Appendix B

Required Design Features (RDFs)

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B. Required Design Features

Required Design Features (RDFs) are required for certain activities in all GRSG habitat. RDFs establish the minimum specifications for certain activities to help mitigate adverse impacts. However, the applicability and overall effectiveness of each RDF cannot be fully assessed until the project level when the project location and design are known. Because of site-specific circumstances, some RDFs may not apply to some projects (e.g., a resource is not present on a given site) and/or may require slight variations (e.g., a larger or smaller protective area). RDFs are continuously improving as new science and technology become available and therefore are subject to change. All variations in RDFs would require that at least one of the following be demonstrated in the NEPA analysis associated with the project/activity:

- A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable;
- An alternative RDF is determined to provide equal or better protection for GRSG or its habitat;
- A specific RDF will provide no additional protection to GRSG or its habitat.

The following required design features (RDFs) are included for consideration and use based upon review of current science and effects analysis (circa 2014) (**Table B-1**). These may be reviewed during project evaluation and updated through plan maintenance as new information and updated scientific findings become available.

The table is organized by program area grouping the RDFs most relevant to that program. All relevant RDFs, regardless of which program they are grouped under, should be considered during project evaluation and applicable RDFs should be applied during implementation. The following measures would be applied as RDFs for all solid minerals. They would also apply to locatable minerals consistent with applicable law. In some cases the RDFs may not all be appropriate based on local conditions and would be assessed in the appropriate site specific NEPA analysis, these all should be considered and where determined to be beneficial to achieving GRSG habitat objectives included as part of the site specific project. In other cases additional project design criteria or best management practices could be incorporated into project implementation to address site specific concerns not fully addressed by the RDFs described here.

Table B-1
Required Design Features

	Required Design Feature
General	
1.	Solicit and consider expertise and ideas from local landowners, working groups, and other federal, state, county, and private organizations during development of projects.
2.	No repeated or sustained behavioral disturbance (e.g., visual, noise over 10 dbA at lek, etc.) to lekking birds from 6:00 pm to 9:00 am within 2 miles (3.2 km) of leks during the lekking season.
3.	Avoid mechanized anthropogenic disturbance, in nesting habitat during the nesting season when implementing: 1) fuels/vegetation/habitat restoration management projects, 2) infrastructure construction or maintenance, 3) geophysical exploration activities; 4) organized motorized recreational events.
4.	Avoid mechanized anthropogenic disturbance during the winter, in wintering areas when implementing: 1) fuels/vegetation/habitat restoration management projects, 2) infrastructure construction or maintenance, 3) geophysical exploration activities; 4) organized motorized recreational events.
Wildfire Suppression	
5.	Compile district-level information into state-wide sage-grouse tool boxes. Tool boxes will contain maps, listing of resource advisors, contact information, local guidance, and other relevant information for each district, which will be aggregated into a state-wide document.
6.	Provide localized maps to dispatch offices and extended attack incident commanders for use in prioritizing wildfire suppression resources and designing suppression tactics. The Fire Planning and Fuels Management Division (FA-600) hosts a webpage containing up-to-date maps, instruction memoranda, conservation measures, BMPs, and spatial data specific to fire operations and fuels management/sage-grouse interactions. These resources can be accessed at: http://web.blm.gov/internal/fire/fpfm/sg/index.html . Additional BLM sage-grouse information can be found at: http://www.blm.gov/wo/st/en/prog/more/fish__wildlife_and/sage-grouse-conservation.html .
7.	Assign a resource advisor with sage-grouse expertise, or who has access to sage-grouse expertise, to all extended attack fires in or near sage-grouse habitat areas. Prior to the fire season, provide training to sage-grouse resource advisors on wildfire suppression organization, objectives, tactics, and procedures to develop a cadre of qualified individuals. Involve state wildlife agency expertise in fire operations through: • instructing resource advisors during preseason trainings; • qualification as resource advisors; • coordination with resource advisors during fire incidents; • contributing to incident planning with information such as habitat features or other key data useful in fire decision making

Table B-1
Required Design Features

	Required Design Feature
8.	At the onset of an emerging wildland fire the Agency Administrators and Fire Management Officers will an engage a local Resource Advisor to assess sage-grouse habitat that may be affected by the fire or suppression activities.
9.	If complexity of the wildland fire warrants the activation of an Incident Management Team, locally refined information regarding important sage-grouse habitat will be relayed during in brief and continually throughout the incident.
10.	On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in sage-grouse habitat areas.
11.	As appropriate, utilize existing fuel breaks, such as roads or discrete changes in fuel type, as control lines in order to minimize fire spread.
12.	During periods of multiple fires, ensure line officers are involved in setting priorities.
13.	To the extent possible, locate wildfire suppression facilities (i.e., base camps, spike camps, drop points, staging areas, heli-bases, etc.) in areas where physical disturbance to sage-grouse habitat can be minimized. These include disturbed areas, grasslands, near roads/trails or in other areas where there is existing disturbance or minimal sagebrush cover.
14.	Power-wash all firefighting vehicles, to the extent possible, including engines, water tenders, personnel vehicles, and all-terrain vehicles (ATV) prior to deploying in or near sage-grouse habitat areas to minimize noxious weed spread.
15.	Minimize cross-country vehicle travel during fire operations in sage-grouse habitat.
16.	Minimize burnout operations in key sage-grouse habitat areas by constructing direct fireline whenever safe and practical to do so.
17.	Utilize retardant, mechanized equipment, and other available resources to minimize burned acreage during initial attack.
18.	As safety allows, conduct mop-up where the black adjoins unburned islands, dog legs, or other habitat features to minimize sagebrush loss.
19.	Adequately document fire operation activities in sage-grouse habitat for potential follow-up coordination activities.
Fuels Management Unless otherwise specified as part of the land use plan consider the full array of fuels management treatment types (prescribed fire, mechanical, chemical and biological) when implementing the following RDFs.	
20.	Where applicable, design fuels treatment objectives to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patterns which most benefit sage-grouse habitat.
21.	Provide training to fuels treatment personnel on sage-grouse biology, habitat requirements, and identification of areas utilized locally.

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Required Design Features

	Required Design Feature
22.	Use burning prescriptions which minimize undesirable effects on vegetation or soils (e.g., minimize mortality of desirable perennial plant species and reduce risk of annual grass invasion).
23.	Ensure proposed sagebrush treatments are planned with full interdisciplinary input pursuant to NEPA and coordination with state fish and wildlife agencies, and that treatment acreage is conservative in the context of surrounding sage-grouse seasonal habitats and landscape.
24.	Where appropriate, ensure that treatments are configured in a manner that promotes use by sage-grouse.
25.	Where applicable, incorporate roads and natural fuel breaks into fuel break design.
26.	Power-wash all vehicles and equipment involved in fuels management activities, prior to entering the area, to minimize the introduction of undesirable and/or invasive plant species.
27.	Design vegetation treatments in areas of high fire frequency which facilitate firefighter safety, reduce the potential acres burned, and reduce the fire risk to sage-grouse habitat. Additionally, develop maps for sage-grouse habitat which spatially display existing fuels treatments that can be used to assist suppression activities.
28.	As funding and logistics permit, restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs or one of that referenced in land use planning documentation.
29.	Emphasize the use of native plant species, especially those from a warmer area of the species' current range, recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions.
30.	Remove standing and encroaching trees within at least 110 yards of occupied sage-grouse leks and other habitats (e.g., nesting, wintering and brood rearing) to reduce the availability of perch sites for avian predators, as resources permit.
31.	Protect wildland areas from wildfire originating on private lands, infrastructure corridors, and recreational areas.
32.	Reduce the risk of vehicle- or human-caused wildfires and the spread of invasive species by installing fuel breaks and/or planting perennial vegetation (e.g., green-strips) paralleling road rights-of-way.
33.	Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application, etc.) to aid in controlling wildfire, should wildfire occur near PHMA or priority restoration areas (such as where investments in restoration have already been made).

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Required Design Features

	Required Design Feature
34.	Design treatments to provide a break in fuel continuity in large, at-risk, expanses of continuous sagebrush. Use local knowledge of fire occurrence, spread patterns, and habitat values at risk to determine the proper placement and size of the fuel break.
35.	Use existing agreements with local, county, and state road departments to improve and maintain existing fuel breaks during routine road maintenance. Examples include: blading, mowing, disking, grading, and spraying roadside vegetation.
36.	Form partnerships with linear right-of-way holders to maintain fuel breaks, which reduce fuel continuity and serve to protect at-risk landscapes.
37.	Use existing NEPA documentation and authorities, where possible, when conducting road right-of-way maintenance. In many instances, existing authorizations for roads or linear rights-of-way contain provisions for maintenance activities that could be implemented and incorporated into a vegetation and habitat protection strategy without requiring additional NEPA analysis. Document this with a Determination of NEPA Adequacy (DNA).
38.	Enter into agreements with road departments which may help fund the construction and maintenance of fuel breaks adjacent to roads, as funding permits.
39.	Spatially depict the locations of existing and planned fuel breaks in a landscape fuel break map and label each vegetation polygon for reference. Offices will make these maps available to suppression resources for use in fire operations.
Vegetation Treatment	
40.	Utilize available plant species based on their adaptation to the site when developing seed mixes. (Lambert 2005; VegSpec).
41.	Utilizing the warmer component of a species' current range when selecting native species for restoration when available (Kramer and Havens 2009).
42.	Reduce annual grass densities and competition through herbicide, targeted grazing, tillage, prescribed fire, etc. (Pyke 2011).
43.	Reduce density and competition of introduced perennial grasses using appropriate techniques to accomplish this reduction (Pellant and Lysne 2005).
44.	Utilize techniques to introduce desired species to the site such as drill seeding, broadcast seeding followed by a seed coverage technique, such as harrowing, chaining or livestock trampling, and transplanting container or bare-root seedlings.
45.	Assess existing on-site vegetation to ascertain if enough desirable perennial vegetation exists to consider techniques to increase on-site seed production to facilitate an increase in density of desired species.
46.	Use site preparation techniques that retain existing desirable vegetation.
47.	Use "mother plant" techniques or planting of satellite populations of desirable plants to serve as seed sources.
48.	Utilize post-treatment control of annual grass and other invasive species.

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Required Design Features

Required Design Feature
49. Utilize new tools and use of new science and research as it becomes available.
50. Give higher priority to vegetation rehabilitation or manipulation projects that include: • Sites where environmental variables contribute to improved chances for project success (Meinke et al. 2009). • Areas where seasonal habitat is limiting GRSG distribution and/or abundance (wintering areas, wet meadows and riparian areas, nesting areas, leks, etc.). • Re-establish sagebrush cover in otherwise suitable GRSG with consideration to local needs and conditions using the general priorities in the following order: • Recently burned native areas • Native grassland with suitable forb component • Nonnative grassland with suitable forb component • Recently converted annual grass areas • Native grassland • Nonnative grassland • Where desirable perennial bunchgrasses and/or forbs are deficient in existing sagebrush stands, use appropriate mechanical, aerial or other techniques to re-establish them. Examples include but are not limited to, use of a Lawson aerator with seeding, harrow or chain with seeding, drill seeding, hand planting plugs, aerial seeding or other appropriate technique. • Cooperative efforts that may improve GRSG habitat quality over multiple ownerships. • Projects that may provide connectivity between suitable habitats or expand existing good quality habitats. • Projects that address conifer encroachment into important GRSG habitats. In general the priority for treatment is 1) Phase 1 (≤10% conifer cover), 2) Phase 2 (10-30%), and 3) Phase 3 (>30%). • Replacing stands of annual grasses within otherwise good quality habitats with desirable perennial species. Other factors that contribute to the importance of the restoration project in maintaining or improving GRSG habitat.
51. When conducting vegetation treatments in areas inhabited or potentially inhabited by slickspot peppergrass (*Lepidium papilliferum*) follow the conservation measures in the applicable conservation agreement between Idaho BLM and US Fish and Wildlife Service (most recent version dated September 2014).
Lands and Realty
52. Where technically and financially feasible, bury distribution powerlines and communication lines within existing disturbance.
53. Above-ground disturbance areas would be seeded with perennial vegetation as per vegetation management.
54. Place infrastructure in already disturbed locations where the habitat has not been fully restored.

Table B-1
Required Design Features

	Required Design Feature
55.	Cluster disturbances, operations (fracturing stimulation, liquids gathering, etc.) and facilities as close as possible.
56.	Co-locate linear facilities within one mile of existing linear facilities.
57.	Micro-site linear facilities to reduce impacts to sage-grouse habitats.
58.	Locate staging areas outside the Priority Habitat Management Areas to the extent possible.
59.	Consider colocating powerlines, flowlines and pipelines under or immediately adjacent to a road or adjacent to other pipelines first, before considering co-locating with other ROW.
60.	Restrict the construction of tall facilities and fences to the minimum number and amount needed.
61.	Use free standing structures where possible, to limit the use of guy wires. Where guy wires are necessary and appropriate bird collision diverters would be used, if doing so would not cause a human safety risk.
62.	Place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.
63.	Construction and development activities should conform to seasonal restrictions.
Fluid Mineral Leasing	
64.	Use directional drilling and/or multi well-pads to reduce surface disturbance.
65.	Apply a phased development approach with concurrent reclamation.
66.	Place liquid gathering facilities outside of PHMAs. Have no tanks at well locations within PHMAs to minimize truck traffic and perching and nesting sites for ravens and raptors.
67.	Use remote monitoring techniques for production facilities and develop a plan to reduce the frequency of vehicle use (Lyon and Anderson 2003).
68.	Site and/or minimize linear ROWs or SUAs to reduce disturbance to sagebrush habitats.
69.	Design or site permanent structures which create movement (e.g. pump jack) to minimize impacts to GRSG.
70.	Equip tanks and other above-ground facilities with structures or devices that discourage nesting of raptors and corvids.
71.	Control the spread and effects of non-native plant species (Gelbard and Belnap 2003, Bergquist et al. 2007, Evangelista et al. 2011). (E.g. by washing vehicles and equipment.)
72.	Restrict pit and impoundment construction to reduce or eliminate threats from West Nile virus (Doherty 2007).

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Required Design Features

	Required Design Feature
73.	Remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues, use the following steps for reservoir design to limit favorable mosquito habitat: • Overbuild size of ponds for muddy and non-vegetated shorelines. • Build steep shorelines to decrease vegetation and increase wave actions. • Avoid flooding terrestrial vegetation in flat terrain or low lying areas. • Construct dams or impoundments that restrict down slope seepage or overflow. • Line the channel where discharge water flows into the pond with crushed rock. • Construct spillway with steep sides and line it with crushed rock. • Treat waters with larvicides to reduce mosquito production where water occurs on the surface
74.	Require noise shields when drilling during the lek, nesting, brood-rearing, or wintering season.
75.	The BLM/Forest Service would work with proponents to limit project related noise where it would be expected to reduce functionality of habitats in Priority and Important Habitat Management Areas.
76.	The BLM/Forest Service would evaluate the potential for limitation of new noise sources on a case-by-case basis as appropriate.
77.	Limit noise sources that would be expected to negatively impact populations in Priority and Important Habitat Management Areas and continue to support the establishment of ambient baseline noise levels for occupied leks in Priority Habitat Management Areas.
78.	As additional research and information emerges, specific new limitations appropriate to the type of projects being considered would be evaluated and appropriate limitations would be implemented where necessary to minimize potential for noise impacts on sage-grouse core population behavioral cycles.
79.	As new research is completed, new specific limitations would be coordinated with the IDFG and MT FWP and partners.
80.	Fit transmission towers with anti-perch devices (Lammers and Collopy 2007).
81.	Require sage-grouse-safe fences.
82.	Locate new compressor stations outside Priority Habitat Management Areas and design them to reduce noise that may be directed towards Priority Habitat Management Areas.
83.	Clean up refuse (Bui et al. 2011).
84.	Locate man camps outside of priority sage-grouse habitats.

Table B-1
Required Design Features

Required Design Feature	
85.	Consider using oak (or other material) mats for drilling activities to reduce vegetation disturbance and for roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment following drilling.
86.	Use only closed-loop systems for drilling operations and no reserve pits.
87.	Cover (e.g., fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce sage-grouse mortality.
Roads	
88.	Utilize existing roads, or realignments of existing routes to the extent possible.
89.	Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
90.	Do not issue ROWs or SUAs to counties on newly constructed energy or mineral development roads, unless for a temporary use consistent with all other terms and conditions included in this document.
91.	Establish speed limits on BLM and FS system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
92.	Coordinate road construction and use among ROW or SUA holders.
93.	Construct road crossings at right angles to ephemeral drainages and stream crossings.
94.	Use dust abatement on roads and pads.
95.	Close and reclaim duplicate roads by restoring original landform and establishing desired vegetation.
Roads Specific to Priority and Important Habitat Management Areas	
96.	Locate roads to avoid priority areas and habitats as described in the Wildfire and Invasive Species Assessments.
97.	Establish trip restrictions (Lyon and Anderson 2003) or minimization through use of telemetry and remote well control (e.g., Supervisory Control and Data Acquisition).
98.	Restrict vehicle traffic to only authorized users on newly constructed routes (using signage, gates, etc.)
Reclamation Activities	
99.	Include objectives for ensuring habitat restoration to meet sage-grouse habitat needs in reclamation practices/sites (Pyke 2011).
100.	Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve sage-grouse habitat needs.
101.	Maximize the area of interim reclamation on long-term access roads and well pads, including reshaping, topsoiling and revegetating cut-and-fill slopes.

Table B-1
Required Design Features

Required Design Feature
102. Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.
103. Irrigate interim reclamation if necessary for establishing seedlings more quickly.
104. Utilize mulching techniques to expedite reclamation and to protect soils.
Grazing
105. Avoid building new wire fences within 2 km of occupied leks (Stevens 2011). If this is not feasible, ensure that high risk segments are marked with collision diverter devices or as latest science indicates.
106. Place new, taller structures, including corrals, loading facilities, water storage tanks, windmills, out of line of sight or at least one kilometer (preferably 3 km) from occupied leks, where such structures would increase the risk of avian predation.
107. Utilize temporary fencing (e.g., ESR, drop down fencing) where feasible and appropriate to meet management objectives.
108. Fence wetlands (e.g., springs, seeps, wet meadows and/or riparian areas) where appropriate, to maintain or foster progress toward Proper Functioning Condition and to facilitate management of sage-grouse habitat objectives. Where constructing fences or exclosures to improve riparian and/or upland management, incorporate fence marking or other BMPs/RDFs as appropriate.
109. During lekking periods, as determined locally (approximately March 15-May 1 in lower elevations and March 25-May 15 in higher elevations), livestock trailing will be avoided to the extent possible within 1 km (0.62 mile) of occupied leks between 6:00 p.m. and 9:00 a.m. to avoid disturbance to lekking and roosting sage-grouse. Over-nighting, watering and sheep bedding locations on public lands must be at least 1 km from occupied leks during the lekking season to reduce disturbance from sheep, human activity and guard animals.
110. Work with permittees in locating sheep over-nighting, watering and sheep bedding locations to minimize impacts to sage-grouse seasonal habitats.
111. When trailing livestock during the lekking or nesting season, use roads or existing trails, to the extent possible to reduce disturbance to roosting, lekking or nesting sage-grouse.
112. Design new spring developments in GRSG habitat to maintain or enhance the free flowing characteristics of springs and wet meadows. Modify developed springs, seeps and associated pipelines to maintain the continuity of the predevelopment riparian area within priority GRSG habitat where necessary.
113. Install ramps in new and existing livestock troughs and open water storage tanks to facilitate the use of and escape from troughs by GRSG and other wildlife.

Table B-1
Required Design Features

Required Design Feature
West Nile Virus
114. Construct water return features and maintain functioning float valves to prohibit water from being spilled on the ground surrounding the trough and/or tank and return water to the original water source, to the extent practicable.
115. Minimize the construction of new ponds or reservoirs except as needed to meet important resource management and/or restoration objectives.
116. Develop and maintain non-pond/reservoir watering facilities, such as troughs and bottomless tanks, to provide livestock water.
117. For most spring developments or wells, mosquito breeding habitat usually is not an issue. Flowing cold (less than 50° Fahrenheit) water and steep sides of the stock tanks are not conducive for egg laying or larvae production. If flows are low, the water is warm, or moss production is an issue in the tank, mosquito breeding habitat could exist in the tank.
118. Maintenance of healthy wetlands at spring sources helps control mosquitoes and their larvae by providing habitat for natural predators such as birds, dragonflies and amphibians. Protecting the wetland at the spring source with a fence is an option to consider.
119. Clean and drain stock tanks before the season starts. If never cleaned or drained, many tanks will fill with silt or debris causing warmer water and heavy vegetation growth conducive to mosquito reproduction.
120. Draining tanks after the period of use is completed, particularly in warmer weather, also reduces potential habitat by eliminating stagnant standing water.
121. Maintain a properly functioning overflow to prevent water from flowing onto the pad and surrounding area, to eliminate or minimize pooling of water that is attractive to breeding mosquitoes.
122. Clean or deepen overflow ponds to maintain colder temperatures to reduce mosquito habitat.
123. Install and maintain float valves on stock tank fill pipes to minimize overflow
124. Harden stock tank pads to reduce tracks that can potentially hold water where mosquitoes may breed.
125. Build ponds with steep shorelines to reduce shallow water (>60 cm) and aquatic vegetation around the perimeter of impoundments to deter colonizing by mosquitos (Knight et al. 2003, cited in NTT report page 61).
126. Consider removing and controlling trees and shrubs to reduce shade and wind barriers on pit and reservoir shorelines if not needed for wildlife, fish, or recreational values.
127. Impoundments that remain accessible to livestock and wildlife can cause tracking and nutrient enrichment from manure which can create favorable mosquito breeding habitat. Where this is a concern, it may be desirable to fence the reservoir and pipe the water to a tank.

Table B-1
Required Design Features

Required Design Feature
128. Construct dams or impoundments that minimize down-slope seepage or overflow. Seepage and overflow results in down-grade accumulation of vegetated shallow water areas that support breeding mosquitoes.
129. On ponds and reservoirs with enough depth and volume, introduce native fish species, which feed on mosquito larvae.
130. Line the overflow of a dam's spillway with crushed rock and constructing the spillway with steep sides to preclude the accumulation of shallow water and vegetation to reduce mosquito habitat.
131. Where an existing reservoir has filled with silt, consider cleaning to reduce shallow water habitat conducive to mosquito reproduction.
132. During confirmed West Nile virus outbreaks in sage-grouse habitat, consider larvicide applications.
Travel Management
133. Designate or design routes to direct use away from priority areas identified in Wildfire and Invasive Species Assessments and still provide for high-quality and sustainable travel routes and administrative access, legislatively mandated requirements, and commercial needs
Recreation
134. Direct use away from GRSG priority areas as described in the Wildfire and Invasive Species Assessments.
135. Eliminate or minimize external food sources for corvids.
136. Avoid development of new campgrounds or recreation facilities in nesting habitat.