5.0 Measures to Avoid and Minimize Risk

The USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations provide standard BMPs for wind energy projects and recommend early and ongoing coordination with agency personnel to develop additional site-specific avoidance, minimization, and conservation measures. *See USFWS 2012a; WGFC 2010.* As recommended by USFWS and WGFC, PCW has coordinated extensively with USFWS, BLM, and WGFD to finalize the Phase I wind turbine layout and to develop site-specific measures for migratory birds, bats, and other wildlife species based on the data collected for the CCSM Project, including Phase I. *See Chapter 4.0.*

PCW used the best available scientific data, including the extensive data collected for Phase I, to develop the avoidance and minimizations measures that were incorporated into the Phase I wind turbine layout. This chapter outlines the avoidance and minimization process that PCW implemented during the Phase I siting consistent with USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations, including considering alternative locations for reducing migratory bird and bat risk and adjusting the Phase I wind turbine layout using site-specific avian and bat use data.

The following sections describe the substantial redesign that PCW has completed since first applying for two Type-II Wind Energy Project Area Grants for wind energy site testing and monitoring, submitting a POD for the CCSM Project to BLM, and applying for a Type-III Wind Energy Development Grant. *See Section 1.3.2.* PCW's iterative design and siting approach resulted in a substantial reconfiguration of the CCSM Project including several revisions of the wind turbine layout for Phase I. These are exactly the type of actions contemplated and recommended by Tier 3 of the USFWS Wind Energy Guidelines and Tier 2 of the WGFC Wind Energy Recommendations. The evolution of the CCSM Project and Phase I described in this chapter illustrates: (1) PCW's attention to the early determination of potential environmental risks at the landscape scale; (2) PCW's evaluation of potential environmental risks based on site-specific data; and (3) PCW's adjustment of the Phase I design using that site-specific data.

The measures identified in this chapter include the BMPs identified in the USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations; avoidance and minimization measures identified in the BLM's CCSM Project ROD; additional conservation measures designed to avoid and minimize impacts to migratory bird and bat species as well as other wildlife; and other site-specific measures based on pre-construction migratory bird and bat risk assessments. *See Chapter 4.0.* These BMPs and other measures address the recommendations contained in the USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations.

As contemplated in the USFWS Wind energy Guidelines and WGFC Wind Energy Recommendations, the Phase I BMPs and conservation measures will be implemented based on site-specific characteristics, monitoring data, and results of post-construction monitoring efforts. Collectively, these measures avoid or minimize, to the extent practicable, direct and indirect impacts to migratory bird and bat species including potential collisions and fatalities; disturbance, displacement, and behavioral changes; and habitat loss, degradation, and fragmentation. The conservation measures contained in the following sections also address habitat-related impacts and other indirect impacts to migratory bird and bat species that may occur.

5.1 Phase I Risk Avoidance and Minimization Process

This BBCS is limited in scope to Phase I of the CCSM Project. Phase II of the CCSM Project will have a separate BBCS; however, portions of this section describe the CCSM Project as a whole to provide context for the migratory bird and bat risk avoidance and minimization effort.

PCW has used the site-specific data collected as part of the pre-construction migratory bird and bat risk assessment process along with recommendations from USFWS, BLM, and WGFD in re-designing the CCSM Project and developing the final wind turbine layout for Phase I. Phase I avoids and minimizes risks to migratory birds and bats consistent with the USFWS Wind Energy Guidelines, the WGFC Wind Energy Recommendations, and the BLM ROD. The Phase I wind turbine layout - when combined with the best management practices, conservation measures, monitoring, and adaptive management described in this Phase I BBCS - avoids and minimizes risks to migratory birds and bats to the extent practicable.

5.1.1 Wind Energy Site Testing and Monitoring Application Area

PCW has an easement from TOTCO for wind development on the privately owned sections of the Ranch; however, PCW must also obtain the proper authorizations for wind development on the interspersed federal land. *See Chapter 1.0.* In November of 2006, PCW applied to BLM for two ROW grants for wind energy site testing and monitoring on federal land (Type-II Wind Energy Project Area Grants) in two areas of the Ranch. *See BLM 2008b.* The northern area was identified as Chokecherry and the southern area was identified as Sierra Madre. BLM approved the Chokecherry Wind Energy Project Area Grant on June 11, 2007, and the Sierra Madre Wind Energy Project Area Grant on June 15, 2007, covering the Wind Energy Site Testing and Monitoring Application Area (Application Area) in which wind energy development was proposed. The Application Area, located almost entirely within the Ranch, encompassed 169,500 acres. PCW installed its first meteorological (or "met") towers for monitoring and measuring wind speed, direction and behavior in June 2007, with additional met tower installations shortly thereafter. The data from these met towers were used to generate a site-specific wind map of the Application Area and inform the wind turbine layout for PCW's original Proposed Action. *See Figure 5.1.*

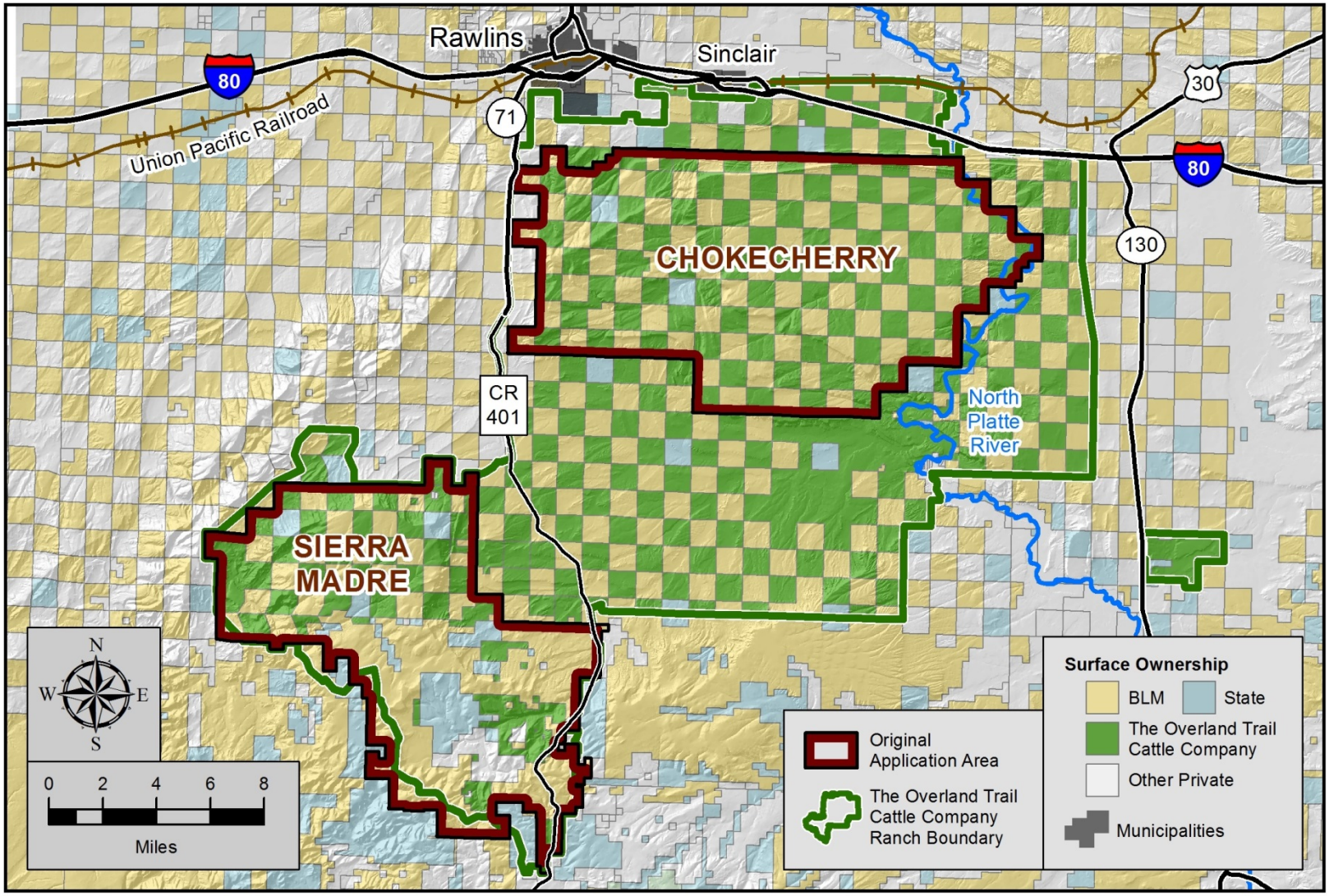

Figure 5.1. Wind Energy Site Testing and Monitoring Application Area – June 2007.

5.1.2 Original Proposed Action

To develop a wind energy generation project on BLM-administered federal land, a Type-III Wind Energy Development Grant is needed from BLM. *See BLM 2008b.* In January 2008, PCW applied for a Type-III Wind Energy Development Grant, which would authorize PCW to construct, operate, maintain and decommission the CCSM Project on BLM-administered land within the Application Area.

In support of its application for a Type-III Wind Energy Development Grant, PCW submitted a POD to BLM in March 2009, which included a proposed wind turbine layout for the CCSM Project (Original Proposed Action). The Original Proposed Action was based on siting the CCSM Project wind turbines to take advantage of the Ranch's best wind resources as verified from the wind data collected since 2007. The Original Proposed Action had 675 wind turbines in Chokecherry and 325 in Sierra Madre, with no wind turbines on Sage Creek Rim or in Lower Miller Hill or the Sage Creek Basin. Wind turbines were planned throughout the full extent of Upper Miller Hill including within the Red Rim-Grizzly WHMA, and along the hogback feature in the north portion of Chokecherry. *See Figure 3.4 & Figure 5.2.*

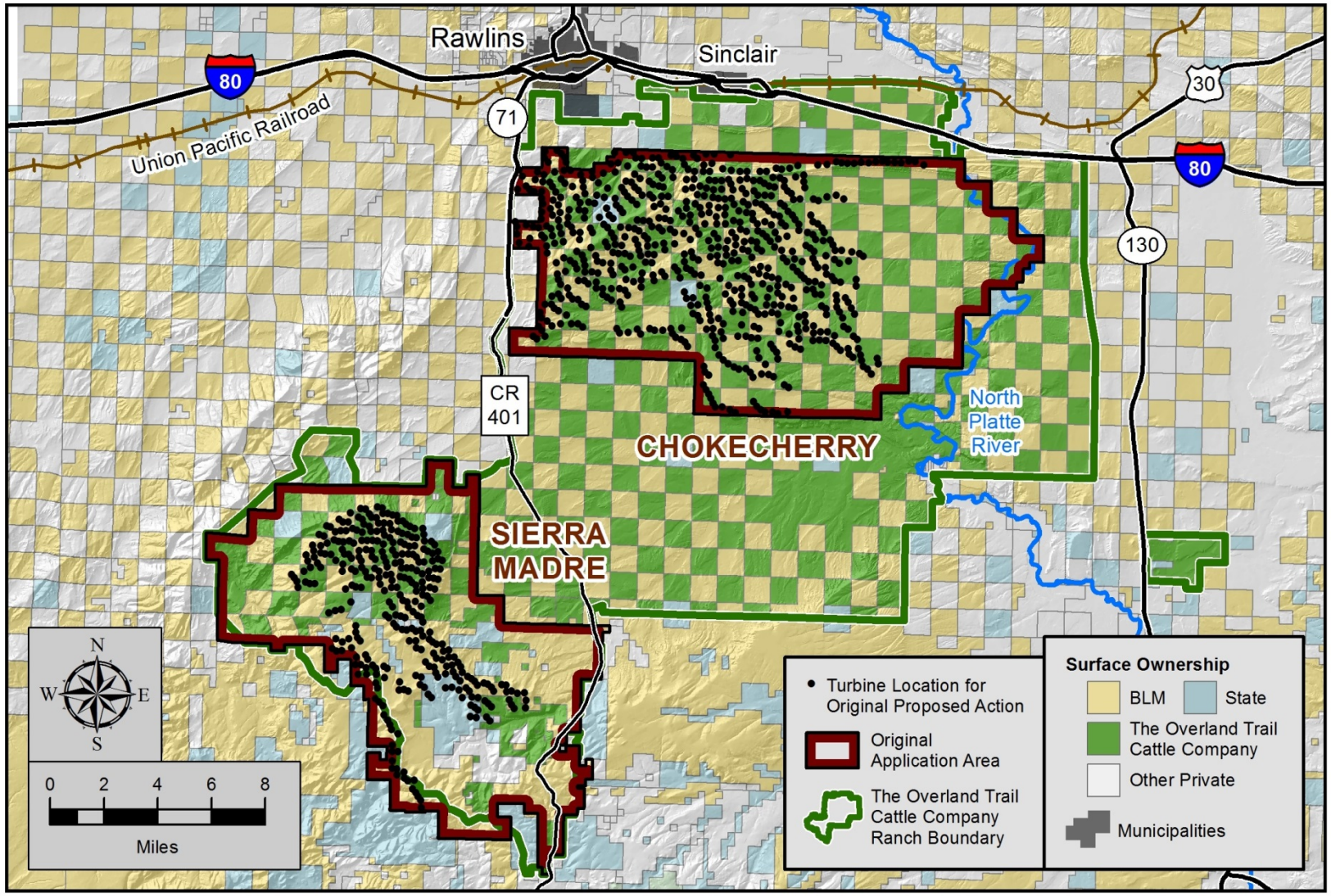

Figure 5.2. Original Proposed Action in Plan of Development – March 2009.

5.1.3 Revision 1, Revised Proposed Action – April 2010

Consistent with Tiers 1 and 2 of the USFWS Wind Energy Guidelines and Tier 1 of the WGFC Wind Energy Recommendations, following the submittal of the Original Proposed Action, PCW conducted a broad, landscape-scale evaluation of the Application Area using the results of the 2008-2009 baseline wildlife surveys. *See Section 4.1.* This included an evaluation of the locations of multiple resources including raptor nest locations and habitat for avian and other wildlife species. The evaluation also included identification of preliminary environmental constraints based on the RMP for the BLM RFO and the best available environmental information and datasets for the Ranch.

As a result of the initial avoidance and minimization effort associated with PCW's review of the Original Proposed Action, over 30% of the wind turbine locations in the Original Proposed Action (approximately 340 wind turbine locations) were removed from consideration. This included proposed wind turbine locations in the southernmost portion of Sierra Madre and the western portion of Upper Miller Hill (also in Sierra Madre). Accordingly, PCW amended its Type-II Wind Energy Project Area Grants to add potential development areas in Sierra Madre (Lower Miller Hill, Sage Creek Basin, and Sage Creek Rim). The Application Area along with these expanded areas form the Amended Application Area evaluated by BLM in its FEIS (with a few additional minor adjustments). The Amended Application Area encompasses approximately 216,000 acres, including all of Phase I.

Following amendment of its Type-II Wind Energy Project Area Grants, PCW revised its Original Proposed Action (the Revised Proposed Action). The Revised Proposed Action moved proposed wind turbine locations from the southernmost portion of Sierra Madre and the western portion of Upper Miller Hill to areas in Lower Miller Hill, Sage Creek Basin, and Sage Creek Rim. When compared with the Original Proposed Action, these wind turbine relocations resulted in decreased impacts to multiple resources, including areas of high quality sagebrush habitat, aspen/mixed conifer woodlands, and mountain shrub communities. The reduction of impacts in these areas benefits sagebrush obligate species as well as raptors and other migratory bird and bat species of concern. The Revised Proposed Action was provided to BLM in April 2010. *See Figure 5.3.*

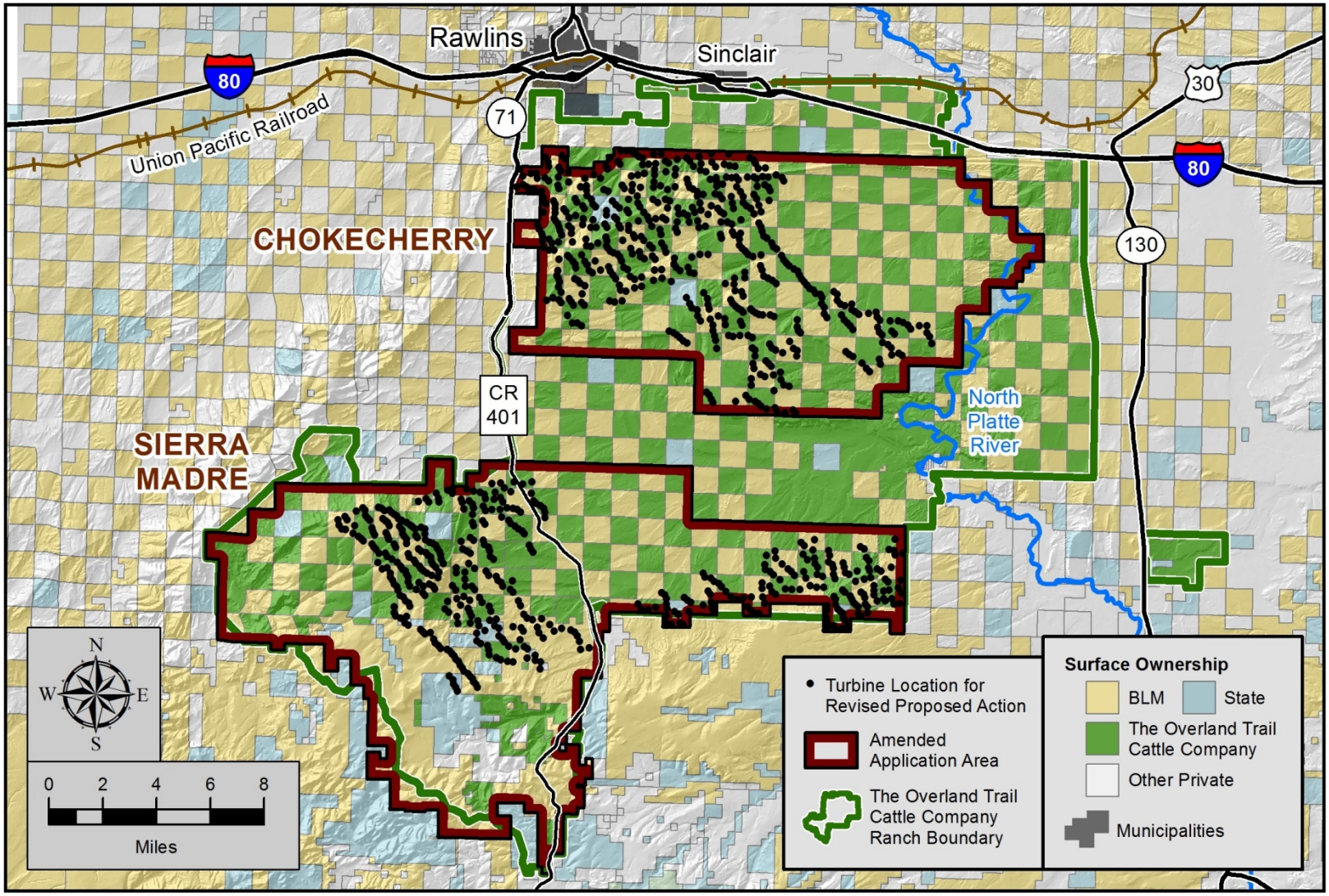

Figure 5.3. Revision 1: Revised Proposed Action – April 2010.

5.1.4 Revision 2, Applicant Proposed Alternative – August 2010

In August 2010, PCW again revised the CCSM Project by removing all wind energy development from greater sage-grouse Core Areas as designated in the Wyoming Governor's Executive Order 2010-4 (and subsequently Executive Order 2011-5). The State of Wyoming Core Area conservation strategy for greater sage-grouse limits development and disturbance in large areas of public, private, and state land across Wyoming. In the vicinity of the CCSM Project, habitats along and east of the North Platte River and habitats south and west of the Sierra Madre WDA are identified as Core Areas for greater sage-grouse conservation. These areas include high quality sagebrush habitat, aspen/mixed conifer woodlands, and mountain shrub communities. The removal of proposed wind turbine locations in these areas benefits sagebrush obligate species as well as raptors and other migratory bird and bat species of concern.

PCW modified the Revised Proposed Action by relocating 68 wind turbines, primarily from western and southern Upper Miller Hill, where the best wind resources are located, to areas outside of greater sage-grouse Core Areas and the associated high quality sagebrush habitat. This is in addition to the over 300 wind turbines that were relocated between the Original Proposed Action and the Revised Proposed Action, most of which were also originally sited in what are now designated greater sage-grouse Core Areas. Revision 2 to the CCSM Project wind turbine layout was submitted to BLM in August 2010 as the Applicant Proposed Alternative. BLM analyzed the Applicant Proposed Alternative as Alternative 1R in its Draft EIS. *See BLM 2011b*. *See Figure 5.4.*

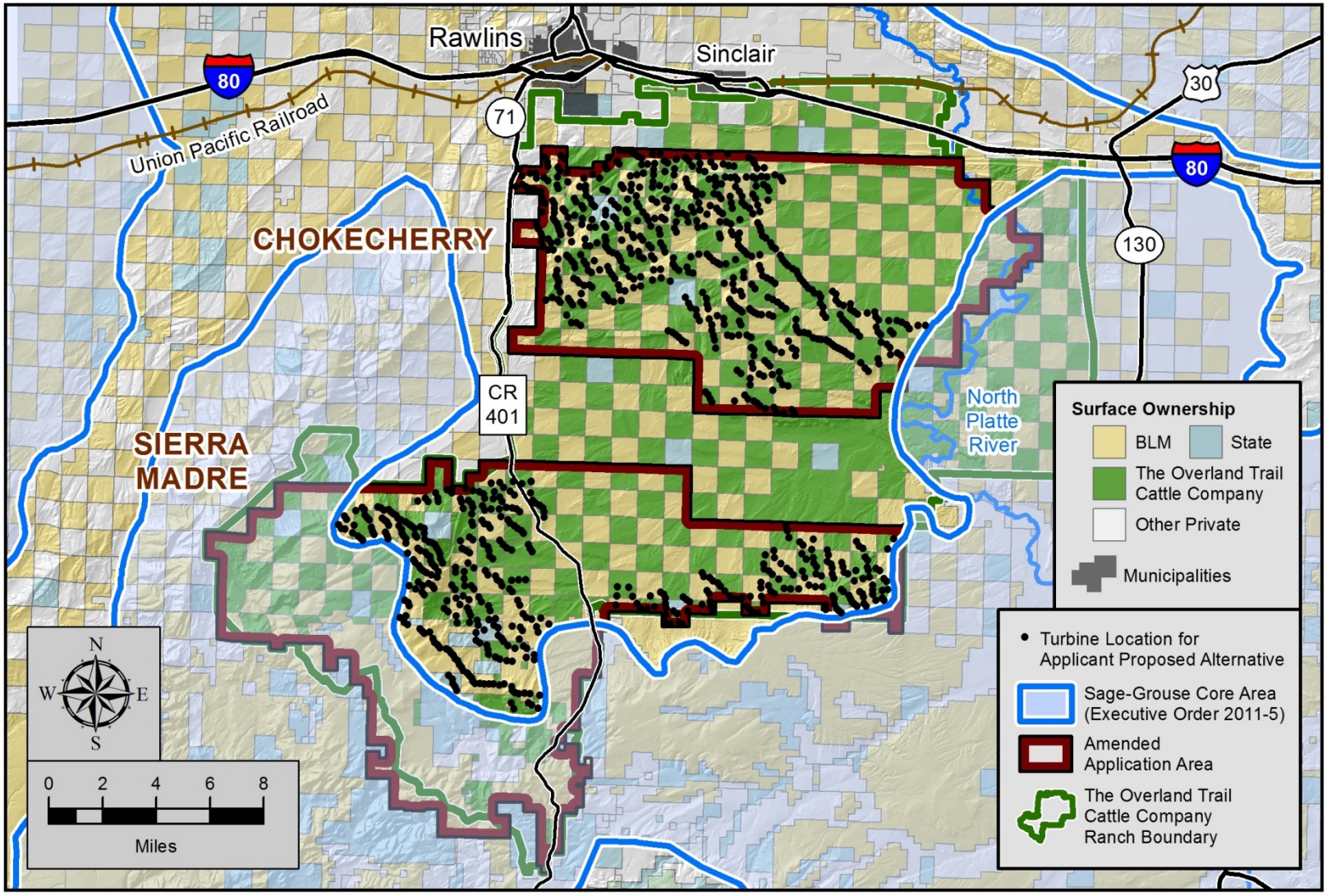

Figure 5.4. Revision 2: Applicant Proposed Alternative – August 2010.

5.1.5 Revision 3, Revised Plan of Development – January 2012

Following the release of BLM's Draft EIS in July 2011, PCW revised the CCSM Project again in its POD dated January 2012. This revision considered the analysis contained in the BLM Draft EIS and incorporated updated ACMs and a revised wind turbine layout. Many of the ACMs are consistent with conservation practices recommended in the USFWS Wind Energy Guidelines, WGFC Wind Energy Recommendations and other additional recommendations made by USFWS, BLM, and WGFD. Specifically, in the January 2012 POD, PCW worked to further reduce surface disturbance and habitat fragmentation and to provide flight/movement corridors for migratory bird and bat species throughout the CCSM Project by aligning wind turbines into rows. In addition, wind turbines were also removed north of the hogback and south of Rasmussen Reservoir to further reduce potential risk to migratory bird and bat species and other wildlife from the CCSM Project. This revised wind turbine layout formed the basis of BLM's analysis in the FEIS. *See Figure 5.5.*

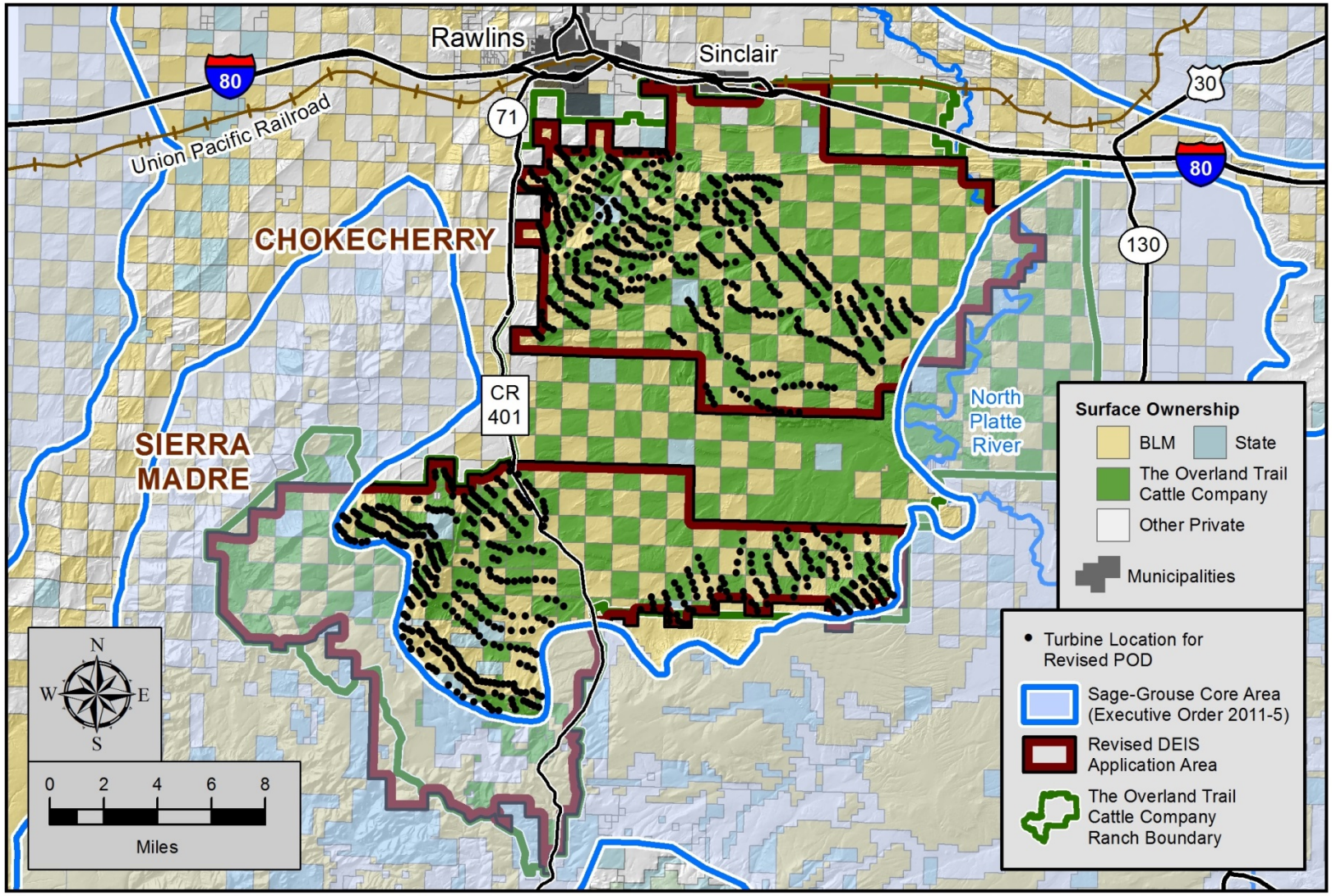

Figure 5.5. Revision 3: Revised Plan of Development – January 2012.

5.1.6 Revision 4, Turbine No-Build Areas – July 2012

Beginning in 2010, PCW coordinated and consulted with USFWS, BLM, and WGFD to identify additional surveys necessary to identify and document migratory bird and bat use areas, potential migration areas, nesting areas, and other resources associated with migratory bird and bat use of the CCSM Project Site. The purpose of these surveys was to inform additional avoidance and minimization efforts to reduce risks to migratory birds and bats by identifying areas of highest use within the CCSM Project Site. These surveys were conducted between April 2011 and July 2012. *See Section 4.4.*

Based on the site-specific data collected through July 2012 and the recommendations made by USFWS, PCW further revised the wind turbine layout in its January 2012 POD (Revision 4). PCW provided Revision 4, which included Turbine No-Build Areas, to USFWS on July 18, 2012. Revision 4's Turbine No-Build Areas total over 105,000 acres across the Ranch and were designed to reduce impacts to migratory birds and bats by avoiding placement of wind turbines in and adjacent to many of the documented avian use areas, flight/movement corridors, and raptor nesting and foraging habitats. The Turbine No-Build Areas were identified through a kernel density analysis of the long-watch raptor survey data, observed raptor flight paths, incidental observations, and consideration of recommendations from USFWS regarding important avian use areas.

In addition to designating Turbine No-Build Areas, Revision 4 removed wind turbines from the Red Rim-Grizzly WHMA located west and south of the Miller Hill portion of the Sierra Madre WDA. The Red Rim-Grizzly WHMA is managed to benefit wildlife species including migratory birds and bats. According to WGFD, the Red Rim-Grizzly WHMA also provides habitat for migratory birds such as ferruginous hawks, red-tailed hawks, and passerines. *See WGFD 2013.* Survey data demonstrates that locations adjacent to and within the Red Rim-Grizzly WHMA had relatively high raptor use compared to other areas that are currently proposed for the CCSM Project. Removal of wind turbines from the Red Rim-Grizzly WHMA reduces potential impacts to migratory birds and bats and will ensure that the Red Rim-Grizzly WHMA continues to provide important habitat for these species and a conservation benefit to local and regional migratory bird and bat populations.

Approximately 66 wind turbines were moved in Revision 4 such that no wind turbines will be constructed in or overhang the boundaries of the Turbine No-Build Areas. Revision 4 of the CCSM Project wind turbine layout, referred to as the Turbine No-Build Areas layout, formed the foundation for the further avoidance and minimization discussions between PCW and USFWS, BLM, and WGFD. The designated Turbine No-Build Areas are described in additional detail below. *See Figure 5.6 & Figure 5.7.*

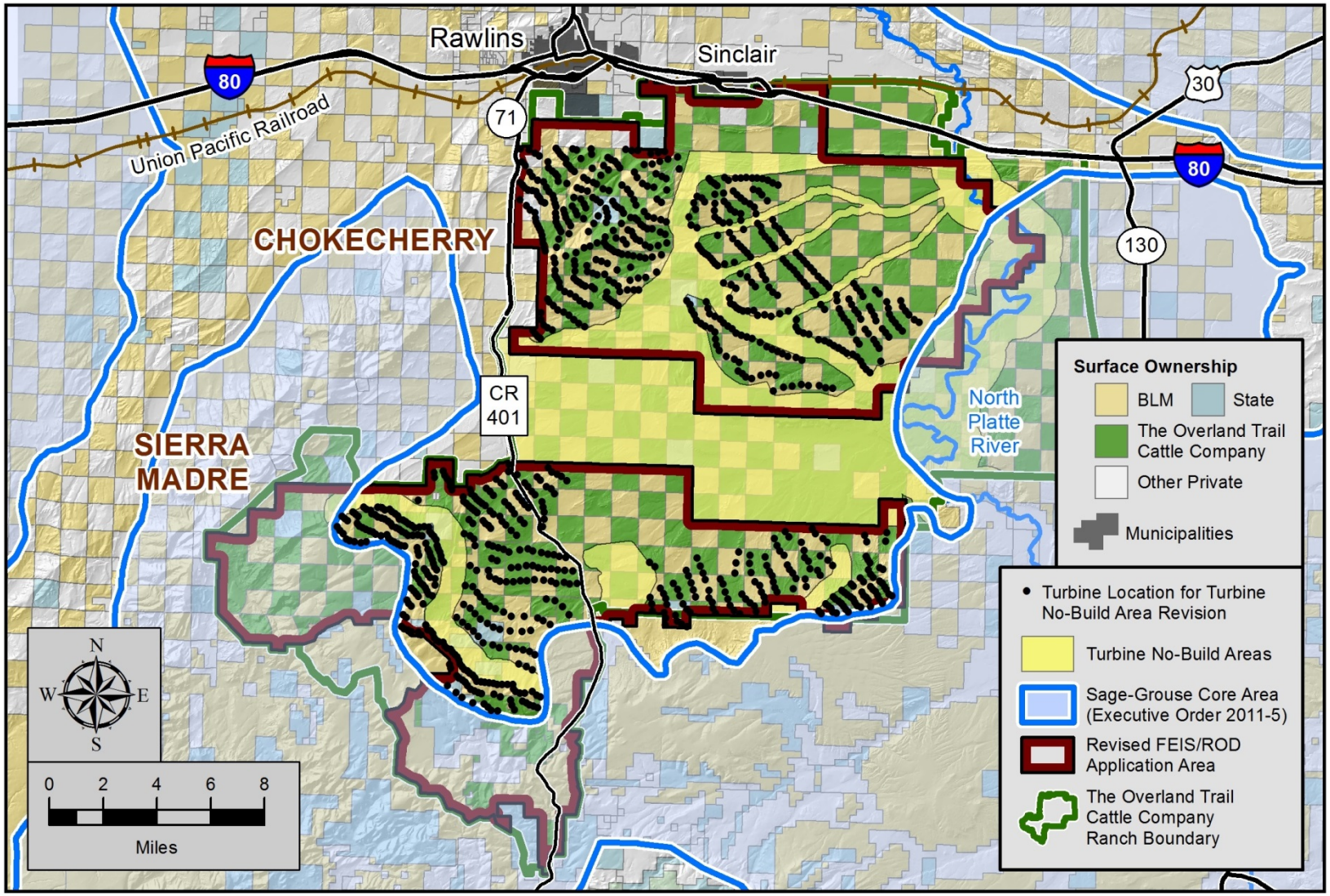

Figure 5.6. Revision 4: Turbine No-Build Areas – July 2012.

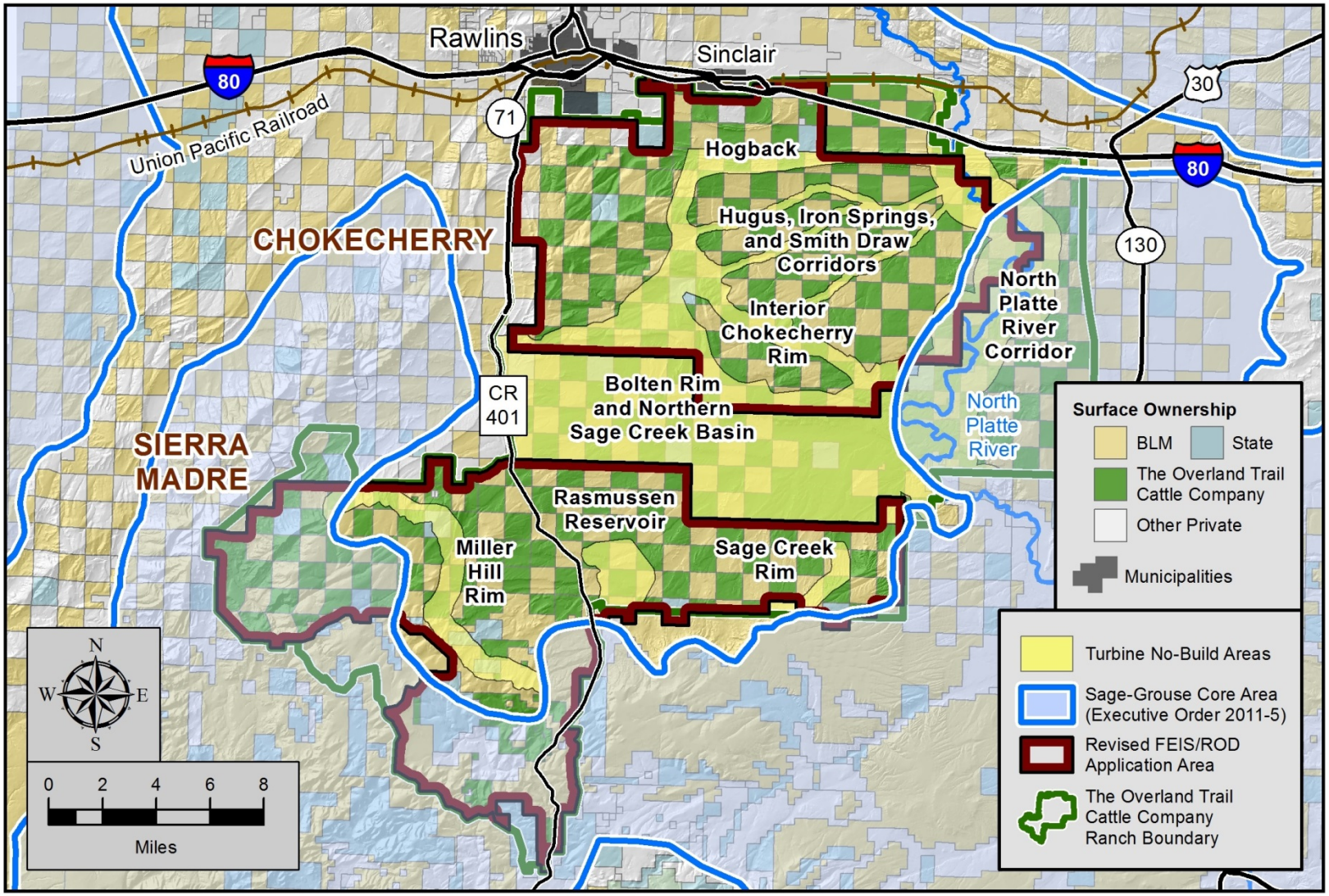

Figure 5.7. Turbine No-Build Areas for the CCSM Project.

Bolten Rim and Northern Sage Creek Basin

A Turbine No-Build Area was designated from the Bolten Rim south to the northern extent of the Sierra Madre WDA and from the Bolten Rim north into adjacent portions of the Chokecherry WDA. *See Figure 5.7.* This Turbine No-Build Area was developed based on survey observations made during long-watch raptor surveys and radar observations of golden eagle use surrounding occupied nests along the Bolten Rim. Observations of golden eagle use surrounding occupied nests on the Bolten Rim demonstrate that the majority of use occurs in the Turbine No-Build Area south of the Bolten Rim where raptor prey resources, perching locations, and suitable soaring conditions are present. The observations are consistent with the observed use of raptors using the Bolten Rim for nesting and perching opportunities.

The Bolten Rim and Northern Sage Creek Basin Turbine No-build Area consists of intact tracts of salt-desert shrub, sagebrush steppe, upland grassland, open water reservoirs, and agricultural pastures. These vegetation communities provide suitable habitat for most migratory bird and bat species of concern that occur within the CCSM Project Site. *See Section 4.3.1.* The Bolten Rim also provides suitable nesting and perching substrate for a number of raptor species; known nesting areas of white-throated swifts and cliff swallows; and potential roost locations for crevice-roosting bats. Designation of the Turbine No-Build Area conserves habitat for the majority of the migratory bird and bat species of concern listed in Table 1.1 and Table 1.2.

South of the Bolten Rim, the Turbine No-Build Area is 5- to 6-kilometers (3- to 4-miles) wide to avoid placement of wind turbines in the highest quality raptor foraging locations identified within the CCSM Project Site and near reservoirs used by waterbird/ waterfowl species. The area south of the Bolten Rim contains the highest density white-tailed prairie dog colonies within the Ranch and three reservoirs (Kindt, Sage Creek, and Teton) that are used by multiple waterbird/ waterfowl species throughout much of the year. *See PCW 2015a. See Section 4.4.1.* Avoiding placement of wind turbines near the reservoirs will reduce impacts to the waterbird/ waterfowl species that use the reservoirs and surrounding areas for migration and nesting activities. In addition, this area provides a suitable, wide flight/movement corridor from Atlantic Rim and Miller Hill to the North Platte River.

Along the eastern half of the Bolten Rim to the north, the Bolten Rim and Northern Sage Creek Rim Turbine No-Build Area provides a 1600- to 2400-meter-wide (1- to 1.5-mile-wide) setback from the rim. Along the western half of the Bolten Rim to the north the Turbine No-Build Area provides a 800- to 3200-meter-wide (0.5- to 2-mile-wide) setback. The setbacks north of the rim avoid and minimize risks to identified nests and nesting substrates for raptors and cliff-dwelling migratory birds and bats. The setbacks also avoid and minimize impacts to species that may use the Bolten Rim for soaring, kiting, perching, or foraging activities. This setback also benefits the other migratory bird and bat species that utilize the habitats contained in this Turbine No-Build Area.

Hogback

A Turbine No-Build Area was designated along the hogback feature north of Chokecherry WDA. *See Figure 5.7*. PCW's Original Proposed Action identified wind turbine locations in this area. During raptor nest and avian use surveys of the CCSM Project Site several occupied raptor nests were identified along the hogback. This Turbine No-Build Area minimizes risks to nesting raptors and other migratory birds and bats by removing the potential for wind turbine development in this area.

In addition to avoiding and minimizing impacts to raptors, this Turbine No-Build Area conserves habitat for many of the migratory bird and bat species of concern listed in Table 1.1 and Table 1.2. Vegetation communities in this Turbine No-Build area consist of salt-desert shrub, sagebrush steppe, upland grassland, barren/sparsely vegetated, and disturbed/developed areas. These vegetation communities provide suitable habitat for many of the upland avian species that occur within the CCSM Project Site, including the passerines and raptors listed in Table 1.1 as well as long-billed curlew and mountain plover. The area also provides potential roost locations for crevice-roosting bats.

Interior Chokecherry Rim

Long-watch raptor surveys identified that raptor use immediately west of the Interior Chokecherry Rim was substantially higher relative to other areas of the CCSM Project Site. The aspect of the Interior Chokecherry Rim is west to southwest and, as that is the predominant wind direction at the CCSM Project Site, the rim provides suitable topography to create uplift and slope-soaring conditions for movement through the Chokecherry WDA. The designation of a Turbine No-Build Area in the 1200- to 3200-meter-wide (0.75- to 2-mile-wide) corridor west and southwest of the Interior Chokecherry Rim provides connectivity to the area north of the Chokecherry WDA, the North Platte River corridor, and the Turbine No-Build Areas adjacent to the Bolten Rim; thus, providing for the use of this contiguous area as a flight/movement corridor. *See Figure 5.7*.

While this Turbine No-Build Area primarily benefits raptors, the avoidance of wind turbine development in the sagebrush steppe and upland grassland habitats adjacent to the Interior Chokecherry Rim will protect and conserve other migratory bird species that use these habitats. Additionally, the width of the corridor provides a substantial movement and migration corridor through the Chokecherry WDA for all migratory bird and bat species.

North Platte River Corridor

While this Turbine No-Build Area is outside of Phase I, PCW has committed to not construct wind turbines within 1600 meters (1 mile) of the North Platte River. Surveys have identified that the North Platte River corridor provides nesting habitat for a number of raptor, migratory bird, waterbird/ waterfowl, and bat species. This corridor provides the only forested riparian habitat in the vicinity of the CCSM Project. This habitat type provides nesting, foraging, and migratory habitat for a number of avian species, including the raptor, bat, and waterbird/ waterfowl species listed in Table 1.1 and Table 1.2. In addition, the cliff habitats adjacent to the river provide suitable nesting substrate for raptors as well as several migratory bird species including cliff swallows and white-throated swifts. *See Figure 5.7*. Finally, the forested riparian habitat and cliff habitat within this Turbine No-Build Area also provides suitable habitat for tree-roosting bat species and crevice-roosting bat species, as well as the highest quality foraging habitat for bats in the vicinity of the CCSM Project.

Hugus, Iron Springs, and Smith Draw Corridors

While this Turbine No-Build Area is outside of Phase I, data collected during long-watch raptor surveys indicate that raptors periodically use the areas immediately over Smith, Iron Springs, and Hugus draws to move between the Interior Chokecherry Rim and the North Platte River corridor. To reduce potential impacts, PCW has designated a 250-meter-wide area on either side of each draw as a Turbine No-Build Area to provide contiguous flight/movement corridors between the North Platte River and Interior Chokecherry Rim. *See Figure 5.7*. In addition to protecting raptors, this Turbine No-Build Area conserves habitat for a number of migratory bird species that use the sagebrush steppe and salt-desert shrub habitats located along these ephemeral drainages. These habitat types provide suitable nesting and foraging habitat for sagebrush-obligate bird species as well other migratory birds in the CCSM Project Site.

Miller Hill Rim

The area 1,200 to 1,600 meters (0.75 to 1 mile) east and north of Miller Hill Rim was designated as a Turbine No-Build Area to avoid and minimize impacts to raptors and other migratory bird and bat species that use mountain shrub and aspen-mixed conifer habitats. *See Figure 5.7*. The corridor adjacent to Miller Hill Rim also provides a flight/movement corridor between areas south of the CCSM Project in greater sage-grouse Core Areas with the Atlantic Rim and other areas north of the CCSM Project. Because prevailing winds are from the west and southwest, Miller Hill Rim does not provide suitable uplift and slope-soaring conditions for raptors except in the rare event of winds from the east and north. In addition to providing flight corridors through the CCSM Project Site, the Miller Hill Rim Turbine No-Build Area also conserves the aspen/mixed conifer woodland, mountain shrub, sagebrush steppe, and other habitats adjacent to Miller Hill. These habitats provide suitable nesting and foraging conditions for a number of migratory bird species, including American robin, black-capped chickadee, dark eyed junco, green-tailed towhee, northern flicker, American goldfinch, mountain bluebird, and rock wren, and the bat species listed in Table 1.2. *See Section 4.2.1.*

Rasmussen Reservoir

While the area surrounding Rasmussen Reservoir is outside of Phase I, a 2.4- to 3.2-kilometer-wide (1.5- to 2-mile-wide) Turbine No-Build Area was established south of the reservoir to provide a foraging and flight/movement corridor for nesting bald eagles. *See Figure 5.7*. While originally designated for the benefit of bald eagles, the designation of this corridor also benefits other raptor and migratory bird species. Waterbird/ waterfowl surveys at Rasmussen Reservoir identified more than 30 species of waterbird/ waterfowl that use the reservoir for migration, foraging, or nesting. *See Section 4.4.1.*

Sage Creek Rim

While this area is outside of Phase I, PCW established a Turbine No-Build Area north of the Sage Creek Rim to maintain a flight/movement corridor that was observed during raptor use surveys. *See Figure 5.7*. During 2011 and 2012 long-watch raptor surveys, flight path data indicated that a corridor 800- to 1200-meters (0.5- to 0.75-mile) wide north of the Sage Creek Rim was consistently used by raptors moving from the west to the east along the southern edge of the Sierra Madre WDA. The aspect of the Sage Creek Rim faces to the northwest and provides potential soaring opportunities as the predominantly southwesterly and westerly winds interact with this topographic feature. In addition to providing protections for raptors, this Turbine No-Build Area also conserves mountain shrub and salt-desert shrub habitats; these habitats provide nesting and foraging opportunities for a number of migratory bird species in the CCSM Project Site.

5.1.7 Revision 5, Initial Phase I Site-Specific Plan of Development - April 2013

As described in chapter 1.0 of this Phase I BBCS, BLM's ROD outlined a specific process in which PCW will submit site-specific PODs to BLM for subsequent tiered NEPA analysis. In compliance with this process, PCW divided the CCSM Project into two phases for final design and subsequent analysis. For purposes of developing the site-specific PODs for Phase I, PCW again revised the wind turbine layout for the CCSM Project to create the initial wind turbine layout for Phase I. Revision 5 to the layout incorporated the Turbine No-Build Areas and all of the requirements set out in BLM's ROD. The Revision 5 layout also considered the most recent environmental data and information for Phase I, including the most recent migratory bird and bat survey data.

Revision 5 to the wind turbine layout incorporated appropriate avoidance and minimization measures related to migratory bird and bat use areas, the terms and conditions of Carbon County's Conditional Use Permit for the CCSM Project, and the USFWS avoidance and minimization recommendations received prior to the revision. *See Figure 5.8.*

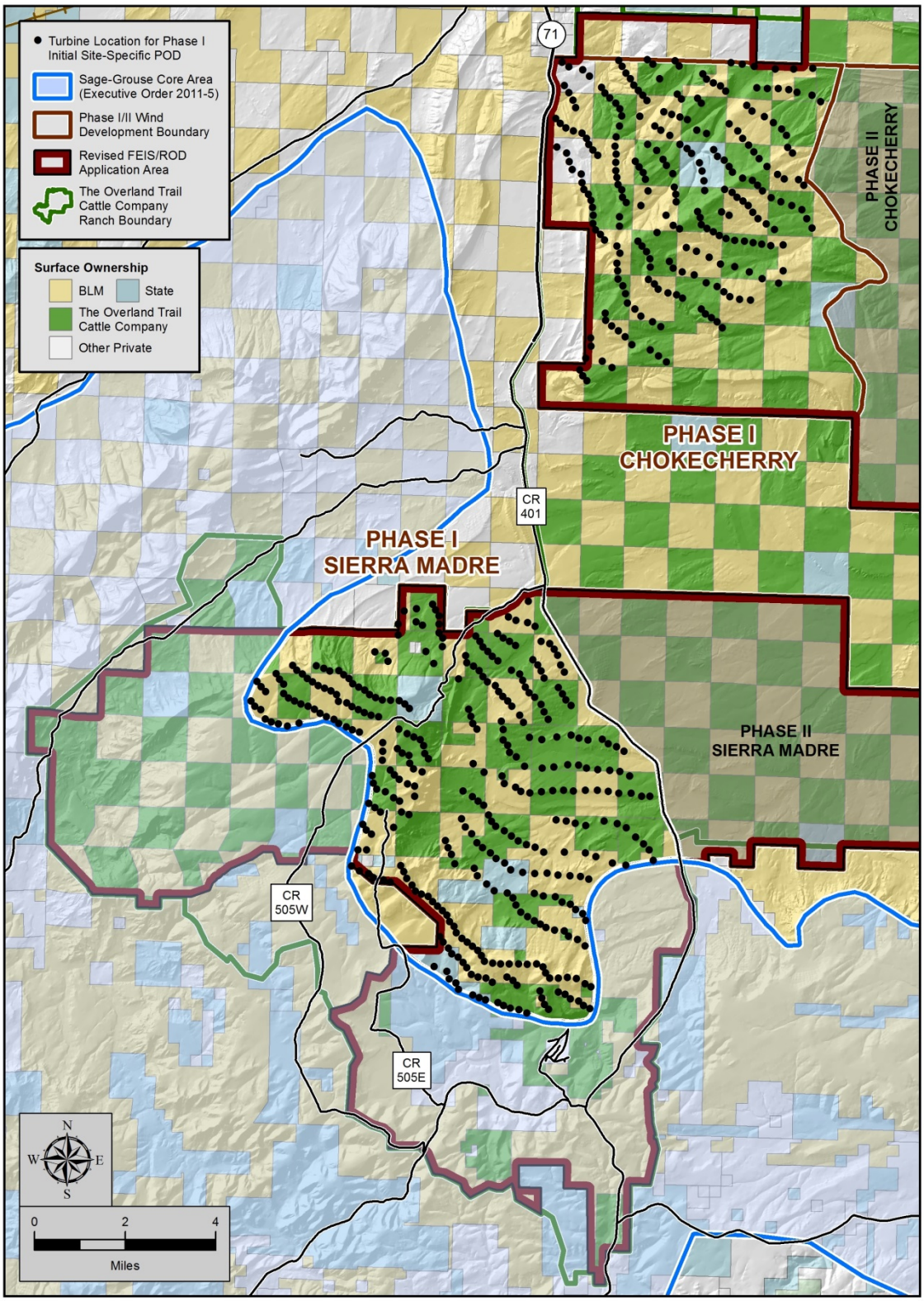

Figure 5.8. Revision 5: Initial Phase I Site-Specific Plan of Development – April 2013.

5.1.8 Revision 6, Final Phase I Site-Specific Plan of Development – January 2014

Revision 5 of the Phase I wind turbine layout was the basis for PCW's micrositing process and pre-construction surveys for Phase I. *See Section 3.1.1.* Beginning in April 2013, PCW conducted engineering field reviews and pre-construction surveys for BLM sensitive species and USFWS threatened and endangered species, Class III cultural resource surveys, and soil, vegetation and aquatic surveys for Phase I, as well as other required pre-construction surveys and inventories. Concurrent with micrositing and pre-construction surveys, PCW continued to work with USFWS and BLM through the remainder of 2013 to refine the Phase I wind turbine layout. In January 2014, PCW revised the Phase I wind turbine layout again. Through the application of additional avoidance and minimization measures designed to reduce risk to migratory birds and bats, PCW incorporated the best available scientific data, including the extensive migratory bird and bat survey data collected for Phase I. *See Chapter 4.0*. Over 110 of the 500 Phase I wind turbines were moved to new locations within Phase I to address USFWS and BLM requirements and recommendations. *See Figure 5.9.* The final Phase I wind turbine layout represents the culmination of the extensive data collection and avoidance and minimization effort for Phase I that began in 2008.

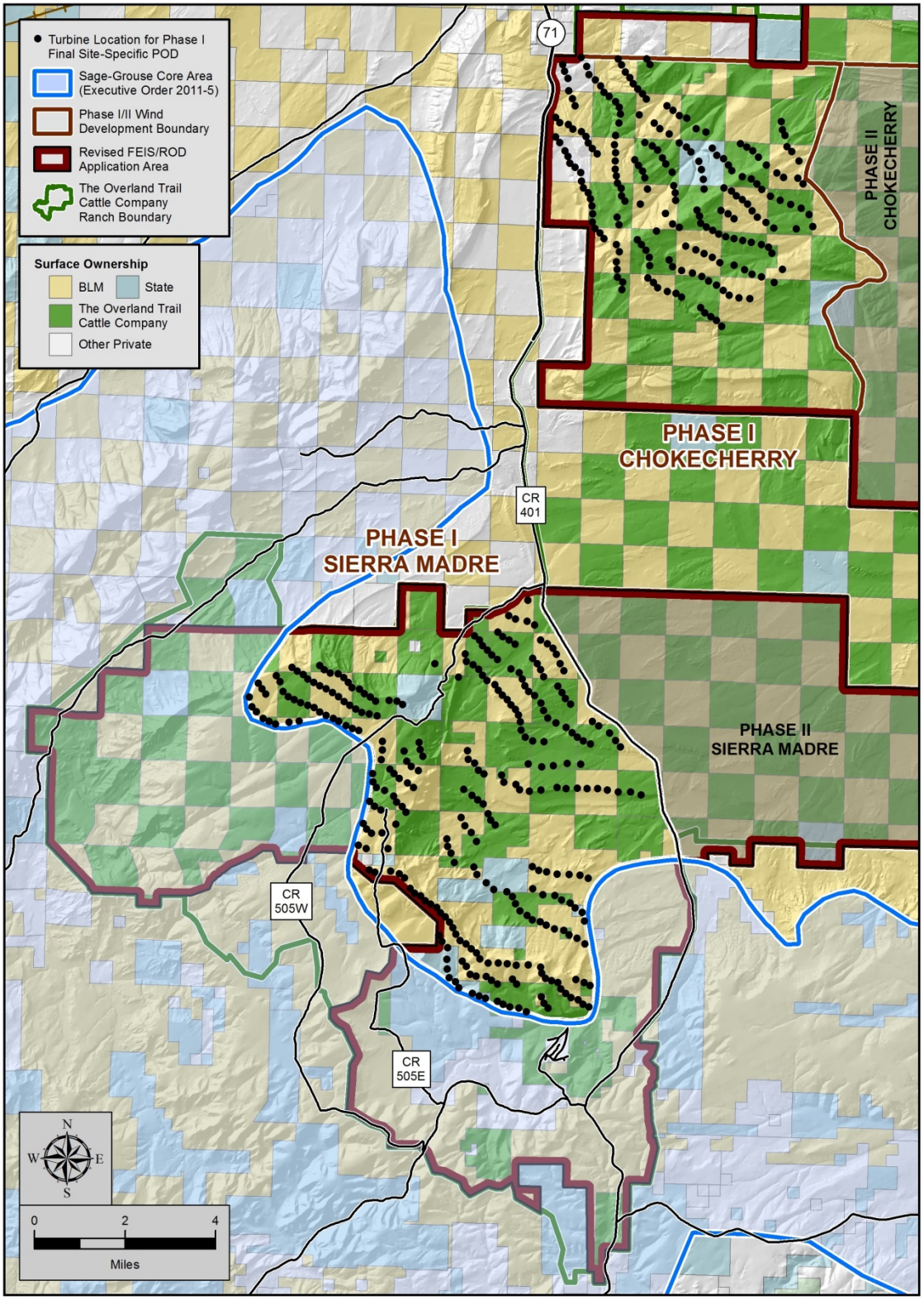

Figure 5.9. Revision 6: Final Phase I Site-Specific Plan of Development – January 2014.

5.2 Best Management Practices and Avoidance, Minimization, and Conservation Measures

In accordance with the USFWS Wind Energy Guidelines and the WGFC Wind Energy Recommendations, PCW has developed BMPs and site- specific avoidance, minimization, and conservation measures for Phase I, including federal, state, and private lands.

Collectively, these measures will reduce risks to migratory birds and bats from Phase I to the extent practicable. It is expected that over the life of Phase I, additional BMPs and conservation measures will be developed. As such, post-construction monitoring and adaptive management will be employed to evaluate the effectiveness of the Phase I BMPs and avoidance, minimization, and conservation measures. Based on the monitoring results, PCW may implement new measures and adjust existing measures as appropriate. *See Chapter 6.0*.

5.2.1 Site-specific Avoidance and Minimization Measures

PCW has developed extensive measures to avoid and minimize risks to migratory birds and bats from Phase I. These include: (1) measures identified in BLM's ROD for the CCSM Project; (2) other project-specific measures to address the risk to migratory birds and bats from the Phase I; and (3) measures to avoid and minimize risks to bald and golden eagles, many of which also provide a benefit to migratory birds and bats. *See PCW 2015a.* Together, these measures avoid and minimize risks to migratory birds and bats from Phase I to the extent practicable.

BLM Record of Decision Avoidance and Minimization Measures

As described in PCW's site-specific PODs, PCW will comply with the avoidance, minimization, and mitigation measures identified in BLM's ROD for the CCSM Project. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*. Many of the avoidance, minimization and mitigation measures included in the ROD were developed for the benefit of migratory birds and bats, including measures in the following categories:

- Timing stipulations to avoid impacts during sensitive time periods, e.g. nesting seasons
- Spatial stipulations to avoid impacts in sensitive locations, e.g. nest locations
- Measures to avoid impacts to sensitive habitats, e.g. wetland and riparian avoidance areas
- Measures to minimize project impacts, e.g. infrastructure collocation.

PCW has reviewed the BLM Environmental Constraints, Applicant Committed Measures, Applicant Committed Best Management Practices, and Proposed Mitigation Measures included in the ROD to identify those measures that provide a benefit to migratory birds and bats. *See BLM 2012a at App. D.* PCW has identified these measures and described their benefits to migratory birds and bats in Appendix I. Adherence to the avoidance, minimization, and mitigation measures identified in BLM's ROD will substantially avoid and minimize impacts to migratory bird and bat species. *See Appendix I.*

The BLM Environmental Constraints, Applicant Committed Measures, Applicant Committed Best Management Practices, and Proposed Mitigation Measures (collectively, BLM Measures) were designed to address BLM requirements. *See Appendix I.* PCW will apply the BLM Measures applicable to migratory birds and bats to all lands regardless of ownership or jurisdiction, where practicable, provided that, for non-federal lands and lands under the jurisdiction of an agency other than the BLM, if a landowner or agency requests different or conflicting measures or actions on such lands it owns or manages, the specific BLM Measures shall not apply. In the event that the BLM Measures are not applied, PCW will identify alternative mitigation measures to protect migratory birds and bats.[37] Such measures may include monitoring of active nests to insure that take does not occur; alternate timing or spatial restrictions to prevent take of migratory birds, removal of nest substrate outside the migratory bird nesting season, or measures to discourage nesting on human-constructed structures and facilities.

Other Project-Specific Measures to Address the Risk to Migratory Birds and Bats from Phase I

PCW has identified additional avoidance and minimization measures and BMPs to address risks to migratory birds and bats from Phase I, including project construction, operation and maintenance, and the overhead electrical system. Risks to migratory birds and bats from Phase I may include collision, electrocution, habitat loss and degradation, habitat fragmentation, displacement and behavioral changes, and various indirect effects. *See Section 4.1.* PCW will implement the following measures to avoid and minimize these risks to migratory bird and bat species from Phase I:

1. *APLIC Recommendations*

Though overhead electric power lines and associated facilities may provide some benefit to migratory bird species by providing increased perching, roosting and nesting opportunities, the addition of an overhead electric power system also creates risks to migratory birds. *See Section 4.1.* This Phase I BBCS incorporates the applicable recommendations in the APLIC APP Guidelines. *See APLIC 2005.* In addition, the Phase I overhead electrical system, including its substations, is designed to meet APLIC recommendations by ensuring there is sufficient separation between components and that appropriate insulating or isolating measures are applied. *See APLIC 2006; APLIC 2012.*

PCW will construct and maintain its overhead electrical system in accordance with all applicable APLIC construction recommendations and suggested practices. *See APLIC 2006; APLIC 2012*. More specifically, as recommended by APLIC, PCW will use the following general construction guidance for the Phase I overhead electrical system:

[37] Measures to protect eagles are included in the Phase I ECP. PCW has not identified any threatened or endangered migratory bird or bat species within Phase I. In the event threatened or endangered migratory bird and bat species are identified within Phase I, and the construction, operation or maintenance of Phase I may affect these species, PCW will consult with the USFWS.

- The overhead electrical system will be designed to meet National Electric Safety Code (NESC) requirements with specialized construction designs for avian use areas.
- The overhead electrical system will be designed to prevent electrocutions by providing adequate conductor separation distances appropriate to the largest species expected in Phase I.[38] When this is not feasible, insulation or isolating measures will be used, e.g. insulator/conductor covers, bushing covers, arrester covers, cutout covers, and jumper wire cover.
- The Phase I overhead electrical system equipment will include bushing covers and covered jumpers.
- The Phase I overhead electrical system arresters and cutouts will be installed with wildlife caps and covered jumpers.
- The Phase I overhead electrical system primary jumpers that do not meet separation requirements will be covered with insulation.

2. Flight Diverters and Line Markers

In areas posing a high-risk for avian collisions (e.g., near open bodies of water, wetlands, nesting habitats, ridgelines) or in areas of high collision mortality identified through post-construction monitoring, PCW will install flight diverters or line markers on overhead electric power lines as appropriate.

3. Vegetation Removal

In areas necessary for construction, or in areas requiring vegetation disturbance as part of operations and maintenance activities, during the active migratory bird breeding season (March through mid-August) vegetation that might support migratory bird nesting activities will be surveyed by a qualified biologist not more than 7 days prior to the vegetation disturbance activity to determine if active nests of any bird species are present within the work area. If no migratory bird nests are found during these surveys, then the activity will proceed as planned. If an active nest is present, then PCW will implement appropriate nest management measures even if the active nest is discovered after the activity is initiated. *See Figure 5.10 and Project-specific Avoidance and Minimization Measure #4.* Alternatively, PCW may remove vegetation outside the active migratory bird breeding season to minimize the likelihood of nest establishment and impacts during construction activities.

[38] Golden eagles are the largest avian species in the vicinity of Phase I. Separation distances recommended for golden eagles are currently 60 inches of horizontal separation and 40 inches of vertical separation for phase-to-phase and phase-to-neutral (or phase-to-ground). These separation distances were developed for eagles with dry feathers.

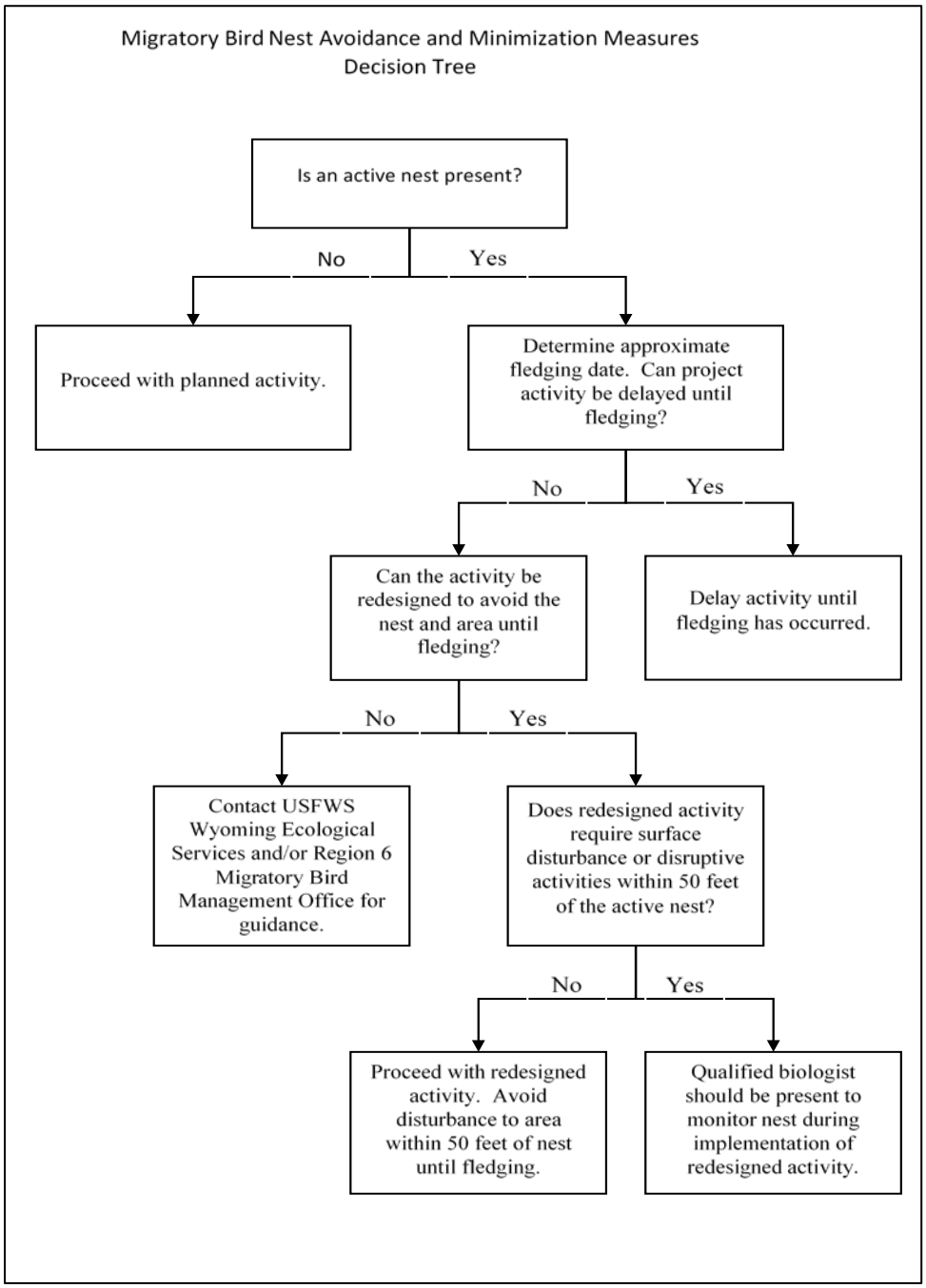

Figure 5.10. Application of Migratory Bird Nest Avoidance and Minimization Measures.[39]

[39] Where species-specific or nest-specific buffers have been identified through the Phase I ECP, BLM Record of Decision, or other project commitments, the species-specific or nest-specific buffers will be applied in lieu of the 50-foot-buffer.

4. Nest Management

PCW has incorporated nest management measures in this Phase I BBCS to properly manage nests to avoid and minimize risks to migratory birds for all lands in Phase I. All migratory birds and their active nests are legally protected under the MBTA. During the active migratory bird breeding season (March through mid-August), PCW will survey all areas requiring vegetation disturbance as a part of construction, operations and maintenance activities not more than 7 days prior to the vegetation disturbance activity to determine if active nests of any bird species are present within the work area. If no migratory bird nests are found during these surveys, then the activity will proceed as planned. If an active nest is present, then PCW will implement appropriate nest management measures even if the active nest is discovered after the activity is initiated. *See Figure 5.10.* Alternatively, PCW may remove vegetation outside the active migratory bird breeding season to minimize the likelihood of nest establishment and impacts during construction activities.

For nest management, it is important to determine which species built the nest and whether the nest is active. The MBTA does not clearly define what an active nest is. This being the case, it is left to qualified biologists to determine what constitutes an active nest. For the purposes of applying the avoidance and minimization measures in this Phase I BBCS, a nest will be considered active if it contains eggs or young, and its formal status will remain active as long as adults, viable eggs, and/or living young are present at the nest. A nest may be abandoned, fail, or fledge young and become inactive during the breeding season. *See USFWS 2003.*

PCW will manage migratory bird nests for Phase I overhead electric power lines, wind turbines, and other project infrastructure in compliance with MBTA. Inactive nests may be removed and/or destroyed in compliance with the MBTA, unless they are nests of federally-listed species or eagles. When possible, PCW will manage nests between late-August and early-January. If nest management is not possible during this period, PCW will have the nest checked by a qualified biologist as appropriate to determine whether the nest is active. If active, nest management decisions will be made following the Migratory Bird Nest Avoidance and Minimization Measures. *See Figure 5.10*. These measures are consistent with USFWS Region 6 recommendations "Migratory Bird Conservation Actions for Projects to Reduce the Risk of Take during the Nesting Season." *See USFWS 2014.*

5. Nest Removal

Removal of active nests is unlikely and will only occur under conditions where there are concerns for human health and safety, safety of the nesting bird, or potential damage to project infrastructure. PCW will address the need for removal of active problem nests on a case-by-case basis and as authorized by the USFWS. As needed, inactive nests will be removed from project infrastructure between late-August and early-January to dissuade birds from re-nesting.

Phase I ECP Avoidance and Minimization Measures

As described in the Phase I ECP, PCW and USFWS have worked cooperatively since 2010 to avoid and minimize impacts to bald and golden eagles from Phase I. USFWS provided PCW with detailed avoidance and minimization recommendations for Phase I and PCW developed appropriate site-specific measures to address those recommendations in the Phase I ECP. Many of the avoidance and minimization measures developed by PCW to reduce risks to bald and golden eagles also provide benefits to migratory bird and bat species that use the same nesting substrates, habitats, foraging areas, and topographic features. *See Table 5.1.* In addition, the wind turbine avoidance areas established in the Phase I ECP include habitats used by other migratory bird and bats species, e.g. sagebrush steppe, salt-desert shrub, and upland grassland habitats. The benefits to migratory birds and bats from the wind turbine avoidance areas established in the Phase I ECP are captured in the discussion of the Phase I risk avoidance and minimization process in section 5.1 and are further detailed in Table 5.1. Please refer to the Phase I ECP for a more detailed discussion of the Phase I ECP avoidance and minimization measures. *See PCW 2015a.*

Table 5.1. Phase I ECP Avoidance and Minimization Measure Benefits to Migratory Birds and Bats

Measure or Type of Measure	Description of Measure	Benefits to migratory birds and bats
Eagle Nest-specific Measures	Measures include seasonal curtailment strategies and identification of nest buffers in which no turbines would be constructed that are specific to individual eagle nests or territories.	Benefits avian and bat species using areas surrounding the specific eagle nests for which site-specific avoidance and minimization measures have been identified. Specific benefits are expected for non-eagle raptors, other avian species, and bats that nest, roost, or forage along cliff bands associated with eagle nests and territories.
Occupied Nest Measures	Measures include seasonal curtailment strategies used when nest-specific or territory-specific measures have not been identified.	Benefits avian species using areas surrounding occupied eagle nests. Specific benefits are expected for non-eagle raptors, other avian species, and bats that nest, roost, or forage along cliff bands associated with eagle nests and territories.
Unoccupied Nest Measures	Measures include seasonal curtailment strategies used when nest-specific or territory-specific measures have not been identified.	Benefits avian species using areas surrounding unoccupied eagle nests. Specific benefits are expected for non-eagle raptors, other avian species, and bats that nest, roost, or forage along cliff bands associated with eagle nests and territories.
Prey Resource Areas	Twenty-eight turbines were removed from a portion of Phase I Sierra Madre where eagle foraging activities or opportunities were identified.	Benefits avian species using identified areas as prey resources. The habitats contained within the prey resource areas primarily consist of sagebrush steppe, upland grasslands, barren slopes, and salt desert shrub. Removal of turbines from this area will benefit foraging raptors that utilize the same prey resources as well as other bat and avian species (including sagebrush obligates, mountain plover, loggerhead shrike, and other species of interest) that use these habitats for foraging, breeding and migratory purposes.
Miller Hill Rim Activity Area	Turbines were set back from the rim of Miller Hill to reduce collision potential for avian species utilizing the habitats along the rim as well as the movement corridor provided by the Miller Hill Rim Turbine No-Build Area	Benefits avian and bat species using habitats along the rim and immediately under the rim of Miller Hill in Phase I. Habitats in this area include upland grasslands, barren slopes, aspen mixed-conifer woodlands, sagebrush steppe, and mountain shrub communities. Species utilizing these habitats and specifically benefiting from this measure include, but are not limited to, raptors, sagebrush obligates, and forest and montane ecosystem specialists.

Measure or Type of Measure	Description of Measure	Benefits to migratory birds and bats
McKinney Creek Activity Area	Four turbines were removed immediately south of the Miller Hill Road in the headwaters of McKinney Creek to provide a movement corridor between undeveloped portions of Miller Hill, the Miller Hill Turbine No-Build Area, and greater sage-grouse Core Areas	Benefits avian and bat species using the Miller Hill Road as a movement corridor, sagebrush steppe habitats on Miller Hill, and habitats along the rim and immediately under the rim of Miller Hill in Phase I. Habitats in this area include upland grasslands, barren slopes, aspen mixed-conifer woodlands, sagebrush steppe, and mountain shrub communities. Species utilizing these habitats and specifically benefiting from this measure include, but are not limited to, raptors, sagebrush obligates, and forest and montane ecosystem specialists.
Lower Miller Hill	Fourteen turbines were removed from areas identified as having eagle and raptor soaring and kiting activities along slopes in the Lower Miller Hill portion of Phase I.	Benefits are primarily to raptors and other avian species that use the same features for soaring and kiting activities. Also benefits other avian and bat species using the habitats within the area for breeding, foraging, or migratory activities.
Eagle Activity Area	Seventeen turbines were removed from an area north of Miller Hill in Phase I where eagle activity was observed during pre-construction survey efforts.	Area is adjacent to the Miller Hill Rim Turbine-No Build area and will benefit all avian and bat species using the corridor provided by that area. Also benefits avian and bat species using the area for foraging, nesting, or migration activities. Habitats in this area include upland grasslands, barren slopes, aspen mixed-conifer woodlands, sagebrush steppe, and mountain shrub communities. Species utilizing these habitats and specifically benefiting from this measure include, but are not limited to, raptors, sagebrush obligates, and forest and montane ecosystem specialists.
Infrastructure Avoidance and Minimization Measures	Avoidance and minimization measures were developed for the North Platte River Water Extraction Facility, the Road Rock Quarry, and the Phase I Haul Road and Transmission Lines where these facilities are proximate to certain eagle nests.	Benefits avian species using areas surrounding the specific eagle nests included in the measure. Specific benefits are expected for non-eagle raptors, other avian species, and bats that nest, roost, or forage along cliff bands associated with eagle nests and territories.

5.2.2 Best Management Practices

Chapter 7 of the USFWS Wind Energy Guidelines and Appendix A of the WGFC Wind Energy Recommendations provide a list of standard BMPs for wind energy projects. As noted by USFWS and WGFC, these BMPs are not applicable to every wind project; instead, they are intended to be applied based on site-specific data and project characteristics. PCW has reviewed the USFWS and WGFC recommended BMPs and has incorporated the applicable recommendations into Phase I as described below.

USFWS Construction and Operation BMPs

In accordance with chapter 7 of the USFWS Wind Energy Guidelines, PCW has incorporated BMPs for construction and operation into Phase I. *See USFWS 2012a.* The implementation of these BMPs will reduce potential impacts to migratory bird and bat species. As recommended by USFWS in the Wind Energy Guidelines, PCW has developed the following BMPs benefitting migratory bird and bat species for Phase I: [40]

1. PCW has minimized, to the extent practicable, the area disturbed by pre-construction site monitoring and testing activities and installations.

2. PCW has avoided locating wind energy facilities in areas identified as having a demonstrated and un-mitigatable high risk to migratory birds and bats.

3. PCW has used available data from state and federal agencies, specifically BLM, WGFD and USFWS, to identify sensitive resources and establish the layout of roads, power lines, fences, and other infrastructure.

4. PCW has minimized, to the extent practicable, roads, power lines, fences, and other infrastructure. PCW will use wildlife compatible design standards for fencing, e.g. chain link security fencing around hazards with 3- or 4-strand barbed wire fencing with smooth wire on the bottom used in all other areas.

5. PCW will use native species when seeding or planting during reclamation in compliance with the Reclamation Plans for Phase I. *See PCW 2015b.*

6. PCW has located collection system power lines underground and away from high bird crossing locations (i.e., between roosting and feeding areas or between lakes, rivers, prairie grouse and sage grouse leks, and nesting habitats) to the extent practical. All overhead power lines for Phase I are designed to meet APLIC recommendations. *See APLIC 2006; APLIC 2012*.

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[40] The numbering of this BMP list corresponds to the numbering of the BMP recommendations in chapter 7 of the USFWS Wind Energy Guidelines. *See USFWS 2012a at pp.49:51.*

7. All permanent meteorological and communication towers for Phase I will be self-supporting, i.e. not guyed. *See PCW 2015b.*

8. PCW has designed Phase I to include the minimum number of permanent meteorological towers necessary.

9. PCW will use construction and management practices that minimize activities that may attract prey and predators. *See Appendix I.*

10. Lighting of Phase I wind turbines will meet FAA requirements and will likely consist of medium intensity synchronized red LED lights. Only a portion of the wind turbines will be lit. *See PCW 2015b.*

11. Exterior lighting at operation and maintenance facilities and substations for Phase I will be shielded downward and is designed to use a combined switch and motion-detection system for exterior lights to minimize the time the lights are on while providing adequate safety for personnel. All internal wind turbine nacelle and tower lighting will be used only when personnel are inspecting or maintaining the wind turbine. *See PCW 2014c; PCW 2015b.*

12. PCW has designed Phase I to comply with the spatial and timing stipulations required by BLM in the ROD. These stipulations address sensitive habitats and species. *See Appendix I.*

13. PCW has designated Turbine No-build Areas to provide flight/movement corridors for migratory bird and bat species.

14. PCW has created an Erosion Control Plan and a preliminary Stormwater Pollution Prevention Plan for Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.

15. PCW will use tubular wind turbine towers to reduce ability of birds to perch and to reduce risk of collision. *See PCW 2015b.*

16. PCW has agreed to work with BLM and TOTCO to close unnecessary roadways and reclaim such roads where practicable. *See Appendix I.*

17. PCW has minimized the number, size, and length of Phase I roads to the extent practicable. *See Appendix I.*

18. PCW has designed Phase I to minimize impacts to wetlands and waters of the U.S. *See Appendix I.*

19. PCW will instruct personnel to drive at appropriate speeds, be alert for wildlife, and use additional caution in low visibility conditions.

20. All employees, contractors, and site visitors will receive a site orientation during which they will be instructed to avoid harassment and disturbance of wildlife. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.

21. PCW will comply with fire prevention standards and will develop a fire safety plan to reduce fire hazard from vehicles and human activities. The health and safety plan will address measures to be taken in the event of a wildfire. *See Appendix I.*

22. PCW will develop a hazardous material management plan as part of the health and safety plan. This plan will address employee training and spill response procedures. *See Appendix I.*

23. PCW has developed a weed management plan for Phase I that will reduce the introduction and spread of invasive species. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.

24. PCW will comply with all applicable rules and regulations for invasive species control.

25. PCW has developed a waste management plan for Phase I that includes appropriate good housekeeping procedures. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.

26. PCW will promptly remove large animal carcasses from Phase I (e.g. big game, domestic livestock, or feral animal). Where feasible, carcass removal will occur within 24-48 hours of discovery. Carcasses may be buried to reduce risk for accidental wildlife exposures to contaminants if poisoning or shooting is suspected as the cause of mortality.

27. PCW will not locate wildlife habitat enhancements or improvements such as ponds, guzzlers, rock or brush piles for small mammals, bird nest boxes, nesting platforms, wildlife food plots, etc. within Phase I.[41]

[41] In addition, PCW will not locate these habitat enhancements or improvements within Phase II.

USFWS Decommissioning BMPs

In accordance with chapter 7 of the USFWS Wind Energy Guidelines, PCW has incorporated best management practices for decommissioning and reclamation into Phase I. *See USFWS 2012a.* The use of these best management practices will reduce potential impacts to migratory bird and bat species. As recommended by USFWS in the Wind Energy Guidelines, PCW has developed the following BMPs benefitting migratory bird and bat species for Phase I: [42]

1. PCW will decommission Phase I to minimize new surface disturbance and minimize the removal of native vegetation, to the extent practicable. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.

2. PCW will remove the pedestal portion of the wind turbine foundations. *See PCW 2015b.*

3. PCW has developed a Reclamation Plan for Phase I that addresses removal and storage of topsoil, as well as appropriate revegetation. *See PCW 2015b.*

4. PCW has developed a Reclamation Plan for Phase I that addresses soil stabilization and revegetation. *See PCW 2015b.*

5. PCW has developed a Reclamation Plan for Phase I that addresses landscape restoration, including hydrology. *See PCW 2015b.*

6. PCW has developed weed control plans that address the monitoring and control of noxious weeds. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*. In addition, the Reclamation Plan for Phase I includes monitoring during revegetation until reclamation standards are achieved. *See PCW 2015b.*

7. At the end of the CCSM Project, PCW will decommission unnecessary overhead power lines, including poles. *See PCW 2015b.*

8. PCW will install and monitor erosion control measures during reclamation in accordance with the Reclamation Plan for Phase I until reclamation standards are achieved. *See PCW 2015b.*

9. At the end of the CCSM Project, PCW will remove any unnecessary fencing. *See Appendix I.*

[42] The numbering of this BMP list corresponds to the numbering of the BMP recommendations in chapter 7 of the USFWS Wind Energy Guidelines. *See USFWS 2012a at p. 52.*

10. PCW has developed preliminary Spill Prevention Control and Countermeasures Plans for Phase I to address petroleum product releases. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*. These plans will be finalized prior to the commencement of Phase I construction. In addition, the Reclamation Plan and Waste Management Plan for Phase I address the proper disposal of unsuitable soil, including contaminated soil. *See PCW 2015b.*

WGFC Wind Energy Development BMPs

In accordance with Appendix A of the WGFC Wind Energy Recommendations, PCW has incorporated BMPs for wind energy development into Phase I. *See WGFC 2010 at App. A.* The implementation of these BMPs will reduce risks to migratory bird and bat species. *See WGFC 2010.* Many of the BMP recommendations for wind energy development included in the WGFC Wind Energy Recommendations are applicable to wildlife species other than migratory birds and bats. Only those BMPs that apply to migratory birds and bats are addressed in this section. As recommended by WGFC in the Wind Energy Recommendations, PCW has developed the following BMPs benefitting migratory bird and bat species for Phase I:

1. PCW has coordinated extensively with WGFD to assess risks and avoid and minimize potential impacts to migratory birds and bats from Phase I.

2. PCW has completed vegetation and habitat mapping as appropriate for Phase I.

3. PCW will post and enforce speed limits during construction, operation, maintenance, and decommissioning of Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.

4. PCW will construct and maintain overhead electric lines in accordance with APLIC construction recommendations. *See APLIC 2006; APLIC 2012*. *See Section 5.2.1.*

5. PCW has designed Phase I roads to minimize stream crossings to the extent practicable.

6. PCW will use non-guyed meteorological towers for Phase I. *See PCW 2015b.*

7. PCW, in coordination with WGFD and USFWS, has determined appropriate wind turbine set-backs from topographic features for Phase I based upon site-specific data and information. *See Section 5.1.*

8. PCW has minimized the surface disturbance associated with the Phase I, including roads, fences and other ancillary features, to the extent practicable to meet the needs of the Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.

9. PCW will install fencing and signage as needed to protect public safety and prevent unauthorized access. Existing public access to federal and state lands will remain unchanged. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.

10. As described in this Phase I BBCS, PCW has designed Phase I to avoid and minimize migratory bird and bat collisions.

11. PCW has designed permanent lighting for ancillary facilities to be motion-activated and shielded downward. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.

12. PCW will consult with existing landowners, BLM, and WGFD to evaluate the location and design of any proposed new fences for Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.

13. PCW has incorporated appropriate timing and spatial stipulations into Phase I, as described in the CCSM Project ROD. *See BLM 2012b at App. D.*

14. PCW has inventoried noxious and invasive plants within Phase I and has developed a Weed Management Plan to control the spread of noxious and invasive plant species. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.

5.2.3 Conservation Measures

In addition to site-specific avoidance and minimization measures and BMPs, PCW has developed conservation measures to further reduce impacts to migratory birds and bats from Phase I. These measures will reduce impacts by removing threats from wind turbines and other infrastructure, as well as reduce risks that could be associated with changes in the availability of habitat within Phase I. The following conservation measures have been incorporated into Phase I:

1. Land Management

PCW's affiliate, TOTCO, currently manages an agricultural operation consisting primarily of cattle grazing and hay production within the Phase I Development Area and in adjacent portions of the Ranch. TOTCO uses active livestock management to minimize impacts of grazing activities on wildlife and wildlife habitat. PCW and TOTCO have entered into an agreement to promote and maintain through collaborative efforts the availability and use of high quality habitat to sustain and enhance terrestrial and aquatic wildlife populations on the Ranch in conjunction with various land uses, including the continuation of ranching and other agricultural operations as well as development of the wind energy resource. *See Appendix H & J*. The commitments made by PCW and TOTCO in the Conservation Plan and Landowner Agreement include but are not limited to continuing active management of the Ranch with a goal of meeting the Wyoming Standards for Healthy Rangeland, implementing reclamation with the objective of ecosystem reconstruction, and implementing appropriate weed management. These commitments and the other measures

described in the Conservation Plan and Landowner Agreement will be implemented in coordination with BLM and WGFD and will reduce impacts to migratory birds and bats by conserving or enhancing habitat for the life of the CCSM Project, including Phase I.

2. Conservation Easement

PCW will forego installing wind turbines on about 27,500 acres of private land owned by TOTCO that is subject to a wind energy development agreement between PCW and TOTCO. Much of these private lands and the adjoining federal lands have some of the best wind resources in the entire Application Area and they had been proposed for wind energy development. Instead, in conjunction with the commencement of commercial operation of Phase I, PCW will join with TOTCO to place this land into a conservation easement. The conservation easement will prohibit in perpetuity wind development activities on the lands subject to the easement. While the conservation easement will be placed on the 27,500 acres of private land owned by TOTCO on which PCW has wind development rights, the easement will also effectively prevent wind energy development on the interspersed sections of federal land due to the checkerboard land ownership pattern. Therefore, the easement essentially protects approximately 48,000 acres of land. The easement is primarily located in high quality sagebrush steppe habitat located within greater sage-grouse Core Areas. *See Figure 5.11.* By prohibiting wind energy development in these areas, risk to sagebrush obligate bird species, raptors, and many other migratory bird and bat species and their habitats from wind energy development will be eliminated in perpetuity. As set forth in of the USFWS DEIS, when compared to other compensatory mitigation measures for birds (other than eagles), a wind conservation easement provides the greatest benefit to bird species (other than eagles) by preventing future injuries and fatalities from wind turbines. *See USFWS 2016a at Table 3-24.*

3. Sagebrush Steppe Habitat Conservation and Enhancement

PCW has implemented a Sage-Grouse Conservation Plan that provides for monitoring of greater sage-grouse within the Ranch and adjacent areas. *See BLM 2012a, App. B at App. N.* PCW's Sage-Grouse Conservation Plan includes conservation measures that will improve habitat and minimize and/or reduce potential threats to greater sage-grouse and other wildlife species. The measures included in the Sage-Grouse Conservation Plan are designed to conserve greater sage-grouse populations and habitat; however, they also have direct benefits to migratory birds and bats by maintaining/restoring contiguous habitat patches, conserving and promoting prey base populations, and improving sagebrush steppe habitat quality throughout the Ranch.

The conservation measures that will be implemented for the CCSM Project, including Phase I, include the minimization or removal of some existing threats to greater sage-grouse survival and productivity such as, removal and marking of fences, water development projects, and riparian/wetland habitat enhancement. Collectively, these improvements will also benefit migratory bird species, especially sagebrush obligates, and bat species. The Greater Sage-Grouse Conservation Plan also provides for the identification of additional conservation projects that will serve to achieve conservation goals. *See BLM 2012a, App. B at App. N.*

Examples of habitat improvement projects completed to date and future projects include:

a. *Fence Removal.*

Since 2010, PCW and TOTCO have removed over 10 miles of fence within the Ranch. Fences consisted primarily of woven-wire fences (i.e., sheep fence) in close proximity to sage-grouse leks and brooding habitat that PCW identified as high-risk (i.e., within 0.6 of a mile of a lek). Removing fences:

- Reduces mortality caused by fence collisions, especially for greater sage-grouse;
- Increases contiguous patches of shrub-steppe habitat;
- Removes localized grazing pressure and increases habitat availability; and
- Reduces potential predation by removing travel conduits along fences.

b. *Fence Marking.*

Since 2010, PCW and TOTCO have marked over 17 miles of fence within the Ranch. Marked fences consisted primarily of barbed-wire fences in close proximity to sage-grouse leks and brooding habitat that PCW identified as high-risk (i.e., within 0.6 of a mile of a lek). Fence marking reduces mortality caused by fence collisions, especially for greater sage-grouse.

c. *Fence Conversion.*

In 2014, PCW and TOTCO converted nearly six miles of fence to a wildlife-friendly design approved by BLM and WGFD (i.e., three strands of barbed-wire over a bottom strand of smooth wire) from a woven-wire fence. The fence is located in an area of sage-grouse winter habitat. Fence marking reduces mortality caused by fence collisions, especially for greater sage-grouse.

d. Noxious weed control.

Noxious weed control reduces susceptibility to noxious weed invasions and pests outbreaks and maintains native vegetative plant communities. This benefits migratory birds and bats by reducing habitat alteration and fragmentation. For several years TOTCO in cooperation with BLM has conducted an active noxious weed control program along Little Sage Creek. During construction, operation and maintenance of Phase I, PCW will implement a rigorous weed management program approved and overseen by BLM.

e. Road Closures.

Following construction of Phase I, PCW will identify existing unused and redundant two-track Ranch roads and reclaim in accordance with the approved Phase I reclamation plan. At this time, such unused and redundant roads cannot be identified. Reclaiming unused and redundant roads will:

- Reduce habitat fragmentation benefiting all wildlife species including migratory birds and bats;
- Increase contiguous patches of shrub-steppe habitat benefiting all sagebrush obligates;
- Increase sagebrush cover over time benefiting all sagebrush obligates; and
- Reduce susceptibility to noxious weed invasions by eliminating possible dispersal conduits and establishing healthy native plant communities.

4. Sequencing

BLM analyzed mitigation measure GEN-1 in its FEIS. GEN-1 states:

> "Limit surface disturbance to areas where turbines would be constructed within 12 months with a goal to mitigate impacts from surface disturbance to wildlife, soils, water, and vegetation (e.g., weeds)."

Sequencing construction to minimize the duration of surface disturbance minimizes impacts to habitats used by all migratory bird and bat species. In addition, sequencing construction minimizes the area being constructed at any given time and allows for reclamation of areas where construction has been completed while construction in other areas is underway; thus, minimizing disruption and disturbance. Simultaneous reclamation minimizes habitat disturbance and leads to earlier reclamation success as opposed to waiting to begin reclamation until the completion of Phase I construction. While sequencing will not eliminate the long term effects of habitat fragmentation, it will reduce effects though earlier reclamation success and minimization of the area disturbed at any given time.

5. Mesic Habitat Improvement

PCW has committed to implement mesic habitat improvement projects on the Ranch. These projects will be implemented prior to commercial operation of Phase I. The primary objective of PCW's proposed mesic habitat improvement projects is to modify water sources to create and enhance natural free-flowing water and wet meadow habitats that are used by many wildlife species including migratory birds and bats. Habitat improvement projects may include installation of upland "bubblers" and water diversions to create and enhance natural free-flowing water, enhance wet meadow habitat, and flood bottomland draws. "Bubblers" may be supplied with water from both artesian wells and other wells actively pumped by windmills. Other habitat improvement projects may include development of additional water sources through water diversion pipelines from existing reservoirs and stock tank pipeline networks. Habitat improvement projects will be completed in a manner to minimize standing water and discourage use by mosquitoes, which might carry West Nile virus. Use of existing water sources to create downstream wet areas will benefit greater sage-grouse and other sagebrush obligates as well as migratory birds that rely upon wet areas and riparian zones. Wet areas and riparian zones provide habitat for numerous bird species, including food, water, nest sites, and shelter.

6. Relic Agricultural Field Enhancements

There are approximately 2,023 acres of relic agricultural fields in the eastern portion of the Ranch within the proposed conservation easement that are currently dominated with either monocultures of cheatgrass (*Bromus tectorum*), crested wheatgrass (*Agropyron cristatum* sp.) or other introduced species. Many areas in these relic agricultural fields currently provide limited value for wildlife, including migratory birds and bats. However, selected migratory bird species including horned larks, mountain plover, killdeer, and other grassland or disturbed habitat specialists currently use these areas. Additionally, three of the relic agricultural fields currently support occupied leks for greater sage-grouse. The areas surrounding the lek locations would not be restored to ensure that the important biological function of these locations is not compromised.

The primary objective of the relic agricultural field enhancement projects is to establish conditions suitable for year-round use by wildlife species. Of the 2,023 acres of relic agricultural fields, PCW has identified approximately 900 acres of sagebrush steppe habitat that could be initially restored while not compromising other important wildlife uses, including greater sage-grouse lek locations. Restoration of these areas back to sagebrush habitat and other native vegetated communities would provide suitable habitat for the benefit of avian and bat species by providing new nesting, foraging, and migration locations for migratory birds and bats; reducing habitat fragmentation or barrier effects caused by existing disturbance; and supporting connectivity between habitat patches. PCW will initiate the relic agricultural field enhancements prior to commercial operation of Phase I; however, it is anticipated that full restoration will require a number of growing seasons.

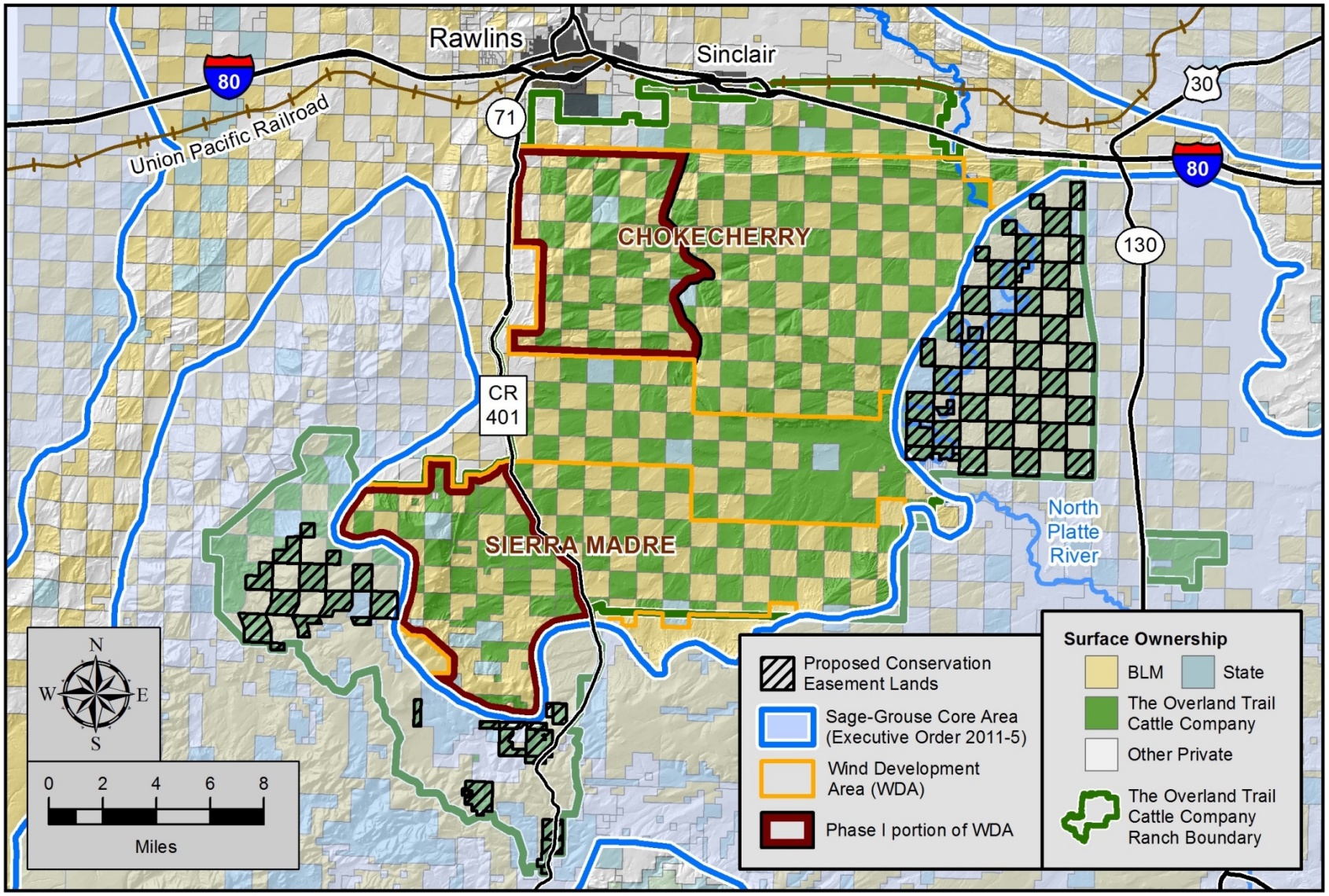

Figure 5.11. Conservation Easements Proposed by PCW in Coordination with TOTCO.

7. Wildfire Emergency Stabilization and Burned Area Rehabilitation

Wildfire, particularly in low-elevation Wyoming big sagebrush systems, has resulted in significant habitat loss primarily because of subsequent invasion by cheatgrass and other invasive species. *See BLM 2011a*. PCW will work with BLM to prioritize stabilization and burned area revegetation projects on the Ranch to: (1) maintain unburned intact sagebrush habitat when at risk from adjacent threats; (2) stabilize soils; (3) re-establish hydrologic function; (4) promote biological integrity; (5) promote plant resiliency; (6) limit expansion or dominance of invasive species; and (7) re-establish native species. For example, in 2010, a 170-acre wildfire occurred within the Chokecherry WDA. Following the fire, PCW and TOTCO seeded portions of the burned area to stabilize soils, reduce the risk of non-native plant invasion, and encourage use by wildlife species, including migratory birds. Rehabilitating burned areas and conserving intact unburned habitats reestablishes habitat function and use by wildlife species resulting in benefits to migratory bird and bat populations.

8. Water Tank Escape Ramps

PCW collaborated with the Saratoga High School chapter of the Future Farmers of America to construct and install metal mesh avian escape ladders in water tanks on the Ranch. Escape ramps reduce the risk of drowning to all avian species as well as other wildlife species. *See Lafón 2006*. To date, PCW has worked with TOTCO to install approximately 30 escape ramps across the Ranch in multiple habitat types including sagebrush steppe, upland grassland, and salt desert shrub communities. PCW will continue to install escape ramps in water tanks across the Ranch where there is an identified risk to wildlife.

9. Elimination of Greater Sage-grouse Hunting

TOTCO has indefinitely suspended access for hunting of greater sage-grouse on all of its private land and other areas under its control, thereby reducing direct mortality of greater sage-grouse, a prey species for several raptor species as well as a potential source of carrion for avian scavengers. Suspension of greater sage-grouse hunting access will continue throughout the life of the CCSM Project, including Phase I, or as otherwise agreed to between PCW, TOTCO and WGFD. Elimination of greater sage-grouse hunting removes any potential carcasses that would be created from injured or unrecovered birds shot by hunters. This removes a potential source of injured birds or carrion containing lead shot that might otherwise attract raptors and avian scavengers. This measure will reduce avian fatalities resulting from lead shot ingestion. Studies have concluded that elevated blood lead levels are prevalent and quantifiable in both bald and golden eagles, and may have a significant impact on eagle populations. *See Allison 2012; Cochrane et al. 2015*. Similar to eagles, risks of lead ingestion may impact raptor and avian scavenger populations. In addition, reduction of mortality to greater sage-grouse, a potential prey species of some raptors, will enhance prey availability and benefit those predator species.

10. Carcass Removal and Handling

All operation and maintenance staff will be trained to appropriately handle, remove, and dispose of all large animal carcasses that are encountered within the CCSM Project Site, including Phase I. Disposal protocols will be developed in coordination with USFWS and WGFD to ensure compliance with relevant state and federal wildlife statutes. Disposal areas will be located outside of the Phase I Development Area to avoid attracting avian scavengers and other species. Preferred disposal areas might include the conservation easement east of the North Platte River; this would add foraging opportunities for avian scavengers in areas away from Phase I. Carcasses may also be buried to reduce risk for accidental wildlife exposures to contaminants if poisoning or shooting is suspected as the cause of mortality.

11. Winter Access

Roads will be maintained in winter in accordance with PCW's Winter Access Plan, attached as an appendix to the site-specific PODs for Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*. PCW's Winter Access Plan specifies that where roads are plowed, breaks will be created in any snow banks alongside roads to allow for passage of ungulates across the landscape. This will minimize the likelihood of concentrated ungulate use along roads that may result in increased vehicle collisions that could attract avian scavengers to roadways.

12. Monitoring of Efficacy of Conservation Measures

Through its on-going, long-term research on greater sage-grouse, PCW will monitor the efficacy of its conservation measures to migratory birds and bats, in particular sagebrush obligates. *See Appendix H. See BLM 2012a (Appendix B at Appendix N).* It is expected that greater sage-grouse and sagebrush obligate utilization will increase in areas where habitat services have been increased through implementation of conservation measures such as habitat enhancement. Greater sage-grouse utilization can be measured through telemetry data. Greater sage-grouse populations may also be measured through annual lek counts. Increased use by greater sage-grouse can be used as an indication of increased habitat quality and availability for sagebrush obligates and other migratory bird species in multiple habitat types.

In addition, PCW will establish photo-points at a number of locations in each of the relic agricultural fields to monitor restoration. On an annual basis PCW will visit each photo-point during the peak of the growing season (typically early-June through mid-July) to document success of enhancement activities including changes in the diversity and structure of vegetation. Photo-point documentation will consist of photographs in the cardinal and ordinal directions as well as a photograph of the nadir of the photo point taken from approximately 4 feet above the ground surface.

5.3 Phase I Risk Assessment

Consistent with Tiers 1 through 3 of the USFWS Wind Energy Guidelines and Tiers 1 and 2 of the WGFC Wind Energy Recommendations, PCW identified the risks to migratory birds and bats from Phase I of the CCSM Project. *See Chapter 4.0.* Through the implementation of the BMPs and avoidance, minimization, and conservation measures described in chapter 5.0, PCW has reduced the risk to migratory birds and bats from Phase I to the extent practicable; as a result of PCW's extensive efforts, significant adverse impacts (as defined in the USFWS Wind Energy Guidelines) to species of concern from Phase I are not anticipated. *See USFWS 2012a at p. 33.* Therefore, consistent with the recommendations of the USFWS Wind Energy Guidelines, additional mitigation beyond that described in this Phase I BBCS is not necessary. *See USFWS 2012a at p. 53.*

Through the risk avoidance and minimization process described in section 5.1 PCW substantially redesigned the CCSM Project, including Phase I to avoid risk to migratory birds and bats. PCW coordinated with USFWS, BLM, and WGFD to use the extensive data collected in accordance with the USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations to develop the final Phase I wind turbine layout. The final Phase I wind turbine layout represents the culmination of the extensive data collection and avoidance and minimization effort for Phase I that began in 2008. The final Phase I wind turbine layout minimizes collision risk and habitat impacts and avoids many of the areas identified as having relatively high use by migratory bird and bat species. *See Section 5.1*.

Following project siting, the remaining risks to migratory birds and bats from Phase I were further minimized through the application of the site-specific avoidance and minimization measures and BMPs identified in section 5.2. These measures include, but are not limited to: (1) timing stipulations to avoid impacts during sensitive time periods; (2) spatial stipulations to avoid impacts in sensitive locations; (3) measures to avoid impacts to sensitive habitats; (4) measures to minimize project impacts; and (5) measures to avoid electrocutions and collisions from Phase I electrical facilities.

The USFWS Wind Energy Guidelines define mitigation as "avoiding or minimizing significant adverse impacts, and when appropriate, compensating for unavoidable significant adverse impacts…" Together with the Phase I siting effort, the measures described in sections 5.2.1 and 5.2.2 avoid and minimize the remaining risks to migratory birds and bats such that significant adverse impacts (as defined in the USFWS Wind Energy Guidelines) to species of concern from Phase I are not anticipated. *See USFWS 2012a at p. 33.* In addition, the conservation measures described in section 5.2.3, e.g. the conservation easement and mesic habitat improvements, provide further benefits to migratory birds and bats by creating, enhancing, and protecting habitats used by migratory birds and bats and removing risks of mortality that are associated with other land use activities that are not related to Phase I.

While complete avoidance of all risks to migratory bird and bat species from Phase I is impossible, the combination of PCW's Phase I risk avoidance and minimization process along with implementation of the site-specific avoidance and minimization measures, BMPs and conservation measures, ensures that remaining impacts to migratory birds and bats from Phase I are reduced to levels that are not significant to any single species or species group (as defined in the USFWS Wind Energy Guidelines). *See USFWS 2012a at p. 33.* As a result, the development of Phase I of the CCSM Project is appropriate and is consistent with the USFWS Wind Energy Guidelines, WGFC Wind Energy Recommendations, the requirements of BLM's FEIS and ROD, and the long-term conservation of migratory bird and bat species.

6.0 Post-Construction Migratory Bird and Bat Studies (USFWS Wind Energy Guidelines – Tiers 4 and 5; WGFC Wind Energy Recommendations – Tier 3)

Consistent with Tiers 4 and 5 of the USFWS Wind Energy Guidelines and Tier 3 of the WGFC Wind Energy Recommendations, PCW has committed to conduct post-construction migratory bird and bat studies for Phase I. Post-construction studies are intended to assess ongoing risk to migratory bird and bat species from Phase I, calculate estimated fatality rates for migratory bird and bat species from Phase I, as well as to evaluate the effectiveness of conservation measures. *See USFWS 2012a at pp. 34:38; WGFC 2010 at p. 38.* Consistent with the USFWS and WGFC recommendations, PCW used the results of the Phase I pre-construction risk assessment to determine the appropriate duration and level of effort for the Phase I post-construction studies. *See USFWS 2012a at p. 34.* Post-construction monitoring will be conducted for Phase I in accordance with the USFWS recommendations for Phase I, including fatality monitoring, searcher efficiency and carcass removal trials, in order to determine whether the migratory bird and bat fatality rate for Phase I is within the expected range and to determine the effectiveness of the conservation measures developed for Phase I in limiting the number of fatalities. *See USFWS 2016b*. PCW will use the adaptive management process described in section 8.4 of this Phase I BBCS to routinely evaluate its post-construction studies and to modify its survey methods and protocols as appropriate.

6.1 Migratory Bird and Bat Fatality Monitoring

PCW will complete post-construction fatality monitoring for migratory birds and bats for Phase I. The primary objectives of the Phase I fatality monitoring are to: (1) determine whether there are any patterns of fatalities within Phase I such that factors associated with those fatalities can be identified and addressed; (2) quantify estimated fatality rates for birds and bats for Phase I and compare those results with data collected during pre-constructions surveys; and (3) evaluate the effectiveness of the Phase I BBCS conservation measures.

PCW's post-construction fatality monitoring for Phase I will assess the magnitude and patterns of migratory bird and bat fatality, species composition, and spatial and temporal attributes of fatalities at Phase I. PCW will divide Phase I into sample areas (i.e., Western Chokecherry, Upper Miller Hill, and Lower Miller Hill;) that represent similar topography, vegetation and other model covariates, and will use a stratified sample approach to ensure that each sample area is surveyed with the same approximate intensity relative to the number of wind turbines and the types of habitats that occur within each area.

As provided for in this Phase I BBCS, PCW will review the results of the Phase I migratory bird and bat fatality monitoring program at least annually and, if deemed appropriate, the fatality monitoring program may be modified through the adaptive management process described in section 8.4, which includes coordination and consultation with the USFWS, BLM, and WGFD, as appropriate.

6.1.1 Migratory Bird and Bat Fatality Monitoring Duration and Frequency

PCW will conduct migratory bird and bat fatality monitoring during the 24 months following commencement of commercial operation for Phase I. The annual migratory bird and bat fatality monitoring will be split into 4 separate seasons that are reflective of different migratory bird and bat use patterns: (1) spring season (April 15 through June 15) when spring migration is most likely to occur and prior to initiation of the majority of migratory bird nesting activities; (2) summer season (June 15 through August 1) during the active nesting period for migratory birds; (3) fall season (August 1 through September 30) prior to winter weather conditions when fall migration is most likely to occur; and (4) late fall/winter season (October 1 through April 14) when avian use decreases substantially and few species of birds are present.[43] A total of 50% of the operational Phase I wind turbines will be monitored once per month during all seasons to provide an indication of species-specific, habitat-specific, and geographic patterns of mortality. In addition, 50% of the wind turbines selected for the bird and bat fatality monitoring (25% of the total wind turbines) will be monitored once per week from April 15 to June 15 and August 1 to September 30 to provide additional survey coverage during the spring and fall migratory periods.

The wind turbines to be monitored will be randomly selected from the Phase I wind turbines using a Generalized Random Tessellation Stratified selection process to provide spatially-balanced sample stratification across Phase I and its associated habitat types.

Further, the eagle fatality monitoring described in the Phase I ECP requires monthly fatality monitoring for all Phase I wind turbines. During the eagle fatality monitoring, all migratory bird and bat fatalities detected at the 50% of turbines not being surveyed under the Phase I BBCS bird and bat fatality monitoring will be recorded. While data on these fatalities will be collected monthly at the wider transect spacing used for the Phase I ECP monitoring, they can still be used to supplement and further inform the data collection under this Phase I BBCS.

6.1.2 Migratory Bird and Bat Fatality Monitoring Protocol

PCW will conduct migratory bird and bat fatality surveys within a 160 meter by 160 meter square plot oriented such that the largest distance searched (i.e., the diagonal of the square) is aligned in the direction of prevailing winds. *See Erickson et al. 2003*. Line transects within each search plot will be spaced at 6-meter intervals such that the entire search plot area will be covered during each survey. Each searcher will scan for carcasses out to approximately 3 meters with occasional scans out to approximately 10 meters. Following initial surveys, transect widths and search plot sizes for surveys may be adjusted to reflect site-specific conditions.

[43] Note that searches will not be performed when weather conditions make wind turbines inaccessible or unsafe to access in a standard road vehicle.

PCW will collect the following information for each migratory bird and bat fatality monitoring survey:

1. Date
2. Start time
3. End time
4. Interval since last search
5. Searcher name
6. Which wind turbine plot was searched (including decimal-degree latitude longitude or UTM coordinates and datum)
7. Habitat and vegetation characteristics, site topography, and any noticeable changes in conditions since previous visit (i.e., fire, increased or decreased herbaceous canopy height or cover, etc.)
8. Weather data for each search, including wind speed or Beaufort wind scale precipitation, snow cover, cloud cover, or other relevant weather condition
9. Global positioning system (GPS) track of the search path

If a migratory bird or bat fatality is discovered, the searcher will mark the carcass with a flag. After completing the search of that wind turbine, the searcher will immediately return to the flagged carcass to collect carcass data as described below. All carcasses, parts, or feathers will be photo-documented. All potential injuries or lack thereof, signs of scavenging, and identifying characteristics will be documented. The preferred method of recording data will be electronically using a data recording device (such as a field computer or notepad), but the searcher may also record information on a paper form. The searcher will record the following information for each fatality:

1. Date
2. Species
3. Age and sex, if possible
4. Band number and notation if wearing a marker
5. Observer name
6. Wind turbine number or other identifying characteristic
7. Distance of the carcass from the wind turbine
8. Azimuth of the carcass from the wind turbine
9. Decimal-degree latitude longitude or UTM coordinates of the wind turbine and carcass
10. Habitat surrounding the carcass
11. Condition of the carcass (entire, partial, scavenged)
12. Description of the carcass
13. A rough estimate of the time since death (e.g., <1 day, > a week), and how estimated
14. A series of digital photographs of the carcass and landscape surrounding the location
15. Information on carcass disposition

All carcasses will be identified using resources such as The Sibley Guide to Birds, The Feather Atlas, A Field Guide to Mammals of North America, or other appropriate references. *See Sibley 2014; USFWS 2012b; Reid 2006*. For bats in particular, geography, morphometric measures (particularly forearm, but also head and body, tail, ear, foot, and tragus), and other field marks (e.g., hair color, presence of keeled calcar) will be used for identification of each specimen. As needed, PCW will obtain the necessary permits for the collection of carcasses. *See Chapter 7.0.* The information collected (including photographs) will be reviewed annually, as described in section 8.3.

6.1.3 Carcass Persistence Trials

As recommended by the USFWS, PCW will conduct carcass persistence trials during migratory bird and bat fatality monitoring. *See USFWS 2016b.* Carcass persistence trials will be conducted once each season during migratory bird and bat fatality monitoring. Carcass persistence trials will be conducted at the locations used for searcher efficiency trials immediately after the placement of carcasses. PCW will revisit carcasses placed as part of carcass persistence trials on days 1 through 7, 14, 21, and 28. *See Erickson et al. 2003; Young et al. 2003*. If carcasses are still present on day 28, they will be visited by PCW weekly until they are scavenged or for 90 days, whichever is sooner. Seasonal carcass persistence trials will account for the effects of weather, differential carcass decay/desiccation rates, scavenger densities, and scavenger behavior across seasons.

During carcass persistence trials, biologists will record presence or absence of each carcass and any relevant notes (e.g., signs of scavenging or partial scavenging). The length of time a carcass persists in Phase I will be calculated as the midpoint between the day the carcass was known to be present and the day it was no longer present. The data from the carcass persistent trials will be used in a suitable statistical estimator to account for imperfect carcass detectability and to produce unbiased estimates of fatality. *See Section 6.1.5.* The data may also be used to adjust the post-construction fatality search interval and sampling coverage as approved by USFWS through the adaptive management process described in section 8.4.

6.1.4 Searcher Efficiency Trials

As recommended by the USFWS, PCW will conduct searcher efficiency trials during migratory bird and bat fatality monitoring.[44] *See USFWS 2016b.* Searcher efficiency trials will be conducted once each season for the first 24 months of fatality monitoring. Searcher efficiency will be calculated as the proportion of trial carcasses found by a searcher relative to the total number of carcasses placed for that searcher's trial. Searcher efficiency trials will be conducted blindly, without the knowledge of the searcher involved, and simultaneously with formal fatality monitoring at a subset of the searched wind turbines. Each searcher efficiency trial will be conducted using the same search protocols described above for fatality monitoring. *See Section 6.1.2.* The trials will be conducted seasonally to account for

[44] In addition, searcher efficiency trials for migratory birds and bats would be conducted as part of the eagle searcher efficiency trials using migratory birds and bats or appropriate surrogates. *See PCW 2015a.*

different field conditions (e.g., vegetation growth, snow) that may affect the ability of the searchers to locate carcasses. Separate searcher efficiency rates will be calculated for each season, carcass-size category, searcher, and sample area or vegetation type (visibility class).

For each searcher efficiency trial, carcasses will be placed during the morning (on the same day as searches) before searches are conducted. The person conducting the blind test (the tester) will place the carcasses at randomly generated locations within the survey plot and drop the carcasses from waist level to ensure the carcasses land in a random position and location. The location of the placed carcasses and vegetation type will be recorded by the tester with a handheld Global Positioning System (GPS) unit. To ensure the trials are blind, searchers will be unaware of the chosen date, the wind turbine plots selected, and the specific locations and number of carcasses placed for each trial. The tester will distinguish the placed carcasses with unique leg bands or other appropriate means to ensure the placed carcasses are distinguishable from carcasses potentially attributable to Phase I. The marking method used will not increase the visibility of the carcass to ensure that searcher efficiency trials are unbiased.

When available, intact, salvaged specimens will be used for searcher efficiency trials. When suitable salvaged specimens are not available, adult geese (or similar), adult chickens (or similar), 1-week-old quail (or similar), and 14- to 18-day-old dark hopper mice (or similar) will be used as surrogates, representing very large birds, large birds, small birds, and bats, respectively. In all cases, carcasses used will either be species collected and possessed from Phase I through all appropriate permits, carcasses provided by an authorized agency explicitly for use in searcher efficiency trials, or non-protected species purchased for the purpose of searcher efficiency trials.

No more than three total carcasses will be placed in each selected monitoring plot to avoid over-seeding (i.e., scavenger swamping; Smallwood 2007). As confidence in estimates of searcher efficiency and carcass persistence – and related error in the adjusted fatality estimate model – are influenced by sample size, a minimum of 75 carcasses will be placed for each fatality group parameter (e.g., 75 per season, and 75 per carcass type over the entire year; Strickland et al. 2011). Based on these constraints, carcasses will be placed at approximately 75 turbines during each season.

6.1.5 Adjusted Fatality Estimates

Data collected during migratory bird and bat fatality monitoring, including searcher efficiency and carcass persistence trials, will be used in an appropriate statistical estimator (e.g., Huso et al. 2012, Péron and Hines 2014, Dalthorp et al. 2014) to calculate a fatality estimate for migratory birds and bats. Fatality estimates are based on observed carcasses found during fatality monitoring, the probability that a searcher will miss a carcass (searcher efficiency correction factor), the probability that a carcass will be removed before a searcher can locate it (carcass persistence correction factor), the date of the last search at a particular search plot prior to finding a carcass (search interval), the proportion of wind turbines searched to the total number of wind turbines at the facility, and the proportion of searchable areas beneath each wind turbine (or similar search area correction). Categorical covariates (i.e., season,

carcass type, sample area, searcher, vegetation attributes) that significantly improve the fit of the searcher efficiency and carcass persistence models will be used, as applicable, in the adjusted fatality estimate.

Annual adjusted fatality estimates will be prepared for the facility and per MW. These estimates will be compared to adaptive management thresholds to determine whether a threshold has been exceeded. Per turbine estimates may be prepared if, during the adaptive management process, it is determined that a finer resolution is needed to understand patterns of fatality. *See Chapter 8*.

6.2 Other Migratory Bird and Bat Monitoring

PCW has incorporated the post-construction fatality monitoring for migratory birds and bats described in section 6.1 into its Conservation Plan and Landowner Agreement with TOTCO. *See Appendix H.* The Conservation Plan and Landowner Agreement also describes the circumstances under which additional bat acoustic surveys, migratory bird point counts, and raptor nest searches would be conducted for the CCSM Project, including Phase I. The Conservation Plan and Landowner Agreement was developed in coordination with WGFD and is based on the recommendations contained in the WGFC Wind Energy Recommendations. WGFD concurred with the terms and conditions of the Conservation Plan and Landowner Agreement and acknowledged that the agreement satisfies the applicable requirements of the WGFC Wind Energy Recommendations. The post-construction monitoring commitments described in the Conservation Plan and Landowner Agreement will be implemented in coordination with BLM and WGFD.

6.3 Incidental Discoveries

All operations and maintenance staff working on the CCSM Project will be trained on how to identify migratory bird or bat fatalities. Instructions and procedures that personnel must follow in the event that an injured or dead migratory bird or bat is discovered on-site shall be included with the educational information, including whom to notify and what actions must be taken.

Operations and maintenance personnel will not disturb any carcass, but will instead document the location of the migratory bird or bat fatality and notify their supervisor as soon as possible. The supervisor will contact a qualified biologist to record the fatality following the procedures set forth in section 6.1.2 and using a form similar to the one provided as Appendix J.

Incidental discoveries will be recorded year-round during Phase I construction and operation, including after the completion of formal post-construction fatality monitoring. Any migratory bird or bat fatality discovered during times other than the formal migratory bird and bat fatality surveys described in section 6.1.2 will be considered an incidental record. Incidental records will be reviewed with other post-construction monitoring results as described in section 8.3.

6.4 Disposition of Carcasses and Injured Migratory Birds or Bats

If the necessary permits have been obtained (e.g., a Migratory Bird Special Purpose Utility Permit [SPUT] from the Migratory Bird Program or a Scientific Collection Permit from WGFD), then following the collection of carcass-specific data, PCW (or other permit holder) will remove the carcass from the field as necessary. A list of state- and federally-permitted wildlife rehabilitation facilities will be maintained for when injured birds or bats are encountered in Phase I. This list will be posted in the Operations Center and will be updated regularly to ensure wildlife rehabilitators can be reached quickly if needed. *See Section 8.1.* Injured birds and bats will be recorded as fatalities and included in fatality rate analyses when they are encountered during formal migratory bird and bat fatality monitoring. Final disposition of carcasses, including any use in migratory bird and bat fatality monitoring carcass persistence or searcher efficiency trials, will be in accordance with permit terms and conditions or directions from the applicable federal or state agency.

7.0 Project Wildlife Permits

PCW may need to obtain the following permits related to migratory bird and bat species from either USFWS or WGFD for Phase I:

- USFWS-issued permits:
    - MBTA 21.23 Scientific Collection Permits
    - MBTA 21.27 Migratory Bird Special Purpose Utility Permit. *See 50 C.F.R. §21.27.*

      A Special Purpose Utility Permit is necessary only if PCW plans to collect, transport, or possess dead migratory birds or parts (including for purposes of conducting searcher efficiency or carcass persistence trials) or contract someone to conduct these activities on its behalf. More detailed information on the applicability of this permit and its requirements are set out in the Service's handout titled "What you should know about a Federal Migratory Bird Special Purpose Utility Permit," which can be accessed at: http://www.fws.gov/forms/3-200-81.pdf
- WGFD-issued permits:
    - Wildlife possession permits. *See Wyoming Game and Fish Commission Regulations, Chapter 10.*
    - Scientific collection permits. *See Wyoming Game and Fish Commission Regulations, Chapter 33.*

The need for additional wildlife permits for Phase I, if any, will be identified as part of the adaptive management process. *See Section 8.1.*

USFWS will determine and provide the conditions of any permits issued by USFWS. State permit conditions will be determined and provided by WGFD.

8.0 Administration

Information related to the administration of this Phase I BBCS is outlined below. This chapter contains: (1) contact information for key personnel; (2) a brief description of PCW's training program for Phase I personnel; (3) information on the Phase I BBCS recordkeeping; and (4) a description of the Phase I BBCS adaptive management program.

8.1 Contact Information

The Environmental and Construction Compliance Monitoring Program for Phase I designates the key management and environmental personnel who will be responsible for compliance during construction of Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*. However, as construction of Phase I is not yet underway, the majority of the construction management and compliance personnel are identified by title only. In addition, PCW will provide contact information for state- and federally-permitted wildlife rehabilitation facilities. Table 8.1 will be updated to include construction management staff, compliance personnel, and appropriate wildlife rehabilitation centers and provided to USFWS and WGFD prior to commencement of construction for Phase I. Table 8.1 will be posted in the Operations Center for use in the event any injured birds or bats are found during construction or operation of Phase I

Table 8.1. Phase I Contact Information.

Position	Name	Phone
Vice President, Land and Environmental Affairs	Garry Miller	303-298-1000
Vice President and General Counsel	Roxane Perruso	303-298-1000
Director of Engineering	Ryan Jacobson	303-298-1000
Senior Environmental Engineer	Kelly Cummins	303-298-1000
Project Manager	To Be Determined	To Be Determined
Construction Manager	To Be Determined	To Be Determined
Compliance Manager	To Be Determined	To Be Determined
Senior Biologist	To Be Determined	To Be Determined
Permitted Wildlife Rehabilitation Center(s)	To Be Determined	To Be Determined

8.2 Personnel Training

As part of the Environmental Compliance and Monitoring Plan for Phase I, PCW will implement an environmental training program to support compliance with environmental permits, including the permit requirements and conservation measures outlined in this Phase I BBCS. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*. The training program will be designed to consistently communicate requirements for Phase I to every individual working on-site so that both managers and workers understand PCW's expectations, the permit requirements, and how to incorporate them into their daily work activities. All personnel working on Phase I will be required to attend environmental training prior to working on-site. PCW will maintain environmental training attendance records on-site.

Elements of PCW's environmental training program will follow the training course format recommended by APLIC and will incorporate site-specific training to minimize risks to migratory birds and bats. *See APLIC 2006; APLIC 2012.* Further, all construction, operation and maintenance staff working on Phase I will be trained on how to identify migratory bird or bat fatalities. Instructions and procedures that personnel must follow in the event that an injured or dead migratory bird or bat is discovered on-site shall be provided with the environmental training information, including whom to notify and what actions must be taken.

8.3 Recordkeeping and Reporting

PCW will keep detailed electronic records of the post-construction migratory bird and bat fatality monitoring. The records will include all fatality data collected, including incidental records. PCW will review the results of the post-construction migratory bird and bat fatality monitoring annually. Post-construction fatality monitoring results will be reviewed in the context of spatial and seasonal distribution. As warranted, PCW will propose modifications to the monitoring protocol and/or conservation measures for consideration under the adaptive management framework. *See Section 8.4.* Following the completion of post-construction fatality monitoring, PCW will continue to collect incidental fatality records for Phase I. PCW will review these records annually using the adaptive management framework. *See Section 8.4.* Following PCW's annual review of this Phase I BBCS and the recorded migratory bird and bat mortality, PCW will provide USFWS and WGFD with a summary of the Phase I migratory bird and bat mortality and a description of any modifications to the post-construction monitoring protocols or conservation measures. In addition, PCW will report information to USFWS and WGFD in accordance with the requirements and conditions of any applicable scientific collection, wildlife possession, or special purpose utility permits. *See Chapter 7.0.*

All post-construction monitoring reports PCW submits to USFWS, WGFD, BLM and other state and federal agencies will be considered confidential and not subject to public disclosure, as provided for under the exemptions applying to confidential commercial information under the Freedom of Information Act and Wyoming state statutes. *See U.S.C. § 552(b)(4) & W.S. 16-4-203(d)(v).*

8.4 Adaptive Management

As described in the USFWS Wind Energy Guidelines, "[a]daptive management is an iterative learning process producing improved understanding and improved management over time." *See USFWS 2012a at p. 8 (citing Williams et al. 2009).* The adaptive management process described by USFWS in the Wind Energy Guidelines "gives special emphasis to uncertainty about management effects, iterative learning to reduce uncertainty, and improved management as a result of learning." *See USFWS 2012a at p. 8.* In fact, the USFWS Wind Energy Guidelines were designed to embody adaptive management by "collecting increasingly detailed information that is used to make decisions about project design, construction, and operation…" *See USFWS 2012a at p. 8.*

In support of the USFWS adaptive management approach to managing risk and uncertainty, PCW has collected a robust pre-construction data set and has also designed an intensive post-construction monitoring program for Phase I. *See Chapters 4.0 & 6.0.* Further, PCW has developed its own adaptive management program for Phase I to use the post-construction data to proactively incorporate adaptive management into Phase I operation.

The intent of the Phase I adaptive management process is to provide a frequent opportunity during post-construction monitoring to evaluate and minimize the uncertainty related to the factors that influence the risk to migratory birds and bats from Phase I. While the goal of this Phase I BBCS is to avoid migratory bird and bat fatalities, it is anticipated that some level of unavoidable mortality will occur despite the application of robust conservation measures. As a result, the Phase I adaptive management process is intended to proactively adjust post-construction monitoring protocols, conservation measures, and BMPs when warranted.

Adaptive management for Phase I has three primary components: (1) quantifiable thresholds that would initiate adaptive management; (2) PCW's adaptive management process that provides an opportunity for PCW to review the Phase I post-construction monitoring results and the observed take in the context of the predicted take and to consult and coordinate as necessary with USFWS or WGFD; and (3) potential adaptive management actions that may be considered in the event that the adaptive management thresholds are exceeded.

8.4.1 Adaptive Management Thresholds

In keeping with the adaptive management approach, PCW recognizes that adaptive management for Phase I will depend heavily on the information collected as part of pre-construction surveys and comparison of those data to post-construction fatality monitoring data. PCW has utilized the pre-construction data summarized in Chapter 4.0 to identify thresholds that will initiate adaptive management for purposes of evaluating the need for additional conservation measures and BMPs. These thresholds have been identified for the protection of migratory bird and bat species, as well as BLM sensitive species, WGFD species of greatest conservation need, or other species of interest, including bats. The following thresholds would initiate PCW's adaptive management process[45]:

1. **Migratory bird adaptive management thresholds** - The USFWS DEIS identified that between 3,150 and 5,400 avian fatalities could occur annually during operation of Phase I. *See USFWS 2016a*. The USFWS recognized that these are likely overestimates of actual fatality as evidenced by results of recent post-construction monitoring efforts in Wyoming and elsewhere. However, these estimates were used as overall adaptive management thresholds as it is recognized that fatalities above these levels would be higher than expected after the measures in this Phase I BBCS are implemented.

   Adaptive management would be initiated for migratory birds as a whole if modeled estimates of fatality for migratory birds exceeds 4,725 (150% of 3,150 predicted fatalities and 87.5% of 5,400 predicted fatalities)

2. **Migratory bird species-specific adaptive management thresholds** – Pre-construction avian use data for BLM sensitive species, WGFD species of greatest conservation need, or other species of interest were evaluated to identify adaptive management thresholds that would be implemented if species-specific or guild-specific estimates of fatality exceeded certain thresholds. The following species-specific or guild-specific adaptive management thresholds were developed for Phase I:
   a. Adaptive management would be implemented if modeled fatality estimates for sagebrush obligate passerine species exceed 17% of all modeled passerine fatalities in any year (25% greater than expected fatality rate based on relative abundance of sagebrush obligate passerines when compared to all other passerine species as presented in Table 4.6)

[45] In the event that the fatality estimates presented in the USFWS DEIS are revised in the USFWS FEIS, the adaptive management triggers will be revised to be consistent with the USFWS FEIS.

b. If the guild-specific threshold for fatality is not met, adaptive management would be implemented when modeled fatality estimates for any of the individual sagebrush obligate species exceed the following thresholds:
    i. Brewer's sparrow – modeled fatality estimates exceed 8% of all modeled passerine fatalities in any year (25% greater than expected fatality rate based on relative abundance of Brewer's sparrow when compared to all other passerine species as presented in Table 4.6)
    ii. Sagebrush sparrow - modeled fatality estimates exceed 6% of all modeled passerine fatalities in any year (25% greater than expected fatality rate based on relative abundance of sagebrush sparrow when compared to all other passerine species as presented in Table 4.6)
    iii. Sage thrasher - modeled fatality estimates exceed 4% of all modeled passerine fatalities in any year (25% greater than expected fatality rate based on relative abundance of sage thrasher when compared to all other passerine species as presented in Table 4.6)

c. Adaptive management would be implemented if modeled fatality estimates for ferruginous hawk exceed 7% of all modeled non-eagle raptor fatalities in any year (25% greater than expected fatality rate based on relative abundance of ferruginous hawk when compared to all other non-eagle raptor species as presented in Table 4.5)

d. Adaptive management would be implemented if modeled estimates for Swainson's hawk exceed 29% of all modeled non-eagle raptor fatalities in any year (25% greater than expected fatality rate based on relative abundance of Swainson's hawk when compared to all other non-eagle raptor species as presented in Table 4.5)

3. **Bat adaptive management thresholds** - The USFWS DEIS identified that up to 4,605 bat fatalities could occur annually during operation of Phase I. *See USFWS 2016a.* The USFWS recognized the uncertainty in this estimate due to lack of available post-construction datasets from which estimates of fatality could be derived, inconsistent survey protocols where bat fatality data were available and inappropriate comparisons of fatality among wind energy projects with different habitat types and environmental conditions. However, this estimate was used as an adaptive management threshold as it is recognized that fatalities above these levels would be higher than expected after the measures in this Phase I BBCS are implemented.

   Adaptive management would be implemented for bats if modeled estimates of fatality for bats exceed 3,450 (approximately 75% of the 4,605 potential fatalities identified in the USFWS DEIS).

8.4.2 Adaptive Management Process

PCW will implement the adaptive management process at least annually through the Phase I Annual Review, or more frequently if the thresholds described in section 8.4.1 have been exceeded. The Phase I adaptive management process would be completed annually even when the thresholds described above are not exceeded. The Phase I Annual Review is intended to provide a routine adaptive management review process in which the uncertainty related to the factors that influence the risk to migratory birds and bats from Phase I can be monitored, evaluated, and minimized to the extent practicable. The Phase I Annual Review will also evaluate patterns of mortality across Phase I to identify specific turbines or groups of turbines that might be disproportionately impacting migratory bird or bat species. The Phase I adaptive management process will be implemented as follows:

1. PCW will implement the post-construction monitoring protocols, conservation measures, and BMPs set forth in this Phase I BBCS.

2. PCW will review the Phase I post-construction monitoring results and conservation measures in the context of the risk to migratory birds and bats from Phase I and the thresholds identified in section 8.4.1.

3. Following review of the post-construction monitoring results and conservation measures, PCW, in coordination and consultation with USFWS, BLM, and WGFD, will consider adjustments to the post-construction monitoring protocols, conservation measures, and BMPs as needed.

4. As warranted, PCW will implement the adjustments to the post-construction monitoring protocols, conservation measures, and BMPs deemed necessary during the Phase I adaptive management review.

The Phase I adaptive management process will provide an opportunity for PCW to review the implementation of the monitoring protocols and the avoidance, minimization, and conservation measures included in this Phase I BBCS in coordination and consultation with USFWS, BLM, and WGFD.

8.4.3 Adaptive Management Actions

Using the thresholds identified above, implementation of the adaptive management process will compare the results of post-construction monitoring (Tier 4 of the USFWS Wind Energy Guidelines) to expected fatalities predicted using the pre-construction data collected consistent with Tier 3 of the USFWS Wind Energy Guidelines. If, through the adaptive management process, it is identified that additional actions are needed to avoid and minimize impacts to migratory birds or bats, PCW will identify the necessary adaptive management actions in coordination and consultation with USFWS, WGFD, and BLM.

Actions to be considered may be turbine-specific, site-specific, or project-specific in nature. Examples of actions that may be considered as part of the Phase I adaptive management process include, but are not limited to:

- Modifications to post-construction monitoring efforts
- Adjustment of turbine cut-in speeds
- Modification to adaptive management thresholds
- Implementation of additional conservation measures
- Modifications to project lighting
- Modifications to timing of project activities
- Marking above-ground electrical transmission and gathering system conductors
- Implementation of additional APLIC mitigation measures for the transmission and collection system

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