

APPENDIX C: BEST MANAGEMENT PRACTICES (BMPs)

In addition to the guidelines in Appendix A (CNFISH), these Best Management Practices (BMPs) expand and supplement the basic guidelines and minimum requirements of the BLM manual; the Idaho Department of Lands (Forest Practices Regulations); Idaho Department of Water Resources (IDWR) Stream Channel Alteration Regulations; and the Corps of Engineers 404 Regulations. Also included are the EPA Source Water Guidelines and BLM's Wind Energy BMPs.

SECTION A-1: GENERAL BEST MANAGEMENT PRACTICES

1. Road Planning, Design, and Location

- Plan road standards and specifications that maintain forest productivity, water quality, and fish and wildlife habitat.
- Road specifications and plans should be consistent with good safety practices. Plan each road to the minimum standards for the intended use. Adapt the plans to the soil materials and terrain, to minimize disturbance and damages to forest productivity, water quality, and wildlife habitat.
- Plan transportation networks to minimize road construction within riparian conservation areas. Leave or re-establish areas of vegetation between roads and streams.
- Plan roads no wider than necessary for safety and anticipated use. Minimize and balance cuts and fills, especially near streams. Fit the road to the natural terrain as closely as possible.
- Dispose of excavated waste material on geologically stable sites.
- While cut-and-fill road construction is common for gentle terrain, full-bench roads should be designed on slopes over 60 percent. End-haul excess material to a geologically stable site for disposal.
- Plan natural road cross-drainage by insloping or outsloping and by grade changes. Plan for effective, well-placed dips or water bars.
- Design relief culverts or roadside ditches where natural drainage will not protect the road surface, excavation, or embankment. Plan relief culvert locations to prevent fill erosion or direct discharge of sediment into streams.
- Plan minimum number of stream crossings. Make sure they comply with Stream Channel Alteration Law, Title 42; Chapter 38, Idaho Code. Be sure all Class I stream culvert installations allow fish passage.
- Consider reusing existing roads if new construction would result in more long-term impact to fish and wildlife.

Road Construction

- Construct roads in a manner that prevents debris, overburden, and excess materials from entering streams. Deposit excess materials outside of stream protection zones.
- Construct roads to comply with Idaho Forest Practices Act (FPA) plan and design guidelines.
- Provide for quarry drainage, to prevent sediment from entering streams.

- Clear drainage ways of all debris, generated during construction or maintenance that may interfere with drainage or impact water quality.
- When constructing road fills near streams, compact the material to settle it, reduce erosion, and reduce water entry into fill. Minimize snow, ice, frozen soil, and woody debris buried in embankments.
- Construct road stream crossings or roads constricting upon a stream channel in compliance with the Stream Channel Alteration Law, Title 42, Chapter 38, Idaho Code.
- Stabilize slopes: Where exposed material (excavation, embankment, waste piles, etc.) is erodible and may enter streams, stabilize it before fall or spring runoff by seeding, compacting, riprapping, benching, mulching, or other suitable means.
- Construct cross drains and relief culverts to prevent erosion. Use rip rap, woody debris, down spouts, or similar devices to prevent erosion of fills. Install drainage structures on uncompleted roads before fall or spring runoff.
- Install relief culverts with a minimum drain grade of 2 percent.
- Design roads to balance cuts and fills or use full bench construction where stable fill construction is not possible.
- Minimize sediment production from borrow pits and gravel sources through proper location, development and reclamation.
- Place debris, overburden, and other waste materials associated with construction and maintenance activities in a location to avoid entry into streams. Include these waste areas in soil stabilization planning for the road.

Road Drainage

- Provide adequate drainage from the surface of all permanent and temporary roads by using outsloped or crowned roads, drain dips, or insloped roads with ditches and crossdrains.
- Vary road grades to reduce concentrated flow in road drainage, ditches, culverts, and on fill slopes and road surfaces.
- Space road drainage features so peak drainage flow on the road surface or in ditches will not exceed the capacity of the individual drainage facilities.
- Outsloped Roads: Outsloped roads provide means of dispersing water in a low-energy flow from the road surface. Outsloped roads are appropriate when fill slopes are stable, drainage will not flow directly into stream channels, and transportation safety considerations can be met.
- Insloped Roads: For insloped roads, plan ditch gradients steep enough, generally greater than 2 percent, but less than 8 percent to prevent sediment deposition and ditch erosion. The higher gradients may be suitable for more stable soils; use the lower gradients for less stable soils.
- Drain Dips: Properly constructed drain dips can be an economical method of channeling surface flow off the road. Construct drain dips deep enough into the subgrade so that traffic will not obliterate them.

- Prevent downslope movement of sediment by using sediment catch basins, drop inlets, changes in road grade, or recessed cut slopes.
- Where possible, install ditch relief culverts at the gradient of the original ground slope; otherwise armor outlets with rock or anchor downspouts to carry water safely across the fill slope.
- Skew ditch relief culverts 20 to 30 degrees toward the inflow from the ditch to improve inlet efficiency. Protect the upstream end of cross-drain culverts from plugging.
- Provide energy dissipators (rock piles, logs, etc.) where necessary at the downstream end of ditch relief culverts to reduce the erosion energy of the emerging water.
- Cross drains, culverts, water bars, dips, and other drainage structures should not be discharged onto erodible soils or fill slopes without outfall protection.
- Design roads for minimal disruption of drainage patterns
- Route road drainage through vegetation, slash windrows, or other sediment settling structures. Install road drainage features above stream crossings to route discharge into filtration zones before entering a stream.

Road Maintenance

- Maintain erosion control features through periodic inspection and maintenance, including cleaning dips and cross-drains, repairing ditches, marking culvert inlets to aid in location, and clearing debris from culverts.
- Avoid using roads during wet periods if such use would damage the road drainage features.
- Grade road surfaces only as often as necessary to maintain a stable running surface and to retain the original surface drainage.
- Avoid cutting the toe of cut slopes when grading roads or pulling ditches.
- Place all excess material removed by maintenance operations in safe disposal sites and stabilize these sites to prevent erosion. Avoid locations where erosion will carry materials into a stream.

Timber Harvesting Activities

- Stabilize or reclaim landings and temporary roads on completion of use.
- For each landing, skid trail, or fire trail, provide and maintain a drainage system to control the dispersal of water and to prevent sediment from entering streams.
- Install necessary cross-ditches on tractor skid trails. Appropriate spacing between cross-ditches is determined by the soil type and slope of the skid trails. Timely implementation is important.
- When natural re-vegetation is inadequate to prevent accelerated erosion before the next growing season, apply seed or construct cross-ditches on skid trails, landings, and fire trails. A light ground cover of slash or mulch will retard erosion.

Recommended Cross-ditch Spacing Distance for Roads and Skid Trails

Grade of Road or Trail	Unstable Soils (High Erosion Hazard)	Stable Soils (Low Erosion Hazard)
2	135'	170'
5	100'	140'
10	80'	115'
15	60'	90'
20	45'	60'
25+	30'	40'

Slash Treatment and Site Preparation

- Use excavators equipped with rakes or crawler-tractors/rubber-tire skidders equipped with brush blades when piling slash. Avoid use of dozers with angle blades.
- Scarify the soil only to the extent necessary to meet the reforestation objective of the site. Site preparation equipment producing irregular surfaces is preferred. Care should be taken to preserve the surface soil horizon.
- Large woody debris may be left to slow surface runoff, return soil nutrients, provide shade for seedlings, and provide habitat for wildlife.
- Carry out brush piling and scarification when soils are frozen or dry enough to minimize compaction and displacement.
- Minimize or eliminate elongated exposure of soils up and down the slope during mechanical scarification. On steep slopes, carry out scarification in a manner that minimizes erosion.

Vegetation Treatments

If herbicides are proposed for use, buffer strips will be provided adjacent to dwellings, domestic water sources, agricultural land, streams, lakes, and ponds. A minimum 100-foot wide buffer strip will be a provided for aerial application, 25 feet for vehicle application and 10 feet for hand application. Any deviations must be in accordance with the label for the herbicide. Herbicides will be wiped on individual plants within 10 feet of water where application is critical.

SECTION A-2: EPA REGION 10 SOURCE WATER PROTECTION BEST MANAGEMENT PRACTICES FOR USFS AND BLM

The following pages include a listing of BMPs. Some are required by USDA Forest Service and Bureau of Land Management (BLM) management plans or by State administrative code. Others are recommendations or are informed by a legal decision. This list represents an initial effort to pull together BMPs from a host of sources to assist in protection of drinking water sources. The first two sections define “Conservative Riparian Reserve Widths” and “Riparian Habitat Conservation Areas.” The third, “Watershed Management Planning,” pertains generally to all actions undertaken by the USFS or BLM. The remaining sections pertain to more specific types of activities, facilities, or structures on USFS or BLM lands, such as roads, recreational facilities, and fire suppression activities.

Context and Background

The USDA Forest Service and BLM have a long history of using BMPs related to timber harvest, grazing, mining, and other land management activities to reduce adverse impacts to water quality. Forest and range land management activities generate diffuse sources of pollution known as nonpoint sources. Assessments of water quality completed at the national level and at the watershed scale have consistently demonstrated that nonpoint sources of pollution (agriculture, mining, construction, forestry, etc.) are the primary cause of water quality impairment. Point sources of pollution, like wastewater treatment facilities and factories, are required to treat effluent to meet water quality standards consistent with State or Federally issued discharge permits. Nonpoint sources require a different approach. BMPs are the primary management mechanism for preventing or reducing impacts to water quality from nonpoint sources. Many States have designated the Forest Service and BLM as the management agencies for implementing BMPs on lands they manage to ensure that water quality standards are met.

Forest Service and BLM lands, usually located in the upper portion of a watershed, capture a significant portion of the precipitation that ends up as drinking water for millions of people in the Pacific Northwest. The Safe Drinking Water Act required states to delineate source water areas for every public drinking water system and assess risks of potential contamination within those areas. Infrastructure and activities of the Forest Service and BLM are included among many identified potential sources of contamination to drinking water supplies. Careful planning and implementation can mitigate the risks of contamination from Forest Service and BLM operations and activities.

The effectiveness of BMPs applied on federal lands affects the quality of water entering drinking water wells and intakes on both federal lands and downstream non-federal lands. Providing the highest quality water possible to the drinking water intakes should be an overriding goal of BMPs. BMPs cover a full spectrum of active and passive measures and can be applied during assessment, planning, project implementation, and monitoring activities. The following BMPs are an initial “draft” starting point for helping to ensure that public health is protected and that water treatment and facility operation and management costs are minimized. This list is intended to serve as a “menu” from which appropriate BMPs can be selected for a specific plan or project. It’s not a comprehensive list. Additional BMPs may be appropriate, depending on the project.

These BMPs come from a variety of sources, some of which pertain to specific geographic regions. As “best” management practices, they can be applied in other geographic regions as well. Some of them are clearly designed to protect water quality for fish and other aquatic life. They are appropriately included in this list because good water quality also benefits drinking water supplies.

Best Management Practices

Watershed Management Planning

- Employ watershed restoration projects where appropriate to repair degraded watershed conditions and improve water quality and soil stability.
- Avoid, where possible, the long- and short-term adverse impacts to water quality associated with the occupancy and modification of floodplains.
- Avoid destruction of wetlands.
- Prevent contamination from accidental spills.
- An Oil and Hazardous Substance Spill Contingency Plan is a predetermined organization and action plan to be implemented in the event of a hazardous substance spill.
- A Spill Prevention Control and Countermeasures (SPCC) Plan is required if the total amount of oil products on site in above-ground storage exceeds 1320 gallons, or if a single container exceeds a capacity of 660 gallons.
- Ensure activities conducted under Special Use Permits are protective of source waters.
- Conduct water quality monitoring to determine the effects of land management activities on the beneficial uses of water, and to ensure the health and safety of water users.
- Minimize the amount of erosion and sedimentation at developed sites.
- Source: General Water Quality Best Management Practices, Pacific Northwest Region, November 1988
- Take active measures, if necessary, to avoid any activity within 300 yards of a spring used as a source of drinking water.

Hardrock Mining

Concern for: Surface Water, Ground Water

Contaminants: Metals (e.g., lead, selenium, cadmium, copper, zinc, arsenic, mercury), acidity (low pH), cyanide, sulfate, turbidity

Both the US Forest Service and Bureau of Land Management have extensive internal guidance on mine permitting and reclamation requirements.

Two documents available on the EPA Region 10 website provide detailed information that should be reviewed when addressing mining issues:

EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska,
U.S. EPA Region 10, January 2003
<http://yosemite.epa.gov/r10/water.nsf/59f3b8c4fc8c923988256b580060f5d9/e4ba15715e97ef2188256d2c00783a8e!OpenDocument>

Inactive Mine Site Characterization and Cleanup Handbook, EPA 910-8-00-001, U.S. EPA, August 2000
<http://yosemite.epa.gov/R10/CLEANUP.NSF/9f3c21896330b4898825687b007a0f33/f4724f10ccdc2f4d8825699a007861dd?OpenDocument>

BLM Districts in Idaho should consult:

Best Management Practices for Mining in Idaho, prepared by The Idaho Department of Lands in conjunction with other State and Federal Agencies through the Idaho Mining Advisory Committee, 1992.

Grazing

Concern for: Surface Water

Contaminants: Pathogens (E. Coli, cryptosporidium, viruses, giardia lamblia), sediment, turbidity, phosphate, nitrates, coliform, sulfate.

(Sources: Drinking Water from Forests and Grasslands: A Synthesis of Scientific Literature, United States Department of Agriculture Forest Service, General Technical Report SRS-39, September 2000, pp. 153-156. Potential Sources of Drinking Water Contamination Index, EPA. www.epa.gov/safewater/swp/sources1.html)

Best Management Practices:

- Manage the timing and intensity of grazing to:
 - enhance, or at a minimum, prevent the degradation of, riparian vegetation,
 - enhance infiltration of surface water into the ground, and
 - ensure stream banks are protected.
- Within source water protection areas, sheep grazing is preferable over cattle because sheep tend to graze in upland areas while cattle tend to spend time in the streams.
- The exclusion of cattle from areas where cryptosporidium may be a concern (such as Source Water Areas) should be considered. If this is not feasible, livestock younger than 4 months should be kept out of the watershed, because calves have not yet developed resistance, and shed greater numbers of oocysts than older animals.

(Source: Drinking Water from Forests and Grasslands: A Synthesis of Scientific Literature, United States Department of Agriculture Forest Service, General Technical Report SRS-39, September 2000, pp. 153-156)

- Locate new livestock handling and/or management facilities outside riparian reserves. For existing livestock handling facilities inside the riparian reserve, ensure that Aquatic

Conservation Strategy objectives are met. Where these objectives cannot be met, require relocation or removal of such facilities.

(Source: Aquatic Conservation Strategy, Attachment A to the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within Range of the Northern Spotted Owl, pp. C-33)

- Manage livestock numbers and season of use to maintain and protect soil and water resources.
- Construct fences or other barriers to keep livestock out of sensitive areas where loss of vegetative cover, soil compaction, or riparian impairment could adversely impact water quality.

(Source: General Water Quality Best Management Practices, Pacific Northwest Region, U.S. Forest Service, November 1988)

Landfills

Concern for: Ground Water, Surface Water

Contaminants: Volatile organic compounds (VOC's), heavy metals, pesticides, nitrates and nitrites, semi-volatile organic compounds.

(Source: Potential Sources of Drinking Water Contamination Index, EPA. www.epa.gov/safewater/swp/sources1.html)

Best Management Practices

- Site new landfills outside of source water protection areas if possible. If not possible, site them where they are unlikely to pose a threat to ground water or surface waters.
- For historic landfills located in source water protection areas, examine existing data to determine whether they may pose a threat to the drinking water source. If a landfill may pose a threat, collect additional data to determine whether it does. If it does, plan and implement appropriate mitigative action.

(Source: EPA Region 10 recommendations)

Recreation Sites

Concern for: Ground Water, Surface Water *Contaminants:* Turbidity, sedimentation, fecal material, household cleansers and detergents, garbage and other floatables, cooking grease and oil, antifreeze, motor oil, illegal dumping of hazardous materials

Best Management Practices

- Wastewater from sanitation facilities can contaminate surface and ground water with bacteria, nutrients, and chemicals. Sanitation facilities (ranging from pit toilets to treatment plants) will be planned, located, designed, constructed, operated, inspected, and maintained to minimize possibilities of water contamination. All activities related to location, design, inspection, operation, and maintenance will be performed by trained, qualified personnel.
- Refuse disposal will be managed to protect surface and subsurface soil and water resources from contamination by nutrients, bacteria, and chemicals.

- Prohibit discharges and disposal of human and animal waste, petroleum products, and other hazardous substances in or near streams in recreation areas. Educate the public to conduct their activities in ways that will not degrade water quality.
- Avoid degradation of water quality by locating pack and riding stock facilities at safe locations away from springs, streams, lakes, wet meadows, and other surface waters.

(Source: General Water Quality Best Management Practices, Pacific Northwest Region, U.S. Forest Service, November 1988)

- RV sewage waste should not be disposed of in septic system drainfields given the potential for chemicals in the sewage waste to kill the microorganisms that drainfields need to function.
(Source: EPA Region 10 Recommendation)

Timber Management

Concern for: Surface Water *Contaminants:* Turbidity, decreased dissolved oxygen, pathogens, nitrogen

Best Management Practices

- Plan, supervise, and implement forest projects that will minimize soil compaction and soil disturbance.
- Maintain as much ground cover as possible to reduce surface runoff and erosion.
- Minimize site disturbance.
- Re-establish vegetation as soon as practicable.
- Keep pesticides and fertilizers out of surface waters

(Source: Drinking Water from Forests and Grasslands: A Synthesis of Scientific Literature, United States Department of Agriculture Forest Service, General Technical Report SRS-39, September 2000, pp. 108-113)

- Prevent downstream water quality degradation by the timely identification of areas
- Use mitigative measures to reduce the impacts of erosion, and subsequent sedimentation, on log landings.
- Ensure that constructed erosion control structures are stabilized and working.
- Prevent pollutants such as fuels, lubricants, bitumens, raw sewage, wash water and other harmful materials from being discharged into or near rivers, streams, and impoundments or into natural or man-made channels leading thereto.

(Source: General Water Quality Best Management Practices, Pacific Northwest Region, U.S. Forest Service, November 1988.)

Fire Management

Concern for: Surface Water Contaminants: Sediment and turbidity, nitrates, nitrites, sulfate, pH, TDS, chloride, iron, phosphate, taste/color/smell *USGS Emerging Contaminant:* fire retardant

Best Management Practices

- Avoid spraying fire retardant in or near drinking water streams, if practicable.
- Utilize Burn Area Emergency Rehabilitation (BAER) in appropriate circumstances.
- During fire suppression efforts, avoid watershed damage in excess of that which would be caused by the fire itself. Avoid heavy equipment operation on fragile soils and steep slopes when possible. Project fires should use a Resource Advisor and watershed specialists to advise the Incident Commander on resource values during the suppression effort.
- Stabilize all areas that have had their erosion potential significantly increased, or their drainage pattern altered by wildfires or by suppression related activities. Treatments include, but are not limited to:
 - installing water bars and other drainage diversions in fire roads, firelines, and other cleared areas;
 - seeding, planting and fertilizing to provide vegetative cover;
 - spreading slash or mulch to protect bare soil;
 - repairing damaged road drainage facilities;
 - clearing stream channels of structures or debris that is deposited by suppression activities;
 - log erosion barriers (contour-felled and anchored trees)
 - channel stabilization structures
 - trash racks above road drainage structures
 - debris retention structures
- Provide for water quality protection in formulating prescribed fire prescriptions. Prescription elements include fire weather, slope, aspect, soil moisture, and fuel moisture. These elements influence the fire intensity and thus have a direct effect of whether or not a desired ground cover remains after burning, and whether or not a water repellent layer is formed. The amount of remaining ground cover and extensiveness of water repellent soil can significantly affect erosion rates.
- Maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris from entering water bodies during prescribed fires. Some of the techniques used to prevent water quality degradation include:
 - maintaining the integrity of the Stream Management Unit or streamcourse
 - planning prescribed fires with intensities that will not result in soils becoming hydrophobic

(Source: General Water Quality Best Management Practices, Pacific Northwest Region, U.S. Forest Service, November 1988.)

Pesticides

Concern for: Ground Water, Surface Water

Contaminants: Organic and inorganic chemicals

Best Management Practices

- Only use U.S. EPA registered pesticides and comply with all label directions for use.
- Ensure proper transportation, handling and application according to the label.
- Do not apply during or right before significant weather events, such as heavy rainfall, which will cause runoff of pesticides.
- Store pesticides according to label directions so that spills and loss are prevented.
- Mix and load pesticides on impermeable surfaces where any accidental spills would not enter surface waters or potentially impact drinking water supplies.
- Contain and clean up spills immediately; report spills to appropriate regulatory agency.
- Dispose of containers properly; recycle if possible.

(Sources: Drinking Water Academy, Managing Large-Scale Application of Pesticides to Prevent Contamination of Drinking Water, EPA-916-F-01-030, July 2001, and WAC Chapter 222-38)

- Notify downstream water systems so the appropriate operational changes can be made prior to spraying to utilize appropriate filtration or switch to ground water sources.
- Consider alternatives to pesticide and herbicide use including biological controls, prescribed fire, mechanical treatments, and silvicultural management systems which minimize or eliminate the need for chemical use (un-even aged management, single and group tree selection, etc.).

(Source: EPA Region 10 recommendations)

Fertilizers

Concern for: Ground Water, Surface Water *contaminants:* Nitrogen and phosphorous, and other nutrients

Best Management Practices

- Apply fertilizers at appropriate agronomic rates so that no ground water pollution will occur below the root zone.
- Do not apply fertilizer during or right before significant weather events, such as heavy rainfall, which will cause runoff of pesticides
- Storage and loading areas should be located where accidental spills will not enter surface waters and should not be located near wellheads.
- Follow label directions for storage, mixing, and disposal
- Prevent fertilizers from entering streams with drinking water intakes.

- Contain and clean up all spills immediately; report to appropriate regulatory agency

(Source: Drinking Water from Forests and Grasslands: A Synthesis of Scientific Literature, United States Department of Agriculture Forest Service, General Technical Report SRS-39, September 2000, pp. 113-115, WAC Chapter 222-38)

Underground Injection Control (UIC) Class V (Shallow) Wells

**** UIC Class V wells are shallow subsurface fluid distribution systems that are designed to place fluids directly below the ground surface. Examples of Class V wells include septic system drainfields, storm water wells, drywells, industrial or commercial disposal wells, aquifer remediation wells, abandoned drinking water wells. Ditches and trenches may be classified as UIC wells. Hazardous waste injection through shallow wells is prohibited.**

Concern for: GW *Contaminants:* Various – may include storm water, solvents, hydrocarbons, motor vehicle fluids, nitrate, bacteria, viruses, septage, and others

Best Management Practices

- EPA and State Regulations apply to the registration, operation, maintenance, and closure of UIC wells. Information is available on the EPA UIC website: <http://www.epa.gov/safewater/uic/index.html>. Please contact the appropriate regulatory agency for information about the rules that apply to your well:

Septic systems

Concern for: GW *Contaminants:* Nitrates, bacteria, viruses, septage

Best Management Practices

- Septic systems designed for more than 20 people per day, fall under State or EPA UIC Class V regulations. If septic systems are designed for fewer than 20 people per day, then other state or local regulations may apply.
- Siting: locate septic systems far enough from drinking water sources to avoid potential contamination (minimum setback distances are typically defined by state or local governments that have oversight of UIC or septic programs)
- Septic tanks and drainfields must be of adequate size to properly treat the volume of wastewater
- Design should be completed by a licensed engineer
- Proper operation and maintenance are imperative
- Pump septic tanks every 2 to 5 years
- Hazardous chemicals should be taken to a hazardous waste collection site rather than disposed into a septic system

(Source: Drinking Water Academy Bulletin, Managing Septic Systems to Prevent Contamination of Drinking Water, July 2001, EPA-816-F-01)

Abandoned Wells

Concern for: Ground Water *Contaminants:* Various – they serve as conduits for any pollutants; typical contaminants are storm water, solvents, nitrates, bacteria, viruses, phosphates, hydrocarbons, pesticides, and

others. Source: Potential Sources of Drinking Water Contamination Index, EPA. www.epa.gov/safewater/swp/sources1.html

Best Management Practices

- Survey property to locate wells.
- Properly remove or seal and abandon identified wells following state rules or procedures.

(Source: Drinking Water from Forests and Grasslands: A Synthesis of Scientific Literature, United States Department of Agriculture Forest Service, General Technical Report SRS-39, September 2000, pp. 68-69)

Parking Lots

Concern for: Ground Water, Surface Water

Contaminants: Oil, gasoline, automotive fluids.

(Source: Drinking Water Academy Bulletin, Managing Storm Water Runoff to Prevent Contamination of Drinking Water, EPA 816-F-01-020, July 2001)

Drywells are UIC Class V wells. If drywells are used to manage parking lot runoff, then state and EPA UIC Class V rules apply to proper registration, operation, maintenance, and closure of these wells.

Best Management Practices

- Design to manage runoff appropriately – grassy swales, vegetated filter strips are options.
- Design to allow infiltration – permeable pavement such as concrete grid pavement is a good option.
- Sweep up litter and debris, especially around storm drains or other direct connections to surface water.

(Sources: Drinking Water Academy Bulletin, Managing Storm Water Runoff to Prevent Contamination of Drinking Water, EPA 816-F-01-020, July 2001. After the Storm: A Citizen’s Guide to Understanding Storm Water, EPA 833-B-03-002, January 2003)

Aboveground Storage Tanks (ASTs)

Concern for: Surface Water *Contaminants:* Petroleum hydrocarbons, heating oil, other chemicals

Refer to State and Local Rules and Regulations to determine whether the state in which the AST is located has an Aboveground Storage Tank regulatory program. If a regulatory program exists, follow appropriate rules and guidance.

A Spill Prevention Control and Countermeasures (SPCC) Plan is required if the total amount of oil products on site in aboveground storage exceeds 1320 gallons, or if a single container exceeds a capacity of 660 gallons.

Best Management Practices

- ASTs should have spill and overfill prevention and leak detection.

- Secondary containment should be designed to contain the entire volume of the materials that can be stored in the AST.
- Tanks should be protected from corrosion.
- ASTs should be protected from physical damage and vandalism through use of guard posts and fencing, as necessary.
- Tanks should be operated, maintained, and closed appropriately.

(Source: New Mexico Environment Department Above Ground Storage Tank Program)

Underground Storage Tanks

Concern for: Ground Water, downgradient Surface Water

Contaminants: diesel, gasoline, heating oil, other chemicals

- EPA and State Regulations apply to the registration, operation, maintenance, and closure of USTs. Please contact the appropriate regulatory agency for information about the rules that apply to your tank:

3. SECTION A-3: BLM WIND ENERGY DEVELOPMENT PROGRAM POLICIES AND BEST MANAGEMENT PRACTICES (BMPs)

The BLM's Wind Energy Development Program will establish a number of policies and BMPs, provided below, regarding the development of wind energy resources on BLM-administered public lands. The policies and BMPs will be applicable to all wind energy development projects on BLM-administered public lands. The policies address the administration of wind energy development activities, and the BMPs identify required mitigation measures that would need to be incorporated into project-specific Plans of Development (PODs) and right-of-way (ROW) authorization stipulations. Additional mitigation measures will be applied to individual projects, in the form of stipulations in the ROW authorization as appropriate, to address site-specific and species-specific issues.

These policies and BMPs were formulated through preparation of the Final Wind Energy PEIS (BLM 2005). The PEIS included detailed, comprehensive analysis of the potential impacts of wind energy development and relevant mitigation measures; reviews of existing, relevant mitigation guidance; and reviews of comments received during scoping and public review of the Draft PEIS.

Policies

- The BLM will not issue ROW authorizations for wind energy development on lands on which wind energy development is incompatible with specific resource values. Lands that will be excluded from wind energy site monitoring and testing and development include designated areas that are part of the National Landscape Conservation System (NLCS) (e.g., Wilderness Areas, Wilderness Study Areas, National Monuments, NCAs,¹

¹ Wind energy development is permitted in one NCA, the California Desert Conservation Area (CDCA), in accordance with the provisions of the *California Desert Conservation Area Plan 1980, as Amended* (BLM 1999).

Wild and Scenic Rivers, and National Historic and Scenic Trails) and Areas of Critical Environmental Concern (ACECs).² Additional areas of land may be excluded from wind energy development on the basis of findings of resource impacts that cannot be mitigated and/or conflict with existing and planned multiple-use activities or land use plans.

- To the extent possible, wind energy projects shall be developed in a manner that will not prevent other land uses, including minerals extraction, livestock grazing, recreational use, and other ROW uses.
- Entities seeking to develop a wind energy project on BLM-administered lands shall consult with appropriate federal, state, and local agencies regarding specific projects as early in the planning process as appropriate to ensure that all potential construction, operation, and decommissioning issues and concerns are identified and adequately addressed.
- The BLM will initiate government-to-government consultation with Indian Tribal governments whose interests might be directly and substantially affected by activities on BLM-administered lands as early in the planning process as appropriate to ensure that construction, operation, and decommissioning issues and concerns are identified and adequately addressed.
- Entities seeking to develop a wind energy project on BLM-administered lands, in conjunction with BLM Washington Office (WO) and Field Office (FO) staff, shall consult with the U.S. Department of Defense (DoD) regarding the location of wind power projects and turbine siting as early in the planning process as appropriate. This consultation shall occur concurrently at both the installation/field level and the Pentagon/BLM WO level. An interagency protocol agreement is being developed to establish a consultation process and to identify the scope of issues for consultation. Lands withdrawn for military purposes are under the administrative jurisdiction of the DoD or a military service and are not available for issuance of wind energy authorizations by the BLM.
- The BLM will consult with the U.S. Fish and Wildlife Service (USFWS) as required by Section 7 of the Endangered Species Act of 1973 (ESA). The specific consultation requirements will be determined on a project-by-project basis.
- The BLM will consult with the State Historic Preservation Office (SHPO) as required by Section 106 of the National Historic Preservation Act of 1966 (NHPA). The specific consultation requirements will be determined on a project-by-project basis. If programmatic Section 106 consultations have been conducted and are adequate to cover a proposed project, additional consultation may not be needed.

² Although the MPDS developed for this PEIS (Section 2.2.1 and Appendix A) did not exclude all of these lands at the screening level, they will be excluded from wind energy development.

- Existing land use plans will be amended, as appropriate, to (1) adopt provisions of the BLM's Wind Energy Development Program, (2) identify land considered to be available for wind energy development, and (3) identify land that will not be available for wind energy development.
- The level of environmental analysis to be required under NEPA for individual wind power projects will be determined at the FO level. For many projects, it may be determined that a tiered environmental assessment (EA) is appropriate in lieu of an EIS. To the extent that the PEIS addresses anticipated issues and concerns associated with an individual project, including potential cumulative impacts, the BLM will tier off of the decisions embedded in the PEIS and limit the scope of additional project-specific NEPA analyses. The site-specific NEPA analyses will include analyses of project site configuration and micro-siting considerations, monitoring program requirements, and appropriate mitigation measures. In particular, the mitigation measures discussed in Chapter 5 of the PEIS may be consulted in determining site-specific requirements. Public involvement will be incorporated into all wind energy development projects to ensure that all concerns and issues are identified and adequately addressed. In general, the scope of the NEPA analyses will be limited to the proposed action on BLM-administered public lands; however, if access to proposed development on adjacent non-BLM-administered lands is entirely dependent on obtaining ROW access across BLM-administered public lands and there are no alternatives to that access, the NEPA analysis for the proposed ROW may need to assess the environmental effects from that proposed development. The BLM's analyses of ROW access projects may tier off of the PEIS to the extent that the proposed project falls within the scope of the PEIS analyses.
- Site-specific environmental analyses will tier from the PEIS and identify and assess any cumulative impacts that are beyond the scope of the cumulative impacts addressed in the PEIS.
- The Categorical Exclusion (CX) applicable to the issuance of short-term ROWs or land use authorizations may be applicable to some site monitoring and testing activities. The relevant CX, established for the BLM in the DOI Departmental Manual 516, Chapter 11, Sec. 11.5, E(19) (DOI 2004), encompasses "issuance of short-term (3 years or less) rights-of-way or land use authorizations for such uses as storage sites, apiary sites, and construction sites where the proposal includes rehabilitation to restore the land to its natural or original condition."
- The BLM will require financial bonds for all wind energy development projects on BLM-administered public lands to ensure compliance with the terms and conditions of the rights-of-way authorization and the requirements of applicable regulatory requirements, including reclamation costs. The amount of the required bond will be determined during the rights-of-way authorization process on the basis of site-specific and project-specific factors. The BLM may also require financial bonds for site monitoring and testing authorizations.

- Entities seeking to develop a wind energy project on BLM-administered public lands shall develop a project-specific Plan of Development (POD) that incorporates all BMPs and, as appropriate, the requirements of other existing and relevant BLM mitigation guidance, including the BLM's interim off-site mitigation guidance (BLM 2005a). Additional mitigation measures will be incorporated into the POD and into the ROW authorization as project stipulations, as needed, to address site-specific and species-specific issues. The POD will include a site plan showing the locations of turbines, roads, power lines, other infrastructure, and other areas of short- and long-term disturbance.
- The BLM will incorporate management goals and objectives specific to habitat conservation for species of concern (e.g., sage-grouse), as appropriate, into the POD for proposed wind energy projects.
- The BLM will consider the visual resource values of the public lands involved in proposed wind energy development projects, consistent with BLM Visual Resource Management (VRM) policies and guidance. The BLM will work with the ROW applicant to incorporate visual design considerations into the planning and design of the project to minimize potential visual impacts of the proposal and to meet the VRM objectives of the area.
- Operators of wind power facilities on BLM-administered public lands shall consult with the BLM and other appropriate federal, state, and local agencies regarding any planned upgrades or changes to the wind facility design or operation. Proposed changes of this nature may require additional environmental analysis and/or revision of the POD.
- The BLM's Wind Energy Development Program will incorporate adaptive management strategies to ensure that potential adverse impacts of wind energy development are avoided (if possible), minimized, or mitigated to acceptable levels. The programmatic policies and BMPs will be updated and revised as new data regarding the impacts of wind power projects become available. At the project-level, operators will be required to develop monitoring programs to evaluate the environmental conditions at the site through all phases of development, to establish metrics against which monitoring observations can be measured, to identify potential mitigation measures, and to establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures and project-specific stipulations.

Best Management Practices (BMPs)

The BMPs will be adopted as required elements of project-specific PODs and/or as ROW authorization stipulations. They are categorized by development activity: site monitoring and testing, development of the POD, construction, operation, and decommissioning. The BMPs for development of the POD identify required elements of the POD needed to address potential impacts associated with subsequent phases of development.

Site Monitoring and Testing

- The area disturbed by installation of meteorological towers (i.e., footprint) shall be kept to a minimum.
- Existing roads shall be used to the maximum extent feasible. If new roads are necessary, they shall be designed and constructed to the appropriate standard.
- Meteorological towers shall not be located in sensitive habitats or in areas where ecological resources known to be sensitive to human activities (e.g., prairie grouse) are present. Installation of towers shall be scheduled to avoid disruption of wildlife reproductive activities or other important behaviors.
- Meteorological towers installed for site monitoring and testing shall be inspected periodically for structural integrity.

Plan of Development Preparation*General*

- The BLM and operators shall contact appropriate agencies, property owners, and other stakeholders early in the planning process to identify potentially sensitive land uses and issues, rules that govern wind energy development locally, and land use concerns specific to the region.
- Available information describing the environmental and sociocultural conditions in the vicinity of the proposed project shall be collected and reviewed as needed to predict potential impacts of the project.
- The Federal Aviation Administration (FAA)-required notice of proposed construction shall be made as early as possible to identify any air safety measures that would be required.
- To plan for efficient use of the land, necessary infrastructure requirements shall be consolidated wherever possible, and current transmission and market access shall be evaluated carefully.
- The project shall be planned to utilize existing roads and utility corridors to the maximum extent feasible, and to minimize the number and length/size of new roads, lay-down areas, and borrow areas.
- A monitoring program shall be developed to ensure that environmental conditions are monitored during the construction, operation, and decommissioning phases. The monitoring program requirements, including adaptive management strategies, shall be

established at the project level to ensure that potential adverse impacts of wind energy development are mitigated. The monitoring program shall identify the monitoring requirements for each environmental resource present at the site, establish metrics against which monitoring observations can be measured, identify potential mitigation measures, and establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures and BMPs.

- “Good housekeeping” procedures shall be developed to ensure that during operation the site will be kept clean of debris, garbage, fugitive trash or waste, and graffiti; to prohibit scrap heaps and dumps; and to minimize storage yards.

Wildlife and Other Ecological Resources

- Operators shall review existing information on species and habitats in the vicinity of the project area to identify potential concerns.
- Operators shall conduct surveys for federal and/or state-protected species and other species of concern (including special status plant and animal species) within the project area and design the project to avoid (if possible), minimize, or mitigate impacts to these resources.
- Operators shall identify important, sensitive, or unique habitats in the vicinity of the project and design the project to avoid (if possible), minimize, or mitigate impacts to these habitats (e.g., locate the turbines, roads, and ancillary facilities in the least environmentally sensitive areas; i.e., away from riparian habitats, streams, wetlands, drainages, or critical wildlife habitats).
- The BLM will prohibit the disturbance of any population of federal listed plant species.
- Operators shall evaluate avian and bat use of the project area and design the project to minimize or mitigate the potential for bird and bat strikes (e.g., development shall not occur in riparian habitats and wetlands). Scientifically rigorous avian and bat use surveys shall be conducted; the amount and extent of ecological baseline data required shall be determined on a project basis.
- Turbines shall be configured to avoid landscape features known to attract raptors, if site studies show that placing turbines there would pose a significant risk to raptors.
- Operators shall determine the presence of bat colonies and avoid placing turbines near known bat hibernation, breeding, and maternity/nursery colonies; in known migration corridors; or in known flight paths between colonies and feeding areas.
- Operators shall determine the presence of active raptor nests (i.e., raptor nests used during the breeding season). Measures to reduce raptor use at a project site (e.g.,

minimize road cuts, maintain either no vegetation or nonattractive plant species around the turbines) shall be considered.

- A habitat restoration plan shall be developed to avoid (if possible), minimize, or mitigate negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species. The plan shall identify revegetation, soil stabilization, and erosion reduction measures that shall be implemented to ensure that all temporary use areas are restored. The plan shall require that restoration occur as soon as possible after completion of activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
- Procedures shall be developed to mitigate potential impacts to special status species. Such measures could include avoidance, relocation of project facilities or lay-down areas, and/or relocation of biota.
- Facilities shall be designed to discourage their use as perching or nesting substrates by birds. For example, power lines and poles shall be configured to minimize raptor electrocutions and discourage raptor and raven nesting and perching.

Visual Resources

- The public shall be involved and informed about the visual site design elements of the proposed wind energy facilities. Possible approaches include conducting public forums for disseminating information, offering organized tours of operating wind developments, and using computer simulation and visualization techniques in public presentations.
- Turbine arrays and turbine design shall be integrated with the surrounding landscape. Design elements to be addressed include visual uniformity, use of tubular towers, proportion and color of turbines, nonreflective paints, and prohibition of commercial messages on turbines.
- Other site design elements shall be integrated with the surrounding landscape. Elements to address include minimizing the profile of the ancillary structures, burial of cables, prohibition of commercial symbols, and lighting. Regarding lighting, efforts shall be made to minimize the need for and amount of lighting on ancillary structures.

Roads

- An access road siting and management plan shall be prepared incorporating existing BLM standards regarding road design, construction, and maintenance such as those described in the BLM 9113 Manual (BLM 1985) and the *Surface Operating Standards for Oil and Gas Exploration and Development* (RMRC 1989) (i.e., the Gold Book).

Ground Transportation

- A transportation plan shall be developed, particularly for the transport of turbine components, main assembly cranes, and other large pieces of equipment. The plan shall consider specific object sizes, weights, origin, destination, and unique handling requirements and shall evaluate alternative transportation approaches. In addition, the process to be used to comply with unique state requirements and to obtain all necessary permits shall be clearly identified.
- A traffic management plan shall be prepared for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration.

Noise

- Proponents of a wind energy development project shall take measurements to assess the existing background noise levels at a given site and compare them with the anticipated noise levels associated with the proposed project.

Noxious Weeds and Pesticides

- Operators shall develop a plan for control of noxious weeds and invasive species, which could occur as a result of new surface disturbance activities at the site. The plan shall address monitoring, education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. The use of certified weed-free mulching shall be required. If trucks and construction equipment are arriving from locations with known invasive vegetation problems, a controlled inspection and cleaning area shall be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.
- If pesticides are used on the site, an integrated pest management plan shall be developed to ensure that applications would be conducted within the framework of BLM and DOI policies and entail only the use of EPA-registered pesticides. Pesticide use shall be limited to nonpersistent, immobile pesticides and shall only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.

Cultural/Historic Resources

- The BLM will consult with Indian Tribal governments early in the planning process to identify issues regarding the proposed wind energy development, including issues related to the presence of cultural properties, access rights, disruption to traditional cultural practices, and impacts to visual resources important to the Tribe(s).

- The presence of archaeological sites and historic properties in the area of potential effect shall be determined on the basis of a records search of recorded sites and properties in the area and/or, depending on the extent and reliability of existing information, an archaeological survey. Archaeological sites and historic properties present in the area of potential effect shall be reviewed to determine whether they meet the criteria of eligibility for listing on the *National Register of Historic Places* (NRHP).
- When any rights-of-way application includes remnants of a National Historic Trail, is located within the viewshed of a National Historic Trail's designated centerline, or includes or is within the viewshed of a trail eligible for listing on the NRHP, the operator shall evaluate the potential visual impacts to the trail associated with the proposed project and identify appropriate mitigation measures for inclusion as stipulations in the POD.
- If cultural resources are present at the site, or if areas with a high potential to contain cultural material have been identified, a cultural resources management plan (CRMP) shall be developed. This plan shall address mitigation activities to be taken for cultural resources found at the site. Avoidance of the area is always the preferred mitigation option. Other mitigation options include archaeological survey and excavation (as warranted) and monitoring. If an area exhibits a high potential, but no artifacts were observed during an archaeological survey, monitoring by a qualified archaeologist could be required during all excavation and earthmoving in the high-potential area. A report shall be prepared documenting these activities. The CRMP also shall (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of artifacts and destruction of property on public land.

Paleontological Resources

- Operators shall determine whether paleontological resources exist in a project area on the basis of the sedimentary context of the area, a records search for past paleontological finds in the area, and/or, depending on the extent of existing information, a paleontological survey.
- If paleontological resources are present at the site, or if areas with a high potential to contain paleontological material have been identified, a paleontological resources management plan shall be developed. This plan shall include a mitigation plan for collection of the fossils; mitigation could include avoidance, removal of fossils, or monitoring. If an area exhibits a high potential but no fossils were observed during survey, monitoring by a qualified paleontologist could be required during all excavation and earthmoving in the sensitive area. A report shall be prepared documenting these activities. The paleontological resources management plan also shall (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of fossils on public land.

Hazardous Materials and Waste Management

- Operators shall develop a hazardous materials management plan addressing storage, use, transportation, and disposal of each hazardous material anticipated to be used at the site. The plan shall identify all hazardous materials that would be used, stored, or transported at the site. It shall establish inspection procedures, storage requirements, storage quantity limits, inventory control, nonhazardous product substitutes, and disposition of excess materials. The plan shall also identify requirements for notices to federal and local emergency response authorities and include emergency response plans.
- Operators shall develop a waste management plan identifying the waste streams that are expected to be generated at the site and addressing hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. This plan shall address all solid and liquid wastes that may be generated at the site.
- Operators shall develop a spill prevention and response plan identifying where hazardous materials and wastes are stored on site, spill prevention measures to be implemented, training requirements, appropriate spill response actions for each material or waste, the locations of spill response kits on site, a procedure for ensuring that the spill response kits are adequately stocked at all times, and procedures for making timely notifications to authorities.

Storm Water

- Operators shall develop a storm water management plan for the site to ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion.

Human Health and Safety

- A safety assessment shall be conducted to describe potential safety issues and the means that would be taken to mitigate them, including issues such as site access, construction, safe work practices, security, heavy equipment transportation, traffic management, emergency procedures, and fire control.
- A health and safety program shall be developed to protect both workers and the general public during construction, operation, and decommissioning of a wind energy project. Regarding occupational health and safety, the program shall identify all applicable federal and state occupational safety standards; establish safe work practices for each task (e.g., requirements for personal protective equipment and safety harnesses; Occupational Safety and Health Administration [OSHA] standard practices for safe use of explosives and blasting agents; and measures for reducing occupational electric and magnetic fields [EMF] exposures); establish fire safety evacuation procedures; and define safety

performance standards (e.g., electrical system standards and lightning protection standards). The program shall include a training program to identify hazard training requirements for workers for each task and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies shall be established.

- Regarding public health and safety, the health and safety program shall establish a safety zone or setback for wind turbine generators from residences and occupied buildings, roads, rights-of-ways, and other public access areas that is sufficient to prevent accidents resulting from the operation of wind turbine generators. It shall identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction or decommissioning activities. It shall also identify measures to be taken during the operation phase to limit public access to hazardous facilities (e.g., permanent fencing would be installed only around electrical substations, and turbine tower access doors would be locked).
- Operators shall consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) shall be identified and addressed in the traffic management plan.
- If operation of the wind turbines is expected to cause significant adverse impacts to nearby residences and occupied buildings from shadow flicker, low-frequency sound, or EMF, site-specific recommendations for addressing these concerns shall be incorporated into the project design (e.g., establishing a sufficient setback from turbines).
- The project shall be planned to minimize electromagnetic interference (EMI) (e.g., impacts to radar, microwave, television, and radio transmissions) and comply with Federal Communications Commission [FCC] regulations. Signal strength studies shall be conducted when proposed locations have the potential to impact transmissions. Potential interference with public safety communication systems (e.g., radio traffic related to emergency activities) shall be avoided.
- The project shall be planned to comply with FAA regulations, including lighting regulations, and to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.
- Operators shall develop a fire management strategy to implement measures to minimize the potential for a human-caused fire.

Construction

General

- All control and mitigation measures established for the project in the POD and the resource-specific management plans that are part of the POD shall be maintained and implemented throughout the construction phase, as appropriate.
- The area disturbed by construction and operation of a wind energy development project (i.e., footprint) shall be kept to a minimum.
- The number and size/length of roads, temporary fences, lay-down areas, and borrow areas shall be minimized.
- Topsoil from all excavations and construction activities shall be salvaged and reapplied during reclamation.
- All areas of disturbed soil shall be reclaimed using weed-free native grasses, forbs, and shrubs. Reclamation activities shall be undertaken as early as possible on disturbed areas.
- All electrical collector lines shall be buried in a manner that minimizes additional surface disturbance (e.g., along roads or other paths of surface disturbance). Overhead lines may be used in cases where burial of lines would result in further habitat disturbance.
- Operators shall identify unstable slopes and local factors that can induce slope instability (such as groundwater conditions, precipitation, earthquake activities, slope angles, and the dip angles of geologic strata). Operators also shall avoid creating excessive slopes during excavation and blasting operations. Special construction techniques shall be used where applicable in areas of steep slopes, erodible soil, and stream channel crossings.
- Erosion controls that comply with county, state, and federal standards shall be applied. Practices such as jute netting, silt fences, and check dams shall be applied near disturbed areas.

Wildlife

- Guy wires on permanent meteorological towers shall be avoided, however, may be necessary on temporary meteorological towers installed during site monitoring and testing.
- In accordance with the habitat restoration plan, restoration shall be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

- All construction employees shall be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. In addition, pets shall not be permitted on site during construction.

Visual Resources

- Operators shall reduce visual impacts during construction by minimizing areas of surface disturbance, controlling erosion, using dust suppression techniques, and restoring exposed soils as closely as possible to their original contour and vegetation.

Roads

- Existing roads shall be used, but only if in safe and environmentally sound locations. If new roads are necessary, they shall be designed and constructed to the appropriate standard and be no higher than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Excessive grades on roads, road embankments, ditches, and drainages shall be avoided, especially in areas with erodible soils. Special construction techniques shall be used, where applicable. Abandoned roads and roads that are no longer needed shall be recontoured and revegetated.
- Access roads and on-site roads shall be surfaced with aggregate materials, wherever appropriate.
- Access roads shall be located to follow natural contours and minimize side hill cuts.
- Roads shall be located away from drainage bottoms and avoid wetlands, if practicable.
- Roads shall be designed so that changes to surface water runoff are avoided and erosion is not initiated.
- Access roads shall be located to minimize stream crossings. All structures crossing streams shall be located and constructed so that they do not decrease channel stability or increase water velocity. Operators shall obtain all applicable federal and state permits.
- Existing drainage systems shall not be altered, especially in sensitive areas such as erodible soils or steep slopes. Potential soil erosion shall be controlled at culvert outlets with appropriate structures. Catch basins, roadway ditches, and culverts shall be cleaned and maintained regularly.

Ground Transportation

- Project personnel and contractors shall be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific

conditions, to ensure safe and efficient traffic flow and to reduce wildlife collisions and disturbance and airborne dust.

- Traffic shall be restricted to the roads developed for the project. Use of other unimproved roads shall be restricted to emergency situations.
- Signs shall be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration shall be given to limiting construction vehicles traveling on public roadways during the morning and late afternoon commute time.

Air Emissions

- Dust abatement techniques shall be used on unpaved, unvegetated surfaces to minimize airborne dust.
- Speed limits (e.g., 25 mph [40 km/h]) shall be posted and enforced to reduce airborne fugitive dust.
- Construction materials and stockpiled soils shall be covered if they are a source of fugitive dust.
- Dust abatement techniques shall be used before and during surface clearing, excavation, or blasting activities.

Excavation and Blasting Activities

- Operators shall gain a clear understanding of the local hydrogeology. Areas of groundwater discharge and recharge and their potential relationships with surface water bodies shall be identified.
- Operators shall avoid creating hydrologic conduits between two aquifers during foundation excavation and other activities.
- Foundations and trenches shall be backfilled with originally excavated material as much as possible. Excess excavation materials shall be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.
- Borrow material shall be obtained only from authorized and permitted sites. Existing sites shall be used in preference to new sites.
- Explosives shall be used only within specified times and at specified distances from sensitive wildlife or streams and lakes, as established by the BLM or other federal and state agencies.

Noise

- Noisy construction activities (including blasting) shall be limited to the least noise-sensitive times of day (i.e., daytime only between 7 a.m. and 10 p.m.) and weekdays.
- All equipment shall have sound-control devices no less effective than those provided on the original equipment. All construction equipment used shall be adequately muffled and maintained.
- All stationary construction equipment (i.e., compressors and generators) shall be located as far as practicable from nearby residences.
- If blasting or other noisy activities are required during the construction period, nearby residents shall be notified in advance.

Cultural and Paleontological Resources

- Unexpected discovery of cultural or paleontological resources during construction shall be brought to the attention of the responsible BLM authorized officer immediately. Work shall be halted in the vicinity of the find to avoid further disturbance to the resources while they are being evaluated and appropriate mitigation measures are being developed.

Hazardous Materials and Waste Management

- Secondary containment shall be provided for all on-site hazardous materials and waste storage, including fuel. In particular, fuel storage (for construction vehicles and equipment) shall be a temporary activity occurring only for as long as is needed to support construction activities.
- Wastes shall be properly containerized and removed periodically for disposal at appropriate off-site permitted disposal facilities.
- In the event of an accidental release to the environment, the operator shall document the event, including a root cause analysis, appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event shall be provided to the BLM authorized officer and other federal and state agencies, as required.
- Any wastewater generated in association with temporary, portable sanitary facilities shall be periodically removed by a licensed hauler and introduced into an existing municipal sewage treatment facility. Temporary, portable sanitary facilities provided for

construction crews shall be adequate to support expected on-site personnel and shall be removed at completion of construction activities.

Public Health and Safety

- Temporary fencing shall be installed around staging areas, storage yards, and excavations during construction to limit public access.

Operation

General

- All control and mitigation measures established for the project in the POD and the resource-specific management plans that are part of the POD shall be maintained and implemented throughout the operational phase, as appropriate. These control and mitigation measures shall be reviewed and revised, as needed, to address changing conditions or requirements at the site, throughout the operational phase. This adaptive management approach would help ensure that impacts from operations are kept to a minimum.
- Inoperative turbines shall be repaired, replaced, or removed in a timely manner. Requirements to do so shall be incorporated into the due diligence provisions of the rights-of-way authorization. Operators will be required to demonstrate due diligence in the repair, replacement, or removal of turbines; failure to do so could result in termination of the rights-of-way authorization.

Wildlife

- Employees, contractors, and site visitors shall be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. In addition, any pets shall be controlled to avoid harassment and disturbance of wildlife.
- Observations of potential wildlife problems, including wildlife mortality, shall be reported to the BLM authorized officer immediately.

Ground Transportation

- Ongoing ground transportation planning shall be conducted to evaluate road use, minimize traffic volume, and ensure that roads are maintained adequately to minimize associated impacts.

Monitoring Program

- Site monitoring protocols defined in the POD shall be implemented. These will incorporate monitoring program observations and additional mitigation measures into standard operating procedures and BMPs to minimize future environmental impacts.
- Results of monitoring program efforts shall be provided to the BLM authorized officer.

Public Health and Safety

- Permanent fencing shall be installed and maintained around electrical substations, and turbine tower access doors shall be locked to limit public access.
- In the event an installed wind energy development project results in EMI, the operator shall work with the owner of the impacted communications system to resolve the problem. Additional warning information may also need to be conveyed to aircraft with onboard radar systems so that echoes from wind turbines can be quickly recognized.

Decommissioning

General

- Prior to the termination of the rights-of-way authorization, a decommissioning plan shall be developed and approved by the BLM. The decommissioning plan shall include a site reclamation plan and monitoring program.
- All management plans, BMPs, and stipulations developed for the construction phase shall be applied to similar activities during the decommissioning phase.
- All turbines and ancillary structures shall be removed from the site.
- Topsoil from all decommissioning activities shall be salvaged and reapplied during final reclamation.
- All areas of disturbed soil shall be reclaimed using weed-free native shrubs, grasses, and forbs.
- The vegetation cover, composition, and diversity shall be restored to values commensurate with the ecological setting.