
Appendix I

Required Design Features, Preferred Design
Features, and Suggested Design Features

APPENDIX I

REQUIRED DESIGN FEATURES, PREFERRED DESIGN FEATURES, AND SUGGESTED DESIGN FEATURES

Table I-1 provides a list of preferred design features (PDFs) and required design features (RDFs) that are applicable to all alternatives in the resource management plan.

- RDFs are required for certain activities in all Greater Sage-Grouse (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) or may require slight variations (e.g., a larger or smaller protective area). All variations in RDFs would require that at least one of the following be demonstrated in the NEPA analysis associated with the project or activity:
 - A specific RDF is documented to not be applicable to the site-specific conditions of the project or 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 would provide no additional protection to GRSG or its habitat.

- PDFs are established guidelines followed by the BLM/Forest Service to be incorporated into management activities where necessary, appropriate, and/or technically feasible. “Necessary” refers to the need for the PDF given the specifics of a proposal (e.g., it is not “necessary” to apply dust abatement on roads when the soil is sandy and wet). “Appropriate” refers to the wisdom of apply the PDF (e.g., it may not be “appropriate” to locate man camps outside priority habitat management areas [PHMA] because the additional vehicle miles required by a more distant location could be more detrimental to GRS). A PDF is “technically feasible” when it entails proven, or in some cases, emerging technology.
- Suggested design features (SDFs) apply to locatable minerals.

While the list of PDFs/RDFs/SDFs in **Table I-1** is thorough, the list is not intended to be exhaustive; additional PDFs/RDFs/SDFs could be developed and implemented to help achieve resource objectives. PDFs/RDFs/SDFs include state-of-the-art measures applied on a site-specific basis to avoid, minimize, reduce, rectify, or compensate for adverse environmental or social impacts. They are applied to management actions to help achieve desired outcomes for safe, environmentally responsible resource development by preventing, minimizing, or mitigating adverse impacts and reducing conflicts. PDFs/RDFs/SDFs also can be proposed by project applicants for activities on public lands (e.g., for gas drilling). PDFs/RDFs/SDFs not incorporated into the permit application by the applicant may be considered and evaluated through the environmental review process and incorporated into the use authorization as conditions of approval or ROW stipulations. Standard conditions of approval and ROW stipulations from each LUP would apply to site-specific analysis. Additional PDFs/RDFs/SDFs, conditions of approval, and ROW stipulations could be developed to meet resource objectives based on local conditions and resource specific concerns.

**Table I-1
Required Design Features, Preferred Design Features, and Suggested Design Features¹**

Alternatives B and C	Alternative D	Proposed LUPA
WEST NILE VIRUS All Designated Habitat (ADH)		
The following seven site modifications will minimize exploitation of coal bed natural gas ponds by <i>Culex tarsalis</i>:		
I RDF (ADH) Increase the size of ponds to accommodate a greater volume of water than is discharged. This will result in un-vegetated and muddy shorelines that breeding <i>Cx. tarsalis</i> avoid (De	Same as Alternative B for energy-related water disposal. PDF (ADH) When authorizing new ponds for watering livestock, evaluate the proposed design for features that reduce the potential for creating mosquito breeding	Same as Alternative D.

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Required Design Features, Preferred Design Features, and Suggested Design Features¹

	Alternatives B and C	Alternative D	Proposed LUPA
	Szalay and Resh 2000). This modification may reduce <i>Cx. tarsalis</i> habitat but could create larval habitat for <i>Culicoides sonorensis</i> , a vector of blue tongue disease, and should be used sparingly (Schmidtman et al. 2000). Steep shorelines should be used in combination with this technique whenever possible (Knight et al. 2003).	habitat in conjunction with features that make the pond fit for the purpose for which it is intended.	
2	RDF (ADH) Build steep shorelines to reduce shallow water (>60 cm) and aquatic vegetation around the perimeter of impoundments (Knight et al. 2003). Construction of steep shorelines also will create more permanent ponds that are a deterrent to colonizing mosquito species like <i>Cx. tarsalis</i> which prefer newly flooded sites with high primary productivity (Knight et al. 2003).	Same as line 1.	Same as line 1.
3	RDF (ADH) Maintain the water level below that of rooted vegetation for a muddy shoreline that is unfavorable habitat for mosquito larvae. Rooted vegetation includes both aquatic and upland vegetative types. Avoid flooding terrestrial vegetation in flat terrain or low lying areas. Aquatic habitats with a vegetated inflow and outflow separated by open water produce 5-10 fold fewer	Same as line 1.	Same as line 1.

Table I-1
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Alternatives B and C	Alternative D	Proposed LUPA
<p>Culex mosquitoes than completely vegetated wetlands (Walton and Workman 1998). Wetlands with open water also had significantly fewer stage III and IV instars which may be attributed to increased predator abundances in open water habitats (Walton and Workman 1998).</p>		
4 RDF (ADH) Construct dams or impoundments that restrict down slope seepage or overflow by digging ponds in flat areas rather than damming natural draws for effluent water storage, or lining constructed ponds in areas where seepage is anticipated (Knight et al. 2003).	Same as line 1.	Same as line 1.
5 RDF (ADH) Line the channel where discharge water flows into the pond with crushed rock, or use a horizontal pipe to discharge inflow directly into existing open water, thus precluding shallow surface inflow and accumulation of sediment that promotes aquatic vegetation.	Same as line 1.	Same as line 1.
6 RDF (ADH) Line the overflow spillway with crushed rock, and construct the spillway with steep sides to preclude the accumulation of shallow water and vegetation.	Same as line 1.	Same as line 1.
7 RDF (ADH) Fence pond site to restrict access by livestock and other wild	Same as line 1.	Same as line 1.

Table I-1
Required Design Features, Preferred Design Features, and Suggested Design Features¹

	Alternatives B and C	Alternative D	Proposed LUPA
	ungulates that trample and disturb shorelines, enrich sediments with manure and create hoof print pockets of water that are attractive to breeding mosquitoes.		
FLUID MINERAL DEVELOPMENT			
Fluid Mineral Roads			
Priority Habitat Management Areas (PHMA)			
8	RDF (ADH) Design roads to an appropriate standard no higher than necessary to accommodate the intended purpose.	Same as Alternative B.	Same as Alternative D.
9	RDF (PHMA) Locate roads to avoid important areas and habitats.	PDF (PHMA)	Same as Alternative D.
10	RDF (PHMA) Coordinate road construction and use among ROW holders.	Same as Alternative B.	Same as Alternative D.
11	RDF (PHMA) Construct road crossing at right angles to ephemeral drainages and stream crossings.	PDF (PHMA)	Same as Alternative D.
12	RDF (PHMA) Establish speed limits on BLM/Forest Service system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.	PDF (PHMA)	Same as Alternative D.
13	RDF (PHMA) Establish trip restrictions (Lyon and Anderson 2003) or minimization through use of telemetry and remote well control (e.g., Supervisory Control and Data Acquisition).	PDF (PHMA)	Same as Alternative D.
14	RDF (PHMA) Do not issue ROWs to counties on newly constructed energy development roads, unless for a temporary use	PDF (PHMA) /Coordinate with counties on transportation management related to GRSG habitat issues.	Same as Alternative D.

**Table I-1
Required Design Features, Preferred Design Features, and Suggested Design Features¹**

Alternatives B and C	Alternative D	Proposed LUPA
consistent with all other terms and conditions included in this document.		
15 RDF (PHMA) Restrict vehicle traffic to only authorized users on newly constructed routes (use signing, gates, etc.).	PDF (PHMA)	Same as Alternative D.
16 RDF (PHMA) Use dust abatement practices on roads and pads.	PDF (PHMA)	Same as Alternative D.
17 RDF (PHMA) Close and rehabilitate duplicate roads.	PDF (PHMA)	Same as Alternative D.
Fluid Mineral Operations Priority Habitat Management Areas (PHMA)		
18 RDF (PHMA) Cluster disturbances, operations (fracture stimulation, liquids gathering, etc.), and facilities.	PDF (PHMA)	Same as Alternative D.
19 RDF (PHMA) Use directional and horizontal drilling to reduce surface disturbance.	PDF (PHMA)	Same as Alternative D.
20 RDF (PHMA) Place infrastructure in already disturbed locations where the habitat has not been restored.	PDF (PHMA)	Same as Alternative D.
21 RDF (PHMA) 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.	PDF (PHMA)	Same as Alternative D.
22 RDF (PHMA) Apply a phased development approach with concurrent reclamation.	PDF (PHMA)	Same as Alternative D.

Table I-1
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	Alternatives B and C	Alternative D	Proposed LUPA
23	RDF (PHMA) Place liquid gathering facilities outside of PHMA. Have no tanks at well locations within PHMA (minimizes perching and nesting opportunities for ravens and raptors and truck traffic). Pipelines must be under or immediately adjacent to the road (Bui et al. 2010).	PDF (PHMA)	Same as Alternative D.
24	RDF (PHMA) Restrict the construction of tall facilities and fences to the minimum number and amount needed.	PDF (PHMA)—Restrict the construction of facilities and fences to the minimum number and size necessary.	Same as Alternative D.
25	RDF (PHMA) Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.	PDF (PHMA)	Same as Alternative D.
26	RDF (PHMA) Place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.	PDF (PHMA)	Same as Alternative D.
27	RDF (PHMA) Bury distribution power lines.	PDF (PHMA)	Same as Alternative D.
28	RDF (PHMA) Corridor power, flow, and small pipelines under or immediately adjacent to roads.	PDF (PHMA)	Same as Alternative D.
29	RDF (PHMA) Design or site permanent structures which create movement (e.g. a pump jack) to minimize impacts to GRSG.	PDF (PHMA)	Same as Alternative D.
30	RDF (PHMA) Cover (e.g., fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce GRSG mortality.	PDF (PHMA)—Cover all drilling and production pits and tanks regardless of size with netting or some other BLM-approved cover method.	Same as Alternative D.

Table I-1
Required Design Features, Preferred Design Features, and Suggested Design Features¹

	Alternatives B and C	Alternative D	Proposed LUPA
31	RDF (PHMA) Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.	PDF (PHMA)	Same as Alternative D.
32	RDF (PHMA) Control the spread and effects of non-native plant species (Evangelista et al. 2011). (E.g. by washing vehicles and equipment).	PDF (PHMA)—Clean vehicles in a manner that prevents transport of weeds.	Same as Alternative D.
33	RDF (PHMA) Use only closed-loop systems for drilling operations and no reserve pits.	PDF (PHMA)	Same as Alternative D.
34	RDF (PHMA) Restrict pit and impoundment construction to reduce or eliminate threats from West Nile virus (Doherty 2007).	PDF (PHMA)	Same as Alternative D.
35	RDF (PHMA) 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: <ul style="list-style-type: none"> • 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 	PDF (PHMA)	Same as Alternative D.

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Alternatives B and C	Alternative D	Proposed LUPA
<p>impoundments that restrict down slope seepage or overflow.</p> <ul style="list-style-type: none"> • 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. 		
<p>36 RDF (PHMA) Limit noise to less than 10 decibels above ambient measures (20-24 dBA) at sunrise at the perimeter of a lek during active lek season (Patricelli et al. 2010; Blickley et al. <i>In preparation</i>).</p>	PDF (PHMA)	Same as Alternative D.
<p>37 RDF (PHMA) Require noise shields when drilling during the lek, nesting, brood-rearing, or wintering season.</p>	PDF (PHMA)	Same as Alternative D.
<p>38 RDF (PHMA) Fit transmission towers with anti-perch devices (Lammers and Collopy 2007).</p>	Same as Alternative B.	Same as Alternative D.
<p>39 RDF (PHMA) Require GRSG-safe fences.</p>	PDF (PHMA)	Same as Alternative D.
<p>40 RDF (PHMA) Locate new compressor stations outside PHMA and design them to reduce noise that may be directed towards PHMA.</p>	<p>PDF (PHMA)—Locate new compressor stations outside PHMA.</p> <p>RDF (PHMA)—Design compressor stations and other production equipment so that noise emitted or measured in PHMA is no reduced to the extent possible.</p>	Same as Alternative D.

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	Alternatives B and C	Alternative D	Proposed LUPA
41	RDF (PHMA) Clean up refuse (Bui et al. 2010).	RDF (PHMA)	Same as Alternative D.
42	RDF (PHMA) Locate man camps outside of PHMA.	PDF (PHMA)	Same as Alternative D.
Fluid Minerals Reclamation Priority Habitat Management Areas (PHMA)			
43	RDF (PHMA) Include objectives for ensuring habitat restoration to meet GRSB habitat needs in reclamation practices/sites (Pyke 2011). Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve GRSB habitat needs.	RDF (PHMA)—See Appendix H , Guidelines for Implementation	Same as Alternative D.
44	RDF (PHMA) Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling, and revegetating cut and fill slopes.	PDF (PHMA)	Same as Alternative D.
45	RDF (PHMA) Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.	PDF (PHMA)—All disturbed areas will be contoured to the original contours or at least to blend with the natural topography. Blending is defined as reducing form, line, shape, and color contrast with the disturbing activity. In visually sensitive areas, all disturbed areas shall be contoured to match the original topography. Matching is defined as reproducing the original topography and eliminating form, line, shape, and color caused by the disturbance as much as possible.	Same as Alternative D.
46	RDF (PHMA) Irrigate interim reclamation if necessary for establishing seedlings more quickly.	PDF (PHMA)	Same as Alternative D.

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	Alternatives B and C	Alternative D	Proposed LUPA
47	RDF (PHMA) Utilize mulching techniques to expedite reclamation and to protect soils.	PDF (PHMA)	Same as Alternative D.
Fluid Minerals Roads			
General Habitat Management Areas (GHMA)			
48	RDF (GHMA) Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.	RDF (ADH) Same as Alternative B.	Same as Alternative D.
49	RDF (GHMA) Do not issue ROWs to counties on energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document.	RDF (ADH) Coordinate with counties on transportation management related to GRSG habitat issues.	Same as Alternative D.
50	RDF (GHMA) Establish speed limits to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.	PDF (ADH)	Same as Alternative D.
51	RDF (GHMA) Coordinate road construction and use among ROW holders.	RDF (GHMA) Same as Alternative B.	Same as Alternative D.
52	RDF (GHMA) Construct road crossing at right angles to ephemeral drainages and stream crossings.	PDF (ADH)	Same as Alternative D.
53	RDF (GHMA) Use dust abatement practices on roads and pads.	PDF (ADH)	Same as Alternative D.
54	RDF (GHMA) Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.	PDF (ADH)	Same as Alternative D.
Fluid Minerals Operations			
General Habitat Management Areas (GHMA)			
55	RDF (GHMA) Cluster disturbances, operations (fracture stimulation,	PDF (ADH)	Same as Alternative D.

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Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C	Alternative D	Proposed LUPA
liquids gathering, etc.), and facilities.		
56 RDF (GHMA) Use directional and horizontal drilling to reduce surface disturbance.	PDF (ADH)	Same as Alternative D.
57 RDF (GHMA) Clean up refuse (Bui et al. 2010).	RDF (ADH)	Same as Alternative D.
58 RDF (GHMA) Restrict the construction of tall facilities and fences to the minimum number and amount needed.	PDF (ADH)—Restrict the construction of facilities and fences to the minimum number and size necessary.	Same as Alternative D.
59 RDF (GHMA) Cover (e.g., fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce GRSB mortality.	PDF (ADH)—Cover all drilling and production pits and tanks regardless of size with netting or some other BLM-approved cover method.	Same as Alternative D.
60 RDF (GHMA) Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.	PDF (ADH)	Same as Alternative D.
61 RDF (GHMA) Use remote monitoring techniques for production facilities and develop a plan to reduce the frequency of vehicle use.	PDF (ADH)	Same as Alternative D.
62 RDF (GHMA) Control the spread and effects from non-native plant species. (e.g., by washing vehicles and equipment).	PDF (ADH)—Clean vehicles in a manner that prevents transport of weeds.	Same as Alternative D.
63 RDF (GHMA) Restrict pit and impoundment construction to reduce or eliminate augmenting threats from West Nile virus (Doherty 2007).	PDF (ADH)	Same as Alternative D.

Table I-1
Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C	Alternative D	Proposed LUPA	
Fluid Minerals Reclamation			
General Habitat Management Areas (GHMA)			
64	RDF (GHMA) Include restoration objectives to meet GRSG habitat needs in reclamation practices/sites (Pyke 2011). Address post reclamation management in reclamation plan such that goals and objectives are to enhance or restore GRSG habitat.	RDF (ADH)—See Appendix H , Guidelines for Implementation	Same as Alternative D.
LOCATABLE MINERALS			
Locatable Minerals Roads			
All Designated Habitat			
65	SDF (ADH)—Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.	SDF (ADH)—Request operators design roads to an appropriate standard no higher than necessary to accommodate their intended purpose; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
66	SDF (ADH)—Locate roads to avoid important areas and habitats.	SDF (ADH)—Request operators locate roads to avoid important areas and habitats; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
67	SDF (ADH)—Coordinate road construction and use among ROW holders.	SDF (ADH)—Request ROW holders coordinate road construction and use with other ROW holders; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
68	SDF (ADH)—Construct road crossing at right angles to ephemeral drainages and stream crossings.	SDF (ADH)—Request operators construct road crossing at right angles to ephemeral drainages and stream crossings; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
69	SDF (ADH)—Establish speed limits on BLM/Forest Service system roads to	SDF (ADH)—Request operators establish speed limits on BLM/Forest Service system roads to reduce	Same as Alternative D.

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Alternatives B and C	Alternative D	Proposed LUPA
reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.	vehicle/wildlife collisions or design roads to be driven at slower speeds; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	
70 SDF (ADH)—Do not issue ROWs to counties on mining development roads, unless for a temporary use consistent with all other terms and conditions included in this document.	SDF (ADH)—Coordinate with counties on transportation management related to GRSG habitat issues.	Same as Alternative D.
71 SDF (ADH)—Restrict vehicle traffic to only authorized users on newly constructed routes (e. g., use signing, gates, etc.).	SDF (ADH)—Request operators restrict vehicle traffic to only authorized users on newly constructed routes (e.g., use signing, gates, etc.); require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
72 SDF (ADH)—Use dust abatement practices on roads and pads.	SDF (ADH)—Request operators use dust abatement practices on roads and pads; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
73 SDF (ADH)—Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.	SDF (ADH)—Request operators close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
Locatable Minerals Operations		
All Designated Habitat		
74 SDF (ADH)—Cluster disturbances associated with operations and facilities as close as possible.	SDF (ADH)—Cluster disturbances associated with operations and facilities as close as possible; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
75 SDF (ADH)—Place infrastructure in already disturbed locations where the habitat has not been restored.	SDF (ADH)—Place infrastructure in already disturbed locations where the habitat has not been restored; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.

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Required Design Features, Preferred Design Features, and Suggested Design Features¹

	Alternatives B and C	Alternative D	Proposed LUPA
76	SDF (ADH)—Restrict the construction of tall facilities and fences to the minimum number and amount needed.	SDF (ADH)—Restrict the construction of tall facilities and fences to the minimum number and amount needed; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
77	SDF (ADH) —Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.	SDF (ADH)—Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
78	SDF (ADH)—Place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.	SDF (ADH)—Request that operators place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
79	SDF (ADH)—Bury power lines.	SDF (ADH)—Request that operators bury power lines; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
80	SDF (ADH)—Cover (e.g., fine mesh netting or use other effective techniques) all pits and tanks regardless of size to reduce GRSG mortality.	SDF (ADH)—Request that operators cover all pits and tanks regardless of size using fine mesh netting or other effective techniques to reduce GRSG mortality; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
81	SDF (ADH)—Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.	SDF (ADH)—Request operators equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
82	SDF (ADH)—Control the spread and effects of non-native plant species	SDF (ADH)—Request operators control the spread and effects of non-native plant species (Gelbard	Same as Alternative D.

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Required Design Features, Preferred Design Features, and Suggested Design Features¹

	Alternatives B and C	Alternative D	Proposed LUPA
	(Gelbard and Belnap 2003; Bergquist et al. 2007).	and Belnap 2003; Bergquist et al. 2007); require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	
83	SDF (ADH)—Restrict pit and impoundment construction to reduce or eliminate threats from West Nile virus (Doherty 2007).	SDF (ADH)—Request operators restrict pit and impoundment construction to reduce or eliminate threats from West Nile virus (Doherty 2007); require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
84	SDF (ADH)—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: <ul style="list-style-type: none"> • 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 	SDF (ADH)—Request that operators adhere to the PDF/RDF provisions in this table's Section on West Nile Virus; require adherence as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.

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Alternatives B and C	Alternative D	Proposed LUPA
rock. <ul style="list-style-type: none"> • Treat waters with larvicides to reduce mosquito production where water occurs on the surface. 		
85 SDF (ADH)—Require GRSG-safe fences around sumps.	SDF (ADH)—Request operators install GRSG -safe fences around sumps; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
86 SDF (ADH)—Clean up refuse (Bui et al. 2010).	SDF (ADH)—Require operators to clean up refuse (Bui et al. 2010) so as to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
87 SDF (ADH)—Locate man camps outside of PHMA.	SDF (ADH)—Request that operators locate man camps outside PHMA; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
Locatable Minerals Reclamation All Designated Habitat		
88 SDF (ADH)—Include restoration objectives to meet GRSG habitat needs in reclamation practices/sites. Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve GRSG habitat needs.	SDF (ADH)—See Appendix H , Guidelines for Implementation	Same as Alternative D.
89 SDF (ADH)—Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling, and revegetating cut and fill slopes.	SDF (ADH) No similar action. (Interim Reclamation is a fluid mineral term that does not apply to locatable minerals.)	Same as Alternative D.
90 SDF (ADH)—Restore disturbed areas at final reclamation to pre-	SDF (ADH)—Request operators' reclamation plans to target pre-disturbance landform and desired	Same as Alternative D.

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Alternatives B and C	Alternative D	Proposed LUPA
disturbance landform and desired plant community.	plant community vegetation; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	
91 SDF (ADH) —Irrigate interim reclamation as necessary during dry periods.	(ADH) No similar action. (Interim Reclamation is a fluid mineral term that does not apply to locatable minerals.)	Same as Alternative D.
92 SDF (ADH)—Utilize mulching techniques to expedite reclamation.	SDF (ADH)—Request operators use mulching techniques to expedite reclamation; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.	Same as Alternative D.
93 SDF (ADH)—Do not issue ROWs to counties on mining development roads, unless for a temporary use consistent with all other terms and conditions included in this document.	SDF (ADH)—Coordinate with counties on transportation management related to GRSG habitat issues.	Same as Alternative D.
FIRE MANAGEMENT		
Fire Management—Fuels Management		
All Designated Habitat		
94 RDF (ADH) Where applicable, design fuels treatment objectives to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patterns which most benefit GRSG habitat.	PDF (ADH)—Where applicable, design fuels treatment objective to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patterns to address other values-at-risk.	Same as Alternative D.
95 RDF (ADH) Provide training to fuels treatment personnel on GRSG biology, habitat requirements, and identification of areas utilized locally.	PDF (ADH)	Same as Alternative D.
96 RDF (ADH) Use fire prescriptions that minimize undesirable effects on vegetation or	PDF (ADH)	Same as Alternative D.

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	Alternatives B and C	Alternative D	Proposed LUPA
	soils (e.g., minimize mortality of desirable perennial plant species and reduce risk of hydrophobicity).		
97	RDF (ADH) Ensure proposed sagebrush treatments are planned with interdisciplinary input from BLM, Forest Service, and/or state wildlife agency biologist and that treatment acreage is conservative in the context of surrounding GRSG seasonal habitats and landscape.	RDF (ADH)	Same as Alternative D.
98	RDF (ADH) Where appropriate, ensure that treatments are configured in a manner (e.g., strips) that promotes use by GRSG (see Connelly et al. 2000).	RDF (ADH)	Same as Alternative D.
99	RDF (ADH) Where applicable, incorporate roads and natural fuel breaks into fuel break design.	RDF (ADH)	Same as Alternative D.
100	RDF (ADH) 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.	PDF (ADH)	Same as Alternative D.
101	RDF (ADH) Design vegetation treatment in areas of high fire frequency to facilitate firefighter safety, reduce the risk of extreme fire behavior; reduce the potential of acres burned;	RDF (ADH)	Same as Alternative D.

**Table I-1
Required Design Features, Preferred Design Features, and Suggested Design Features¹**

	Alternatives B and C	Alternative D	Proposed LUPA
	and to reduce the fire risk to key GRSG habitats. Additionally, develop maps for GRSG habitat which spatially display current fuels treatment opportunities for suppression resources.		
I02	RDF (ADH) Give priority for implementing specific GRSG habitat restoration projects in annual grasslands first to sites which are adjacent to or surrounded by GRSG key habitats. Annual grasslands are second priority for restoration when the sites not adjacent to key habitat, but within 2 miles of key habitat. The third priority for annual grasslands habitat restoration projects are sites beyond 2 miles of key habitat. The intent is to focus restoration outward from existing, intact habitat.	PDF (ADH)	Same as Alternative D.
I03	RDF (ADH) As funding and logistics permit, restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs.	PDF (ADH)—Restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs.	Same as Alternative D.
I04	RDF (ADH) Emphasize the use of native plant species, recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions.	PDF (ADH)	Same as Alternative D.
I05	RDF (ADH) Remove standing and encroaching trees within at least 100	PDF (ADH)	Same as Alternative D.

Table I-1
Required Design Features, Preferred Design Features, and Suggested Design Features¹

	Alternatives B and C	Alternative D	Proposed LUPA
	meters of occupied GRSG leks and other habitats (e.g., nesting, wintering, and brood rearing) to reduce the availability of perch sites for avian predators, as appropriate, and resources permit.		
I06	RDF (ADH) Protect wildland areas from wildfire originating on private lands, infrastructure corridors, and recreational areas.	RDF (ADH)—Prioritize suppression immediately after firefighter and public safety commensurate with the values-at-risk.	Same as Alternative D.
I07	RDF (ADH) Reduce the risk of vehicle or human-caused wildfires and the spread of invasive species by planting perennial vegetation (e.g., green-strips) paralleling road ROW.	PDF (ADH)	Same as Alternative D.
I08	RDF (ADH) Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application, and strictly managed grazed strips) to aid in controlling wildfire should wildfire occur near key habitats or important restoration areas (such as where investments in restoration have already been made).	PDF (ADH)	Same as Alternative D.
Fire Management All Designated Habitat			
I09	RDF (ADH) Develop state-specific GRSG reference information and resource materials containing maps, a list of resource advisors, contact information, local guidance, and other relevant information.	RDF (ADH)—Develop state-specific GRSG reference and resource materials containing maps, a list of resource advisors, contact information, local guidance, and other relevant information. These state-specific GRSG reference and resource materials are for internal use only.	Same as Alternative D.

Table I-1
Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C	Alternative D	Proposed LUPA
Adequately document fire operation activities in GRSG habitat for potential follow-up coordination activities.		
I 10 RDF (ADH) Provide localized maps to dispatch offices and extended attack incident commanders for use in prioritizing wildfire suppression resources and designing suppression tactics.	RDF (ADH)	Same as Alternative D.
I 11 RDF (ADH) Assign a GRSG resource advisor to all extended attack fires in or near key GRSG habitat areas. Prior to the fire season, provide training to GRSG resource advisors on wildfire suppression organization, objectives, tactics, and procedures to develop a cadre of qualified individuals.	PDF (ADH)—Prior to the fire season, provide training to GRSG resource advisors on wildfire suppression organization, objectives, tactics, and procedures to develop a cadre of qualified individuals.	Same as Alternative D.
I 12 RDF (ADH) On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in GRSG habitat areas.	PDF (ADH)—Pre-position fire suppression resources based on all resource values-at-risk.	Same as Alternative D.
I 13 RDF (ADH) During periods of multiple fires, ensure line officers are involved in setting priorities.	RDF (ADH)	Same as Alternative D.
I 14 RDF (ADH) Locate wildfire suppression facilities (i.e., base camps, spike camps, drop points, staging areas, and heli-bases) in areas where physical disturbance to GRSG habitat can be	PDF (ADH)	Same as Alternative D.

**Table I-1
Required Design Features, Preferred Design Features, and Suggested Design Features¹**

Alternatives B and C	Alternative D	Proposed LUPA
minimized. These include disturbed areas, grasslands, near roads/trails or in other areas where there is existing disturbance or minimal sagebrush cover. As appropriate, utilize existing fuel breaks, such as roads or discrete changes in fuel type, as control lines in order to minimize fire spread.		
I 15 RDF (ADH) Power-wash all firefighting vehicles, to the extent possible, including engines, water tenders, personnel vehicles, and ATVs prior to deploying in or near GRSG habitat areas to minimize noxious weed spread.	PDF (ADH)	Same as Alternative D.
I 16 RDF (ADH) Minimize unnecessary cross-country vehicle travel during fire operations in GRSG habitat.	RDF (ADH)—Eliminate unnecessary cross-country vehicle travel during fire operations in GRSG habitat.	Same as Alternative D.
I 17 RDF (ADH) Minimize burnout operations in key GRSG habitat areas by constructing direct fire line whenever safe and practical to do so.	PDF (ADH)	Same as Alternative D.
I 18 RDF (ADH) Utilize retardant and mechanized equipment to minimize burned acreage during initial attack.	PDF (ADH)	Same as Alternative D.
I 19 RDF (ADH) As safety allows, conduct mop-up where the black adjoins unburned islands, dog legs, or other habitat features to minimize sagebrush loss.	PDF (ADH)	Same as Alternative D.

¹ All Designated Habitat (ADH) includes Priority Habitat Management Areas (PHMA), General Habitat Management Areas (GHMA), and Linkage/Connectivity Habitat Management Areas (LCHMA).

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