Recreation impacts are expected to be negligible.		
NI	Socio-Economics	There would be relatively minor social or economic impacts from this project. This determination is based on the scale of the project when compared to the level of the oil and gas development/production in the Uinta Basin. Consequently, this resource will not be carried forward for a detailed analysis.	Mark Wimmer	5/17/2013
NI	Visual Resources	Baseline quality scenic rating during inventory was a Class C (lowest) with the Highest rating (Most Scenic) being an A. The 2008 Resource management plan assigned the area Management Class IV. Class IV objectives state: "To provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high." The proposed action meets class IV objectives, however, every effort should be made to utilize best management practices such as low profile tanks, vegetative screening, avoidance of straight line construction, use of approved paint colors on sites, and avoiding skylines, or high spots in the environment for location selection.	Jason R. West	5/20/2013
NI	Wastes (hazardous or solid)	Hazardous Waste: No chemicals subject to reporting under SARA Title III in an amount equal to or greater than 10,000 pounds will be used, produced, stored, transported, or disposed of annually in association with the project. Furthermore, no extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities, will be used, produced, stored, transported, or disposed of in association with the project. Solid Wastes: Trash would be confined in a covered container and hauled to an approved landfill. Burning of waste or oil would not be done. Human waste would be contained and be disposed of at an approved sewage treatment facility.	Mark Wimmer	6/10/2013
NI	Water: Floodplains	The proposed project does not cross any mapped 100 year flood plains. However, since the area is prone to flood type events and has thin slow to develop soils that are very low in permeability, it is recommended that the company applies good applicant committed measures to help prevent soils from being eroded and then affecting active floodplains further down gradient. If it is observed that tons of new soils are reaching the Green river or another down gradient floodplain, then further analysis may be necessary.	James Hereford II	6/11/2013
NI	Water: Groundwater Quality	Groundwater: Compliance with "Onshore Oil and Gas Order No. 1, will assure that the project will not adversely affect groundwater quality. Due to the state-of-the-art drilling and wells completion techniques, the possibility of adverse degradation of groundwater quality or prospectively valuable mineral deposits by the proposed action will be negligible	Betty Gamber	5/22/2013

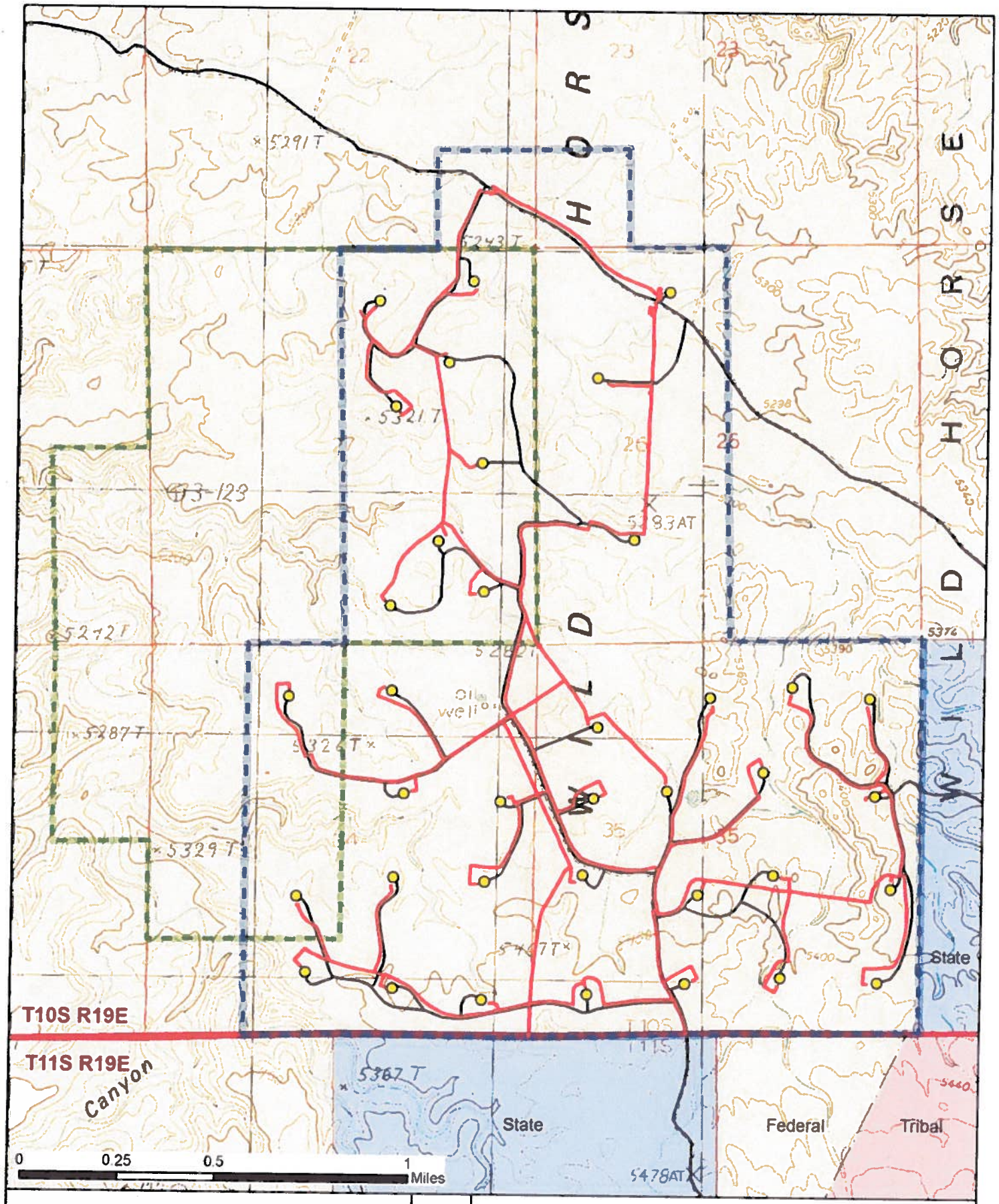
Determination	Resource/Issue	Rationale for Determination	Signature	Date
NI	Water: Hydrologic Conditions (stormwater)	The proposed action is within an area that has many ephemeral washes present which are very prone to flood events since the main soils in the area are clay type soils, which are very low in permeability. During these flood events in these ephemeral washes exhibit flash tendencies and often time get well above bank full status. As long stormwater controls are in place to reduce erosion especially during the flood type events, further analysis is not necessary.	James Hereford II	6/11/2013
PI	Water: Surface Water Quality	The proposed project does not directly affect any mapped perennial waters. However as discussed above the area is inundated with dry ephemeral type drainages that exhibit flash flood tendencies during storm events. There is a potential for erosion of sediments into adjacent drainages during and following construction, it is recommended to apply the proper applicant committed measures to help reduce the amount of sediment reaching perennial waters in the area. In addition, there is a potential for leaks to run into adjacent perennial drainages. Proper ACMs should be applied to reduce the chance of hydrocarbons from reaching active waters.	Melissa Wardle Update: James Hereford II	6/3/2013 6/11/2013
NI	Water: Waters of the U.S.	Impacts would be minimal considering the location of the project and that all stream channel crossings would be constructed in accordance to "Hydraulic Considerations for Pipelines Crossing Stream Channels" (Technical Note 423 April 2007).	Melissa Wardle	6/3/2013
PI	Wild Horses	The project falls within the Hill Creek HA boundary. The HC HA boundary is no longer definitive as the historic fence has been removed and damaged during the last 6 years of energy extraction activities. Although the HA is no longer managed as an HMA, the Bureau has a due diligence to manage the forage , soil and water resources in a manner that will not harm or cause foreseen mortality to the existing horses until such time that they can be gathered.	Dusty Carpenter	6/17/2013
PI	Wildlife: Migratory Birds (including raptors)	Potential to impact nesting birds during the nesting season. The BLM raptor database did not identify any known raptor nests.	Dixie Sadlier	6/10/2013
PI	Wildlife: Non-USFWS Designated	UDWR identifies pronghorn habitat, bison habitat, and Rocky Mountain big horn sheep habitat. Loss of habitat would be minimal because the proposed action is to drill from existing pads.	Dixie Sadlier	6/10/2013
PI	Wildlife: Threatened, Endangered, Proposed or Candidate	Office files were reviewed along with a field visit, and no T&E species or habitat was identified. Water Depletion would occur (Water Source?)	Dixie Sadlier	6/10/2013
NP	Woodland / Forestry	Not present in project area as per GIS review.	David Palmer	6/11/13

FINAL REVIEW:

Reviewer Title	Signature	Date	Comments
Environmental Coordinator	Jessica Taylor	1-12-15	
Authorized Officer	[illegible]	1-20-2015	

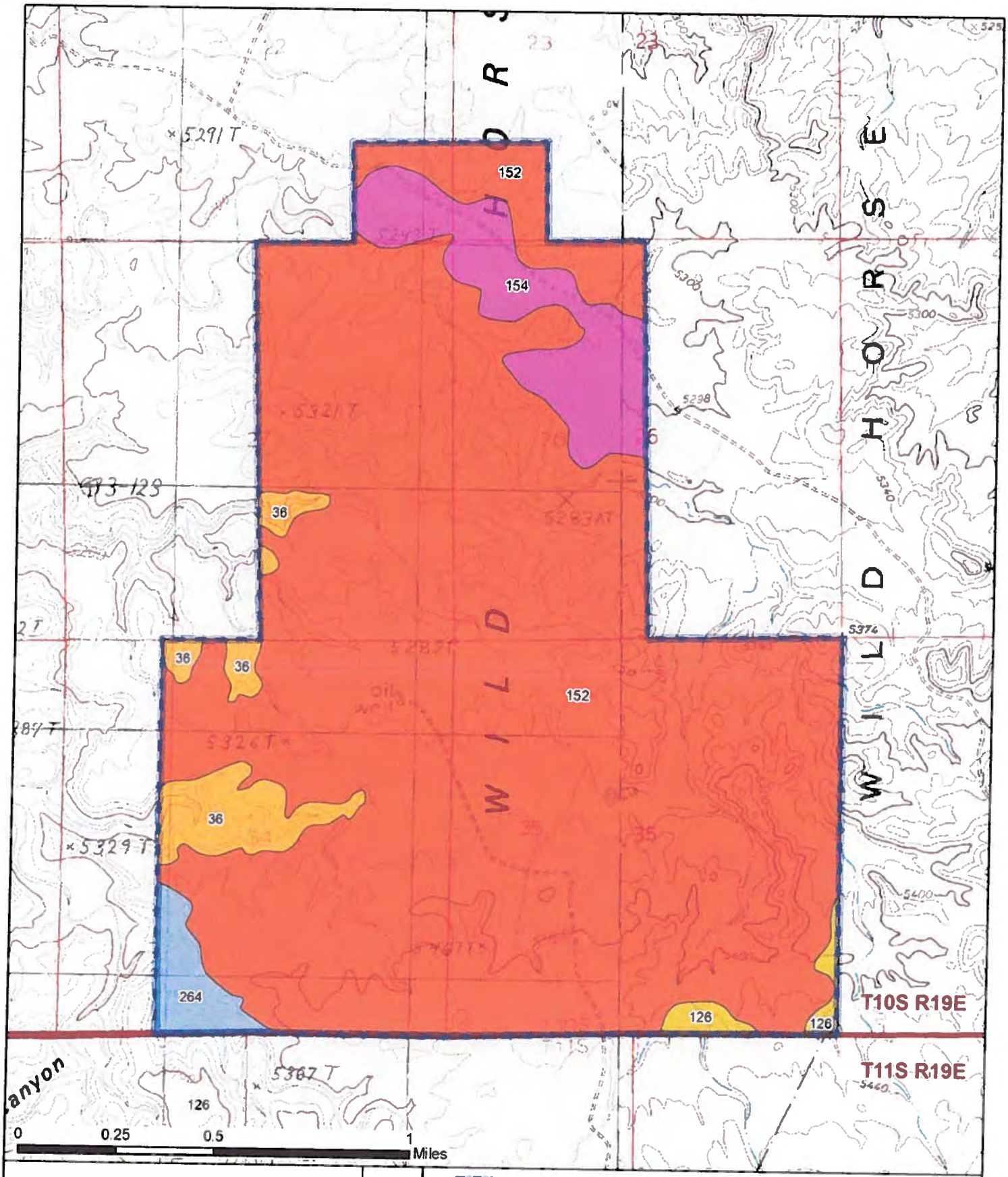
APPENDIX B

Maps



Map 1
Wild Horse Bench Project Area
Uintah County, Utah

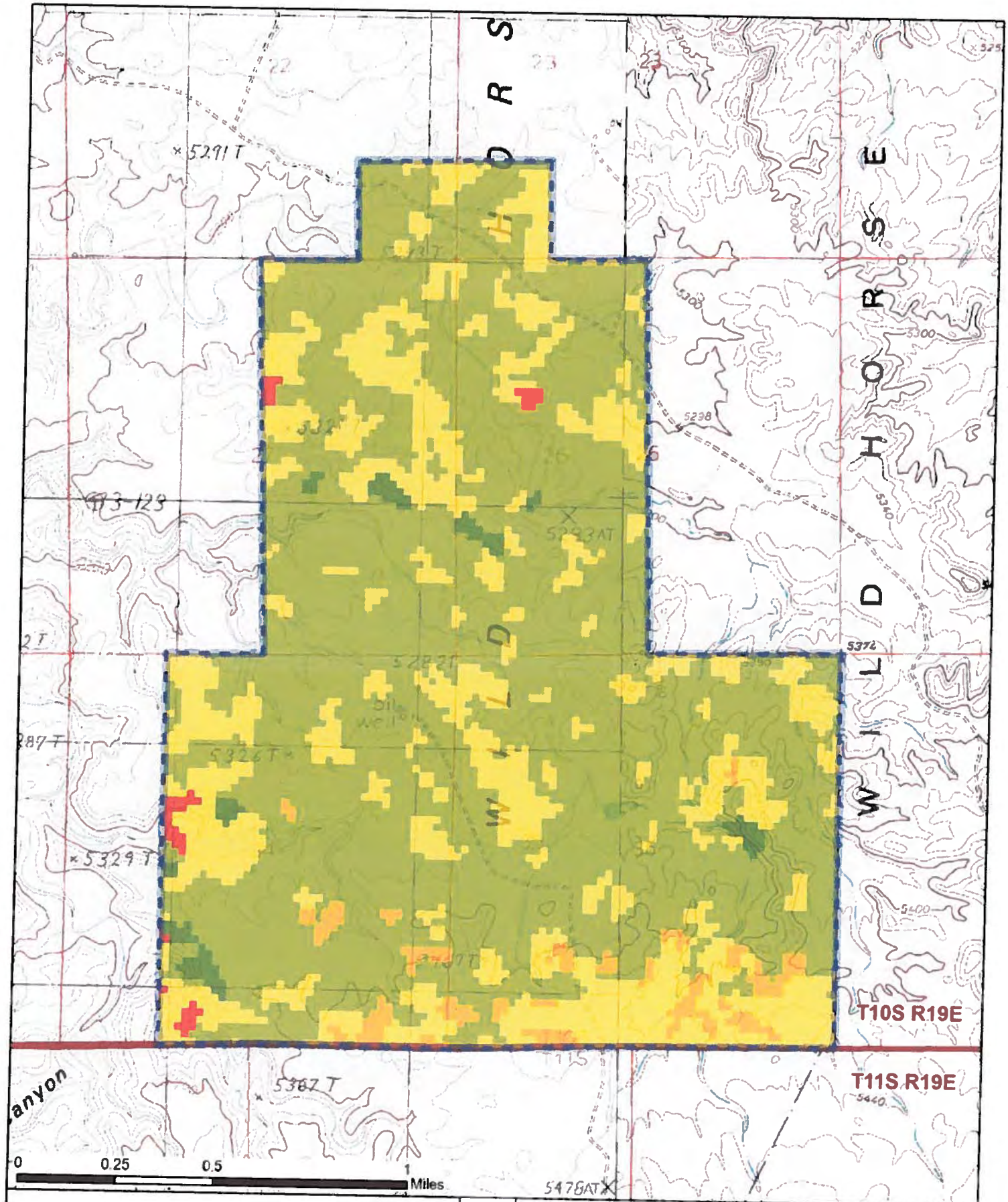
Existing Well Pad
Existing Road
Existing Pipeline Corridor
Wild Horse Bench Infill Project Area
North Alger Unit Boundary



Map 2
WHBPA Soil Units
Uintah County, Utah

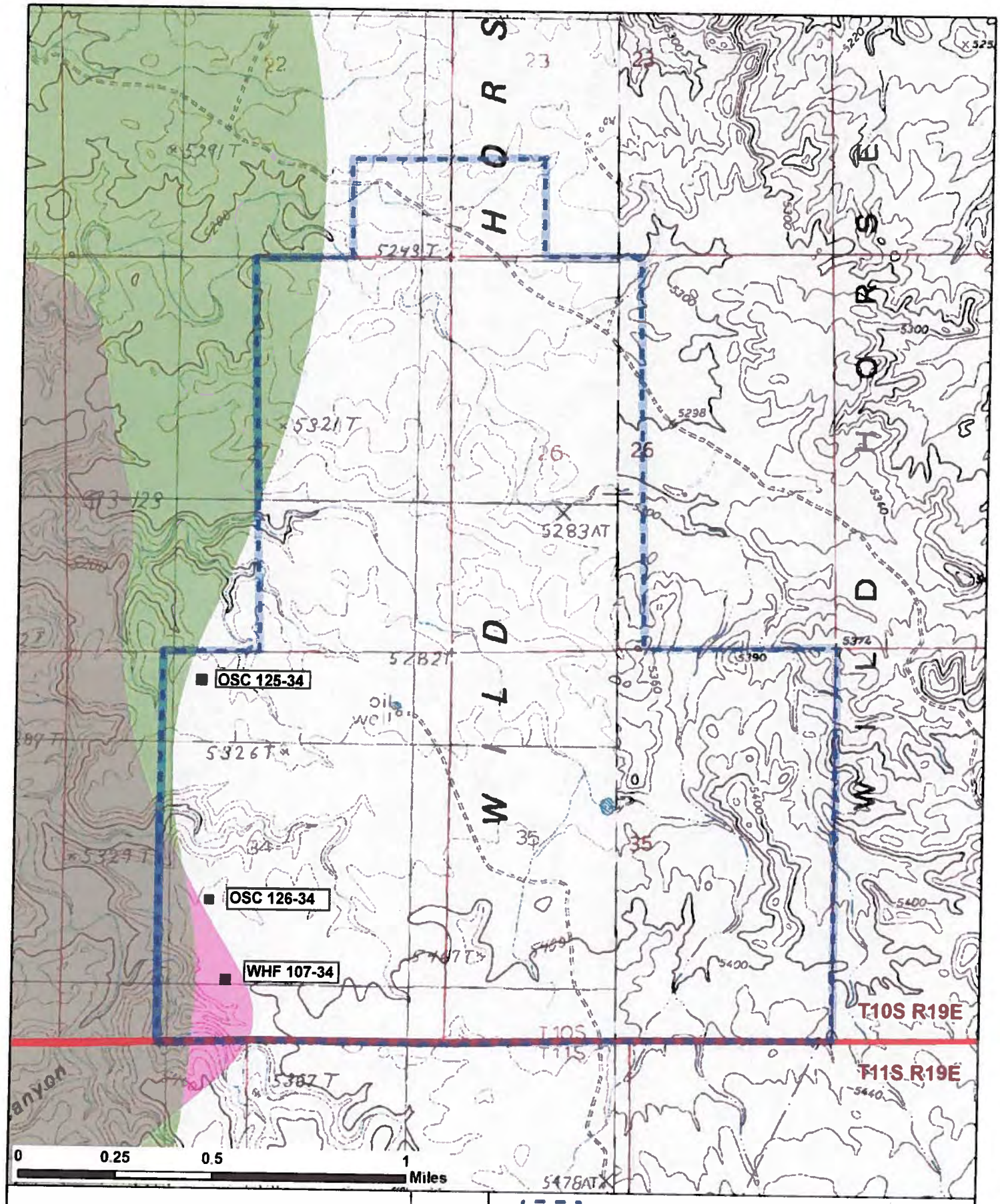
Wild Horse Bench Infill Project Area
Cadrina extremely stony loam-Rock outcrop complex, 25 to 50 percent slopes - 36
Lanver-Walknolls association, 2 to 25 percent slopes - 126
Motto-Casmos complex, 2 to 25 percent slopes - 152
Motto-Rock outcrop complex, 2 to 25 percent slopes - 154
Walknolls-Rock outcrop complex, 2 to 50 percent slopes - 264

*numbers after soil names represent soil unit numbers



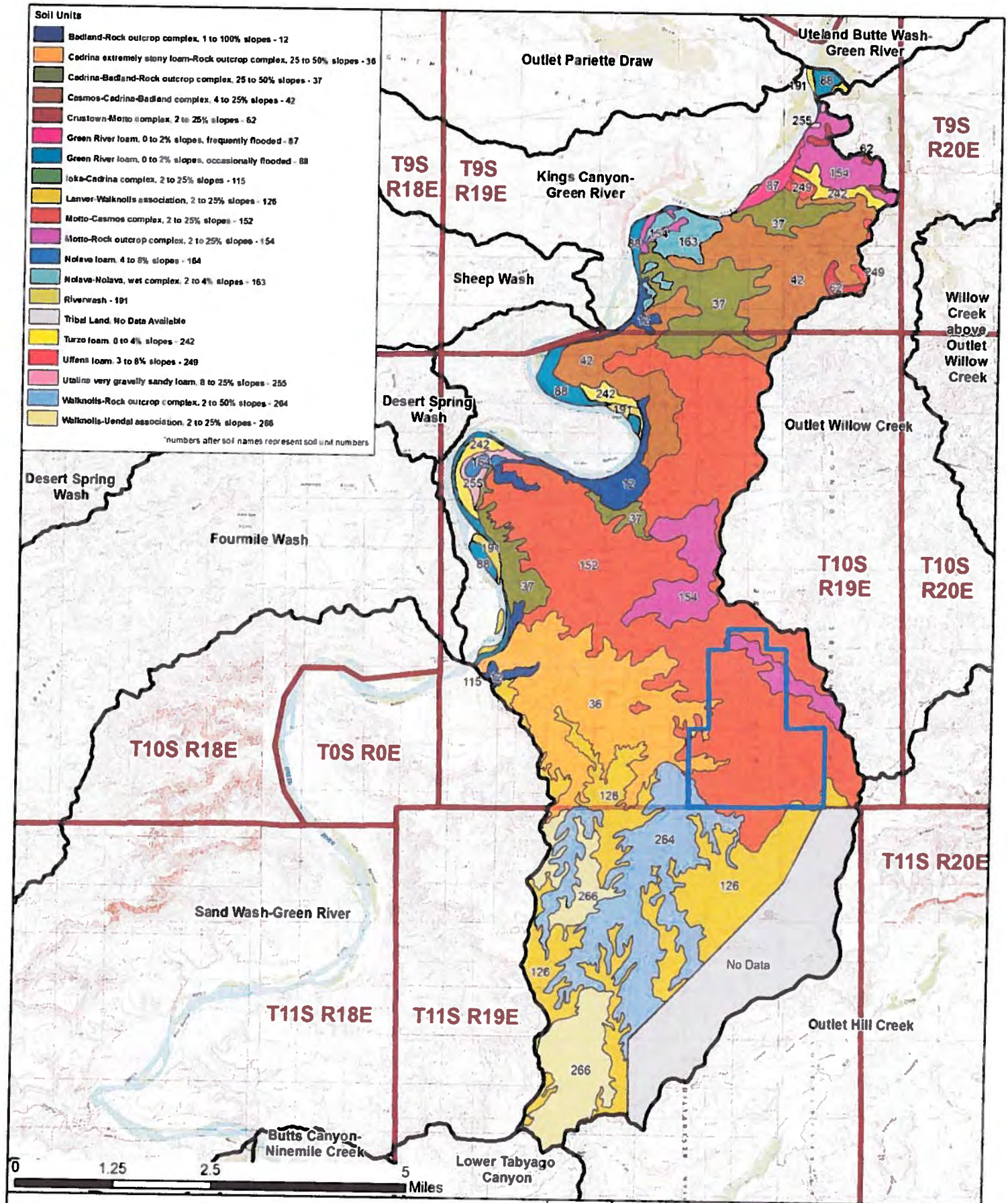
Map 3
WHBPA Vegetation Communities
Uintah County, Utah

Wild Horse Bench Infill Project Area
Barren
Grassland
Mixed Desert Shrub
Pinyon-Juniper
Sagebrush Shrubland



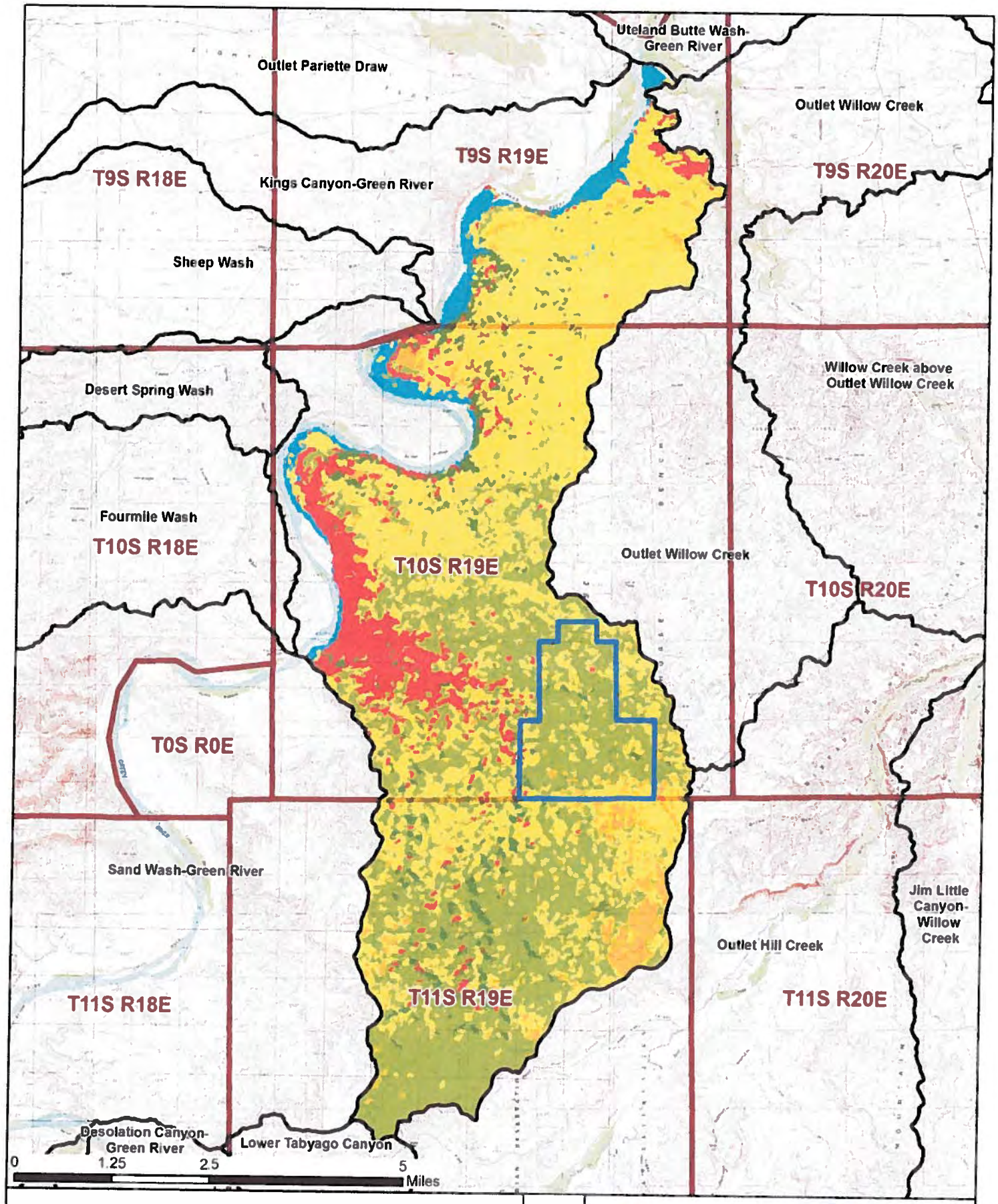
Map 4
WHBPA Protected Plant Species
Uintah County, Utah

Wild Horse Bench Infill Project Area
Sclerocactus Habitat Polygon
Clay Reed Mustard Habitat Polygon



Map 5
Soil Types for the Kings Canyon- Green River Watershed (East of the Green River)
Uintah County, Utah

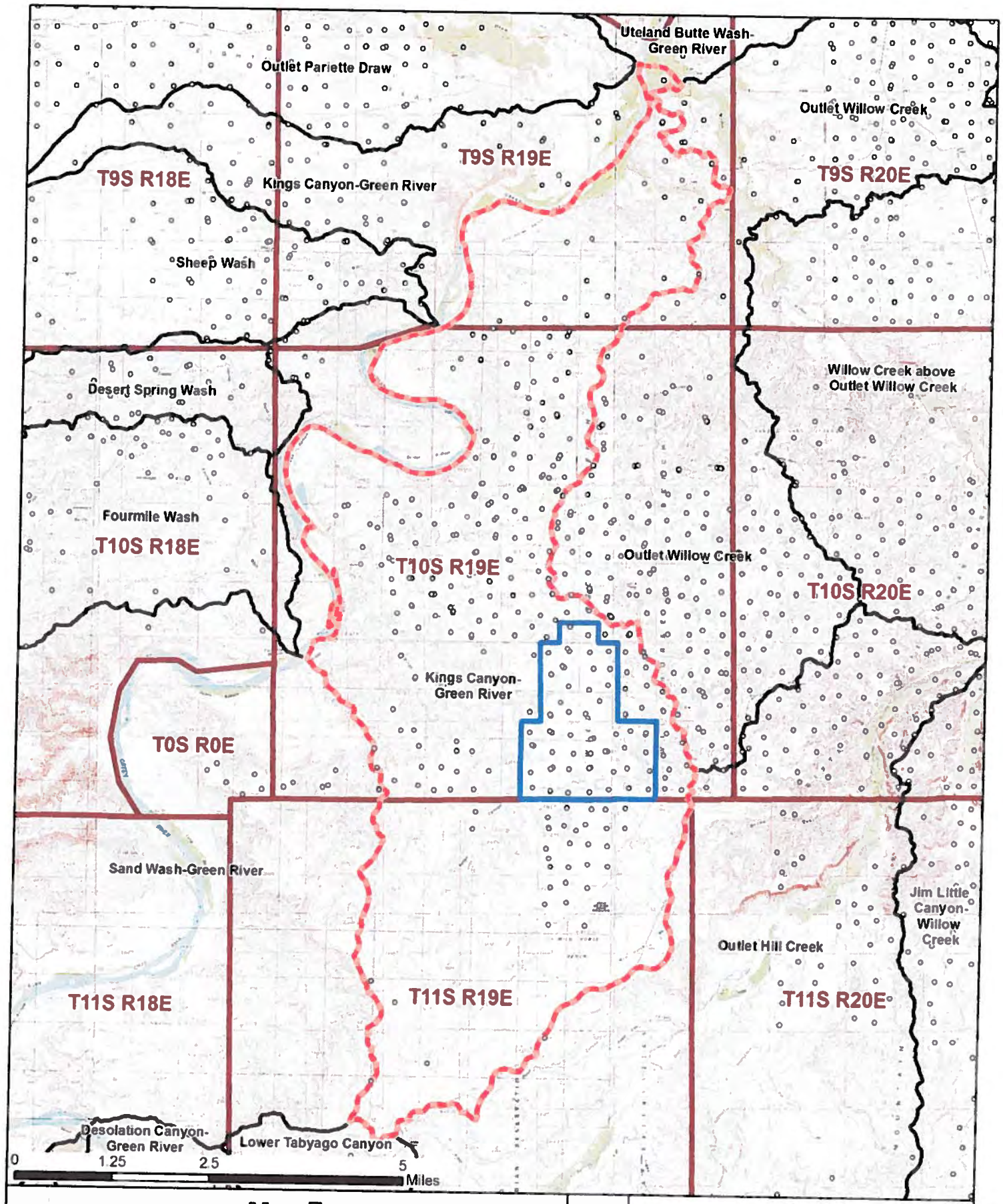
Wild Horse Bench Infill Project Area
HUC 12 Watershed Boundary



Map 6
Vegetation Communities for the Kings Canyon-Green River Watershed (East of the Green River)
Uintah County, Utah

N

- Wild Horse Bench Infill Project Area
- HUC 12 Watershed Boundary
- Barren
- Grassland
- Mixed Desert Shrub
- Pinyon-Juniper
- Sagebrush Shrubland
- Riparian



Map 7
Well Locations in Cumulative Impacts Area for Physical Resources
Uintah County, Utah

N

- Existing and Approved Well Locations
- Wild Horse Bench Infill Project Area
- Cumulative Impacts Area
- HUC 12 Watershed Boundary

APPENDIX C

BIOLOGICAL INFORMATION

Table C-1: Threatened, Endangered, Candidate and Utah BLM Sensitive Species that Potentially Occur in Uintah County

Table C-2: BCC (Region 16) and PIF Priority Migratory Bird Species

Nesting Periods and Recommended Buffers for Raptors in Utah

Conservation Measures for Clay Reed-Mustard, Graham's Beardtongue, Uinta Basin Hookless Cactus, Bonytail, Colorado Pikeminnow, Humpback Chub, and Razorback Sucker

TABLE C-1
THREATENED, ENDANGERED, PROPOSED, AND CANDIDATE SPECIES AND BLM UTAH SENSITIVE SPECIES THAT POTENTIALLY OCCUR IN UINTAH COUNTY

Status:
FE = Federally Listed as Endangered.
FT = Federally Listed as Threatened.
FC = Federal Candidate.
CS = Species receiving special management under a Conservation Agreement in order to preclude the need for a federal listing.

BLM = BLM Sensitive Species
SPC = Wildlife Species of Concern (Utah).

Species Name	Status	Habitat Association	Potential for Occurrence within the Project Area and Cumulative Effects Area	Eliminated from Detailed Analysis (Yes/No)	References
MAMMALS					
Big free-tailed bat *Nyctinomops macrotis*	SPC BLM	Rocky areas in rugged country. The species has been observed in lowlands of river floodplain-arroyo association; also in shrub desert and woodland habitats. Roosts in rock crevices (vertical or horizontal) in cliffs; also in buildings caves, and occasionally tree holes. Winter habits unknown.	The species has been documented in northeastern part of the state from Daggett County into Wyoming. Foraging habitat for this species may be present within the proposed project area.	yes	Fitzgerald et al. 1994; Oliver, 2000; UDWR, 2005.
Black-footed ferret *Mustela nigripes*	FE	Semi-arid grasslands and mountain basins. It is found primarily in association with active prairie dog colonies that contain suitable burrow densities and colonies that are of sufficient size.	The distribution of this species is limited to a nonessential experimental population reintroduced into Coyote Basin, Uintah County starting in 1999. Habitat is not present within the proposed project area.	yes	UDWR, 2005.
Canada Lynx *Lynx canadensis*	FT	Primarily occurs in Douglas-fir, Spruce-fir, and subalpine forests at elevations above 7,800 feet amsl. The lynx uses large woody debris, such as downed logs and windfalls.	If extant in Utah, this species most likely occurs in montane forests in the Uinta Mountains. Habitat is not present within the proposed project area.	yes	Fitzgerald et al. 1994; Ruggiero et al., 1999; UDWR, 2005.
Fringed myotis *Myotis thysanodes*	SPC BLM	Occurs in a wide range of habitats from low desert scrub to fir pine associations. Oak and pinyon-juniper woodlands are the most used vegetative types. This species roosts in caves, mines, and buildings. Water courses and lowland riparian areas are very important. A few scattered observations of the species have been documented in Uintah County.	Potentially suitable habitats are limited, and species occurrence is likely scattered.	yes	Oliver, 2000; UDWR, 2005.
Spotted bat *Euderma maculatum*	SPC BLM	Inhabits desert shrub, sagebrush-rabbit brush, pinion-juniper woodland, and ponderosa pine and montane forest habitats. The species also uses lowland riparian and montane grassland habitats. Suitable cliff habitat typically appears to be necessary for roosts/hibernacula.	The species potentially occurs throughout Utah; however, no occurrence records exist for the extreme northern or western parts of the state. Known occurrences have been reported in northeastern Uintah	yes	Oliver, 2000; UDWR, 2005.

Species Name	Status	Habitat Association	Potential for Occurrence within the Project Area and Cumulative Effects Area	Eliminated from Detailed Analysis (Yes/No)	References
		Spotted bats typically do not migrate and use hibernacula that maintain a constant temperature above freezing from September through May.	County. Habitat may be present within the proposed project area.		
Townsends big-eared bat *Corynorhinus townsendii*	SPC BLM	Inhabits a wide range of habitats from semidesert shrublands and pinion-juniper woodlands to open montane forests. Roosting occurs in mines and caves, in abandoned buildings, on rock cliffs, and occasionally in tree cavities. Foraging occurs well after dark over water, along margins of vegetation, and over sagebrush.	The species occurs throughout much of Utah including Duchesne and Uintah counties. One individual was collected at the Ouray National Wildlife Refuge in 1980. Roosting habitat for this species potentially could occur in areas where rock cliffs and caves are present. Habitat may be present within the proposed project area.	yes	Oliver, 2000; UDWR, 2005; BLM, 2008a.
White-tailed prairie dog *Cynomys leucurus*	SPC BLM	Inhabits grasslands, plateaus, plains and desert shrub habitats. White-tailed prairie dogs form colonies or "towns" and spend much of their time in underground burrows and hibernating during the winter months.	Prairie dogs are an obligate species to several other state-sensitive species, such as ferruginous hawk, mountain plover, and burrowing owl, in that these species depend on them for food, shelter, and nesting habitat or habitat manipulation. Habitat is present within the proposed project area.	no	Fitzgerald et al., 1994; UDWR, 2005.
BIRDS					
American white pelican *Pelecanus erythrorhynchos*	SPC BLM	Inhabits areas of open water including large rivers, lakes, ponds, and reservoirs with surrounding habitats ranging from barren to heavily vegetated sites. Typically nests on isolated islands in lakes or reservoirs.	Known to nest on islands associated with Great Salt and Utah Lakes. In northeastern Utah, the species occurs as a transient on larger water bodies. Habitat is not present within the proposed project area.	yes	UDWR, 2005; BLM, 2008a.
Bald eagle *Haliaeetus leucocephalus*	SPC BLM	Inhabits areas of open water including large rivers, lakes, ponds, and reservoirs with surrounding habitats ranging from barren to heavily vegetated sites. Typically nests on isolated islands in lakes or reservoirs. They are known to occur near the White and Green River corridor during the winter months.	This species is known to winter along the Green River, approximately 1.7 miles distant. They may utilize the project area for foraging.	yes	UDWR, 2005; BLM, 2008a.
Bobolink *Dolichonyx oryzivorus*	SPC BLM	Inhabits mesic and irrigated meadows, riparian woodlands, and subalpine marshes at lower elevations (2,800 to 5,000 feet amsl). Suitable breeding habitat for this ground nester includes tall grass, flooded meadows, prairies, and agricultural fields; forbs and perch sites also are required.	The species breeds in isolated areas of Utah, primarily in the northern half of the state. Breeding and winter habitat have been documented throughout Uintah, Duchesne, and Daggett counties. Habitat is not present within the proposed project area.	yes	Parrish et al., 2002; UDWR, 2005; BLM, 2008a.

Species Name	Status	Habitat Association	Potential for Occurrence within the Project Area and Cumulative Effects Area	Eliminated from Detailed Analysis (Yes/No)	References
Burrowing owl *Athene cunicularia*	SPC BLM	Inhabits desert, semi-desert shrubland, grasslands, and agriculture areas. Nesting habitat primarily consists of flat, dry, and relatively open terrain; short vegetation; and abandoned mammal burrows (within northeastern Utah primarily in association with prairie dog complexes) for nesting and shelter.	Known to occur in Uintah and Duchesne counties. Nesting and foraging habitat is present within the proposed project area.	no	UDWR, 2005; BLM, 2008a.
Ferruginous hawk *Buteo regalis*	SPC BLM	Resides mainly in lowland open desert terrain characterized by barren cliffs and bluffs, pinion-juniper woodlands, sagebrush-rabbit brush, and cold desert shrub. Nesting habitat includes promontory points and rocky outcrops.	This species is known to occur in the West Desert and the Uintah Basin as a summer resident and a common migrant. Within the Uintah Basin, the species is more associated with prairie dog colonies as the main prey base. Foraging and nesting habitat is present.	no	Behle, 1981; UDWR, 2005.
Greater sage-grouse *Centrocercus urophasianus*	FC SPC BLM	Inhabits upland sagebrush habitat in rolling hills and benches. Breeding occurs on open leks (or strutting grounds) and nesting and brooding occurs in upland areas and meadows in proximity to water and generally within a 2-mile radius of the lek. During winter, sagebrush habitats at submontane elevations commonly are used.	The species is widespread, but declining, with extant populations in Uintah and Duchesne counties. No leks are present.	yes	BLM, 2010; UDWR, 2005.
Lewis' woodpecker *Melanerpes lewis*	SPC BLM	Inhabits open habitats including pine forests, riparian areas, and pinion-juniper woodlands. Breeding habitat typically includes ponderosa pines and cottonwoods in stream bottoms and farm areas. The species inhabits agricultural lands and urban parks, montane and desert riparian woodlands, and submontane shrub habitats.	In Utah, the species is widespread, but is an uncommon nester along the Green River. Breeding by this species has been observed in Ouray and Uintah counties, and along Pariette Wash. Habitat is not present within the proposed project area.	yes	Parrish et al., 2002; UDWR, 2005; BLM, 2008a.
Long-billed curlew *Numenius americanus*	SPC BLM	Inhabits shortgrass prairies, alpine meadows, riparian woodlands, and reservoir habitats. Breeding habitat includes upland areas of shortgrass prairie or grassy meadows with bare ground components, usually near water.	Widespread migrant in Utah. Breeding birds are fairly common but localized, primarily in central and northwestern Utah. Potential nesting has been reported in Uintah County, but has not been confirmed. Occupied habitat or brood areas are not present within the proposed project area.	yes	Parrish et al., 2002; UDWR, 2005; BLM, 2008a.
Mexican spotted owl *Strix occidentalis lucida*	FT	In Utah, found primarily in rocky canyons. Nests in caves or crevices. Roosts on ledges or in trees in canyons. The species prefers mesic (moister/cooler) canyons with mixed conifer or riparian components. Breeding and nesting season: March through August.	Preferred habitat is not present.	yes	UDWR, 2005.
Mountain plover *Charadrius montanus*	SPC BLM	In the Uintah Basin, small mountain plover populations breed in shrub-steppe habitat where vegetation is sparse	The only known breeding population of mountain plover in Utah is located on	yes	Parrish et al., 2002; UDWR,

Species Name	Status	Habitat Association	Potential for Occurrence within the Project Area and Cumulative Effects Area	Eliminated from Detailed Analysis (Yes/No)	References
		and sagebrush communities are dominated by *Artemisia* spp. with components of black sage and grasses. Nest locations also vary with respect to topography (nests were located on flat, open ground; on the top or at the base of slopes; or very close to large rocky outcroppings).	Myton Bench.		2005.
Northern goshawk *Accipiter gentilis*	CS	Generally found in a wide variety of forest types including deciduous, coniferous, and mixed forests. Typically mature and old growth forests and generally selects larger tracts of forest over smaller tracts. In the western U.S., characteristically nests in coniferous forests including those dominated by ponderosa pine, lodgepole, or in mixed forests dominated by various coniferous species including, Douglas-fir, cedar, hemlock, spruce, and larch. Western birds also nest in deciduous forests dominated by aspen, paper birch, or willow.	Prefers old-growth forests near or within large drainage systems. Habitat is not present within the proposed project area.	yes	Graham et al., 1999; BLM, 2008a.
Short-eared owl *Asio flammeus*	SPC BLM	Inhabits arid grasslands, agricultural areas, marshes, and occasionally open woodlands. In Utah, cold desert shrub and sagebrush-rabbit brush habitats also are utilized. Typically a ground nester.	Known to occur in Uintah County, with occurrence probable in Duchesne County. Preferred habitat is not present.	yes	Johnsgard, 2002; UDWR, 2005; BLM, 2008a.
Three-toed woodpecker *Picoides tridactylus*	SPC BLM	Prefers coniferous forest, primarily spruce and balsam fir. It inhabits areas where dead timber remains after fires or logging. It is found less frequently in mixed forest, and occasionally in Willow thickets along streams. Also found in high elevation aspen groves, bogs, and swamps.	Suitable habitat is not present within the proposed project area.	yes	Parrish et al., 2002; BLM, 2008a; UDWR, 2011.
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	FC	Riparian obligate and usually occurs in large tracts of cottonwood/willow habitats. However, this species also has been documented in lowland deciduous woodlands, alder thickets, deserted farmlands, and orchards. Breeding season: late June through July.	Species is known to occur along the Green River and the Ouray National Wildlife Refuge. Habitat is not present within the proposed project area.	yes	Parrish et al., 2002; UDWR, 2005.
AMPHIBIANS AND REPTILES					
Corn snake *Elaphe guttata*	SPC BLM	Habitat includes pine woodlands, brushy fields, open hardwood forests, mangrove thickets, barnyards, and abandoned buildings, areas near springs, old trash dumps, and caves.	Occurs in Uintah County. The species have been identified at Ouray National Wildlife Refuge. Habitat is not present within the proposed project area.	yes	UDWR, 2005.
Smooth greensnake *Opheodrys vernalis*	SPC BLM	Habitat includes meadows, grassy marshes, and moist grassy fields at forest edges, mountain shrublands, stream borders, bogs, open moist woodland, abandoned farmland, and vacant lots.	Although not commonly seen throughout Utah the species has been documented in the northern section of Uintah County in lower elevations. Habitat is not present within the proposed project area.	yes	BLM, 2008a; UDWR, 2005.
FISH					

Species Name	Status	Habitat Association	Potential for Occurrence within the Project Area and Cumulative Effects Area	Eliminated from Detailed Analysis (Yes/No)	References
Bluehead sucker *Catostomus discobolus*	CS	Occupies a wide range of aquatic habitats ranging from cold, clear mountain streams to warm, turbid rivers.	The bluehead sucker is native in parts of Utah. The species occurs in the upper Colorado River system. Habitat is not present within the project area but water depletion would occur.	no	BLM, 2008a; UDWR, 2005.
Bonytail *Gila elegans*	FE	Is endemic to the Colorado River system within main channels of large rivers, and favor swift currents.	This species occurs in the Green River. Habitat is not present within the project area; however, water depletion would occur.	no	UDWR, 2005; USFWS, 2002.
Colorado pikeminnow *Ptychocheilus lucius*	FE	This species is endemic to the Colorado River system. It is a long distance migratory fish that requires pools, deep runs, and eddy habitats maintained by high spring flows.	Suitable habitat does not exist within the project area; however, water depletion would occur with project implementation.	no	UDWR, 2005; USFWS, 2002a.
Colorado River cutthroat trout *Oncorhynchus clarkii pleuriticus*	CS	Requires cool, clear water and well-vegetated stream banks for cover and bank stability; in stream cover in the form of deep pools and boulders and logs also is important; adapted to relatively cold water, thrives at high elevations. Most remaining populations are fluvial or resident. Occurs also in lakes.	Habitat is not present within the proposed project area.	yes	UDWR, 2005; Lentsch et al., 2000.
Flannelmouth sucker *Catostomus latipinnis*	CS	Adults occur in riffles, runs, and pools in streams and large rivers, with the highest densities usually in pool habitat. Young live in slow to moderately swift waters near the shoreline areas.	The flannemouth sucker is native in Utah. The species occurs in the Colorado River system. Habitat is not present within the project area; but water depletion would occur.	no	BLM, 2008a; UDWR, 2005.
Humpback chub *Gila cypha*	FE	Endemic to the Colorado River System within deep, swift-running rivers, with canyon shaded environments.	This species occurs in the Green River. Habitat is not present within the project area but water depletion would occur.	no	USFWS, 2002b; UDWR, 2005.
Razorback sucker *Xyrauchen texanus*	FE	Endemic to large rivers of the Colorado River system.	This species occurs in the Green and White Rivers. Habitat is not present within the project area but water depletion would occur.	no	USFWS, 2002c; UDWR, 2005.
Roundtail chub *Gila robusta*	CS	Adults inhabit low to high flow areas in the Green River; young occur in shallow areas with minimal flow.	The roundtail chub is native in Utah. The species occurs in the Colorado River system. Habitat is not present within the project area but water depletion would occur.	no	BLM, 2008a; UDWR, 2005.
PLANTS					
Alcove bog orchid *Platanthera zothecina*	BLM	This species occurs on moist stream banks, seeps, and hanging gardens of the Weber Sandstone Formation in mixed desert shrub, pinyon-juniper, and oakbrush	Suitable habitat for this species is not present within the WHBPA, as indicated by lack of associated geologic	yes	UNPS, 2013.

Species Name	Status	Habitat Association	Potential for Occurrence within the Project Area and Cumulative Effects Area	Eliminated from Detailed Analysis (Yes/No)	References
		communities from 4,000 to 8,690 feet.	formations.		
Barneby's ridge cress *Lepidium barnebyanum*	FE	This species is known to occur only on tribal lands in Duchesne County on the West Tavaputs Plateau. Barneby's ridge cress occurs in the Indian Canyon Uinta Formation, on white shale outcrops, ridges, and barren inclusions in pinyon-juniper communities, at elevations between 6,200 and 6,500 feet.	The WHBPA is outside the known elevation range of this species.	yes	UNPS, 2013.
Clay reed-mustard (clay thelopody) *Schoenocrambe argillacea*	FT	This species is known to occur in Uintah County on canyon rims and steep slopes in the contact zone of the Uinta and Green River Formations in mixed desert shrub communities at elevations between 4,800 and 5,650 feet.	Potentially suitable habitat is present in the WHBPA.	no	UNPS, 2013.
Gibben's beardtongue (Gibben's penstemon) *Penstemon gibbensii*	BLM	This species is known to occur in Daggett County on Browns Park and Green River Formations in sandy/shaly bluffs and slopes in juniper and mixed desert shrub communities at elevations between 5,500 and 7,700 feet.	Suitable habitat for this species is not present within the WHBPA, which is slightly below the known elevation range.	yes	UNPS, 2013.
Goodrich's beardtongue (Goodrich's penstemon) *Penstemon goodrichii*	BLM	This species occurs on the Duchesne River on blue-gray to reddish bands of clay badlands at elevations of 5,590 to 6,215 feet.	The WHBPA is outside the known occurrence and elevation range of this species. Suitable substrate is not present.	yes	BLM, 2008a; UDWR, 2005; UNPS, 2013.
Goodrich blazingstar *Mentzelia goodrichii*	BLM	This species is known to occur in Duchesne County in Willow and Argyle Canyons in the Green River Formation. The species occurs on steep escarpments and cliffs in white calcareous shale in montane brush communities at elevations between 8,100 and 8,800 feet.	The WHBPA is outside the known occurrence and elevation range of this species. Suitable substrate is not present.	yes	UNPS, 2013.
Goodrich cleomella *Cleomella palmeriana* var. *goodrichii*	BLM	This species typically occurs in heavy clay soils on eroded clay and shale slopes of the Mancos, Tropic, and Morrison formations. It occurs in salt desert shrub communities from 4,000 to 6,000 feet in elevation.	This species occurs only in Rainbow Draw in Uintah County, which is outside the WHBPA.	yes	BLM, 2008a.
Graham's beardtongue (Graham's penstemon) *Penstemon grahamii*	BLM	This species is known to occur in Uintah County on shale ledges and slopes derived from the Evacuation Creek and Parachute Creek members of the Green River formation. It grows in semi-barren mixed desert shrub or pinyon-juniper communities, at elevations between 4,600 to 6,700 feet.	Potentially suitable habitat for the species is not present within the WHBPA. Critical habitat for this species is located 3.2 miles southwest of the WHBPA.	yes	BLM, 2008a; UNPS, 2013.
Graham's catseye *Cryptantha grahamii*	BLM	This species exhibits an affinity for oil-rich shale substrates.	The oil-rich Green River Formation is exposed to the west of the project area on the side slopes of Kings Canyon.	yes	BLM, 2008a; UNPS, 2013
Hamilton milkvetch *Astragalus hamiltonii*	BLM	This species is known to occur in Uintah County at Asphalt Ridge on the Lapoint and Dry Gulch members of the Mowry Shale, and Dakota, Wasatch and Duchesne Formations. It occurs in mixed desert shrub or pinyon-	Suitable substrate is not present in the WHBPA	yes	BLM, 2008a; UNPS, 2013.

Species Name	Status	Habitat Association	Potential for Occurrence within the Project Area and Cumulative Effects Area	Eliminated from Detailed Analysis (Yes/No)	References
		juniper,at elevations between 5,240 to 5,800 feet.			
Huber pepperplant *Lepidium huberi*	BLM	This species is known to occur in Uintah County in foothills along Ashley Creek in Dry Fork along eroding cliffs, in alluvium, sandy or shaly bluffs derived from the Chinle, Park City, and Weber Formations. The species occurs in association with black sage or montane brush communities, at elevations between 5,000 to 9,700 feet.	Suitable substrate is not present in the WHBPA.	yes	BLM, 2008a; UNPS, 2013.
Owenby's thistle *Cirsium owenbyii*	BLM	This species inhabits the east flank of the Uinta mountains in sagebrush, juniper, and riparian communities at elevations ranging from 5,500 to 6,200 feet.	This species is currently known for a few sites in Brown's Park, Diamond Mountain, and Cliff Ridge.	yes	BLM, 2008a; UNPS, 2013.
Pariette cactus (Wagonhound cactus) *Sclerocactus brevispinus*	FT	This species is endemic to Pariette and Castle Peak Washes, occuring only in the Wagonhound member of the Uinta Formation on alkaline clay. It occurs in shadscale, mat-saltbush, and greasewood communities, at elevations between 4,700 and 5,400 feet.	This species has not been documented in the WHBPA and is not known to occur east of the Green River.	yes	BLM, 2008a; UNPS, 2013.
Park rockcress *Arabis vivariensis*	BLM	This species is known to occur in Uintah County at Diamond Mountain, on the Diamond Gulch Weber Formation sandstone and limestone, in mixed desert shrub or pinyon-juniper communities, at elevations between 5,000 and 6,000 feet.	Suitable habitat for this species is not present within the WHBPA, as indicated by the lack of the associated geologic formation.	yes	BLM 2008a; UNPS, 2013
Rock bitterweed *Hymenoxys lapidicola*	BLM	This species is endemic to Uintah County. The species occurs on rock crevices in the ponderosa pine-manzanita and pinyon-juniper communities between 6,000 and 8,100 feet.	Suitable habitat for this species is not present within the WHBPA, which is below its elevation range.	yes	BLM 2008a; UNPS, 2013
Shrubby reed-mustard *Schoenocrambe suffrutescens*	FE	This species is known to occur from Willow Creek to Sand Wash. The species occurs on calcareous shale outcrops of the Evacuation Creek member of the Green River Shale in mixed desert shrub, pinyon-juniper-sagebrush, or montane brush communities, at elevations between 5,100 and 6,600 feet.	Suitable habitat for this species is not present within the WHBPA because of lack of suitable substrates.	yes	BLM, 2008a; UNPS, 2013.
Spanish bayonet *Yucca sterilis*	BLM	This species is found in salt desert shrub communities on the Uinta Formation. The species occurs in grasslands, sagebrush shrublands, pinyon-juniper, and mountain-brush areas, as well as on desert ridges and hills at elevations ranging from 4,790 to 5,800 feet.	Suitable habitat may be present on sandy soils derived from the Uinta Formation, but suitable habitat was not found in the WHBPA during the May 2014 biological inventories.	yes	UNPS, 2013.
Stemless beardtongue *Penstemon acaulis*	BLM	This species is known to occur in Daggett County on the Browns Park Formation in ashy, gravelly, or sandy ridges and knolls in sagebrush-desert, grass, or pinyon-juniper communities at elevations from 5,900 to 8,200 feet.	The WHBPA is outside the known occurrence and elevation range of this species. Suitable substrate is not present.	yes	UNPS, 2013.

Species Name	Status	Habitat Association	Potential for Occurrence within the Project Area and Cumulative Effects Area	Eliminated from Detailed Analysis (Yes/No)	References
Strigose Townsendia (Hairy Townsend daisy) *Townsendia strigosa* var. *prolixa*	BLM	This species occurs in Daggett, Duchesne, and Uintah counties in salt desert shrub, mixed desert shrub, and pinyon-juniper communities at elevations ranging from 4,800 to 6,200 feet.	Although suitable habitat may be present, the WHBPA is outside the known occurrence of this species.	yes	NRCS, 2012.
Uinta Basin hookless cactus *Sclerocactus wetlandicus*	FT	This species is known to occur in Duchesne and Uintah counties. It grows on gravelly hills and terraces in salt desert shrub and pinyon-juniper communities on river benches, valley slopes, and rolling hills of the Duchesne River, Green River, and Mancos Formations between 4,500 and 6,600 feet.	The WHBPA is within the known range of the species and may have the potential to support individuals or small scattered populations.	no	BLM, 2008a; UDWR, 2005; UNPS, 2013.
Uinta greenthread *Thelesperma caespitosum*	BLM	The species occurs on white shale slopes, benches, and ridgecrests in pinyon-juniper, sagebrush, and montane brush communities, at elevations ranging from 5,000 to 9,000 feet.	This species is known to occur in Duchesne County at West Tavaputs Plateau on the north slope of the Uintas Bishop Formation. Suitable habitat for this species is not present within the WHBPA.	yes	UNPS, 2013.
Untermann fleabane *Erigeron untermannii*	BLM	This species is known to occur in Duchesne and Uintah Counties on the West Tavaputs Plateau. The species occurs on ridges, in dry calcareous shales and sandstones in pinyon-juniper or montane brush communities, at elevations between 7,000 and 9,400 feet.	The WHBPA is outside the elevation range of this species.	yes	BLM, 2008a; UNPS, 2013.
Ute ladies'-tresses orchid *Spiranthes diluvialis*	FT	This species has been documented in Daggett, Duchesne, and Uintah Counties in unconsolidated alluvium in riparian corridors, wetlands, and wet meadows, at elevations between 4,500 and 6,800 feet. It occurs along the Green River in Brown's Park (Utah and Colorado), Dinosaur National Monument, and near the confluence with the Yampa River. The species also occurs on Ashley Creek, within Ashley Valley, along Big Bruch Creek, the upper Duchesne River, and tributaries to the Duchesne River.	Suitable habitat for this species is not present within the WHBPA.	yes	BLM, 2008a; UNPS, 2013.
White River beardtongue *Penstemon scariosus* var. *albifluvis*	FC	Known to occur in Uintah County at Evacuation Creek and on surficial outcrops of oil shale in southern Uintah County. It occurs on outcrops of oil shale, in semi-barren mixed desert shrub or pinyon-juniper communities at elevations between 5,000 to 6,880 feet.	Preferred substrates are not present in the WHBPA.	yes	BLM, 2008a; UDWR, 2005; UNPS, 2013.

Source: Species status from UDWR, 2011.

TABLE C-2
BCC (Region 16) and PIF PRIORITY MIGRATORY BIRD SPECIES

Species Name	USFWS Birds of Conservation Concern	State of Utah Wildlife Species of Concern	Partners in Flight Priority Bird Species	Primary Breeding Habitat	Secondary Breeding Habitat	Winter Habitat
American avocet *Recurvirostra americana*			X	Wetland	Playa	Migrant
American bittern *Botaurus lentiginosus*	X			Wetland	Wetland	Migrant
Bald eagle *Haliaeetus leucocephalus*	X	X		Lowland Riparian	Agriculture	Lowland Riparian
Bendire's thrasher *Toxostoma bendirei*	X			Low Desert Scrub	Low Desert Scrub	Migrant
Black rosy-finch *Leucosticte atrata*	X			Alpine	Alpine	Grassland
Black-throated grey warbler *Dendroica nigrescens*			X	Pinyon-Juniper	Mountain Shrub	Migrant
Brewer's sparrow *Spizella breweri*	X		X	Shrubsteppe	High Desert Scrub	Migrant
Broad-tailed hummingbird *Selasphorus platycercus*			X	Lowland riparian	Mountain riparian	Migrant
Brown-capped rosy-finch *Leucosticte australis*	X			Above Timberline	Above Timberline	Migrant
Burrowing owl *Athene cunicularia*	X	X		High Desert Scrub	Grassland	Migrant
Cassin's finch *Carpodacus cassinii*	X			Aspen	Sub-Alpine Conifer	Lowland Riparian
Chestnut-collared longspur *Calcarius ornatus*	X			Prairie	Grasslands	Grasslands
Ferruginous hawk *Buteo regalis*	X	X	X	Pinyon-Juniper	Shrubsteppe	Grassland
Flammulated owl *Otus flammeolus*	X			Ponderosa Pine	Sub-Alpine Conifer	Migrant

Species Name	USFWS Birds of Conservation Concern	State of Utah Wildlife Species of Concern	Partners in Flight Priority Bird Species	Primary Breeding Habitat	Secondary Breeding Habitat	Winter Habitat
Gambel's quail *Callipepla gambelii*			X	Low Desert Scrub	Lowland Riparian	Low Desert Scrub
Golden eagle *Aquila chrysaetos*	X			Cliff	High Desert Scrub	High Desert Scrub
Grace's warbler *Dendroica graciae*	X			Ponderosa Pine	Mixed Conifer	Migrant
Grasshopper sparrow *Ammodramus savannarum*	X			Grasslands	Grasslands	Migrant
Gray vireo *Vireo vicinior*	X		X	Pinyon-Juniper	Northern Oak	Migrant
Greater sage-grouse *Centrocercus urophasianus*		X	X	Shrubsteppe	Shrubsteppe	Shrubsteppe
Gunnison sage-grouse *Centrocerus minimus*	X		X	Shrubsteppe	Shrubsteppe	Shrubsteppe
Juniper titmouse *Baeolophus ridgwayi*	X			Pinyon-Juniper	Pinyon-Juniper	Pinyon-Juniper
Lewis' woodpecker *Melanerpes lewis*	X	X	X	Ponderosa Pine	Lowland Riparian	Northern Oak
Long-billed curlew *Numenius americanus*	X	X	X	Grassland	Agriculture	Migrant
Lucy's warbler			X	Lowland Riparian	Low Desert Scrub	Migrant
Mountain plover *Charadrius montanus*	X	X	X	High Desert Scrub	High Desert Scrub	Migrant
Peregrine falcon *Falco peregrinus*	X			Cliff	Lowland Riparian	Wetland
Pinyon jay *Gymnorhinus cyanocephalus*	X			Pinyon-Juniper	Ponderosa Pine	Pinyon-Juniper
Prairie falcon *Falco mexicanus*	X			Cliff	High Desert Scrub	Agriculture

Species Name	USFWS Birds of Conservation Concern	State of Utah Wildlife Species of Concern	Partners in Flight Priority Bird Species	Primary Breeding Habitat	Secondary Breeding Habitat	Winter Habitat
Sage sparrow *Amphispiza belli*			X	Shrubsteppe	High Desert Scrub	Low Desert Scrub
Snowy plover *Charadrius alexandrius*	X			Playa	Playa	Migrant
Virginia's warbler *Vermivora virginiae*			X	Northern Oak	Pinyon-Juniper	Migrant
Veery *Catharus fuscescens*	X			Lowland Riparian	Lowland Riparian	Migrant
Willow flycatcher *Empidonax traillii*	X			Lowland Riparian	Mountain Riparian	Migrant
Yellow-billed cuckoo *Coccyzus americanus*	X		X	Lowland Riparian	Agriculture	Migrant

Sources: UDWR, 2011; Parrish et al., 2002 (Utah Priority Species, Colorado Plateau); USFWS, 2008 (Table 14 BCR 16)

ATTACHMENT 2

Nesting Periods and Recommended Buffers for Raptors in Utah

Species	Spatial Buffer (miles)	Seasonal Buffer	Incubation, # Days	Brooding # Days Post-Hatch	Fledging, # Days Post-Hatch	Post-fledge Dependency to Nest, # Days[1]
Bald eagle	1.0	1/1-8/31	34-36	21-28	70-80	14-20
Golden eagle	0.5	1/1-8/31	43-45	30-40	66-75	14-20
N. Goshawk	0.5	3/1-8/15	36-38	20-22	34-41	20-22
N. Harrier	0.5	4/1-8/15	32-38	21-28	42	7
Cooper's hawk	0.5	3/15-8/31	32-36	14	27-34	10
Ferruginous hawk	0.5	3/1-8/1	32-33	21	38-48	7-10
Red-tailed hawk	0.5	3/15-8/15	30-35	35	45-46	14-18
Sharp-shinned hawk	0.5	3/15-8/31	32-35	15	24-27	12-16
Swainson's hawk	0.5	3/1-8/31	33-36	20	36-40	14
Turkey vulture	0.5	5/1-8/15	38-41	14	63-88	10-12
California condor	1.0	NN yet	56-58	5-8 weeks	5-6 months	2 months
Peregrine falcon	1.0	2/1-8/31	33-35	14-21	35-49	21
Prairie falcon	0.25	4/1-8/31	29-33	28	35-42	7-14
Merlin	0.5	4/1-8/31	28-32	7	30-35	7-19
American kestrel	NN[2]	4/1-8/15	26-32	8-10	27-30	12
Osprey	0.5	4/1-8/31	37-38	30-35	48-59	45-50
Boreal owl	0.25	2/1-7/31	25-32	20-24	28-36	12-14
Burrowing owl	0.25	3/1-8/31	27-30	20-22	40-45	21-28
Flammulated owl	0.25	4/1-9/30	21-22	12	22-25	7-14
Great horned owl	0.25	2/1-9/31	30-35	21-28	40-50	7-14
Long-eared owl	0.25	2/1-8/15	26-28	20-26	30-40	7-14
N. saw-whet owl	0.25	3/1-8/31	26-28	20-22	27-34	7-14
Short-eared owl	0.25	3/1-8/1	24-29	12-18	24-27	7-14
Mex. Spotted owl	0.5	3/1-8/31	28-32	14-21	34-36	10-12
N. Pygmy owl	0.25	4/1-8/1	27-31	10-14	28-30	7-14
W. Screech owl	0.25	3/1-8/15	21-30	10-14	30-32	7-14
Common Barn-owl	NN[2]	2/1-9/15	30-34	20-22	56-62	7-14

[1] Length of post-fledge dependency period to parents is longer than reported in this table. Reported dependency periods reflect the amount of time the young are still dependent on the nest site; i.e. they return to the nest for feeding. [2] Due to apparent high population densities and ability to adapt to human activity, a spatial buffer is not currently considered necessary for maintenance of American kestrel or Common barn-owl populations. Actions resulting in direct mortality of individual bird or take of known nest sites is unlawful

C.1 CLAY REED-MUSTARD (*SCHOENOCRAMBE ARGILLACEA*)

In order to minimize effects to the federally threatened clay reed-mustard, the BLM in coordination with the U.S. Fish and Wildlife Service (USFWS) developed the following avoidance and minimization measures. Integration of and adherence to these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance) are in compliance with the Endangered Species Act (ESA). The following avoidance and minimization measures should be included in the Plan of Development (POD):

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat[1] prior to any ground disturbing activities to determine if suitable clay reed-mustard habitat is present.
2. Site inventories will be conducted within suitable habitat[2] to determine occupancy. Where standard surveys are technically infeasible and otherwise hazardous due to topography, slope, etc., suitable habitat will be assessed and mapped for avoidance (hereafter, "avoidance areas"); in such cases, in general, 300-foot buffers will be maintained between surface disturbance and avoidance areas. However, site specific distances will need to be approved by USFWS and BLM when disturbance will occur upslope of habitat. Where conditions allow, inventories:
    a. Must be conducted by qualified individual(s) and according to BLM and USFWS accepted survey protocols,
    b. Will be conducted in suitable and occupied[3] habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected (usually May 1st to June 5th, in the Uinta Basin; however, surveyors should verify that the plant is flowering by contacting a BLM or USFWS botanist or demonstrating that the nearest known population is in flower),
    c. Will occur within 300 feet from the centerline of the proposed right-of-way (ROW) for surface pipelines or roads; and within 300 feet from the perimeter of disturbance for the proposed well pad including the well pad,
    d. Will include, but not be limited to, plant species lists and habitat characteristics, and
    e. Will be valid until May 1st the following year.

---

[1] *Potential habitat* comprises areas that satisfy the broad criteria of the species habitat description; usually determined by preliminary, in house assessment.
[2] *Suitable habitat* comprises areas that contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain clay reed mustard; habitat descriptions can be found in Federal Register Notice and species recovery plan links at <http://www.fws.gov/endangered/wildlife.html>.
[3] *Occupied habitat* is defined as any area within 300 feet of a listed plant individual.

3. Design project infrastructure to minimize impacts within suitable habitat[2]:

   a. Where standard surveys are technically infeasible, infrastructure and activities will avoid all suitable habitat (avoidance areas) and incorporate 300-foot buffers, in general; however, site specific distances will need to be approved by USFWS and BLM when disturbance will occur upslope of habitat,

   b. Reduce well pad size to the minimum needed, without compromising safety,

   c. Limit new access routes created by the project,

   d. Roads and utilities should share common ROWs where possible,

   e. Reduce the width of ROWs and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat,

   f. Place signing to limit off-road travel in sensitive areas,

   g. Stay on designated routes and other cleared/approved areas,

   h. Dust abatement will be employed in all potential clay reed-mustard habitat during the flowering period for the species and when the species is most vulnerable to dust-related impacts (March 1 to August 30),

   i. Only water (no chemicals, reclaimed production water or oilfield brine) will be used for dust abatement within all clay reed-mustard potential habitat, and

   j. Dust abatement will occur weekly or as necessary as directed by the BLM Authorized Officer (AO) during construction and drilling activities, and monthly (March 1 to August 30) or as directed by the BLM AO over the life of the project.

4. Within occupied habitat[3], project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:

   a. Where standard surveys are technically infeasible, infrastructure and activities will avoid all suitable habitat (avoidance areas) and incorporate 300-foot buffers, in general; however, site specific distances will need to be approved by USFWS and BLM when disturbance will occur upslope of habitat,

   b. Follow the above recommendations (#3) for project design within suitable habitats,

   c. To avoid water flow and/or sedimentation into occupied habitat and avoidance areas, silt fences, hay bales, and similar structures or practices will be incorporated into the project design; appropriate placement of fill is encouraged,

   d. Construction of roads will occur such that the edge of the ROW is at least 300 feet from any plant and 300 feet from avoidance areas,

   e. Roads will be graveled within occupied habitat; the operator is encouraged to apply water for dust abatement to such areas from May 1st to June 5th (flowering period); dust abatement applications will be comprised of water only,

f. The edge of the well pad should be located at least 300 feet away from plants and avoidance areas, in general; however, site specific distances will need to be approved by USFWS and BLM when disturbance will occur upslope of habitat,

g. Surface pipelines will be laid such that a 300-foot buffer exists between the edge of the ROW and plants and 300 feet between the edge of ROW and avoidance areas; use stabilizing and anchoring techniques when the pipeline crosses suitable habitat to ensure pipelines don't move towards the population; site specific distances will need to be approved by USFWS and BLM when disturbance will occur upslope of habitat,

h. Construction activities will not occur from May 1st through June 5th within occupied habitat,

i. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,

J. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,

k. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and

l. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

5. Occupied clay reed-mustard habitats within 300 feet of the edge of the surface pipelines' ROWs, 300 feet of the edge of the roads' ROWs, and 300 feet from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the USFWS. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the USFWS.

6. Reinitiation of section 7 consultation with the USFWS will be sought immediately if any loss of plants or occupied habitat for the shrubby reed-mustard is anticipated as a result of project activities.

Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the USFWS to ensure continued compliance with the ESA.

C.4 UINTA BASIN HOOKLESS CACTUS (*SCLEROCACTUS WETLANDICUS*)

In order to minimize effects to the federally threatened Uinta Basin hookless cactus, the BLM in coordination with the USFWS, developed avoidance and minimization measures. Integration of and adherence to these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance) are in compliance with the ESA. The following avoidance and minimization measures would be included in the POD:

1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat[10] prior to any ground disturbing activities to determine if suitable Uinta Basin hookless cactus habitat is present.
2. Within suitable habitat[11], site inventories will be conducted to determine occupancy. Inventories:
    a. Must be conducted by qualified individual(s) and according to BLM and USFWS accepted survey protocols.
    b. Will be conducted in suitable and occupied[12] habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected, and during appropriate flowering periods. For this species, surveys can be done any time of the year provided there is no snow cover,
    c. Will occur within 300 feet from the edge of the proposed ROW for surface pipelines or roads; and within 300 feet from the perimeter of disturbance for the proposed well pad including the well pad,
    d. Will include, but not be limited to, plant species lists and habitat characteristics, and
    e. Will be valid until one year from the survey date.
3. Design project infrastructure to minimize impacts within suitable habitat[11]:
    a. Reduce well pad size to the minimum needed, without compromising safety,
    b. Limit new access routes created by the project,
    c. Roads and utilities should share common ROWs where possible,
    d. Reduce width of ROWs and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat,
    e. Place signing to limit off-road travel in sensitive areas,

---

[10] *Potential habitat* comprises areas that satisfy the broad criteria of the species habitat description; usually determined by preliminary, in house assessment.

[11] *Suitable habitat* comprises areas that contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Uinta Basin hookless cactus. Habitat descriptions can be found in the U.S. Fish and Wildlife USFWS's 2010 Recovery Outline and Federal Register Notices for the Uinta Basin hookless cactus (http://www.fws.gov/endangered/wildlife.html).

[12] *Occupied habitat* is defined as any area within 300 feet of a listed plant individual.

f. Stay on designated routes and other cleared/approved areas, and

g. All disturbed areas will be re-vegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.

4. Within occupied habitat[12], project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants when and where practicable:

   a. Follow the above (#3) recommendations for project design within suitable habitats,

   b. Buffers of 300 feet minimum between the edge of the ROW (roads and surface pipelines) or surface disturbance (well pads) and plants and populations will be incorporated,

   c. Surface pipelines will be laid such that a 300-foot buffer exists between the edge of the ROW and the plants, use stabilizing and anchoring techniques when the pipeline crosses the habitat to ensure the pipelines don't move towards the population,

   d. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,

   e. Where technically and economically feasible, use directional drilling or multiple wells from the same pad,

   f. Designs will avoid concentrating water flows or sediments into occupied habitat,

   g. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and

   h. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

5. From one year of the date forward of 100% *Sclerocactus* clearance survey for this project, spot checks will be conducted and approved for all planned disturbance areas on an annual basis. (The *S. wetlandicus* survey period is defined as anytime without snow cover prior.) Results of spot checks may require additional pre-construction plant surveys as directed by the BLM. If the proposed action or parts thereof have not occurred within four years of the original survey, 100% clearance re-survey will be required prior to ground disturbing activities.

6. The Operator will perform ground disturbing activities in *Sclerocactus* Core Conservation Areas (CCAs) outside of the flowering period, April 1 through May 30.

7. Only water (no chemicals, reclaimed production water or oil field brine) will be used for dust abatement measures within cactus habitat.

8. Dust abatement will be employed in suitable *Sclerocactus* habitat over the life of the project during the time of the year when *Sclerocactus* species are most vulnerable to dust-related impacts (March through August).

9. Where surveys have documented *Sclerocactus* plants within 50-feet of construction, a *qualified botanist will be present during all phases of construction.

10. Pipeline ROW's located within 50 feet of individual *Sclerocactus* plants/and or populations will be hand laid (vehicle-free) and secured in place to prevent pipeline movement.

11. The seed mix will be amended to exclude Snake River wheatgrass, (not endemic to Utah) and Siberian wheatgrass (introduced). The forb, Blue Flax (*Linum perenne*, introduced) will be excluded and Lewis Flax *(Linum lewisii*, native to Utah) may be substituted, if desired.

12. Application for Pesticide Use Permit will include provisions for mechanical removal, as opposed to chemical removal, for Utah Class A, B and C noxious weeds within 50 feet of individual/populations of *Sclerocactus*.

13. Erosion control measures (i.e. silt fencing) will be implemented to minimize sedimentation to Sclerocactus plants and populations located down slope of proposed surface disturbance activities.

14. Reinitiation of Section 7 consultation with the USFWS will be sought immediately if any loss of plants or occupied or occupied habitat for the Uinta Basin hookless cactus is anticipated as a result of project activities.

15. Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the USFWS to ensure continued compliance with the ESA.

BONYTAIL (*GILA ELEGANS*), COLORADO PIKEMINNOW (*PTYCHOCHEILUS LUCIUS*), HUMPBACK CHUB (*GILA CYPHA*), RAZORBACK SUCKER (*XYRAUCHEN TEXANUS*)

- If water were to be drawn from the White or Green Rivers, the conservation measures for endangered fish will be followed:
  a. The best method to avoid entrainment is to pump from an off-channel location – one that does not connect to the river during high spring flows. An infiltration gallery constructed in a USFWS-approved location is best.
  b. If the pump head is located in the river channel the following stipulations apply:
     i. The pump will not be situated in a low-flow or no-flow area because these habitats tend to concentrate larval fishes.
     ii. The amount of pumping will be limited, to the greatest extent possible, during that period of the year when larval fish may be present, April 1st to as late as August 31st, earlier in the dry years, later in the wet years.
     iii. The amount of pumping will be limited, to the greatest extent possible, during the midnight hours (10 pm to 2 am) because larval drift studies indicate that this is a period of greatest daily activity. Dusk is the preferred pumping time, as larval drift abundance is lowest during this time.
  c. All pump intakes will be screened with 3/32" mesh material.
  d. Approach velocities for intake structures should follow the National Marine Fisheries Service's document "Fish Screening Criteria for *Anadromous Salmonids*". For projects with an in-stream intake that operate in stream reaches where larval fish may be present, the approach velocity should not exceed 0.33 cubic feet per second (cfs).
  e. Report any fish impinged on the intake screen or entrained into irrigation canals to the Service (801.975.3330) or the Utah Division of Wildlife Resources:

     Northeastern Region
     152 East 100 North
     Vernal, UT 84078
     Phone: (435) 781-9453

APPENDIX D

RECLAMATION PLAN FOR UINTAH BASIN OPERATIONS

Koch Exploration Company, LLC
Reclamation Plan for Uintah Basin Operations

1. Introduction

1.1 For the purposes of this Program, reclamation is defined as the process of returning lands that have been disturbed to a condition that will meet specified regulatory requirements and other binding agreements. KEC's Reclamation Program establishes the expectations, conditions, guidelines and performance standards for reclamation following company activities.

1.2 KEC operates in multiple regulatory jurisdictions with various reclamation requirements. This document has been prepared to allow flexibility in order to comply with the various agency requirements.

1.3 This document does not modify government regulatory requirements, other internal reporting requirements outside of Environmental, Health and Safety (EHS) and Operations, or any specific binding agreement (e.g., lease obligations, surface use agreements).

2. Applicability

2.1 The Federal Land Policy Management Act of 1976 (FLPMA) mandates that the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values.

2.2 This Program applies to disturbed lands on federal-owned surfaces, state-owned surfaces and privately-owned surfaces. Reclamation should be conducted on disturbed surface that is not necessary for continued production and operation.

2.3 Typical areas requiring reclamation covered under this Program include:

- Well Locations
- Transportation Corridors (e.g., roads)
- Pipelines / Flowlines
- Right-of-Ways (ROWs)
- Pits/Reservoirs
- Utility Corridors (e.g., water, electricity, communication
- Facilities (e.g., compressor stations, tank batteries)

2.4 The Utah Pollution Discharge Elimination System (UPDES), as governed by the Utah Division of Water Quality, requires construction activities that disturb one or more acres of land be authorized under the UPDES General Permit for Construction Activities. KEC will abide by the General Permit and prepare a Stormwater Pollution Prevention Plan (SWPPP) as required by the General Permit.

3. Goals and Objectives

3.1 By implementing a Reclamation Program, it is KEC's goal to maintain stewardship to the environment, foster good-will with federal, state and local regulatory agencies, be a "good neighbor" with surface owners, and comply with all applicable regulations.

3.2 Stabilization (Short-Term) Reclamation – The objective of Short-Term Reclamation is to stabilize a disturbed area, protect adjacent areas from undue degradation during construction and development phases and reduce the cost and effort of Interim and Final Reclamation.

3.3 Interim (Long-Term) Reclamation – The objective of Interim Reclamation is to shape, stabilize, re-vegetate, or otherwise treat disturbed areas in order to provide a self-sustaining and productive use of the land during production operations.

3.4 Final Reclamation – After production and operations cease, the goal of final reclamation is to return the land to a condition that approximates that which existed prior to disturbance and maintain a stable and productive condition compatible with the land use.

4. Responsibilities

4.1 Production Superintendents – Production Superintendents are accountable for assuring compliance with this Program.

4.2 Operations Department – The Operations Department will be responsible for topsoil management, minimizing disturbance, and stabilization of disturbed soil throughout project and facility development and operation.

4.3 Regulatory Department – The Regulatory Department is responsible for training operations personnel, permitting, notice of intent, subsequent reports of activities, and final abandonment. And for designing, implementing, monitoring and tracking the progress of reclamation including erosion and weed control measures.

5. Pre-Construction and Pre-Disturbance Activities

5.1 Reclamation begins prior to surface disturbing activity commencement.

5.2 A Baseline Vegetation Survey may be conducted prior to soil disturbing activity. The inventory should include the species composition, cover and density. This inventory will aid in determining when final reclamation is complete.

5.3 Preliminary site information may be gathered prior to any soil disturbing activity. This information may include, but is not limited to, weeds and soil conditions, precipitation maps, soil survey maps, county maps, land use maps, topographic maps, survey plats of the proposed project, and an outline of impacts.

5.4 The Bureau of Land Management's (BLM's) placement Best Management Practices (BMPs) for Fluid Mineral Operations should be considered. Examples of placement BMPs include the following.

• Locations should be selected that will minimize disturbance. The disturbed area should be large enough to conduct safe drilling and production operations. Use existing roads whenever possible. Site access should be planned for the minimum width.
• Use corridors when possible, (one route for the power line, pipeline, and assess road).

• Consolidating and reducing facility size.

5.5 The selection of the best soil erosion and sediment controls for the specific site should be primarily based on the nature of the construction activity and the conditions that exist at the site. Minimum BMPs that should be utilized at each site include:

• Minimize the amount of soil disturbed and preserve existing vegetation,
• Prevent soil (or sediment) movement from leaving the original location within the construction site by the proper installation of erosion controls and sediment capture measures (such as silt fencing),
• Document inspections annually at a minimum,
• Maintain erosion and sediment control until vegetation has been re-established.

5.6 Prior to site disturbing activities Operations and Regulatory Departments should meet to discuss:

• An outline of expectations to operation personnel and contractors
• Safety issues
• Top soil management
• Review BMPs for erosion control, soil stabilization, and Short-Term Reclamation
• Review of any site specific Conditions of Approval

6. Short-Term Reclamation

6.1 Short-Term Reclamation commences as soon as soil disturbing activities begin up to completion of construction and drilling activity.

6.2 Soil erosion and sediment controls may be implemented to reduce the amount of soil that is carried off-site and to reduce the disturbance of the top soil.

6.3 Topsoil is an important component of the reclamation process. Topsoil is typically the most fertile portion of soil. Minimal topsoil disturbance will aid in the reclamation process. Whenever possible, the first 6 to 12 inches of top soil should be stockpiled for replacement at a later date. The salvaged topsoil should be applied as soon as possible to the area being reclaimed. A more detailed description of topsoil management can be found in the Handbook of Western Reclamation Techniques (see Section 15, References).

7. Long Term Reclamation

7.1 Long -Term Reclamation can occur during production operations. The long-term reclamation of an area helps stabilize and reduce final reclamation costs. Examples of long-term reclamation are listed below.

• Utility corridors should be backfilled and re-vegetated.

• The size of the well site should be reduced, if possible, to the area that is necessary for safe ongoing operations. Un-used areas at the well site should be re-vegetated as part of an interim reclamation program.
• Linear features alongside roads, such as borrow ditches and utility corridors should be re-vegetated. In some cases roads may be narrowed and the un-needed portions re-contoured and re-vegetated.
• Pits will be closed and backfilled as soon as practical. The surface area will be re-contoured and re-vegetated.

7.2 A complete description of long-term reclamation projects can be found in the Bureau of Land Management's Goldbook and the Handbook of Western Reclamation Techniques (see Section 15, References).

8. Final Reclamation

8.1 Final Reclamation can generally be judged complete when the landscape features meet the post-disturbance land use and vegetation shows signs of being self- sustaining, vigorous, diverse, and established with a density sufficient to retain fundamental resources.

8.2 All disturbed areas, including well pads, access roads, pipeline ROWs, will be reclaimed per BLM requirements.

8.3 Final reclamation may include re-contouring the area to its original contour, seeding, controlling noxious weeds, and other reclamation practices described in the Handbook of Western Reclamation Techniques (see Section 15, References).

8.4 Reclamation activities will be considered complete when applicable standards have been met, when vegetation has reached a minimum of 75 percent of background vegetation (undisturbed areas), or as approved by surface owner.

8.5 Once Final Reclamation has been achieved, the appropriate regulatory agencies should be notified. For example,

• BLM and/or Bureau of Reclamation – Sundry (Final Abandonment Notice)
• State Departments of Environmental Quality – Notice of Termination
• State Oil & Gas Conservation Commissions – Bond release
• Landowners – Cessation of surface use payments

9. Seeding and Re-vegetation

9.1 The goal of seeding is to re-vegetate and stabilize a disturbed site. The result of seeding should be a self-sustaining community of perennial vegetation.

9.2 Seeding and re-vegetation is a component of short-term, long-term, and final reclamation.

9.3 Seeding should occur as quickly as possible during the first appropriate seeding season.

9.4 The seed mix selected for re-vegetation should include a diverse mix of perennial species specified by the surface management agency or surface owner and are adapted to the region and consistent with

the current land use. The seed mix selection should be guided by experiences in similar location and observation of undisturbed vegetation in the area and at the discretion of the surface owner.

9.5 Certified weed free seed mix should be used. Seeding rates can be calculated using the Natural Resource Conservation Service's Technical Notes Reading Seed Packaging Labels and Calculating Seed Mixtures (see Section 15, References).

9.6 The methodology for seeding should generally be site specific. The methodologies for seeding techniques are described in the Handbook for Western Reclamation Techniques and Dryland Pastures in Montana and Wyoming (see Section 15, References).

9.7 Predatory grazing on areas being newly established should be avoided if possible.

10. Monitoring and Performance Assurance

10.1 Monitoring is the orderly and quantitative collection, analysis and interpretation of resource data to evaluate progress toward a goal.

10.2 The purpose of monitoring is to assess and assure performance and in progression toward final reclamation.

10.3 Monitoring methodologies and frequency generally should be scientific, according to surface use agreements, Bureau of Land Management (BLM) methodology, other regulatory requirements, or according to the project Conditions of Approval document.

10.4 Monitoring should continue until at least 70 percent or greater of vegetation, as compared to surrounding undisturbed areas, is established. If after two growing seasons, progression toward this standard has not been accomplished, further site evaluation may be necessary to determine if re-seeding or other actions are required to improve reclamation success.

10.5 Geospatial databases should be used to track the reclamation process. Data that should be tracked includes, but not limited to the following:

- Areas of disturbance
- Seeding data
- Vegetation progress
- Construction information
- Inspection information
- Well Data
- Weed Data

11. Training

11.1 Awareness training of this Program should be conducted by the Regulatory Department. Individuals with responsibilities involving construction and surface disturbing activities may receive additional training beyond awareness training.

11.2 Training of field level personnel will take place at the following frequency:

A. Initial Training will involve awareness of the Reclamation Program.
B. Refresher Training will be conducted on an annual basis.

11.3 Training topics can include, but are not limited to:

- Contents of Stormwater Pollution Prevention Plan
- Common stormwater pollutants and mitigation measures (BMPs)
- Phases of construction and reclamation
- Inspections

12. Relationship to Contractual Agreements

12.1 Nothing contained in this Program document shall be construed as altering in any way the rights, duties, and/or obligations contained in any applicable contract or master service agreement (Contract) between parties. Where a conflict arises between this Program document and the Contract, the language in the Contract will be controlling.

13. Relevant APC Programs

13.1 The following Programs are referenced within the KEC Reclamation Program:

A. Utah Pollution Discharge Elimination System.
B. The Reasonable and Prudent Practice (RAPPS) for Stabilization of Oil & Gas Construction Sites.

14. Document Management

14.1 Reclamation documentation forms, information, and data will be retained in KEC field and/or Denver office files in accordance with the KEC Records Retention Policy.

15. References

Utah Pollution Elimination System General Permit for Construction Activities, UTR300000.
U.S. Federal Regulations A. 43 CFR §3160, *Bureau of Land Management – Onshore Oil and Gas Operations.*
Oil and Gas – Surface Operating Standards for Oil and Gas Exploration and Development (Gold Book).
Handbook of Western Reclamation Techniques – Second Edition. 2006.
Draft - Solid Minerals Reclamation Handbook.
Natural Resource Conservation Service's Technical Notes – Wyoming. Reading Seed Packaging Labels and Calculating Seed Mixtures. June 2001.
Guidebook to the Seed of Native and Non-Native Grasses, Forbs and Shrubs of the Great Basin. U.S. Department of the interior, Bureau of Land Management. 2005.
Dryland Pastures of Montana and Wyoming; Montana State University Extension Service, 2003.

APPENDIX E

POST-CONSTRUCTION STORMWATER PLAN

KOCH

KOCH EXPLORATION COMPANY, LLC

Post-construction Stormwater Plan

February 2012

Table of Contents

1.0 Introduction 1
2.0 Post-Construction Stormwater Program Contacts 1
3.0 Potential Pollution Sources and BMPs 1
3.1 Transport of Chemicals and Materials: Loading and Unloading Operations 1
3.2 Vehicle/Equipment Fueling 1
3.3 Outdoor Storage Activities, Including those for Chemicals and Additives 2
3.4 Produced Water and Drilling Fluids Storage ..... **Error! Bookmark not defined.**
3.5 Outdoor Processing and Machinery 2
3.6 Significant Dust or Particulate Generating Processes or Activities ..... **Error! Bookmark not defined.**
3.7 Erosion and Vehicle Tracking from Well Pads, Production Facilities, Tank Batteries, Road Surfaces, and Pipelines 2
3.8 Waste Disposal Practices 2
3.9 Leaks and Spills 2
3.10 Ground Disturbance Maintenance Activities 2
4.0 Inspections 4
5.0 Employee Training 4

1.0 Introduction

The purpose of this plan is to outline best management practices (BMPs) to be used at facilities that have achieved final stabilization following construction activities.

2.0 Post-Construction Stormwater Program Contacts

Jordan Radin
Compliance Manager
(303) 325-2564 (office)
(720) 201-4941 (cell)

Don Johnson
Field Operations Manager
(505) 334-9111 (office)
(505) 320-0819 (cell)

3.0 Potential Pollution Sources and BMPs

Potential pollution sources and associated BMPs are addressed below.

3.1 Transport of Chemicals and Materials: Loading and Unloading Operations

Activities associated with this pollution source are potential spills during delivery and unloading of materials. BMPs selected to control this source are materials management practices and personnel training. Hazardous materials and petroleum products used in the post-construction phase of a pad include fuel and lubricants for equipment and vehicles, small quantities of paints and solvents, water or gel based frac fluids (surfactant, friction reducer, dilute hydrochloric acid, potassium chloride) used during well servicing; produced water; and condensate. Material Safety Data Sheets (MSDS) for materials to be used or that are produced, are maintained at KEC's Vernal field office. If a spill of pollutant(s) threatens stormwater or has the potential to discharge from the site, the procedures in the Emergency Response Plan (ERP) will be activated. A Spill Prevention, Control and Countermeasure (SPCC) Plan is in place for well sites that meet the minimum oil storage capacity thresholds (1,320 gallons aggregate oil storage). The ERP is stored in the Vernal Field Office and employee vehicles. The SPCC Plan is stored at the Vernal Field Office. Operators are trained in the safe handling of materials and spill discovery, response, and cleanup procedures as appropriate during annual SPCC and ERP training.

3.2 Vehicle/Equipment Fueling

Activities associated with this pollution source are fueling and equipment repair. Routine vehicle maintenance and fueling of vehicles generally will not occur on-site. However if refueling would occur or on-site maintenance is necessary, containment BMPs will be implemented as necessary.

3.3 Outdoor Storage Activities, Including those for Chemicals and Additives

KEC will adhere to the following good housekeeping practices regarding outdoor storage activities as applicable.

- Storage containers will be labeled as required by National Fire Prevention Assocation (NFPA) and Occupational Safety and Health Administration (OSHA) regulations;
- Containers are stored away from direct traffic to prevent accidents;
- Dumpsters and trash receptacles will be enclosed in order to prevent the spread of refuse;
- Storage areas will be kept free of trash;
- Chemical substances will have proper spill containment; and
- Chemical containers will be clearly and properly labeled, and an MSDS will be kept on file at the Vernal Field Office.

3.4 Outdoor Processing and Machinery

Production facility post-construction sites may include equipment such as separators, heaters, internal combustion engines, valves, meters, and flow lines. Equipment is maintained per the manufacturers instructions. Field personnel are trained to identify and immediately correct leaking machinery. Site inspections are conducted monthly and documented as required by the SPCC plan.

3.5 Erosion and Vehicle Tracking from Well Pads, Production Facilities, Tank Batteries, Road Surfaces, and Pipelines

Access road entrances from well pads, dirt road surfaces, and pipeline right of ways (ROWs) adjacent to paved roads may be graveled when practical (subject to landowner approval) to prevent or minimize any off-site soil tracking. In some instances, cattle guards are used to drop off caked mud before the vehicle exits the site areas.

3.6 Waste Disposal Practices

Trash, debris, scrap, or other discarded materials will be properly disposed. If impacted soils are excavated, additional BMPs may be employed to ensure containment of any stormwater runoff. In addition, stockpiles of impacted soil will be removed from the site and disposed or land-farmed as soon as possible.

3.7 Leaks and Spills

The KEC Uintah County SPCC Plan and ERP detail procedures used to prevent and remedy leaks and spills. Both plans are incorporated by reference.

3.8 Ground Disturbance Maintenance Activities

Structural and non-structural practices primarily include physical attributes of pad sites, production facilities, access roads, and pipeline ROWs and are designed to reduce erosion and sediment. Disturbed areas that aren't integral to production activities will be seeded and stabilized immediately.

Areas that become unstabilized over time (erosive conditions) may be seeded using seed mixes appropriate to the location and approved by the surface owner. Additional revegetation guidance will be obtained from soil conservation authorities related to the US Natural Resources Conservation Service, Local Conservation Districts, or reclamation contractors familiar with the area as needed.

Post-construction erosion control will be addressed as necessary by using all or combinations of various erosion control methods. These methods include, but are not limited to the following:

- Erosion Control Blanket (ECB) Hydraulic Mulching (HM)
- Land Grading (LG) – Roads
- Low Water Crossing (LWC)
- Mulching (M)
- Retaining Wall (RW)
- Revegetation (RV)
- Riprap (R)
- Soil Stabilizers (SS)
- Stockpiling (SP) – Topsoil and Subsoil
- Surface Roughening (SR)
- Terracing (T)
- Turf Reinforcement Mat (TRM)
- Vegetated Buffer (VB)
- Wattles (W)

Post-construction sediment controls that may be used to mitigate and control sediments generated from the erosive transport forces of stormwater may include the following:

- Check Dam (CD)
- Detention Pond (DP)
- Filter Berm (FB)
- Sediment Reservoir (SedR)
- Sediment Trap (ST)
- Silt Fence (SF)
- Slash (SL)
- Stabilized Construction Entrance (SCE)
- Straw Bale Barrier (SBB)
- Wattles (W)

4.0 Inspections

KEC will inspect all facilities as part of the annual detailed inspection program. Inspections will be documented and action items tracked to closure.

5.0 Employee Training

Field employees will receive stormwater training annually. Training records will be maintained in the KEC Aztec, NM or Denver, CO office.

APPENDIX F

Reponses to Public Comments

APPENDIX F – RESPONSES TO PUBLIC COMMENTS

Source	Comment	Response
General Comments		
1. Joe Andrade	According to recent press reports and interviews with BLM staff, the agency does not have the manpower or other resources to inspect but a fraction of new and existing wells. Until BLM catches up with existing and current well needs for inspection and regulation, it is imprudent and inappropriate to continue to license, lease, or approve new well/drilling projects. I argue for a moratorium on leases and permits until the inspection and regulatory backlog is corrected. The risk to groundwater and atmospheric pollution (via methane leakage) is far too great to continue business as usual.	Monitoring and compliance for the project is discussed in Section 4.3.1.12. All operations would be conducted in compliance with Federal Oil and Gas Onshore Orders, Utah Division of Oil, Gas, and Mining (UDOGM) rules and regulations, and applicable local rules and regulations (See Section 2.2). The proposed action involves wells that would be drilled on expansions of existing well pads. Inspections of the proposed new facilities would likely occur in association with the inspections of the facilities that are currently occupying the well pads. Approval of the proposed action would not require issuance of new leases. The proposed wells would be drilled to extract minerals from existing leases, which authorize exploration and production. The Operator's valid existing rights allows it drill the proposed wells in a manner that minimizes impacts to the environment. To disallow authorization of new wells in an environmentally responsible manner consistent with applicable rules, regulations, and environmental management guidelines would be inconsistent with the Operator's lease rights and, therefore, unlawful. Groundwater was not analyzed in the EA. The rationale for its omission in the body of the EA is presented in Appendix A, the IDT Checklist. The Operator incorporated best management practices (BMPs) to control emissions into its proposed action. The BMPs listed in Section 2.2.6.2 include those recommended by the State of Utah and the BLM. Impacts to air quality are discussed in Section 4.3.1.1. The analysis determined that impacts from project emissions would result in small impacts to air quality. Also, see the responses to comments that specifically pertain to air quality.

Source	Comment	Response
Air Quality		
2. State of Utah	UDAQ encourages the use of Best Management Practices in protecting air quality. UDAQ recommends the following BMPs in protecting air quality as standard operating procedures: 1) Emission standards for Stationary Internal Combustion Engines of 2g/bhp-hr of NO_x for engines less than 300 HP. 2) Pneumatic Pumps, Actuators or other Pneumatic Devices-no or low bleed controllers. 3) Oil or Gas Atmospheric Storage Tanks-VOC venting controls or flaring. Glycol Dehydration and Amine Units, Well Completion, Re-completion, Venting, or Planned Blowdown Remissions. 4) Where feasible, green completion is highly recommended. Alternatively, controlled VOC emissions methods with 90% efficiency.	These BMPs are included as part of the Operator's proposed action and are listed in Section 2.2.6.2.
3. U.S. Environmental Protection Agency Region 8	The Draft EA mixes direct, indirect, and cumulative impacts when reporting potential impacts to air quality, making it difficult for the reader to understand the potential project-specific impacts as compared to existing air quality conditions…Project specific incremental impacts would be more appropriately discussed as direct and indirect impacts rather than cumulative impacts, and we recommend that the EA be revised accordingly, with relevant portions of the discussion moved to Section 4.3.	Sections 4.3 and 4.4.1.4 have been revised to clarify impacts to air quality that would result from the proposed project, consistent with the suggestions provided in the comment.
4. U.S. Environmental Protection Agency	An emissions inventory was prepared for the proposed project but no modeling was	Text has been added to Section 4.3.1.1.1 to provide explanation as to the rationale for not requiring modeling for the project. The comment letter acknowledges that "… conducting photochemical modeling is

Source	Comment	Response
Region 8	performed.	challenging for smaller projects…"
5. U.S. Environmental Protection Agency Region 8	Given regional ozone concerns and its impacts to human health and regulation as a criteria pollutant under the Clean Air Act, ozone warrants attention outside of its connection to climate change, and we recommend that the two issues be separated.	Text has been added to Section 4.3.1.1.1 to acknowledge that project emissions will likely contribute incrementally to basin-wide ozone concentrations and potentially exacerbating ozone NAAQS exceedences.
6. U.S. Environmental Protection Agency Region 8	…the comparison of project emissions to regional emissions of ozone precursors in Table 4-6 obscures the fact that regional ozone concerns exist, and the likelihood that the project will result in an incremental impact to ozone.	Table 4-6 has been removed from Section 4.4.1.4 for clarfication, and text has been revised in this section to further clarify that project emissions will likely contribute incrementally, and cumulatively, to basin-wide ozone concentrations and potentially exacerbate winter ozone NAAQS exceedences.
7. U.S. Environmental Protection Agency Region 8	Table 4-6 and the discussion in Section 4.4.1.4 focus on production emissions, Because the projected NOx emissions at 1,087 TPY are approximately 50% of the project emissions modeled for the GNB project, we recommend that drilling and construction emissions be incorporated and discussed in this section, and that the potential for the project to contribute to regional ozone be acknowledged.	Table 4-6 has been removed from Section 4.4.1.4 for clarification. In addition, text has been added to this section to clarify that cumulative project emissions include both drilling and construction emissions (Table 4-1) plus ongoing production emissions (Table 4-3).
8. U.S. Environmental Protection Agency Region 8	The draft EA does not clearly state that the GNB modeling did not consider wintertime impacts to ozone…We recommend that the EA acknowledge that the GNB only modeled summertime ozone, and that it discuss the basin-wide modeling results from the ARMS effort.	Section 4.3.1.1 has been revised to clarify that the GNB modeling did not consider wintertime impacts to ozone. The final ARMS report is not yet available to the public and was, therefore, not referenced in the EA.
9. U.S. Environmental Protection Agency Region 8	The Draft EA includes a series of Applicant-committed design features to control air pollutant emissions and an adaptive management strategy for ozone.	The Applicant-committed design features in Section 2.2.6 have been revised to reflect current mitigation strategies. The BLM, in conjunction with the Utah Division of Air Quality and the Ute Tribe, is developing a basin-wide air quality management plan which will identify those emissions controls and management strategies that will

Source	Comment	Response
		be utilized to address winter ozone exceedences. The plan is not yet finalized; however, if authorized, the proposed project would be required to comply with the emissions controls and management strategies found in the plan. The final ARMS report is not yet available to the public and was, therefore, not referenced in the EA.
10. U.S. Environmental Protection Agency Region 8	We recommend the use of Tier IV drill rig engines to reduce NO_x emissions.	At this time, the BLM does not have sufficient evidence to support the mandatory use of Tier IV drill rig engines.
11. U.S. Environmental Protection Agency Region 8	The Draft EA does not appear to draw a distinction between near-field impacts and far-field impacts…near-field ambient air pollutant concentrations are influenced more by short-term emission rates than annual average emissions, and are more dependent upon the layout of development and operational activities than by overall well count. We recommend that the BLM compare the anticipated equipment and layout of oil and gas activities to that of the GNB project to support the use of the GNB near-field modeling as representative of the proposed action.	The proposed wells and the GNB approved wells would be drilled to produce natural gas and/or oil from the same reservoirs, and therefore, the facilities on the well pads would be similar if not essentially identical. Like the GNB project, the proposed project is conceptual in that the Operator does not identify which of the 37 existing well pads would be used to drill any of the proposed wells, nor does it identify how many wells would be drilled on any of the analyzed well pads. The existing well pads analyzed for the Wild Horse Bench project have been constructed on 40-acre surface densities while the GNB project analyzed well pads on 20 and 40-acre surface densities. The GNB project analyzed up to 64 wells being drilled in any particular section, which is approximately equivalent to the number of wells that would result in any particular section under the Wild Horse Bench proposal. Therefore, the BLM considers the GNB and Wild Horse Bench projects to be sufficiently similar as to substantiate the use of GNB modeling results to the project under consideration in this EA.