APPENDIX A

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

APR 20 2011

In Reply Refer To:
ES-61411/WY11CPA0147

Memorandum

To: Field Manager, Bureau of Land Management, Rawlins Field Office, Rawlins, Wyoming

From: Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Avian Protection Plan Concurrence for the Sierra Madre-Chokecherry Wind Energy Project

Thank you for your letter of December 9, 2011, regarding the proposed Power Company of Wyoming's (PCW) Sierra Madre-Chokecherry Wind Energy Project (Project). The proposed Project is located south/southwest of the city of Rawlins, Carbon County, Wyoming. The Project is a proposed 2,000-MW electrical generating facility consisting of up to 1,000 2-MW wind turbines.

You have requested that the U.S. Fish and Wildlife Service (Service) determine if an Avian Protection Plan (APP) is appropriate for this Project to minimize the potential "take" of eagles. Our response to your request is based on the two-step process identified in the Bureau of Land Management's (Bureau) Instruction Memorandum No. 2010-156 (IM-2010-156), which is:

1) The Service determines that developing an APP is an appropriate option for this Project to avoid and minimize the potential for golden eagle take; therefore, the Bureau's Authorized Officer may issue a Record of Decision approving the project; and

2) The Bureau's Authorized Officer shall not authorize a Notice to Proceed for this Project until the Service has evaluated the APP and determines that it is adequate.

Following the two-step process, we have determined that developing an APP is an appropriate option to avoid and minimize the potential take of eagles (based on the Bureau's IM-2010-156), and migratory birds and bats based on PCW's commitment to meeting the following criteria:

a) Three years of surveys evaluating eagle, migratory bird and bat use of the Project area, as per Service guidance, conducted prior to Project construction; and

RECEIVED
APR 22 2011
BUREAU OF LAND MANAGEMENT
RAWLINS FIELD OFFICE

b) Turbine numbers and layout are adjusted to provide effective buffers for eagle and other raptor nest sites as well as areas with high bird and bat utilization, as evidenced by the survey data.

To avoid and minimize impacts to migratory bird species protected by the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703, as well as eagles protected under the Bald and Golden Eagle Protection Act (Eagle Act), 16 U.S.C. 668, the APP will need to address all migratory bird species. The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. While the MBTA has no provision for allowing unauthorized take, the Service realizes that some birds may be killed even if all reasonable measures to protect them are used. The Service's Office of Law Enforcement (OLE) carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to minimize their impacts on migratory birds, and by encouraging others to enact such programs. It is not possible to absolve individuals, companies, or agencies from liability even if they implement avian mortality avoidance or similar conservation measures. However, the OLE focuses its resources on investigating individuals and companies that take migratory birds without regard for their actions or without following an agreement to avoid take.

We advise the Bureau's Authorized Officer to not authorize a "Notice to Proceed" until the completed APP is delivered to the Service for evaluation and the Service determines the APP is adequate as documented in formal correspondence. The Service's determination as to the adequacy of the APP will depend upon the quality of the survey results used to develop the APP, how survey information was used to design a project layout that minimizes impacts, and how conservation measures will be applied during construction and operation.

We suggest that a programmatic APP, containing conservative conservation measures (e.g., no turbines within 4 miles of a golden eagle nest), be developed initially to provide guidance in lieu of area-specific information. This APP should be incorporated into the Project's Environmental Impact Statement (EIS). Any subsequent Project phases that rely upon an Environmental Assessment, which tiers to the EIS, will also form the basis for an individual Plan of Development (POD) APP. We expect that site-specific PODs will have higher levels of information about bird use, and their APP can be tailored to each specific area. We caution that it may not be reasonable to expect that the entire Project area can be developed (e.g., some Project areas may not be suitable for construction and should remain undeveloped).

The Service appreciates the Bureau's efforts to conserve golden eagles, other migratory birds, and bats in Wyoming. If you have questions regarding this letter or the MBTA and the Eagle Act, please contact Travis Sanderson of my staff at the letterhead address or phone (307) 328-4333.

cc: BLM, High Desert District Manager, Rock Springs, WY (J. Ruhs)
BLM, RECO Wildlife Biologist, Rawlins, WY (C. Morton)
BLM, Project Manager, Rawlins, WY (P. Murdoch)
BLM, RECO Project Manager, Cheyenne, WY (T. Engles)
BLM, State RECO Manager, Cheyenne, WY (M. Valle)
USFWS, Regional Energy Coordinator, Lakewood, CO (T. Modde)
USFWS, Branch Chief Energy, Water, Climate, Lakewood, CO (P. Repp)
USFWS, Chief, Branch of Conservation Planning Assistance, Washington, D.C (L. Bright)
WGFD, Non-Game Coordinator, Lander, WY (B. Oakleaf)
WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (M. Flanderka)

APPENDIX B

LIST OF MIGRATORY BIRD SPECIES THAT HAVE BEEN OBSERVED IN THE CCSM PROJECT SITE AND THEIR ASSOCIATED CONSERVATION STATUS. [1]

Species Group	Common Name	Scientific Name	Conservation Status[1]
Corvids	American Crow	*Corvus brachyrhynchos*	
	Black-billed Magpie	*Pica hudsonia*	
	Clark's Nutcracker	*Nucifraga columbiana*	
	Common Raven	*Corvus corax*	
Passerines	American Goldfinch	*Spinus tristis*	
	American Robin	*Turdus migratorius*	
	Barn Swallow	*Hirundo rustica*	
	Bewick's Wren	*Thryomanes bewickii*	
	Black-capped Chickadee	*Poecile atricapillus*	
	Blue-gray Gnatcatcher	*Polioptila caerulea*	
	Brewer's Blackbird	*Euphagus cyanocephalus*	
	Brewer's Sparrow	*Spizella breweri*	USFWS-CC, BLM-S, WGFD-SGCN
	Brown-headed Cowbird	*Molothrus ater*	
	Chipping Sparrow	*Spizella passerina*	
	Cliff Swallow	*Petrochelidon pyrrhonota*	
	Common Yellowthroat	*Geothlypis trichas*	
	Dark-eyed Junco	*Junco hyemalis*	
	Dusky Flycatcher	*Empidonax oberholseri*	
	Evening Grosbeak	*Coccothraustes vespertinus*	
	Grasshopper Sparrow	*Ammodramus savannarum*	
	Gray-crowned Rosy-finch	*Leucosticte tephrocotis*	
	Green-tailed Towhee	*Pipilo chlorurus*	
	Hammond's Flycatcher	*Empidonax hammondii*	
	Hermit Thrush	*Catharus guttatus*	
	Horned Lark	*Eremophila alpestris*	
	House Finch	*Carpodacus mexicanus*	
	House Wren	*Troglodytes aedon*	
	Lark Bunting	*Calamospiza melanocorys*	WGFD-SGCN
	Lark Sparrow	*Chondestes grammacus*	
	Lincoln's Sparrow	*Melospiza lincolnii*	
	Loggerhead Shrike	*Lanius ludovicianus*	USFWS-CC, BLM-S
	MacGillivray's Warbler	*Geothlypis tolmiei*	
	Mountain Bluebird	*Sialia currucoides*	
	Mountain Chickadee	*Poecile gambeli*	

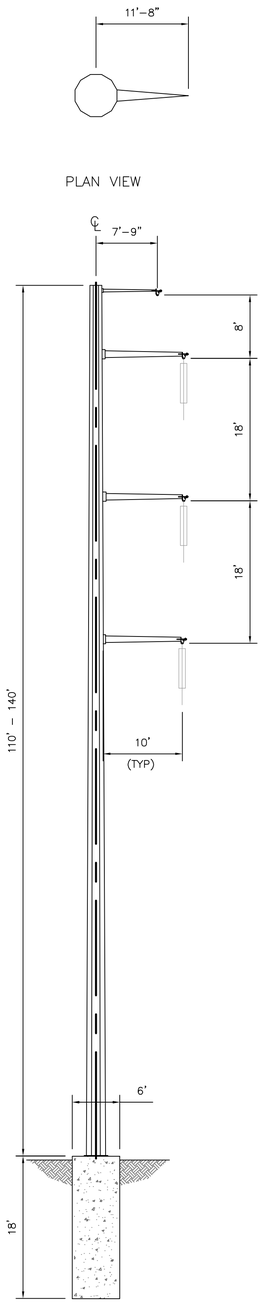
[1] Consistent with the scope of the Phase I BBCS, this table does not include eagles or greater sage-grouse.

Species Group	Common Name	Scientific Name	Conservation Status[1]
	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	
	Orange-crowned Warbler	*Oreothlypis celata*	
	Red-winged Blackbird	*Agelaius phoeniceus*	
	Rock Wren	*Salpinctes obsoletus*	
	Ruby-crowned Kinglet	*Regulus calendula*	
	Sagebrush Sparrow	*Artemisiospiza nevadensis*	USFWS-CC, BLM-S, WGFD-SGCN
	Sage Thrasher	*Oreoscoptes montanus*	USFWS-CC, BLM-S, WGFD-SGCN
	Savannah Sparrow	*Passerculus sandwichensis*	
	Say's Phoebe	*Sayornis saya*	
	Snow Bunting	*Plectrophenax nivalis*	
	Song Sparrow	*Melospiza melodia*	
	Swainson's Thrush	*Catharus ustulatus*	
	Townsend's Solitaire	*Myadestes townsendi*	
	Tree Swallow	*Tachycineta bicolor*	
	Vesper Sparrow	*Pooecetes gramineus*	
	Violet-green Swallow	*Tachycineta thalassina*	
	Warbling Vireo	*Vireo gilvus*	
	Western Kingbird	*Tyrannus verticalis*	
	Western Meadowlark	*Sturnella neglecta*	
	Western Wood-pewee	*Contopus sordidulus*	
	Wilson's Warbler	*Wilsonia pusilla*	
	Yellow Warbler	*Dendroica petechia*	
	Yellow-breasted Chat	*Icteria virens*	
	Yellow-rumped Warbler	*Dendroica coronata*	
Non-eagle Raptors, Owls, and Allies	American Kestrel	*Falco sparverius*	
	Burrowing Owl	*Athene cunicularia*	USFWS-CC, BLM-S, WGFD-SGCN
	Cooper's Hawk	*Accipiter cooperii*	
	Ferruginous Hawk	*Buteo regalis*	USFWS-CC, BLM-S, WGFD-SGCN
	Great Horned Owl	*Bubo Virginianus*	
	Merlin	*Falco columbarius*	WGFD-SGCN
	Northern Goshawk	*Accipiter gentilis*	BLM-S, WGFD-SGCN
	Northern Harrier	*Circus cyaneus*	
	Osprey	*Pandion haliaetus*	
	Peregrine Falcon	*Falco peregrinus*	USFWS-CC, BLM-S, WGFD-SGCN
	Prairie Falcon	*Falco mexicanus*	USFWS-CC
	Red-tailed Hawk	*Buteo jamaicensis*	

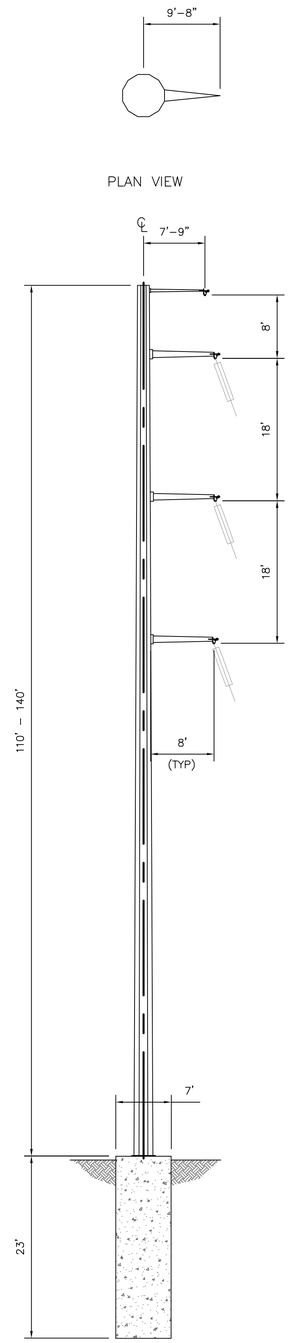
Species Group	Common Name	Scientific Name	Conservation Status[1]
	Rough-legged Hawk	*Buteo lagopus*	
	Sharp-shinned Hawk	*Accipiter striatus*	
	Swainson's Hawk	*Buteo swainsoni*	USFWS-CC, WGFD-SGCN
	Turkey Vulture	*Cathartes aura*	
Waterfowl, Waterbirds, and Wading Birds	American Avocet	*Recurvirostra americana*	
	American Coot	*Fulica americana*	
	American White Pelican	*Pelecanus erythrorhynchos*	
	American Wigeon	*Anas americana*	
	Black-crowned Night-heron	*Nycticorax nycticorax*	WGFD-SGCN
	Bufflehead	*Bucephala albeola*	
	Canada Goose	*Branta canadensis*	
	Canvasback	*Aythya valisineria*	WGFD-SGCN
	Cinnamon Teal	*Anas cyanoptera*	
	Clark's Grebe	*Aechmophorus clarkii*	WGFD-SGCN
	Common Loon	*Gavia immer*	
	Common Merganser	*Mergus merganser*	
	Double-crested Cormorant	*Phalacrocorax auritus*	
	Eared Grebe	*Podiceps nigricollis*	
	Gadwall	*Anas strepera*	
	Great Blue Heron	*Ardea herodias*	
	Greater Scaup	*Aythya marila*	
	Greater Yellowlegs	*Tringa melanoleuca*	
	Green-winged Teal	*Anas crecca*	
	Horned Grebe	*Podiceps auritus*	
	Killdeer	*Charadrius vociferus*	
	Least Sandpiper	*Calidris minutilla*	
	Lesser Scaup	*Aythya affinis*	WGFD-SGCN
	Lesser Yellowlegs	*Tringa flavipes*	
	Long-billed Curlew	*Numenius americanus*	USFWS-CC, BLM-S, WGFD-SGCN
	Mallard	*Anas platyrhynchos*	
	Marbled Godwit	*Limosa fedoa*	
	Mountain Plover	*Charadrius montanus*	USFWS-CC, BLM-S, WGFD-SGCN
	Northern Pintail	*Anas acuta*	WGFD-SGCN
	Northern Shoveler	*Anas clypeata*	
	Pied-billed Grebe	*Podilymbus podiceps*	
	Redhead	*Aythya americana*	WGFD-SGCN
	Ring-billed Gull	*Larus delawarensis*	
	Ring-necked Duck	*Aythya collaris*	

Species Group	Common Name	Scientific Name	Conservation Status[1]
	Ruddy Duck	*Oxyura jamaicensis*	
	Sandhill Crane	*Grus canadensis*	WGFD-SGCN
	Sora	*Porzana carolina*	
	Western Grebe	*Aechmophorus occidentalis*	
	White-faced Ibis	*Plegadis chihi*	BLM-S, WGFD-SGCN
	Willet	*Tringa semipalmata*	
	Wilson's Phalarope	*Phalaropus tricolor*	
	Wilson's Snipe	*Gallinago delicata*	
Other	Broad-tailed Hummingbird	*Selasphorus platycercus*	
	Common Nighthawk	*Chordeiles minor*	
	Common Poorwill	*Phalaenoptilus nuttallii*	
	Mourning Dove	*Zenaida macroura*	
	Northern Flicker	*Colaptes auratus*	
	Rufous Hummingbird	*Selasphorus rufus*	
	White-throated Swift	*Aeronautes saxatalis*	

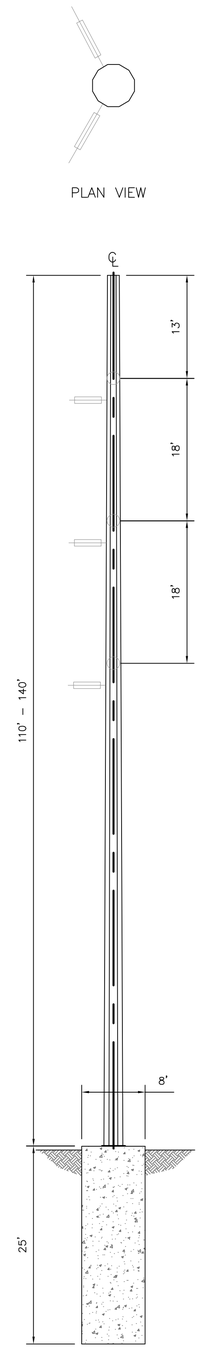
APPENDIX C



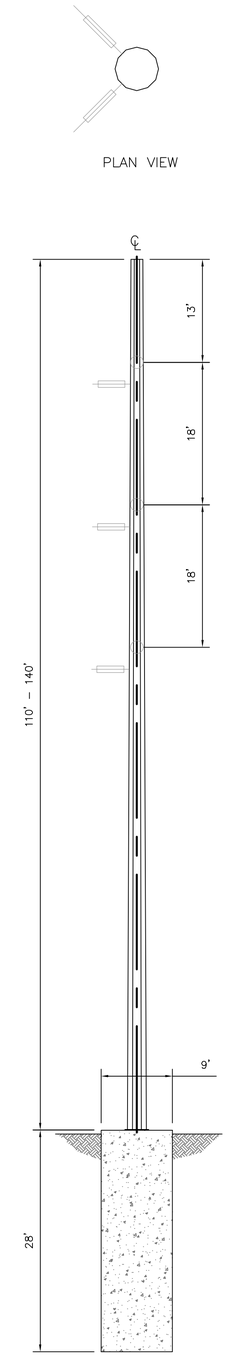
SINGLE CIRCUIT
0° – 1° TANGENT



SINGLE CIRCUIT
1° – 30° SUSPENSION ANGLE



SINGLE CIRCUIT
0° – 60° LIGHT DEADEND



SINGLE CIRCUIT
60° – 90° HEAVY DEADEND

NOTES:
1. DIMENSIONS ARE PRELIMINARY AND WILL VARY DEPENDING GRADE AND LINE ANGLES. TYPICAL POLE HEIGHTS ARE DESIGNED FOR PROJECT CONDITIONS.

BLACK & VEATCH CORP.
6300 S SYRACUSE WY
SUITE 300
CENTENNIAL CO, 80111

Designed: AGR
Checked: -
Drawn: JRF
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
.	.	.

Prepared for:

Power Company of Wyoming LLC

555 Seventeenth Street, Suite 2400
Denver, CO 80202 USA

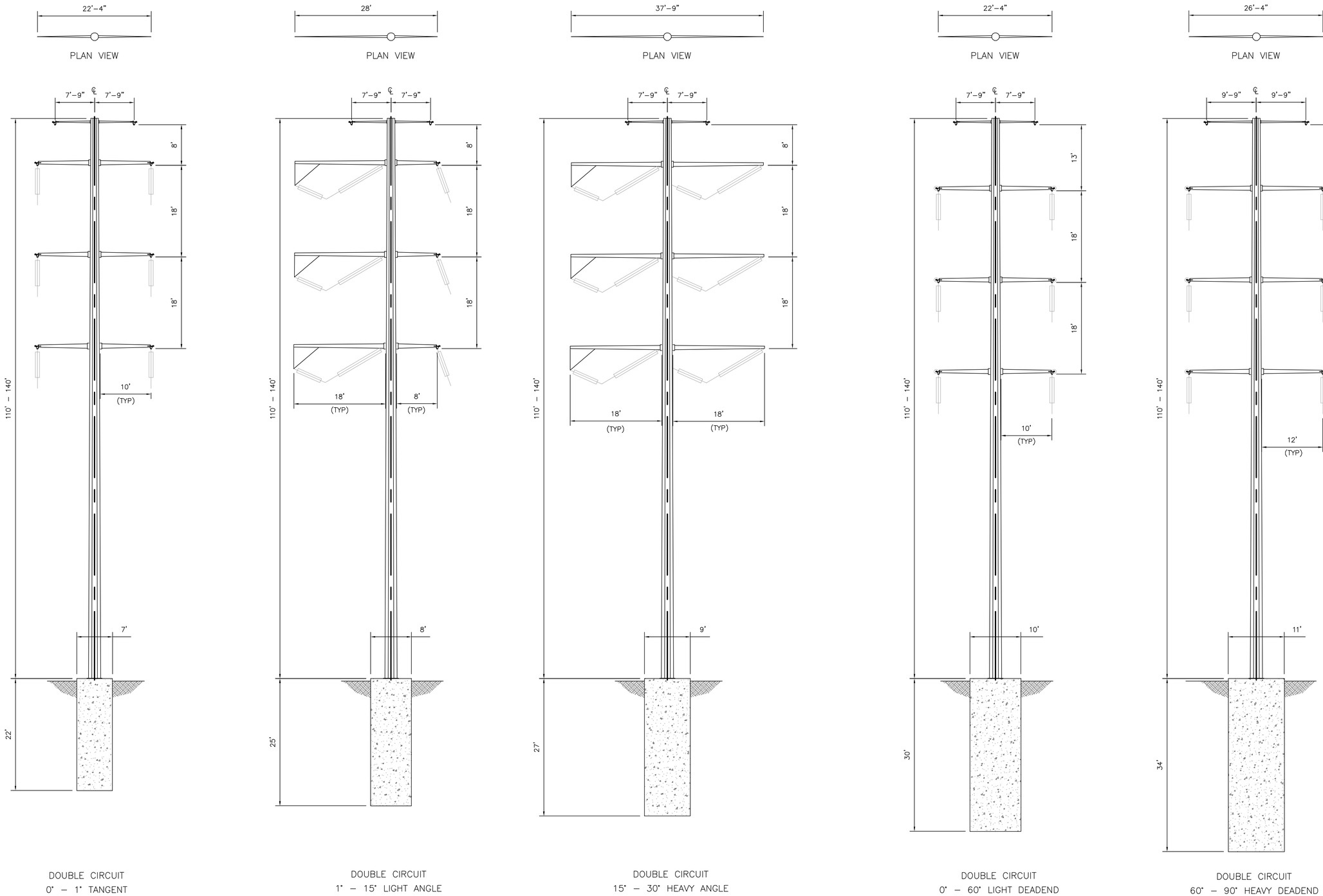
Chokecherry and Sierra Madre Wind Energy Project

Carbon County, Wyoming

230KV Single Circuit Steel Pole Structures

Phase I Wind Development Area Wind Turbine Sites & Related Infrastructure
NOT FOR CONSTRUCTION

Date: 01/05/15
Sheet: 38 of 254



NOTES:

1. DIMENSIONS ARE PRELIMINARY AND WILL VARY DEPENDING GRADE AND LINE ANGLES. TYPICAL POLE HEIGHTS ARE DESIGNED FOR PROJECT CONDITIONS.

BLACK & VEATCH CORP.
6300 S SYRACUSE WY
SUITE 300
CENTENNIAL CO, 80111

Designed: AGR
Checked: -
Drawn: JBF
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
.	.	.

Prepared for:

Power Company of Wyoming LLC

555 Seventeenth Street, Suite 2400
Denver, CO 80202 USA

Chokecherry and Sierra Madre Wind Energy Project

Carbon County, Wyoming

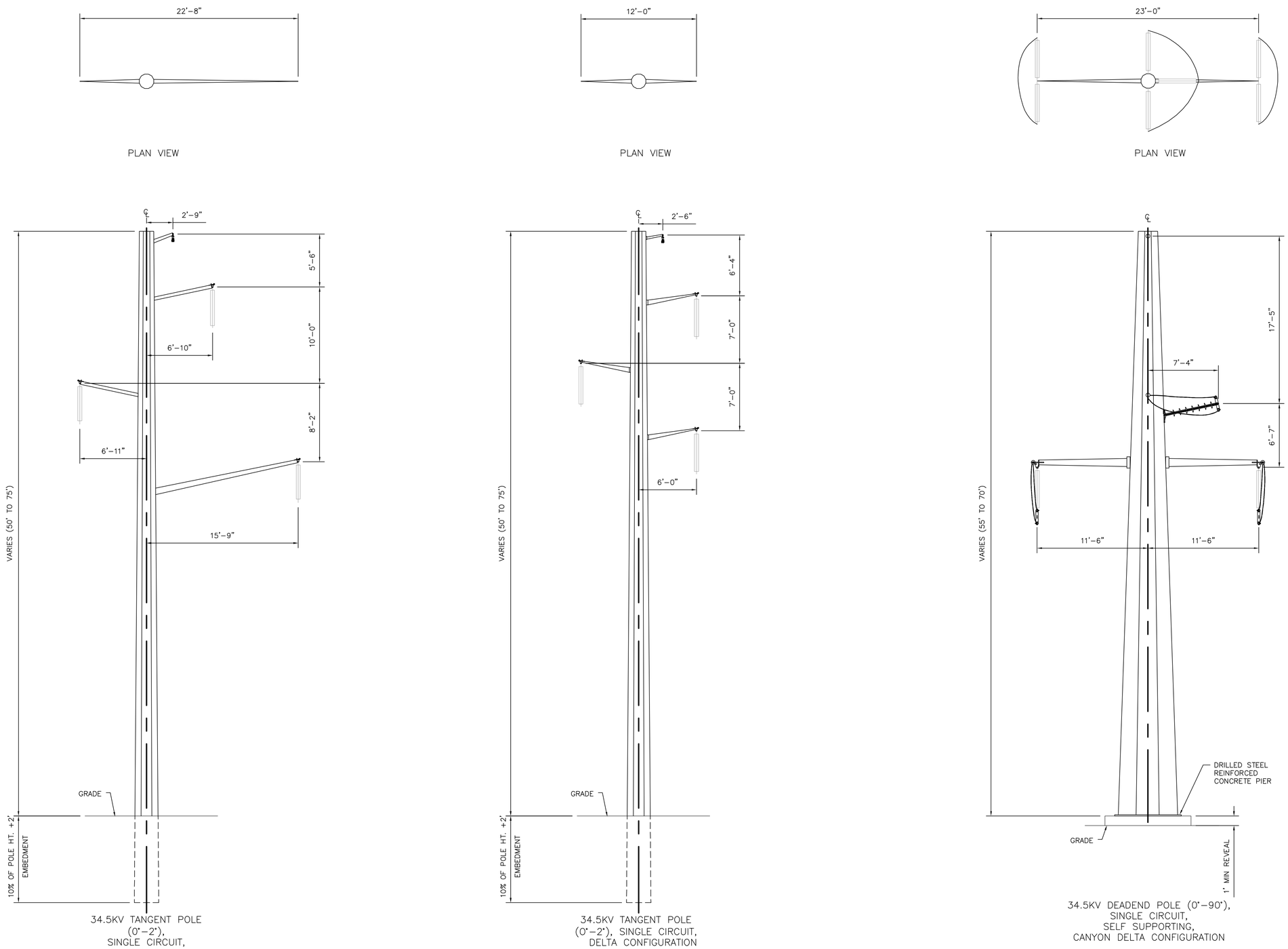
230KV Double Circuit Steel Pole Structures

Phase I Wind Development Area Wind Turbine Sites & Related Infrastructure

NOT FOR CONSTRUCTION

Date: 01/05/15

Sheet: 39 of 254



NOTES:

1. DIMENSIONS ARE PRELIMINARY AND WILL VARY DEPENDING GRADE AND LINE ANGLES. TYPICAL POLE HEIGHTS ARE DESIGNED FOR PROJECT CONDUTIONS.
2. POLE TYPE SHOWN IS STEEL; HOWEVER, FINAL DESIGN MAY UTILIZE WOOD AND/OR STEEL POLES DEPENDING ON GEOTECH AND LOADING COMBINATIONS.
3. FOUNDATIONS ARE TO BE TYPICAL AUGER DRILLED AND BACKFILLED WITH NATIVE MATERIAL., UNLESS NOTED OTHERWISE.

BLACK & VEATCH CORP.
6300 S SYRACUSE WY
SUITE 300
CENTENNIAL CO, 80111

Designed: ZAT
Checked: -
Drawn: JEF
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
.	.	.

Prepared for:

Power Company of Wyoming LLC

555 Seventeenth Street, Suite 2400
Denver, CO 80202 USA

Chokecherry and Sierra Madre Wind Energy Project

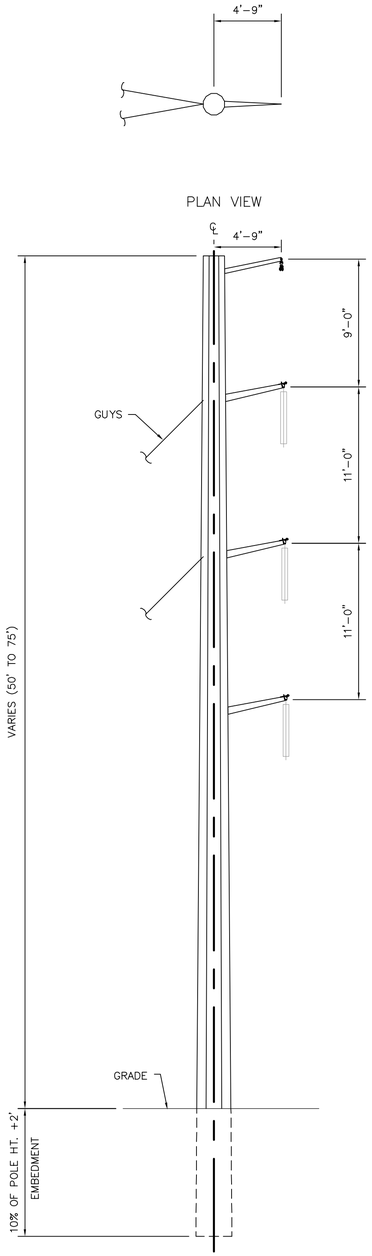
Carbon County, Wyoming

34.5KV Steel Single Circuit Pole Structures

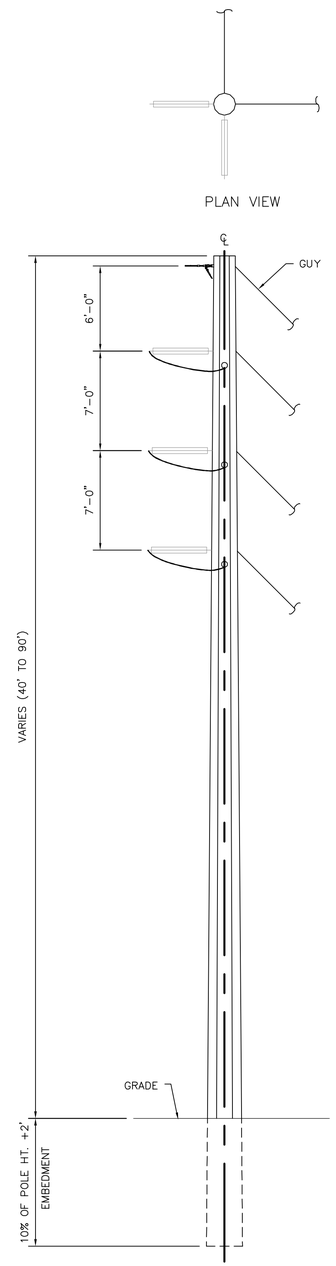
Phase I Wind Development Area Wind Turbine Sites & Related Infrastructure

NOT FOR CONSTRUCTION

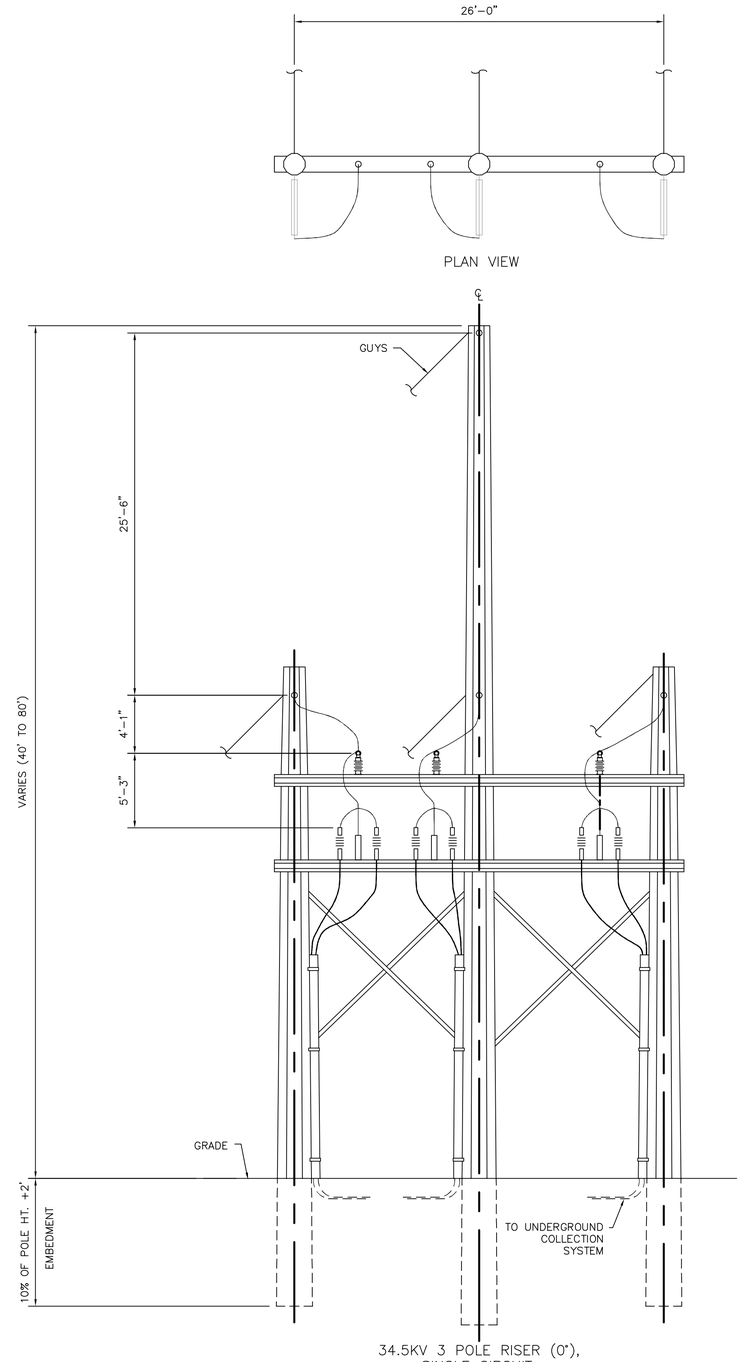
Date: 01/05/15



34.5KV RUNNING ANGLE POLE
(2°–25°),
SINGLE CIRCUIT,
GUYED VERTICAL CONFIGURATION



34.5KV DEADEND POLE
(>25°), SINGLE CIRCUIT,
GUYED VERTICAL
CONFIGURATION



34.5KV 3 POLE RISER (0°),
SINGLE CIRCUIT,
GUYED HORIZONTIAL
CONFIGURATION

NOTES:

1. DIMENSIONS ARE PRELIMINARY AND WILL VARY DEPENDING GRADE AND LINE ANGLES. TYPICAL POLE HEIGHTS ARE DESIGNED FOR PROJECT CONDUTIONS.
2. POLE TYPE SHOWN IS STEEL; HOWEVER, FINAL DESIGN MAY UTILIZE WOOD AND/OR STEEL POLES DEPENDING ON GEOTECH AND LOADING COMBINATIONS.
3. FOUNDATIONS ARE TO BE TYPICAL AUGER DRILLED AND BACKFILLED WITH NATIVE MATERIAL., UNLESS NOTED OTHERWISE.

BLACK & VEATCH CORP.
6300 S SYRACUSE WY
SUITE 300
CENTENNIAL CO, 80111

Designed: ZAT
Checked: -
Drawn: JEF
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
.	.	.

Prepared for:

Power Company of Wyoming LLC

555 Seventeenth Street, Suite 2400
Denver, CO 80202 USA

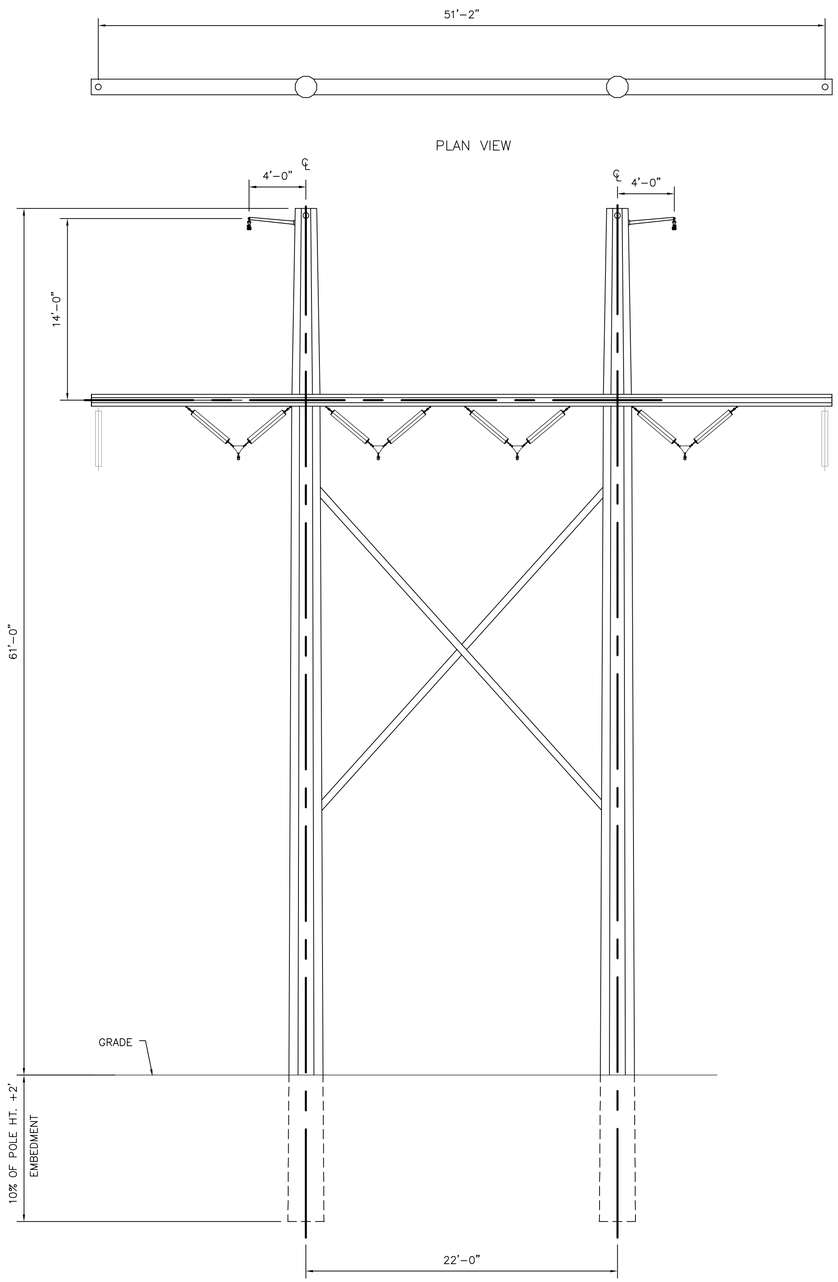
Chokecherry and Sierra Madre Wind Energy Project

Carbon County, Wyoming

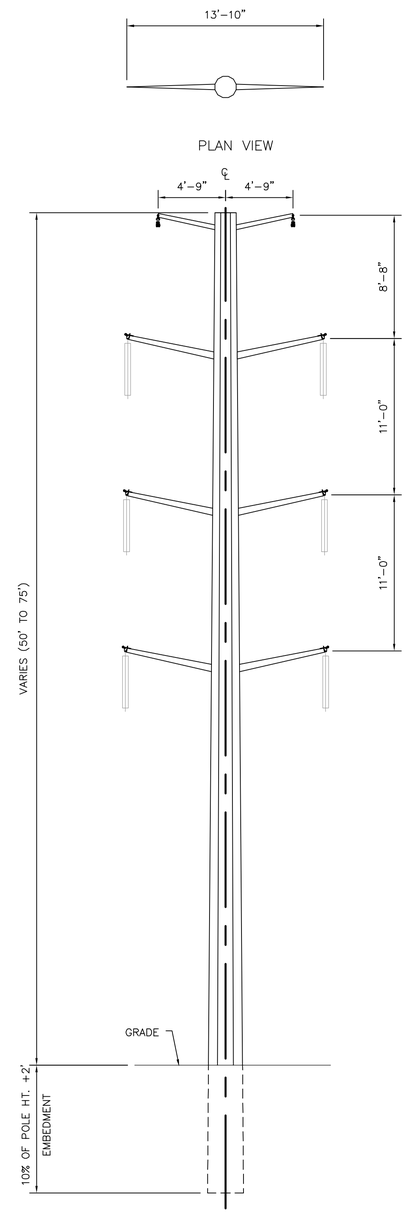
34.5KV Steel Single Circuit Pole Structures

Phase I Wind Development Area Wind Turbine Sites & Related Infrastructure
NOT FOR CONSTRUCTION

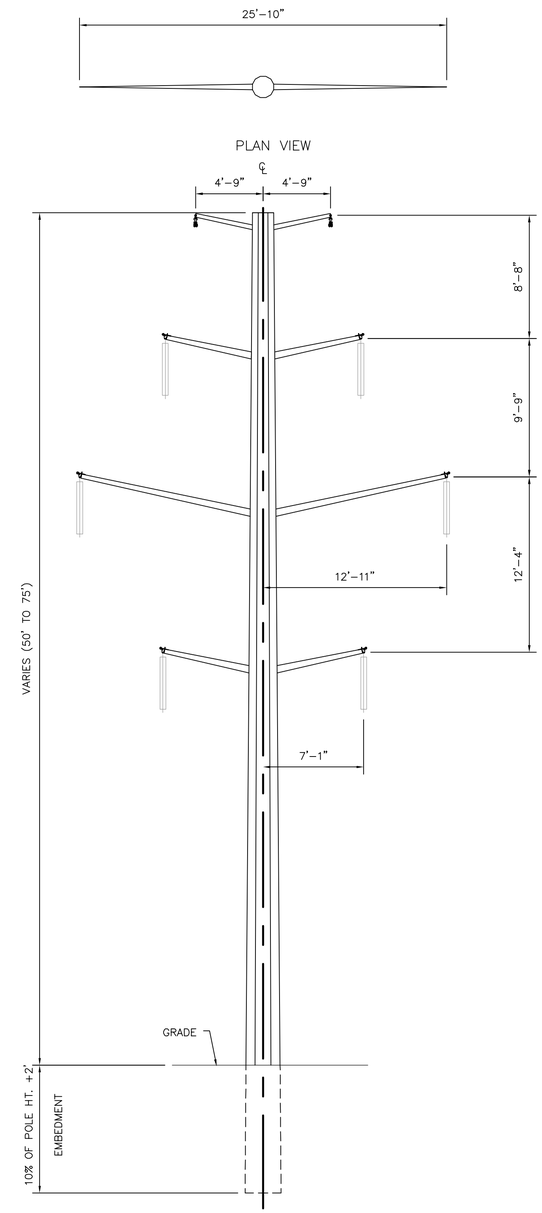
Date: 01/05/15
Sheet: 45 of 254



34.5KV TANGENT POLE
(0°-2°),
DOUBLE CIRCUIT,
HORIZONTAL CONFIGURATION



34.5KV TANGENT POLE
(0°-2°),
DOUBLE CIRCUIT,
VERTICAL CONFIGURATION



34.5KV TANGENT POLE
(0°-2°),
DOUBLE CIRCUIT,
VERTICAL CONFIGURATION

NOTES:

1. DIMENSIONS ARE PRELIMINARY AND WILL VARY DEPENDING GRADE AND LINE ANGLES. TYPICAL POLE HEIGHTS ARE DESIGNED FOR PROJECT CONDUTIONS.
2. POLE TYPE SHOWN IS STEEL; HOWEVER, FINAL DESIGN MAY UTILIZE WOOD AND/OR STEEL POLES DEPENDING ON GEOTECH AND LOADING COMBINATIONS.
3. FOUNDATIONS ARE TO BE TYPICAL AUGER DRILLED AND BACKFILLED WITH NATIVE MATERIAL., UNLESS NOTED OTHERWISE.

BLACK & VEATCH CORP.
6300 S SYRACUSE WY
SUITE 300
CENTENNIAL CO, 80111

Designed: ZAT
Checked: -
Drawn: JEF
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
.	.	.

Prepared for:

Power Company of Wyoming LLC

555 Seventeenth Street, Suite 2400
Denver, CO 80202 USA

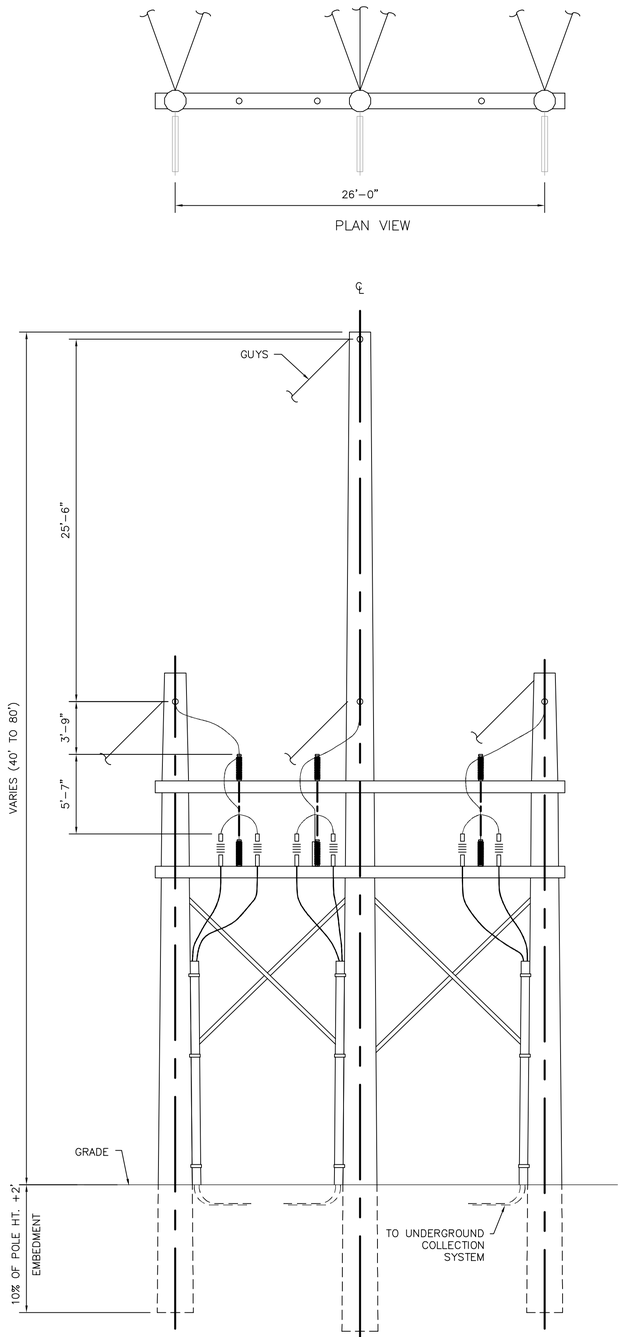
Chokecherry and Sierra Madre Wind Energy Project

Carbon County, Wyoming

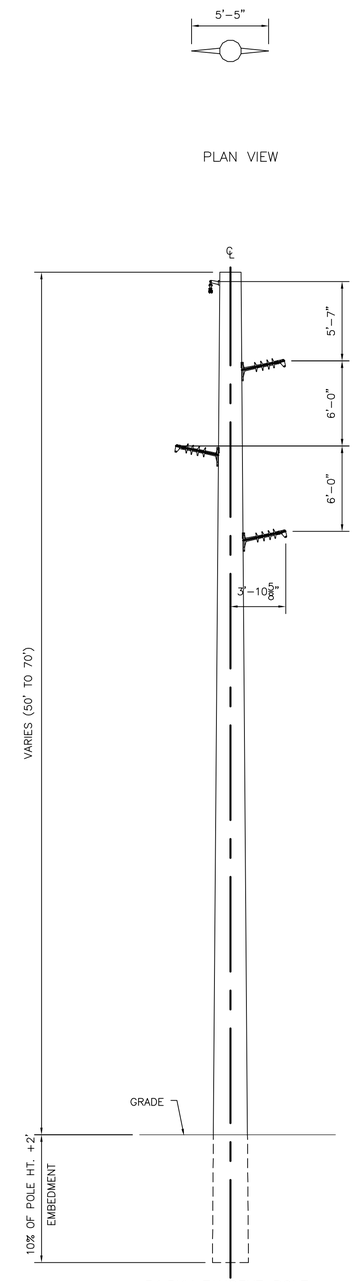
34.5KV Steel Double Circuit Pole Structures

Phase I Wind Development Area Wind Turbine Sites & Related Infrastructure
NOT FOR CONSTRUCTION

Date: 01/05/15
Sheet: 46 of 254



34.5KV 3 POLE RISER (0°), SINGLE CIRCUIT, GUYED HORIZONTIAL CONFIGURATION



34.5KV TANGENT POLE (0°–2°), SINGLE CIRCUIT, DELTA CONFIGURATION

NOTES:

1. DIMENSIONS ARE PRELIMINARY AND WILL VARY DEPENDING GRADE AND LINE ANGLES. TYPICAL POLE HEIGHTS ARE DESIGNED FOR PROJECT CONDUTIONS.
2. POLE TYPE SHOWN IS STEEL; HOWEVER, FINAL DESIGN MAY UTILIZE WOOD AND/OR STEEL POLES DEPENDING ON GEOTECH AND LOADING COMBINATIONS.
3. FOUNDATIONS ARE TO BE TYPICAL AUGER DRILLED AND BACKFILLED WITH NATIVE MATERIAL., UNLESS NOTED OTHERWISE.

BLACK & VEATCH CORP.
6300 S SYRACUSE WY
SUITE 300
CENTENNIAL CO, 80111

Designed: ZAT
Checked: -
Drawn: JEF
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
.	.	.

Prepared for:

Power Company of Wyoming LLC

555 Seventeenth Street, Suite 2400
Denver, CO 80202 USA

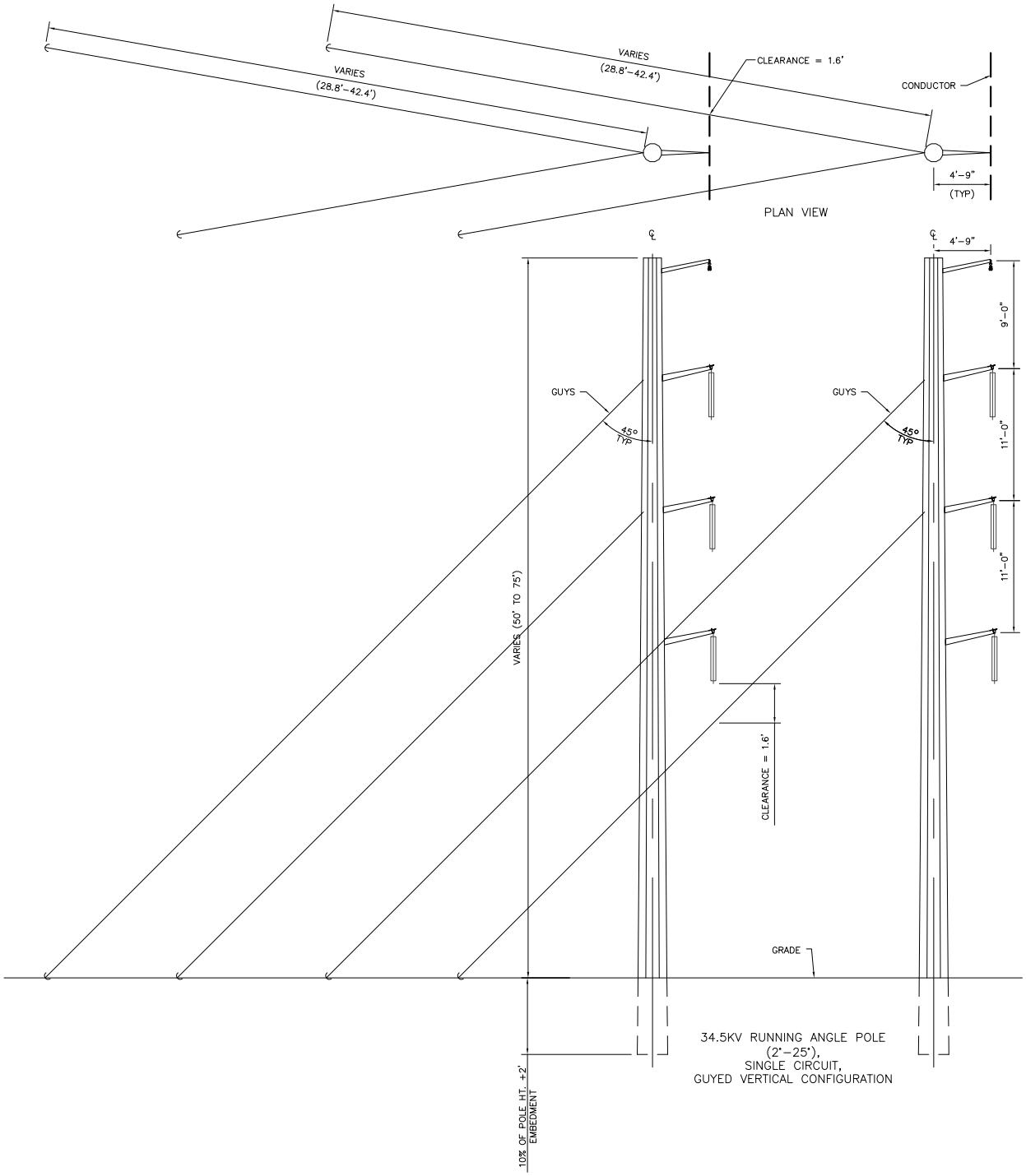
Chokecherry and Sierra Madre Wind Energy Project

Carbon County, Wyoming

34.5KV Wood Single Circuit Pole Structures

Phase I Wind Development Area Wind Turbine Sites & Related Infrastructure
NOT FOR CONSTRUCTION

Date: 01/05/15
Sheet: 47 of 254



CLEARANCE	MIN (FT)	MAX (FT)
CONDUCTOR TO GUY	1.6'	9.9'
CONDUCTOR TO CONDUCTOR	7.0'	29.9'

BLACK & VEATCH
Building a world of difference.

Black & Veatch Corporation
Denver, Colorado

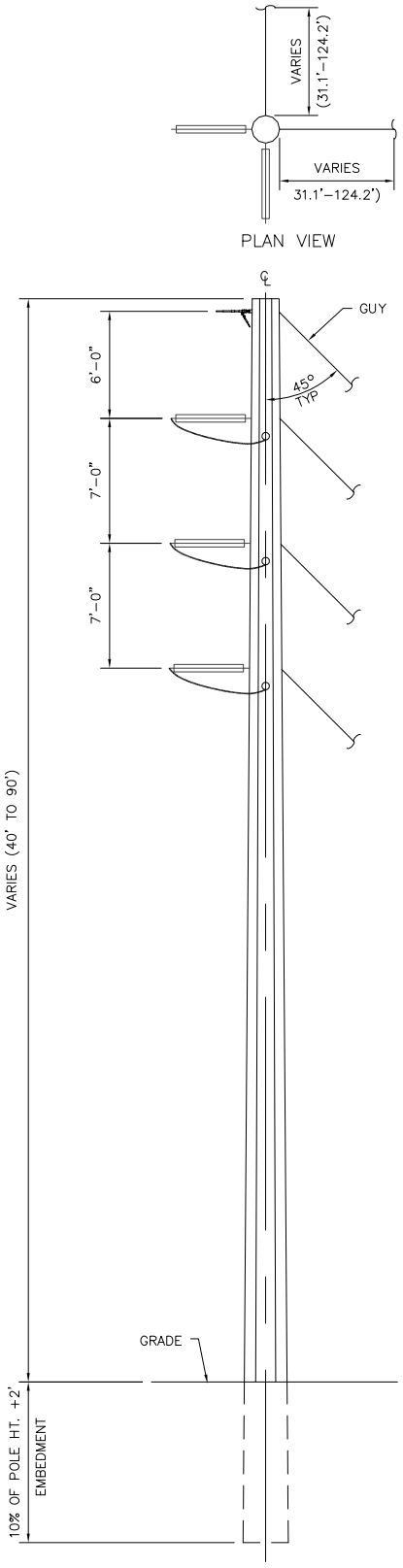
34.5kV RUNNING ANGLE POLE
DOUBLE CIRCUIT
GUYED VERTICAL CONFIGURATION

CLEARANCE REFERENCE DRAWING

7/24/15

Project No.
185028

FIGURE 1



34.5KV DEADEND POLE (>25'), SINGLE CIRCUIT, GUYED VERTICAL CONFIGURATION

CLEARANCE	MIN (FT)	MAX (FT)
CONDUCTOR TO GUY	1.7'	5.8'
CONDUCTOR TO CONDUCTOR	6.6'	29.9'

BLACK & VEATCH
Building a world of difference.

Black & Veatch Corporation
Denver, Colorado

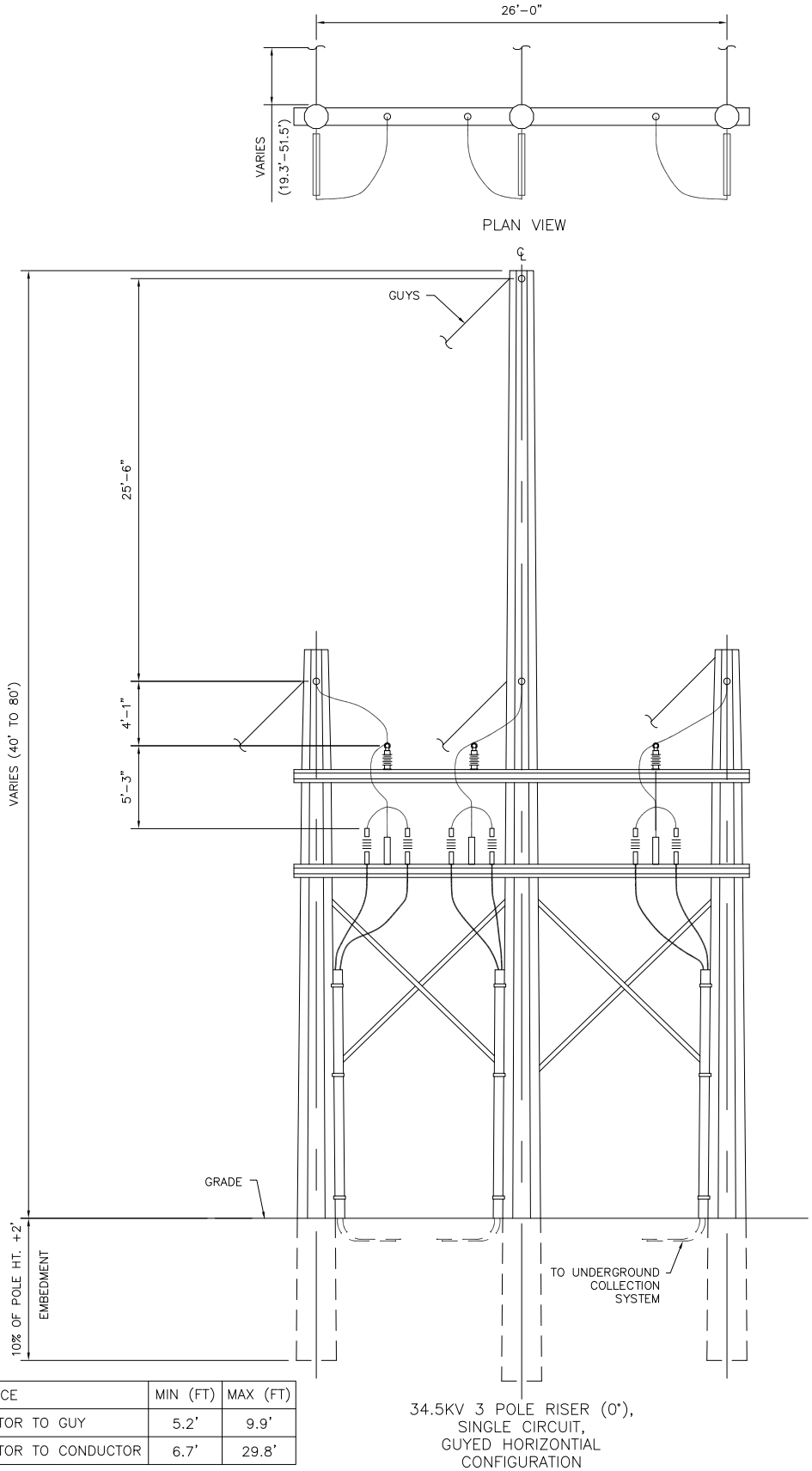
34.5kV DEADEND POLE
SINGLE CIRCUIT
GUYED VERTICAL CONFIGURATION

CLEARANCE REFERENCE DRAWING

7/24/15

Project No.
185028

FIGURE 2



CLEARANCE	MIN (FT)	MAX (FT)
CONDUCTOR TO GUY	5.2'	9.9'
CONDUCTOR TO CONDUCTOR	6.7'	29.8'

34.5KV 3 POLE RISER (0°),
SINGLE CIRCUIT,
GUYED HORIZONTIAL
CONFIGURATION

BLACK & VEATCH
Building a world of difference.

Black & Veatch Corporation
Denver, Colorado

34.5kV 3 POLE RISER (0°)

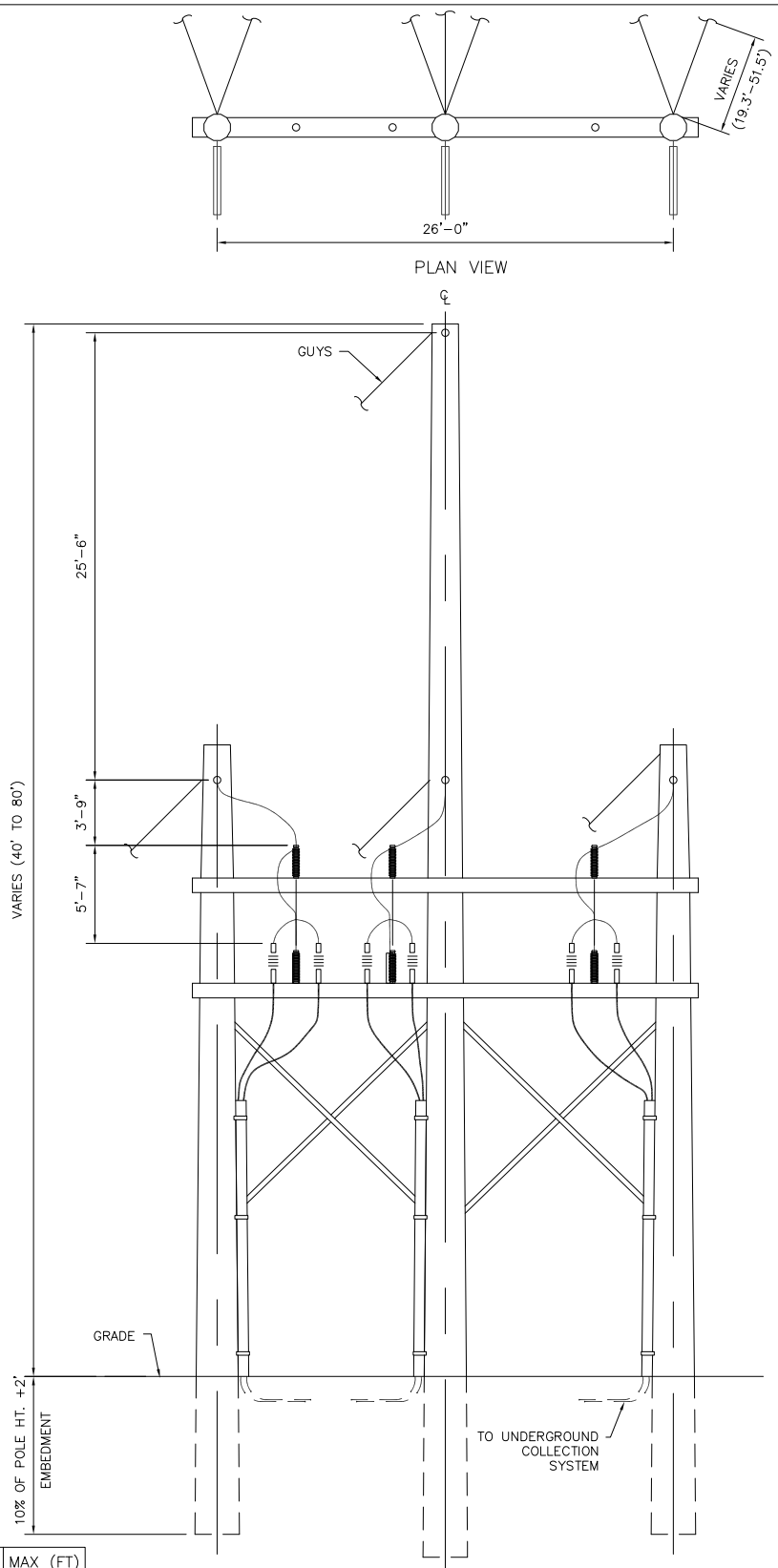
SINGLE CIRCUIT
GUYED HORIZONTIAL CONFIGURATION

CLEARANCE REFERENCE DRAWING

7/24/15

Project No.
185028

FIGURE 3



CLEARANCE	MIN (FT)	MAX (FT)
CONDUCTOR TO GUY	5.2'	9.9'
CONDUCTOR TO CONDUCTOR	6.7'	29.8'

34.5KV 3 POLE RISER (0°),
SINGLE CIRCUIT,
GUYED HORIZONTIAL
CONFIGURATION

BLACK & VEATCH
Building a world of difference.

Black & Veatch Corporation
Denver, Colorado

34.5kV 3 POLE RISER (0°)

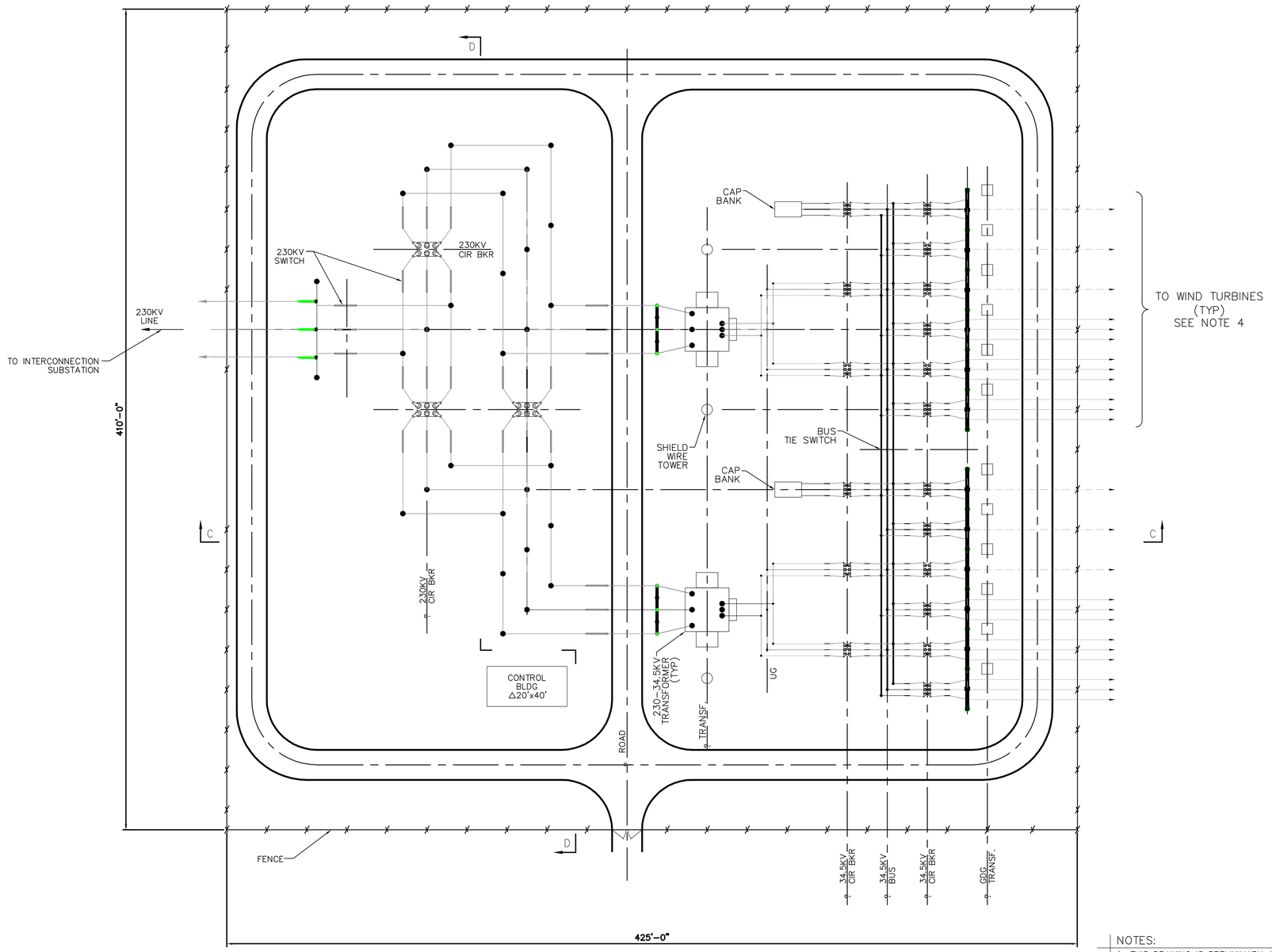
SINGLE CIRCUIT
GUYED HORIZONTIAL CONFIGURATION

CLEARANCE REFERENCE
DRAWING

7/24/15

Project No.
185028

FIGURE 4



30' 15' 0 15' 30' 60'

SCALE IN FEET
1"=30'-0"

NOTES:

1. THIS DRAWING IS PRELIMINARY AND INTENDED TO SHOW THE GENERAL SIZE AND DIMENSIONS OF A TYPICAL ARRANGEMENT BASED ON THE CURRENT CONCEPTUAL DESIGN.
2. ACTUAL NUMBER OF 34.5KV CIRCUITS PER TRANSFORMER BANK COULD VARY BETWEEN 4–6 CIRCUITS. 6 CIRCUITS ARE SHOWN AS A CONSERVATIVE MEASURE.
3. 34.5KV BUS CONFIGURATION IS PRELIMINARY. ACTUAL CONFIGURATION TO BE DETERMINED LATER BASED ON FINALIZED LAYOUTS, DESIGN PARAMETERS, AND OPERATIONS.
4. 34.5KV CIRCUITS FROM WIND TURBINES WILL ENTER THE SUBSTATION AS AN OVERHEAD OR UNDERGROUND CIRCUIT. BOTH OVERHEAD AND UNDERGROUND ARRANGEMENTS ARE SHOWN ON THIS DRAWING.
5. BUS TIE SWITCHES INTENDED TO BE NORMALLY OPEN. IN THE EVENT OF A XFMR FAILURE, THE BUS TIE SWITCH WOULD BE CLOSED TO MINIMIZE LOSS OF GENERATION. THIS SITUATION WOULD REQUIRE SPECIAL OPERATING PROCEDURES AND MAY REQUIRE SOME CURTAILING IN ORDER TO STAY WITHIN EQUIPMENT RATINGS.
6. SEE SHEET 35 FOR CONCEPTUAL ELEVATION VIEWS.

BLACK & VEATCH CORP.
6300 S SYRACUSE WY
SUITE 300
CENTENNIAL CO, 80111

Designed: AGR
Checked: -
Drawn: JEF
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
.	.	.

Prepared for:

Power Company of Wyoming LLC

555 Seventeenth Street, Suite 2400
Denver, CO 80202 USA

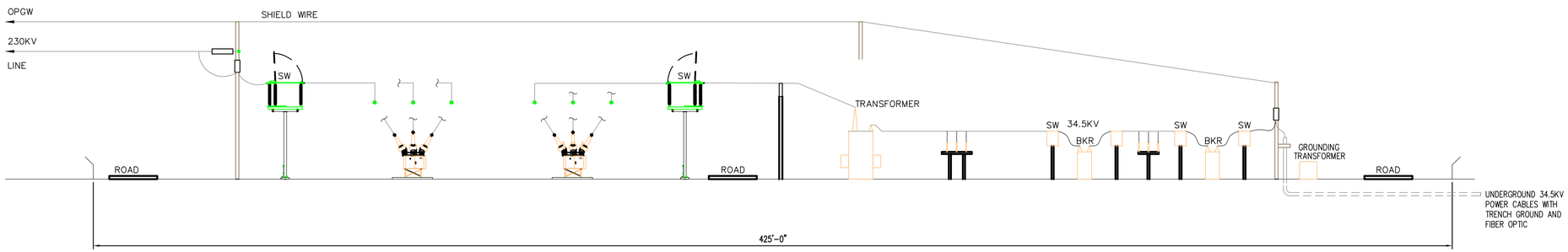
Chokecherry and Sierra Madre Wind Energy Project

Carbon County, Wyoming

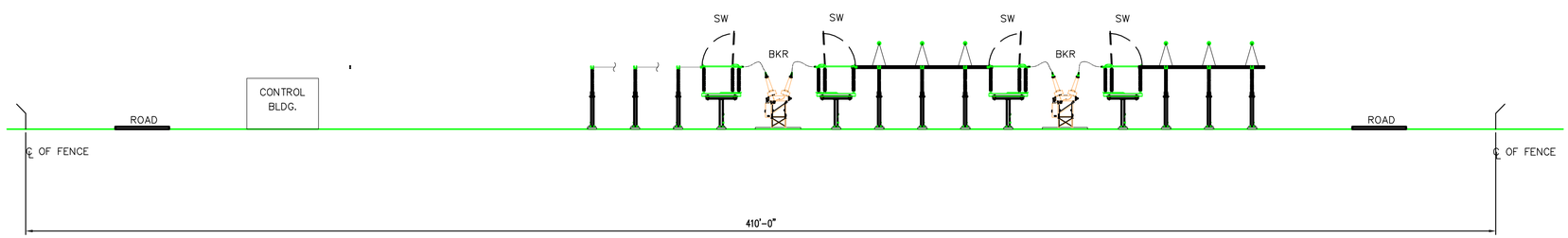
34.5/230KV Substation Plan View 2 Transformer Layout

Phase I Wind Development Area Wind Turbine Sites & Related Infrastructure
NOT FOR CONSTRUCTION

Date: 01/05/15
Sheet: 42 of 254



SECTION C–C



SECTION D–D

20' 10' 0 10' 20' 40'

SCALE IN FEET
1"=20'-0"

NOTES:

1. SEE SHEET 34 FOR CONCEPTUAL PLAN VIEW.

BLACK & VEATCH CORP.
6300 S SYRACUSE WY
SUITE 300
CENTENNIAL CO, 80111

Designed: AGR
Checked: -
Drawn: JEF
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
.	.	.

Prepared for:

Power Company of Wyoming LLC

555 Seventeenth Street, Suite 2400
Denver, CO 80202 USA

Chokecherry and Sierra Madre Wind Energy Project

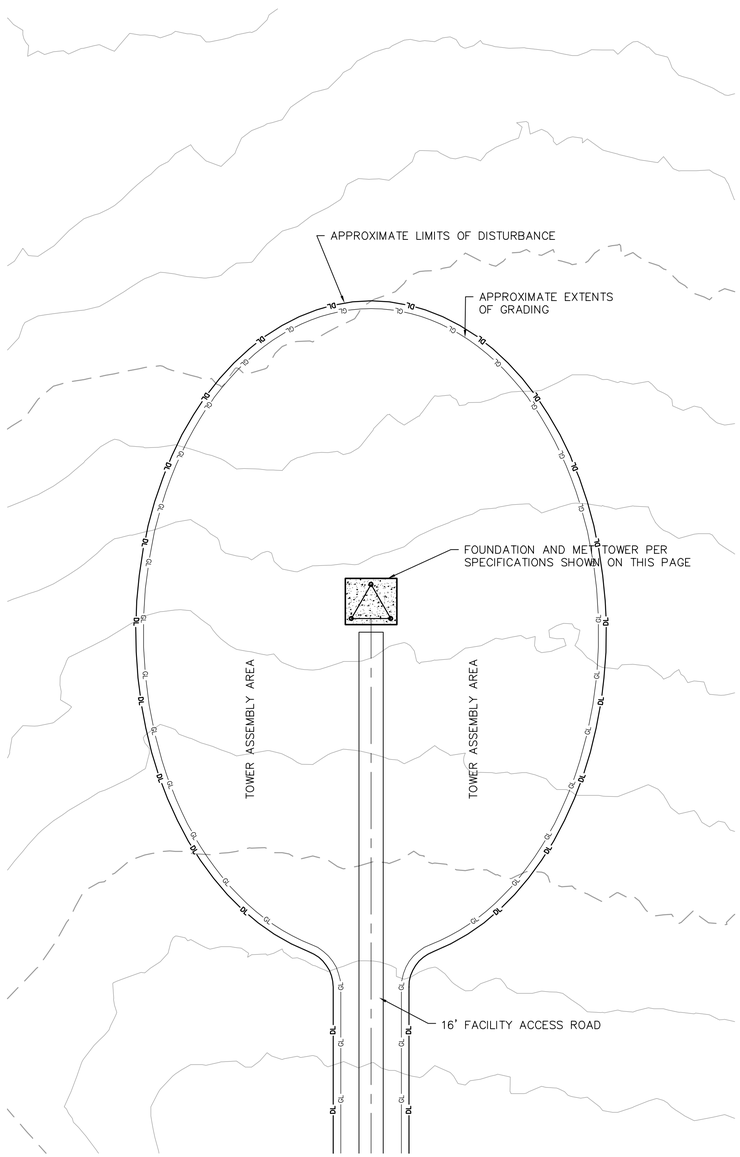
Carbon County, Wyoming

34.5/230KV
Substation Elevation
2 Transformer Layout

Phase I Wind Development Area Wind Turbine Sites & Related Infrastructure
NOT FOR CONSTRUCTION

Date: 01/05/15
Sheet: 43 of 254

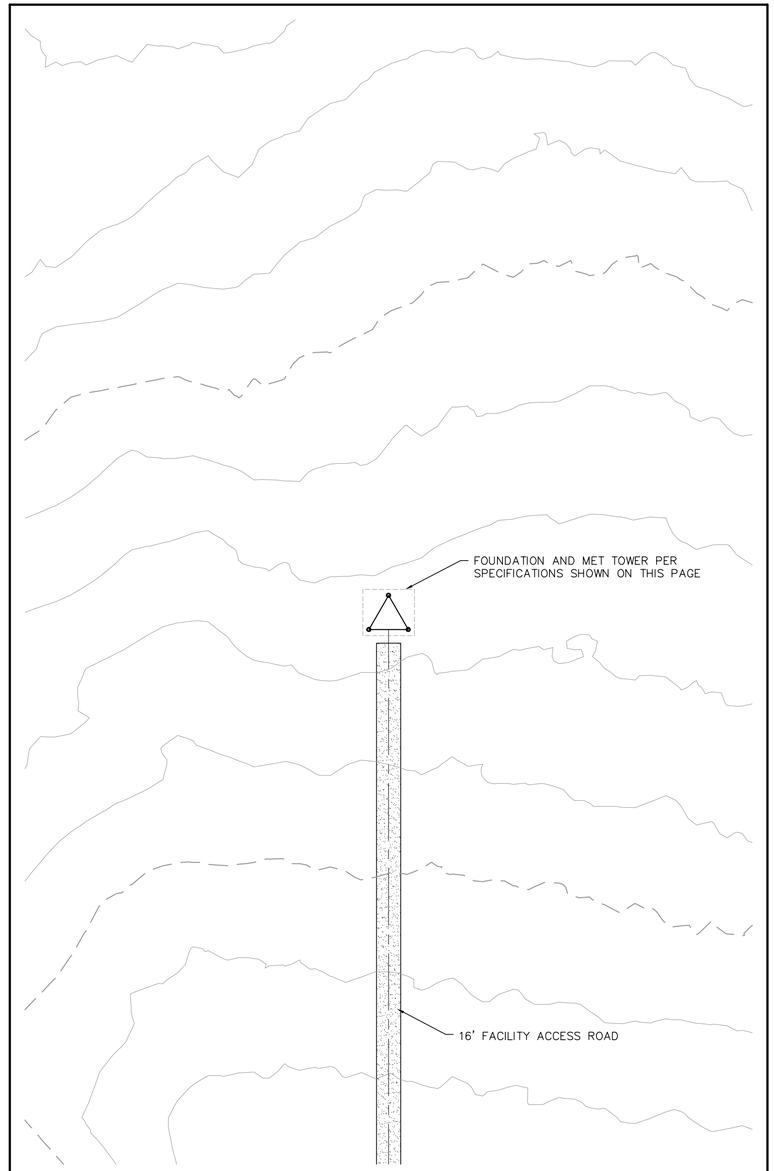
©2015 Westwood Professional Services, Inc.



TYPICAL MET TOWER SITE (DURING CONSTRUCTION)

LAST REVISED: 11/13/13

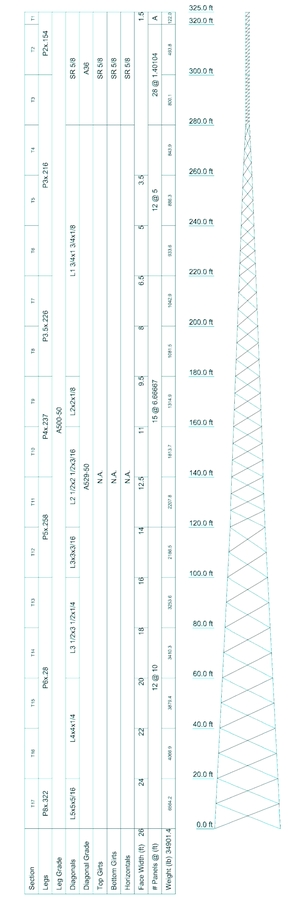
TS16

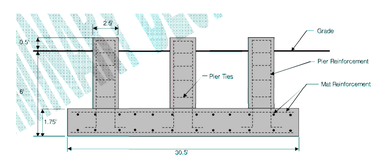


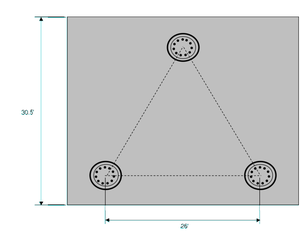
TYPICAL MET TOWER SITE (POST CONSTRUCTION)

LAST REVISED: 11/13/13

TS17







TOWER & FOUNDATION DESIGN PROVIDED BY:

Nello Corporation 211 W. Washington Street, Suite 2000 South Bend, IN 46601-1705 Phone: (574)289-3632 FAX: (574)289-5860	Job: *RFQ50164* Project: Client: AWS Truewind; Drawn by: Nello Corporation; Appl: Code: TIA-222-G; Date: 11/08/13; Scale: NTS Path: N:\all_Projects\50100-50164.wf; Dwg No: E-1

DESIGNS PROVIDED ARE PRELIMINARY AND SUBJECT TO CHANGE. REFER TO FINAL PLANS FOR CONSTRUCTION INFORMATION.

Westwood Professional Services, Inc.
7699 Anagram Drive
Eden Prairie, MN 55344

PHONE 952-937-5150
FAX 952-937-5822
TOLL FREE 1-888-937-5150

www.westwoodps.com

Designed: DK/KM
Checked: RC/PC
Drawn: KM/TR
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION
.	.	.

Prepared for:

Power Company of Wyoming LLC
555 Seventeenth Street, Suite 2400
Denver, CO 80202 USA

Chokecherry and Sierra Madre Wind Energy Project

Carbon County, Wyoming

Met Tower Details

Phase I Wind Development Area Wind Turbine Sites & Related Infrastructure
NOT FOR CONSTRUCTION

Date: 01/05/15

APPENDIX D

Avian and Bat Monitoring Protocols
for the
Chokecherry and Sierra Madre Wind Energy Project

Prepared for:

Power Company of Wyoming, LLC
555 17th Street, Suite 2400
Denver, CO 80202

Prepared by:

SWCA Environmental Consultants
295 Interlocken Blvd, Suite 300
Broomfield, CO 80021
303.487.1183 Fax: 303.487.1245
www.swca.com

March 2011

Review of Agency Recommendations

The following protocols have been developed in accordance with the following agency recommendations:

U.S. Fish and Wildlife Service (USFWS)
Wind Turbine Guidelines Advisory Committee *Recommendations on Developing Effective Measures to Mitigate Impacts to Wildlife and Their Habitats Related to Land-Based Wind Energy Facilities* (USFWS 2010)
USFWS Draft Land-Based Wind Energy Guidelines (USFWS 2011a)
Draft Eagle Conservation Plan Guidance (USFWS 2011b)

Wyoming Department of Game and Fish (WGFD)
Wildlife Protection Recommendations for Wind Energy Development in Wyoming (WGFD 2010)

Bureau of Land Management (BLM)
Rawlins Field Office *Wildlife Survey Protocols for Wind Energy Development*,

Generally, UFWS survey recommendations (USFWS 2010, 2011a, and 2011b) include using standard sampling methods to determine avian use of a project area, fatality risk in a project area, the presence of sensitive species and other species of interest, and to provide a baseline for assessing displacement effects and habitat loss. USFWS recommends that sampling frequency, type, and duration be sufficient to account for variability of avian use between and within sampling periods. When more precise estimates of density are required for a special status species, other methods, including radar or nocturnal surveys have been recommended when risks for collision are expected.

Similarly, the Bureau of Land Management (BLM) Rawlins Field Office Wildlife Survey Protocols for Wind Energy Development recommends that surveys be sufficient to detect temporal and spatial use patterns within the project area. Special emphasis is placed on surveys for raptors and sensitive avian species. BLM survey protocols recommend weekly, 20-minute point counts to record avian use of a project area. Survey times are recommended to be varied weekly to ensure that avian use during daylight hours is adequately documented. In addition to weekly surveys, marine radar is recommended to better define avian foraging, dispersal, and migration paths.

Wyoming Game and Fish Department's (WGFD) Wildlife Protections Recommendations for Wind Energy Development in Wyoming recommend sufficient numbers of weekly point count surveys during spring and fall migration periods following similar protocols as specific by BLM with survey periods of twenty minutes at each point. WGFD recommends that four surveys be conducted during winter months to capture overwintering avian species. For raptor species, WGFD recommends nest surveys and weekly day-long surveys during spring and fall migration periods.

Review of Existing Data

In compliance with its obligations under the National Environmental Policy Act of 1969 (NEPA), BLM is preparing an environmental impact statement (EIS) analyzing the potential impacts of the Chokecherry and Sierra Madre Wind Energy Project (Project) on lands and resources within the Project area. Between June 2008 and June 2009, avian use data were collected for much of the Project area as part of the BLM NEPA process [Johnson et al. 2008]. Data were collected using standard point count methods at 19 locations in all months except January and February when much of the Project area was inaccessible due to adverse weather conditions. All sites except for three were visited 31 times during the survey period.

WEST, Inc. (WEST) conducted avian point surveys of the Project area between June 26, 2008 and June 15, 2009. A portion of these data are analyzed in WEST's report, "*Baseline Avian Use Studies for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming: Final Summer and Fall Interim Report, June 26-October 14, 2008*" (Johnson et al. 2008). WEST also prepared a report summarizing bat surveys conducted between July 13 through October 13, 2008 titled, "*Bat Surveys for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming: Final Report*" (Solick et al. 2008). SWCA has completed additional analyses of all data collected in 2008 and 2009 to determine compliance with various agency monitoring recommendations.

Data collected during the 2008 and 2009 surveys are sufficient to provide estimates of avian use of the Project area as well as to provide initial estimates of the frequency of each species at rotor-swept heights. Horned lark (*Eremophila alpestris*) was predominantly the most common avian species detected in the 2008 and 2009 surveys, having over 800 individual detections. The next most common species were the common raven (*Corvus corax*) with less than 200 detections, and vesper sparrow (*Pooecetes gramineus*) with less than 150 detections. Golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis),* and common raven were most commonly observed within the rotary height of the turbines.

Data collected during 2008 and 2009 comply with the agency wind energy survey recommendations described in the previous section and serve as one year of suggested pre-construction monitoring data. Data collected for purposes of NEPA compliance provide estimates of collision and fatality risk and enable determination of avian use of the Project area, the presence of sensitive species and other species of interest, as well as providing a baseline for assessing displacement effects and habitat loss.

Project-Specific Protocols

To supplement the 2008-2009 dataset and to better identify concentrated avian use areas for development of a Project-specific Avian Protection Plan (APP) and an Eagle Conservation Plan (ECP), an intensive one-year survey will be used to better identify avian use areas in the Project area. Protocols have been developed following the various agency recommendations discussed above and in coordination with local USFS, BLM, and WGFD biologists. The protocols are consistent with agency recommendations and will provide more detailed site-specific use data than the protocols individually recommended by any of the agencies.

A combination of avian radar, raptor count stations, standard grid sampling, and point count surveys will be used to determine avian use across the Project area with emphasis on large raptors including golden eagles. Avian radar technology has been identified by the BLM and USFWS as a desired method to map areas of high avian use. The sampling design will follow recommendations made by the USFWS, BLM, and WGFD by combining radar surveys with standard point count and breeding bird methodologies. The radar technology will also enable better identification of bat use areas and relative densities of bats in the Project area.

A DeTect Merlin Avian Radar System will be used to map avian use across the Project area. The DeTect Merlin radar system is a trailer-mounted system with a 200-watt horizontal solid-state S-band radar and a 10–kilowatt (kW) vertically operating X-band open array radar. The horizontal radar has a range of 2 to 5 miles in a 360-degree pattern around the unit. The vertical radar has a 24-degree beam width and detects flight paths 0.75 to 2.00 miles above the unit.

The avian radar system requires weekly maintenance and fueling and cannot be moved over extremely rough terrain on a regular basis. Additionally, the system will not differentiate between large raptors such as golden eagles and other large birds including geese, other large raptors, and possibly even ravens and; therefore, will be used in conjunction with field surveys to validate radar recorded data. However, the radar system, when coupled with point count verification of avian use, will allow for accurate horizontal and vertical mapping of avian use in the Project area. The radar system will also enable mapping of high use areas for bat species.

A combination of raptor and point surveys and breeding bird grid surveys will be conducted in concert with the radar survey. This design will provide intensive survey information regarding avian use patterns within the radar survey perimeter for each season. Raptor count stations, point counts, and breeding bird surveys will be used to validate the radar data and provide estimates of species-specific use patterns. Raptor stations and point count surveys will record the location, flight path, approximate height, and time of use for any individual observed from the count location. Raptor count locations will be surveyed for 8-12 hours per day during periods with the highest likelihood for detection of migrating birds and/or large raptors. Standard 20-minute point counts will be completed at each raptor count location. Timing of point count surveys at each location will be varied to determine patterns of avian use during daylight hours.

In addition to the raptor, point count, and radar surveys, breeding bird surveys will be completed at 15 locations across the Project area. Breeding bird surveys will be conducted following the grid monitoring protocols published by the Rocky Mountain Bird Observatory (RMBO) (Hanni et al. 2010). Grid survey locations will be randomly selected using a generalized random tessellation stratified design to ensure a spatially balanced design stratified by major vegetation and habitat types in the Project area. Data collected as part of the grid monitoring efforts will also be used to validate radar data and better determine avian species use. As part of the breeding bird surveys, waterfowl and water bird use surveys will be conducted three times annually (springs, summer, and fall) to identify migrating and resident species.

Locations for placement of the radar and for conducting point count surveys (Figure 1) and breeding bird surveys were determined using a four-tiered approach:

- Tier 1 – Survey areas should determine avian use within the Project area.

- Tier 2 – Survey areas should overlap possible foraging areas for large raptors (winter range areas, prairie dog towns, waterfowl use areas, etc.).
- Tier 3 – Survey areas should be in locations to allow for detection of avian movement into and out of the Project area.
- Tier 4 – Survey areas should capture variability in habitat and topography.

Locations of radar placement were refined following attendance at DeTect's radar training courses and during coordination with DeTect's radar placement specialists. Figure 1 reflects the revised radar locations. Final placement of the radar unit and final point locations for survey will be determine in early spring 2011 following radar unit delivery.

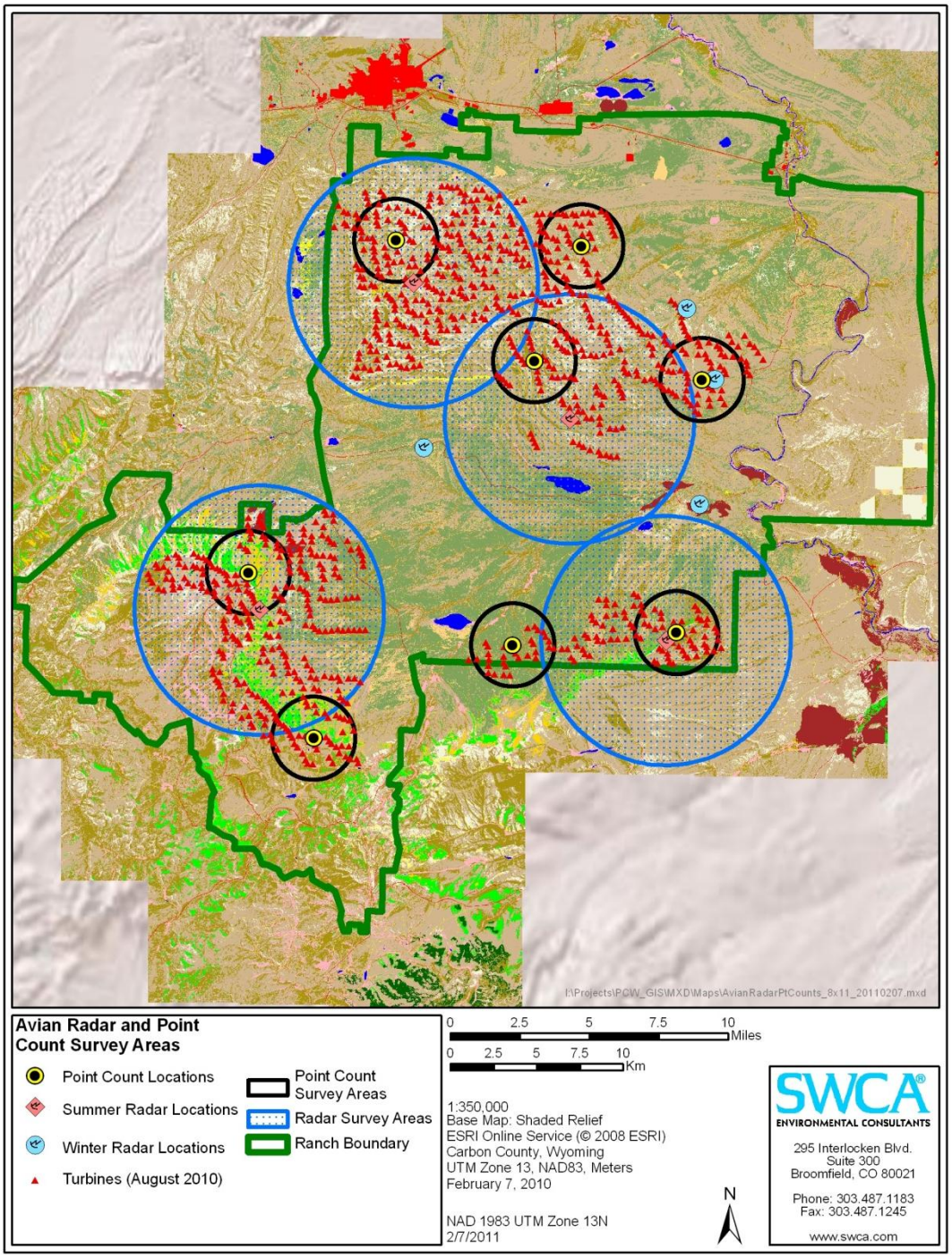


Figure 1. Approximation of area surveyed using avian radar and traditional point count methodologies with respect to possible wind turbine locations. Spring, summer, and fall radar installation locations are the center point of the large blue circles. Proposed point count locations are the center points of the small black circles. Potential winter radar locations are the four blue points. Final locations for survey will be determined in coordination with BLM, WGFD, and USFWS.

The radar unit will be placed at five locations within the Project area (Figure 1). Point counts will be completed at nine additional locations to map avian use patterns where radar coverage is not possible. Eight of these point counts will be completed at permanent sampling locations. The ninth point count location will be completed at the radar site to validate the data being collected by the radar unit. During winter months, the radar will be placed in a location that has high probability of access on a weekly basis. Much of the project area is covered in snow and large drifts during winter; therefore, radar placement in winter will likely be near the Bolton Ranch headquarters, south of I-80 near the North Platte River, on the Bolton Road east of Teton Reservoir, or on the north side of the Chokecherry project area (Figure 1). Winter point count survey locations will also be adjusted as needed to account for winter weather conditions, access issues, and safety concerns.

Based on a four mile radius for radar surveys and a one mile radius for point count surveys, approximately 90-93% of the turbine locations, depending on winter radar placement, will be directly surveyed. It is likely that this percentage is higher than 90-93% for large raptors including bald and golden eagles as many of the point count locations have visibility of several miles and recent radar advancements may allow for detection of large raptors out to 5+ miles. Point count locations outside of the radar survey perimeters have been placed to allow for detection of raptors moving into the Project area and between radar surveyed zones.

Helicopter flights will be completed in mid-April or early May to document eagle nesting activity as well as nesting activity of other raptors that are incidentally observed. Aerial nest activity surveys will be completed in accordance with the recent draft eagle guidance (USFWS 2011b). Following identification of active eagle nests, follow-up productivity surveys will be completed from the ground above/below the nest to determine nesting and fledging success.

The protocols and schedule outlined below will be followed for monitoring and mapping avian and bat use across the Project area using the marine radar system, point counts, and breeding bird surveys.

1. Winter 2010/2011 – Radar construction, programming, and training. The Draft APP/ECP will be delivered to USFWS, BLM, and WGFD for review in late winter/early spring. Among other descriptive sections, the preliminary plan will contain the detailed sampling protocols, preliminary mitigation and avoidance measures, and detailed adaptive management protocols. Monthly reconnaissance surveys will be completed to document eagle use of the Project area during winter months and to help determine best locations for winter 2011/2012 deployment of the radar system.

2. Spring and Early Summer 2011 – Radar surveys will begin in the southern portion of the Project area. The radar system will be moved once during the spring migration period to capture as much data as possible during this period. During the migration period, weekly migratory bird counts and raptor use surveys will be conducted at the eight point counts identified in Figure 1 as well as at the point where the radar system is placed. Breeding bird surveys will be completed at 15 locations across the Project area. Surveys for waterfowl and other waterbirds will be conducted once during the spring migration at Kindt, Rasmussen, Sage Creek, and Teton reservoirs. Analysis of the radar data will be

used to identify areas with high avian and bat use. The following schedule will be used for spring and early summer 2011 surveys:

a. March 15 – May 15, 2011: Radar system will be initialized and debugged prior to main migratory period. Initial installation will occur at the southeastern-most radar survey location identified on Figure 1. This survey location will detect migrating birds in areas adjacent to the Platte River corridor and along the ridgeline north of the Jack Creek road. Weekly point count locations will be completed at the eight point count locations identified in Figure 1 as well as at the radar location.

b. May 15–July 31, 2011: Radar system will be moved to the northeastern survey location (Figure 1). This survey location will detect migrating birds adjacent to and along the Bolten Rim as well as in the basin below the Bolten Rim. Migratory use and raptor soaring locations within and adjacent to the ridgelines in this portion of Chokecherry will also be surveyed using the radar system. Between May 15 and June 30, weekly point surveys will be conducted at the eight locations identified on Figure 1 as well as at the radar location. During the month of July, the point count locations will be visited twice instead of every week in compliance with BLM and WGFD recommendations. Additionally, this time is between migratory periods and typically bird movements are lower because of nesting activities. A point count will be conducted weekly at the radar installation location during this period during routine maintenance activities.

c. May 25–June 30, 2011: Breeding bird surveys will be completed once at each of 15 locations across the Project area to determine relative abundance, species richness, and habitat use patterns. Breeding bird surveys will follow RMBO grid survey protocols (Hanni et al. 2010). Bird flight patterns will be documented to better define risks of wind development activities. All raptors as well as their flight paths and heights will be recorded at all breeding bird locations regardless of whether the raptor falls within the grid survey area.

d. May 1, 2011: An agency meeting will be scheduled to discuss preliminary analyses of radar data from early spring migration to allow for more informed use of the radar and survey data that will be used in the APP/ECP.

3. Late Summer – Fall 2011: The radar system will be moved once during the fall migration period to capture as much data as possible during this period. During the migration period, weekly migratory bird counts and raptor use surveys will be conducted at the eight point counts identified in Figure 1 as well as at the point where the radar system is placed. Waterfowl and wading bird surveys will be conducted once during late summer to detect nesting activity and once during fall migration at Kindt, Rasmussen, Sage Creek, and Teton reservoirs. Analysis of the radar data collected during spring and early summer will be completed to evaluate bird and bat use and to identify appropriate mitigation measures that could be implemented. The following schedule will be used for late summer and fall 2011 surveys:

a. August 1: A revised APP/ECP will be delivered to the agencies for review and approval. The revised APPECP will contain the mitigation measures that will be applied to remove or minimize risks to avian species. The revised APP/ECP will also identify the adaptive management process that will be followed to update the APP/ECP and apply additional site-specific mitigation measures as additional data are obtained prior to, during and after construction. An interim report of radar data trends and observations will also be provided with the revised APP/ECP.

b. August 1– September 30, 2011: Radar system will be installed at the western radar location in the Chokecherry project area radar survey location identified on Figure 1. This survey location will detect migrating birds in the western portion of Chokecherry as well as along the rim of Chokecherry and the basin between Chokecherry and Atlantic Rim. During the month of August, the point count locations will be visited twice instead of every week. A point count will be conducted weekly at the radar installation location during August as part of routine maintenance activities. During September, weekly point count locations will be completed at the eight point count locations identified in Figure 1 as well as at the radar location.

c. October 1–November 15, 2011: Radar system will be moved to a location along the rim of Miller Hill in the southwestern portion of the project area (Figure 1). This survey location will detect birds in the Miller Hill area and below the Miller Hill rim in the Sage Creek Basin. Weekly point count surveys will be conducted at the eight locations identified on Figure 1 as well as at the radar location.

4. Winter 2011/2012 (November 16, 2011–March 30, 2012) – A final APP/ECP will be delivered to the agencies for review. The final APP/ECP will identify the avoidance, minimization, and mitigation measures to reduce threats to eagles and other avian species. The radar system will be deployed in a suitable location to ensure weekly maintenance is possible during winter months. Weekly bird observations will be recorded during routine maintenance activities at the radar location. Weather permitting, monthly counts will be conducted at the point count locations in Figure 1.

5. Spring 2012 – PCW and the agencies will initiate the adaptive management process identified and approved in the final APP to incorporate site-specific mitigation and avoidance measures into final project designs and the Final Environmental Impact Statement and Record of Decision. A final report documenting the results of the radar and point count efforts will be provided at least two weeks prior to the initiation of the adaptive management process to ensure adequate review time prior to discussions.

LITERATURE CITED

Detmers, R., D.A. Buehler, J.G. Bartlett, and N.A. Klaus. 1999. Influence of point count length and repeated visits on habitat model performance. Journal of Wildlife Management 63:815-823.

Gerrodette, T. 1987. A power analysis for detecting trends. Ecology 68:1364–1372.

Hester, S.G. and M.B. Grenier. 2005. A conservation plan for bats in Wyoming. Wyoming Game and Fish Department, Nongame Program, Lander, WY.

Johnson, G., T. Rintz, M.D. Strickland, and K. Bay. 2008. Baseline avian use studies for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming: final summer and fall interim report, June 26-October 14, 2008. Submitted to ENSR, Golden, CO by Western Ecosystems Technology, Inc., Cheyenne, Wyoming.

Reynolds, R.T., J.M. Scott, and R.A. Nussbaum. 1980. A Variable Circular-Plot Method for Estimating Bird Numbers. Condor 82:309-313.

Solick, D., Johnson, G., T. Rintz, and M.D. Strickland. 2008. Bat surveys for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming. Submitted to ENSR, Golden, CO by Western Ecosystems Technology, Inc., Cheyenne, Wyoming.

U.S. Fish and Wildlife Service [USFWS]. 2010. Recommendations on developing effective measures to mitigate impacts to wildlife and their habitats related to land-based wind energy facilities. Submitted to the Secretary of the Interior by the Wind Turbine Guidelines Advisory Committee.

USFWS. 2011a. Draft Land-Based Wind Energy Guidelines, Recommendations on measures to avoid, minimize, and compensate for effects to fish, wildlife, and their habitats

USFWS. 2011b. Draft eagle conservation plan guidance. January 2011.

Wyoming Game and Fish Department [WGFD]. 2010. Wildlife protection recommendations for wind development in Wyoming. Commission approved version (4-23-2010). 70pp.

2012 – 2013 800-meter Raptor Survey Protocols

Chokecherry and Sierra Madre Wind Energy Project

Prepared for:

Power Company of Wyoming, LLC
555 17th Street, Suite 2400
Denver, CO 80202

Prepared by:

SWCA Environmental Consultants
295 Interlocken Blvd., Suite 300
Broomfield, CO 80021
(303) 487-1183 / Fax (303) 487-1245

August 31, 2012

Introduction

The Power Company of Wyoming LLC (PCW) recently initiated revisions to the methodologies currently used to survey for raptors at the Chokecherry and Sierra Madre Wind Energy Project (Project). Based on conversations with U.S. Fish and Wildlife Service (Service) personnel, and in an effort to collect data that are appropriate for use in the Service's model that predicts the potential fatality rate of eagles for wind energy projects (hereafter, the Service's model), raptor survey protocols were revised for the fall 2012 season and for future raptor survey efforts. These survey methodology revisions are fully compliant with the recommendations for raptor surveys set forth by the Service in their Draft Eagle Conservation Plan Guidance (Draft ECP Guidance), the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices (Technical Appendices; as received from Kevin Kritz, Service Region 6, on August 4, 2012), and the Land-Based Wind Energy Guidelines, while still maintaining expansive coverage of the Project site.

Year Two and Year Three 4,000-meter-radius long-watch raptor surveys were fully compliant with the recommendations set forth by the Service's Draft ECP Guidance (Service 2011) and Land-Based Wind Energy Guidelines (Service 2012a), the Bureau of Land Management's (BLM's) Wildlife Survey Protocols for Wind Energy Development (BLM 2008), and the Wyoming Game and Fish Department's (WGFD's) Wildlife Protection Recommendations for Wind Energy Development (WGFD 2010). These surveys were successful in identifying concentrated raptor use areas across the Project that could be used to design avoidance areas in order to minimize avian impacts. Additionally, 4,000-meter data were instructive in showing the Project site is not a strong migratory corridor for raptors, and the flight paths digitized from these data were used to identify high eagle-use areas as recommended by the Service's Technical Appendices (Service 2012b).

Because the Service's model requires data from 800-meter point count survey efforts, the 4,000-meter data were truncated to include only those observations that occurred within 800 meters (Figure 1). However, due to the 4,000-meter raptor count locations being placed on promenades, ridgelines, and in areas where there was an expectation of high raptor use, estimates of use, and therefore risk calculations that were developed for use across the entire Project site, were overstated due to many of these data being collected in identified high-use areas. Because use estimates were being driven upwards for the Project by many of the data being collected in high-use areas, unrealistic projections of eagle risk were being generated by the Service's model. This in part facilitated the revision to survey protocols.

800-meter Raptor Survey Protocols

The revised raptor count protocols follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices (Service 2012b), and are also in accordance with the aforementioned guidance documents produced by the Service, BLM, and WGFD. PCW also sought consultation with Dr. Joshua Millspaugh (Professor of Wildlife Management, University of Missouri) to ensure the development of a rigorous sampling design that would result in the collection of data appropriate for the analysis methods and fatality model currently being used by the Service.

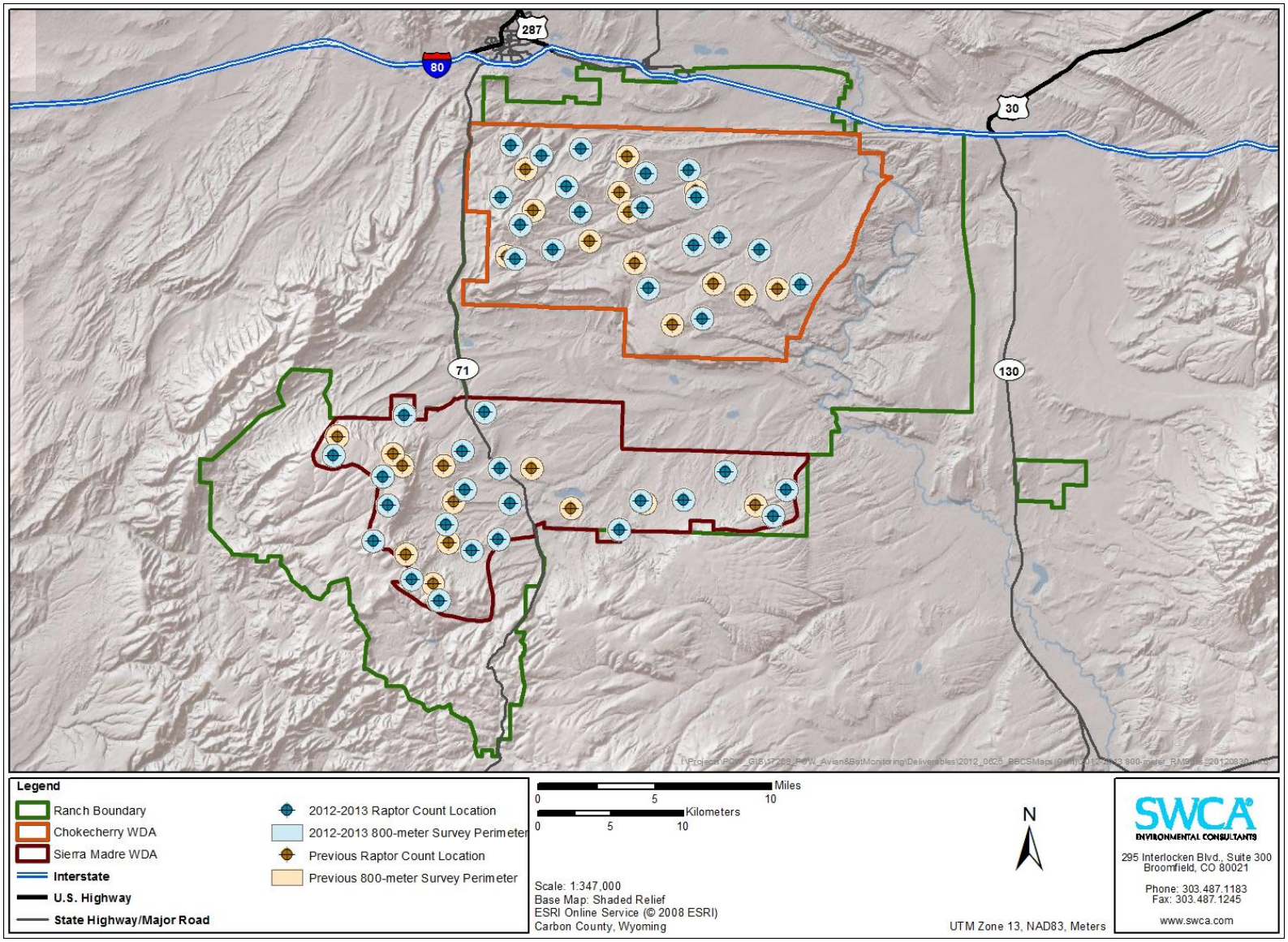


Figure 1. All 800-meter raptor count locations and survey perimeters on the Project site.

Based upon agency guidance and logistical considerations, the revised protocols were designed to include 40, 800-meter raptor count locations throughout areas of the Project site where turbine development was likely (Figure 1). Locations were selected using a spatially balanced random selection process with the number of 800-meter raptor count locations per area determined by the relative turbine density in the different areas of the Project. Raptor count locations were selected such that no overlap occurs between survey locations or with the avoidance areas that PCW has committed to as part of the Project Eagle Conservation Plan (ECP). Once the initial 800-meter raptor count locations were selected, some minimal micrositing of the locations was conducted to ensure full visibility of the survey areas and safe and consistent accessibility on the part of field personnel. Coordinates for each of the final 800-meter raptor survey locations are listed in Table 1. Landmarks and lathe stakes were located within each survey location perimeter to provide distance references for field personnel completing survey efforts. When the 800-meter radius survey areas of the new 40 point count locations are combined with the 800-meter radius survey areas of the Year Two and Year Three sites, 34.7% of the probable development areas are covered by raptor count surveys, which is greater than the 30% recommendation made by the Service (Service 2012b).

Table 1. Names and Coordinates for 2012 – 2013 800-meter Raptor Count Locations.

Location	Easting	Northing
CB1	326414	4597515
CB2	321985	4595451
CB3	323462	4597428
CB4	329306	4599449
CC1	316611	4621251
CC2	315166	4616447
CC3	318351	4619090
CC4	314539	4621971
CC5	317418	4614741
CC6	319335	4621702
CC7	313825	4618366
CC8	314807	4614119
CC9	319294	4617332
CMD1	334482	4612363
CMD2	331648	4614732
HB1	323818	4620014
HB2	326781	4620243
MH1	302291	4600564
MH2	305677	4599125
MH3	307684	4592030

Location	Easting	Northing
MH4	305024	4594675
MH5	309573	4590571
MH6	306043	4597131
PG1	313663	4594801
PG2	311358	4598224
PG3	307172	4603361
PG4	314434	4597259
PG5	313730	4599682
PG6	312721	4603547
PG7	310058	4595825
PG8	311832	4594006
PG9	311187	4600886
SCR1	333505	4598194
SCR2	332597	4596408
SR1	323560	4617658
SR2	327318	4618336
UH1	328912	4615606
UH2	327099	4615081
UI1	323987	4612091
UI2	327702	4610001

Surveys will be conducted at each raptor count location for two hours per guidance in the Technical Appendices (Service 2012b). Two avian technicians will each survey two locations a day for a total of 20 locations per week. Each location will be surveyed bi-weekly. A schedule for all 40 raptor count locations was designed to provide survey coverage across all daylight hours for each of the 40 sites. The schedule was also designed such that the four

raptor count surveys conducted on any given day are separated temporally and spatially to provide independence of any observations that are made.

Avian technicians are equipped with binoculars, spotting scopes, laser rangefinders, and aerial maps to assist with accurate detection and documentation of all raptors observed within the 800-meter survey area. Each aerial map is displayed with relevant landforms occurring in the area, locations of lathe stakes, and concentric rings at each 200-meter interval to facilitate accurate distance estimation (Attachment 1). Each raptor flight path is recorded by technicians on the provided aerial maps. Additional data collected include species, number of individuals per observation, age, sex, behavior, bearing to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, and hourly weather data (Attachment 2).

At present, the 800-meter raptor counts are scheduled to continue bi-weekly at each location through the fall migration period (November 15). Surveys are tentatively slated to occur once per month at each location during the winter season (December 2012 through March 2013) due to accessibility and safety concerns. The end of winter surveys in March 2013 will complete three full years of data collection for the Project. Consultations are ongoing with Service personnel to determine the scope of potential survey efforts beyond March 2013.

References

Bureau of Land Management (BLM). 2008. Wildlife Survey Protocols for Wind Energy Development.

U.S. Fish and Wildlife Service (Service). 2011. Draft Eagle Conservation Plan Guidance. Available online at http://www.fws.gov/windenergy/. Accessed December 2011.

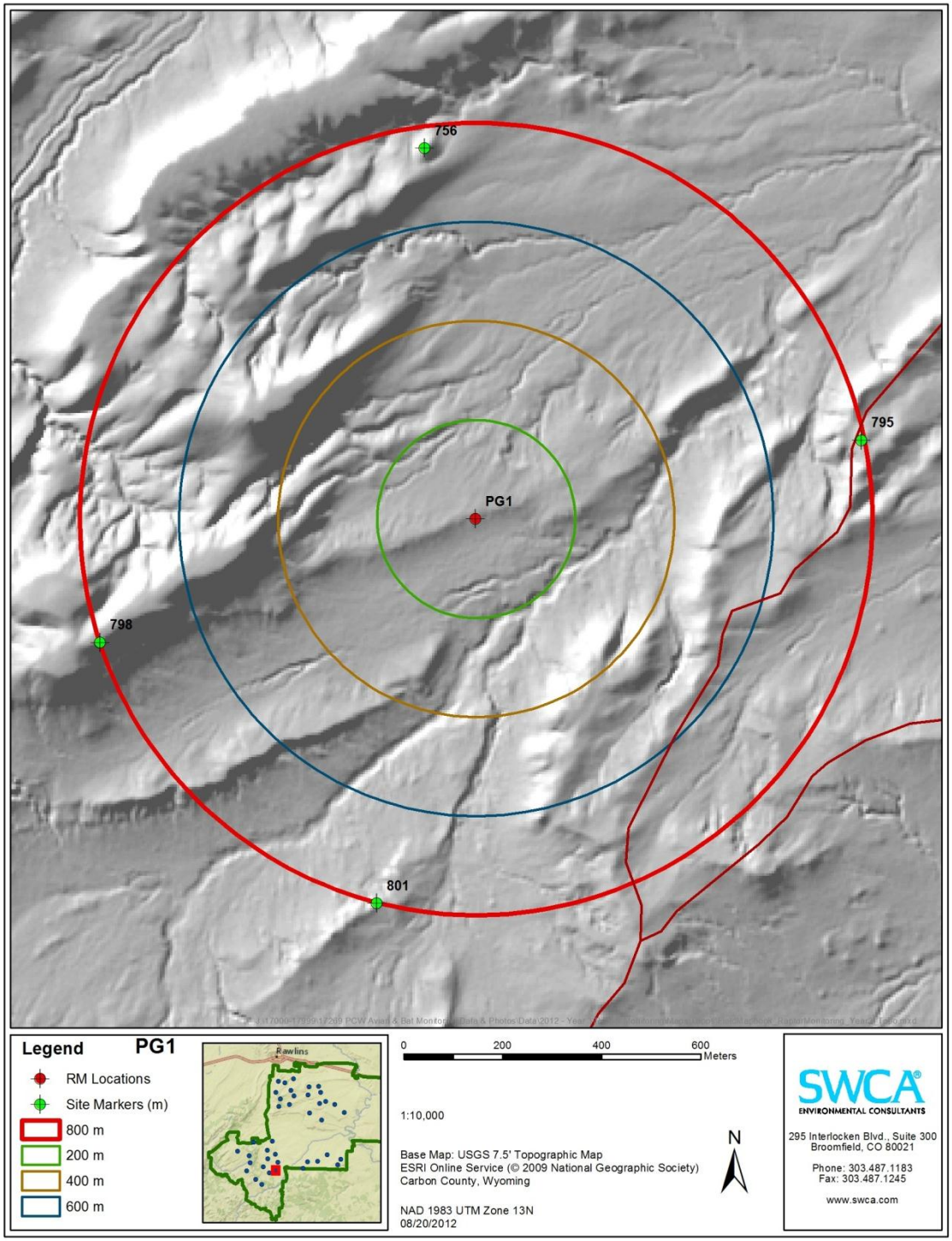
———. 2012a. Land Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at http://www.fws.gov/windenergy/docs/WEG_final.pdf. Accessed August 2012.

———. 2012b. Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices. Received from Kevin Kritz, Service Region 6, on August 4, 2012.

Wyoming Game and Fish Department (WGFD). 2010. Wildlife Protection Recommendations for Wind Energy Development in Wyoming. Wyoming Game and Fish Commission Approved November 17, 2010. Wyoming Game and Fish Department, Cheyenne, WY.

ATTACHMENT 1

Example Aerial Map Used to Map Flight Paths during 800-meter Raptor Count Surveys



Aerial map example.

ATTACHMENT 2

Data Sheets Used to Collect Data during 800-meter Raptor Count Surveys

PCW 2011 Raptor Survey

Field Observer: _____

Survey Location: _____

Start time: _____

End time: _____

Date: _____

Page: ____ **of** _____

Target #	Obs #	Species	# Birds	Age	Sex	Behav	Bearing to Bird (°)	Distance to Bird (m)	Angle of Bird (°)	Heading of Bird	0-30	30-150	150+	Time Begin	Time End

PCW 2011 Raptor Survey Notes

Field Observer: _____ **Survey Pt:** ____

Date: _____ **Page:** _____ of _____

Other species and Notes:

Weather Conditions				
		Wind		
Time	**Sky**	**Dir**	**Spd**	**Temp (°F)**

Incidental Species Observations

Revised 2012-2013 800-meter Raptor Survey Protocols

Chokecherry and Sierra Madre Wind Energy Project

Prepared for:

Power Company of Wyoming, LLC
555 17th Street, Suite 2400
Denver, CO 80202

Prepared by:

SWCA Environmental Consultants
295 Interlocken Blvd., Suite 300
Broomfield, CO 80021
(303) 487-1183 / Fax (303) 487-1245

November 2012

The Power Company of Wyoming (PCW) recently initiated revisions to the methodologies currently used to survey for raptors at their Chokecherry and Sierra Madre Wind Energy Project (Project). Based on conversations with U.S. Fish and Wildlife Service (Service) personnel, and in an effort to collect data that are appropriate for use in the Service's model that predicts the potential fatality rate of eagles for wind energy projects (hereafter, the Service's model), raptor survey protocols were revised for the fall 2012 season and for future raptor survey efforts. On August 31, 2012, PCW provided the Service with a revised protocol for conducting eagle and raptor surveys at 40 800-meter point count survey sites throughout the Project. PCW began surveying the 40 locations at the beginning of the autumn 2012 survey season and it is anticipated that those survey efforts will continue through October 2012 at which time the revised protocols discussed in this document will be initiated. On September 28, 2012, the Service issued a letter recommending slight modifications to the August 31, 2012 protocols. This revised protocol addresses the comments made by the Service and specific responses to each comment made are provided in Attachment 1.

These survey methodology revisions are fully consistent with the recommendations for raptor surveys set forth by the Service in their Draft Eagle Conservation Plan Guidance (Draft ECP Guidance), the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices (Technical Appendices; as received from Kevin Kritz, Service Region 6, on August 4, 2012), and the Land-Based Wind Energy Guidelines, while still maintaining expansive coverage of the Project Site.

Year Two and Year Three long-watch raptor surveys were fully consistent with the recommendations set forth by the Service's Draft ECP Guidance (Service 2011) and Land-Based Wind Energy Guidelines (Service 2012a), the Bureau of Land Management's (BLM's) Wildlife Survey Protocols for Wind Energy Development (BLM 2008), and the Wyoming Game and Fish Department's (WGFD's) Wildlife Protection Recommendations for Wind Energy Development (WGFD 2010). These surveys were very successful in identifying concentrated raptor use areas across the Project that could be used to design avoidance areas to minimize avian impacts. Additionally, long-watch survey data were instructive in showing the Project Site is not a strong migratory corridor for raptors, and the flight paths digitized from these data were used to identify high eagle use areas as recommended by the Service's Technical Appendices (Service 2012b).

The revised raptor count protocols follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices (Service 2012b), and are also in accordance with the aforementioned guidance documents produced by the Service, BLM, and WGFD. PCW also sought consultation with Dr. Joshua Millspaugh (Professor of Wildlife Management, University of Missouri) to ensure the development of a rigorous sampling design that would result in the collection of data appropriate for the analysis methods and fatality model currently being used by the Service.

Based upon agency guidance and logistical considerations, the revised protocols were designed to include 60, 800-meter raptor count survey sites throughout the Chokecherry and Sierra Madre Wind Development Areas (WDAs) where turbine development is likely (Figures 1 and 2). Most of the 60 survey sites are identical to the original 40 sites identified in the August 31, 2012 protocols. However, some of those 40 sites were shifted slightly to

accommodate the placement of the additional 20 survey sites and ensure that no overlap occurs between samples. Seven of the new sites correspond to raptor monitoring locations that were used in 2011 and spring 2012 survey efforts (RM2, RM7, RM9, RM10, RM12, RM14, and RM15). Efforts were made to resample as many of the previous sampling sites as possible. However, because of PCW's Project re-design efforts identified in the Project Eagle Conservation Plan (ECP), many of the previous sampling locations are outside or on the very edge of the current development area and could not be included without violating the spatially balanced design that is critical to these protocols.

A spatially balanced sampling design was used to capture the variability in habitat conditions, terrain features, and turbine numbers and densities. Minimum convex polygons (MCPs) were placed around each of 10 discrete potential development areas that are separated by Turbine No-Build areas, topography, or other factors (Figures 1 and 2). MCPs were evaluated for differences in habitat characteristics, forage potential, and topography. While differences in habitat characteristics, forage potential, and topography occur among the 10 MCPs, within each MCP, these factors are similar and additional stratification beyond the MCP level was not necessary.

Using the "Create Spatially Balanced Points" tool in ArcGIS Geostatistical Analyst, 250 spatially balanced locations were generated within the MCPs. Using the spatially balanced points, survey sites were selected sequentially in a manner that was consistent with the recommendations made by the Service while ensuring that no overlap occurs between survey areas. Total number of sampling sites per MCP was based on the relative surface area and number of turbines in the MCP. Two primary selection criteria were used to select sampling sites. First, no overlap of sampling areas was permitted (sites had to be separated by more than 1,650 meters). Second, because of logistical considerations, sampling sites were required to be reasonably accessible from the existing road network and in a safe location. If a potential sampling location violated either of the selection criteria it was dropped and the next point was evaluated. Tables 1 and 2 provide the locations of each sampling site in the WDAs as well as information specific to the MCPs and sampling sites.

The first 36 survey sites that were selected correspond to locations that were identified in the August 31, 2012 protocols. These were sequentially selected using the spatially balanced points that were generated as part of the process described above while controlling for site overlap and logistical considerations for survey. Of the remaining 24 sites, 4 correspond with the original 40 sites with locations slightly shifted to avoid overlap with new sites, 7 correspond with the long-watch raptor monitoring sites that were surveyed in 2011 and spring/summer 2012, 3 were selected outside of the current probable turbine footprint, and 10 were selected using the remaining spatially balanced points. Some minimal micrositing of the new locations is anticipated to ensure maximum visibility of the survey areas as well as safe and consistent accessibility on the part of field personnel.

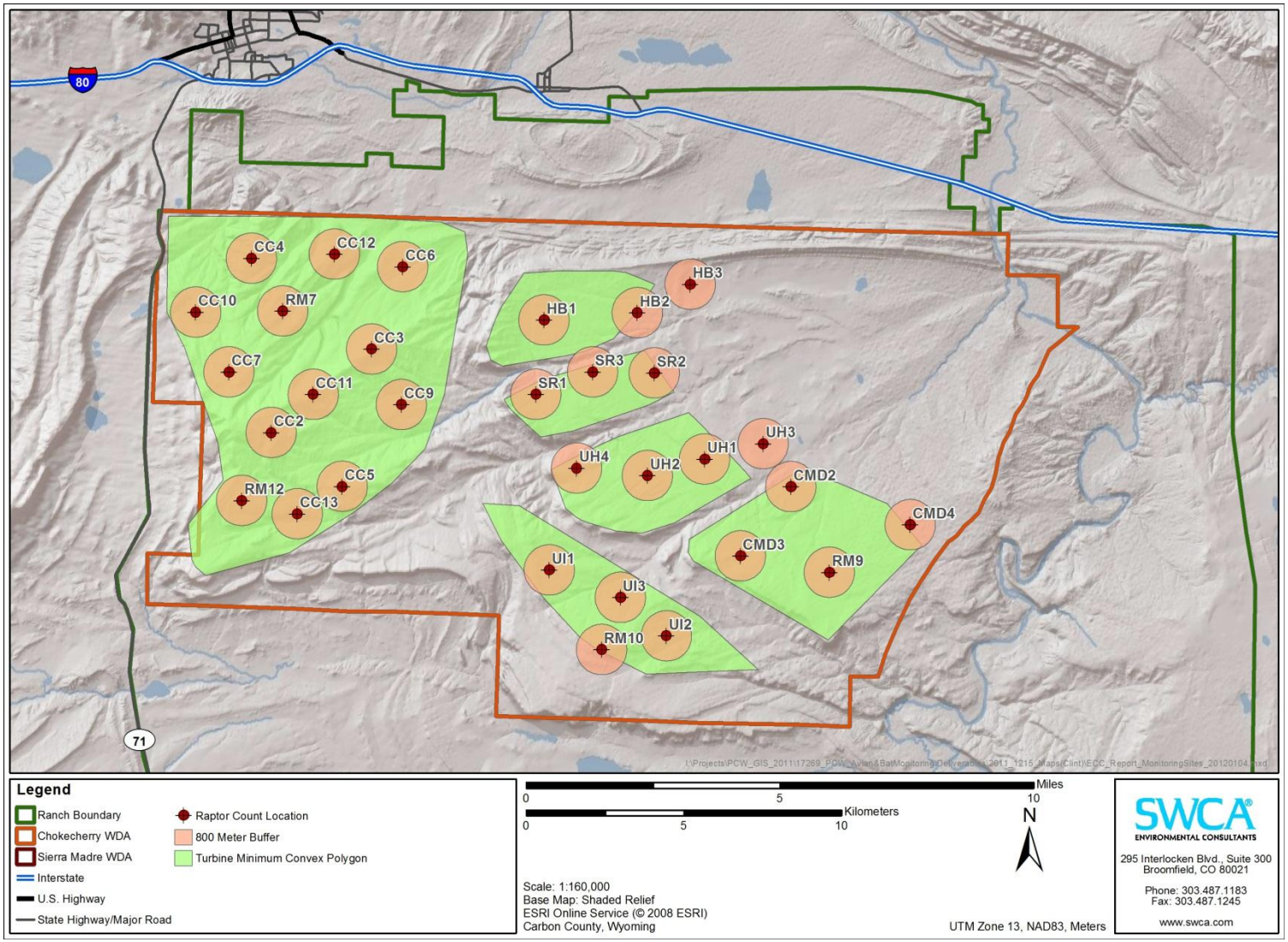


Figure 1. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Chokecherry.

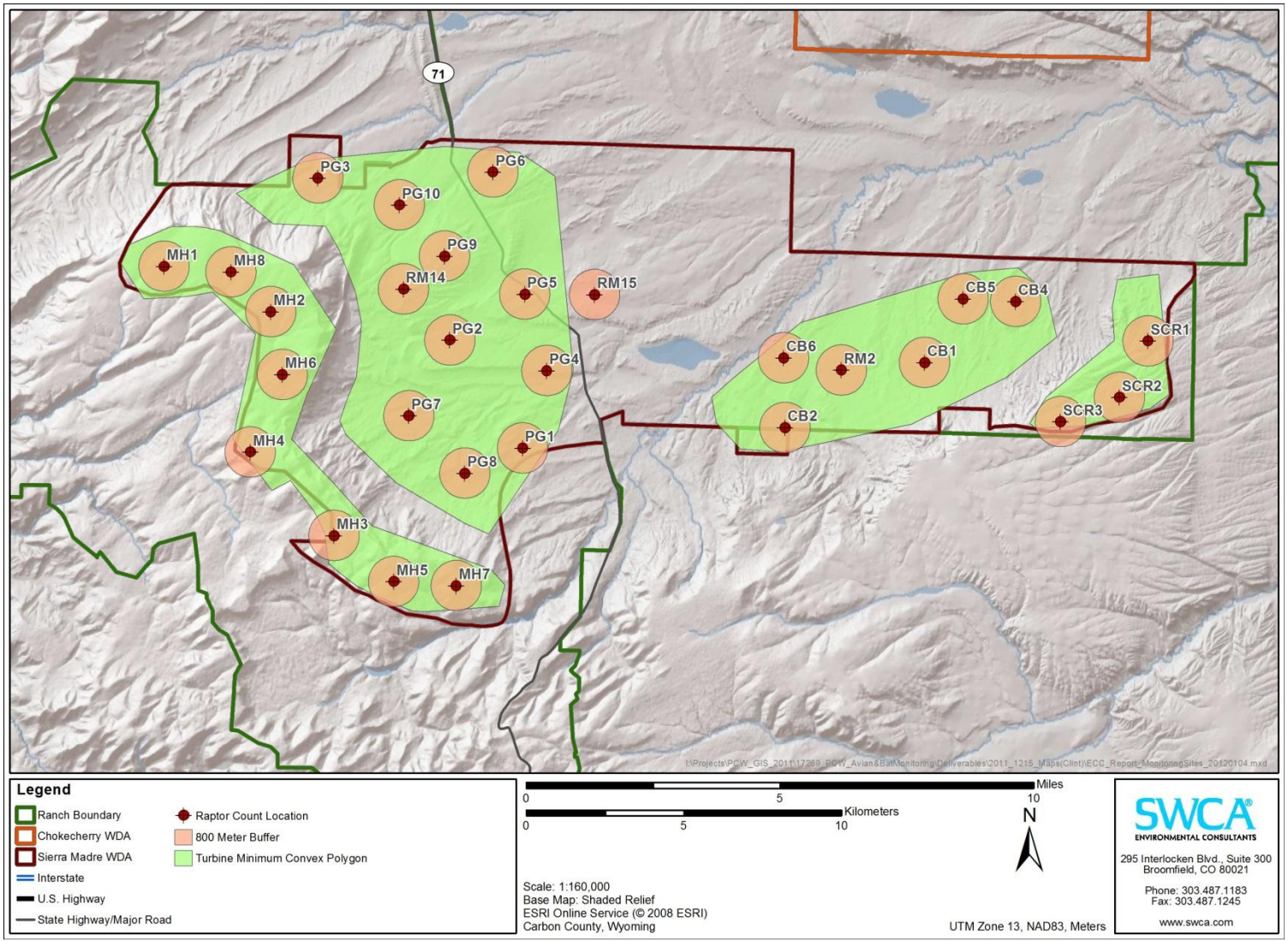


Figure 2. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Sierra Madre.

Table 1. Fall 2012-2013 Avian Monitoring Survey Locations for the Chokecherry WDA.

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Chokecherry	Chokecherry	CC2	Original Fall 2012 Site	315166	4616447
		CC3	Original Fall 2012 Site	318351	4619090
		CC4	Original Fall 2012 Site	314539	4621971
		CC5	Original Fall 2012 Site	317418	4614741
		CC6	Original Fall 2012 Site	319335	4621702
		CC7	Original Fall 2012 Site	313825	4618366
		CC9	Original Fall 2012 Site	319294	4617332
		CC10	New 2012 Survey Site	312770	4620262
		CC11	New 2012 Survey Site	316501	4617656
		CC12	New 2012 Survey Site, original CC1 site shifted north to eliminate overlap with RM7	317170	4622100
		CC13	New 2012 Survey Site, original CC8 site shifted southeast to eliminate overlap with RM12	315993	4613871
		RM7	2011-2012 Long-watch Site	315531	4620298
		RM12	2011-2012 Long-watch Site	314228	4614294
	Coal Mine Draw	CMD2	Original Fall 2012 Site	331648	4614732
		CMD3	New 2012 Survey Site	330049	4612535
		CMD4	New 2012 Survey Site, original CMD1 site shifted east to eliminate overlap with RM9	335437	4613524
		RM9	2011-2012 Long-watch Site	332870	4612018
	Hogback South	HB1	Original Fall 2012 Site	323818	4620014
		HB2	Original Fall 2012 Site	326781	4620243
		HB3	New 2012 Survey Site	328457	4621145
	Smith Rim	SR1	Original Fall 2012 Site	323560	4617658
		SR2	Original Fall 2012 Site	327318	4618336
		SR3	New 2012 Survey Site	325362	4618367
	Upper Hugus	UH1	Original Fall 2012 Site	328912	4615606
		UH2	Original Fall 2012 Site	327099	4615081
		UH3	New 2012 Survey Site	330772	4616091
		UH4	New 2012 Survey Site	324853	4615321
	Upper Iron Springs	UI1	Original Fall 2012 Site	323987	4612091
		UI2	Original Fall 2012 Site	327702	4610001
		UI3	New 2012 Survey Site	326242	4611221
		RM10	2011-2012 Long-watch Site	325646	4609568

*UTM Zone 13, NAD83, Meters

Table 2. Fall 2012-2013 Avian Monitoring Survey Locations for the Sierra Madre WDA.

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Sierra Madre	Central Basin	CB1	Original Fall 2012 Site	326414	4597515
		CB2	Original Fall 2012 Site	321986	4595452
		CB4	Original Fall 2012 Site	329306	4599449
		CB5	New 2012 Survey Site	327638	4599529
		CB6	New 2012 Survey Site, original CB3 site shifted west to eliminate overlap with RM2	321942	4597660
		RM2	2011-2012 Long-watch Site	323776	4597273
	Miller Hill	MH1	Original Fall 2012 Site	302291	4600564
		MH2	Original Fall 2012 Site	305677	4599125
		MH3	Original Fall 2012 Site	307684	4592030
		MH4	Original Fall 2012 Site	305024	4594675
		MH5	Original Fall 2012 Site	309573	4590571
		MH6	Original Fall 2012 Site	306043	4597131
		MH7	New 2012 Survey Site	311561	4590443
		MH8	New 2012 Survey Site	304412	4600385
	Pine Grove	PG1	Original Fall 2012 Site	313663	4594801
		PG2	Original Fall 2012 Site	311358	4598224
		PG3	Original Fall 2012 Site	307172	4603361
		PG4	Original Fall 2012 Site	314434	4597259
		PG5	Original Fall 2012 Site	313730	4599682
		PG6	Original Fall 2012 Site	312721	4603547
		PG7	Original Fall 2012 Site	310058	4595825
		PG8	Original Fall 2012 Site	311832	4594006
		PG9	Original Fall 2012 Site	311187	4600886
		PG10	New 2012 Survey Site	309753	4602508
		RM14	2011-2012 Long-watch Site	309884	4599843
		RM15	2011-2012 Long-watch Site	315948	4599668
	Sage Creek Rim	SCR1	Original Fall 2012 Site	333505	4598194
		SCR2	Original Fall 2012 Site	332596	4596407
		SCR3	New 2012 Survey Site	330727	4595638

*UTM Zone 13, NAD83, Meters

Landmarks will be identified and visible stakes will be placed around each survey location perimeter to provide distance references for field personnel completing survey efforts. The 800-meter radius survey areas of the new 60 point count locations provide coverage for approximately 35% of the probable turbine locations, which is greater than the 30% recommendation made by the Service (Service 2012b). Additionally, 46.7% of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of all previous survey sites was not possible because many fall outside of the current project layout in Turbine No-Build areas and use of those sites would violate the spatially balanced study design in addition to sampling areas that are already known as high use areas for eagles and other raptors. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. However, many of the 60 new survey sites overlap with areas previously surveyed as part of 2011 and 2012 raptor monitoring efforts. When these areas are included, 50.3% of the area surveyed as part of previous raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). Three avian technicians will each survey two locations per day for a total of 6 locations per day and 60 locations in a 10 day period. Each location will be surveyed twice per month. A schedule for all 60 raptor count locations was designed to provide survey coverage across all daylight hours for each of the 60 sites. The schedule was also designed such that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

Avian technicians will be equipped with binoculars, spotting scopes, laser rangefinders, and aerial maps to assist with accurate detection and documentation of all raptors observed within the 800-meter survey area. Each aerial map is displayed with relevant landforms occurring in the area, locations of stakes, and concentric rings at each 200-meter interval to facilitate accurate distance estimation (Attachment 2). Each raptor flight path is recorded by technicians on the provided aerial maps. Additional data collected include species, number of individuals per observation, age, sex, behavior, bearing to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, interactions with other birds, and hourly weather data among other variables (Attachment 3).

Surveys at the 60 800-meter raptor counts will begin in November 2012 and are scheduled to continue bi-weekly at each location through August of 2013. Surveys during winter months will be completed on the same schedule as the remainder of the year and efforts will be made to survey at least 50% of all locations twice per month during winter. However, winter surveys are subject to cancellation or delay based on weather conditions and safety of the field technicians.

REFERENCES

Bureau of Land Management (BLM). 2008. Wildlife Survey Protocols for Wind Energy Development.

U.S. Fish and Wildlife Service (Service). 2011. Draft Eagle Conservation Plan Guidance. Available online at http://www.fws.gov/windenergy/. Accessed December 2011.

———. 2012a. Land Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at http://www.fws.gov/windenergy/docs/WEG_final.pdf. Accessed August 2012.

———. 2012b. Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices. Received from Kevin Kritz, Service Region 6, on August 4, 2012.

Wyoming Game and Fish Department (WGFD). 2010. Wildlife Protection Recommendations for Wind Energy Development in Wyoming. Wyoming Game and Fish Commission Approved November 17, 2010. Wyoming Game and Fish Department, Cheyenne, WY.

ATTACHMENT 1

Response to Survey Recommendations Made in the Service's September 28, 2012 Letter

The following recommendations were made by the Service in the September 28, 2012 letter to Garry Miller (PCW) regarding Eagle Use Sampling Considerations and Recommendations for the proposed Chokecherry-Sierra Madre Wind Energy Development Project. A response is provided to document how each recommendation has been incorporated into the revised 800-meter point count survey protocols. Recommendations are presented in italics below.

1. *We recommend focusing sampling efforts within the most recently proposed project footprint in order to quantify eagle use in areas where turbines are planned for location. By collecting eagle and raptor use data in areas of likely development, we believe it will be easier to obtain a more reliable estimate of risk to eagles in these areas, from which more informed, site-specific, predictions can be made.*

   Response: The revised protocols and placement of the 60 point count sites are based on the most recent proposed Project footprint and probable turbine locations. The most recent Project footprint reflects PCW's commitment to the Turbine No-Build areas identified in the Project ECP.

2. *Although we recommend concentrating sampling effort within the project footprint as stated above, we believe it also would be prudent to establish additional sample points outside of the currently proposed footprint in areas of potential development. Adding points in areas of possible alternative turbine layouts will provide data to assess the impact of those alternatives, which may be necessary if survey results identify areas of high eagle use within areas currently proposed for development. Without eagle use data outside of the proposed footprint, it would be difficult to show that the relocation of turbines outside of the currently proposed project footprint would avoid and minimize impacts to eagles. Without these data, the only likely alternatives would be a reduction in the total number of turbines, or a reduction in the spacing between turbines in areas where avian and raptors surveys were conducted.*

   Response: Three of the 60 point count survey sites (RM15, HB3, and UH3) are placed outside of the most current probable turbine locations. Several additional locations (e.g., CMD2, HB2, RM10, SR2) have a substantial portion of their survey areas that fall outside of the current probable turbine locations. Each of these sites provides survey coverage in areas of the Project Site where turbines could be located if the current probable turbine location footprint changes.

3. *We recommend resampling at least fifty percent of the raptor point counts from previous years: this will help distinguish between apparent changes in documented eagle use caused by different point locations and associated differences in detectability, versus actual changes in habitat use. This is an important consideration, because the number of eagles and their location on the landscape is likely to vary across years (e.g., not every nest is active every year), making it difficult to account for inter-annual variability, which might lead to inaccurate conclusions about the risk of eagle fatalities. For example, observing fewer eagles at a second set of survey points could be misinterpreted as an area of lower eagle use, when in fact the number of eagles and eagle use across the landscape decreased due to other factors. In this*

example, the use (and hence risk) might have been the same for all survey points, but sampling different points across years would lead to the erroneous conclusion. Resampling some points across years can reduce this uncertainty by creating an index or allow for scaling of observations across years.

Response: Nearly 50% (46.7%) of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of previous survey sites is not possible because many fall outside of the current project layout in Turbine No-Build areas. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. Many of the 60 new survey sites overlap with areas previously surveyed as part of 2012 raptor monitoring efforts. When those areas are included, 50.3% of the area surveyed as part of 2012 raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

4. *Previous long-watch raptor surveys were based on an unlimited radius, and analysis of data from these surveys suggests that the detectability of eagles dropped off after 600 to 800 meters. We recommend using a distance of no more than 800 meters for point counts intended to collect data on eagles and other large raptors. This recommendation is found in our draft Eagle Conservation Plan Guidance (Service 2012, Appendix C, p. 18) and in other literature (e.g., Strickland et al. 2011). While it is acceptable to collect data on eagles and other raptors beyond 800 meters (e.g., location, flight height, flight path)—since they may be useful to identify travel corridors and areas of eagle use—the collection of this information should not distract surveyors from collecting data within the 800-meter point count. In addition, because only those data collected within 800 meters will be used in the models to predict eagle fatalities, data collected at distances more than 800 meters should be separated from data collected within 800 meters.*

   Response: Previous long-watch raptor surveys recorded any eagle observed to help identify high use areas per the protocols developed collaboratively between the Service, BLM, and PCW. The analysis of detectability of eagles presented in the Service's comments does not consider that the reason eagle use was higher within 800 meters of previously sampled sites is because those sites were placed on ridgelines and terrain features known to attract or concentrate eagle use, making the likelihood of observing an eagle within 800 meters of a survey site higher than if the point was placed randomly in the landscape where varying terrain features may or may not occur. The implementation of the previous surveys was extremely successful and resulted in the development of Turbine No-Build areas that will avoid impacts to eagles and other avian species in the majority of the high use areas that were identified. To be consistent with with the Service's Draft ECP Guidance, the Service's eagle risk model, and the recommendation made above, all surveys will be conducted using a distance of 800-meters.

5. *Based on recommendations in the draft Eagle Conservation Plan Guidance, the sampling goal should provide a "minimal spatial coverage of at least 30% of the project footprint" (i.e., the total area sampled in any given year should be thirty percent of the total project footprint) (Service 2012, Appendix C, p. 1 8). We recognize that even this level of effort will not provide specific information for seventy percent of the project area; however, it may be assumed that the information is representative of the remaining project area, provided the sample points are appropriately located (e.g., stratified and spatially balanced). To achieve the desired goal of at least 30 percent coverage of the Chokecherry Sierra Madre Proposed Project footprint, we calculate up to 70 survey points are needed, depending on how the project footprint is portrayed.*

   Response: Using the conceptual turbine footprint that PCW provided to the Service, 35% of all turbine locations fall within the 800-meter survey perimeters of the 60 point count sites. As stated above, the entirety of 3 sites and substantial portions of 3 others fall outside of the probable Project footprint in areas where turbines could be placed. These provide adequate coverage of areas outside of the current probable turbine footprint. When combined with the 800-meter radius surveyed areas from previous survey events (2011 and spring/summer 2012), 42% of probable turbine locations are included within the perimeter of 800-meter point count sites.

6. *We recommend sample locations be stratified by features of the landscape that may influence eagle and raptor activity, such as distinct geographic/topographic elements (e.g., escarpments), vegetation (if appropriate), and concentrated prey base. Doing so will allocate sampling points across the project in proportion to their occurrence on the landscape. A common sampling design in use today is the generalized random tessellation stratified sampling design (GRTS). We remain concerned that there is insufficient information about eagle habitat use associated with important eagle use areas including: active nests; concentrated prey base including grouse leks, prairie dog colonies, and reservoirs; as well as topographic features such as Miller Hill. Therefore, we recommend that some sample points be located near these important eagle use areas. Doing so would help with identifying additional avoidance areas or alleviating concerns for increased risk associated with these areas.*

   Response: The spatially balanced design that is discussed in the revised protocols above is reflective of the variability in habitat conditions, terrain features, and turbine numbers and densities. The revised protocols describe the methods used to select sites and the sampling strata and selection criteria that were used to place sites. The 60 sampling sites described in the revised protocols provide coverage in areas that provide some level of foraging, contain sage-grouse leks, and have variable topography that could influence eagle and raptor behavior. Site placement near active eagle nests is difficult because most nests have been avoided and are within the Turbine No-Build areas along the Bolten Rim or North Platte River corridor and, as seen in the data previously collected for the Project, active nests locations change each year.

7. *Based on recommendations in the Service's Eagle Conservation Plan Guidance, count periods should be one to two hours long (Service 2012, Appendix C, p. 18). If longer survey periods are used (e.g., four to six hours), the surveys should be divided into smaller units such as one or two hour blocks (or the actual time of eagle observations recorded), so that the influence of time of day can be evaluated (e.g., in relation to when turbines are inactive).*

   Response: Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD.

8. *We recommend the protocol include a representative distribution of sampling events across all daylight hours across all point locations and seasons. Collecting data "evenly" across time and space should reduce any potential bias associated with locations, seasons, and time of day. This may also make it possible to evaluate how time of day influences eagle use of the site or when eagles are more likely to use specific topographic features. In addition, surveys should include multiple sampling events in each season per point.*

   Response: As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD. The sampling schedule will provide survey coverage across all daylight hours for each of the 60 sites. The schedule also makes certain that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

9. *We recommend locating survey sampling points at least 800 meters (0.5 mile) from active eagle and ferruginous hawk nests to limit disturbance. It may be possible to reduce this distance if topographic features create a visual barrier between observers and the nest.*

   Response: Should an eagle or ferruginous hawk nest become active within 800 meters of a survey site, PCW will coordinate with the Service and BLM to evaluate the most appropriate methods to take to ensure that survey activities do not disrupt nesting. With PCW's Turbine No-Build areas and Project re-design efforts, most eagle and raptor nests in the Project Site have been avoided by 800 meters or more. However, some survey sites are located within 800 meters of historically active nests. As stated above, sampling locations have been selected in a spatially balanced, stratified manner using methods recommended by the Service. Maintaining the sites that are located within 800 meters of historically active nests is necessary to maintain this spatially balanced design. Since Project survey efforts began in 2008, no active ferruginous hawk nests have been identified.

10. *We recommend data collection include identification of eagle species and their flight minutes within the 800-meter point count. Additional data collection could include, but should not necessarily be limited to (in relative order of importance): age and sex (if possible), flight path, flight behavior (e.g., soaring, kiting), activity (e.g., territory defense, foraging), interactions with other birds, flight height, obvious prey items, time observed outside of the 800-meter point count, and time perched. It is acceptable to record detections beyond 800-meters as these can provide additional information about eagle and raptor use of the project area. However, collecting data beyond 800-meters should not detract from observations made within the 800-meter point count.*

    Response: Only those observations occurring within 800 meters of the survey sites will be recorded. As described in the protocols and illustrated on the data collection forms in Attachment 3, data collection efforts will provide all of the information recommended by the Service.

11. *We recommend collecting data on all raptors to the extent feasible; however, collecting data on other raptors should not preclude the collection of data on eagles.*

    Response: Data on all raptors and other species of interest will be collected in a manner identical as that used for eagles unless those efforts interfere with data collection for eagles.

12. *Based on eagle use data collected between April of 2011 and April of 2012, eagle activity relative to sampling effort appears to be higher in the winter and summer periods (Table 1). Higher eagle activity in the summer likely corresponds to the time during which adults are actively feeding young and when young are learning to fly. Higher eagle activity in the winter may be related to the presence of migrant eagles, or could be due to the location of survey points. Because data were not collected following the above recommendations during the summer of 2012, we recommend the collection of eagle and raptor use data continue through the 2013 nesting season (at least through August of 2013) to evaluate this potential season of higher use.*

    Response: Data will be collected through August of 2013. Our interpretation of eagle use in winter and summer periods differs from the Service's interpretation. The Service's interpretation assumes that each minute of eagle use is independent and evenly distributed across the landscape. Based on the survey data, it is clear that most of the eagle minutes recorded across all seasons are not independent and that the simple statistic of flight minutes per survey minute does not consider that observations are not independent in space or time and therefore mischaracterizes seasonal use and risk. As an example, 72 of the 141 minutes (51%) of winter use observed in the Project Site occurred at two sites on two days. On December 8, 2011, 35 eagle flight minutes were recorded at RM11 and on March 9, 2012 37 minutes of eagle use were recorded at RM14. On both days, field technicians wrote on datasheets that the use was associated with 2-3 individuals who were using the area for a long period of time. If the three eagles at RM14 had not been observed on March 9, no winter use would

have been observed within 800 meters of that sampling site. Similarly, if the use at RM11 would not have been observed on December 8, only 3 minutes of eagle use over would have been observed at that site during winter months and use would have been decreased by 95%. The observed activity on December 8 and March 9 is indicative of short duration, concentrated use by a few individuals rather than of high eagle use of the Project throughout the entire winter period. The data also indicate that for most of the Project Site there is no risk or very low risk to eagles during winter. Summer data are very similar to winter data. During summer 2011, only 71 eagle minutes were recorded. Nearly 60% of these minutes were associated with only 3 observations of individual circle soaring birds at RM14 and RM5. This indicates that the high use the Service cites is not from adults feeding young or young learning to fly. Rather, the behavior observed indicates that this is localized use by individual birds utilizing thermals created by warm summer temperatures.

13. *In several locations, the document states that it was "fully compliant" with recommendations by the U.S. Fish and Wildlife Service (Service). First, it is important to understand that the draft Eagle Conservation Plan Guidance is voluntary; consequently we prefer to use the term "consistent with" rather than "compliant with" when describing recommendations found within the Eagle Conservation Plan Guidance. Second, we do not believe that the protocol provided by PCW is, in fact, consistent with the Eagle Conservation Plan Guidance for numerous reasons, one key reason being that the limited number of 800-meter survey points do not provide the recommended minimum 30 percent coverage of the project footprint. Additionally, we do not believe it is scientifically justifiable to combine survey points from multiple years in order to meet the minimum recommended standard of 30 percent coverage: the minimum 30 percent coverage should occur within each individual year.*

    Response: The recommended changes have been made. The term "compliant" has been changed to "consistent". As stated above, 35% of the probable turbine locations will be surveyed using the revised protocols.

14. *The document makes a definitive statement about "unrealistic projections" concerning eagle risk. This statement is based on several assumptions, including that previous survey efforts correctly identified areas of high eagle use. One of the reasons for increasing the spatial coverage in 2012-2013 is to increase our confidence in understanding eagle and raptor use across the Project area. Because substantial uncertainty exists as a result of the limited amount of spatial and temporal survey coverage used to document impacts and relative risk to eagles, the Service believes our projections concerning risk to eagles are realistic and clearly demonstrate the need for increased coverage. In addition, our letter of August 10, 2012, identified numerous areas of potential high eagle use that are not currently included in the avoidance areas, such as the golden eagle nest in the southwest corner of Sierra Madre. Our letter also identified the presence of high density prey base, proximity of sage grouse leks and other habitat features that are used by eagles. Because these habitat features (and others) are not included in the proposed avoidance areas, the projections of risk and high eagle fatalities identified by the Service are possible.*

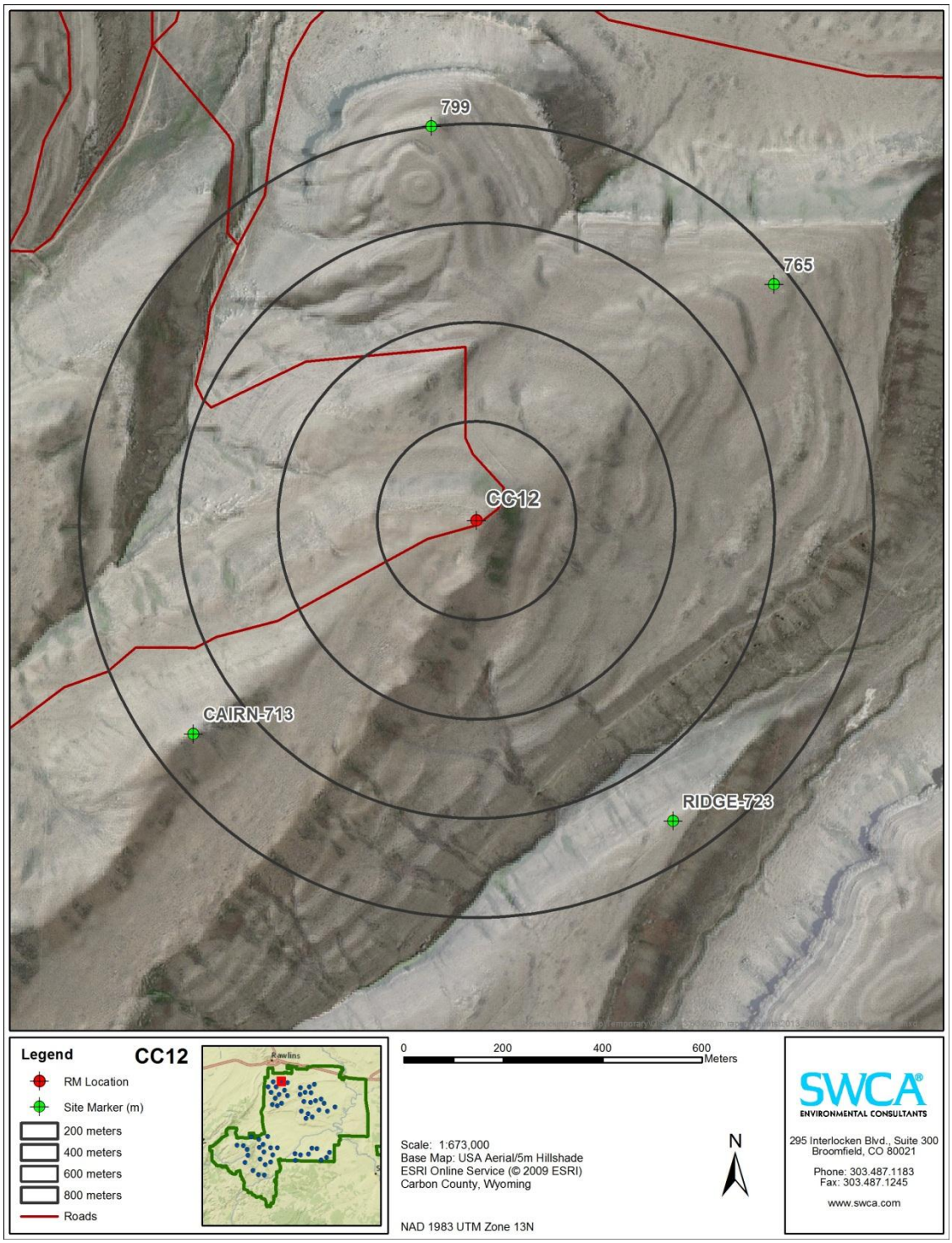
Response: The comments made above have been addressed in the revised protocols, the prey-base report submitted to the Service, and the Project ECP. We concur that within the context of the Service's eagle fatality model, the revised protocols will help address uncertainties.

15. *The data sheet attached to the protocol provided by PCW does not appear to have a means of recording flight path in data. It should be clear how flight path data will be collected on the existing data sheet, or additional datasheets should be included if there is more than one.*

    Response: Attachment 2 contains an example figure that is used to record flight paths for eagles and other raptors. Additionally, multiple rows of data are recorded for each eagle observed which results in multiple spatial points per individual bird. Fitting a line between each point for each observed eagle provides another mechanism to create flight paths. The methods used to collect data are described in the revised protocols.

ATTACHMENT 2

Example Aerial Map Used to Map Flight Paths during 800-meter Raptor Count Surveys



Aerial map example. Numbers next to site markers indicate distance from raptor monitoring location to the site marker location. Concentric rings around raptor monitoring location indicate 200-meter distance intervals to aid in estimation of distance. Other features on the landscape (roads, rock cairns, etc.) are also noted on each map to aid in distance and location estimation.

ATTACHMENT 3

Data Sheets Used to Collect Data during 800-meter Raptor Count Surveys

PCW 2012-2013 Raptor Survey

Field Observer: _____

Survey Location: _____

Start time: _____

End time: _____

Date: _____

Page: ____ **of** _____

Target #	Obs #	Species	# Birds	Age	Sex	Behav	Bearing to Bird (°)	Distance to Bird (m)	Angle of Bird (°)	Heading of Bird	0-30	30-150	150+	Time Begin	Time End

PCW 2012-2013 Raptor Survey Notes

Field Observer: _____ **Survey Pt:** ____

Date: _____ **Page:** _____ of _____

Other species and Notes.

Weather Conditions

Time	Sky	Wind Dir	Wind Spd	Temp (°F)

Incidental Species Observations
for eagles and raptors note distance and bearing