EXHIBIT Q
THREATENED AND ENDANGERED PLANT AND ANIMAL SPECIES

OAR 345-021-0010(1)(q) and OAR 345-022-0070

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Q.1 INTRODUCTION

The Energy Facility Siting Council (EFSC; Council) previously approved construction of the 404-megawatt (MW) Montague Wind Power Facility (Facility)[1] and found that the Facility complies with the Threatened and Endangered Species standard required in OAR 345-022-0070. Montague Wind Power Facility, LLC (Montague) is constructing the Facility in two phases. Phase 1 consists of up to 81 wind turbines generating 202 MW of power within the approved site boundary. Montague has already begun construction of Phase 1 under the conditions of the existing Site Certificate. Phase 2 consists of an expanded site boundary, solar array, and battery storage. The analysis in this exhibit focuses on Phase 2 and the three design scenarios described in *Request for Amendment No. 4 Project Description and OAR Division 27 Compliance* (referred to herein as RFA 4)

Q.2 SUMMARY OF ANALYSIS RESULTS

The Council previously found in the Final Order on the Application, Final Order on Amendment 1, Final Order on Amendment 2, and Final Order on Amendment 3 that based on compliance with existing Site Certificate conditions, the Facility is not likely to cause a significant reduction in the likelihood of survival or recovery of any threatened or endangered species.[2] This exhibit presents an analysis of the changes to impacts to wildlife habitat and threatened and endangered species resulting from the modifications proposed in RFA 4 to demonstrate that the Facility, as amended, will still comply with the requirements. The analysis results are summarized as follows:

- **Site Boundary Expansion**: The expansion of the site boundary will add land that contains potentially suitable habitat for one listed mammal (Washington ground squirrel [WGS]), and three listed plants (Laurent's milk-vetch, sessile mousetail, and dwarf evening primrose). However, approximately 80 percent of the proposed expanded site boundary is Category 6 habitat with "low potential to become essential or important habitat for fish and wildlife" per OAR 635-415-0025(6), which will allow Montague to relocate facilities from higher-quality habitat in the approved site boundary to lower-quality habitat in the proposed expanded site boundary. Therefore, the site boundary expansion will reduce the potential for impacts on listed species.
- **Addition of Solar Array**: Montague will limit construction of the solar array to Category 6 habitat within the solar micrositing area. Category 6 habitat is not considered suitable for any state or federal listed species (plants and WGS) with potential to occur within the site boundary. Therefore, addition of the solar array is not expected to displace listed species.
- **Addition of Battery Storage**: The battery storage system will occupy up to 6 acres of Category 6 habitat adjacent to Oregon Highway 19. This impact will be insignificant, accounting for less than 1 percent of the total impact for Phase 2. Category 6 habitat is not considered suitable for any state or federal listed species with potential to occur within the site boundary. Therefore, addition of battery storage is not expected to displace listed species.

Q.3 CONDITION COMPLIANCE

The Third Amended Site Certificate imposes four conditions (91, 93, 94, and 95) designed to reduce or avoid potential impacts to habitat and sensitive wildlife resources. The modifications proposed under RFA 4 do not affect Montague's ability to comply with these Site Certificate

[1] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility*. July 11.

[2] EFSC. 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility.* p. 37. July 12.

conditions. No new conditions are needed for protection of listed species. Conditions 91 and 93 impose conditions regarding finalization of the Wildlife Mitigation Monitoring Plan (WMMPs) and Habitat Mitigation Plan (HMPs). Montague proposes minor changes to Conditions 91 and 93 as described in Exhibit P. Condition 95 addresses the implementation of measures to mitigate impacts to sensitive wildlife habitat during construction. Montague proposes the addition of phasing language to Condition 95, as underlined below.

95 The certificate holder shall implement measures to mitigate impacts to sensitive wildlife habitat during construction including, but not limited to, the following:

(a) The certificate holder shall not construct any facility components within areas of Category 1 habitat and shall avoid temporary disturbance of Category 1 habitat.

(b) Before beginning construction of a phase of the facility, but no more than two years prior to the beginning of construction, the certificate holder shall hire a qualified professional biologist to conduct a survey of all areas to be disturbed by construction for threatened and endangered species. The certificate holder shall provide a written report of the survey and a copy of the survey to the Department, the Oregon Department of Fish and Wildlife (ODFW), and the Oregon Department of Agriculture (ODA). If the surveys identify the presence of threatened or endangered species within the survey area, the certificate holder shall implement appropriate measures to avoid a significant reduction in the likelihood of survival or recovery of the species, as approved by the Department, in consultation with ODA and ODFW.

(c) Before beginning construction of a phase of the facility, the certificate holder's qualified professional biologist shall survey the Category 1 Washington ground squirrel habitat to ensure that the sensitive use area is correctly marked with exclusion flagging and avoided during construction. The certificate holder shall maintain the exclusion markings until construction has been completed.

(d) Before beginning construction of a phase of the facility, certificate holder's qualified professional biologist shall complete the avian use studies that began in September 2009 at six plots within or near the facility site as described in the Final Order on the Application. The certificate holder shall provide a written report on the avian use studies to the Department and to ODFW.

(e) Before beginning construction of a phase of the facility, certificate holder's qualified professional biologist shall complete raptor nest surveys within the raptor nest survey area as described in the Final Order on the Application. The purposes of the survey are to identify any sensitive raptor nests near construction areas and to provide baseline information on raptor nest use for analysis as described in the Wildlife Monitoring and Mitigation Plan referenced in Condition 91. The certificate holder shall provide a written report on the raptor nest surveys and the surveys to the Department and to ODFW. If the surveys identify the presence of raptor nests within the survey area, the certificate holder shall implement appropriate measures to assure that the design, construction and operation of the facility are consistent with the fish and wildlife habitat mitigation goals and standards of OAR 635-415-0025, as approved by the Department, in consultation with ODFW.

(f) In the final design layout of the facility, the certificate holder shall locate facility components, access roads and construction areas to avoid or minimize temporary and

permanent impacts to high quality native habitat and to retain habitat cover in the general landscape where practicable.

Q.4 GENERAL INFORMATION

Q.4.1 Analysis Area

Response: In accordance with OAR 345-001-0010(59)(a), the threatened and endangered plant and animal species analysis area includes all the area within the approved and expanded site boundary and the area within 5 miles from the site boundary (Figure Q-1). The analysis in this exhibit supports an amendment request to expand the previously approved site boundary by approximately 13,365 acres to accommodate the development of the remaining 202 MW of power generation approved in the Third Amended Site Certificate.

Q.4.2 Agency Consultation

Response: Montague agency consultation was conducted before the initial field investigations for the Facility began. Additional agency consultation was conducted in 2017 before surveys were initiated for this amendment request. The additional consultation is summarized as follows:

- In a letter dated February 1, 2017, Montague notified Oregon Department of Fish and Wildlife (ODFW) biologist Steve Cherry of Montague's plan to construct the Facility in phases, with the second phase located on lands outside the approved site boundary to avoid WGS habitat. Montague also requested a meeting to discuss plans for preconstruction wildlife surveys. Mr. Cherry provided an email confirming that ODFW deemed the survey protocol acceptable (see Attachment P-2b in Exhibit P).
- During a March 14, 2017 phone call between ODFW biologist Steve Cherry and Montague, the following topics were discussed:
  - ODFW considers the results of protocol-level WGS surveys valid for 3 years.
  - ODFW would not consider reconnaissance-level surveys to be sufficient to identify Category 1 habitat for purposes of the Phase 2 amendment request, even if full protocol-level surveys were implemented prior to construction.
  - Montague will use the ODFW-approved Category 1 areas as avoidance areas for the duration of construction. ODFW protocol states that surveys are valid for 3 years, such that annual protocol-level surveys described in Condition 94 should not require a complete resurvey every year. ODFW recommends that annual surveys during the 3-year period after protocol-level surveys have been completed only need to be conducted in areas where WGS were identified during protocol-level surveys to see if locations have changed.
  - ODFW recommends development of permanent infrastructure needed to access facilities (e.g., access roads for transmission line maintenance) in areas where potentially suitable WGS habitat occurs as it is difficult to predict where WGS will occur in the future.

Q.5 THREATENED AND ENDANGERED PLANT AND ANIMAL SPECIES

OAR 345-021-0010(1)(q) requires the following:

Information about threatened and endangered plant and animal species that may be affected by the proposed facility, providing evidence to support a finding by the Council as required by OAR 345-022-0070. OAR 345-022-0070 requires the following:

"[T]he Council, after consultation with appropriate state agencies, must find that:

(1) For plant species that the Oregon Department of Agriculture has listed as threatened or endangered under ORS 564.105(2), the design, construction and operation of the proposed facility, taking into account mitigation:

(a) Are consistent with the protection and conservation program, if any, that the Oregon Department of Agriculture has adopted under ORS 564.105(3); or

(b) If the Oregon Department of Agriculture has not adopted a protection and conservation program, are not likely to cause a significant reduction in the likelihood of survival or recovery of the species; and

(2) For wildlife species that the Oregon Fish and Wildlife Commission has listed as threatened or endangered under ORS 496.172(2), the design, construction and operation of the proposed facility, taking into account mitigation, are not likely to cause a significant reduction in the likelihood of survival or recovery of the species."

OAR 345-021-0010(1)(q)(A) *Based on appropriate literature and field study, identification of all threatened or endangered species listed under ORS 496.172(2) and ORS 564.105(2) that may be affected by the proposed facility.*

Response: Identification of state or federal listed, proposed, and candidate species that might be affected by the proposed Facility involved a combination of literature review and the familiarity of CH2M HILL Engineers, Inc. (CH2M) personnel with the region. Field studies (surveys) were then designed to verify the presence or absence of species. Before initiating field studies, a desktop survey and information search was completed for the entire analysis area. Information and data gathered during the desktop survey were then used to inform the planned field surveys in areas where facilities will be located. The desktop information review included the approved and proposed expanded site boundary and the area 5 miles outside of the approved and expanded site boundary (analysis area).

Q.5.1 Literature Review

Species data were obtained from the U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation System (IPaC) list of threatened, endangered, proposed, and candidate species that may be present within 5 miles of the Facility site boundary (USFWS, 2017) and from the Oregon Biodiversity Information Center (ORBIC) database query (see Exhibit P, Attachment P-4a). There are no Oregon Department of Agriculture (ODA) plant protection and conservation programs that apply within the analysis area, nor are wildlife conservation programs in place.

Based on these data, 31 state and federal threatened, endangered, and candidate species were identified as potentially occurring within the analysis area. State-sensitive species and federal species of concern (nonlisted, special-status species) are addressed in Exhibit P. State and federal threatened, endangered, proposed, and candidate species are addressed in this Exhibit Q.

Table Q-1 provides a summary of the threatened, endangered, proposed, and candidate plant and wildlife species with known or potential occurrence within the analysis area. Of these species, only steelhead (Middle Columbia River Evolutionarily Significant Unit [ESU]), Laurent's milk-vetch, sessile mousetail, dwarf evening primrose, and WGS have been documented within 5 miles of the

Facility. Listed steelhead are documented in Rock Creek and the Columbia River, which are both outside of the Facility area, and therefore steelhead will not be affected by the Facility.

The list of species in Table Q-1 differs slightly from the species identified in 2010[3]. Three species no longer appear on the list, and five species have been added that were identified using ORBIC and IPaC. The five added species did not previously appear on the Oregon Natural Heritage Information Center (ORNHIC, 2007) and USFWS (2009a and 2009b) Gilliam County lists. The three species that no longer appear on any lists are bald eagle, sockeye salmon, and mardon skipper. Bald eagle has been delisted since the original analysis was completed. Sockeye salmon and mardon skipper occur in Klickitat County, Washington, but not within 5 miles of the approved and proposed expanded site boundary, according to IPaC. Additional description of plants and wildlife is provided after the table.

Table Q-1. Federal and State Threatened and Endangered Species with Potential to Occur within 5 Miles of the Approved and Proposed Expanded Facility Site Boundary – State of Oregon

Species	Scientific Name	State Status[a]	Federal Status[a]	Potential Habitat within the Facility Site Boundary
Mammals				
Washington ground squirrel	*Urocitellus washingtonis*	LE	--	Yes
Gray Wolf	*Canis lupus*	LE	LE	No
North American Wolverine	*Gulo luscus*	PT	PT	No
Fisher	*Martes pennanti*	--	C	No
Birds				
Northern spotted owl	*Strix occidentalis caurina*	LT	LT	No
Yellow-billed cuckoo	*Coccyzus americanus)*	--	LT	No
Amphibians				
Oregon spotted frog	*Rana pretiosa*	--	LT	No
Fish				
Bull trout	*Salvelinus confluentus*	--	LT	No
Steelhead – Lower Columbia River DPS	*Oncorynchus mykiss*	--	LT	No
Steelhead – Mid-Columbia River DPS, Summer run	*O. mykiss*	SV	LT	No
Steelhead – Upper Columbia River DPS	*O. mykiss*	--	LE	No
Steelhead – Snake River Basin DPS	*O. mykiss*	--	LT	No
Steelhead – Upper Willamette River DPS	*O. mykiss*	--	LT	No
Chinook Salmon – Snake River Basin DPS	*Oncorhynchus tshawytscha*	LT	LT	No
Chinook Salmon – Lower Columbia River ESU	*O. tshawytscha*	--	LT	No
Chinook Salmon – Upper Columbia River ESU	*O. tshawytscha*	--	LE	No

[3] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. pp. 88-92. September 10.

Facility. Listed steelhead are documented in Rock Creek and the Columbia River, which are both outside of the Facility area, and therefore steelhead will not be affected by the Facility.

The list of species in Table Q-1 differs slightly from the species identified in 2010[3]. Three species no longer appear on the list, and five species have been added that were identified using ORBIC and IPaC. The five added species did not previously appear on the Oregon Natural Heritage Information Center (ORNHIC, 2007) and USFWS (2009a and 2009b) Gilliam County lists. The three species that no longer appear on any lists are bald eagle, sockeye salmon, and mardon skipper. Bald eagle has been delisted since the original analysis was completed. Sockeye salmon and mardon skipper occur in Klickitat County, Washington, but not within 5 miles of the approved and proposed expanded site boundary, according to IPaC. Additional description of plants and wildlife is provided after the table.

Table Q-1. Federal and State Threatened and Endangered Species with Potential to Occur within 5 Miles of the Approved and Proposed Expanded Facility Site Boundary – State of Oregon

Species	Scientific Name	State Status[a]	Federal Status[a]	Potential Habitat within the Facility Site Boundary
Mammals				
Washington ground squirrel	*Urocitellus washingtonis*	LE	--	Yes
Gray Wolf	*Canis lupus*	LE	LE	No
North American Wolverine	*Gulo luscus*	PT	PT	No
Fisher	*Martes pennanti*	--	C	No
Birds				
Northern spotted owl	*Strix occidentalis caurina*	LT	LT	No
Yellow-billed cuckoo	*Coccyzus americanus)*	--	LT	No
Amphibians				
Oregon spotted frog	*Rana pretiosa*	--	LT	No
Fish				
Bull trout	*Salvelinus confluentus*	--	LT	No
Steelhead – Lower Columbia River DPS	*Oncorynchus mykiss*	--	LT	No
Steelhead – Mid-Columbia River DPS, Summer run	*O. mykiss*	SV	LT	No
Steelhead – Upper Columbia River DPS	*O. mykiss*	--	LE	No
Steelhead – Snake River Basin DPS	*O. mykiss*	--	LT	No
Steelhead – Upper Willamette River DPS	*O. mykiss*	--	LT	No
Chinook Salmon – Snake River Basin DPS	*Oncorhynchus tshawytscha*	LT	LT	No
Chinook Salmon – Lower Columbia River ESU	*O. tshawytscha*	--	LT	No
Chinook Salmon – Upper Columbia River ESU	*O. tshawytscha*	--	LE	No

[3] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. pp. 88-92. September 10.

Table Q-1. Federal and State Threatened and Endangered Species with Potential to Occur within 5 Miles of the Approved and Proposed Expanded Facility Site Boundary – State of Oregon

Species	Scientific Name	State Status[a]	Federal Status[a]	Potential Habitat within the Facility Site Boundary
Chinook Salmon – Upper Willamette River ESU	*O. tshawytscha*	--	LE	No
Plants				
Ute-Ladie's-tresses	*Spiranthes diluvialis*	--	LT	No
Northern Wormwood	*Artemisia borealis* ssp. *Wormskioldi*	LE	--	No
Laurent's milk-vetch	*Astragalus collinus* var. *laurentii*	LT	--	Yes
Sessile Mousetail	*Myosurus sessilis*	C	--	Yes
Dwarf Evening Primrose	*Camissonia pygmaea*	C	SoC	Yes
Clustered Lady's-slipper	*Cypripedium fasciculatum*	C	SoC	No
Suksdorf's Desert-Parsley	*Lomatium suksdorfii*	C	SoC	No
White Meconella	*Meconella oregana*	C	SoC	No
Disappearing Monkeyflower	*Mimulus evanescens*	C	SoC	No
Liverwort Monkey-flower	*Mimulus jungermanioides*	C	SoC	No
Barrett's Beardtongue	*Penstemon barrettiae*	C	SoC	No
Obscure Buttercup	*Ranunculus reconditus* (*triternatus*)	E	SoC	No
Persistent Sepal Yellowcress	*Rorippa columbiae*	C	SoC	No
Pale Blue-eyed Grass	*Sisyrhinchium sarmentosum*	C	SoC	No

[a] Status Definitions:

-- = No status.

LE = Listed Endangered. Taxa listed by the U.S. Fish and Wildlife Service or National Marine Fisheries Service as endangered under the Endangered Species Act, or by the Oregon Department of Agriculture and Oregon Fish and Wildlife under the Oregon Endangered Species Act of 1987. Endangered taxa are those which are in danger of becoming extinct within the foreseeable future throughout all or a significant portion of their range.

LT = Listed Threatened. Taxa listed by the above agencies as Threatened; defined as those taxa likely to become endangered within the foreseeable future.

PT = Proposed Threatened. Taxa listed by the above agencies as Proposed Threatened; defined as candidate species that were found to warrant listing as either threatened and likely to become threatened within 1 year.

C = Candidate. Candidate taxa for which National Marine Fisheries Service or U.S. Fish and Wildlife Service have sufficient information to support a proposal to list under the Endangered Species Act, or which is a candidate for listing by the Oregon Department of Agriculture under the Oregon Endangered Species Act.

CH = Federal dedicated critical habitat.

SoC = Federal Species of Concern.

Q.5.1.1 Plants

Table Q-1 identifies 14 federal and state listed, proposed, or candidate plant species as potentially occurring within the analysis area. Review of habitat requirements determined that Ute ladies'-tresses, northern wormwood, clustered lady's-slipper, Suksdorf's desert-parsley,

white meconella, Barrett's beardtongue, obscure buttercup, persistent sepal yellowcress, and pale blue-eyed grass are not likely to occur within or near the Facility site boundary because of the species' range or lack of suitable habitat within or adjacent to the approved or proposed expanded site boundary (CH2M, 2017a, 2017b). Habitat preferences were derived from the literature and the specialists' regional knowledge and experience for each species.

Three plant species listed in Table Q-1 have potential habitat within or adjacent to the site boundary: the state-listed threatened plant species, Laurent's milk-vetch (*Astragalus collinus* var. *laurentii*), and the state candidate species, sessile mousetail (*Myosurus sessilis*) and dwarf evening primrose (*Camissonia pygmaea*) (CH2M, 2017a; CH2M, 2017b). These plant species were carried forward for field investigation and are further described below.

Laurent's Milk-vetch

Laurent's milk-vetch is Oregon state listed as threatened. This species has no federal status.

In 2009, surveys conducted for Leaning Juniper IIB (LJIIB) discovered a population of Laurent's milk-vetch near Alkali Canyon, about 0.5 mile from proposed Phase 2 turbine locations and within the expanded site boundary (NWC, 2009). ORBIC has a historical record (1950) of the Laurent's milk-vetch within the 5-mile analysis area, but outside of the site boundary (ORBIC, 2017). Laurent's milk-vetch is a perennial that typically occurs on dry slopes with sandy or rocky soils. If additional populations occur, they should be present throughout the year.

Sessile Mousetail

Sessile mousetail is a state candidate for listing as threatened or endangered and a federal species of concern.

Sessile mousetail occurs in alkali flats and vernal pools. ORBIC reported two populations of sessile mousetail within the 5-mile analysis area, but outside of the site boundary. The nearest of these is approximately 0.3 mile north of the western portion of the site boundary on the opposite side of a railway corridor. The other documented population of sessile mousetail is located within the LJII site boundary (NWC, 2009). Five additional populations were documented within the analysis area for the nearby Pebble Springs wind-energy facility, including two populations within the Montague site boundary; however, those populations were located outside of the area surveyed in 2017. In addition, Montague identified potentially suitable alkaline seasonal wetland/vernal pool habitat for this species in several areas within the site boundary (Figure Q-2). The nearest of vernal pool habitat to proposed Phase 2 components is approximately 4 miles. Sessile mousetail is a perennial. If additional occurrences were present onsite, they would be present year-round, although this species would be difficult to distinguish during the dry and nongrowing periods.

As with the Laurent's milk-vetch, primary threats to this species include roadside herbicide application and livestock grazing.

Dwarf Evening Primrose

Dwarf evening primrose is an Oregon State candidate for listing as threatened or endangered and a federal species of concern. It is also classified as a sensitive species in Washington State.

This species occurs on unstable soil or gravel in steep talus, dry washes, banks, and roadcuts. ORBIC had no record of dwarf evening primrose within the 5-mile analysis area and no populations of this species were reported from adjacent and nearby facilities including Leaning Juniper I (LJI), LJII, Pebble Springs, or Shepherds Flat (NWC and WEST, 2005; PPM, 2006; CSF, 2007). However, potentially suitable habitat for this species occurs within the site boundary (see Exhibit P, Attachment P-1b). Dwarf evening primrose is an annual. If it occurred onsite, it would not be present year-round.

Q.5.1.2 Wildlife

Table Q-1 identifies 17 state and federal listed, proposed, and candidate wildlife species potentially occurring within the analysis area. Species that are not state or federal listed, candidate, or proposed are discussed in Exhibit P. Proposed and candidate species are included in this exhibit because of their potential to be listed during the life of the Facility. Most of the wildlife species shown in Table Q-1 occur within the analysis area but are not likely to occur within or near the Facility site boundary because of the species' ranges or lack of suitable habitat at the site or adjacent to the site. These species are North American wolverine, gray wolf, fisher, northern spotted owl, yellow-billed cuckoo, and Oregon spotted frog. In addition, the 10 fish populations are unlikely to occur in or near the Facility site boundary because the Facility area lacks perennial stream habitat.

Of the 17 identified state and federally listed wildlife species identified as potentially occurring within the analysis area, only WGS are likely to occur based on a review of habitat suitability within the site boundary. Because there is no suitable habitat for the remaining species and because, for many of these species, the Facility will be located outside of their historical or current range, they are not addressed further in this exhibit.

Q.5.2 Field Surveys

Field surveys were conducted in the spring of 2017 where the literature review and desktop surveys data indicated the potential presence of listed species. Table P-1 in Exhibit P summarizes field surveys that have been conducted within the Facility site boundary between 2008 and 2017, and highlights the quantity of biological data available for the site.

Q.5.2.1 Plants

Based on a review of habitat conditions and the results of the literature review and prior site surveys, Montague concluded that Laurent's milk-vetch, sessile mousetail, and dwarf evening primrose may occur within the micrositing corridor. As such, Montague completed rare plant surveys for those species in May and June 2017 by teams led by qualified botanists with experience in vegetation of the Columbia Plateau region (CH2M, 2017b). The survey area included all areas where Facility components are planned that are not currently in agricultural production or consist of residential or farm operation facilities. The survey time was selected to coincide with the optimum bloom time for the target species. Lists of all vascular plant taxa encountered were recorded in the field. Plant species documented were identified to the level needed to determine their protected status, if any. Collections were made of specimens that could not be identified readily in the field. Final determinations were made by keying specimens using standard references.

Special-status plant surveys were previously conducted in portions of the approved site boundary where Phase 2 components may occur in the spring of 2006, spring of 2009, and

spring of 2010, as described in Attachments P-6 and P-7 in Exhibit P. These studies found no threatened or endangered plant species within the proposed Facility footprint.

Q.5.2.2 Wildlife

Based on the species listed in Table Q-1, WGS is the only listed wildlife species that may occur within the analysis area. Surveys for WGS were conducted by CH2M in the spring of 2016 and 2017 (CH2M, 2017c; CH2M, 2017d; CH2M, 2017e) within portions of the approved and proposed expanded site boundary where permanent Facility components are planned or where construction disturbance may occur. The purpose of these surveys was to identify active WGS areas and delineate corresponding Category 1 habitat[4].

Previous surveys for WGS were conducted in 2008 in portions of the approved site boundary where Phase 2 components are planned (Exhibit P, Attachment P-6). WGS surveys were conducted within portions of the proposed expanded site boundary in March through May 2010 (Exhibit P, Attachment P-9). Further details of the completed biological investigations are provided in Section Q.6 and in Attachments P-1 through P-10 to Exhibit P.

Q.6 EXISTING CONDITIONS AND POTENTIAL IMPACTS TO SPECIAL-STATUS SPECIES

OAR 345-021-0010(1)(q)(B) *For each species identified under (A), a description of the nature, extent, locations and timing of its occurrence in the analysis area and how the facility might adversely affect it;*

Response: As discussed in Section Q.5 and presented in Table Q-1, three plant species and one mammal are listed as threatened or endangered by Oregon or USFWS, with the potential for occurrence within the analysis area. Sections Q.6.1 and Q.6.2 present the results of plant and wildlife protocol-level field surveys conducted in 2010 and 2017.

Q.6.1 Plants

The field surveys conducted by CH2M in May and June of 2017 and by CH2M and NWC in May and June of 2010 found no rare or special-status plants within the Montague analysis area. Because no rare or special-status plants were identified within the analysis area, no impacts to rare or special-status plants are expected to occur. Montague is also required by Condition 95(b) to conduct preconstruction surveys to verify that rare plants are absent from the construction footprint.

Q.6.2 Wildlife

The WGS is an Oregon state endangered species and the only listed wildlife species that may occur within the analysis area. Historically, this species was abundant in the sagebrush (*Artemesia tridentata*) and bluebunch wheatgrass (*Pseudoroegneria spicatum*) habitats throughout the Columbia plateau east and south of the Columbia River in Washington and Oregon (Bailey, 1936; Howell, 1938). The extent of its current range is not known with certainty, but it is greatly reduced from the historic range (Betts, 1999). Agricultural and grazing activities have fragmented and disturbed the native vegetation. Today, much of the remaining native habitat is dominated by rabbitbrush (*Chyrysothamnus visciduiflorus* and *C. tectorum*) and cheatgrass (*Bromus tectorum*) or is grazed intensively, reducing forage and cover for the ground squirrels. In this degraded habitat, the WGS is found most often in areas that have good cover

[4] See Section P.6.2 in Exhibit P for an explanation of Category 1 habitat classification.

(annual grasses and forbs) and deep, loose soils with low clay content, enabling burrow excavation.

Observations of WGS (holes, pellets, individuals, or vocalizations) were initially made within or near the Facility site boundary in 2006-2011 (Table Q-2, Figure Q-3 [confidential and not for public distribution], and Figure 5 in Exhibit P, Attachment P-6 [confidential and not for public distribution]). These surveys were summarized as part of Council's findings in the Final Order on the Application[5].

Given the known use of the analysis area by WGS, Montague conducted protocol-level WGS surveys in 2017 for areas with suitable habitat in the Phase 2 area, including areas within 1,000 feet of planned Phase 2 turbine locations, solar array, transmission line, and access roads, plus an expanded survey in the northern Shutler Flat area where WGS activities were previously detected. Surveys were not conducted in unsuitable WGS habitat (for example, paved roads and active agriculture fields) because these areas are not suitable for foraging or burrow establishment.

In 2017 surveys, Montague documented 22 active WGS sites between April 5 and May 31, 2017 (Attachment P-2b in Exhibit P). Eighteen of the WGS sites were colonies and four were single or individual WGS sites. Figure Q-3 (confidential and not for public distribution) shows active 2017 WGS sites and associated Category 1 habitat. Overall, active WGS burrows are concentrated in the northwest corner of the project.

Based on the results of 2017 surveys, Montague revised its turbine layout for Phase 2 to remove turbines from the northern part of Shutler Flat where multiple WGS areas were found. Montague has arranged the proposed facilities for Phase 2 to avoid all Category 1 WGS habitat mapped in 2017, and will complete future surveys as needed prior to construction to ensure that facilities and temporary work areas avoid WGS areas.

By avoiding known WGS areas, no displacement or abandonment of WGS colonies are expected to occur as a result of Phase 2 construction and operation. Construction and operational monitoring of WGS colonies at adjacent wind projects, Stateline turbine strings WS-A and B (FPLE, 2002a, 2002b, 2002c; Erickson et al., 2004), and LJI, identified no significant change in WGS behavior during construction activities located at least 785 feet away (NWC, 2007; Kronner, 2005-2006). Accordingly, construction and operation of the proposed modified Facility is not expected to cause a significant reduction in the likelihood of the survival or recovery of the species.

During construction, Montague will implement measures to avoid impacts to WGS by flagging Category 1 WGS habitat and implementing speed limits, as described in Section Q.7.

Q.7 MEASURES PROPOSED TO AVOID OR REDUCE ADVERSE IMPACTS

OAR 345-021-0010(1)(q)(C) *For each species identified under (A), a description of measures proposed by the applicant, if any, to avoid or reduce adverse impact;*

Response: Montague has implemented or will implement several measures to avoid or reduce adverse impacts to WGS. The measures proposed in this section will also be protective of other species, in addition to WGS. Additional general measures for nonlisted, special-status wildlife

[5] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. pp. 91-92. September 10.

and habitat are provided in Exhibit P. These measures are the same as those described for the approved Facility and no changes are needed based on the modifications proposed under RFA 4.

Q.7.1 Before Construction

Because construction and operation of the modifications proposed under RFA 4 will not create any significant new impacts on habitats and sensitive species resources, no new avoidance measures are proposed.

Montague sited the proposed turbines and other permanent and temporary facilities that were closest to WGS outside of the Category 1 WGS habitat, as shown on Figure Q-3 (confidential and not for public distribution). Following review of the 2017 WGS data, Montague moved turbine strings and associated Facility components away from WGS locations.

Before beginning construction of Phase 2, in compliance with Site Certificate Condition 31, Montague will provide to the Department a map showing the final design locations and areas that could be disturbed during construction. Category 1 habitat will be avoided. Montague will instruct all construction personnel to avoid these areas and will implement other appropriate measures to protect the resources.

Where any Category 1 WGS habitat or other state or federal listed, proposed, or candidate wildlife species are found, in compliance with Site Certificate Conditions 94 and 95, Montague will ensure that construction and operation of the Facility will have no impact on the resources. Montague will instruct all construction personnel to avoid these areas and will implement other appropriate measures to protect the resources. Category 1 WGS habitat will be flagged and avoided during construction, as required by Site Certificate Condition 95(c).

Facility components will be microsited outside of the Category 1 WGS habitat based on the most recent survey results. In addition, Montague will minimize impacts to Category 2 habitat that could be suitable for WGS and will implement compensatory mitigation for unavoidable impacts to Category 2 habitat as described in the HMPs.

Q.7.2 Avoidance and Minimization During Construction

Because construction and operation of the modifications proposed under RFA 4 will not create any significant new impacts on habitat and sensitive species resources, no new minimization measures are proposed.

Montague has committed to implementing protective measures for threatened and endangered species during construction, as summarized below.

Q.7.2.1 Construction Monitoring

Montague will use an onsite manager and require the construction contractors to designate a Field Contact Representative (FCR) to oversee their compliance during construction (Site Certificate Condition 36). The FCR is responsible for overseeing compliance with environmental protective measures and coordination in accordance with the county and other regulatory agencies.

One or more qualified biologists will provide environmental training and monitoring during construction. A qualified biologist will visit the site periodically before site development and

during construction in order to flag the Category 1 WGS habitat and other sensitive resource areas and oversee construction and permit compliance.

Q.7.2.2 Exclusion Flagging

Facility components will be microsited to avoid the Category 1 WGS habitat and populations. Category 1 habitat will be labeled as avoidance areas on construction plans and Category 1 habitat will be marked in the field with brightly colored pin flags or wooden lathes and signage if construction activities are planned with 1,000 feet. Construction crews will be instructed the contractor to work outside these boundaries.

Additional measures include dust and erosion control, environmental training, limited work areas, speed limits, and fire control, as described in Section P.9 of Exhibit P.

Q.7.3 Minimization and Mitigation after Construction

Because construction and operation of the modifications proposed under RFA 4 will not create any significant new impacts on habitat and sensitive species resources, no new mitigation measures are proposed. After construction is complete, Montague will work to restore the habitat to preconstruction conditions as defined in the revegetation plan. A summary of protective measures is provided in Section P.9 of Exhibit P.

Q.8 NO SIGNIFICANT REDUCTION IN THE LIKELIHOOD OF SURVIVAL OR RECOVERY OF PLANT SPECIES

Q.8.1 Identified Plant Species with an ODA Protection and Conservation Program

OAR 345-021-0010(1)(q)(D) *For each plant species identified under (A), a description of how the proposed facility, including any mitigation measures, complies with the protection and conservation program, if any, that the Oregon Department of Agriculture has adopted under ORS 564.105(3);*

Response: Protection and conservation programs are prepared by ODA for selected plant species listed as threatened or endangered under the Oregon Endangered Species Act and selected locations within the state. There is no plant protection and conservation program applicable to the site. Therefore, no additional information is required under this provision and OAR 345-022-0070(1)(a) does not apply.

Q.8.2 Identified Plant Species without an ODA Protection and Conservation Program

OAR 345-021-0010(1)(q)(E) *For each plant species identified under (A), if the Oregon Department of Agriculture has not adopted a protection and conservation program under ORS 564.105(3), a description of significant potential impacts of the proposed facility on the continued existence of the species and on the critical habitat of such species and evidence that the proposed facility, including any mitigation measures, is not likely to cause a significant reduction in the likelihood of survival or recovery of the species;*

Response: Section Q.6 describes the potential impacts of the proposed Facility on the continued existence of state and federally listed and candidate plant species and on the suitable habitat for these species. The mitigation measures described in Section Q.7 are designed to avoid or minimize adverse impacts to listed and candidate plant species. The construction, operation, and maintenance of the Facility, as described, and taking into account the proposed mitigation measures, are not likely to cause a significant reduction in the likelihood of survival or recovery

of the state threatened Laurent's milk-vetch, the state candidate sessile mousetail, or the state candidate dwarf evening primrose because these species are not present onsite.

Q.9 NO SIGNIFICANT REDUCTION IN THE LIKELIHOOD OF SURVIVAL OR RECOVERY OF WILDLIFE SPECIES

OAR 345-021-0010(1)(q)(F) *For each animal species identified under (A), a description of significant potential impacts of the proposed facility on the continued existence of such species and on the critical habitat of such species and evidence that the proposed facility, including any mitigation measures, is not likely to cause a significant reduction in the likelihood of survival or recovery of the species;*

Response:

Q.9.1 Overview

In compliance with these requirements, this exhibit describes the potential impacts of the proposed Facility on the continued existence of the state and federally listed wildlife species and on the suitable habitat for this species. The mitigation measures described in Section Q.7 are designed to avoid or minimize adverse impacts to this species. Specifically, the construction, operation, and maintenance of the Facility, as described, and taking into account the proposed mitigation measures, are not likely to cause a significant reduction in the likelihood of survival or recovery of the state endangered WGS, as further described in Section Q.9.2.

Q.9.2 Washington Ground Squirrel

Construction and operation of Phase 2 will have no significant impact on the survival or recovery of this species. No Facility components will be placed within active Category 1 WGS habitat mapped prior to construction. During micrositing, laydown areas, turbines, roads, and collector lines and other temporary and permanent disturbance will be located outside Category 1 WGS habitat to protect this species.

The approved and proposed expanded site boundary includes 22,174 acres of habitat that is not currently designated Category 1, but could potentially be colonized by WGS. This includes all Category 2, 3, and 4 habitat. Based on the Design Scenario A layout, Phase 2 will permanently disturb about 2.63 acres, or approximately 0.01 percent of Category 2, 3, and 4 habitat that could potentially be colonized by WGS (see Exhibit P for details of habitat impacts). Moreover, by locating facilities on Category 6 habitat, the proposed development will not affect connectivity between WGS colonies and potentially suitable habitat.

Site Certificate Condition 94 and 95(c) require the protection of WGS colonies and a buffer around identified colonies and nothing in the modifications proposed under RFA 4 alters Montague's ability to comply with this condition. Accordingly, no significant impacts are expected to occur that could cause a significant reduction in the likelihood of the survival or recovery of this species.

Q.10 MONITORING PROGRAM

OAR 345-021-0010(1)(q)(G) *The applicant's proposed monitoring program, if any, for impacts to threatened and endangered species;*

Response: Montague will update the previously approved monitoring plans to account for the design modifications proposed in this RFA 4 to satisfy the Council's requirements and no

additional monitoring plans are proposed. Postconstruction monitoring of WGS colonies will also be conducted, as described in the Phase 1 and 2 WMMPs.

Q.11 CONCLUSION

The information provided in this exhibit demonstrates that construction and operation of the Facility as modified by RFA 4 will not result in significant adverse impacts to threatened or endangered species. Accordingly, Montague has satisfied the requirements of OAR 345-021-0010(1)(q) and 345-022-0070.

Q.12 REFERENCES

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Figures

Figure Q-1
Threatened and Endangered Species Analysis Area
Montague Wind Power Facility

Klickitat County
Gilliam County
Sherman County
Morrow County
Roosevelt
Arlington
Ione
14
84
19
74
206

Legend

- Approved Site Boundary
- Proposed Expanded Site Boundary
- 5-mile Threatened and Endangered Species Analysis Area

Basemap Features

- Interstate/Highway
- County Boundary
- Town

N
W E
S

0 1.5 3 6
Miles

AVANGRID RENEWABLES

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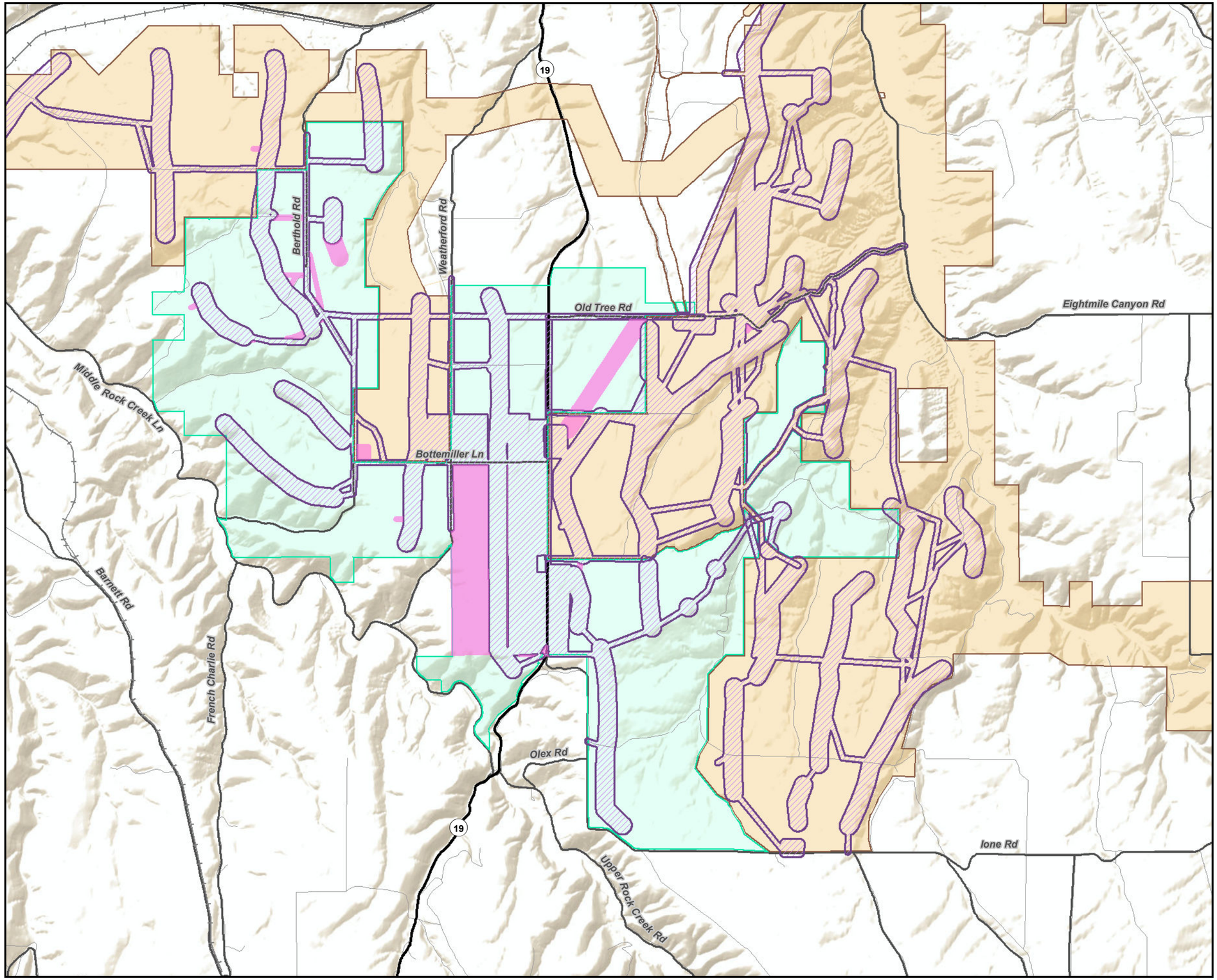
Basemap Source: ESRI World Imagery

Figure Q-2
State and Federal Listed and Candidate Plants
Montague Wind Power Facility



Legend

- Approved Site Boundary
- Approved Micrositing Corridor
- Proposed Expanded Site Boundary
- Proposed Expanded Micrositing Corridor
- 2017 Botanical Field Investigation
- Supplemental Desktop Review Area

Basemap Features

- Interstate/Highway
- Public Road
- Other Road
- Major Railroad Line

N
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Miles

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Basemap Source: ESRI World Terrain Base

Figure Q-3: Washington Ground Squirrel Locations
Confidential and not for public distribution. Provided under separate cover.

EXHIBIT R
SCENIC RESOURCES

OAR 345-021-0010(1)(r)

TABLE OF CONTENTS

R.1 INTRODUCTION

The Energy Facility Siting Council (EFSC; Council) previously approved construction of the 404-megawatt (MW) Montague Wind Power Facility (Facility)[1] and found that the Facility complies with the Scenic Resources standard required in OAR 345-022-0080. Montague Wind Power Facility, LLC (Montague) is constructing the Facility in two phases. Phase 1 consists of up to 81 wind turbines generating 202 MW of power within the approved boundary. Montague has already begun construction of Phase 1 under the conditions of the existing Site Certificate. Phase 2 consists of an expanded site boundary, solar array, and battery storage. The analysis in this exhibit focuses on Phase 2 and the three design scenarios described in *Request for Amendment No. 4 Project Description and OAR Division 27 Compliance* (referred to herein as RFA 4).

R.2 SUMMARY OF ANALYSIS RESULTS

The Council addressed the Scenic Resources standard in the Final Order on the Application, Final Order on Amendment 1, Final Order on Amendment 2, and Final Order on Amendment 3 and found that the design, construction, and operation of the Facility, when taking into account mitigation and condition compliance, will not result in a significant adverse impact to scenic resources.[2]

This exhibit demonstrates that the Facility modified by RFA 4, with an expanded site boundary, solar array, and battery storage, will not result in significant adverse impacts to scenic resources for the following reasons:

- **Site Boundary Expansion:** Relocating wind turbines to the proposed expanded site boundary will not result in substantial additional visibility of wind turbines in areas where scenic resources are protected. Relocating turbines will result in more turbines being visible from points west of the site boundary and less visible from points northeast of the site boundary. The expansion of the site boundary results in an expansion of the analysis area to the southwest, and consequently additional portions of Cottonwood Canyon State Park are included in the analysis. However, the Facility as modified by RFA 4 would not be visible from these new portions of Cottonwood Canyon. Relocating turbines to the proposed expanded site boundary would result in additional turbines being visible in low-lying areas to the southwest where they were not previously visible, but these areas do not contain scenic protected areas under identified management plans.
- **Solar Array:** The solar array will be visible primarily to drivers on Oregon Highway 19 (OR 19). Construction and operation of a solar array will not result in impacts to any protected scenic resources.
- **Battery Storage:** The battery storage system will be visible primarily to drivers on OR 19. Construction and operation of a battery storage system will not result in impacts to any protected scenic resources.

R.3 CONDITION COMPLIANCE

The Third Amended Site Certificate imposes four conditions (102 through 105) designed to reduce or avoid potential impacts to scenic resources. The conditions include requirements related to painting and signage, lighting, and avoid turbine placement within a corridor viewed

[1] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility*. July 11.

[2] EFSC. 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility*. p. 39. July 12.

from the Fourmile Canyon interpretive site in the northeast portion of the Facility. The modifications proposed under RFA 4 do not affect Montague's ability to comply with the existing Site Certificate conditions and no new conditions are needed for protection of scenic resources. However, Montague proposes a modification to Condition 103 to account for the new components that will be part of Phase 2. The proposed modifications are underlined below.

103 The certificate holder shall design and construct the O&M buildings, substation, and buildings and containers associated with battery storage to be generally consistent with the character of similar buildings used by commercial farmers or ranchers in the area and shall paint the building in a low-reflectivity, neutral color to blend with the surrounding landscape.

R.4 ANALYSIS OF SCENIC RESOURCE IMPACTS

In analyzing the potential significant impacts and providing information under OAR 345-021-0010(1)(r), Montague followed the standard professional methods based on the procedures for evaluation of aesthetic impacts developed by federal agencies such as the Bureau of Land Management (BLM), the U.S. Forest Service, and the Federal Highway Administration.[3] The analysis presents sufficient information for the Council to confirm its prior findings under OAR 345-022-0080. Specifically, OAR 345-022-0080(1) states the following:

"The Council must find the design, construction and operation of the facility, taking into account mitigation, are not likely to result in significant adverse impact to scenic resources and values identified as significant or important in local land use plans, tribal land management plans and federal land management plans for any lands located within the analysis area described in the project order."

Montague provides the information in this exhibit in accordance with OAR 345-021-0010(1)(r) as evidence to support findings by the Council as required by OAR 345-022-0080.

The analysis methodology used for this exhibit is similar to and builds on that used by the Council as the basis for its findings in the 2010 Final Order[4]. The visual impact analysis considered the combined effects of Phase 1 and Phase 2 components. However, because of the large distances from most of the identified scenic resources, the limited lines of sight from the closest identified scenic resources, and the dominance of wind turbines compared with other components (e.g., solar array) in terms of visual impact, the visual appearance of the Facility from the identified scenic areas consists almost entirely of the wind turbines. For this reason, the analyses in this exhibit focus on the turbines, as explained in greater detail directly below. A summary of visual impacts resulting from installation of the solar array and battery storage area is located in Section R.4.3.3, and a summary of reflectivity and glare effects of the potential solar generation facility is located in Section R.8.

R.4.1 Define Analysis Area

In accordance with OAR 345-021-0010(1)(r), the analysis area for scenic resources is the area within the Facility's site boundary plus the area within 10 miles from the site boundary, which includes a small area in Washington. Because the site boundary is proposed to be expanded under RFA 4, the area covered by this analysis is larger than the area previously analyzed by Council. Figure R-1 shows the analysis area for scenic resources addressed in this exhibit.

[3] These methods are documented in Smardon et al., 1986.

[4] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 65-74. September 10.

R.4.2 Review Applicable Plans

Montague conducted a search of available information to identify significant and important scenic resources within the analysis area that are listed in applicable federal and state land management plans as well as local land use plans. No tribal lands were identified within the analysis area; therefore, no tribal management plans have been included as part of this analysis. Section R.5 (Local, Tribal, and Federal Plans) describes the plans reviewed.

R.4.3 Conduct Analysis

The methodology includes a discussion of the analysis area, a review of applicable plans, and a geographic information system (GIS) analysis referred to as a viewshed or zone of visual influence (ZVI) analysis to assess the visibility of the proposed modified Facility, including both Phase 1 and Phase 2, from scenic resources. The ZVI provides a screening analysis to determine whether turbines may be visible from resources that are protected under OAR 345-022-0080. If the ZVI analysis identifies potentially significant impacts to resources that are protected for their scenic qualities, then additional evaluation may be conducted. If the ZVI analysis does not identify a potential for significant impacts to scenic resources as identified in the relevant management plans, then the evaluation may be concluded.

R.4.3.1 Treatment of Wind Turbines

In order to assess potential visibility of Facility components within the analysis area, Montague used a GIS model that considered the turbine locations, maximum turbine height of 150 meters (492 feet), and surrounding topography to identify locations from which portions of the Facility would theoretically be visible via an unobstructed or partial line-of-sight.

The Facility will also include night lighting on some of the turbines to minimize aviation risks, as required by the Federal Aviation Administration (FAA). The number of turbines with lights and the lighting pattern of the turbines will be determined in consultation with the FAA. As required by Site Certificate Condition 104, turbine tower lighting will be the minimum required by FAA. Security lighting at other structures will be the minimum necessary and will be shielded or downward-directed to reduce glare.

R.4.3.2 Treatment of 230-kV Transmission Line Segment

To assess the potential visibility of the 230-kilovolt (kV) transmission line, the tops of transmission line support structures for both Phase 1 and Phase 2 were analyzed using the ZVI methodology described previously for turbines. The ZVI analysis for the transmission line represents only the visibility of the transmission line without the influence of turbines (see discussion in Section R.4.3.4, ZVI Inputs).

R.4.3.3 Treatment of Solar Array and Battery Storage

Because the solar array and battery storage system will be located near turbines and because they are considerably lower in height than the turbines (the maximum height of the solar collectors will be 13 feet, and the maximum height of the battery storage units will be 20 feet), the areas from which they will be potentially visible will fall well within the ZVI identified for the turbines. To evaluate visibility of the proposed solar array and battery storage system, separate ZVI analyses were prepared, which confirm that these features will not be visible from any areas where turbines are not visible. Because concerns are sometimes expressed about the potential glare effects of solar installations, a discussion of the reflectivity and glare effects of the potential solar generation facility was prepared and is included in the analysis (see Section R.8).

R.4.3.4 ZVI Inputs

A fundamental first step in evaluating the potential visual effects of wind farms and other projects is to conduct a viewshed or ZVI analysis to identify the areas from which the proposed features have the potential to be seen. A viewshed analysis is prepared using GIS tools that make it possible to identify the areas in the surrounding landscape from which a point or points (such as the tops of turbines) have the potential to be visible. Viewshed analysis techniques were first developed by landscape architects to assist in visual impact assessment. One of the earliest computerized viewshed analysis tools, known as VIEWIT, was developed by landscape architects at the U.S. Forest Service Pacific Southwest Research Station in Berkeley, California, in the 1970s (Travis et al., 1975). Since that time, viewshed analysis functions have become a standard feature of most GIS analyses, and viewshed analyses have become a standard and expected part of visual impact assessments prepared to meet the requirements of the National Environmental Policy Act and the environmental impact analysis statutes adopted by many states. Viewshed analyses are prescribed as a part of the visual impact assessment methods developed by the U.S. Forest Service (1976), BLM (1984), and the Federal Highway Administration (2015).

In terms of the assessment of the visual impacts of proposed wind farms, viewshed (ZVI) analyses are a standard and heavily relied-on feature of the analysis process. This fact is reflected in guidance recently issued by the National Park Service (NPS) for evaluation of visual impact assessments prepared for proposed renewable resource facilities (NPS, 2014). This guidance describes the viewshed analysis as "…a critical early step in the VIA process…to determine the geographic scope of the impact assessment."[5] The guidance further states that "The viewshed map is used to identify sensitive visual resource areas (e.g., national, state, or local parks, historic sites, trails, and cultural landscapes) and other sensitive viewpoints (e.g., residential areas) that would have views of the project and thus may be subject to visual impacts from the project."[6]

It is important to note that the visibility pattern this ZVI analysis presents is highly conservative. First, in some areas where the model indicates Facility visibility, the only visible parts of the Facility might be the tips of the turbine blades or tops of the transmission line structures, which will be hardly noticeable especially at a distance from the structures. In addition, the analysis does not take into account the screening role of vegetation, trees, and other structures, so in some areas where Facility visibility is indicated, views of the turbines or the transmission line will be screened by trees, vegetation, or other structures in the foreground. In addition, the ZVI model is a line-of-sight model that does not account for attenuating factors such as distance, haze, humidity, background landscape, or weather, which will make the Facility invisible or barely visible from certain locations under many atmospheric or weather conditions.[7] Therefore, the ZVI is conservative in that the actual visibility of the Facility components will be less than indicated in Figure R-1.

[5] National Park Service (NPS). 2014. *Guide for Evaluating Visual Impact Assessments for Renewable Energy Projects*. Natural Resource Report NPS/ARD/NRR—2014/836. p. 20.

[6] National Park Service (NPS). 2014. *Guide for Evaluating Visual Impact Assessments for Renewable Energy Projects*. Natural Resource Report NPS/ARD/NRR—2014/836. p. 21.

[7] The ZVI analysis is based on visibility that will occur at 2 meters (6.6 feet) above ground level, which is somewhat higher than the average eye level for an upright adult.

Both Phase 1 and Phase 2 turbines were included in the analysis. For Phase 2, Design Scenario A was used for the ZVI analysis as it represents the most turbines over the largest area. For Phase 1, the construction layout (81 turbines) was used in the analysis. Because the largest turbines under consideration are only approximately 2 meters taller at maximum blade tip height than the smaller turbines, Montague conservatively analyzed the taller turbine height with the greater number of turbines. Towers were assumed to be 82 meters (269 feet), the rotors were assumed to be 136 meters (446 feet) in diameter, and the distance from the ground to the maximum blade tip height was assumed to be 150 meters (492 feet).

Figure R-2 provides the turbine visibility for the Facility as originally analyzed, which assumed the dimensions of a 1.5-MW turbine (maximum height of 119 meters), and Figure R-1 shows the ZVI for the current Facility layout (both Phase 1 and Phase 2) using the taller turbines described above. Figure R-3 depicts the change between the previous analysis and the current layouts.

The ZVI analysis shown in Figure R-4 assumed that support structures for the 230-kV transmission line will be 30.5 meters (100 feet) tall. The ZVI analysis for the transmission line represents only the visibility of the transmission line without the influence of turbines.

R.4.3.5 Visual Simulations

In locations where the ZVI analysis indicates that the project features will be readily visible at locations that are visually sensitive because of their existing scenic qualities and/or their protection in adopted plans or policies, additional analysis may be conducted. This analysis may include preparing visual simulations of the view as it would appear after development of the project. Where such analysis is warranted, a visual simulation can supplement the understanding of how much of the project will be visible, the role that it will play in the view, and the extent to which it will alter the view's existing visual character and visual quality. For RFA 4, no simulations were prepared because the results of the ZVI analysis indicated that in the areas where policies are in place to protect scenic resources, project features would not be visible.

R.5 LOCAL, TRIBAL, AND FEDERAL PLANS

OAR 345-021-0010(1)(r) *An analysis of significant potential impacts of the proposed facility, if any, on scenic resources identified as significant or important in local land use plans, tribal land management plans and federal land management plans for any lands located within the analysis area, providing evidence to support a finding by the Council as required by OAR 345-022-0080, including:*

OAR 345-021-0010(1)(r)(A) *A list of the local, tribal and federal plans that address lands within the analysis area.*

Response: Table R-1 lists local and federal plans that pertain to the analysis area. There are no tribal plans describing protected scenic resources within the analysis area. The identification of State-level management is not specified under OAR 345-021-0010(1)(r)(A). However, State-level plans are included in Table R-1 for completeness. Those areas within 10 miles of the site boundary from which wind turbines will potentially be visible are identified on Figure R-1.

Table R-1. Identification of Applicable Local Land Use Plans and Federal Management Plans that Pertain to Lands within the Analysis Area

Plan Category/Area/Applicable Plans	Plan Reviewed in Final Order (EFSC, 2010)	Facility Potentially Visible in the Plan Area and Further Analysis Required
Local Land Use Plans[a]		
Gilliam County, Oregon		
Gilliam County Comprehensive Plan and County Zoning and Land Development Ordinance, May 3, 2017	X	X
Morrow County, Oregon		
Morrow County Comprehensive Land Use Plan, January 1986 (Natural Resources Element amended October 2013)	X	X
Sherman County, Oregon		
Comprehensive Land Use Plan, Sherman County, Oregon, 1994 (amended June 2007)	X	X
Klickitat County, Washington		
Klickitat County Comprehensive Plan, August 1977 (amended April 1979)	X	X
Roosevelt Community Subarea Plan, 1990	X	X
Klickitat County Energy Overlay Zone Ordinance: Natural Resources/Energy Comprehensive Plan Amendment, March 2005	X	X
City of Arlington, Gilliam County, Oregon		
City of Arlington Comprehensive Plan, June 2003 (amended 2015)	X	X
City of Ione, Morrow County, Oregon		
City of Ione Comprehensive Plan, June 1987	X	X
Applicable State Land Management Plans		
Cottonwood Canyon State Park Cottonwood Canyon State Park Comprehensive Plan (OPRD, 2011)		X
Willow Creek Wildlife Area Columbia Basin Wildlife Areas Management Plan	X	X
John Day Wildlife Refuge No management plan in place	X	X
Applicable Federal Land Management Plans		
John Day River	X	X
Omnibus Oregon Wild and Scenic Rivers Act of 1988 (WSA, 1988); Public Law 100-557, 102 STAT. 2782; 16 *United States Code* 1271.		
John Day River Basin Record of Decision and Resource Management Plan (2015)		X
Horn Butte Wildlife Area		
John Day River Basin Record of Decision and Resource Management Plan (2015)	X	X
Oregon National Historic Trail		
Oregon Trail Comprehensive and Management Use Plan, Oregon National Historic Trail (1999)	X	X
Lewis and Clark National Historic Trail		
Lewis and Clark National Historic Trail, Comprehensive Plan for Management and Use (NPS, 1982)	X	X

[a] Some identified scenic resources are located in Washington. Although Montague has undertaken studies of potential impacts to the scenic resources within the analysis area identified under OAR 345-021-0010(1)(r)(B), Montague reserves the right to argue that applicable Oregon law does not require analysis of scenic resources outside of Oregon.

R.6 IDENTIFICATION AND DESCRIPTION OF THE SCENIC RESOURCES IDENTIFIED AS SIGNIFICANT OR IMPORTANT

OAR 345-021-0010(1)(r)(B) *Identification and description of the scenic resources identified as significant or important in the plans listed in (A), including a copy of the portion of the management plan that identified the resource as significant or important.*

Response: The following sections describe the significant or important scenic and aesthetic values that were identified in the plans listed in Table R-1. Table R-2 identifies potential impacts to the scenic resources that were identified in the plans listed in Table R-1.

R.6.1 Local Land Use Plans

R.6.1.1 Gilliam County, Oregon

The Council previously analyzed Facility impacts on scenic resources identified in the *Gilliam County Comprehensive Plan* (GCCP) (Gilliam County, 2017a) and found that "the Facility is not likely to have a significant impact on rock outcroppings in Gilliam County and is not likely to have a significant adverse effect on any scenic resources identified in the GCCP."[8] All lands within the Facility site boundary are located within Gilliam County. Land use is administered by the GCCP and the *County Zoning and Land Development Ordinance* (Gilliam County, 2017b). The plan has been updated since the 2010 analysis was done, however the substance of the scenic resource language has not changed.

The Facility is located entirely within Gilliam County and the proposed MWPF turbines and transmission lines would be visible from higher elevations at many locations in the county. The GCCP is the applicable local land use plan for the county. The GCCP, Part 5, includes the following finding regarding the John Day River as a scenic resource (Gilliam County, 2017a):

> *7. Portions of the John Day River from the Wheeler County line to Tumwater Falls have been classified as Scenic or Natural River areas by the State of Oregon under provisions of ORS 390.805 to 390.925. Also, within this area of the John Day River, from the mouth up river for about 84 miles to Thirtymile Creek, is the John Day State Wildlife Refuge which provides a resting area for ducks and geese and provides habitat for various raptor species and other wildlife. Land uses, including structures, are regulated within this area by the provisions of the Scenic Waterway designation. No additional regulations on behalf of the County are deemed necessary.*

The visual impacts of the proposed Facility on scenic values identified in the management plans for the John Day River area are described below in Section R.6.3.1.

The GCCP, Part 5 (Gilliam County, 2017a) contains the following additional finding regarding the county's scenic resources: "The rock outcroppings marking the rim and walls of steep canyon slopes are an important characteristic of the county's landscape." The Council finds that the proposed Facility is not likely to have a significant impact on viewing rock outcroppings in Gilliam County and is not likely to have a significant adverse effect on any scenic resources identified in the GCCP.

The Council may rely on its prior findings regarding Gilliam County for the following reasons:

- The Gilliam County Plan has been updated since the 2010 analysis was completed, but the substance of the scenic resources language has not changed.

[8] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 68. September 10.

- Under the current Facility designs, none of the Facility components would directly impact the rock outcroppings cited in the plan.
- The visual impacts of the proposed Facility on scenic values identified in the management plans for the John Day River area are described in Section R.6.3.1.

R.6.1.2 Morrow County, Oregon

Although the proposed Facility is located entirely within Gilliam County, the analysis area extends into Morrow County. Parts of the proposed Facility would be visible from higher elevations at many locations in the county. The *Morrow County Comprehensive Land Use Plan* (MCCP) is the applicable local land use plan for the county. The "Natural Resources Element" of the MCCP addresses scenic resources and states that the County has not designated any significant scenic resources:

> *Scenic Views and Sites - lB: Morrow County contains a variety of landscapes, many of which may be considered to be scenic. The County has not, however, designated any sites or areas as being particularly high in scenic-resource value.*

The MCCP contains policies related to natural resources, including General Policy "F" which states: "It shall be the policy of the County to conserve open space and protect natural and scenic resources."

In the 2010 Final Order, the Council found that the MCCP does not identify any specific "significant or important" scenic resources.[9] The MCCP was updated in 2013, however no significant or important resources have been identified in the latest version.

The Council may rely on its prior findings regarding Morrow County in that there has been no change to the MCCP's plan regarding identification of "significant or important" scenic resources and values.

R.6.1.3 Sherman County, Oregon

The analysis area extents into the northeast portion of Sherman County but the nearest portions of Sherman County are approximately 5 miles from the site boundary. The *Comprehensive Land Use Plan, Sherman County, Oregon* (SCCP) (Sherman County, 2007) is the applicable local land use plan for the county. The Council previously found that the Facility is not likely to have a significant adverse effect on any scenic resources identified in the SCCP.[10] The SCCP was last updated in 2007 and therefore has not changed since being analyzed in 2010.

Section XI, Finding XI, of the SCCP identifies "rock outcroppings, trees, the John Day River Canyon and the Deschutes River Canyon" as "important features of the County's landscape." The Finding also notes ''scenic highway" designations by the Oregon Department of Transportation (ODOT).

The proposed Facility would not require the removal of any trees in Sherman County. The Council finds that the Facility is not likely to have a significant impact on viewing trees or rock outcroppings in the county. The visual impacts of the proposed Facility on scenic values identified in the management plans for the John Day River area are described in Section R.6.3.1. The Deschutes River Canyon is outside the analysis area.

The SCCP identifies I-84, US Highway 97 and Oregon Highways 206 and 216 as scenic highways. ODOT is responsible for managing state highways, and state "scenic byways" are designated

[9] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 68. September 10.

[10] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 69. September 10.

under OAR 734-032-0000 through OAR 734-032-0070. Portions of US Highway 97 and State Highway 218 have been designated a scenic byway and named the "Journey Through Time Scenic Byway." ODOT does not list I-84, Highway 206 or Highway 216 scenic byways. The "Journey Through Time Scenic Byway" lies outside the analysis area.

The Council previously found that the proposed MWPF is not likely to have a significant adverse effect on any scenic resources identified in the SCCP.

The Council may rely on its prior findings regarding Sherman County for the following reasons:

- There has been no change in the Sherman County's plan policies regarding scenic resources
- The visual impacts of the proposed Facility on scenic values identified in the management plans for the John Day River area are described in Section R.6.3.1.
- There has been no change in the ODOT scenic byway status of I-84, Highway 206, and Highway 216, and Highway 97, the Journey Through Time Scenic Byway, remains outside the analysis area.

R.6.1.4 Klickitat County, Washington

In the 2010 Final Order, the Council found that the *Klickitat County Comprehensive Plan* (Klickitat County, 1979), which includes the *Roosevelt Community Subarea Plan* and the *Klickitat County Energy Overlay Ordinance*, does not identify any specific scenic resources and values.[11] Klickitat County's land use plan has not changed since the Council's previous analysis.

Land use planning in Klickitat County is administered by the *Klickitat County Comprehensive Plan* and includes both the *Roosevelt Community Subarea Plan* and the *Klickitat County Energy Overlay Ordinance*. The *Roosevelt Community Subarea Plan* does not identify any specific scenic resources or views outside of Roosevelt. The *Klickitat County Energy Overlay Ordinance* also applies to the portion of the analysis area on the Washington side of the Columbia River (Klickitat County, 2005). However, the Facility is not sited in Klickitat County or in the State of Washington, and the amendment does not identify any scenic resources or views.

The Council may rely on its prior findings regarding Klickitat County in that the County land use plan still does not identify any "significant or important" scenic resources and values.

R.6.1.5 City of Arlington, Oregon

The Council previously analyzed the *City of Arlington Comprehensive Plan* in the 2010 Final Order and found that the scenic views identified in the plan are all directed away from the Facility, which is proposed to the south of the city.[12] The plan was updated in 2011 and 2015; however, no changes were made to Goal 5, which identifies scenic resources.

Land use in the City of Arlington is administered by the *City of Arlington Comprehensive Plan* (2015) and refers to scenic resources under the discussion of Goal 5, Open Space, Scenic and Historic Areas, and Natural Resources).

The following sections pertain to scenic resources addressed in Goal 5:

Subtopic A: "[…] the Horse Heaven Hills on the Washington side of the Columbia River, and vast areas of open space within sight of almost every house in the town" and "the views outside the City of Arlington to the east, west, and north […]."

[11] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 69. September 10.

[12] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 67. September 10.

The Council may rely on its prior findings regarding the City of Arlington for the following reasons:

- There has been no change in the City of Arlington's policies regarding scenic resources.
- The proposed expanded site boundary is farther from the City of Arlington than the approved site boundary, and therefore turbines and other Facility components sited within the proposed expanded site boundary will be farther from the city than the turbines and facilities evaluated for the approved site boundary.
- The battery storage system and solar array will not be visible from the community.
- The visibility of the transmission line route will be essentially the same as it was for the approved site boundary.

R.6.1.6 City of Ione, Oregon

The Council previously found that the City of Ione's comprehensive plan did not identify any specific visual resources or values, and that the Facility complies with the City's goals to develop and use renewable resources.[13] Montague has made several efforts to contact the City of Ione to determine whether the plan has been updated since 2010 but has not received a response.

Land use planning in the City of Ione is guided by the City of Ione Comprehensive Plan (Ordinance #156) (City of Ione, 1987). Section D of the ordinance (Statewide Goal 5, Open Spaces, Scenic and Historic Areas, and Natural Resources) outlines the City's commitment to "conserve open space and protect natural, scenic, historic and cultural resources." In this section, Policy 1 indicates that the City of Ione shall identify scenic and historical areas which should be preserved from urban development. However, no scenic resources are identified in this plan.

The Council may rely on its prior findings regarding the City of Ione in that none of the Facility's elements will be visible from the city.

R.6.2 State Land Management Plans

Although state land management plans are not discussed in the OAR, the information is presented here for completeness.

R.6.2.1 Cottonwood Canyon State Park

Cottonwood Canyon State Park is located on the John Day River, approximately 6 miles from the Facility site boundary. The park was designated in 2011 and although its existence was considered as part of the original review, at that time no management plan was in place and a detailed analysis was not conducted[14]. The park is managed by the Oregon Parks and Recreation Department (OPRD). The *Cottonwood Canyon State Park Comprehensive Plan*, approved July 2011, includes a number of trails and viewpoints (OPRD, 2011). As part of the planning effort, OPRD staff conducted scenic assessments using a visual rating system, different from that typically used on BLM lands. In the OPRD process, Cottonwood Canyon State Park lands are currently designated as Class III, Rural. The goal of this designation is to preserve and enhance the scenic character of Cottonwood Canyon.

The OPRD scenic landscape assessment led to the creation of 10 specific character areas. Although the plan provides classification for scenic resources within the ten character areas and identifies major viewpoint and screening areas, it does not give specific guidelines or

[13] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 67. September 10.

[14] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 66. September 10.

designations to determine visual impacts. From most of the park, including from the area along the John Day River, which is the park's most important use area, no turbines will be visible. The only turbine visibility will be from a few small higher elevation areas on the ridges south of Hay Creek. From these areas, the turbines will be visible at 7.5 miles and farther in the distance, and will constitute relatively small elements in the overall panorama. Because views from the park toward the turbines will be limited, and because the turbines will not affect views of the park's most valued scenic resources, the Facility will not adversely affect scenic resources identified as significant or important in the park plan.

R.6.2.2 Willow Creek Wildlife Area

The Council previously found that the management plan for Willow Creek Wildlife Area includes "wildlife viewing" as one of the public uses of the area but does not identify specific scenic resources and values.[15]

The Council may rely on its prior findings regarding the Willow Creek Wildlife Area in that the management plan for the area still does not identify specific scenic resources and values.

R.6.2.3 John Day Wildlife Refuge

The John Day Wildlife Plan does not have a management plan and therefore no scenic resources are identified for protection. Scenic management of the John Day River is addressed in Sections R.6.2.4 and R.6.3.1.

R.6.2.4 State Scenic Waterways Act

A portion of the John Day River that falls within the analysis area is designated as a State Scenic Waterway by the Oregon State Scenic Waterways Act, which provides for management of scenic waterways "in such manner as to protect and enhance the values which caused such scenic waterway to be included in the system," including giving "primary emphasis… to protecting aesthetic, scenic, fish and wildlife, scientific and recreation features, based on the special attributes of each area."[16] The administrative rules adopted by OPRD for the management of State Scenic Waterways protect scenic values "seen from the waters" or "visible from the river." Lands beyond the boundaries of "related adjacent land" (defined as land within a quarter-mile of the riverbank), whether or not such land is visible from the river, is outside state management jurisdiction."[17] While the State Scenic Waterway designation is helpful in identifying and characterizing scenic resources along the John Day River, they are not directly applicable to the proposed Facility because the designated scenic waterway lies outside of the areas regulated by the federal plan and state designation.

R.6.3 Federal Land Management Plans

R.6.3.1 John Day Basin Record of Decision and Resource Management Plan

A segment of the John Day River stretching 147.5 miles from Service Creek in Wheeler County to Tumwater Falls at river mile 10 in Sherman County is designated as a "recreational river" under the federal Wild and Scenic Rivers Act. The portion of the designated recreational river area that lies within the analysis area for Montague forms the border between Sherman County and Gilliam County. The Council previously found that Montague would not result in significant

[15] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 70. September 10.

[16] ORS 390.845

[17] OAR 736-040-0015

adverse impact to the significant or important scenic resources and values within the John Day River area.[18]

The Council previously analyzed the *Two Rivers Resource Management Plan and Record of Decision*, as amended by the *Record of Decision John Day River Management Plan, Two Rivers, John Day and Baker Resource Management Plan Amendments*. Since this analysis, the BLM has prepared a Record of Decision and approved the *John Day Basin Resource Management Plan* (BLM, 2015), which addresses 456,600 acres of public land. In doing so, they consolidated all resource management activities in the plan area into a single unified land use plan that replaces three land use plans, one Wild and Scenic River Plan, and one Coordinated Resource Plan. While this has resulted in a new plan, the documents have simply been streamlined, and the intentions of policies/goals and resources previously analyzed have remained the same. In particular, there have been no substantive changes to scenic resource identification, management objectives, and actions from the plans analyzed by the Council in 2010.

Because the plan covers such a vast area, only a few sections are relevant to the identification of visual resources. These are Visual Resources, Wild and Scenic Rivers, and Areas of Critical Environmental Concern, as discussed below.

Visual Resources

This section generally discusses broad objectives and management actions related to Visual Resources, with a few exceptions. The main objective is to "maintain the scenic quality of river canyons, open space landscapes, cultural landscapes, and other areas having high quality visual resources."[19] This statement does not identify any specific visual resources.

Two management actions read: "Do not permit activities that would result in significant, long-term, adverse effects on the visual resources of the John Day River Canyons in areas normally seen from these rivers" and "Manage Fourmile Canyon tract as VRM Class II consistent with the provisions of the Oregon Trail Management Plan: Prineville District (1993)."[20] The first management action does not identify any specific visual resources, and it also does not directly apply to the Facility because it lies outside of areas managed by the BLM. The second management action identifies the need to manage Fourmile Canyon consistent with the Oregon Trail Management Plan. The management plan also addresses McDonald Crossing (i.e., John Day Crossing) and John Day Crossing Interpretive Site. Fourmile Canyon and McDonald Crossing are discussed in Section R.6.3.3, Oregon National Historic Trail.

Wild and Scenic Rivers

The Council may rely on its previous findings regarding the John Day River for the following reasons:

- The federal policies for this area that were previously laid out in the *Two Rivers Resource Management Plan and Record of Decision* (BLM, 1986) as amended by the *Record of Decision John Day River Management Plan, Two Rivers, John Day, and Baker Resource Management Plan Amendments* (BLM, 2001) have now been consolidated into a single document, the *John Day Basin Resource Management Plan* (BLM, 2015), which applies to 456,600 acres of public land in the area. While this new plan has streamlined many of the

[18] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 71. September 10.

[19] BLM. 2015. *John Day Basin Resource Management Plan*. p. 71. April.

[20] BLM. 2015. *John Day Basin Resource Management Plan*. pp. 71-72. April.

policies that were in the individual plans, the overall policies have remained the same, and there has been no substantive change to the policies related to visual resources.

- The ZVI analyses indicate that none of the proposed Facility components will be visible from viewpoints on the river.
- Under the proposed Facility, as in 2010, the only potential visibility of the Facility may be from vantage points in one small, limited area in the canyon and small, limited areas high on the canyon's rim where the proposed turbines may be visible. The transmission line, solar array, and battery storage system will have little to no visibility from within the canyon or from its rim area. As noted in the 2010 Council findings, in views from these areas, the turbines will be distant elements in the landscape which, because of their small size and the presence of intervening elements, will not create significant adverse visual impacts.

Areas of Critical Environmental Concern

The Horn Butte Wildlife Area lies within the analysis area, to the northeast of the approved site boundary. The area is managed by the BLM, which previously fell under the Two Rivers Resource Management Plan and Record of Decision. This plan has now been combined with several other BLM plans to form the John Day Basin Resource Management Plan. The Council previously found that the management plan addressing Horn Butte Wildlife Area does not identify any scenic resources and values.[21]

The goals and policies for the Horn Butte Wildlife Area have not changed with this new plan, and no new visual resources have been identified. Therefore, the Council may rely on its prior findings to conclude that the management plan addressing the Horn Butte Wildlife Area does not identify any scenic resources or values.

R.6.3.2 Scenic Highways/Byways

The National Scenic Byways Program was established under the Intermodal Surface Transportation Efficiency Act of 1991, and reauthorized in 1998 under the Transportation Equity Act. Under the program, the U.S. Secretary of Transportation recognizes certain roads as National Scenic Byways or All-American Roads based on their archaeological, cultural, historic, natural, recreational, and scenic qualities. This program is voluntary and does not have specific regulations regarding visual impacts.

The Blue Mountain Scenic Byway was designated by the U.S. Forest Service in 1989 as a National Forest Scenic Byway and by ODOT as an Oregon State Scenic Byway in 1997. It is located by Oregon Route 74, approximately 5 miles east of the Facility within the scenic resources analysis area. Review of the ZVI analyses prepared for the proposed solar array, battery storage system, and transmission line indicates that they would not be visible at all from Route 74, and that turbines would be visible only from a short, less-than-1-mile segment of the roadway located in northeastern Gilliam County, 12 miles distant from the closest proposed turbine. Given that a management plan does not exist for the byway, and views of the Facility will be very limited, no significant adverse impacts are expected.

R.6.3.3 Oregon National Historic Trail

The Oregon National Historic Trail (ONHT) passes through six states and covers 2,130 miles. The applicable federal land management plan is the *Comprehensive Management and Use Plan* (CMP) adopted by the NPS in 1999. As described in the CMP, the purposes of the ONHT are "to identify, preserve, and interpret the sites, route, and history of the Oregon Trail" and "to

[21] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 71. September 10.

commemorate the westward movement of emigrants to the Oregon country as an important chapter of our national heritage." Accordingly, the federal land segments of the Oregon Trail are managed for their historical significance and not primarily as scenic resources. Cultural impacts of the proposed amendment on the ONHT are discussed in Exhibit S. Recreational impacts of the proposed amendment on the ONHT are discussed in Exhibit T.

The plan only applies to portions of the ONHT that are located on federal land. Two sites are identified to be located within the analysis area: Fourmile Canyon and McDonald Crossing (NPS, 1999).

Fourmile Canyon Interpretive Site

One of the two high-potential sites within the analysis area is Fourmile Canyon, which comprises the Fourmile Canyon BLM interpretive sites where the ONHT crosses Fourmile Road and over a mile of deep ruts in the vicinity of the interpretive site. The interpretive site directs viewers towards the southernmost trail segment that extends up an adjacent foothill located to the west. The Fourmile Canyon high-potential site is located east of the Facility. Site Certificate Condition 105 requires that Montague maintain specific setback distances for turbines constructed near the line-of-sight from the Fourmile Canyon interpretive site toward the ONHT.

The proposed expanded site boundary is to the southwest of the approved site boundary and therefore any turbines or other Facility components constructed as a result of the proposed modification would be no closer to the Fourmile Canyon Interpretive Site than turbines and facilities located within the approved site boundary.

McDonald Crossing (John Day River Crossing)

The other high-potential site within the analysis area is McDonald Crossing. The site is located within the river canyon on BLM and private land. Based on the ZVI maps in Figures R-1 through R-4, the modifications proposed under RFA 4 would not alter the Council's previous finding that it is unlikely that turbine towers would be visible from the river crossing.

Based on this analysis, the Council may conclude that the modifications proposed under RFA do not alter its prior finding that the Facility would not have a significant adverse effect on the view from Fourmile Canyon, and the Facility is unlikely to be visible from the McDonald Crossing.

R.6.3.4 Lewis and Clark National Historic Trail, Comprehensive Plan for Management and Use

The analysis area includes a portion of the Lewis and Clark National Historic Trail (LCNHT), which is managed on federal lands as a designated historic trail under the National Trails System Act. The LCNHT is managed under the *Lewis and Clark National Historic Trail Comprehensive Plan for Management and Use*. The Council previously found that the LCNHT does not identify any specific scenic resources or views related to the LCNHT within the Facility's analysis area.[22] Although the analysis area has expanded to the southwest, the proposed expanded site boundary is farther from the LCNHT and the portion of the LCNHT within the analysis area is the same as it was in 2010. Since this finding, the management plan has not been updated.

Therefore, the Council may rely on its prior finding that the Facility would not have a significant adverse on views of the trail.

[22] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 74. September 10.

R.7 SUPPLEMENTAL ANALYSIS OF EFFECTS ON VIEWS FROM TWO GILLIAM COUNTY LOCATIONS

R.7.1 Overview of Resources Outside of EFSC Jurisdiction

The requirements under OAR 345-022-0080 pertain only to views from specified classes of areas with adopted plans and policies to protect scenic qualities. However, given potential public concerns about the Facility's possible effects on rural residential areas near the site boundary but not within areas designated scenic resources, Montague prepared a supplemental assessment of the Facility's potential visual impacts on two areas near Phase 2. These areas are a segment of the OR 19/John Day Highway located within the proposed expanded site boundary, and the community of Olex outside the proposed expanded site boundary (see Section R.7).

The results of the ZVI analysis (Figure R-1) were overlaid with maps of local land use and federal land management plans to identify scenic resources within the analysis area that could be affected.

Figure R-3 is a map that compares the visibility of the turbines proposed in the Facility permitted in September 2010 with the visibility of the turbines in the amended Facility now under evaluation. This map identifies the areas where turbines as approved would have been visible but where no turbines would be visible under the amended by RFA 4. Figure R-3 also identifies areas where turbines would be visible under the amended Facility but where no turbines would have been visible under the permitted Facility. This map provided a tool for identifying any areas within the protected scenic areas where there would be changes in Facility visibility under the amended Facility that required a need to revisit the Council findings regarding the Facility visual impacts in those areas that were presented in the 2010 Final Order.

The ZVI maps make it possible to identify immediately those areas in which turbines will not be visible and thus where there will be no potential impacts on views. In areas where the ZVI analysis identifies turbines as being visible, careful evaluation is necessary to establish the nature and degree of visual effect that the visibility of the turbines could create. Determination of potential visual impact entails more than just noting the numbers of turbines that have the potential to be visible at a given location. A key consideration is the viewing distance – turbines are most likely to be visually dominant elements in the landscape in very close views (i.e., in the area from 0 to up several miles), but with increasing distance, the turbines become smaller elements in a larger landscape scene and the degree of potential visual impact decreases. Another consideration is landscape context, turbines seen against a sky backdrop, for example, are more likely to stand out in the view than turbines seen against a land backdrop that provides a measure of visual absorption. All of these factors were taken into account in evaluating the potential level of visual impact of Facility turbines that are potentially visible from the protected scenic resource areas.

As discussed under Section R.7.1.1 above, Phase 2 is consistent with Gilliam County's plans and policies governing scenic resources. Although the Facility will clearly be consistent with the County's scenic resources policies, there are two unincorporated areas near the proposed expanded site boundary that have expressed concern about the potential visual impacts from Phase 2. Because there are no plans or policies identifying these areas as scenic resources, there is no statutory obligation for Montague to evaluate Phase 2's potential effects on views from these areas. However, to provide a basis for the Council and the public to put Phase 2's potential visual effects into perspective, Montague is voluntarily providing this analysis of how the views from these areas will be affected by the amendment request.

R.7.2 OR 19/John Day Highway

OR 19, also known as the John Day Highway, connects Arlington in northern Gilliam County to Condon near the Gilliam County/Wheeler County line to the south. An approximately 3.9-mile segment of the highway crosses the proposed expanded site boundary adjacent to the proposed solar area, battery storage system, and Phase 2 collector substation. Figure R-5 shows this highway segment depicting the locations of the proposed project features under Scenario A. Figure R-6 shows the highway segment with the locations of the features proposed under Design Scenario C.

This segment of OR 19 is an important vantage as this highway is an artery for both in-county and inter-county travel and Phase 2 facilities would be the first thing that drivers would see at the crest of the hill driving north on OR 19 headed out of Rock Creek Canyon. Review of the traffic data in Table U-3 in Exhibit U indicates that the two-lane roadway segment within the project site (generally the area between Tree Lane and Baseline Road) had an annual daily traffic of 230 vehicles per day in 2015, the most recent year for which data are available. The landscape in the area consists of a flat plane that slopes up gradually from north to south, gaining approximately 215 feet in elevation over the 3.9 miles from the northern to the southern project site boundary. The landscape is open, with views extending across flat fields devoted to field crops toward distant low hills. The only developed features consist of two small clusters of farm residences and farm operation support structures (barns, sheds, and grain storage facilities); one is located approximately 1.5 mile south of the location where the project's site boundary crosses OR 19, and the other is located approximately 3 miles south of the boundary crossing.

Development under the maximum turbine layout scenario (Figure R-5) will result in rows of Phase 2 turbines being visible along the west side of the highway at distances of 0.5 mile, 1.4 miles, and 2.2 miles from the roadway. East of the highway, a curving string of Phase 1 turbines will range in distance from 800 feet to 0.5 mile from the road. Beyond that first string will be additional strings of Phase 1 turbines at distances of approximately 0.8 and 1.8 miles. On the east side of the highway, south of the Phase 1 turbines, Phase 2 turbine strings would be located at distances of 1,800 feet, 1.0 mile, and 1.5 miles from the roadway. These Montague turbines are in addition to existing turbines located farther to the north that have been constructed as part of the existing Leaning Juniper II and Pebble Springs facilities. Existing Leaning Juniper II turbines are located approximately 0.4 mile west and 0.8 mile east of OR 19, immediately north of the locations where Montague turbines will be visible. Farther to the north, Pebble Springs turbines are located approximately 0.3 mile to the east of OR 19, near its intersection with Eightmile Road.

In addition to the turbines, the other project features that will be visible in this area include a substation on the west side of the highway at the location indicated in Figure R-5, and a 230-kV transmission line with structures up to approximately 100 feet tall that would extend across the highway and then travel northeast and east. On the west side of OR 19 adjacent to the substation, an approximately 467-foot by 600-foot parcel would be developed with stacked battery storage units that would be 20 feet in height. The presence of the turbines, substation, transmission line, and battery storage system will not change the open and agricultural nature of the landscape along this segment of OR 19 because the project facilities will take a relatively small percentage of land out of agricultural production (see Exhibit K). However, the large vertical turbines and the moderately tall electric transmission structures will add readily visible electric infrastructure elements to the landscape. As a consequence, the landscape in this area will look like other agricultural areas in Gilliam County and surrounding counties where wind generation installations have already been developed and have become a common feature in

the regional landscape pattern. Although the appearance and visual character of the landscape of the area seen from the segment of OR 19 that travels through the project site will be changed, the project's impacts on scenic resources along this segment of the highway will not be substantial because the area's existing landscape is a utilitarian agricultural landscape that does not contain outstanding visual features. In particular, in this area there would be no effects on visual resources protected by the GCCP (Gilliam County, 2017a).

Comparison of Figure R-6, which depicts the Phase 2 layout under Design Scenario C, with Figure R-5 (Scenario A, the Maximum Turbine Layout), indicates that under Design Scenario C, the locations of the turbine strings would remain generally similar to their locations under Design Scenario A, but that the turbines would be spaced farther apart, resulting in a decreased number of turbines in the area along the OR 19 corridor. The most important difference between the two scenarios is that under Design Scenario C, the solar array will be approximately 0.5 mile in width and will extend along the west side of OR 19 for approximately a 2-mile segment between Bottemiller Lane and the southern boundary of the Facility near Baseline Road. The solar array will be set back 100 to 150 feet from the highway and will be arranged in orderly rows. The solar collector panels will be relatively low to the ground, with a maximum height of 13 feet. The substation, transmission line, and battery storage system will be a part of all three design scenarios. The visual changes created by Design Scenario C along OR 19 will be greater than those created by the all-wind design scenarios in that the area on the west side of the road along a 2-mile segment of the highway that is now open agricultural land will be covered with solar modules, giving this area a developed appearance.

Design Scenario C illustrates the worst-case scenario for the proposed solar array because it is located immediately adjacent to OR 19. The nearest fenced boundary of the solar array is approximately 35 feet west of the shoulder of OR 19. The nearest fenced boundary of the Phase 2 collector substation, battery storage system, and operations and maintenance (O&M) building is approximately 165 feet west of the shoulder of OR 19.

As described in Section R.8, because solar modules are designed to maximize the absorption of sunlight and because antireflective coated glass will be used for the solar panels, the potential for the solar array to create glare impacts that would affect drivers on OR 19 will be limited. Although the presence of the solar array will affect the open, agricultural character of the corridor along OR 19, the solar array will not have a substantial effect on scenic resources because the area's existing landscape is a utilitarian agricultural landscape that does not contain outstanding visual features. Should the solar array be located farther to the west within the solar micrositing area, it would be less visible from OR 19. None of the three design scenarios will adversely affect visual resources protected by the GCCP (Gilliam County, 2017a).

Although analysis of views from OR 19 is not required under OAR 345-022-0080, Montague will provide a visual simulation of the solar array under separate cover to aid in public understanding of how this new component will affect the landscape.

R.7.3 Community of Olex

Olex is a small, unincorporated community located in the canyon formed by Rock Creek, approximately 0.3 mile west of the proposed expanded site boundary at its closest point, and slightly east of OR 19/John Day Highway. The community of Olex consists of fewer than a dozen rural residences dispersed along a short segment of Rock Creek Road near its intersection with Olex Road.

Figure R-7 is a map that depicts the physical relationship of the community of Olex to the project site. Figure R-8 provides a detailed view of Olex and of the ZVI results indicating the numbers of turbines that are potentially visible from the different parts of the community and the

immediately surrounding area. As review of Figure R-8 indicates, turbines will be visible from areas along Upper Rock Creek Road, where the residences in Olex are concentrated. The number of turbines visible from most of the areas where residences are located will range from 1 to 5, or 6 to 15.

Because Olex is located in a canyon 400 feet below the plateau on which the closest turbines will be located, there are a number of factors that are likely to attenuate the potential effect of the turbines on the views experienced by those who live in the community or who drive through it. One of them is that when viewers are looking straight ahead at their surroundings, the turbines located on the tops of the surrounding canyon will not always lie within their field of view. In addition, because of the angles from which the turbines located on the tops of the surrounding canyon walls will be visible, only portions of the turbines will be visible, reducing their effects on the visual character and quality of the view. Because Montague has not selected a final turbine type for Phase 2, the exact number and arrangement of turbines is not yet determined and the number of turbines visible from Olex may be less than shown on Figure R-8. Even though the project's proposed turbines may have varying but limited degrees of visibility from Olex, they will have no effect on visual resources protected by the GCCP (Gilliam County, 2017a).

Although analysis of views from Olex is not required under OAR 345-022-0080, Montague will provide a visual simulation of turbines under separate cover to aid in public understanding of how turbines closer to the community will affect the landscape.

R.8 SOLAR ARRAY AND GLARE EFFECT

The solar array is designed to generate power through the absorption of sunlight, resulting in limited reflectivity (glare) that may be visible within the scenic resources analysis area. Viewed a distance for a similar elevation, the limited reflectivity of the solar modules contributes to an overall appearance of a dark line on the horizon. In closer-in views, modules will be discernible but they are unlikely to be substantial sources of glint or glare.

The solar modules will be mounted on a tracking system that rotates the modules throughout the day as the sun's angle changes. The movement of the modules, combined with the solar module's antireflective coating will minimize glare. Top-tier modern photovoltaic solar modules use a sophisticated antireflective coating to nearly eliminate the reflection of sunlight off the module face. A typical human eye reacts to light wavelengths from 390 to 700 nanometers (nm) and in that spectrum, the antireflective-coated glass on a typical module will have a high-level transmittance of at least 90 percent. Transmittance is the percent of radiation (light) that travels through a surface. Such a high level of transmittance is important because it means that more light is traveling through the glass and onto the photovoltaic cells, rather than reflecting off the surface. With transmittance values higher than a body of water or a glass window without an antireflective coating, the potential for glare is lower for modules compared to these other surfaces. Based on systematic observations of solar facilities in the American Southwest, researchers from the Argonne National Laboratory (Sullivan et al., n.d.) found that thin-film PV facilities "…were not observed to generate glare."[23]

The surfaces of other Facility components, such as the O&M building and inverter boxes will be treated to reduce potential visibility and reflectivity through use of dulled finishes in colors selected to blend into the backdrop.

[23] Sullivan, Robert G., Leslie B. Kirchler, Carol McCoy, John Mc Carty, Kevin Beckman, and Pamela Richmond. No date. *Visual Impacts of Utility-scale Solar Energy Facilities on Southwestern Desert Landscapes.* Argonne National Laboratory. p. 28.

Although as described above, the solar panels are not expected to generate significant reflective glare, Montague will coordinate with ODOT to determine whether ODOT may have concerns about the potential effects of glare from the solar array on motorists using the highway.

R.9 MITIGATION

OAR 345-021-0010(1)(r)(D) *The measures the applicant proposes to avoid, reduce or otherwise mitigate any significant adverse impacts.*

Response: While no significant adverse impacts to scenic resources have been identified, Montague proposes to incorporate best management practices into the Phase 2 Facility design:

- Most of the collector systems will be buried underground; however, where this is not feasible, portions may be carried overhead.
- Montague will limit or minimize the visual effects of lighting, to the maximum extent possible in compliance with FAA requirements. Facility lights typically used to meet FAA requirements will, to some extent, be shielded from ground level view due to a constrained (3 to 5 degree) vertical beam. (Condition 104)
- Lighting fixtures, except those required by the FAA for safety purposes, will be shielded, hooded, and oriented towards the ground so that direct rays of light do not shine onto neighboring properties or serve as a source of light pollution. (Condition 104)
- The Facility will be maintained and kept free of debris and unused or nonfunctioning equipment by storing equipment and supplies offsite (postconstruction), and removing damaged or unusable equipment from the site.
- Montague will choose antireflective paint colors for turbine towers and blades that are a neutral nonobtrusive color such as white, off-white, or gray. Colors will reduce glare of the wind turbines, but will be required to meet the FAA's daytime lighting and marking standards. The O&M building will be painted earth-tone colors that are similar to colors in the nearby landscape (browns, beiges, or grays are preferable). (Condition 102)
- Montague will design and construct O&M buildings, battery storage area, and substation to be generally consistent with the character of similar buildings in the area. Proposed new buildings or upgrades to existing buildings will be painted in a low-reflectivity, neutral color to blend with the surrounding landscape. (Condition 103)
- There will be no signs posted that are visible from any public road, other than the manufacturer's or installer's identification, appropriate warning signs, or owner identification on a wind turbine, tower, building, or other structure.
- A minimum distance of 1,000 feet measured from the centerline of each turbine tower or meteorological tower will be maintained to the centerline of the line-of-sight from the vantage point of the Fourmile Canyon interpretive site looking toward the visible ONHT ruts (bearing S 89-42-34 W from latitude, longitude: 45.622047, -120.044112). (Condition 105)

R.10 MAP OF SCENIC RESOURCES

OAR 345-021-0010(1)(r)(E) *A map or maps showing the location of the scenic resources described under (B).*

Response: Table R-1 shows the scenic resources that are located within the analysis area. The locations of other permitted energy generation facilities within 10 miles of the site boundary are provided in Exhibit C, Figure C-11.

R.11 MONITORING

OAR 345-021-0010(1)(r)(F) *The applicant's proposed monitoring program, if any, for impacts to scenic resources.*

Response: The Facility will not result in significant adverse impacts to scenic resources within the analysis area. Therefore, a monitoring program is not proposed.

R.12 CONCLUSION

This exhibit provides the required information pursuant to OAR 345-21-0010(1)(r)(A) through (F). Montague has demonstrated through the discussion presented in this exhibit that the design, construction, and operation of the Facility, as modified by RFA 4, will not result in significant adverse impacts to scenic resources and the Facility, including Phase 2, complies with OAR 345-022-0080.

R.13 REFERENCES

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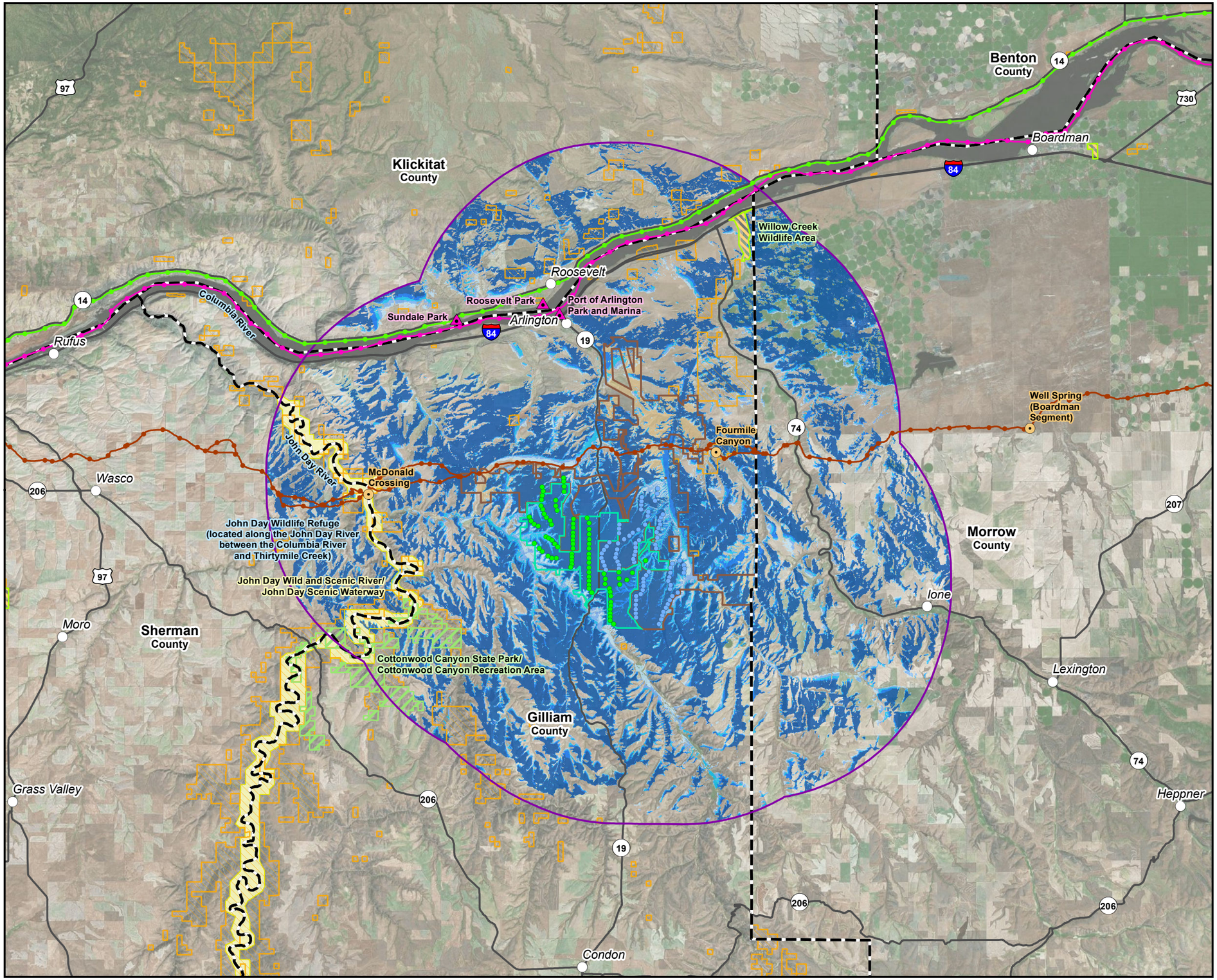
Figures

Figure R-1
Scenic and Aesthetic Areas: Visibility of Maximum Turbine Layout for Proposed Facility
Montague Wind Power Facility



Legend

- Approved Site Boundary
- Proposed Expanded Site Boundary
- Analysis Area for Scenic Resources
- Phase 1 Turbine
- Phase 2 Proposed Turbine
- BLM Land
- Cottonwood Canyon State Park
- John Day Wild and Scenic River/Waterway
- Willow Creek Wildlife Area

Oregon National Historic Trail

- Oregon Trail (Approximate Route)
- Oregon Trail High-Potential Site

Lewis and Clark National Historic Trail

- Water Trail (Approximate 1804 Route)
- Motor Route (Approximate 1806 Route)
- Lewis and Clark Trail Potential Site

Number of Visible Turbines

- < 6
- 6 - 15
- 16 - 30
- 31 - 50
- > 50

Basemap Features

- Interstate/Highway
- County Boundary
- Town

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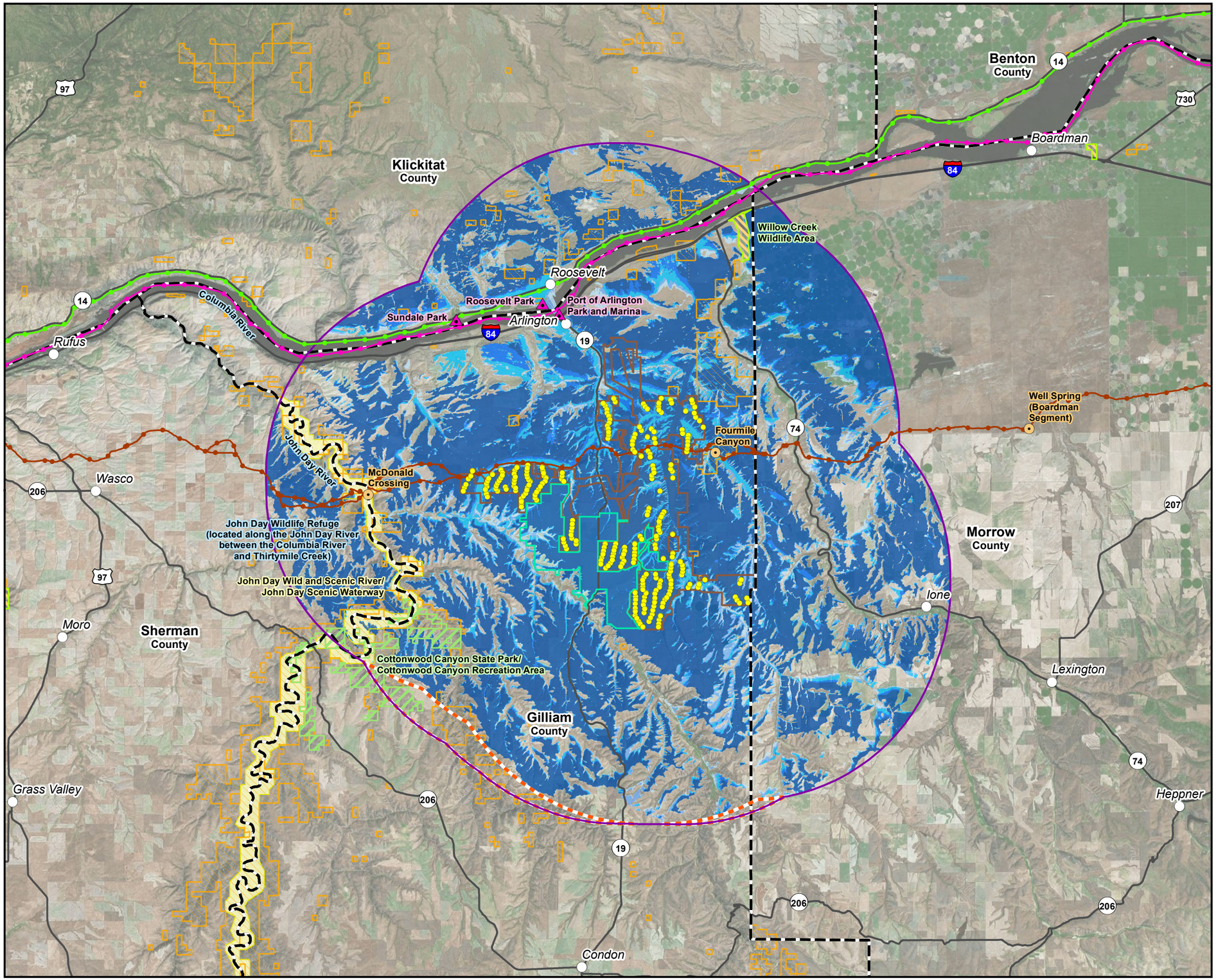
Basemap Source: ESRI World Imagery

Figure R-2
Scenic and Aesthetic Areas: Visibility of Maximum Turbine Layout for Facility Permitted September 2010
Montague Wind Power Facility



Legend

- Approved Site Boundary
- Proposed Expanded Site Boundary
- Analysis Area for Scenic Resources
- 2010 Turbine Location
- BLM Land
- Cottonwood Canyon State Park
- John Day Wild and Scenic River/Waterway
- Willow Creek Wildlife Area

Oregon National Historic Trail

- Oregon Trail (Approximate Route)
- Oregon Trail High-Potential Site

Lewis and Clark National Historic Trail

- Water Trail (Approximate 1804 Route)
- Motor Route (Approximate 1806 Route)
- Lewis and Clark Trail Potential Site

Number of Visible Turbines

- < 6
- 6 - 15
- 16 - 30
- 31 - 50
- > 50
- Area not within 10 miles of the originally permitted facility

Basemap Features

- Interstate/Highway
- County Boundary
- Town

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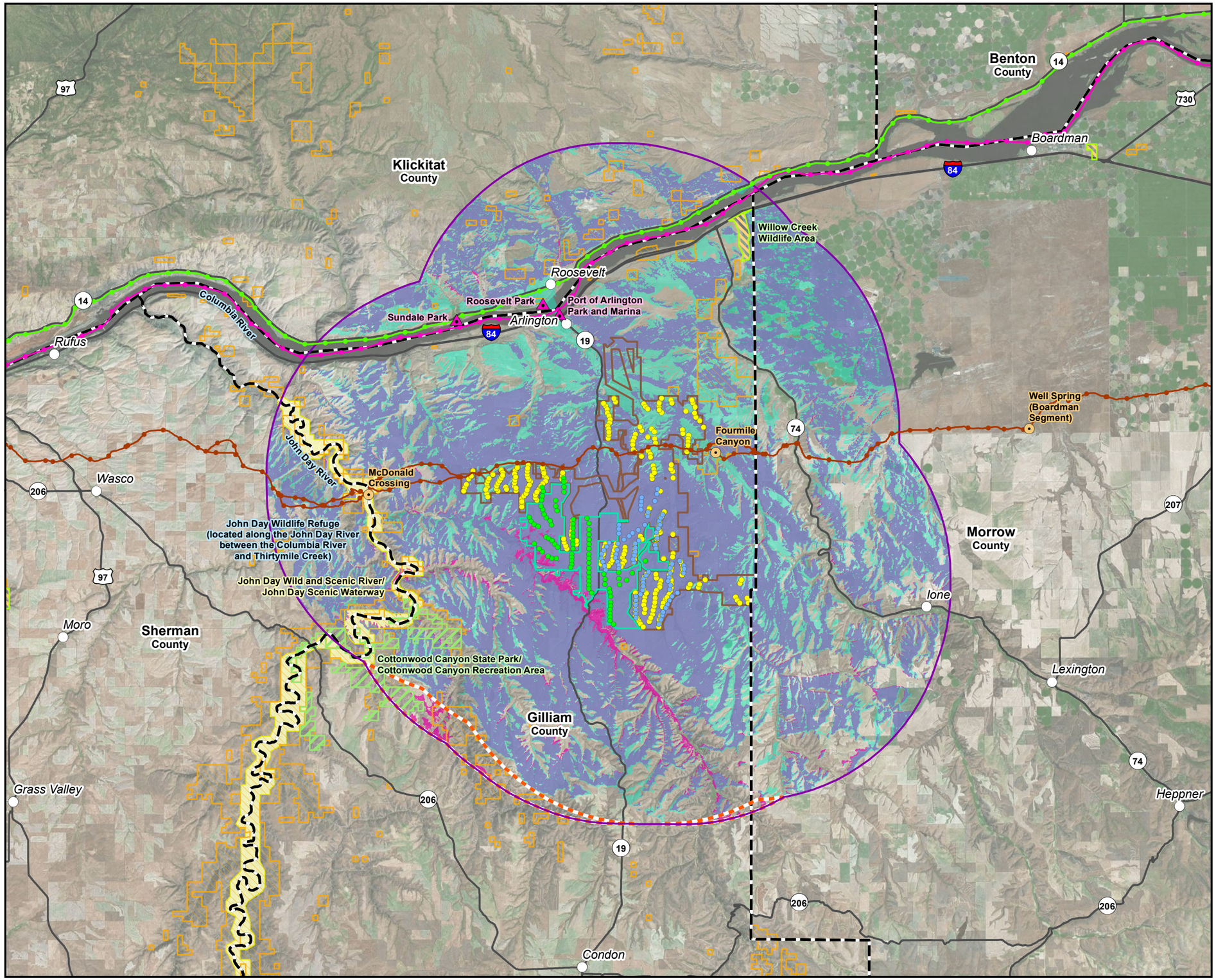
Basemap Source: ESRI World Imagery

Figure R-3
Turbine Visibility with Proposed Modifications Compared to Original Turbine Visibility
Montague Wind Power Facility



Legend

- Approved Site Boundary
- Proposed Expanded Site Boundary
- Analysis Area for Scenic Resources
- 2010 Turbine Location
- Phase 1 Turbine
- Phase 2 Proposed Turbine
- BLM Land
- Cottonwood Canyon State Park
- John Day Wild and Scenic River/Waterway
- Willow Creek Wildlife Area

Oregon National Historic Trail

- Oregon Trail (Approximate Route)
- Oregon Trail High-Potential Site

Lewis and Clark National Historic Trail

- Water Trail (Approximate 1804 Route)
- Motor Route (Approximate 1806 Route)
- Lewis and Clark Trail Potential Site

Turbine Visibility

- Turbines would be visible under the originally permitted facility but would not be visible under the proposed facility
- Turbines would be visible under the proposed facility but would not be visible under the originally permitted facility
- Turbines would be visible under both the originally permitted facility and the proposed facility
- Area not within 10 miles of the originally permitted facility

Basemap Features

- Interstate/Highway
- County Boundary
- Town

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Basemap Source: ESRI World Imagery

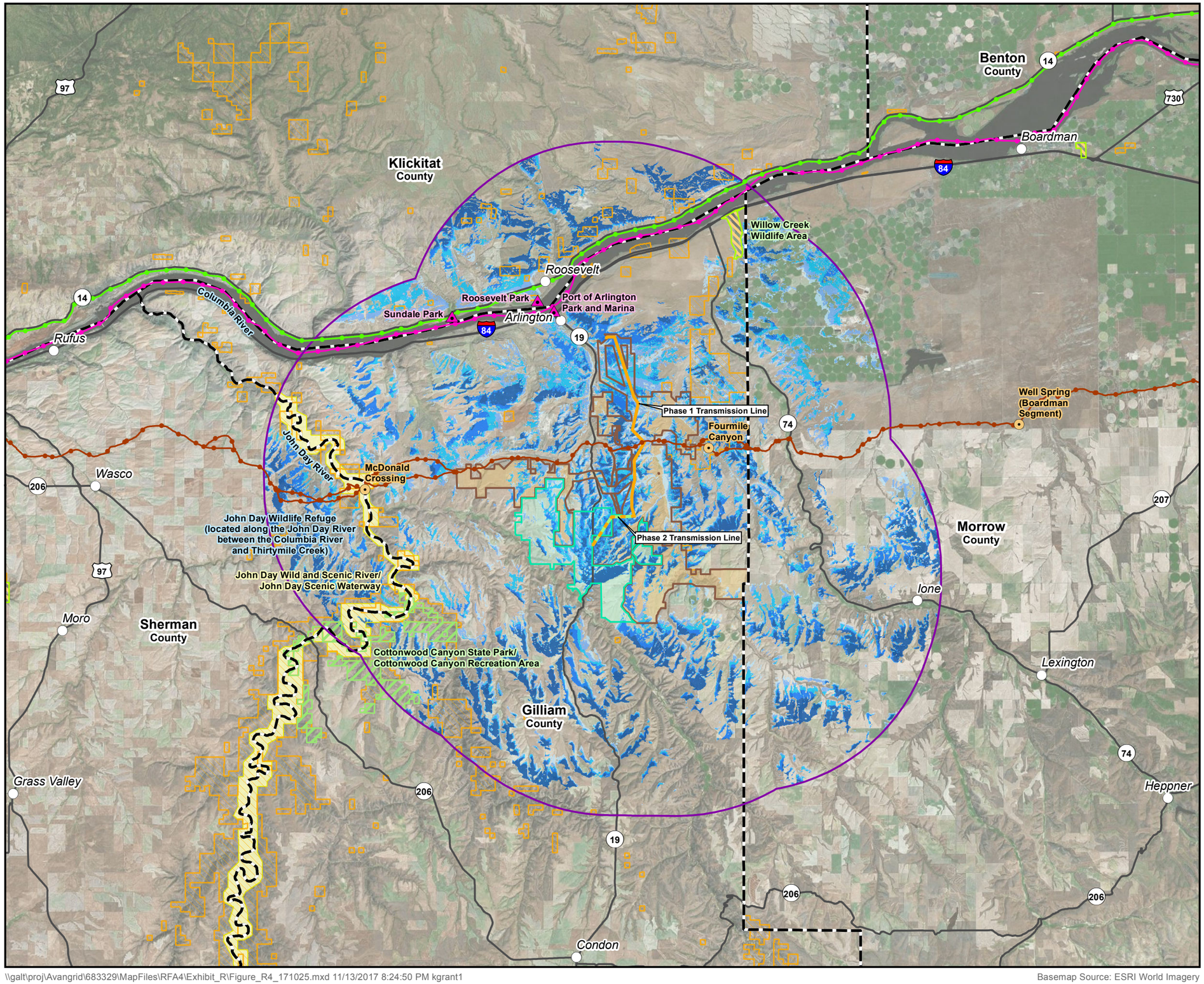

Figure R-4
Scenic and Aesthetic Areas: Visibility of 230-kV Transmission Line – Without Turbines
Montague Wind Power Facility

Legend

- Approved Site Boundary
- Proposed Expanded Site Boundary
- Analysis Area for Scenic Resources
- Phase 1 230-kV Transmission Line
- Phase 2 230-kV Transmission Line
- BLM Land
- Cottonwood Canyon State Park
- John Day Wild and Scenic River/Waterway
- Willow Creek Wildlife Area

Oregon National Historic Trail

- Oregon Trail (Approximate Route)
- Oregon Trail High-Potential Site

Lewis and Clark National Historic Trail

- Water Trail (Approximate 1804 Route)
- Motor Route (Approximate 1806 Route)
- Lewis and Clark Trail Potential Site

Number of Visible Transmission Line Poles

- < 6
- 6 - 15
- 16 - 30
- 31 - 50
- > 50

Basemap Features

- Interstate/Highway
- County Boundary
- Town

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Basemap Source: ESRI World Imagery

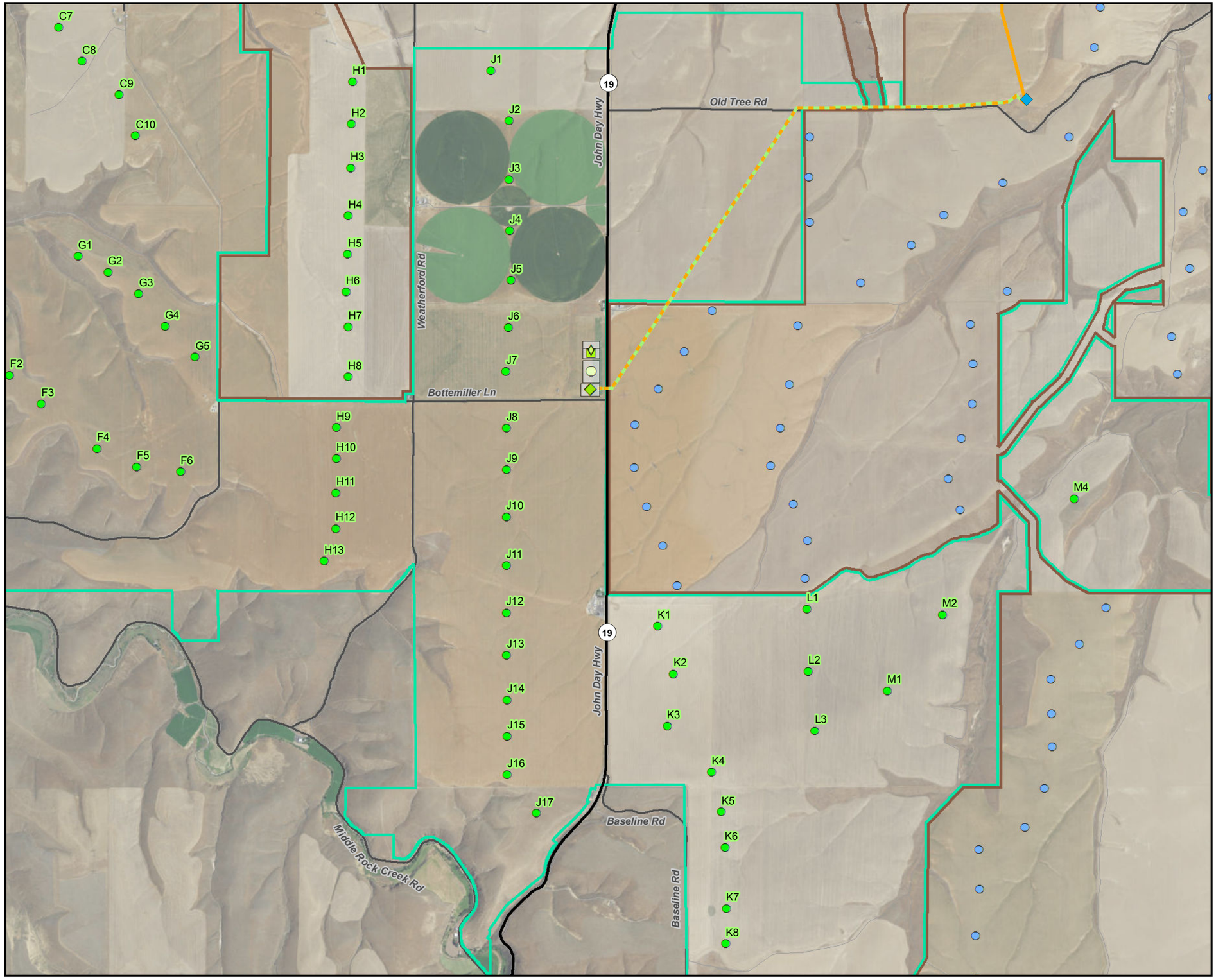

Figure R-5
John Day Highway Detail
Design Scenario A: Maximum Turbine Layout for Proposed Facility
Montague Wind Power Facility

Legend

- Approved Site Boundary/Micrositing Corridor
- Proposed Expanded Site Boundary/ Micrositing Corridor

Phase 2 (Features within the Approved and Proposed Expanded Site Boundary and Micrositing Corridor)

- Proposed Turbine
- Phase 2 Collector Substation
- Battery Storage System
- O&M Building
- Temporary Laydown Area
- Modified 230-kV Transmission Line Route

Phase 1 (Features Constructed within the Approved Site Boundary and Micrositing Corridor)

- Turbine
- Phase 1 Substation
- Approved 230-kV Transmission Line

Basemap Features

- Highway
- Public Road
- Other Road
- Major Railroad Line

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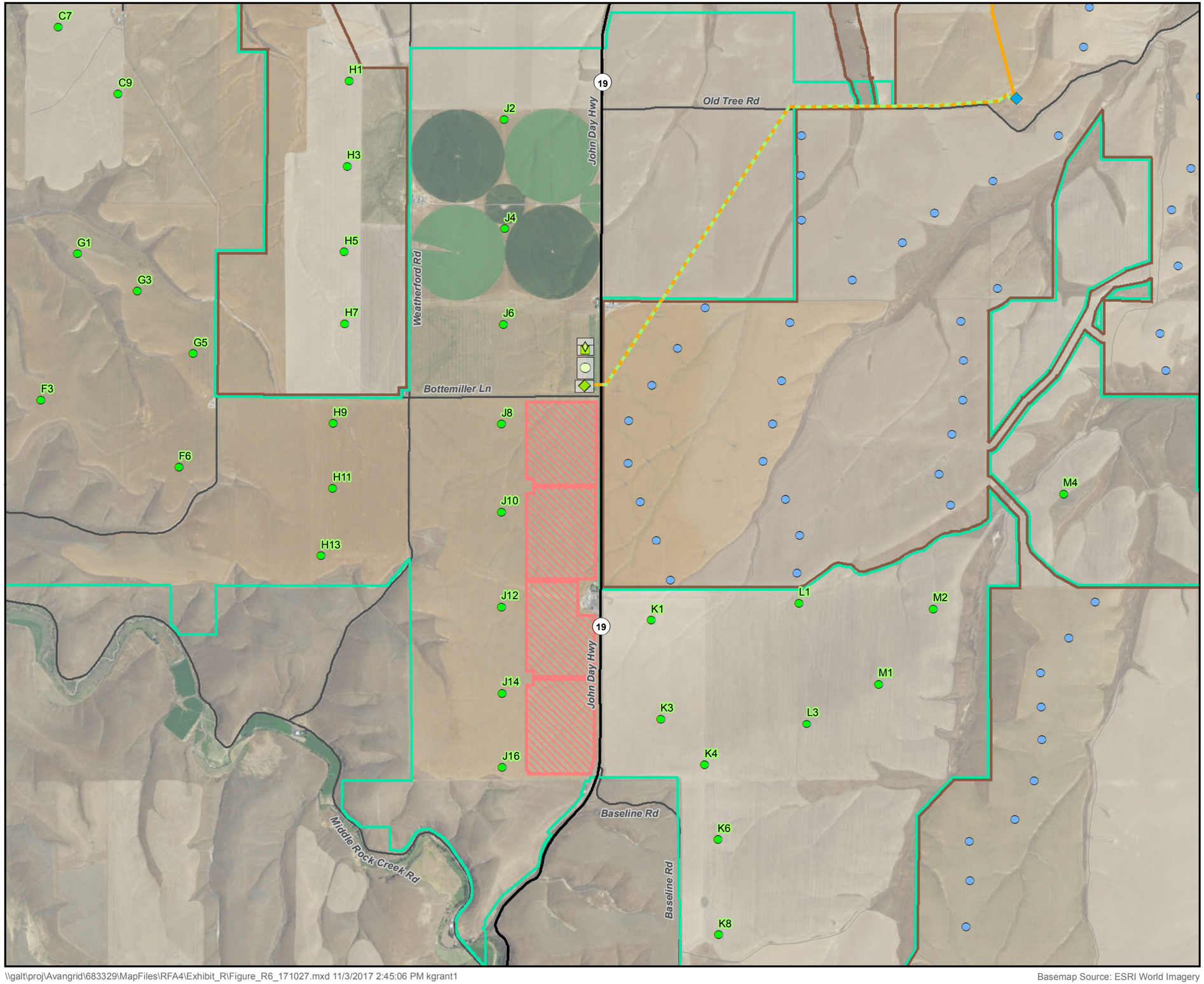
Basemap Source: ESRI World Imagery

Figure R-6
John Day Highway Detail
Design Scenario C: Wind and Solar Layout for Proposed Facility
Montague Wind Power Facility



Legend

- Approved Site Boundary/Micrositing Corridor
- Proposed Expanded Site Boundary/ Micrositing Corridor

Phase 2 (Features within the Approved and Proposed Expanded Site Boundary and Micrositing Corridor)

- Proposed Turbine
- Phase 2 Collector Substation
- Battery Storage System
- O&M Building
- Temporary Laydown Area
- Modified 230-kV Transmission Line Route
- Solar Array

Phase 1 (Features Constructed within the Approved Site Boundary and Micrositing Corridor)

- Turbine
- Phase 1 Substation
- Approved 230-kV Transmission Line

Basemap Features

- Highway
- Public Road
- Other Road
- Major Railroad Line

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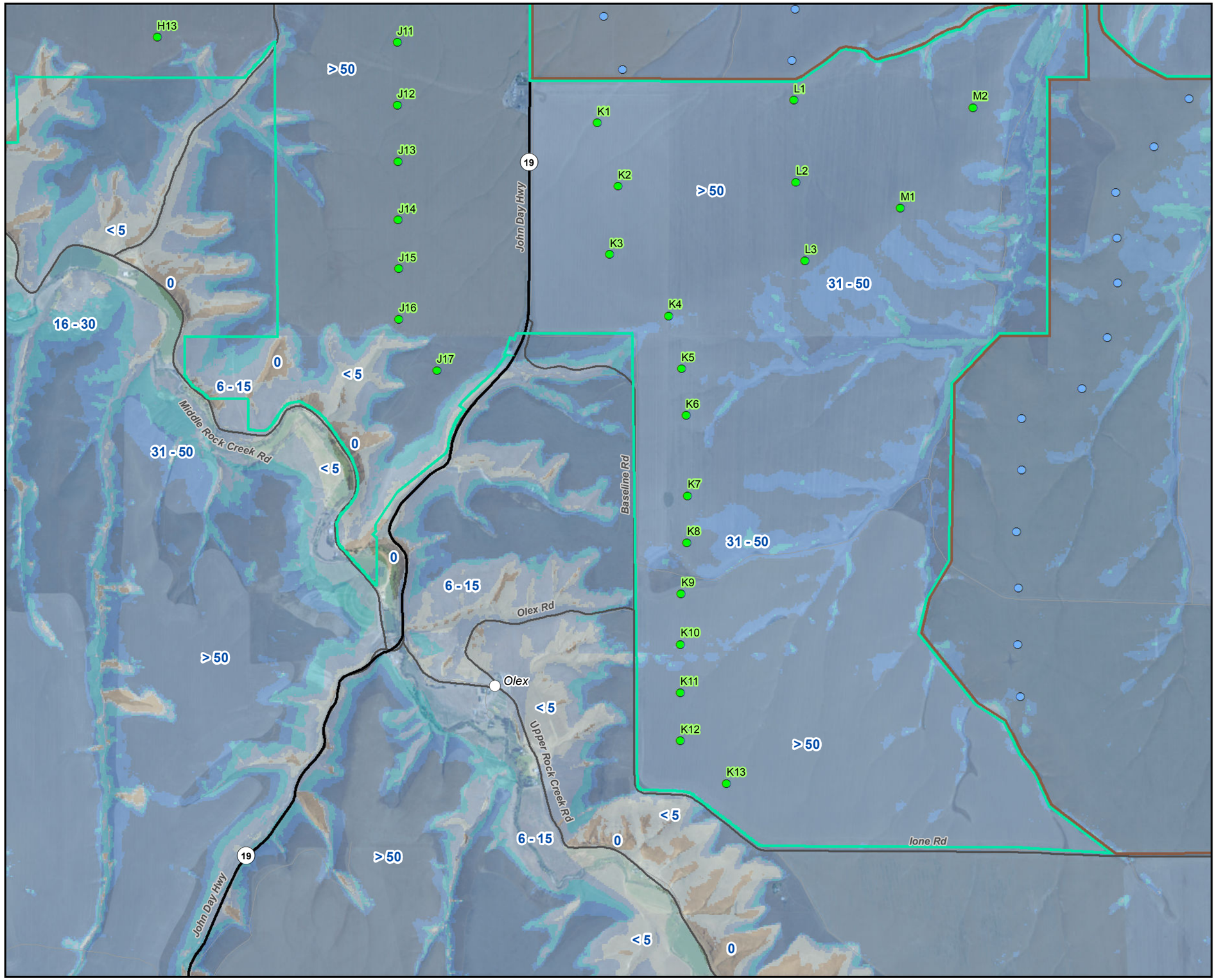
Basemap Source: ESRI World Imagery

Figure R-7
Context Map for Olex
Design Scenario A: Maximum Turbine Layout for Proposed Facility
Montague Wind Power Facility



Legend

- Approved Site Boundary/Micrositing Corridor
- Proposed Expanded Site Boundary/ Micrositing Corridor
- Phase 1 Turbine
- Phase 2 Proposed Turbine

Number of Visible Turbines, Assuming Design Scenario A

- < 5
- 6 - 15
- 16 - 30
- 31 - 50
- > 50

Basemap Features

- Highway
- Public Road
- Other Road
- Major Railroad Line

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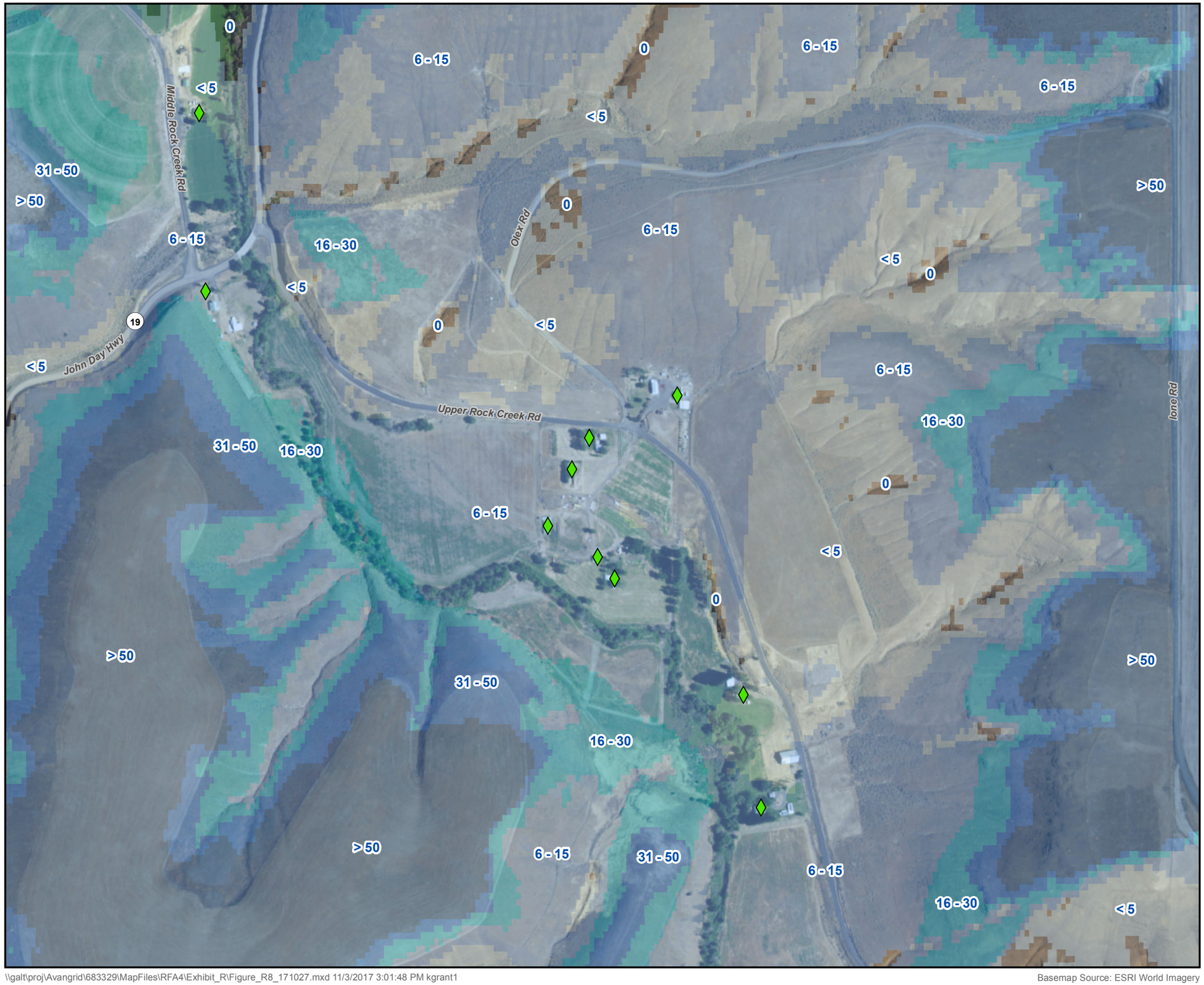
Basemap Source: ESRI World Imagery

Figure R-8
Olex Community
Visibility of Maximum Turbine Layout for Proposed Facility
Montague Wind Power Facility



Legend

Number of Visible Turbines, Assuming Design Scenario A

- < 6
- 6 - 15
- 16 - 30
- 31 - 50
- > 50

Residences Identified for Noise Analysis

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Basemap Source: ESRI World Imagery

EXHIBIT S
HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

OAR 345-021-0010(1)(s)

TABLE OF CONTENTS

FIGURES

ATTACHMENTS

S.1 INTRODUCTION

The Energy Facility Siting Council (EFSC; Council) previously approved construction of the 404-megawatt (MW) Montague Wind Power Facility (Facility)[1] and found that the Facility complies with the Historic, Cultural, and Archaeological Resources standard in Oregon Administrative Rule (OAR) 345-022-0090. Montague Wind Power Facility, LLC (Montague) is constructing the Facility in two phases. Phase 1 consists of up to 81 wind turbines generating 202 MW of power within the approved boundary. Montague has already begun construction of Phase 1 under the conditions of the existing Site Certificate. Phase 2 consists of an expanded site boundary, solar array, and battery storage. The analysis in this exhibit focuses on Phase 2 and the three design scenarios described in *Request for Amendment No. 4 Project Description and OAR Division 27 Compliance* (referred to herein as RFA 4).

The Council may issue or amend a site certificate without making findings under OAR 345-022-0090(1) when a facility qualifies under OAR 345-022-0090(2) as a facility producing power from wind and solar. In such circumstances, the Council may, at its discretion, apply the requirements of OAR 345-022-0090(1) to impose site certificate conditions on such a facility, but the Council is not legally obligated to make findings or impose conditions under the Historic, Cultural, and Archaeological Resources standard. Consequently, the rule provides flexibility for a certificate holder to address potential impacts to certain cultural resources outside of the EFSC process. Montague requests that the Council exercise its discretion under OAR 345-022-0090 and allow Montague to address one Historic Property of Religious and Cultural Significance to Indian Tribes (HPRCSIT) outside of the EFSC amendment process. One HPRCSIT was previously identified within the Facility analysis area that was determined eligible by the Oregon State Historic Preservation Office (SHPO) for listing on the National Register of Historic Places (NRHP). The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) have requested that Montague not disclose details regarding the NRHP-eligible HPRCSIT. Montague is engaging in discussions with the CTUIR to assess potential impacts to the HPRCSIT and to discuss appropriate mitigation.

S.2 SUMMARY OF ANALYSIS RESULTS

RFA 4 proposes to expand the Facility site boundary, add a solar array, and store energy in a battery system. This exhibit presents an analysis of potential impacts from Phase 2 construction on historic, cultural, and archaeological resources that are eligible or potentially eligible for listing on the NRHP.[2]

The analysis results are summarized as follows:

- **Site Boundary Expansion**. The entire analysis area was covered in desktop surveys. The majority of the analysis area, including areas where Phase 2 components are proposed in the preliminary design layout, has been field surveyed during five cultural resources investigations (Sharpe et al., 2010; McClintock and Sharpe, 2010; Ragsdale et al., 2011; Sheldon and Brown, 2017; Sheldon et al., 2017). The investigations identified five built environment properties and one historical archaeological site within the analysis area.
  - One of the built environment resources, Weatherford Barn, was determined eligible for listing on the NRHP (Startz, 1987). Steps were taken through Facility redesign to minimize indirect visual impacts to the Weatherford Barn.

[1] EFSC. 2017. *Third Amended Site Certificate for Montague Wind Power Facility*. July 11.

[2] With the exception of the identified HPRCSIT, which is being addressed outside of the EFSC amendment process.

  - The other four built environment resources (68040 Highway 19, 69180 Weatherford Road, 69064 Weatherford Road, and 69398 Berthold Road) have been recommended not eligible for listing on the NRHP.
  - The single historical archaeological resource (35GM306) was determined not eligible by SHPO (SHPO, 2017).
  - One NRHP-eligible HPRCSIT was identified within the viewshed of the analysis area. Consultation with the CTUIR is taking place outside of the EFSC amendment process to assess potential impacts to the HPRCSIT and to evaluate any mitigation needs, as appropriate.

  SHPO's concurrence with the cultural report for the proposed expanded area (Sheldon et al., 2017) constitutes concurrence with the site ineligibility recommendations. Therefore, such sites will not need to be avoided during construction.

- **Addition of Solar Array**. The solar array will be constructed within the proposed expanded site boundary in the defined solar micrositing area. The entire solar micrositing area was included in the cultural resources desktop surveys and the majority (more than 95 percent) was field surveyed. Only a small portion on the western edge of the micrositing area, adjacent to Weatherford Road south of Bottemiller Lane, was not field surveyed (see Figure S-3). If the solar array is shifted within the solar micrositing area to include any land that was not previously included in pedestrian surveys, Montague will comply with Site Certificate Condition 47 by conducting a supplemental pedestrian survey and providing a report to the Oregon Department of Energy and SHPO prior to construction. No NRHP-eligible or potentially eligible sites are within the surveyed portions of the solar micrositing area. No new types of impacts to cultural sites are anticipated as a result of construction and operation of solar technology.
- **Addition of Battery Storage**. The battery storage area will be constructed within the proposed expanded site boundary. The battery storage area was field surveyed in 2017 (Sheldon et al., 2017). The battery storage area will be located to avoid impacts to the one identified NRHP-eligible property (the Weatherford Barn). No new types of impacts to cultural sites are anticipated as a result of construction and operation of battery storage technology.

S.3 CONDITION COMPLIANCE

The Third Amended Site Certificate imposes five conditions (47 through 51) designed to reduce or avoid potential impacts to cultural resources. The conditions include requirements to avoid impacts within a buffer around identified sites, conduct additional surveys, generate preconstruction mapping, and provide training to construction workers in the case of inadvertent discovery of cultural resources. The modifications proposed under RFA 4 do not affect Montague's ability to comply with the existing Site Certificate conditions and no new conditions are needed for protection of cultural resources. However, Montague suggests modifying Conditions 47 and 49 for clarification, as shown below with underline and strikeout.

47 *Before beginning construction, the certificate holder shall label <u>the specified</u> ~~all identified~~ historic, cultural, or archaeological resource sites on construction maps and drawings as "no entry" areas. If construction activities will occur within 200 feet of an identified site, the certificate holder shall flag a 30-meter no-entry buffer around the site. The certificate holder may use existing private roads within the buffer areas but may not*

widen or improve private roads within the buffer areas. The no-entry restriction does not apply to public road rights-of-way within the buffer areas or to operational farmsteads.

49 Before beginning construction, the certificate holder shall provide to the Department a map showing the final design locations of all components of the facility, the areas that would be temporarily disturbed during construction and the areas that were surveyed in 2009, 2011, and 2017 as described in the Final Order on ~~the Application~~Amendment 4. The certificate holder shall hire qualified personnel to conduct field investigation of all areas to be disturbed during construction that lie outside the previously-surveyed areas. The certificate holder shall provide a written report of the field investigations to the Department and to the Oregon State Historic Preservation Office (SHPO) for review and approval. If any potentially significant historic, cultural or archaeological resources are found during the field investigation, the certificate holder shall instruct all construction personnel to avoid the identified sites and shall implement appropriate measures to protect the sites, including the measures described in Condition 47.

S.4 CULTURAL RESOURCES ANALYSIS AREA

The analysis area for Exhibit S consists of the area within the approved and proposed expanded Facility site boundary. Montague hired CH2M HILL Engineers, Inc. (CH2M) to conduct cultural resource surveys within the site boundary. Consistent with SHPO guidelines, CH2M completed a desktop survey to identify archaeological investigations and prehistoric and historical sites previously recorded within the site boundary, and within 1.0 mile of the site boundary. In addition, professional archaeologists led five separate field surveys within the site boundary (Sharpe et al., 2010; McClintock and Sharpe, 2010; Ragsdale et al., 2011; Sheldon and Brown, 2017; Sheldon et al., 2017).

Figures S-1 through S-3 show the cultural resources analysis area and areas included in each pedestrian survey. The entire approved site boundary, which encompasses 33,691 acres, was desktop surveyed, and more than 23,000 acres (nearly 70 percent) were included in previous field pedestrian surveys conducted in 2010 (Sharpe et al., 2010; McClintock and Sharpe, 2010). The proposed expanded site boundary totals approximately 13,365 acres, of which 8,113 acres (over 60 percent) were field surveyed in 2011 for the Baseline Wind Energy Project (Ragsdale et al., 2011). In 2017, another 748.3 acres within the approved and proposed expanded site boundary were field surveyed (approximately 1.6 percent) in anticipation of this RFA 4. Field surveys focused on areas where preliminary designs indicated Facility components likely will be sited. Some facilities may shift during the final design process as engineering details are confirmed. The analysis in this exhibit focuses on potential impacts to cultural resources from construction of Phase 2.

S.5 INFORMATION ABOUT HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

OAR 345-021-0010(1)(s) *Information about historic, cultural and archaeological resources. Information concerning the location of archaeological sites or objects may be exempt from public disclosure under ORS 192.502(4) or ORS 192.501(11). The applicant shall submit such information separately, clearly marked as "confidential," and shall request that the Department and the Council keep the information confidential to the extent permitted by law. The applicant shall include information in Exhibit S or in confidential submissions providing evidence to support a finding by the Council as required by OAR 345-022-0090, including:*

Response: This exhibit provides information about cultural surveys conducted within the approved micrositing corridor and the proposed expanded site boundary, as well as the historic, cultural, and archaeological resources identified during those surveys. Additional information is provided in Attachment S-1, *2017 Field Investigation Report for Montague Wind Power Facility – Phase 2* (Sheldon et al., 2017). The cultural resources survey report is a confidential document that is exempt from public disclosure under Oregon Revised Statute (ORS) 192.501(11) and is provided separately. Montague provided copies of the previously conducted confidential cultural resources survey reports for the approved site boundary (Sharpe et al., 2010; McClintock and Sharpe, 2010; Ragsdale et al., 2011; Sheldon and Brown, 2017), as well as the survey report for the proposed expanded site boundary (Sheldon et al., 2017), to SHPO and area Tribes as identified by the Commission on Indian Services (see Attachment S-1).

S.6 SURVEY METHODOLOGY

S.6.1 File Search

In May 2017, a professional archaeologist from CH2M conducted a file search through the SHPO online geographic information system database for previously recorded cultural resources and previous cultural resource investigations conducted within 1.0 mile of the analysis area (site boundary). Thirteen previous cultural resource investigations were conducted within 1.0 mile of the expanded site boundary, two of which cross the Facility site (Sharpe et al., 2010; Ragsdale et al., 2011).

Thirty cultural resources were previously recorded within 1.0 mile of the analysis area, comprising 14 isolates, 10 archaeological sites, 5 built environment properties, and 1 NRHP-eligible HPRCSIT.

Within the analysis area, the file search identified one archaeological site (35GM306), two built environment properties (a farmstead at 69398 Berthold Road and the Weatherford Barn), and one HPRCSIT. The single archaeological site, 35GM306, consists of a sparse historic domestic debris scatter. The built environment properties consist of the Weatherford Barn and a farmstead at 69398 Berthold Road. The Weatherford Barn was determined eligible for listing on the NRHP.

In deference to a previous request from the CTUIR, no additional details regarding the NRHP-eligible HPRCSIT are provided in this exhibit.

No other NRHP-eligible resources, archaeological sites, or objects (as defined by ORS 358.905[1][a] and [c]) were identified within the analysis area during the file search.

S.6.2 Cartographic Research

As a part of the desktop survey prior to fieldwork, a search of General Land Office (GLO), historical U.S. Geological Survey (USGS) quad maps, and Metsker maps was conducted within the Facility analysis area (Sharpe et al., 2010; McClintock and Sharpe, 2010; Ragsdale et al., 2011; Sheldon et al., 2017).

GLO maps dating between 1865 and 1884 were examined to determine whether unrecorded historical structures or features are located within the analysis area. These types of GLO maps were created following cadastral surveys, which established internal divisions within townships. Natural and cultural features that were noted by the surveyors as they established section lines are depicted on the maps. With the exception of several roads, no Donation Land Claims,

homes, or other improvements are shown on any of the GLO maps pertaining to the analysis area. No information could be located concerning the other roads.

The 1916 USGS Arlington, Oregon 1:125,000 quad map shows several roads and structures evident on Shutler Flats. Extant structures located within the analysis area were documented during the previous Montague survey (Sharpe et al., 2010) and Baseline survey (Ragsdale et al., 2011).

Historical Metsker maps were also reviewed for the Facility analysis area (Sharpe et al., 2010; McClintock and Sharpe, 2010; Ragsdale et al., 2011; Sheldon et al., 2017). These maps identified several ranches including the J. Bottemiller Ranch, L. W. Childs Ranch, and A. M. Cannon Ranch within the analysis area.

S.6.3 Traditional Use Survey

After receiving comments on the Montague cultural survey report (Sharpe et al., 2010), Montague funded Traditional Cultural Property (TCP) identification studies by the Confederated Tribes of Warm Springs Reservation and the CTUIR that led to the documentation and evaluation of TCPs or HPRCSIT in the vicinity of the analysis area.

S.6.4 Pedestrian Survey

Substantial portions of the Facility analysis area were previously field surveyed, as described in Section S.4, Cultural Resources Analysis Area. The approved site boundary encompasses approximately 33,691 acres, while the proposed expanded site boundary will add approximately 13,365 acres. More than 23,000 acres of the approved site boundary and 8,113 acres of the proposed expanded site boundary were previously pedestrian surveyed (nearly 70 percent) for cultural resources (Sharpe et al., 2010; McClintock and Sharpe, 2010; Ragsdale et al., 2011).

The Facility design for Phase 2 will result in the location of Facility components outside of previously surveyed areas. Surveys were generally conducted within 500 feet of planned and alternate turbine locations, within 500 feet of the transmission line route (i.e., 1,000-foot corridor), and within 150 feet of roads and electrical collector lines (i.e., 300-foot corridor). Based on the planned Phase 2 component locations and associated buffer areas, 748.3 acres are located outside of previously surveyed areas, or approximately 1.6 percent of the approved and proposed Facility site boundary (see Figures S-1 through S-3 and Attachment S-1). The methodology for the RFA 4 May and June 2017 field survey (Sheldon et al., 2017) was comparable to the previous field surveys (Sharpe et al., 2010; Ragsdale et al., 2011). Each pedestrian field survey used linear transects spaced between 20- and 30-meter (66- and 98-foot) intervals. Surveys were guided by the use of Trimble Geo 7x handheld Global Positioning System devices (or equivalent) loaded with Facility files to identify the survey areas.

Structures deemed to meet the 50-year threshold for potential NRHP eligibility were photodocumented by archaeological field staff for analysis and inventory by architectural historians. For the original Montague survey (Sharpe et al., 2010), CH2M architectural historian Jessica Feldman prepared the inventory forms. For the Baseline survey (Ragsdale et al., 2011), architectural historian Natalie Perrin prepared the built environment inventory forms and evaluated the resources. For the 2017 survey, architectural historians Marcia Montgomery and Marynell Nolan-Wheatley prepared the built environment inventory forms and evaluated the resources (Sheldon et al., 2017).

S.7 HISTORIC RESOURCES LISTED OR ELIGIBLE FOR LISTING ON NATIONAL REGISTER OF HISTORIC PLACES

(A) Historic and cultural resources within the analysis area that have been listed, or would likely be eligible for listing, on the National Register of Historic Places.

Response: Attachment S-6 contains three confidential figures showing identified cultural resources with the layouts for Design Scenarios A, B, and C, respectively. One previously identified NRHP-eligible resource (the Weatherford Barn) exists within the analysis area. Other identified cultural resources within the analysis area consist of four built environment resources that were documented as a part of the 2017 survey and a historic archaeological site that was documented during the Baseline survey (Ragsdale et al., 2011). The four built environment properties were recommended not eligible for listing on the NRHP. The inventory forms are included as Appendix C to the confidential cultural resources survey report (Attachment S-1). Site 35GM306 was determined ineligible for listing on the NRHP by SHPO (SHPO, 2017). The site was revisited and, pending concurrence from SHPO, these resources are considered unevaluated and potentially eligible. Montague plans to avoid impacts to the eligible and potentially eligible resources.

S.7.1 Weatherford Barn

The Weatherford Barn is a single structure located in an agricultural field north of Bottemiller Road and west of Oregon Highway 19. It was constructed in 1880 and is reportedly the oldest barn in the county (Startz, 1987). An updated inventory form was prepared (Appendix C to the confidential cultural resources survey report in Attachment S-1). SHPO determined that the Weatherford Barn was eligible for listing on the NRHP (SHPO, 2017).

S.7.2 68040 Highway 19, Arlington, Oregon

The farmstead complex located at 68040 Highway 19 includes two residential buildings, a garage, a shed, three storage buildings, a collection of silos, and three Quonset huts. One residence dates to the early twentieth century and the other is a mid-century ranch-style house. None of the resources within this property is recommended as eligible for listing on the NRHP. An inventory form and evaluation were prepared (Appendix C to the confidential cultural resources survey report in Attachment S-1).

S.7.3 69180 Weatherford Road, Arlington, Oregon

The farmstead complex located at 69180 Weatherford Road consists of six buildings and structures: a mobile home, three silos, a Quonset hut, and a small shed located on the west side of Weatherford Road. The county assessor provides dates of construction for the silos as 1926, 1931, and 1991, and the Quonset hut dates to 1971. None of the documented resources within this property is recommended as eligible for listing on the NRHP. An inventory form and evaluation were prepared (Appendix C to the confidential cultural resources survey report in Attachment S-1).

S.7.4 69064 Weatherford Road, Arlington, Oregon

The property at 69064 Weatherford Road consists of a collection of farm buildings with no residence. The complex includes a barn, grain elevator, and associated grain silos, three outbuildings, and a chicken coop. County assessor records identify the barn and grain elevator as constructed in 1941, and the largest outbuilding, an equipment storage shed, as built in 1971. Two of the silos were constructed in 1936 and one in 1981. None of the resources within this

complex is recommended as eligible for listing on the NRHP. An inventory form and evaluation were prepared (Appendix C to the confidential cultural resources survey report in Attachment S-1).

S.7.5 69398 Berthold Road, Arlington, Oregon

The farmstead complex located at 69398 Berthold Road consists of a collection of farm buildings, including a residence, a detached garage, a grain elevator and silo, an outbuilding, a barn, and a shed. The property was originally documented in 2010 as a part of the Baseline surveys (Ragsdale et al., 2011). The form was updated in 2013; however, it was not submitted to SHPO. According to county assessor's records, the oldest resource on the property is a silo constructed in 1925. The residence reportedly dates to 1962, but appears older. The outbuildings date to the 1940s and 1950s. None of the resources within this property is recommended as eligible for listing on the NRHP. An inventory form and evaluation were prepared (Appendix C to the confidential cultural resources survey report in Attachment S-1).

S.7.6 Site 35GM306

Site 35GM306 consists of a historic debris scatter located in Township 01 North, Range 21 East, Section 28. The site was originally recorded in 2010 for the Baseline Wind Energy Project as a small domestic and agricultural debris scatter adjacent on the west side of Weatherford Road (Ragsdale et al., 2011). A review of historical maps shows nothing at the location in 1864 (Bureau of Land Management [BLM], 1864), and only the road in 1916 (USGS, 1916). It is likely that the site consists of an opportunistic dumping event. The site was evaluated and recommended not eligible for listing on the NRHP. SHPO concurred with the recommendation (SHPO, 2017). The site was revisited during the 2017 surveys, and no change was found in the condition of the site.

S.8 ARCHAEOLOGICAL OBJECTS AND ARCHAEOLOGICAL SITES ON PRIVATE LANDS

(B) For private lands, archaeological objects, as defined in ORS 358.905(1)(a), and archaeological sites, as defined in ORS 358.905(1)(c), within the analysis area.

Response: The entirety of the analysis area is located on private lands. The regulatory definition for consideration as an archaeological site on private lands is defined by ORS 358.905(1)(c).

S.8.1 Regulatory Definitions

For private lands, ORS 358.905(1)(a) defines archaeological objects as follows:

(a) Archaeological object means an object that:

(A) Is at least 75 years old;

(B) Is part of the physical record of an indigenous or other culture found in the state or waters of the state; and

(C) Is material remains of past human life or activity that are of archaeological significance including, but not limited to, monuments, symbols, tools, facilities, technological by-products and dietary by-products.

For private lands, ORS 358.905(1)(c) defines archaeological sites as follows:

(c)(A) Archaeological site means a geographic locality in Oregon, including but not limited to submerged and submersible lands and the bed of the sea within the state's jurisdiction, that

contains archaeological objects and the contextual associations of the archaeological objects with:

(i) Each other; or
(ii) Biotic or geological remains or deposits.

(B) Examples of archaeological sites described in subparagraph (A) of this paragraph include but are not limited to shipwrecks, lithic quarries, house pit villages, camps, burials, lithic scatters, homesteads and townsites.

S.8.2 Archaeological Objects and Sites Found within the Analysis Area

The identified resources within the analysis area (Weatherford Barn, 68040 Highway 19, 69180 Weatherford Road, 69064 Weatherford Road, 69398 Berthold Road, and 35GM306) all meet the definition for consideration as an archaeological site as defined by ORS 358.905(1)(c).

S.9 ARCHAEOLOGICAL OBJECTS AND ARCHAEOLOGICAL SITES ON PUBLIC LANDS

(C) For public lands, archaeological sites, as defined in ORS 358.905(1)(c), within the analysis area.

Response: No portion of the analysis area is located on public lands. Thus, no archaeological sites, as defined in ORS 358.905(1)(c), were found on public lands.

S.10 POTENTIAL IMPACTS ON HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

(D) The significant potential impacts, if any, of the construction, operation and retirement of the proposed facility on the resources described in paragraphs (A), (B) and (C) and a plan for protection of those resources that includes at least the following:

Response: The Facility as proposed, and taking into account mitigation, will have no significant impacts on NRHP-eligible resources. Potential significant impacts to NRHP-eligible properties will be avoided through Facility redesign or mitigated through offsite consultation. Adherence to Site Certificate Condition 47 will ensure avoidance of NRHP-eligible or potentially eligible resources during the construction, operation, and retirement of the Facility.

(i) A description of any discovery measures, such as surveys, inventories, and limited subsurface testing work, recommended by the State Historic Preservation Officer or the National Park Service of the U.S. Department of Interior for the purpose of locating, identifying and assessing the significance of resources listed in paragraphs (A), (B) and (C).

Response: Discovery measures employed by Montague included a desktop review, a traditional use survey, and field investigations. The methods employed as a part of each of these discovery measures are described in Section S.6.

(ii) The results of the discovery measures described in subparagraph (i), together with an explanation by the applicant of any variations from the survey, inventory, or testing recommended.

Response: The results of the cultural resources surveys are documented in the confidential cultural resources survey reports provided as Attachments S-1, S-2, S-3, S-4, and S-5. Five built environment resources and one historical archaeological resource were identified within the analysis area. In addition, one HPRCSIT was identified within the viewshed of the analysis area.

See Section S.7 for additional details related to properties identified during the 2017 investigations.

One built environment resource (Weatherford Barn) was previously determined eligible for listing on the NRHP (Startz, 1987). The other four built environment resources (68040 Highway 19, 69180 Weatherford Road, 69064 Weatherford Road, and 69398 Berthold Road) were recommended as not eligible for listing on the NRHP (Sheldon et al., 2017, see Attachment S-1). Pending SHPO concurrence, these built environment properties should be considered unevaluated. The single archaeological resource (35GM306) was documented as a part of the Baseline Survey (Ragsdale et al., 2011) and SHPO determined it was not eligible for listing on the NRHP (SHPO, 2017). No additional field investigations are recommended.

The desktop review confirmed the presence of a NRHP-eligible HPRCSIT outside of the area where Phase 2 Facility components will be sited, but within the viewshed of the Phase 2 Facility Components. Consultation with the CTUIR is being held outside of the EFSC process to evaluate potential impacts and mitigation.

(iii) A list of measures to prevent destruction of the resources identified during surveys, inventories and subsurface testing referred to in subparagraph (i) or discovered during construction.

Response: To reduce visual impacts to the NRHP-eligible Weatherford Barn, Montague has sited electrical collector lines to the south of Bottemiller Road, and the Phase 2 substation and battery storage area to the east of Weatherford Barn. This was done in order to avoid compromising the integrity of setting of the property from the predominant public vantage point to the south at Bottemiller Road. In addition, adherence to Conditions 47, 49, 50, and 51 will ensure prevention of destruction to resources identified during the surveys, and minimize impacts to previously undiscovered resources.

If previously unidentified cultural materials or human remains are discovered during construction, the steps outlined in the Inadvertent Discovery Plan should be followed (Attachment S-7; Appendix D to the confidential cultural resources report in Attachment S-1).

S.11 PROPOSED MONITORING PROGRAM

(E) The applicant's proposed monitoring program, if any, for impacts to historic, cultural and archaeological resources during construction and operation of the proposed facility.

Response: Avoidance measures listed in Condition 49 will be followed. In accordance with Condition 50, a qualified archaeologist will instruct construction personnel in the identification of cultural materials and avoidance of accidental damage to identified resource sites. If previously unidentified cultural materials or human remains are discovered during construction, the steps outlined as a part of Condition 51 and in the Inadvertent Discovery Plan (Attachment S-7) will be followed.

S.12 CONCLUSION

Based on the evidence presented in this exhibit, the Council may rely on its earlier findings to conclude in accordance with OAR 345-022-0090, that the construction, operation, and retirement of the Facility as modified under RFA 4, taking into account mitigation, is not likely to result in significant adverse impacts to historic, cultural, or archaeological resources that are

eligible or potentially eligible for listing on the NRHP, with the exception of the HPRCSIT which is being addressed outside of the EFSC amendment process.

S.13 REFERENCES

Bureau of Land Management (BLM). 1864. Plat of Township 4 North, Range 23 East, Willamette Meridian. General Land Office (GLO) Records. Accessed September 2, 2017. http://www.glorecords.blm.gov/search/.

Energy Facility Siting Council (EFSC). 2017. *Third Amended Site Certificate for Montague Wind Power Facility*. July 11.

McClintock, Robin, and Jim Sharpe. 2010. *Preconstruction Survey Addendum to the Cultural Resources Survey Report for the Montague Wind Power Facility, Gilliam County, Oregon*. Prepared for Montague Wind Power Facility, LLC. September. (Attachment S-3. Confidential and not for public distribution. Provided under separate cover.)

Oregon State Historic Preservation Office (SHPO). 2017. Electronic database. "Oregon SHPO GIS." Accessed September 27, 2017. https://maps.prd.state.or.us/shpo/archaeoview.html.

Ragsdale, Emily, Jennifer Olander, Frederick Anderson, and James Grant. 2011. *Cultural Resource Investigations for the Baseline Wind Energy Project, Gilliam County, Oregon.* Historical Research Associates, Inc. Prepared for HDR Engineering. December. (Attachment S-4. Confidential and not for public distribution. Provided under separate cover.)

Sharpe, Jim, Julie Wilt, and Robin McClintock. 2010. *Cultural Resources Survey for the Montague Wind Power Facility.* Prepared for Iberdrola Renewables, Inc. Revised March. (Attachment S-2. Confidential and not for public distribution. Provided under separate cover.)

Sheldon, David, and Jamelon Brown. 2017. *2017 Field Investigation Report for Montague Wind Power Facility* [Phase 1]. CH2M HILL Engineers, Inc. Prepared for Avangrid Renewables LLC, d/b/a Montague Wind Power Facility, LLC. Report on file at the Oregon State Historic Preservation Office, Salem. July. (Attachment S-5. Confidential and not for public distribution. Provided under separate cover.)

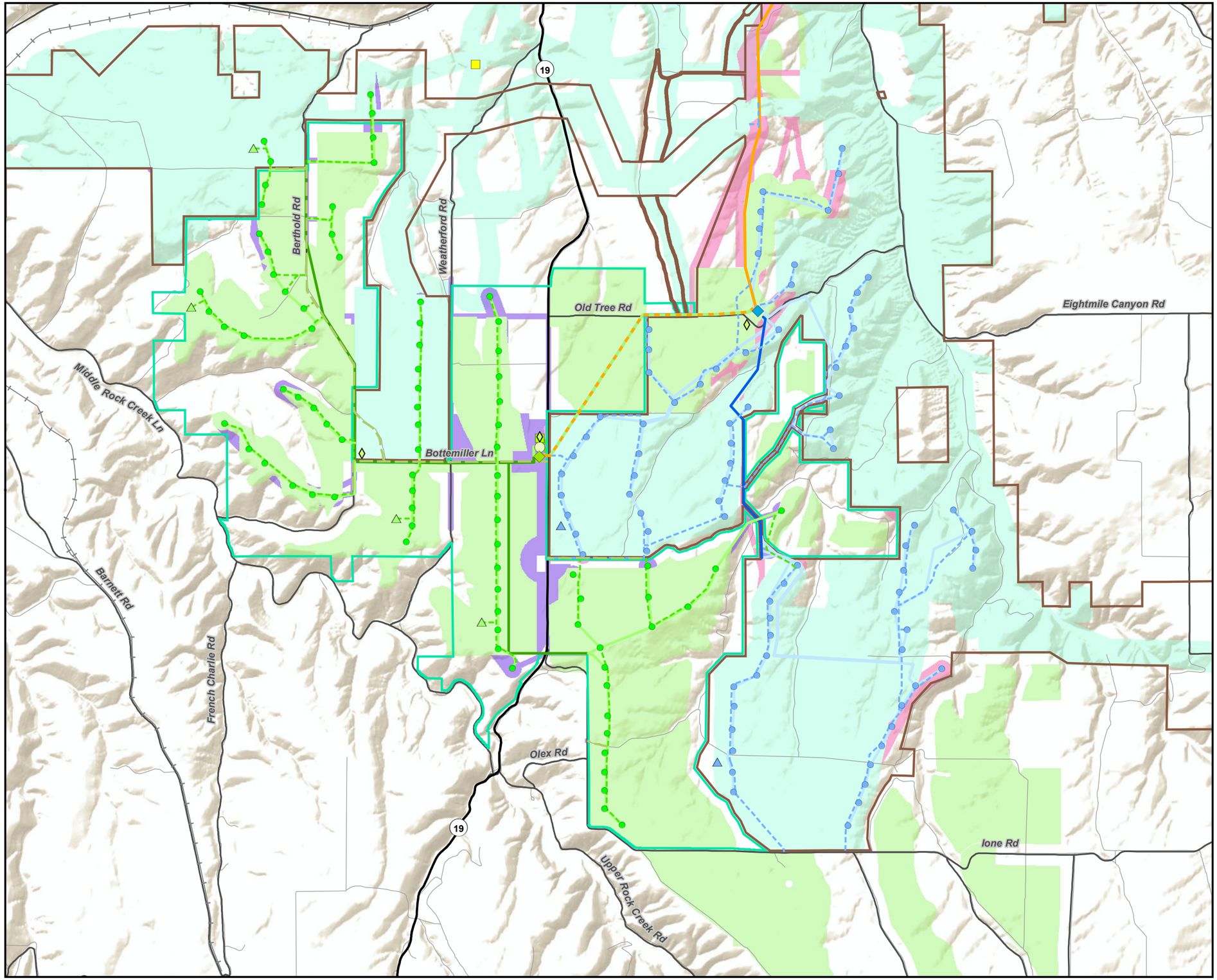
Sheldon, David, Marynell Nolan-Wheatley, and Marcia Montgomery. 2017. *2017 Field Investigation Report for Montague Wind Power Facility—Phase 2.* Prepared for Avangrid Renewables, LLC. (Attachment S-1. Confidential and not for public distribution. Provided under separate cover.)

Startz, Kathleen. 1987. Oregon Inventory of Historic Properties – Historic Resource Survey Form for the Weatherford Barn. Accessed June 25, 2017. http://heritagedata.prd.state.or.us/historic/index.cfm?do=v.dsp_siteSummary&resultDisplay=37317.

U.S. Geological Survey (USGS). 1916. Arlington, Oregon 1:125,000 topographic quadrangles.

Figures

Figure S-1
Historic, Cultural, and Archaeological Resources Field Survey Locations
Design Scenario A
Montague Wind Power Facility



Legend

- Approved Site Boundary/Micrositing Corridor
- Proposed Expanded Site Boundary/ Micrositing Corridor
- 2009/2010 Montague Surveys (Sharpe et al., 2010; McClintock and Sharpe, 2010)*
- 2010 Baseline Surveys (Ragsdale et al., 2011)*
- 2017 Phase 1 Surveys (Sheldon and Brown, 2017)*
- 2017 Phase 2 Surveys (Sheldon et al., 2017)*
- Existing Shared LJIIB O&M Building

Phase 2 (Features within the Approved and Proposed Expanded Site Boundary and Micrositing Corridor)

- Proposed Turbine
- Meteorological Tower
- Phase 2 Collector Substation
- Battery Storage System
- O&M Building
- Temporary Laydown Area
- Modified 230-kV Transmission Line Route
- 34.5-kV Overhead Collector Line
- 34.5-kV Underground Collector Line
- New Access Road
- Facility Use of Existing Road

Phase 1 (Features Constructed within the Approved Site Boundary and Micrositing Corridor)

- Turbine
- Meteorological Tower
- Phase 1 Substation
- Approved 230-kV Transmission Line
- 34.5-kV Overhead Collector Line
- 34.5-kV Underground Collector Line
- Access Road

Basemap Features

- Interstate/Highway
- Public Road
- Other Road
- Major Railroad Line

Note:
* Please refer to Exhibit S, Section S.13, for complete references.

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Basemap Source: ESRI World Terrain Base

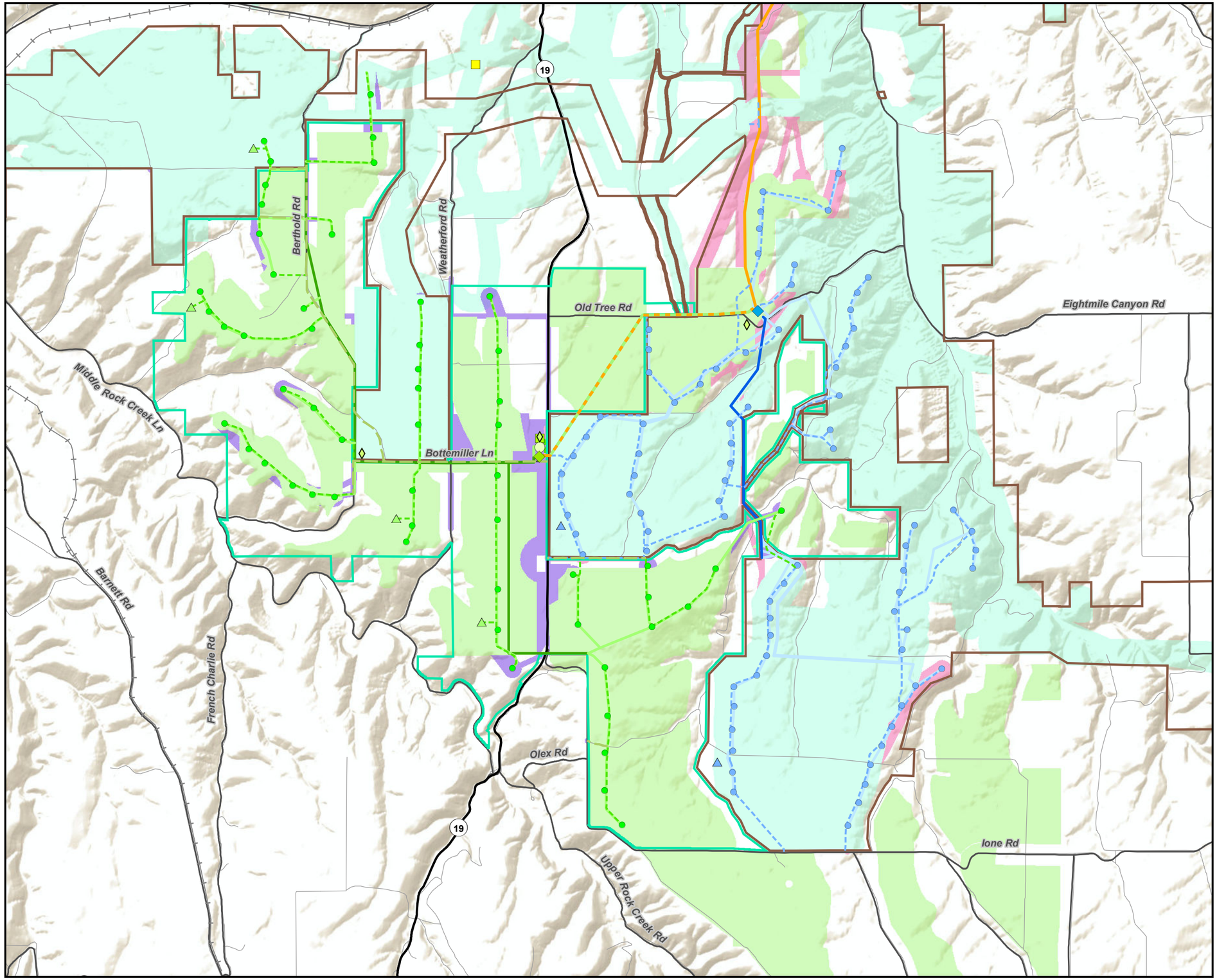

Figure S-2
Historic, Cultural, and Archaeological Resources Field Survey Locations
Design Scenario B
Montague Wind Power Facility

Legend

- Approved Site Boundary/Micrositing Corridor
- Proposed Expanded Site Boundary/ Micrositing Corridor
- 2009/2010 Montague Surveys (Sharpe et al., 2010; McClintock and Sharpe, 2010)*
- 2010 Baseline Surveys (Ragsdale et al., 2011)*
- 2017 Phase 1 Surveys (Sheldon and Brown, 2017)*
- 2017 Phase 2 Surveys (Sheldon et al., 2017)*
- Existing Shared LJIIB O&M Building

Phase 2 (Features within the Approved and Proposed Expanded Site Boundary and Micrositing Corridor)

- Proposed Turbine
- Meteorological Tower
- Phase 2 Collector Substation
- Battery Storage System
- O&M Building
- Temporary Laydown Area
- Modified 230-kV Transmission Line Route
- 34.5-kV Overhead Collector Line
- 34.5-kV Underground Collector Line
- New Access Road
- Facility Use of Existing Road

Phase 1 (Features Constructed within the Approved Site Boundary and Micrositing Corridor)

- Turbine
- Meteorological Tower
- Phase 1 Substation
- Approved 230-kV Transmission Line
- 34.5-kV Overhead Collector Line
- 34.5-kV Underground Collector Line
- Access Road

Basemap Features

- Interstate/Highway
- Public Road
- Other Road
- Major Railroad Line

Note:
* Please refer to Exhibit S, Section S.13, for complete references.

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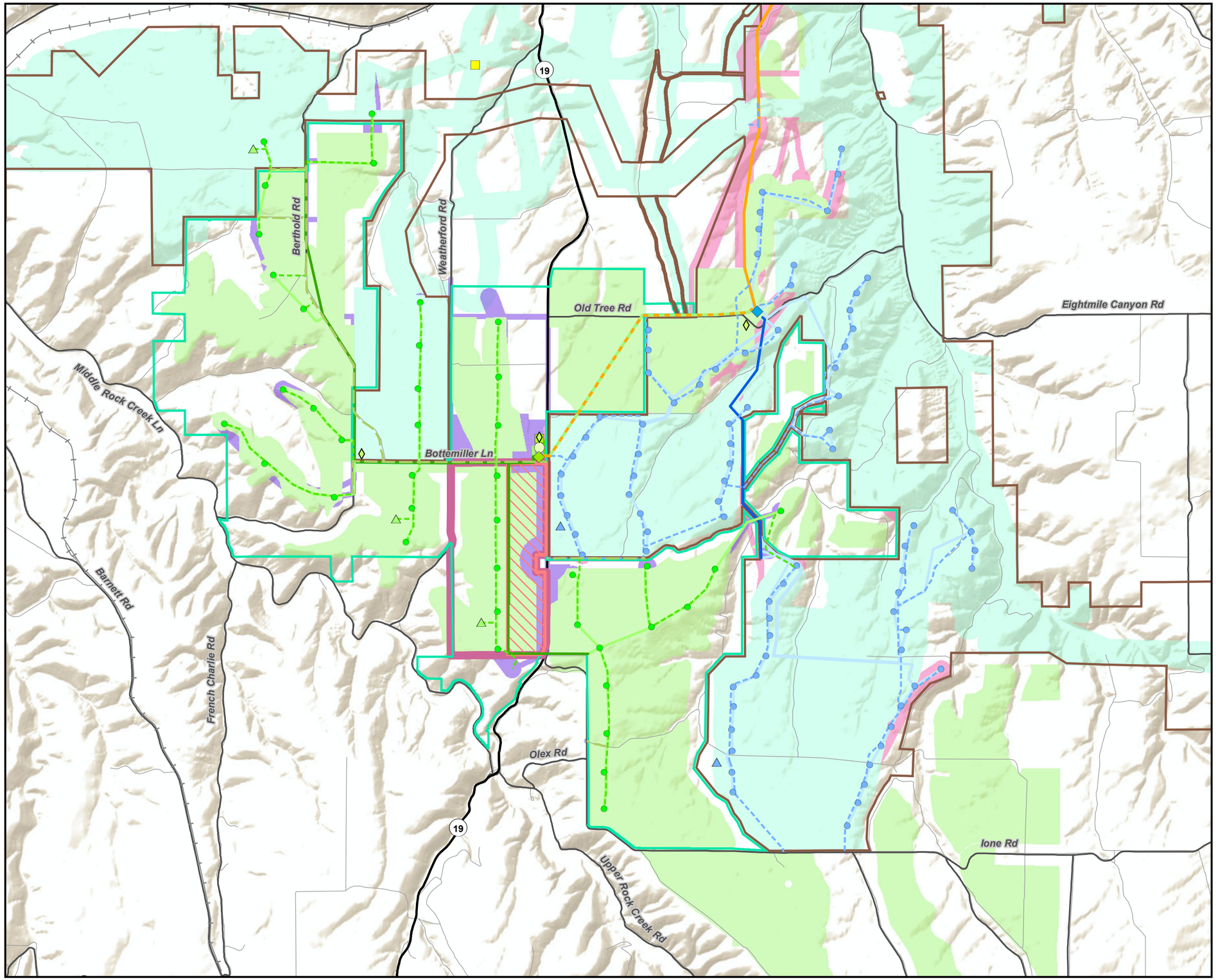
Basemap Source: ESRI World Terrain Base

Figure S-3
Historic, Cultural, and Archaeological Resources Field Survey Locations
Design Scenario C
Montague Wind Power Facility



Legend

- Approved Site Boundary/Micrositing Corridor
- Proposed Expanded Site Boundary/ Micrositing Corridor
- 2009/2010 Montague Surveys (Sharpe et al., 2010; McClintock and Sharpe, 2010)*
- 2010 Baseline Surveys (Ragsdale et al., 2011)*
- 2017 Phase 1 Surveys (Sheldon and Brown, 2017)*
- 2017 Phase 2 Surveys (Sheldon et al., 2017)*
- Existing Shared LJIIB O&M Building

Phase 2 (Features within the Approved and Proposed Expanded Site Boundary and Micrositing Corridor)

- Proposed Turbine
- Meteorological Tower
- Phase 2 Collector Substation
- Battery Storage System
- O&M Building
- Temporary Laydown Area
- Modified 230-kV Transmission Line Route
- 34.5-kV Overhead Collector Line
- 34.5-kV Underground Collector Line
- New Access Road
- Facility Use of Existing Road
- Solar Array
- Solar Micrositing Area

Phase 1 (Features Constructed within the Approved Site Boundary and Micrositing Corridor)

- Turbine
- Meteorological Tower
- Phase 1 Substation
- Approved 230-kV Transmission Line
- 34.5-kV Overhead Collector Line
- 34.5-kV Underground Collector Line
- Access Road

Basemap Features

- Interstate/Highway
- Public Road
- Other Road
- Major Railroad Line

Note:
* Please refer to Exhibit S, Section S.13, for complete references.

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Basemap Source: ESRI World Terrain Base

Attachment S-1
Field Investigation Report for Montague Wind Power Facility – Phase 2 (2017)

Confidential and not for public distribution. Provided under separate cover.

Attachment S-2
Cultural Resources Survey for the Montague Wind Power Facility (March 2010)

Confidential and not for public distribution. Provided under separate cover.

Attachment S-3
Preconstruction Survey Addendum to the Cultural Resources Survey Report for the Montague Wind Power Facility (September 2010)

Confidential and not for public distribution. Provided under separate cover.

Attachment S-4
Cultural Resource Investigations for the Baseline Wind Energy Project, Gilliam County, Oregon (December 2011)

Confidential and not for public distribution. Provided under separate cover.

Attachment S-5
2017 Field Investigation Report for Montague Wind Power Facility (July 2017)

Confidential and not for public distribution. Provided under separate cover.

Attachment S-6
Confidential Design Scenario Figures

Confidential and not for public distribution. Provided under separate cover.

Attachment S-7
Inadvertent Discovery Plan

Inadvertent Discovery Plan

PLAN AND PROCEDURES FOR THE INADVERTENT DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS FOR THE MONTAGUE WIND POWER FACILITY, GILLIAM COUNTY, OREGON

1.0 Introduction

Montague Wind Power Facility, LLC (Montague) proposes to construct the Montague Wind Power Facility (Montague Facility) in Gilliam County, Oregon. This Inadvertent Discovery Plan outlines procedures to follow, in accordance with state and federal laws, if cultural resources or human remains are discovered during construction.

2.0 Recognizing Cultural Resources

A cultural resource is an item of historical, traditional, or cultural importance. The item could be prehistoric or historic. Examples are as follows:

- A multispecies accumulation of shell (shell-midden) with associated bone, stone, antler, or wood artifacts, burned rocks, or charcoal
- Bones that appear to be human or animal bones associated with a shell-midden (i.e., with associated artifacts or cooking features)
- An area of charcoal or very dark, stained soil with associated artifacts
- Artifacts made of chipped or ground stone (i.e., an arrowhead, adze, or metate) or an accumulation (more than one) of cryptocrystalline stone flakes (lithic debitage)
- Items made of botanical materials
- Clusters of tin cans or bottles, agricultural, or military equipment that appears to be older than 50 years

3.0 Onsite Responsibilities

STEP 1: STOP WORK IMMEDIATELY. If the contractor or subcontractor believes that he or she has uncovered any cultural resource during construction of the project, all work adjacent to the discovery must stop. The discovery location should not be left unsecured at any time.

STEP 2: NOTIFY CONSTRUCTION PROJECT MANAGEMENT IMMEDIATELY. Contact the construction project manager or cultural resources specialist for the Montague Facility, as listed below.

Construction Project Manager

To be determined.

Cultural Resources Specialist

If the construction project manager cannot be reached, contact one of the designated Cultural Resources Specialists:

David Sheldon
CH2M
Cell: (360) 219-6953
david.sheldon@ch2m.com

Doug McFarland
CH2M
Cell: (509) 306-9401
doug.mcfarland@ch2m.com

STEP 3: NOTIFY THE STATE HISTORIC PRESERVATION OFFICE IMMEDIATELY. The Montague Facility construction project manager or cultural resources specialist will contact the Oregon State Historic Preservation Office (SHPO) immediately.

Note: If human remains are encountered, treat them with dignity and respect at all times. Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection in place and to shield them from being photographed. Do not call 911 or speak with the media.

STEP 4: PARTICIPATE IN CONSULTATION AND DOCUMENTATION. The Montague Facility construction project manager will participate in consultations with Oregon SHPO and affiliated Tribes. After consultation, the construction project manager will complete a written plan of action describing the disposition of cultural resources pursuant to 43 *Code of Federal Regulations* (CFR) Part 10 and will execute his or her prescribed duties within that plan of action.

4.0 Further Contacts and Consultations

Construction Project Manager

The Montague Facility construction project manager's responsibilities as follows:

- Secure the Site: The construction project manager is responsible for taking appropriate steps to protect and secure the discovery site. All work will stop in an area adequate to provide for the total security, protection, and integrity of the resource. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site. Work in the immediate area will not resume until treatment of the discovery has been completed following provisions for treating archaeological/cultural material in consultation with the affiliated Tribe(s).
- Direct Construction Elsewhere Onsite: The construction project manager will direct construction to resume away from cultural resources where appropriate and in communication with the affiliated Tribe(s).
- Contact Project Cultural Resources Specialist: If the cultural resources specialist has not yet been reached in earlier attempts, the construction project manager will do so.

Cultural Resources Specialist

The cultural resources specialist's responsibilities are as follows:

- Notify Tribes: If not already notified, the cultural resources specialist will notify the Tribe(s) of the discovery.
- Identify Find: The construction project manager will consult with the Tribes and will ensure that a qualified individual examines the find to determine if it is a cultural resource, as follows:
  - If it is determined to not be a cultural resource, work may proceed with no further delay.
  - If it is determined to be a cultural resource, the cultural resources specialist will send a certified letter to the Tribal Historic Preservation Offices, notifying them that a cultural resource has been discovered and requesting further consultation.
  - If the find may be human remains or funerary objects, the cultural resources specialist will follow the procedures described in Section 5.0.

- Notify State Agencies: The construction project manager will contact Oregon SHPO.
- Formulate Plan: The construction project manager, affiliated Tribes, and Oregon SHPO will consult to determine a plan for disposition of the cultural resources.

Any required excavation or removal of cultural resources will be carried out under the requirements of 43 CFR Part 10.3 and 16 *United States Code* 470 aa, and will require a permit from the Oregon SHPO. The activity that resulted in the inadvertent discovery may resume thirty (30) days after certification of receipt of notification.

Oregon Historic Preservation Office

State Archaeologist
Dennis Griffin, Ph.D.
e-mail: Dennis.Griffin@oregon.gov
(503) 986-0674

-or-

Assistant State Archaeologist
John Pouley
E-mail: john.pouley@oregon.gov
(503) 986-0675

Tribes

Confederated Tribes of the Warm Springs Reservation of Oregon
Kathleen Sloan: Cultural Resources Manager
kathleen.sloan@ctwsbnr.org
PO Box 460
Warm Springs, Oregon 97761
(541) 553-3464

Confederated Tribes of the Umatilla Indian Reservation
Teara Farrow Ferman, Cultural Resources
tearafarrow@ctuir.com
PO Box 638
Pendleton, OR 97801
(541) 429-7230

5.0 Special Procedures for the Discovery of Human Skeletal Material

Any human skeletal remains will at all times be treated with the utmost dignity and respect. The attached document titled *Tribal Position Paper on the Treatment of Human Remains* (Government to Government Cultural Resources Cluster Group, September 2006) describes the appropriate protocol on the treatment of Native American human remains.

STEP 1: STOP WORK. In the event that human remains are discovered, stop all work in the area and secure the site.

STEP 2: NOTIFY APPROPRIATE PARTIES. Notify the construction project manager, law enforcement, and the coroner, immediately. The coroner (with the assistance of law enforcement personnel) will determine if the remains are human and whether the discovery site constitutes a crime scene, and will notify Oregon SHPO and the Tribes.

- Medical Examiner, Gilliam County

  To be determined

- Gilliam County Sheriff's Department

  221 S. Oregon Street
  Condon, Oregon 97823
  (541) 384-2851

STEP 3: PROTECT THE REMAINS. There shall be no photography or drawings and sketches made of the human remains or funerary objects found with the human remains without written permission signed by the affiliated Tribes. Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection in place and to shield them from being photographed. Remains should not be removed from the site prior to identifying the remains as Native American or not. If the remains are determined to be Native American, final disposition will be decided through consultation with the affiliated Tribes, Oregon SHPO, and Montague.

STEP 4: CONSULTATION. If the coroner determines the remains are nonforensic, and if it is determined that the remains constitute a cultural resource, the construction project manager or appointed representative will participate in consultation with the affiliated Tribes and Oregon SHPO. The construction project manager or appointed representative will complete a written plan of action describing the disposition of cultural resources pursuant to 43 CFR Part 10 and will execute its prescribed duties within that plan of action. If the remains are determined to be Native American, final disposition will be decided through consultation with the affiliated Tribes, Oregon SHPO, and Montague. If the medical examiner is not able to make a determination of Native American, a qualified forensic anthropologist from the State, Tribe, or contracted archaeological firm will need to be consulted for final determination.

6.0 Proceeding with Construction

Project construction outside the discovery location may continue while documentation and assessment of the cultural resources proceed. The construction project manager and a qualified archaeologist or Tribal representative must determine the boundaries of the discovery location. Construction may continue at the discovery location only after the process outlined in this plan is followed and the Oregon SHPO (and the federal agencies, if any) determines that compliance with state and federal laws is complete.

Attachment
Tribal Position Paper on the Treatment of Human Remains

Treatment of Native American Human Remains Discovered Inadvertently or Through Criminal Investigations on Private and Non-Federal Public Lands in Oregon

Native American burial sites are not simply artifacts of the tribe's cultural past, but are considered sacred and represent a continuing connection with their ancestors. Native American ancestral remains, funerary objects, sacred objects and objects of cultural patrimony associated with Oregon Tribes are protected under state law, including criminal penalties (ORS 97.740-.994 and 358.905-.961). The laws recognize and codify the Tribes' rights in the decision-making process regarding ancestral remains and associated objects. Therefore both the discovered ancestral remains and their associated objects should be treated in a sensitive and respectful manner by all parties involved.

Identification of Human Remains

- Oregon laws (ORS 146.090 & .095) outline the types of deaths that require investigation and the accompanying responsibilities for that investigation. The law enforcement official, district medical examiner, and the district attorney for the county where the death occurs are responsible for deaths requiring investigation. Deaths that require investigation include those *occurring under suspicious or unknown circumstances*.
- If human remains that are inadvertently discovered or discovered through criminal investigations **are not clearly modern**, then there is high probability that the remains are Native American and therefore ORS 97.745(4) applies, which requires immediate notification with State Police, State Historic Preservation Office, Commission on Indian Services, and all appropriate Native American Tribes. To determine who the "appropriate Native American Tribe" the responsible parties should contact the Legislative Commission on Indian Services (CIS). To determine whether the human remains are Native American the responsible parties should contact the appropriate Native American Tribes at the initial discovery. It should be noted that there may be more than one appropriate Native American Tribe to be contacted.
- If the human remains are possibly Native American then the area should be secured from further disturbance. The human remains and associated objects **should not be disturbed**, **manipulated, or transported from the original location until a plan is developed in consultation with the above named parties.** These actions will help ensure compliance with Oregon state law that prohibits any person willfully removing human remains and/or objects of cultural significance from its original location (ORS 97.745).
- All parties involved and the appropriate Native American Tribes shall implement a culturally sensitive plan for reburial.

Notification

- State law [ORS 97.745 (4)] requires that any discovered human remains suspected to be Native American shall be reported to-
    1. State Police (current contact Sgt. Chris Allori, Department of State Police, office phone 503-731-4717, cell 503-708-6461, or Dispatch 503-731-3030)
    2. State Historic Preservation Office (SHPO)

*Note: This document was created by the Government to Government Cultural Resource Cluster Group in September, 2006.

- Primary contact= Dennis Griffin, State Archaeologist, office phone 503-986-0674, cell phone 503-881-5038
- Secondary contact= John Pouley, Asst. State Archaeologist, office phone 503-986-0675, cell phone 503-480-9164.

3. Commission on Indian Services (CIS)
   - Current contact= Karen Quigley, Director, office phone 503-986-1067. Karen will provide the list of appropriate Native American Tribes.
4. All appropriate Native American Tribes provided by CIS.

   - Burns Paiute Tribe- Diane Teeman 541-417-1986
   - Confederated Tribes of Coos, Lower Umpqua and Siuslaw- Stacy Scott 541-888-9577 X7513
   - Confederated Tribes of Grand Ronde- Briece Edwards 503-879-2084
   - Confederated Tribes of Siletz- Robert Kentta 541-444-2532
   - Confederated Tribes of the Umatilla Indian Reservation- Teara Farrow 541-276-3629, secondary contact; Catherine Dickson 541-429-7231
   - Confederated Tribes of Warm Springs- Kathleen Sloan 541-553-3464
   - Coquille Indian Tribe- Kassie Rippee 541-756-0904 X1216
   - Cow Creek Band of Umpqua Indians- Jessie Plueard 541-677-5575 X5577
   - Klamath Tribes- Perry Chocktoot 541-783-2219 X159

*Note: This document was created by the Government to Government Cultural Resource Cluster Group in September, 2006.

EXHIBIT T
RECREATIONAL FACILITIES AND OPPORTUNITIES

OAR 345-021-0010(1)(t)

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T.1 INTRODUCTION

The Energy Facility Siting Council (EFSC; Council) previously approved construction of the 404-megawatt (MW) Montague Wind Power Facility (Facility)[1] and found that the Facility complies with the Recreation standard required in Oregon Administrative Rule (OAR) 345-022-0100. Montague Wind Power Facility, LLC (Montague) is constructing the Facility in two phases. Phase 1 consists of up to 81 wind turbines generating 202 MW of power within the approved boundary. Montague has already begun construction of Phase 1 under the conditions of the existing Site Certificate. Phase 2 consists of an expanded site boundary, solar array, and battery storage. The analysis in this exhibit focuses on Phase 2 and the three design scenarios described in *Request for Amendment No. 4 Project Description and OAR Division 27 Compliance* (referred to herein as RFA 4).

T.2 SUMMARY OF ANALYSIS RESULTS

The Council previously found in the Final Order on the Application, Final Order on Amendment 1, Final Order on Amendment 2, and Final Order on Amendment 3 that based on compliance with existing Site Certificate conditions, the Facility will not result in significant adverse impacts to any important recreational opportunities in the analysis area. The evidence provided in this analysis conducted under RFA 4 demonstrates that the expanded site boundary, solar array, and battery storage will not result in significant adverse impacts to recreational opportunities for the following reasons:

- **Site Boundary Expansion**: Expansion of the site boundary does not occur within any county- or state-designated recreation lands or any designated recreational facilities. Turbines proposed as part of Phase 2 are located farther from the Oregon National Historic Trail (ONHT) Fourmile Canyon interpretive site than turbines already allowed under the approved Site Certificate. Relocation of Phase 2 turbines into approved and proposed expanded areas of the Facility will not cause significant adverse noise, traffic, or visual impacts to important recreational opportunities.
- **Addition of Solar Array and Battery Storage**: Because their visual profile is low, neither the solar array nor battery storage will be visible from any of the important recreational facilities within the analysis area. In addition, together with the other Phase 2 components, they will not adversely affect noise, traffic, or visual impacts to important recreational opportunities.

T.3 CONDITION COMPLIANCE

The Third Amended Site Certificate imposes four conditions (73, 102, 104, and 105) designed to reduce or avoid potential impacts to recreational areas. The conditions address traffic management, Facility visual impact reduction, exterior nighttime lighting, and distance from the ONHT Fourmile Canyon interpretive site. The modifications proposed under RFA 4 do not affect Montague's ability to comply with the existing Site Certificate conditions and no new conditions are needed to manage potential impacts on recreational areas and opportunities.

T.4 EVIDENCE TO SUPPORT FINDINGS

The Council has applied the requirements of OAR 345-022-0100(1) as conditions to Montague's Site Certificate. Therefore, this exhibit is generally organized in accordance with OAR 345-021-

[1] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility*. July 11.

0010(1)(t) and provides evidence needed to support a finding by the Council as required by OAR 345-022-0100, which provides the following:

> *(1) Except for facilities described in section (2), to issue a site certificate, the Council must find that the design, construction and operation of a facility, taking into account mitigation, are not likely to result in a significant adverse impact to important recreational opportunities in the analysis area as described in the project order. The Council shall consider the following factors in judging the importance of a recreational opportunity:*
>
> *(a) Any special designation or management of the location;*
>
> *(b) The degree of demand;*
>
> *(c) Outstanding or unusual qualities;*
>
> *(d) Availability or rareness;*
>
> *(e) Irreplaceability or irretrievability of the opportunity.*

T.5 RECREATIONAL OPPORTUNITIES IN THE ANALYSIS AREA

OAR 345-021-0010(1)(t) *Information about the impacts the proposed facility would have on important recreational opportunities in the analysis area, providing evidence to support a finding by the Council as required by OAR 345-022-0100, including:*

OAR 345-021-0010(1)(t)(A) *A description of the recreational opportunities in the analysis area that includes information on the factors listed in OAR 345-022-0100(1) as a basis for identifying important recreational opportunities.*

Response: The analysis area for impacts on recreational opportunities includes the Facility site boundary and the area within 5 miles of the Facility site boundary. The proposed site boundary expansion results in an expansion of the analysis area from the area previously considered by the Council.

The recreational opportunities within the 5-mile analysis area are listed in Table T-1, shown on Figure T-1, and discussed in the following subsections. The general types of recreational activities in the analysis area are consistent with those identified by the Council in the Final Order on the Application.[2] Recreational activities in the analysis area include camping, hiking, sightseeing, bicycling, hunting, wind and kite surfing, swimming, boating, fishing, birding, wildlife observation, nature photography, sightseeing, upland bird and big game hunting, and off-highway vehicle (OHV) use. As previously noted by the Council, similar opportunities for each of these activities are available on public and private lands outside the analysis area.

Specific types of recreational opportunities previously identified within the approved site boundary include various city and state parks, a golf course, the ONHT, and the Lewis and Clark National Historic Trail (LCNHT). Additional recreational opportunities that have been identified within the proposed expanded site boundary and 5-mile analysis area include a combination of various waterbodies, parks, wildlife refuges, scenic byways, and Bureau of Land Management (BLM)-administered lands.

[2] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 75. September 10.

Consistent with previous Council findings,[3] no county- or state-designated recreation lands or recreational facilities are located within the Facility site boundary. The only designated recreational opportunity within the Facility site boundary is the federally-designated ONHT, portions of which are located within the northern area of the Facility site boundary. This trail is within the approved site boundary and has previously been considered by the Council.[4]

To determine if a recreational opportunity within the analysis area is important, Montague conducted an assessment based on available information specific to each factor listed in OAR 345-022-0100(1). A balanced consideration of all five criteria and an overall assessment of importance was conducted for each recreational opportunity. Recreational opportunities that do not meet the criteria of important are described under Section T.5.1, whereas recreational opportunities that do meet the criteria of important are described under Section T.5.2.

T.5.1 Identified Recreational Opportunities that Do Not Meet the Criteria of Important

The Council previously considered the following recreational facilities and opportunities and found them to be "not important" as defined in OAR 345-022-0100: John Day Hilderbrand State Park, Arlington State Park, Alkali Park, City Park, Earl Snell Memorial Park, China Creek Golf Course, Roosevelt Park, ONHT (with the exception of the ONHT McDonald and John Day Crossing interpretive site and the Fourmile Canyon interpretive site addressed in Section T.5.2.4), and the LCNHT.

Based on the expansion of the site boundary and a review of more recent site certificates for nearby facilities, the following additional recreational areas were identified for consideration in this analysis: Rock Creek, Willow Creek, the Rock Creek Day Use Area, and other BLM-administered lands. Although the Port of Arlington Park was identified in the 2010 Final Order,[5] it is revisited in this exhibit because its management plan has been updated since 2010. The Horn Butte Wildlife Area was previously considered for potential impacts to protected areas[6] and scenic resources,[7] but was not separately considered for recreational impacts. Because its management plan has been updated also, it is addressed in this exhibit.

With the exception of the ONHT, the recreational opportunities outlined below are not located within the approved or proposed expanded site boundaries and, in many cases, only a portion of the opportunity occurs within the 5-mile analysis area.

[3] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 75. September 10.

[4] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* pp. 76-77. September 10.

[5] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 75. September 10.

[6] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* pp. 62-65. September 10.

[7] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 71. September 10.

Table T-1. Inventory of Recreational Resources in the Analysis Area

Recreational Opportunity	Distance from Facility Site Boundary (miles)	Importance Factors					Considered Important per OAR 345-022-0100?
		Special Designation/ Management	Degree of Demand	Outstanding/ Unusual Quality	Availability/ Rareness	Irreplaceability/ Irretrievability	
Waterbodies							
John Day River	5	Managed by the Prineville District BLM as both a National Wild and Scenic River and an Oregon Scenic Waterway	High	Opportunity for unimpeded navigation by boat, swimming, potential wildlife viewing and sightseeing, camping, hunting, fishing, picnic use	Recreational opportunities are somewhat common in the region	Replaceable	Yes
Rock Creek	<1	No designation or recreation management	Low	Boating access to John Day River, fishing, swimming, potential wildlife viewing and sightseeing, picnic use	Recreational opportunities are common in the region	Replaceable	No
Willow Creek	3	No designation or recreation management	Low	Fishing, swimming, potential wildlife viewing and sightseeing	Recreational opportunities are common in the region	Replaceable	No
Park Facilities, Recreation Sites, and Golf Course							
Rock Creek Day Use Area	5	No designation, area managed by Prineville District BLM	Moderate	Boating access to John Day River, fishing, swimming, potential wildlife viewing and sightseeing, picnic use	Recreational opportunities are common in the region	Replaceable	No
John Day Hilderbrand State Park	5	State park managed by OPRD	Low	Accessible from the John Day River by boat only, swimming, camping, fishing, hiking, potential wildlife viewing and sightseeing	Recreational opportunities are common in the region	Replaceable	No
Cottonwood Canyon State Park	5	State park managed by OPRD	High	Hiking, biking, fishing, hunting, horseback riding, boating access to John Day River, camping, picnic use, cross-country skiing, potential wildlife viewing and sightseeing	Some recreational opportunities are relatively rare in the region	Relatively Irreplaceable	Yes

Table T-1. Inventory of Recreational Resources in the Analysis Area

Recreational Opportunity	Distance from Facility Site Boundary (miles)	Importance Factors					Considered Important per OAR 345-022-0100?
		Special Designation/ Management	Degree of Demand	Outstanding/ Unusual Quality	Availability/ Rareness	Irreplaceability/ Irretrievability	
Port of Arlington Park and Marina	3	Marina and RV Park managed by the Port of Arlington	High	Boating access to the Columbia River, boat docking, fishing, swimming, camping, kite and windsurfing, picnic use, playground, potential wildlife viewing and sightseeing	Recreational opportunities are common in the region	Replaceable	No
Earl Snell Memorial Park	3	City park managed by the City of Arlington	Moderate	Swimming, playground, sports courts, regionally significant historical features, picnic use, nonmotorized boat access to the Columbia River, potential wildlife viewing and sightseeing	Recreational opportunities are common in the region	Replaceable	No
Alkali Park	3	City park managed by the City of Arlington	Low	Potential picnic use	Recreational opportunities are common in the region	Replaceable	No
City Park	3	City park managed by the City of Arlington	Low	Limited playground, potential picnic use	Recreational opportunities are common in the region	Replaceable	No
China Creek Golf Course	3	Municipal golf course managed by the City of Arlington	Low	Nine-hole golf course, potential wildlife viewing and sightseeing	Recreational opportunity is common in the region	Replaceable	No
Arlington State Park	3	State park managed by OPRD	Low	Potential wildlife viewing and sightseeing, hiking, fishing	Recreational opportunities are common in the region	Replaceable	No
Roosevelt Park[a]	4	Recreation area owned and operated by U.S. Army Corps of Engineers	Moderate	Boating access to the Columbia River, fishing, swimming, camping, kite and windsurfing, picnic use, playground, potential wildlife viewing and sightseeing	Recreational opportunities are common in the region	Replaceable	No

Table T-1. Inventory of Recreational Resources in the Analysis Area

Recreational Opportunity	Distance from Facility Site Boundary (miles)	Importance Factors					Considered Important per OAR 345-022-0100?
		Special Designation/ Management	Degree of Demand	Outstanding/ Unusual Quality	Availability/ Rareness	Irreplaceability/ Irretrievability	
Wildlife Areas							
Horn Butte Wildlife Area	0-5	Area of Critical Environmental Concern managed by BLM	Low	Off-highway vehicle use, access to the Oregon National Historic Trail, potential wildlife viewing and sightseeing	Some recreational opportunities are common in the region	Replaceable	No
John Day Wildlife Refuge	4	Wildlife refuge managed by Oregon Department of Fish and Wildlife	High	Deer and upland game bird hunting on public lands, fishing, potential wildlife viewing and sightseeing	Some recreational opportunities are rare in the region	Relatively Irreplaceable	Yes
Trails, Interpretive Sites, and Monuments							
Lewis and Clark National Historic Trail (LCNHT)	4	National historic trail managed by National Park Service	Low	Interpretive sites and monuments along the trail, potential wildlife viewing and sightseeing	Recreational opportunities are common in the region	Replaceable	No
Oregon National Historic Trail (ONHT)	Within Facility site boundary and analysis area	National historic trail managed by National Park Service	Low	Interpretive sites and monuments along the trail, potential wildlife viewing and sightseeing	Recreational opportunities are rare in the region	Intact segments not accessible to public; replaceable	No
ONHT McDonald and John Day Crossing Interpretive Site	5	ONHT interpretive site located on BLM-administered land	Low	Public viewing of ONHT at the McDonald Ford on the John Day River and interpretation of the trail's historical significance	Recreational opportunities are rare in the region	Irreplaceable	Yes
ONHT Fourmile Canyon Interpretive Site	<1	ONHT interpretive site located on BLM-administered land	Low	Public viewing of intact remnants of the ONHT and display depicting emigrant life, interpretation of historical significance; hiking, potential wildlife viewing, and sightseeing	Recreational opportunities are rare in the region	Irreplaceable	Yes

Table T-1. Inventory of Recreational Resources in the Analysis Area

Recreational Opportunity	Distance from Facility Site Boundary (miles)	Importance Factors					Considered Important per OAR 345-022-0100?
		Special Designation/ Management	Degree of Demand	Outstanding/ Unusual Quality	Availability/ Rareness	Irreplaceability/ Irretrievability	
ONHT Historical Markers (Oregon Highway 19 [OR 19] and Oregon Highway 74 [OR 74])	<1 and 1	ONHT interpretive sites located within OR 19 and OR 74 rights-of-way	Low	Interpretation of historical significance of the ONHT	Recreational opportunities are common in the region	Replaceable	No
Other Recreational Opportunities							
Blue Mountain Scenic Byway	3	Oregon State Scenic Byway managed by Oregon Department of Transportation and Federal Highway Administration	Moderate	Varied scenery including historic sites and many recreational opportunities	Recreational opportunities are somewhat rare in the region	Relatively Irreplaceable	Yes
Lewis and Clark Trail Scenic Byway[a]	5	State Scenic and Recreational Highway designation managed by Washington State Department of Transportation	Low	Varied scenery including historic sites and many recreational opportunities along byway; no unique or rare opportunities within analysis area	Recreational opportunities are somewhat rare in the region	Relatively Irreplaceable	No
BLM-administered lands	0-5	Public lands managed by BLM	Moderate	Hunting, hiking, bicycling, horseback riding, camping, off-highway vehicle use, potential wildlife viewing and sightseeing	Recreational opportunities are relatively common in the region	Replaceable	No

[a] Recreational opportunity located in Washington state.

T.5.1.1 Waterbodies

Rock Creek

Rock Creek was not previously evaluated by the Council. The creek is an 82-mile tributary of the John Day River. There are few public access points along the roughly 25-mile stretch of the creek within the analysis area. The recreational qualities associated with this portion of Rock Creek are fishing, swimming, potential wildlife viewing and sightseeing, picnic use, and, in the lowest reach, boating access to John Day River at the Rock Creek Day Use Area (see Section T.5.1.2). Rock Creek has no special designation or management plan. The demand for recreational opportunities along Rock Creek is low, relatively common, and replaceable elsewhere in the region. Therefore, this recreational opportunity does not meet the criteria to be considered "important" under the standard.

Willow Creek

Willow Creek was not previously evaluated by the Council. The creek is a 79-mile tributary to the Columbia River. The northern portion of the creek runs through the Willow Creek Wildlife Area; this wildlife area is located 1 mile or more outside of the Montague recreational resources analysis area.[8] Roughly 18 miles of the southern portion of the creek are located within the analysis area. A few public access points are present within this portion of the creek. The recreational qualities associated with this portion of Willow Creek are fishing, swimming, and potential wildlife viewing and sightseeing. Willow Creek has no special designation or management plan assigned to any portion of the creek that occurs within the analysis area. The demand for recreational opportunities along Willow Creek is low, common, and replaceable elsewhere in the region. Therefore, this recreational opportunity does not meet the criteria to be considered "important" under the standard.

T.5.1.2 Park Facilities, Recreation Sites, and Golf Course

Rock Creek Day Use Area

The Rock Creek Day Use Area was not previously evaluated by the Council. This recreational opportunity is an unimproved public area on the east side of the John Day River near the ONHT McDonald Crossing and its confluence with Rock Creek. The area has no special designation and is managed by the Prineville District BLM. Recreational qualities associated with the Rock Creek Day Use Area include fishing, swimming, picnic use, boating access to the John Day River, and potential wildlife viewing and sightseeing. The degree of demand for recreational opportunities offered at the day use area is moderate, common, and replaceable elsewhere in the region. Therefore, the Rock Creek Day Use Area does not meet the criteria to be considered "important" under the standard.

Port of Arlington Park and Marina

The Port of Arlington Park and Marina was previously evaluated by the Council and found to be not important.[9] However, since then, plans that apply to this site have been updated. The park

[8] Regardless of the Willow Creek Wildlife Area's location outside of the analysis area, the Council previously found that this wildlife area is not an important recreational resource (EFSC, 2008, p. 77).

[9] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 75. September 10.

is managed by the Port of Arlington under the 2013 Strategic Plan.[10] The values for which the park is managed have not changed with the update of this plan. The recreational opportunities available in the area are the same as previously considered. Therefore, the park still does not meet the criteria of an important recreational facility or opportunity.

John Day Hilderbrand State Park

The John Day Hilderbrand State Park is an undeveloped property along the John Day River Scenic Waterway. It is open to the public, but only accessible by the river as the park is otherwise landlocked by private property. There is no management plan for this park. The park's recreational opportunities include boating access and potential sightseeing. The recreational opportunities available in the area are the same as previously considered. Therefore, the park still does not meet the criteria of an important recreational facility or opportunity.

T.5.1.3 Wildlife Areas

Horn Butte Wildlife Area

Horn Butte was previously evaluated by the Council for potential impacts to protected areas and scenic resources and found not to be adversely impacted.[11] Horn Butte is designated and managed as an Area of Critical Environmental Concern by BLM. Although this area is now managed under the *John Day Basin Record of Decision and Resource Management Plan*,[12] the values for which it is managed have not changed with the update of this plan. The degree of demand for recreational opportunities offered at the Horn Butte Wildlife Area is low, common, and replaceable elsewhere in the region. It does not meet the criteria to be considered as "important" under the standard.

T.5.1.4 Trails, Interpretive Sites, and Monuments

Oregon National Historic Trail

The Facility site boundary and the 5-mile analysis area include sites and segments of the ONHT, which received federal designation as a "historic trail" under the National Trails System Act in 1978. The purpose of the historic trail designation on federal lands is to identify, preserve, and interpret sites, the route, and history of the Oregon Trail. The ONHT was never a clearly defined trail, and portions of the route have been obliterated by agriculture, modern roadways, and other modern developments along most of its approximate route. The approximate east-west route of the ONHT intersects the Facility site boundary in the northeastern portion of the analysis area on Fourmile Road approximately 0.25 mile north of the public Fourmile Canyon interpretive site, and exits the Facility site boundary near Blalock Canyon Road, as shown on Figure T-1. This segment of the ONHT was previously considered by the Council and determined not to provide an important recreational opportunity.[13] These remnants are on private land and continue to be inaccessible by the public for recreation. Therefore, the Council may rely on its

[10] Port of Arlington. 2013. *Port of Arlington – Gilliam County Strategic Plan 2012-2017*. Prepared by the Port of Arlington. Updated April 2013.

[11] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* pp. 66 and 71. September 10.

[12] BLM. 2015. *John Day Basin Record of Decision and Resource Management Plan*. BLM Prineville District. April.

[13] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 76. September 10.

prior finding that these segments of the ONHT that are within the Facility site boundary do not provide an important recreational opportunity.

Outside of the Facility site boundary but within the 5-mile analysis area, specific sites and segments of the ONHT are considered irreplaceable and important. These sites are the ONHT McDonald and John Day Crossing interpretive site and the ONHT Fourmile Canyon interpretive site, discussed under Section T.5.2.4.

Oregon National Historic Trail Historical Markers

ONHT Historical Markers that occur within the analysis area were previously evaluated in the Final Order on the Application.[14] An ONHT Historical Marker is located on Oregon Highway 19 (OR 19) approximately 6 miles south of Arlington and just west of the Facility's approved micrositing corridor. This monument marks the approximate alignment of the ONHT and is located within OR 19 public right-of-way, but otherwise offers no addition recreational opportunities. In addition, a small interpretive marker exists within Oregon Highway 74 (OR 74) public right-of-way approximately 1 mile north of Cecil, Oregon, and roughly 2 miles east of the Facility's proposed expanded micrositing corridor. No remnants of the ONHT are visible at either location. Demand for these opportunities is low and recreational qualities offered by the monuments are limited to interpretation of the historical significance of the ONHT. There has been no change to the characteristics or demand for these opportunities since the Council previously considered them. Therefore, the Council may rely on its prior findings that these monuments do not provide important recreational opportunities.

Lewis and Clark National Historic Trail

The LCNHT is located along Washington State Route 14 and Interstate 84 (I-84) in Oregon. The LCNHT can be viewed from the roadway or by boating the route along the Columbia River. It offers recreational qualities, including interpretive sites and monuments along the trail, and potential wildlife viewing and sightseeing. The demand for this recreational opportunity is low, and the recreational qualities for the part of the trail within the analysis area are common and can be found elsewhere in the region. Therefore, the Council may rely on its prior findings to conclude that the LCNHT does not meet the criteria to be considered "important" under the standard.[15]

T.5.1.5 Other Recreational Opportunities

Bureau of Land Management-Administered Lands

BLM-administered lands are scattered within the 5-mile analysis area in Oregon and Washington State. BLM lands aside from those specifically designated (e.g., Fourmile Canyon interpretive site, McDonald and John Day Crossing interpretive sites) were not previously evaluated by the Council as recreational opportunities for this Facility, although they were evaluated for potential scenic resource impacts. Demand for this opportunity is moderate, but use may be limited due to their size, and access depends on landscape position (i.e., landlocked by private property). Recreational qualities include hiking, hunting, bicycling, horseback riding, camping, OHV use, and potential wildlife viewing and sightseeing. These recreational qualities are relatively

[14] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 76. September 10.

[15] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 76. September 10.

common and replaceable within the region. Therefore, these public lands do not meet the criteria of "important" under the standard.

Lewis and Clark Trail Scenic Byway (Washington)

The Lewis and Clark Trail Scenic Byway (located in Klickitat County, Washington) was not previously evaluated by the Council as a recreational opportunity. Approximately 19 miles of the byway cross through the analysis area along Washington State Route 14, north of the Columbia River. The state scenic byway is managed by the Washington State Department of Transportation (WSDOT) under the *Washington State Scenic and Recreational Highways Strategic Plan*.[16] Sites of interest and recreational opportunities are present along the route, including Roosevelt Park. The portion of the route located within the analysis area has no unique or rare qualities and the demand for this opportunity is low. The Council previously found that the qualities offered by Roosevelt Park to be common and replaceable.[17] For these reasons, the portions of the Lewis and Clark Trail Scenic Byway do not meet the criteria to be considered "important" under the standard.

T.5.2 Recreational Opportunities that Meet the Criteria of Important

The Council previously considered the following recreational facilities and opportunities associated with the ONHT and found them to meet the criteria of "important," as defined in OAR 345-022-0100: McDonald Crossing (also known as the John Day River Crossing) interpretive site [18] and Fourmile Canyon interpretive site.[19]

As a result of the expanded Facility site boundary, the following recreational facilities and opportunities that may meet the criteria of important have been identified within the analysis area: John Day River; Cottonwood Canyon State Park; John Day Wildlife Refuge; and Blue Mountain Scenic Byway.

T.5.2.1 Waterbodies

John Day River

Recreational opportunities associated with the John Day River were not previously considered by the Council, with the exception of the John Day (Hilderbrand) State Park (see Section T.5.1.2). A 6-mile segment of the 281-mile long river is located within the analysis area. Recreational opportunities associated with the John Day River include boating, floating, riverside camping, picnic use, wildlife viewing, hunting, and fishing for bass, steelhead, and trout. The John Day River meets the criteria set forth in OAR 345-022-0100 as important due to the unique designations, varied recreational qualities offered by the river, and high degree of demand.

The lower John Day River mainstem from Tumwater Falls upstream to Service Creek is designated as Wild and Scenic and classified as a "Recreational River Area" under the National Wild and Scenic River Act. In addition, the John Day River mainstem from Tumwater Falls upstream to Parrish Creek is designated as an Oregon Scenic Waterway. The program is administered by the

[16] WSDOT. 2010. *Washington State Scenic and Recreational Highways Strategic Plan*. Highways and Local Planning Division. March.

[17] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 75. September 10.

[18] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 76. September 10.

[19] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 77. September 10.

Oregon Parks and Recreation Department (OPRD). Exhibit L provides further discussion on the John Day River designations. Large portions of the lower John Day River corridor are managed by the Prineville District BLM. BLM's management of the river corridor is guided by the 2015 *John Day Basin Record of Decision and Resource Management Plan*.[20]

T.5.2.2 Park Facilities, Recreation Sites, and Golf Course

Cottonwood Canyon State Park

Cottonwood Canyon State Park was established in 2011. It was previously considered by the Council as a protected area[21], but not included in the evaluation for recreational resources. The park is managed by the OPRD under the *Cottonwood Canyon State Park Comprehensive Plan*.[22] Cottonwood Canyon State Park is located off Oregon Highway 206 between the cities of Condon and Wasco. The park encompasses 8,000 acres on the Lower John Day River, making it the largest state park in Oregon; approximately 12.5 acres of the park are located within the analysis area. Recreational opportunities associated with the park include hiking, camping, boating the John Day River (Section T.5.2.1), horseback riding, fishing, and hunting. Because the park has a special designation and is not common or replaceable, it is considered an "important recreational opportunity."

T.5.2.3 Wildlife Areas

John Day Wildlife Refuge

The Oregon Department of Fish and Wildlife manages the John Day Wildlife Refuge located along the lower mainstem of the John Day River, from the Columbia River about 84 miles to Thirtymile Creek. The refuge is located approximately 4 miles west of the Facility site boundary, and includes a 0.25-mile corridor on each side of the river, measured from the mean high water line. Recreational opportunities associated with the wildlife refuge include hunting, hiking, and wildlife viewing. The primary purpose of the John Day Wildlife Refuge is to protect wintering and nesting waterfowl. The refuge provides a resting area for ducks and geese and provides habitat for various raptor species and other wildlife. The area is also open to hunting of deer and upland game birds during authorized seasons, but this hunting on private lands within the refuge requires landowner permission. While the John Day Wildlife Refuge does not provide unique recreational sites or offer outstanding or unusual qualities, the park has a special designation and management; it is not common and is relatively irreplaceable; and demand is high. Therefore, the John Day Wildlife Refuge meets the definition of "important" under the standard.

T.5.2.4 Trails, Interpretive Sites, and Monuments

Oregon National Historic Trail McDonald and John Day Crossing Interpretive Site

The Council previously found that the ONHT McDonald and John Day Crossing interpretive site provides an important recreational opportunity.[23] The recreational opportunity at the ONHT

[20] BLM. 2015. *John Day Basin Record of Decision and Resource Management Plan.* BLM Prineville District. April.

[21] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 66. September 10.

[22] OPRD. 2011. Cottonwood Canyon State Park Comprehensive Plan. Oregon Parks & Recreation Department: Salem, Oregon. July.

[23] EFSC. 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility*. p. 41. July 12.

McDonald and John Day Crossing interpretive site includes viewing the historic McDonald Ford where the trail crosses the river and viewing the interpretive display. The site is unique, although demand is low due to the limited access to the site. Therefore, the ONHT McDonald and John Day Crossing interpretive site is considered an important recreational opportunity.

Oregon National Historic Trail Fourmile Canyon Interpretive Site

The Council previously found that the ONHT Fourmile Canyon interpretive site provides an important recreational opportunity[24] because it offers visitors interpretation of the historic significance of the trail during its major use. Therefore, the ONHT Fourmile Canyon interpretive site is considered an important recreational opportunity.

T.5.2.5 Other Recreational Opportunities

Blue Mountain Scenic Byway

The Blue Mountain Scenic Byway, which passes through Morrow County approximately 3 miles east of the Facility site boundary, was not previously evaluated by the Council. However, subsequent findings by the Council have determined that it meets the criteria as "important" under the standard.[25] The byway was designated in 1989 under the National Scenic Byway Project and, in 1997, by the Oregon Department of Transportation (ODOT) as an Oregon State Scenic Byway. The route is approximately 145 miles, begins in Heppner Junction and I-84, and follows OR 74 (Heppner Highway) southeast along the Gilliam/Morrow County line.[26] Many sites of interest and recreational opportunities are present along the route. However, none occur along the roughly 11-mile portion within the analysis area. Because the route is used commonly and is one of only six Oregon State Scenic Byway designations in the state, the Blue Mountain Scenic Byway meets the criteria as "important" per OAR 345-022-0100.

T.6 SIGNIFICANT POTENTIAL ADVERSE IMPACTS

OAR 345-021-0010(1)(t)(B) *A description of any significant potential adverse impacts to the important opportunities identified in (A) including, but not limited to:*

T.6.1 Loss of Recreational Opportunity

(i) Direct or indirect loss of a recreational opportunity as a result of facility construction or operation.

Response: The Council previously found that the area within the approved site boundary is privately owned, and it contains no county, state, or federally-designated lands or recreational facilities.[27] Likewise, the area within the proposed expanded site boundary is privately owned and contains no county, state, or federally-designated lands or recreational facilities. Construction and operation of Phase 2 components will not result in any direct or indirect loss of a recreational opportunity. Access to the important recreation locations within the analysis area

[24] EFSC. 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility*. p. 41. July 12.

[25] EFSC. 2017c. *Final Order in the Matter of the Application for a Site Certification Agreement for the Wheatridge Wind Energy Facility*. p. 209. April.

[26] U.S. Forest Service. 2017. *Blue Mountain Scenic Byway*. U.S. Forest Service, Umatilla National Forest. Accessed July 25, 2017.

[27] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 75. September 10.

will not be restricted as a result of either construction or operation of Phase 2. Phase 2 operation activities will occur within the Facility site boundary, as expanded, and will not displace persons from the seven important recreational opportunities identified previously.

Phase 2 wind turbines will be constructed at locations farther from the ONHT Fourmile Canyon interpretive site than turbines allowed under the approved Site Certificate. Solar array and battery storage will be located approximately 10 miles from this site. Construction and operation of Phase 2 components will not affect visually intact remnants of the ONHT located to the north within the approved site boundary.

T.6.2 Indirect Impacts

Indirect impacts related to noise, traffic, and visual impacts are discussed in the following subsections.

T.6.2.1 Noise

(ii) Noise resulting from facility construction or operation.

Response: Phase 2 construction and operation activity will occur at locations two or more miles removed from the important recreational opportunities identified earlier in this exhibit. The Council previously found that construction noise would produce localized, short-duration noise levels similar to those produced by any large construction project with heavy construction equipment. Phase 2 construction activities will occur farther from the ONHT Fourmile Canyon interpretive site than anticipated in the Council's prior evaluation.[28] Impacts to the ONHT Fourmile Canyon interpretive site resulting from Phase 2 construction will be less than those anticipated in the 2010 Final Order. The remaining recreational opportunities are located approximately 5 miles from the closest Phase 2 construction activity; construction noise will be significantly attenuated as a result of the intervening distance and topography.

As discussed in Exhibit X, Condition 107 of the Site Certificate requires Montague to demonstrate that, prior to construction, the Facility will comply with Oregon Department of Environmental Quality noise regulations. For Phase 2, Montague proposes to use turbines that fall within the range of turbines previously approved by the Council. Furthermore, the solar array and the battery storage are not anticipated to contribute to Facility operational noise.

Therefore, Phase 2 will not result in adverse noise impacts to important recreational opportunities during Facility construction or operation.

T.6.2.2 Increased Traffic

(iii) Increased traffic resulting from facility construction or operation.

Response: The Council previously considered the impacts of construction and operation traffic resulting from the Facility.[29] The Council considered the number of construction trips that will occur daily and how such trips would be distributed on roads serving the Facility area. The Council imposed Site Certificate Condition 73 requiring Montague to implement measures to

[28] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 77. September 10.

[29] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. pp. 121-122. September 10.

reduce construction-related traffic impacts. The Council found that the anticipated operations staff of up to 30 employees will not significantly increase traffic in the analysis area.[30]

As further discussed in Exhibit U, the modifications proposed under RFA 4 do not significantly change the level of traffic during construction or operation, and the transporter routes, their condition, and current traffic levels are substantially similar to those described for the approved Facility. Therefore, no new traffic-related impacts are associated with construction or operation of Phase 2. A summary of previously approved traffic impacts is provided below.

- While construction-related traffic may cause brief traffic delays, it is not anticipated that these delays will adversely affect important recreational opportunities.

  Potential state highway (I-84 and OR 19) traffic congestion as a result of Facility construction and operation is anticipated to be insignificant. Construction-generated traffic on I-84 represents a very small percentage of overall average daily trips, and OR 19 has ample capacity to handle the additional trips created. Because the county roadways experience very little daily traffic, and additional construction-related trips will be spread out over the workday, no significant traffic congestion or delay impacts are expected along county roadways.

- Operations access is primarily related to travel by operations staff and occasional deliveries. The modifications proposed under RFA 4 will not increase the number of operations staff as identified in Exhibit U. Daily access to the Facility as a whole (by only approximately 10 to 30 operations staff) is not anticipated to adversely affect traffic or recreational opportunities.

Facility construction and operations traffic will not affect the public's ability to access intact portions of the ONHT, interpretive sites, or monuments. Existing state and county roadways can safely accommodate Facility construction traffic, with minor improvements, as necessary. In addition, increased traffic resulting from Facility construction will be temporary and no adverse impacts are anticipated. Further, traffic safety and flow will be monitored during construction.

Therefore, the modifications proposed under RFA 4 do not alter the Council's prior findings that the Facility will not result in any adverse traffic impacts to important recreational opportunities during Facility construction or operation.

T.6.2.3 Visual

(iv) Visual impacts of facility structures or plumes.

Response: The Council previously found that the Facility will not result in in significant adverse impacts to important recreational resources in the analysis area.[31,32] The Council imposed Conditions 102 and 105 to minimize the visual impacts of wind turbines.

In order to assess changes to potential impacts resulting from the modifications proposed under RFA 4, an updated analysis was performed to determine the zone of visual influence (ZVI) of the

[30] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. pp. 121-122. September 10.

[31] EFSC. 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility*. p. 42. July 12.

[32] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 78. September 10.

modified Facility. Results of the visual analysis are presented in Exhibit R. Wind turbines constructed as part of the Facility (Phases 1 and 2) will be the predominant component contributing to longer-range visual impacts. As discussed in Exhibit R, the relatively low profile of the solar array and battery storage will not be visible at greater distances, such as those separating important recreational opportunities from the proposed expanded site boundary.

Consistent with impacts previously evaluated by the Council, the Facility will not have significant adverse visual impacts to scenic resources and values. The ZVI presented in Exhibit R shows that Phase 2 will not be visible from most of the important recreational resources including the ONHT McDonald and John Day Crossing interpretive site or the John Day Wildlife Refuge. Similarly, as described in Exhibit R, travelers along Blue Mountain Scenic Byway portions of OR 74 will not see the solar array, battery storage, and transmission line. Wind turbines located 12 miles from the byway will only be visible from a short (less-than-1-mile) segment of the byway located in northeastern Gilliam County. No Phase 2 components will be visible from the Lewis and Clark Trail Scenic Byway.

Some Facility components may be visible from the ONHT Fourmile Canyon interpretive site of the ONHT. Wind turbines may appear in the background of the view from the ONHT Fourmile Canyon interpretive site. However, they will be entirely on private land, outside of the ¼-mile protective corridor specified in the *Oregon Trail Management Plan*,[33] and will not obstruct the view of the trail ruts from the ONHT Fourmile Canyon interpretive site. Phase 2 components are located farther from the ONHT Fourmile Canyon interpretive site than previously approved turbines and therefore visual impacts from the Facility on the ONHT Fourmile Canyon interpretive site will not be increased by the modifications proposed under RFA 4.

Montague will continue to comply with Condition 105, which ensures the Facility will maintain a minimum distance of 1,000 feet measured from the centerline of each turbine tower or meteorological tower to the centerline of the line-of-sight from the vantage point of the ONHT Fourmile Canyon interpretive site looking toward the visible ONHT ruts. The Council previously concluded that, with the adopted Condition 105, the Facility will not have a significant adverse effect on the view of the ruts, which is the identified scenic value at the ONHT Fourmile Canyon interpretive site.

Although the proposed expanded site boundary adds land at a similar distance to the John Day River (5 miles) as the closest portions of the approved site boundary, turbine visibility from the John Day River will be similar to visibility of the approved Facility (see Figure R-3 in Exhibit R). The Facility as modified by RFA 4 still will not be visible from the ONHT McDonald Crossing (see Figure R-1 in Exhibit R). Facility wind turbines will be visible from higher elevations of lands associated with recreational opportunities at the John Day River. However, as indicated in Exhibit R, there will be limited views of the Facility as modified from these isolated areas and the impact was determined to not be substantial. For these reasons, the modifications proposed under RFA 4 do not alter the prior conclusion that the Facility will not have significant adverse visual impacts to the river or associated recreational opportunities.

As described in Exhibit R, visual impacts from the solar array will be restricted to locations in proximity to the array. No important recreational resources are present in proximity to the array.

[33] BLM. 1993. *Oregon Trail Management Plan*. Prineville District, U.S. Department of the Interior. September.

Therefore, Phase 2 will not result in any adverse visual impacts to important recreational opportunities during construction or operation.

T.7 MITIGATION MEASURES

OAR 345-021-0010(1)(t)(C) *A description of any measures the applicant proposes to avoid, reduce or otherwise mitigate the significant adverse impacts identified in (B).*

Response: No new mitigation measures are proposed. Because Phase 2 design, construction, and operation will not result in any significant adverse impacts to important recreational opportunities, no new measures to avoid, reduce, or otherwise mitigate adverse Facility impacts to recreational opportunities are proposed. Mitigation measures proposed for other purposes (such as use of existing roads and rights-of-way where possible, and the visual design of the wind turbines) will reduce potential impacts to other recreational opportunities not considered important per OAR 345-022-0100.

T.8 MAP OF ANALYSIS AREA

OAR 345-021-0010(1)(t)(D) *A map of the analysis area showing the locations of important recreational opportunities identified in (A).*

Response: The analysis area and locations of important recreational opportunities identified pursuant to OAR 345-021-0010(1)(t)(A) are shown on Figure T-1.

T.9 MONITORING PROGRAM

OAR 345-021-0010(1)(t)(E) *The applicant's proposed monitoring program, if any, for impacts to important recreational opportunities.*

Response: No new monitoring measures are proposed. A monitoring program is not proposed because Facility design, construction, and operation will not result in any significant adverse impacts to important recreational opportunities.

T.10 CONCLUSION

The modifications proposed under RFA 4 do not alter the Council's prior conclusion that the Facility will not result in any significant adverse impacts to any important recreational opportunities within the analysis area. Therefore, in accordance with OAR 345-022-0100(1), the Facility can be designed, constructed, and operated so that it will not result in significant adverse impacts on important recreational opportunities in the analysis area. Montague will continue to comply with Site Certificate Condition 105 in order to avoid adverse impacts to recreational facilities and opportunities at the ONHT Fourmile Canyon interpretive site.

T.11 REFERENCES

Bureau of Land Management (BLM). 1993. *Oregon Trail Management Plan*. Prineville District, U.S. Department of the Interior. September.

Bureau of Land Management (BLM). 2015. *John Day Basin Record of Decision and Resource Management Plan*. BLM Prineville District. April.

Energy Facility Siting Council (EFSC). 2008. *Final Order on the Application for Site Certificate for the Shepherd's Flat Wind Farm*. July 25.

Energy Facility Siting Council (EFSC). 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. September 10.

Energy Facility Siting Council (EFSC). 2013. *Final Order on Request for Contested Case and Amendment #1 of the Site Certificate for the Montague Wind Power Facility*. June 21.

Energy Facility Siting Council (EFSC). 2015. *Final Order on Request for Contested Case and Amendment #2 of the Site Certificate for the Montague Wind Power Facility*. December 4.

Energy Facility Siting Council (EFSC). 2017a. *Third Amended Site Certificate for Montague Wind Power Facility.* July 11.

Energy Facility Siting Council (EFSC). 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility.* July 12.

Oregon Park and Recreation Department (OPRD). 2011. *Cottonwood Canyon State Park Comprehensive Plan*. Oregon Parks & Recreation Department: Salem, Oregon. July.

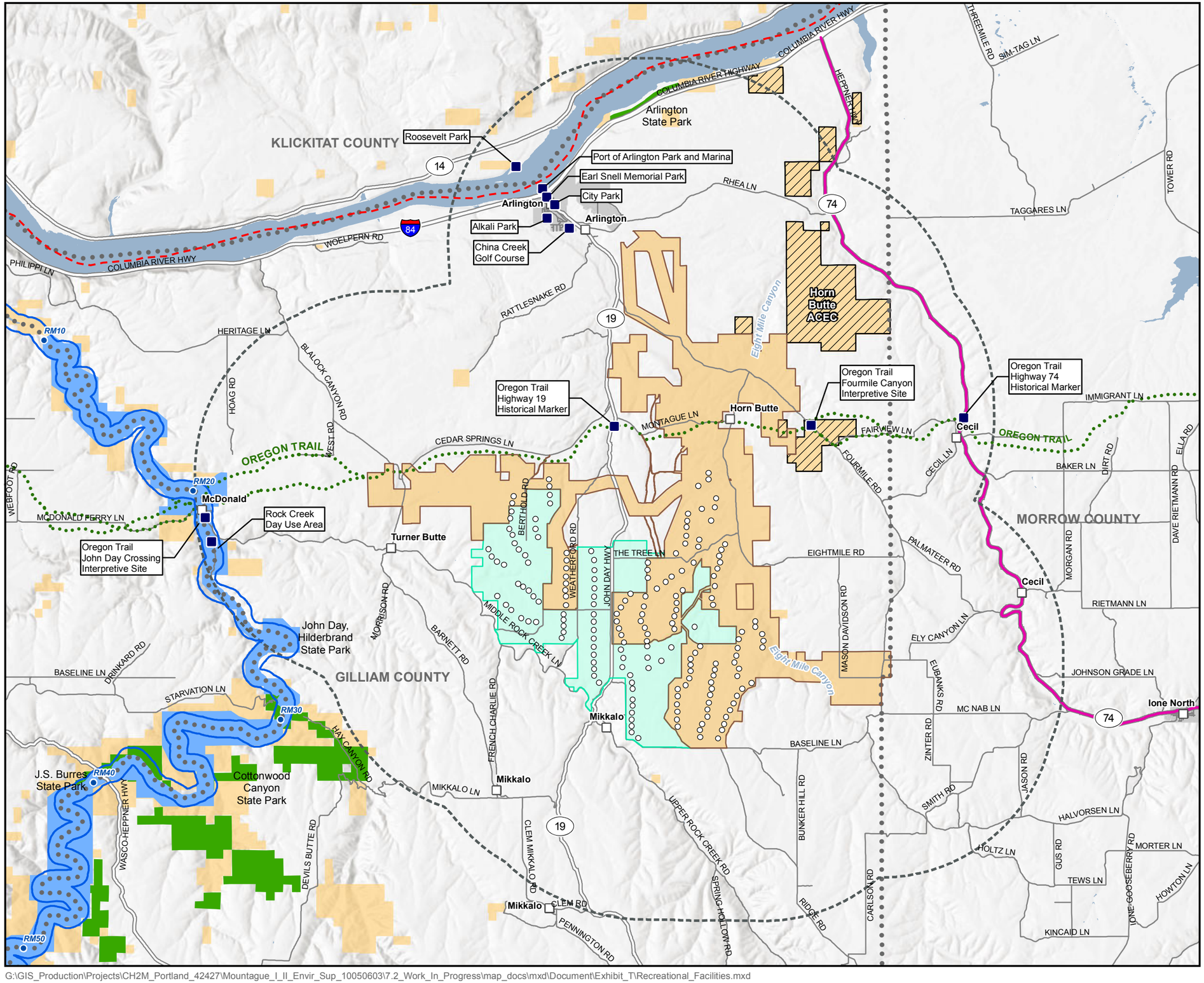
Port of Arlington. 2013. *Port of Arlington – Gilliam County Strategic Plan 2012-2017*. Prepared by the Port of Arlington. Updated April 2013. https://nebula.wsimg.com/172cc7505481fa4957f17c95d5587308?AccessKeyId=112FABA55D63C2DEEE68&disposition=0&alloworigin=1.

U.S. Forest Service. 2017. *Blue Mountain Scenic Byway.* US Forest Service, Umatilla National Forest. Accessed July 25, 2017. https://www.fs.usda.gov/recarea/umatilla/recarea/?recid=56909.

Washington State Department of Transportation (WSDOT). 2010. *Washington State Scenic and Recreational Highways Strategic Plan*. Highways and Local Planning Division. March.

Figure

Figure T-1
Recreational Facilities and Opportunities
Montague Wind Power Facility



Legend

- Approved Site Boundary
- Approved Micrositing Corridor
- Proposed Expanded Site Boundary
- Proposed Expanded Micrositing Corridor
- 5-mile Analysis Area
- Turbine
- Recreation Site
- Lewis and Clark Trail (Historic Route)
- Oregon Trail (Historic Route)
- Blue Mountain Scenic Byway
- John Day WSR and Scenic Waterway
- John Day River Wildlife Refuge
- John Day River Mile Marker
- Horn Butte ACEC
- State Park
- BLM Land
- Populated Place
- Water Body
- Road
- County Boundary

Data Source: Gilliam County (2017), OR Spatial Data Library (2017), ESRI (2017)
Basemap Source: ESRI Multi-Directional Hillshade

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EXHIBIT U
PUBLIC SERVICES/SOCIOECONOMIC IMPACTS

OAR 345-022-0010(1)(u)

TABLE OF CONTENTS

ATTACHMENTS

TABLES

FIGURES

U.1 INTRODUCTION

The Energy Facility Siting Council (EFSC; Council) previously approved construction of the 404-megawatt (MW) Montague Wind Power Facility (Facility)[1] and in doing so used information provided by Montague Wind Power Facility, LLC (Montague) in accordance with OAR 345-021-0010(1)(u). Montague is constructing the Facility in two phases. Phase 1 consists of up to 81 wind turbines generating 202 MW of power within the approved boundary. Montague has already begun construction of Phase 1 under the conditions of the existing Site Certificate. Phase 2 consists of an expanded site boundary, solar array, and battery storage. The analysis in this exhibit focuses on Phase 2 and the three design scenarios described in *Request for Amendment No. 4 Project Description and OAR Division 27 Compliance* (referred to herein as RFA 4).

U.2 SUMMARY OF ANALYSIS RESULTS

RFA 4 proposes to expand the Facility site boundary, add a solar array, and store energy in a battery system. This exhibit presents an analysis of potential impacts on public services and socioeconomics during Phase 2 construction and operation, and then demonstrates that the Facility, as a whole, will comply with the Public Services standard. In addition, the exhibit updates information on providers and demographic information within the analysis area, and demonstrates that there has been no significant change to area resources since the Site Certificate was issued in 2010. The analysis is described in detail in Section U.7, and the results are summarized as follows:

- **Site Boundary Expansion:** The expansion of the site boundary will not directly affect public services and socioeconomics in the analysis area during construction and operation of the Facility. Facilities previously included within the approved site boundary (wind turbines, access roads, electrical lines, substation, and operations and maintenance [O&M] building) will be relocated to new areas, but the analysis shows that the expansion is not likely to result in significant adverse impacts on the ability of the providers within the analysis area to provide the following services: sewers and sewage treatment, water, stormwater drainage, solid waste management, housing, traffic safety, police and fire protection, healthcare, and schools.
- **Addition of Solar Array:** Impacts on public services and socioeconomics resulting from construction of the solar array under Design Scenario C will not directly affect public services and socioeconomics in the Facility area during construction and operation of the Facility. The solar array will be constructed within the proposed expanded site boundary. Construction, operation and maintenance, and retirement of the solar array does not alter the need for public services; therefore, it is not likely to result in significant adverse impacts on the ability of the providers within the analysis area to provide services for sewers and sewage treatment, water, stormwater drainage, solid waste management, housing, traffic safety, police and fire protection, healthcare, and schools.
- **Addition of Battery Storage:** Impacts on public services and socioeconomics resulting from construction of a battery storage system will not directly affect public services and socioeconomics in the Facility area during construction and operation of the Facility. The battery storage system will be constructed within the proposed expanded site boundary. Construction, operation and maintenance, and retirement of battery storage does not alter the need for public services; therefore, it is not likely to result in significant

[1] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility*. July 11.

adverse impacts on the ability of the providers within the analysis area to provide the following services: sewers and sewage treatment, water, stormwater drainage, solid waste management, housing, traffic safety, police and fire protection, healthcare, and schools.

U.3 CONDITION COMPLIANCE

The Third Amended Site Certificate imposes 20 conditions (28, 42, 60, 61, 62, 63, 67, 71, 73, 74, 75, 76, 77, 78, 80, 81, 109, 110, 111, and 112) designed to reduce or avoid potential impacts to socioeconomics and public services. The conditions include requirements to obtain necessary permits, adhere to setbacks, meet new road design standards, implement traffic mitigation measures, properly store equipment/machinery, repair damaged roads, use improved roads, develop and implement health, safety, fire, and waste management plans, provide onsite security, comply with an erosion control plan, and manage wastewater. Montague can continue to comply with the listed conditions but proposes modifications to Conditions 111 and 112 to address the use of lithium-ion batteries. Please refer to Exhibit V for a description of the proposed modifications to Conditions 111 and 112.

U.4 GENERAL INFORMATION

OAR 345-021-0010(1)(u) *Information about significant potential adverse impacts of construction and operation of the proposed facility on the ability of public and private providers in the analysis area to provide the services listed in OAR 345-022-0110, providing evidence to support a finding by the Council as required by OAR 345-022-0110. The applicant shall include:*

Response: The Council previously addressed the Public Services standard in the Final Order on the Application, Final Order on Amendment 1, Final Order on Amendment 2, and Final Order on Amendment 3. The Council found the following: (1) public services necessary for the Facility are available, (2) the Facility will not exceed the carrying capacities of the affected services, and (3) the Facility is not likely to result in significant adverse impact to the ability of public and private providers to provide public services.[2]

This exhibit describes potential adverse impacts on employment, population, housing, and transportation, and on the ability of affected communities in the analysis area to provide public services resulting from construction of the Facility as described in RFA 4.

OAR 345-022-0110 requires that "the Council must find that the construction and operation of the Facility, taking into account mitigation, are not likely to result in significant adverse impact to the ability of public and private providers within the analysis area described in the project order to provide: sewers and sewage treatment, water, stormwater drainage, solid waste management, housing, traffic safety, police and fire protection, healthcare and schools." OAR 345-022-0110, however, is not a directly applicable approval criterion for wind energy facilities and special criteria facilities like the Facility. See OAR 345-022-0110(2) and (3), 345-015-0310. At the same time, the Council may apply the requirements of OAR 345-022-0110(1) as conditions on the Facility's Site Certificate. Therefore, this exhibit is organized in accordance with the application requirements contained in OAR 345-021-0010(1)(u) and provides evidence to support a finding by the Council as required by OAR 345-022-0110.

[2] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. pp. 31-32, p. 118. September 10.

U.5 IMPORTANT ASSUMPTIONS USED TO EVALUATE POTENTIAL IMPACTS

OAR 345-021-0010(1)(u)(A) *The important assumptions the applicant used to evaluate potential impacts.*

Response: Potential impacts were evaluated based on assumptions for number of employees needed to construct and operate the Facility, population shifts, and use of transporter routes. The analysis area for public services and socioeconomics is the area within and extending 10 miles from the site boundary in Oregon and Washington[3] (see OAR 345-001-0010(2)(57)(b)). Figure U-1 shows the analysis area. The analysis area is greater than the area previously analyzed because RFA 4 proposes to expand the Facility site boundary.

U.5.1 Employment

Employment during construction, operation, and retirement of the Facility was previously described in the Final Order on the Application.[4] Each of the following subsections identifies how the changes proposed in RFA 4 are expected to modify the number and nature of employees needed.

U.5.1.1 Construction

As described in the Final Order on the Application[5], construction of the Facility will require an estimated average workforce of 200 people, with a maximum of 475 people during the peak months of construction.

Construction employment for wind facility construction under Phase 2, including related or supporting facilities such as electrical systems and roads, will be substantially similar to the previous estimates for average workforce. Because Phase 2 constitutes only half of the original authorized Facility, the maximum number of people onsite during peak months may be lower than previously estimated. However, some overlap between Phase 1 construction and Phase 2 construction could occur, in which case, the total maximum number of people onsite at a given time could be as high as previously estimated.

Construction of the battery storage system will require some employees with a different skillset, but will not significantly affect the maximum number of employees at any given time because construction of the battery storage will likely not occur at the peak of wind facility construction.

Under Design Scenario C, construction will include installation of a solar array. Most elements needed to install solar components are similar to those needed to construct the wind turbines and related or supporting facilities (e.g., electrical systems and concrete support structures). However, some specialty labor will be required to install PV panels. Because Design Scenario C includes a reduced amount of wind generation, the number of employees onsite overall at any given time still will not likely exceed the originally estimated maximum of 475 employees for the Facility as a whole.

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[3] Although Montague has included within this analysis the potential adverse impacts of Facility construction and operation on public services in Washington, Montague reserves the right to argue that the Council lacks jurisdiction to condition a Site Certificate due to potential impacts that reach beyond Oregon.

[4] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 50. September 10.

[5] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 120. September 10.

Construction of Phase 1 was initiated on September 8, 2017, and will continue in stages with completion by late 2019. Construction of Phase 2 for the selected design scenario is anticipated to begin in late 2018 or early 2019 after issuance of the amended Site Certificate, and may overlap with the completion of Phase 1 construction. The commissioning and start of commercial operation for the full Facility is targeted for completion by September 14, 2020. The originally anticipated duration was a little more than 1 year.

Most construction workers will be employees of construction and equipment manufacturing companies under contract to Montague. Consistent with previous estimates for the approved Facility, construction workers will include a mix of locally hired workers within 30 miles of the Facility site boundary (e.g., from Gilliam, Morrow, Sherman, and Wasco counties in Oregon and Klickitat, Benton, and Yakima counties in Washington) for road and turbine pad construction, and specialized workers for specialized construction (e.g., substation and electrical transmission construction, turbine erection, turbine testing, solar array, and battery storage). For purposes of this analysis, the conservative assumption was made that 30 percent of construction workers will be hired locally and the remainder from outside the four-county area. Local hiring may be greater and will depend on the availability of workers with appropriate skills. Montague's policy will be to hire locally to the extent practicable.

U.5.1.2 Operation

Estimates for operational employment at the Facility, including modifications proposed under RFA 4, are the same as those previously described in the Final Order on the Application.[6] An estimated 10 to 30 employees will be hired to operate and maintain the Facility. Some of the O&M staff will be hired locally, and some will be hired from outside the area for those positions that require previous experience at other wind or solar generation facilities. Some specialized outside contractors may also be required on occasion. Operations will continue for at least 40 years. (See Exhibit W for a discussion of Facility life.)

U.5.1.3 Retirement

No wind energy facility has been decommissioned in Oregon; therefore, it is difficult to predict the number of workers needed for retirement of the Facility. The activities to remove turbines, overhead collection lines, and other related and supporting facilities will likely require a workforce of similar size to the average workforce needed for the construction of the Facility (about 200 people). When the Facility is retired, operational jobs will be eliminated; however, there may be short-term contract jobs to monitor restored areas. Retirement of the Facility will require removal of most Facility components and restoration of disturbed areas. These activities will result in temporary employment levels similar to those experienced during Facility construction.

U.5.2 Population

Population impacts are correlated to the number of construction and operations employees at the Facility who will move into the area either temporarily or permanently, as compared to the population of the surrounding area. This section provides an update to the expected number of workers and their family members during each phase of Facility construction and operation.

[6] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. pp. 64, p. 120. September 10.

U.5.2.1 Construction

Although the analysis area has increased in size as a result of the expanded site boundary, the commuting distance for construction employees will not significantly change from the locations described for the approved Facility. Approximately 30 percent of the construction workers are expected to be local residents (from Gilliam, Morrow, Sherman, and Wasco counties in Oregon and Klickitat, Benton, and Yakima counties in Washington), and an average of about 140 and a maximum of about 330 workers will be temporary residents (in-migrants). The in-migrants, and their families, will likely settle in vacant hotels, campgrounds, recreational vehicle (RV) parks, houses, and temporary housing located within a commutable distance to the Facility (50 miles). An average household size of 2.0 is assumed for such migrants, resulting in an estimated maximum of about 660 temporary residents during the peak construction periods. This is the same maximum number of temporary residents that was estimated for construction of the Facility as previously approved.

U.5.2.2 Operation

The number of new permanent residents resulting from Phase 2 operations will be small, similar to the approved Facility. Under Design Scenarios A and B, the total MW of wind energy from the Facility will be the same as previously authorized and will require the same number of employees to operate. Under Design Scenario C, a portion of the wind energy will be replaced by solar energy, and a portion of the workforce dedicated to support of the wind energy facility will be retargeted to operate the solar-energy-generating components. An estimated 10 to 30 employees will be hired to operate and maintain the Facility, and some will already be local residents. Assuming conservatively that 50 percent (5 to 15) of these employees are in-migrants with an average household size of 3.0 (higher than for temporary employees), as many as 45 new permanent residents could be added to the local population. It is assumed that these workers will live locally, with the exception of specialized personnel who may commute from outside the area. This is the same number of new permanent residents that was estimated for operation of the Facility as previously approved.

U.5.3 Transportation

Various transporter routes will provide access to the Facility during construction and operations. These routes will be used to bring in turbine components, other equipment and materials, water, and workers from outside of the analysis area to the Facility and will include state, county, and private roadways. Major transporter routes are depicted in Figure U-1.

U.5.3.1 Primary and Alternate Transporter Routes

There is no change to the primary transporter routes resulting from the changes proposed under RFA 4. The primary transport route to the Facility will be Oregon Highway 19 (OR 19; also known as John Day Highway) through Arlington and connecting Interstate 84 (I-84). Component deliveries are coordinated by the turbine supplier but are likely to arrive by either cargo vessel at Columbia River ports in the Portland area or by train at rail yards east of Arlington. Deliveries from central Oregon using Highway 26 to OR 19 could occur but are less likely. Figure U-1 depicts the major transporter routes and alternate routes planned for use.

Near the construction area, various county roads will be used to connect to newly built turbine access roads. Turbine access roads to the west of OR 19 can be accessed via Cedar Springs Lane, Berthold Road, Bottemiller Lane, Middle Rock Creek Lane, and Weatherford Road. Turbine string

roads to the east of OR 19 can be accessed using Eightmile Road, Fourmile Road, Montague Lane, Tree Lane, and Baseline Road. Mason Road, Davidson Road, and Upper Fourmile Road could also be used to access individual turbine string roads. All transporter routes are shown on Figure U-1.

U.5.3.2 Truck Traffic

As with any large construction project, there will be a considerable amount of truck traffic during construction of Phase 2. The Council previously considered the volume of truck traffic between 156 to 269 daily trips going to or coming from the Facility[7], for a total of 31,920 truck trips (that is, roundtrips equal two truck trips). The previous estimate was based on the need for approximately 120 truck trips for each 1.5-MW turbine and approximately 140 trips for each 3.0-MW turbine. The use of larger turbines at the Facility will cause a corresponding increase in the number of truck trips because more concrete trucks will be needed for the larger foundations. Therefore, Montague assumes that approximately 130 truck trips will be needed for each 2.5-MW turbine and approximately 170 trips for each 3.6-MW turbine. For solar array construction, Montague assumes that an average of 90 truck trips per day (45 trucks making roundtrips) will be needed over 9 months, with 20 days of construction per month.

Because the Facility will be built in phases, each phase will have less truck traffic than the total amount previously considered by the Council. Each phase will require about 10,530 truck trips for turbine installation, assuming 81 turbines are built for each phase and 130 truck trips per turbine, for a total of 21,060 truck trips. Therefore, if Design Scenario A is constructed, the combined amount of trucks for Phases 1 and 2 will be similar to or less than the truck volume considered by the Council even if construction schedules overlap. Construction of Design Scenario B will require 9,520 trips for the installation of 56 3.6-MW turbines. Construction of Design Scenario C will require about 21,400 trips, which combines 5,200 trips for installation of forty 2.5-MW turbines and 16,200 trips for solar array construction. These estimates do not include trucks associated with the construction of related and supporting facilities, or workforce travel to the site.

The Site Certificate allows construction of the Facility over 36 months; however, the construction of major elements will be concentrated over a shorter period. Assuming that delivery of major components for each phase takes place over 9 months, at 20 workdays per month, the number of daily truck trips will range between 59 and 119, depending on design scenario. Therefore, the combined construction traffic of Phases 1 and 2 will have up to 178 trips per day added to background conditions. This amount of daily traffic is associated with Design Scenario C and is about 10 percent more than the daily traffic rate previously evaluated.

Montague will ensure the integrity of local roads used for construction through coordination with the County and ODOT and where needed with local transportation officials, in order to make improvements needed to accommodate Facility construction traffic. Roadway improvements may be needed at the intersection of OR 19 with Tree Lane, Weatherford Lane, Montague Road, new access road south of Tree Lane, and on a private road to the proposed O&M building, as shown on Figure U-2. Any modifications will be entirely within the County and State rights-of-way and therefore will be subject to approval by the County or State and conformance with County or State road design standards. Montague will contact the Oregon Department of Transportation (ODOT) to schedule a site visit to review approaches onto OR 19

7 EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. pp. 64, p. 121. September 10.

and will confirm the necessary permits. Permits needed for this project relevant to the proposed roadway improvements are discussed in Exhibit E.

The sizes and weights of the vehicles are of concern, particularly in areas where roadways are designed for less than the legal load limit of 80,000 pounds. Oversize transporter trucks will be required to bring in the parts of each turbine. Additional oversize vehicles will be required for transporting large construction operating equipment (cranes, bulldozers, etc.).

These estimates are similar to the volumes anticipated for the previously approved Facility.

U.5.3.3 Point of Origin

During construction, an estimated average workforce of 200 people will be employed, with a maximum of 475 people during the peak months of construction. As identified in Section U.5.1.1, local workers will most likely originate from areas within 30 to 60 miles of the site boundary, or will relocate to communities within this area. The relocation of facilities to the expanded site boundary or installation of the solar array does not change the points of origin for workers, and most local workers will still most likely come from Arlington, Condon, or other cities within 30 miles of the Facility site boundary. Some workers also may originate in Goldendale, Washington (approximately 30 miles west of the site), The Dalles, Oregon (approximately 60 miles from the Facility), or Hermiston, Oregon, to the east (approximately 50 miles from the Facility). Some workers from outside the local area may temporarily relocate to communities closer to the Facility. Workers needed for specialized construction, such as electricians for solar installation, may originate from areas outside Gilliam County.

U.6 PUBLIC AND PRIVATE PROVIDERS IN THE ANALYSIS AREA

OAR 345-021-0010(1)(u)(B) *Identification of the public and private providers in the analysis area that would likely be affected.*

Response: The following subsections address the existing socioeconomic conditions and public and private service providers within 10 miles of the proposed expanded site boundary that could be affected by construction and operation of the Facility. This analysis area includes portions of Gilliam, Morrow, Sherman, and Klickitat counties. There are no new public or private service providers associated with Phase 2 components.

U.6.1 Counties, Cities, and Communities

While the proposed expanded site boundary will increase the site boundary by over 13,000 acres, the cities and counties located within the modified analysis area (10 miles from the proposed expanded site boundary) have not changed from what was previously described for the approved Facility. The proposed expanded site boundary is still entirely within Gilliam County, and there are no other cities within the amended analysis area that were not previously considered in the Final Order.

While the number of communities near the project has not changed, the populations have slightly changed since 2010. Gilliam County and Sherman County both experienced population declines between 2010 and 2016. Conversely, Morrow County and Klickitat County both experienced population growth from 2010–2016. Table U-1 presents population estimates for each of the counties and communities within the Facility analysis area.

Table U-1. Historical Population of Counties, Cities, and Communities within the Analysis Area

	Population			Annual Growth Rate	
	2000[a]	2010[b]	2016[c]	2000-10	2010-16
Gilliam	**1,915**	**1,871**	**1,854**	**-0.23%**	**-0.15%**
Arlington	524	586	581	1.12%	-0.14%
Condon	759	682	678	-1.06%	-0.1%
Morrow	**10,995**	**11,173**	**11,274**	**0.16%**	**0.15%**
Boardman	2,855	3,220	3,383	1.21%	0.83%
Ione	321	329	333	0.25%	0.2%
Lexington	263	238	237	-0.99%	-0.07%
Sherman	**1,934**	**1,765**	**1,710**	**-0.91%**	**-0.53%**
Rufus	268	249	242	-0.73%	-0.47%
Wasco	381	410	395	0.74%	-0.62%
Moro	337	324	316	-0.39%	-0.42%
Grass Valley	171	164	160	-0.42%	-0.41%
Klickitat	**19,161**	**20,318**	**21,301**	**0.59%**	**0.79%**
Goldendale	3,760	3,407	3,449	-0.98%	0.2%
Four-County Total	**34,005**	**35,127**	**36,139**	**0.33%**	**0.47%**

Sources:

[a] U.S. Census Bureau, 2000.

[b] U.S. Census Bureau, 2010.

[c] U.S. Census Bureau, 2016.

In the nearest cities of Condon and Lexington, populations declined by approximately 0.1 percent per year (a net loss of 9 people) between 2010 and 2016. Since 2010, the Boardman population has increased slightly, while that of Arlington has remained relatively stable. Overall, the population of the four counties is slightly higher (102 people, for an annual growth rate of 0.47 percent) than it was at the time of the Site Certificate issuance in 2010. The Dalles is the largest community within commutable distance to the Facility and had a 2016 population of approximately 15,572 people.

U.6.2 Service Providers

The service providers within the analysis area for the proposed expanded site boundary have not changed since the Facility Site Certificate was issued in 2010. Montague reviewed the most current information on these service providers to verify that they are still able to serve the needs of the Facility.

U.6.2.1 Sewers and Sewage Treatment

There are no new sewer systems or sewage treatment facilities located within the modified analysis area. Most of the cities in the analysis area have sewer systems and treatment facilities.

Rural residences in the area generally use onsite private septic systems for sewage disposal. No community in the analysis area currently provides sewers or sewage treatment to the Facility site. Montague will construct a septic system at the O&M building located within the expanded site boundary.

U.6.2.2 Water

There are no new water systems within the analysis area for the proposed expanded site boundary.

Most of the cities in the analysis area have public water systems that serve their respective incorporated areas. Montague's contractor will obtain construction water from a privately owned well under a limited water-use license or from the City of Arlington. The City will continue to serve as a sufficient water source to meet the construction requirements. During operations, water will be provided by a newly constructed well near the O&M building for Phase 2. See Exhibit O for a more detailed discussion.

U.6.2.3 Stormwater Drainage

There are no new stormwater drainage facilities located within the analysis area for the proposed expanded site boundary.

No community in the analysis area currently provides stormwater drainage service to the Facility site, except for minimal stormwater drainage facilities associated with public roads maintained by Gilliam County. As already required by the Site Certificate, during construction, Montague will implement numerous best management practices, outlined in the Facility erosion and sediment control plan, in order to minimize erosion and sedimentation that could alter the surrounding stormwater drainages.

U.6.2.4 Solid Waste Management

There are no new solid waste management facilities located within the analysis area for the proposed expanded site boundary.

No community in the analysis area currently provides solid waste management services to the Facility site. Solid waste disposal for the Facility during construction and operations will be provided by private contract with a local commercial hauler or haulers. Waste quantities will be similar to those previously considered by the Council (see Exhibit V). The public landfill nearest to the Facility is the Arlington Landfill owned by Waste Management Services of Oregon, Inc.

U.6.2.5 Housing

There are no new major sources of housing (that is, cities or towns) located within the analysis area for the proposed expanded site boundary.

Consistent with housing options at the time of the 2010 Final Order, housing is provided to varying degrees in all of the incorporated and unincorporated communities within the analysis area, and within a commutable distance from the Facility (50 miles) outside of the analysis area. In general, housing is not provided as a government service, except in the case of subsidized housing for low-income persons and through a variety of government loans and other incentives. Provision of housing in a given area depends on a number of factors, including the

supply of appropriately zoned land, builders, and developers, and the demand for housing by potential residents. There is no government housing within the proposed expanded site boundary.

Table U-2 presents housing supply and availability data for counties and communities within the analysis area. Housing vacancy rates for 2015 (the most recent data available) ranged from 3.9 percent in Grass Valley to 24.1 percent in Condon. The four-county average vacancy rate of approximately 18.1 percent is higher than the State of Oregon's average of 9.5 percent for 2015. Although the available housing units have decreased for a number of nearby communities, most communities continue to experience vacancy rates greater than 10 percent. Overall regional availability of housing has not significantly changed since 2010.

Table U-2. Housing Supply in Counties, Cities, and Communities within the Analysis Area

	Housing Units		Annual Growth Rate	Vacancy Rate
	2010[a]	2015[b]	2010-2015	2015[b]
Gilliam	**1,099**	**1,073**	**-0.48%**	**22.4%**
Arlington	255	263	0.62%	17.1%
Condon	403	399	-0.2%	24.1%
Morrow	**4,435**	**4,449**	**0.06%**	**15.2%**
Boardman	1,072	1,024	-0.91%	7.2%
Ione	128	148	2.95%	21.6%
Lexington	121	67	-11.15%	7.5%
Sherman	**967**	**938**	**-0.61%**	**14.3%**
Rufus	130	134	0.61%	11.2%
Wasco	279	221	-4.55%	10.0%
Moro	158	180	2.64%	8.3%
Grass Valley	78	77	-0.26%	3.9%
Klickitat	**9,612**	**9,894**	**0.58%**	**20.5%**
Goldendale	1,644	1,455	-2.41%	10.0%
Four-County Area Total	**16,113**	**16,354**	**0.30%**	**18.5%**

Sources:

[a] U.S. Census Bureau, 2010.

[b] U.S. Census Bureau, 2015.

U.6.2.6 Transportation

Major transportation routes used to access the proposed expanded site boundary will be the same as those used to access the approved site boundary, with the addition of one county road (Bottemiller Lane) that provide access to the southwest area of the proposed expanded site boundary.

No new transportation services have been identified as a result of the expanded site boundary. The providers of transportation services near the Facility are the Gilliam County Road Department and ODOT.

U.6.2.7 Traffic Volumes and Roadways

Primary Transporter Route

The roads in the primary transportation route include interstate, district, and county roadways. I-84, also known as the Columbia River Highway Number 2, serves as the primary east-west route through Gilliam County. I-84 is a four-lane divided highway, with two lanes traveling in each direction and 6-foot paved shoulders. The remaining roads are state highways and county roadways. OR 19 begins at the I-84 junction, extends through Arlington, and continues south to US 26 in central Oregon. The portion of OR 19 that passes through the Facility site boundary is primarily two lanes (one lane in each direction, undivided) with varying paved shoulder widths. ODOT classifies this road as a regional highway. The posted speed limit is 55 miles per hour (mph), except on various curves and grade changes where the speed limit is reduced to between 35 and 45 mph. There are no passing lanes on OR 19 within Gilliam County.

Table U-3 provides updated traffic volumes for the expected transporter routes. State highway volumes were published in the 2011 through 2015 Traffic Volume Tables (ODOT, 2015). Table U-3 shows the average daily traffic (ADT) volumes for the most recent 5 years of data available at various milepost locations along the transporter routes.

County roadways on the primary transporter route include Cedar Springs Lane, Berthold Road, Weatherford Road, Eightmile Road, Bottemiller Lane, Fourmile Road, Montague Lane, Tree Lane, and Baseline Road. Mason Road, Davidson Road, and Upper Fourmile Road could also be a part of the transporter route.

Because of the rural nature of the analysis area, recent traffic counts on county roads proposed for use in transporter routes are not available. The counties do not monitor traffic volumes on a yearly basis. The most recent version of the *Gilliam County Transportation System Plan* (TSP) (Gilliam County, 2015) indicates that the County only has one year of traffic-count data (2014) for a select group of roadway segments in the County. Traffic data in the TSP indicate that, in general, traffic volumes on county roadways are low. Major collector roads in the county such as Baseline Road, Blalock Canyon Road, and Fourmile Road could be expected to carry approximately 200 vehicles per day, while minor collector roadways could carry approximately 100 vehicles per day. County roadway volumes are minimal, and only during harvest times for various crops in the area do the roadways carry more than residential trips. Harvest season typically is between July and mid-September.

Alternate Transporter Route

An alternate transporter route includes I-84, Oregon Highway 74 (OR 74), and county roadways not proposed in the primary transporter route. The alternate route includes Blalock Canyon Road between I-84 and Cedar Springs Lane. Blalock Canyon Road is not suitable for oversize or overweight trucks because of limitations caused by the physical terrain. Only smaller vehicles destined for the turbines in the west portion of the Facility will use Blalock Canyon Road. In addition, the alternate route also includes access to the Facility from the east via OR 74 and Fairview Road.

Table U-3. Transporter Route Average Daily Traffic Volumes

Highway/Road	Location	Milepost	2011 ADT	2012 ADT	2013 ADT	2014 ADT	2015 ADT
Primary Transporter Route							
I-84[a]	Sherman-Gilliam County Line	114.55	10,500	10,500	10,800	11,000	12,000
	Arlington Interchange (OR 19)	137.02	10,500	10,500	10,700	10,800	11,900
OR 19[a]	Rhea Lane	1.62	1,300	1,100	1,000	980	980
	Fourmile Road	3.89	930	890	860	830	810
	Cedar Springs Lane	7.20	230	270	260	250	250
	Tree Lane	11.95	280	260	250	240	230
	Baseline Road	15.39	290	250	250	240	230
Fourmile Road[b]	Southeast of OR 19	N/A	<200	<200	<200	192	<200
Baseline Road[b]	East of OR 19	N/A	<250	<250	<250	240	<250
Cedar Springs Lane[c]	N/A	N/A	<200	<200	<200	<200	<200
Berthold Road[c]	N/A	N/A	<200	<200	<200	<200	<200
Weatherford Road[c]	N/A	N/A	<200	<200	<200	<200	<200
Eightmile Road[c]	N/A	N/A	<200	<200	<200	<200	<200
Bottemiller Lane[c]	N/A	N/A	<200	<200	<200	<200	<200
Montague Lane[c]	N/A	N/A	<200	<200	<200	<200	<200
Tree Lane[c]	N/A	N/A	<200	<200	<200	<200	<200
Mason Road[c]	N/A	N/A	<200	<200	<200	<200	<200
Davidson Road[c]	N/A	N/A	<200	<200	<200	<200	<200
Upper Fourmile Road[c]	N/A	N/A	<200	<200	<200	<200	<200
Secondary (Alternate) Transporter Route							
OR 74	I-84	0.30	150	170	170	170	180
	Fairview Road	13.88	120	140	140	140	160
Blalock Canyon Road[2]	S of I-84	N/A	<200	<200	<200	142	<200
Fairview Road[3]	N/A	N/A	<200	<200	<200	<200	<200

[a] Source: ODOT 2011-2015 Traffic Volume Tables, 2015.

[b] Estimated ADT from Gilliam County TSP (2015), except 2014 data, which come from actual traffic counts reported in the TSP.

[c] Estimated ADT from Gilliam County TSP (2015) for all years listed.

N/A = not applicable

Table U-3 shows that from 2011 to 2015, ADT volumes increased by approximately 14 percent on average for I-84, while volumes for OR 19 roadway segments decreased by approximately 13 percent on average over the same time period. The alternate transporter route, which generally carries much lower volumes (180 trips per day on OR 74 compared to 12,000 trips per day on I-84), saw an increase of 30 trips per day between 2011 and 2015.

U.6.2.8 Pavement Conditions

Pavement conditions may influence traffic safety issues. Poor pavement with potholes might cause vehicles to swerve, resulting in unsafe vehicle operation. ODOT's Pavement Condition data were reviewed for state highway transportation routes (ODOT, 2017). Table U-4 shows the updated pavement conditions for state highways expected to be used as part of the primary transporter route. Pavement conditions have changed for some of the roadways listed in Table U-4 since the 2010 application was prepared.

Table U-4. Pavement Condition for State Highway Transportation Routes

Highway	Location	Mileposts	2017 Pavement Condition	2009 Pavement Condition
I-84	West of Blalock	125.5-132	Fair	Very Good
	West of Arlington	132-138	Good	Good
	South of Arlington	1.13-7.2	Good	Good
	Cedar Springs to The Tree Lane	7.2-11.6	Good	Fair
	South of Old Tree Lane	11.6-15.3	Good	Good
OR 74	South of I-84	0-4.25	Good	Good

Sources: ODOT, 2009, 2017.

The majority of primary state highway transporter routes are in good condition. The condition of I-84 west of Blalock has deteriorated since 2009 and is now in fair condition, while other route segments are in the same condition now as in 2009. The surface of OR 19 between Cedar Springs and Old Tree Lane has improved from fair condition to good condition since 2009.

Local county roadway surfaces vary from paved to unimproved gravel, as shown on Figure U-2. Cedar Springs Lane, Baseline Road, portions of Eightmile Road, and portions of Fourmile Road on the primary transporter route are paved.

Other county roads on the primary transporter route (Berthold Road, Weatherford Road, Montague Lane, Tree Lane, and portions of Eightmile Road and Fourmile Road) have gravel surfaces.

U.6.2.9 Police Protection

There are no new police services located within the analysis area for the proposed expanded site boundary.

Local police service is provided by most of the incorporated cities in the Facility analysis area. Montague will seek assistance from the Gilliam County Sheriff's Office in Condon, Oregon, for

police service (see Attachment U-1). Backup law enforcement service is available from the Oregon State Police Eastern Region, with offices in Arlington, Condon, Pendleton, and Milton-Freewater.

U.6.2.10 Fire Protection

There are no new fire districts located within the analysis area for the proposed expanded site boundary.

North Gilliam County Rural Fire Protection District provides fire protection to the Facility area (see Attachment U-2). Montague will notify the Fire Protection District of construction plans and phasing, identify the location of and access to Facility structures, and provide mutual assistance in the case of fire within or around the Facility site boundary.

The site will be equipped with fire protection equipment in accordance with the Oregon Fire Code.

U.6.2.11 Healthcare

There are no new healthcare facilities located within the analysis area for the proposed expanded site boundary.

Because population in the analysis area is relatively sparse, hospitals and healthcare services tend to be regional in nature. There are no hospitals within the 10-mile analysis area. The hospitals nearest to the Facility are the Klickitat Valley Hospital in Goldendale, Washington (about 50 miles away by car) and the Pioneer Memorial Hospital in Heppner, Oregon (about 50 miles away by car). Gilliam County provides ambulance service in the analysis area through contracts with private service groups.

U.6.2.12 Schools

There are no new school districts or schools located within the analysis area for the proposed expanded site boundary.

A total of 5 school districts and 11 individual schools provide educational services to the zip codes located in the analysis area. The schools closest to the Facility are operated by the Arlington and Condon school districts. Arlington and Condon both have an elementary school and high school. School enrollment levels in these districts have been relatively stable since 2010, with close to 600 students in grades K-12.

U.7 IMPACTS ON PROVIDERS AND EVIDENCE THAT ADVERSE IMPACTS ARE NOT LIKELY TO BE SIGNIFICANT

OAR 345-021-0010(1)(u)(C) *A description of any likely adverse impact to the ability of the providers identified in (B) to provide the services listed in OAR 345-022-0110.*

OAR 345-021-0010(1)(u)(D) *Evidence that adverse impacts described in (C) are not likely to be significant, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts.*

Response: The following sections describe potential impacts on service providers from construction and operation of Phases 1 and 2 combined, since the analysis area for both phases

overlap and because resources used during construction and operation such as employees, transportation routes, and service providers will be shared between the phases.

U.7.1 Economic and Demographic Impacts

The modifications proposed under RFA 4 do not alter the basis for the Council's prior findings that the Facility is not likely to adversely affect the local economy or demographics. In fact, the Facility will have a beneficial economic impact on Gilliam County through tax revenue. Therefore, the Council can rely on its prior findings to conclude that the Facility, as modified, is not likely to have significant adverse impacts on economic and demographic resources in the community.

U.7.1.1 Population and Housing

The Council previously found that the Facility will not result in adverse impacts on available housing.[8] The number of people employed for construction and O&M of the Facility is not affected by the changes proposed under RFA 4, and neither are the origins of these employees. Additionally, the assumptions about household size of in-migrant workers will not change and, as a result, the proposed modifications do not alter the need for housing in the area.
The existing population and available housing within the analysis area have remained relatively stable since the Facility Site Certificate was issued. Therefore, the changes proposed under RFA 4 do not modify the basis for the Council's conclusion that the Facility is not likely to have a significant adverse effect on available housing.

U.7.1.2 Economic Activity and Tax Revenues

The Council previously found that the Facility will provide local jobs and annual lease payments to local landowners. Additionally, it found that the Facility will provide significant tax revenue.[9]

Montague has entered into a Strategic Investment Program (SIP) agreement with Gilliam County in order to direct tax revenue benefits to the local governments. The change in the site boundary does not affect Montague's tax liability due to the presence of an executed SIP agreement.

Therefore, the changes proposed under RFA 4 do not alter the basis for the Council's conclusion that the Facility will have beneficial economic consequences.

U.7.2 Sewers and Sewage Treatment

As stated in Section U.6.2.1, there are no new sources of sewage or domestic waste water associated with the modifications proposed under this RFA. During construction, contract portable toilets will be used. Sewage from portable toilets will be pumped regularly and disposed of at a local treatment facility in accordance with Site Certificate Condition 109, which addresses portable onsite sewage handling during construction.

Montague will install a kitchen and bathrooms in the O&M building. The building will be served by an onsite sewage disposal (septic) system in accordance with Site Certificate Condition 110. The modifications proposed under RFA 4 do not alter the Facility's plans for sewage or sewage

[8] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 120. September 10.

[9] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 50. September 10.

treatment during construction or operation, and there has been no change to local providers since the Site Certificate was issued in 2010.

The council previously found that Montague's impact on sewage treatment will be minimal.[10] There are no changes to the plan for onsite sewage management. Additionally, there have been no changes to the service providers, as no community in the modified analysis area provides solid waste management services to the Facility.

Therefore, the Council may rely on its prior findings to conclude that the Facility, as modified by RFA 4, is not likely to result in significant adverse impacts on sewers or sewage treatment facilities.

U.7.3 Water

As described in Section U.6.3, construction water-use estimates for the Facility, as modified by this amendment request, are similar to the original estimates for the approved Facility. During construction, approximately 36.8 million gallons will be required for Phases 1 and 2, which is lower than the total accommodated by the City of 36.9 million gallons (see Exhibit O). The majority of the water (34.1 million gallons) will be used to control dust and maintain compaction on constructed access roads. The maximum daily use demand for construction is expected to range up to 120,000 gallons per day. Water for construction will be purchased from the City of Arlington pursuant to an existing municipal water right held by the City. The Facility's water demand is not expected to injure the City's existing water right or exceed the amount of water available to the City. Alternatively, water will be provided from an existing or newly constructed well under a limited license to be issued by the Oregon Water Resources Department.

The Council previously found that adequate water is available in the area for construction purposes.[11] The source(s) of the water have not changed (see Exhibit O). The quantity of water used for construction will be the same as, or less than, previously analyzed. Therefore, the changes proposed under RFA 4 do not alter the basis for the Council's conclusion that adequate water is available for Facility construction.

The Council previously found that the small volume of water needed for Facility operation is not likely to have an impact on other wells that serve local landowners.[12] One well will be installed at the Phase 2 O&M building area. The amount of water being pumped from the onsite well will not change. If water is needed for industrial purposes, such as solar panel washing (if installed), it will come either from the City of Arlington or from a local landowner with water rights (see Exhibit O for details).

Therefore, the Council can rely on its earlier findings, as supplemented by the analysis provided in Exhibit O, to conclude that the Facility, as modified, is not likely to adversely impact water supply within the analysis area.

U.7.4 Stormwater Drainage

The Council previously found that Condition 80, which requires construction activities to be conducted in accordance with a National Pollutant Discharge Elimination System 1200-C

[10] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 119. September 10.

[11] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 119. September 10.

[12] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 119. September 10.

stormwater permit, will ensure appropriate onsite handling of stormwater and measures to reduce erosion.[13] Montague will continue to comply with this condition for Phase 2.

Therefore, the modifications proposed under RFA 4 do not alter the basis for the Council's previous finding that Montague will use appropriate measures to avoid or reduce erosion from stormwater runoff during construction and operation of the Facility.[14]

U.7.5 Solid Waste Management

The Council previously found that the Facility will not result in adverse impacts on solid waste management services.[15] The changes described for RFA 4 do not change the type and quantity of onsite waste generated during construction and operation, and Montague is still able to use the adjacent Columbia Ridge Landfill for disposed of solid wastes. The Columbia Ridge Landfill has adequate capacity to accommodate construction-related debris and is not expected to reach its full capacity for more than 100 years. Additional detail regarding solid waste management is provided in Exhibit V.

As described in Exhibit G, only minimal amounts of solid waste will be generated during operations. Therefore, the modifications proposed under RFA 4 will not alter the basis for the Council's prior conclusion that construction and operation of the Facility is not likely to have significant adverse impacts on the ability of any community in the area to provide solid waste management services.

U.7.1 Housing

As described in Section U.6.2.5, housing impacts from the Facility, as modified under RFA 4, will be essentially the same as impacts from the Facility as approved. The number of employees required during construction and operation of the Facility remain the same as for the approved Facility, and housing conditions in the analysis area have not substantially changed. Therefore, the Council may rely on its earlier findings to conclude that the Facility, as modified, is not likely to have a significant adverse impact on housing.

U.7.2 Transportation: Traffic Safety and Roadway Impacts

The Council previously found that impacts on roadways and traffic safety could be effectively minimized or mitigated through implementation of Site Certificate conditions that require limiting truck traffic, setback of turbine locations from public roads, obtaining necessary permits, and implementing other measures to reduce traffic impacts.[16]

As described in Section U.6.2, in 2015 I-84 carried an ADT volume of approximately 12,000 vehicles past Arlington, Oregon. Assuming similar volumes during the 18-month construction period for Phase 2, construction vehicles will cause an increase in traffic of approximately 1 percent through I-84 under the maximum layout scenario. This increase is expected to be inconsequential on the primary route. ADT volumes on OR 19 just south of Arlington will increase by 13 percent with construction trips, and will likely double in the more rural areas near Old Tree Lane and Baseline Road. This is not expected to affect driving

[13] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 119. September 10.

[14] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 119. September 10.

[15] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 119. September 10.

[16] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 122. September 10.

conditions or cause backups and delays because there will be ample capacity on these state roads.

Traffic volumes resulting from construction Phase 2 will not exceed the volumes anticipated for the approved project, and the volumes of traffic generated by the Facility represent a minimal amount of traffic with respect to the state highway system ADT volumes. Adverse construction and operational impacts on traffic safety or travel times are not anticipated. While construction-related traffic may cause short-term traffic delays (because of large, slow-moving delivery trucks), the delays will be temporary and can be mitigated by implementing the following measures as applicable:

- Providing notices to adjacent landowners when construction takes place to help minimize access disruptions
- Providing proper road signage and warnings of "Equipment on Road," "Truck Access," or "Road Crossings"
- Implementing traffic-diversion equipment (such as advance signage and pilot cars) whenever possible when slow or oversize loads are being hauled
- Employing flag persons necessary to direct traffic when large equipment is exiting or entering public roads to minimize risk of accidents
- Maintaining at least one travel lane at all times so that roadways will not be closed to traffic due to construction vehicles entering or exiting public roads

The Council previously found that impacts on roadways and traffic safety could be effectively minimized or mitigated through implementation of Site Certificate conditions that require limiting truck traffic, setback of turbine locations from public roads, obtaining necessary permits, and implementing other measures to reduce traffic impacts.[17] Because the modifications proposed under RFA 4 do not significantly change the level of traffic during construction or operation, and because the transporter routes, their condition, and current traffic levels are substantially similar to those described for the approved Facility, the Council may rely on its earlier findings to conclude that the previously identified Site Certificate conditions regarding traffic impacts are sufficient to effectively minimize or mitigate impacts on roadways and traffic safety.

U.7.3 Police Protection

The changes proposed under RFA 4 are not expected to require more police services than those previously considered in the Final Order, and the ability of the community to provide services has not changed since the Site Certificate was issued.

During construction, Montague will provide for onsite security and will establish good communications between onsite security personnel and the Gilliam County Sheriff's Office, as required by Site Certificate Condition 78.

Therefore, the modifications proposed under RFA 4 will not alter the basis of the Council's conclusion that the Facility is unlikely to have a significant adverse impact on the ability of local communities to provide police protection or law enforcement services.

[17] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 122. September 10.

U.7.4 Fire Protection and Emergency Response

Construction and operation of Phase 2 may present a risk of accidental grass fire as discussed in the Final Order. The solar array will not create new fire or emergency requirements that are substantially different than wind facilities. However, the addition of the battery storage system introduces a new element that could pose a fire hazard. The lithium-ion battery system must be kept in a temperature-controlled facility with individual battery modules isolated to prevent the spread of fire if it were to occur. The battery storage system will incorporate a fire sprinkler system as designed by the battery manufacturer. In addition, the following measures will be implemented for lithium-ion battery systems to minimize fire and safety risks:

- The battery systems will be stored in completely contained, leak-proof modules. O&M staff will conduct frequent inspections of the battery systems according to the manufacturer's recommendations, which are assumed to be monthly inspections.
- An emergency contingency plan will also be developed with response procedures in the event of an emergency, such as a fire.
- Transportation of lithium-ion batteries is subject to 49 *Code of Federal Regulations* 173.185 – Department of Transportation Pipeline and Hazardous Material Administration. The regulations include requirements for prevention of a dangerous evolution of heat, prevention of short circuits, prevention of damage to the terminals, and require that no battery come in contact with other batteries or conductive materials. Adherence to the requirements and regulations, personnel training, safe interim storage, and segregation from other potential waste streams will minimize any public hazard related to transport, use, or disposal of batteries.

Site Certificate Conditions 77 and 78 require development of a health and safety plan, and the presence of personnel onsite who are trained and equipped for tower rescue and first aid. Conditions 60, 61, and 62 address fire-safety planning, training, and prevention measures. The measures are adequate to address the risk of fire at the proposed modified Facility, including additional risks that may be posed by the lithium-ion battery storage system.

Once the Facility is operational, Montague intends to hold an annual meeting with North Gilliam County Rural Fire Protection District and the Arlington Fire Department to discuss emergency planning. If Montague conducts an annual emergency drill or performs tower rescue training at the Facility, the North Gilliam County Rural Fire Protection District and the Arlington Fire Department will be invited to observe.

Therefore, Phase 2, with implementation of identified mitigation measures, is unlikely to have a significant adverse impact on fire protection and emergency response services.

U.7.5 Healthcare

Impacts on healthcare will remain the same as for the approved Facility since the need for these services will not increase as a result of the modifications proposed under RFA 4, and the ability of the community to provide healthcare services has not changed since the Site Certificate was issued.

Therefore, the Council may rely on its earlier findings that the modifications proposed under RFA 4 will not adversely affect healthcare providers.

U.7.6 Schools

The potential impacts on schools will not be altered by the modifications proposed under RFA 4 since the permanent employment for Phases 1 and P 2 is expected to be the same as previously estimated, and the area population, including school enrollment, has remained relatively stable since the Site Certificate was issued.

Because construction work for the Facility will be short-term and temporary and because peak construction will occur during the summer months, no new students are anticipated in association with Facility construction. Therefore, no impacts on schools will result from construction.

Assuming that about 15 new permanent households will result from operation, an estimated maximum of 30 new schoolchildren (assuming two children per household) could move to the analysis area during the operational phase of the project. This is the same number of new students anticipated at the time the Site Certificate was issued in 2010.

Therefore, the Council may rely on its earlier findings to conclude that the modifications proposed under RFA 4 will not adversely affect schools.

U.8 PROPOSED MONITORING PROGRAMS

OAR 345-021-0010(1)(u)(E) *The applicant's proposed monitoring program, if any, for impacts to the ability of the providers identified in (B) to provide the services listed in OAR 345-022-0110.*

Response: The following plans were previously identified for monitoring potential Facility impacts on service providers:

- Develop and implement fire safety plans in consultation with the North Gilliam County Rural Fire Protection District to minimize the risk of fire and to respond appropriately to any fires that occur on the Facility site, and meet annually with fire protection agency personnel to discuss emergency planning (Condition 60).
- Develop fire safety plans. Montague will take into account the dry nature of the region and will address risks seasonally. Provide a site plan and emergency contact information to fire protection agency personnel (Condition 61).
- Coordinate with the local fire district to provide annual fire prevention and response training to all onsite employees (Condition 63).
- Design and implement a safety-monitoring program, and inspect all turbine and turbine tower components on regularly (Condition 67).
- Cooperate with the Gilliam and Morrow County Road Departments to ensure that any unusual damage or wear caused by the use of the County's roads by Montague and its contractors during construction will be repaired (Condition 75). Inspections will include monitoring of roadway conditions after the completion of construction activities. Monitoring could include use of photographs, videotape, and engineer field notes to document road conditions.
- Establish and maintain communication with local law enforcement personnel during construction and operation of the Facility (Condition 78).

No new monitoring plans are needed to address modifications proposed under RFA 4.

U.9 CONCLUSION

Based on the evidence presented in this Exhibit U, the Council may rely on its earlier findings to conclude in accordance with OAR 345-022-0120, that the construction and operation of the Facility as modified under RFA 4, taking into account mitigation, is not likely to result in significant adverse impacts on the ability of the providers within the analysis area to provide the following services: sewers and sewage treatment, water, stormwater drainage, solid waste management, housing, traffic safety, police and fire protection, healthcare, and schools.

U.10 REFERENCES

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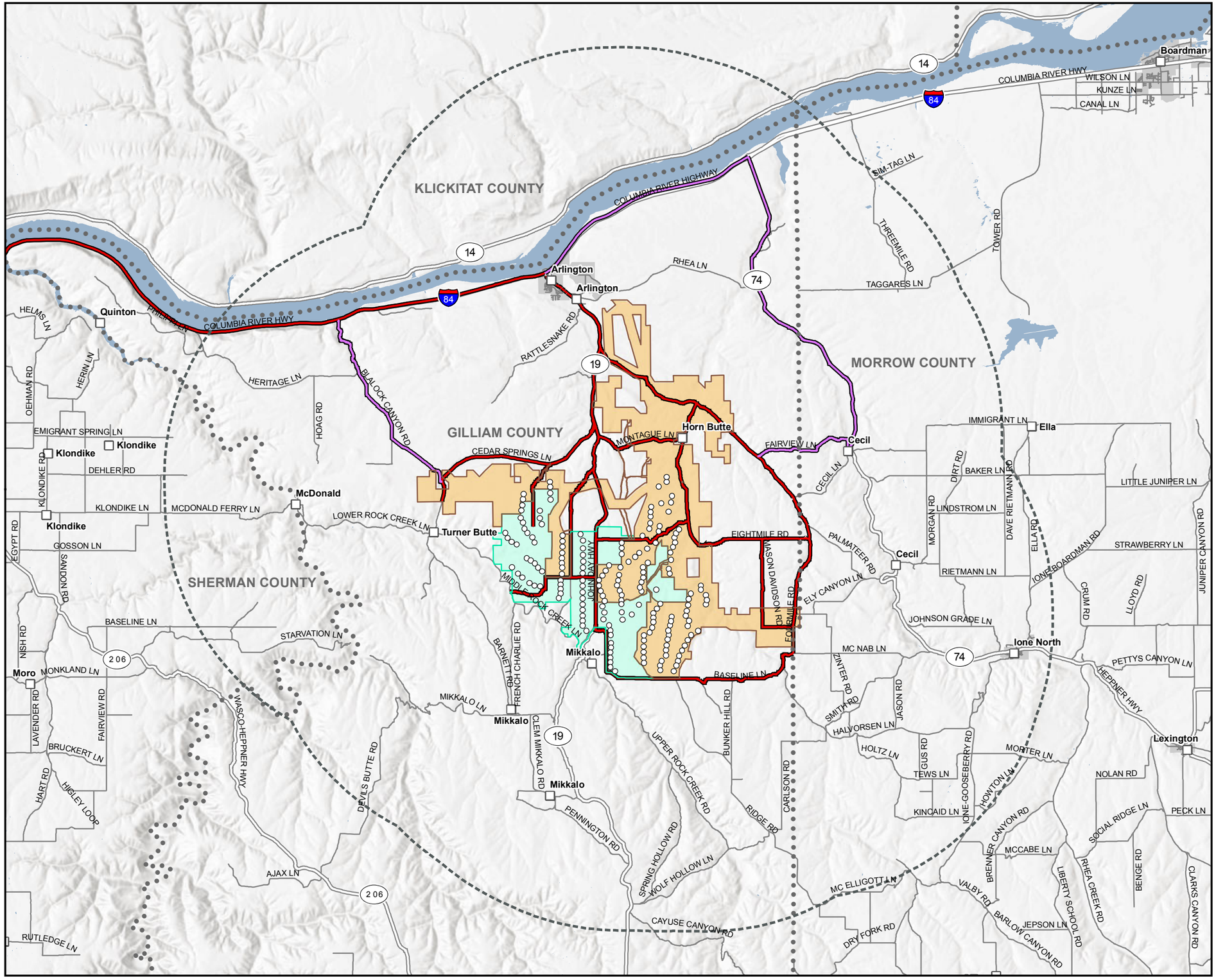
Figures

Figure U-1
Major Transporter Routes
Montague Wind Power Facility



Legend

- Proposed Major Transportation Route - Primary
- Proposed Major Transportation Route - Alternate
- Approved Site Boundary
- Approved Micrositing Corridor
- Proposed Expanded Site Boundary
- Proposed Expanded Micrositing Corridor
- 10-mile Analysis Area
- Turbine
- Populated Place
- Water Body
- Road
- County Boundary

Data Source: Gilliam County (2017), OR Spatial Data Library (2017), ESRI (2017)
Basemap Source: ESRI Multi-Directional Hillshade

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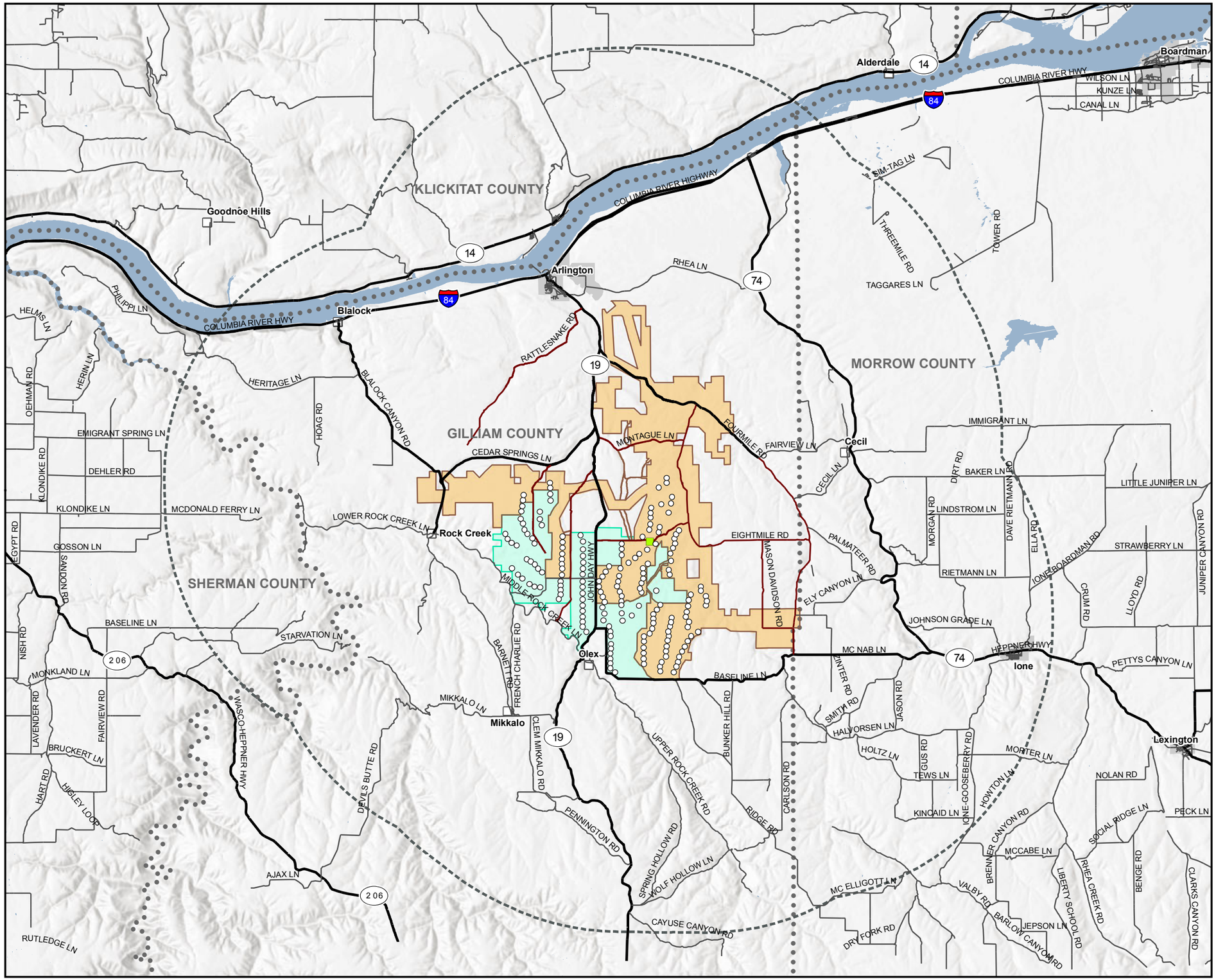
Figure U-2
Public and Private Access Roads
Montague Wind Power Facility



Legend

- Approved Site Boundary
- Approved Micrositing Corridor
- Proposed Expanded Site Boundary
- Proposed Expanded Micrositing Corridor
- Public Road, Paved
- Public Road, Gravel
- Other Public Road
- Private Road, Gravel
- Private, Unpaved or Unimproved Road
- Other Private Road
- 10-mile Analysis Area
- Turbine
- O&M Building
- Populated Place
- Water Body
- County Boundary

Data Source: Gilliam County (2017), OR Spatial Data Library (2017), ESRI (2017)
Basemap Source: ESRI Multi-Directional Hillshade

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Attachment U-1
Correspondence with Gilliam County Sheriff's Office

To be submitted under separate cover when obtained.

Attachment U-2
Correspondence with Gilliam County Fire Protection District

To be submitted under separate cover when obtained.

EXHIBIT V
WASTE MINIMIZATION

OAR 345-021-0010(1)(v)

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V.1 INTRODUCTION

The Energy Facility Siting Council (EFSC; Council) previously approved construction of the 404-megawatt (MW) Montague Wind Power Facility (Facility)[1] and found that the Facility complies with the Waste Minimization standard required in OAR 345-022-0120. Montague Wind Power Facility, LLC (Montague) is constructing the Facility in two phases. Phase 1 consists of up to 81 wind turbines generating 202 MW of power within the approved boundary. Montague has already begun construction of Phase 1 under the conditions of the existing Site Certificate. Phase 2 consists of an expanded site boundary, solar array, and battery storage. The analysis in this exhibit focuses on Phase 2 and the three design scenarios described in *Request for Amendment No. 4 Project Description and OAR Division 27 Compliance* (referred to herein as RFA 4).

V.2 SUMMARY OF ANALYSIS RESULTS

OAR 345-021-0010(1)(v) *Information about the applicant's plans to minimize the generation of solid waste and wastewater and to recycle or reuse solid waste and wastewater, providing evidence to support a finding by the Council as required by OAR 345-022-0120.*

Response: The Council previously found in the Final Order on the Application, Final Order on Amendment 1, Final Order on Amendment 2, and Final Order on Amendment 3 that based on compliance with existing Site Certificate conditions, Montague will minimize and manage solids waste and wastewater, resulting in minimal adverse impacts on surrounding and adjacent areas.[2] The analysis presented in this exhibit considers the new waste types that could be generated as a result of the modifications proposed under RFA 4. Analysis of wastes from wind turbine construction and operation is not presented as the number of turbines will remain the same or be fewer than previously approved. Waste from the Facility will be managed and minimized to avoid adverse impacts on surrounding and adjacent areas. The analysis results are summarized as follows:

- **Site Boundary Expansion**: The expansion of the site boundary will not directly affect waste generation during construction and operation of the Facility. Facilities previously included within the approved site boundary (wind turbines, access roads, electrical lines, substation, and operations and maintenance [O&M] building) will be relocated to new areas, but the types and quantities of waste will be the same or less as previously described.
- **Addition of Solar Array**: Construction of the solar array will generate the same types of waste previously considered by the Council for a wind facility. Waste generated from solar array construction will be managed the same as other construction waste. Operation of the solar array will generate incidental solid waste related to electrical equipment and wastewater for periodic solar panel[3] washing. This incidental solid waste and wastewater will be managed the same as the previously approved waste related to turbine operation.
- **Addition of Battery Storage**: Construction of the battery storage system may generate the same types of waste previously considered by the Council. Waste generated from construction of the battery storage system will be managed the same as other construction waste. Depending on the type of battery technology chosen, operation of the battery storage system may generate additional solid or liquid waste. With both technologies,

[1] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility*. July 11.

[2] EFSC. 2017b. *Final Order on Amendment #3 of the Site Certificate for the Montague Wind Power Facility*. p. 45. July 12.

[3] Solar panels are wired in series and in parallel to form an array.

incidental waste from repair or replacement of electrical equipment will be required. Lithium-ion battery technologies will generate additional solid and liquid waste as batteries and the liquid coolant will need to be changed periodically. Flow batteries have a life span of approximately 20 years, or one-half of the Facility life span, and will also need to be replaced during operation. Battery components will be recycled or disposed of at a permitted facility throughout operations and at Facility retirement.

OAR 345-021-0010(1)(v) requires that site certificate applications address waste minimization in accordance with OAR 345-022-0120, which states:

> *…[T]o the extent reasonably practicable:*
>
> *(a) The applicant's solid waste and wastewater plans are likely to minimize generation of solid waste and wastewater in the construction and operation of the facility, and when solid waste or wastewater is generated, to result in recycling and reuse of such wastes; [and]*
>
> *(b) The applicant's plans to manage the accumulation, storage, disposal and transportation of waste generated by the construction and operation of the facility are likely to result in minimal adverse impact on surrounding and adjacent areas.*

The Council found previously, however, that OAR 345-022-0120 is not a directly applicable approval criterion for wind or solar energy facilities and special-criteria facilities like Montague. See OAR 345-022-0120(2) and OAR 345-015-0310. At the same time, the Council has applied the requirements of OAR 345-022-0120(1) as conditions to Montague's Site Certificate. Therefore, this exhibit is generally organized in accordance with OAR 345-021-0010(1)(v) and provides evidence needed to support a finding by the Council as required by OAR 345-022-0120.

V.3 CONDITION COMPLIANCE

The Third Amended Site Certificate imposes six conditions (80, 87, 109, 110, 111, and 112) designed to facilitate the management of solid waste and wastewater and the minimization of waste. The conditions pertain to erosion and sediment control and stormwater permit compliance, blade washing runoff, onsite sewage handling, wastewater discharge from the O&M building, and wastewater management plan implementation. The modifications proposed under RFA 4 do not affect Montague's ability to comply with the existing Site Certificate conditions. However, Montague proposes modifications to Condition 87 to address the handling of solar panel washwater in the same manner as previously approved for blade washwater, and to Conditions 111 and 112 to address the use of lithium-ion or flow batteries. The modifications are represented by underline and strikeout, and further explained in Sections V.4.2.2 and V.4.2.1, respectively.

87: During facility operation, if blade-washing <u>or washing of solar panels</u> becomes necessary, the certificate holder shall ensure that there is no runoff of wash water from the site or discharges to surface waters, storm sewers or dry wells. The certificate holder shall not use acids, bases or metal brighteners with the wash water. The certificate holder may use biodegradable, phosphate free cleaners sparingly.

111: The certificate holder shall implement a waste management plan during construction that includes but is not limited to the following measures:

(a) Recycling steel and other metal scrap.

(b) Recycling wood waste.

(c) Recycling packaging wastes such as paper and cardboard.

(d) Collecting non-recyclable waste for transport to a local landfill by a licensed waste hauler.

(e) Segregating all hazardous wastes such as used oil, oily rags and oil-absorbent materials, mercury-containing lights and lithium-ion, lead-acid and nickel-cadmium batteries for disposal by a licensed firm specializing in the proper recycling or disposal of hazardous wastes.

(f) Confining concrete delivery truck rinse-out within the foundation excavation, discharging rinse water into foundation holes and burying other concrete waste as part of backfilling the turbine foundation.

112: The certificate holder shall implement a waste management plan during facility operation that includes but is not limited to the following measures:

(a) Training employees to minimize and recycle solid waste.

(b) Recycling paper products, metals, glass and plastics.

(c) Recycling used oil and hydraulic fluid.

(d) Collecting non-recyclable waste for transport to a local landfill by a licensed waste hauler.

(e) Segregating all hazardous, non-recyclable wastes such as used oil, oily rags and oil-absorbent materials, mercury-containing lights and lithium-ion, lead-acid and nickel-cadmium batteries for disposal by a licensed firm specializing in the proper recycling or disposal of hazardous wastes.

V.4 MAJOR TYPES OF WASTE PRODUCED WITH QUANTITY ESTIMATES

OAR 345-021-0010(1)(v)(A) *A description of the major types of solid waste and wastewater that construction, operation and retirement of the facility are likely to generate, including an estimate of the amount of solid waste and wastewater.*

Response: To address the Waste Minimization standard, this exhibit describes Montague's plan to minimize the generation of solid waste and wastewater during construction, operation, and retirement of Facility components associated with the modifications proposed in RFA 4. The types of solid waste and wastewater generated during Facility construction, operation, and retirement, and the procedures and practices used to handle these materials, will largely be similar to those identified in the Council's earlier findings on waste minimization.[4] New types of waste associated with the solar array will consist of incidental waste generated by occasional repair or replacement of solar panels (Design Scenario C only). New types of waste associated

[4] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* pp. 123-125. September 10.

with battery storage will include battery components that need to be periodically replaced and disposed of during operations.

V.4.1 Construction

V.4.1.1 Solid Waste

The Council previously considered construction solid wastes generated by the Facility from turbine towers and pads, meteorological towers, transmission line support structures, O&M buildings, substations, packaging materials for turbine parts and electrical equipment, and erosion control materials. The solid waste types generated from these activities (concrete waste, wood waste, scrap metal, packaging materials, and erosion control material waste [such as straw wattles and silt fencing]) have already been considered and are not included in this analysis[5]. Only waste associated with construction of the solar array (Design Scenario C only) and battery storage system are included in this analysis.

Construction of the solar array (Design Scenario C only) will result in similar types of solid waste as construction of the turbines, given that the same types of construction activities are occurring. To support solar generating technology, foundations and equipment pads will be installed and associated electrical equipment (transformers, inverters, collector lines, and substation) and a control enclosure structure will be erected. Waste materials generated through construction of these components will primarily consist of concrete waste and packaging materials, which are consistent with materials previously considered by Council.

Construction of the battery storage system will also involve generation of concrete waste from construction of concrete pads for container and inverter support, erosion control materials, and packaging materials. These materials are consistent with those previously considered by Council. Therefore, no new types of solid waste will be generated from the construction of additional Facility components proposed under RFA 4. Site Certificate Condition 111 requires specific solid waste management procedures during construction and the solar array and battery storage system elements of RFA 4 do not alter Montague's ability to comply with this condition. However, Montague proposes a modification to Condition 111 to add "lithium-ion" and "flow" batteries to the list of wastes to be disposed of by a licensed firm specializing in such materials. The added language is underlined in list item "e" under Section V.3 Condition Compliance above.

V.4.1.2 Wastewater

The Council previously evaluated construction wastewater generated from concrete washouts and sewage collected in portable toilets[6]. Construction methods used for installation of the solar array or battery storage will also generate concrete wastewater and sewage from portable toilets, therefore the proposed changes would not generate different types of waste. During construction of the modifications proposed in RFA 4, Montague will ensure that no water used for construction will be discharged into wetlands, streams, or other waterways. Montague will implement erosion control measures required by its NPDES 1200-C permit and its associated Erosion and Sediment Control Plan (Site Certificate Condition 80) to control stormwater runoff. During construction, portable toilets will continue to be provided onsite. This amendment request does not result in the need for any change to onsite sewage handling during

[5] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* pp. 123-124. September 10.

[6] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* pp. 124-125. September 10.

construction. Site Certificate Condition 109 requires that a licensed contractor pump and clean portable toilets and dispose of the wastewater offsite. The certificate holder can continue to comply with this condition.

Based on the information provided above, no new types of wastewater will be generated from the construction of additional Facility components proposed in RFA 4.

V.4.2 Operations

V.4.2.1 Solid Waste

Consistent with the Final Order on the Application[7], the modifications proposed in RFA 4 do not change the way previously considered operational solid waste will be handled. New operational solid waste sources include the solar array (Design Scenario C only) and battery storage system elements added to the Facility through RFA 4.

Repair or replacement of solar array and associated electrical equipment could generate incidental waste. However, a solar array typically lasts more than 30 years without significant degradation in function, and will be replaced infrequently if at all. Operation of the solar array will not result in a significant amount of solid waste.

The battery storage system may also generate incidental waste from repair or replacement of electrical equipment. In addition, solid waste will be generated when batteries are replaced. Lithium-ion batteries will need to be changed out periodically (estimated at approximately every 5 years, on average). Flow batteries have a life span of approximately 20 years and will need to be replaced at least once during Facility operation. With both battery technologies, self-contained battery components will be removed and disposed of or recycled by a qualified vendor.

Site Certificate Condition 112 requires specific solid waste management procedures during operations and the solar array and battery storage system elements of RFA 4 do not alter Montague's ability to comply with this condition. However, Montague proposes a modification to Condition 112 to add "lithium-ion" and "flow" batteries to the list of wastes to be disposed of by a licensed firm specializing in such materials. The added language is underlined in list item "e" under Section V.3 Condition Compliance above.

V.4.2.2 Wastewater

Minimal water will be used during operations and will primarily be related to sanitation at the O&M building. Under RFA 4, there will be no change to Montague's plan to construct a septic system to serve the sanitary uses at the O&M building. Consistent with Site Certificate Condition 110, the onsite septic system will be licensed and constructed in compliance with state permit requirements and will have a discharge capacity of less than 2,500 gallons per day.

New operational wastewater sources include the solar array and battery storage system elements (Design Scenario C only) added to the Facility through RFA 4.

If the solar array is constructed, there may be periodic washing of the solar modules to minimize the effects of dust and dirt on energy production. Assuming the solar modules are washed two

[7] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 124. September 10.

(2) times a year, with each wash requiring 5,000 gallons of water, approximately 10,000 gallons of water per year would be required for this purpose. The water used for array cleaning is not anticipated to require offsite disposal due to the extremely high evaporation rate at the site. Any wastewater would likely evaporate before it could be collected for transport offsite. Therefore, washwater will be evaporated or infiltrated into the ground. To ensure that washwater does not discharge to surface waters, Montague proposes the modification to Condition 87 shown under Section V.3 Condition Compliance above. The added language is underlined.

Liquid waste associated with the battery storage system will vary depending the type of technology installed at the Facility. Lithium-ion battery systems are typically air cooled and do not have liquid component. However, there are some lithium-ion battery systems that are liquid cooled, such as the Tesla Powerpack which uses coolant similar to automotive antifreeze. The coolant is recirculated through a closed system to cool the batteries.

Flow batteries use nontoxic ionized fluids as a key component in energy storage. Although the entire battery component will need to be replaced at least once during Facility operation, the fluids within the battery will not require change. No other liquid or wastewater will be generated using this storage technology.

New types of operational wastewater associated with operation of the modifications proposed in RFA 4 include solar array washwater and the liquid coolant used with the lithium-ion battery storage system technology. The solar array washwater will be handled in a manner similar to the Council-approved turbine blade washwater. Any liquid waste generated by the battery storage system will be transported offsite to a facility permitted to treat and dispose of it.

V.4.3 Retirement

Facility retirement is discussed in greater detail in Exhibit W. This section provides a summary of wastes generated by the modifications proposed in RFA 4 at the time of retirement. Wastes generated during retirement of the Facility include wind turbines, meteorological towers, overhead collector lines, and supporting facilities and will be decommissioned the same manner as previously described and approved. The addition of solar array and battery storage system present new types of wastes that would be generated during decommissioning. These are discussed in the following sections.

V.4.3.1 Solid Waste

The solar array components will be constructed with steel, aluminum, concrete, solar photovoltaic modules, cable, and plastics, as described in Exhibit G. When the Facility is retired, the components will be disassembled and the materials will be recycled, sold for scrap, or taken to a landfill. Internal roads, fences, and gates will be removed and the area revegetated unless otherwise requested or agreed by the landowner. Ancillary components, such as concrete pads, and gravel, will be removed in a manner similar to the methodology approved in the Final Order[8] for wind turbines, underground electrical cables, and underground concrete pads. Underground components, such as buried collector lines or concrete pads, will be removed down to 3 feet below ground surface but left in place below that point.

The retirement of the battery storage system will involve disposing of battery components at an offsite facility designed and approved for disposal or recycling of batteries. Battery disposal or

[8] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 10. September 10.

recycling retirement will be similar to manner described above for operations. Ancillary components of battery storage system will also be removed in a manner similar to the methodology approved in the Final Order.

Wastes generated by retirement, including from the solar array and battery storage system, will be recycled where feasible to reduce waste generation.

V.4.3.2 Wastewater

As described for the approved Facility, minimal wastewater will be generated during retirement of Phase 2 wind turbines or related or supporting facilities including electrical systems, roads, and buildings. Likewise, retirement of the solar array and related electrical components will not generate any wastewater.

If flow technology is selected for battery storage, then nontoxic ionized solutions will be disposed of at an approved location at the time of retirement. If lithium-ion technology is selected, no wastewater will be generated at the time of retirement.

V.5 STRUCTURES, SYSTEMS, AND EQUIPMENT TO MANAGE AND DISPOSE OF WASTE

OAR 345-021-0010(1)(v)(B) *A description of any structures, systems and equipment for management and disposal of solid waste, wastewater and storm water.*

Response: Structures, systems, and equipment used for the proper management and disposal of solid waste, wastewater, and stormwater during Facility construction and operations are discussed in Sections V.5.1 and V.5.2.

V.5.1 Construction

Construction waste generated for the proposed amended Facility will be consistent with the types and quantities of construction waste previously identified for the Facility. Construction of the solar array and battery storage area will not add any new types or significant quantities of waste. As a result, no new structures, systems, or equipment will be needed to manage and dispose of construction wastes.

V.5.2 Operations

The new types of waste may be generated during operations of the solar array and battery storage system elements include solar array washwater and battery components.

Operation of the solar array will result in some wastewater during period washing. Wastewater generated from this activity will be managed similarly to the Council-approved methodology for turbine blade washing. No additional structures, systems, or equipment are required for solar array washwater.

Lithium-ion battery modules will require replacement periodically as the modules lose their effectiveness through repeated charge/discharge cycles. The frequency of replacement will depend on operational parameters that are not yet fully designed, but for purposes of this analysis, it is conservatively assumed that batteries will require replacement every 5 years. The following procedures will be implemented for battery replacement:

- The Facility operator will disconnect and de-energy battery system prior to removal from the installed racks, and package the batteries for transport to an approved facility.

- At the recycling facility, the qualified contractor will dismantle battery modules and prepare individual cells for metals recovery.
- Individual cells will be processed in a furnace to recover metals. Recovered metals may include aluminum, calcium, lithium, and a metal alloy comprising cobalt, copper, nickel, and iron.
- Recovered metals will be recycled or separated to recover individual metals where economically viable.

Flow batteries will also require replacement at least once during Facility operation. Similar to the procedures for lithium-ion batteries, the batteries will be de-energized, removed, and transported to an approved facility where they will be recycled or properly disposed of.

Stormwater resulting from the modifications proposed in RFA 4 will be managed similarly to the Council-approved methods described in the Final Order[9]. A NPDES stormwater discharge general permit will be obtained. No additional structures, systems, or equipment are required for stormwater resulting from the modification proposed in RFA 4.

V.5.3 Retirement

Waste produced from retirement activities will be managed in a similar manner to the waste produced during construction and operation. See Sections V.4.1 and V.4.2 above.

The solar array will be removed and recycled or disposed at Facility retirement. At the expected Facility life span of 40 years, an available solar array could still be capable of generating 80 to 85 percent of its initial capacity, in which case, the Facility array will be repurposed for use at other locations. If continued reuse is not practical, the array will be dismantled and recycled to reclaim constituent parts such as glass, aluminum, silicon solar cells, and metals.

The battery storage system will require disposal of the metal container structures housing the batteries and their constituent parts. If lithium-ion technology is selected, batteries will be disposed of at retirement in the same manner described above for operational replacement. If flow technology is selected, the nontoxic ionized fluids contained in the battery modules will be transported offsite for disposal at an approved wastewater disposal location. Electrical systems will be disposed of as previously described for wind turbines.[10]

V.6 WATER USE REDUCTION

OAR 345-021-0010(1)(v)(C) *A discussion of any actions or restrictions proposed by the applicant to reduce consumptive water use during construction and operation of the facility.*

Response: Water use during Facility construction will not be modified by the changes proposed in this amendment request. As described in the Final Order on the Application[11], water loss during construction will occur primarily through evaporation from wetted road surfaces and from drying concrete. Rinse water from concrete delivery truck washout will be handled in accordance with prior agreement with DEQ, and construction of the Facility will be subject to the NPDES permit and its associated erosion and sediment control plan.

[9] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 32. September 10.

[10] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* pp. 124. September 10.

[11] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* pp. 124. September 10.

During operation, the changes described in this amendment request will result in additional water use for the purpose of periodic solar panel washing. Water used for solar panel washing will be limited to the minimum necessary for effective panel function. No additional water use, and therefore no additional actions to limit water use, will result from installation of the battery storage system.

V.7 PLANS FOR RECYCLING AND REUSE

OAR 345-021-0010(1)(v)(D) *The applicant's plans to minimize, recycle or reuse the solid waste and wastewater described in (A).*

Response: The changes described in this amendment request will result in additional solid waste in the form of lithium-ion battery recycling during operations and at retirement, and potential solar array replacement during operation and decommissioning at the time of retirement. These materials will be recycled where practicable, and disposed at an approved disposal location where necessary. Water used for solar panel washing will be discharged for infiltration into the ground near the point of use but will not be discharged into wetlands, streams, or other waterways.

V.8 ADVERSE IMPACTS OF WASTE DISPOSAL

OAR 345-021-0010(1)(v)(E) *A description of any adverse impact on surrounding and adjacent areas from the accumulation, storage, disposal and transportation of solid waste, wastewater and stormwater during construction and operation of the facility.*

Response: Solid waste, wastewater, and stormwater for the proposed amended Facility will be generated and managed consistent with the methods and procedures to be used for the previously approved Facility. As a result, there will be no new adverse impacts resulting from the changes proposed under this RFA.

V.9 EVIDENCE THAT ADVERSE IMPACTS WILL BE MINIMAL

OAR 345-021-0010(1)(v)(F) *Evidence that adverse impacts described in (D) are likely to be minimal, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts.*

Response: The Council previously found that adoption of Conditions 87, 109, 110, 111, and 112 mitigated impacts associated with waste generated at the Facility. These conditions will apply equally to the new activities proposed under RFA 4. As described above, Montague proposes a modification to Condition 87 to include solar panel washwater, and to Conditions 111 and 112 to include handling of lithium-ion or flow batteries.

V.10 PROPOSED MONITORING PROGRAM

OAR 345-021-0010(1)(v)(G) *The applicant's proposed monitoring program, if any, for minimization of solid waste and wastewater impacts*

Response: The Council previously adopted Site Certificate Conditions 111 and 112, which summarize the requirements of Montague's solid waste management plan during construction and operation, respectively. The Council also adopted Condition 80, which requires that Montague obtain a NPDES 1200-C permit and its associated ESCP. The ESCP describes BMPs for erosion and sediment control, spill prevention and response procedures, regular maintenance for vehicles and equipment, employee training on spill prevention, and proper disposal

procedures. Condition 110 requires Montague to discharge sanitary wastewater generated at the O&M buildings to licensed, onsite septic systems in compliance with state permit requirements. Monitoring associated with Conditions 80, 111, and 112 is sufficient to demonstrate minimization of solid waste and wastewater impacts.

V.11 CONCLUSION

The evidence provided above demonstrates that the Council's Waste Minimization standard is met because waste generated as a result of the changes described in RFA 4 will be minimized, reused, or recycled where feasible and because minimal adverse impacts on the surrounding or adjacent areas will result from the management of waste related to the Facility.

V.12 REFERENCES

Energy Facility Siting Council (EFSC). 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. September 10.

Energy Facility Siting Council (EFSC). 2013. *Final Order on Request for Contested Case and Amendment #1 of the Site Certificate for the Montague Wind Power Facility*. June 21.

Energy Facility Siting Council (EFSC). 2015. *Final Order on Request for Contested Case and Amendment #2 of the Site Certificate for the Montague Wind Power Facility*. December 4.

Energy Facility Siting Council (EFSC). 2017a. *Third Amended Site Certificate for Montague Wind Power Facility.* July 11.

Energy Facility Siting Council (EFSC). 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility.* July 12.

EXHIBIT W
RETIREMENT AND RESTORATION

OAR 345-021-0010(1)(w)

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W.1 INTRODUCTION

The Energy Facility Siting Council (EFSC; Council) previously approved construction of the 404-megawatt (MW) Montague Wind Power Facility (Facility)[1] and found that the Facility complies with the Retirement and Financial Assurance standard required in OAR 345-022-0050. Montague Wind Power Facility, LLC (Montague) is constructing the Facility in two phases. Phase 1 consists of up to 81 wind turbines generating 202 MW of power within the approved boundary. Montague has already begun construction of Phase 1 under the conditions of the existing Site Certificate. Phase 2 consists of an expanded site boundary, solar array, and battery storage. The analysis in this exhibit focuses on Phase 2 and the three design scenarios described in *Request for Amendment No. 4 Project Description and OAR Division 27 Compliance* (referred to herein as RFA 4).

W.2 SUMMARY OF ANALYSIS RESULTS

The Council previously found in the Final Order on the Application, Final Order on Amendment 1, Final Order on Amendment 2, and Final Order on Amendment 3 that the actions necessary to retire and restore the site are feasible and that retirement and restoration of the site to a useful, nonhazardous condition could be achieved. In addition, the Council found that Montague has a reasonable likelihood of obtaining a bond or letter of credit in an amount necessary to retire and restore the site[2].

Montague subsequently provided a bond in the amount of $8.685 million, which the Oregon Department of Energy (ODOE) has confirmed is sufficient to retire and restore the portions of the site where Phase 1 will be constructed. Attachment W-1 provides a detailed Facility retirement and restoration cost estimate for three different design scenarios (Tables W-1A through W-1C, respectively). The estimated cost of Phase 2 retirement and restoration is $9.620 million (in third-quarter 2017 dollars) for the largest layout configuration (see Table W-1C).

W.3 CONDITION COMPLIANCE

The Third Amended Site Certificate imposes five Site Certificate conditions that apply to Facility retirement and restoration (8, 9, 16, 32, and 33).[3] These conditions cover the requirement to retire and restore the site to a useful, nonhazardous condition by way of obtaining a bond or letter of credit in an amount sufficient to retire and restore the Facility. The bond amount was established at $21.511 million (third-quarter 2010 dollars), to be adjusted according to a set formula at the time of bond issuance. Montague has obtained a bond for Phase 1 in the amount of $8.685 million, and will obtain a bond for Phase 2 in the amount of $9.620 million (described in Section W.5); therefore, the combined amount will be less than the previously approved amount.

The modifications proposed under RFA 4 in Conditions 8 and 16 address Facility phasing. The modifications proposed in Condition 32 adjust the total dollar amount required for Facility retirement and restoration and allow Montague to carry two bonds, one for each phase, that equate the total retirement and restoration costs of the Facility. The proposed modifications do not otherwise affect Montague's ability to comply with the Site Certificate conditions. The modifications are presented with underlining and strikeout below.

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[1] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility*. July 11.

[2] EFSC. 2017b. *Final Order on Amendment #3 of the Site Certificate for the Montague Wind Power Facility.* p. 31. July 12.

[3] EFSC. 2017b. *Final Order on Amendment #3 of the Site Certificate for the Montague Wind Power Facility.* pp. 6-7, 11-13.

8 Before beginning construction of the facility or a phase of the facility, the certificate holder shall submit to the State of Oregon, through the Council, a bond or letter of credit, in a form and amount satisfactory to the Council to restore the site or a portion of the site to a useful, non-hazardous condition. The certificate holder shall maintain a bond or letter of credit in effect at all times until the facility or the phase of the facility has been retired. The Council may specify different amounts for the bond or letter of credit during construction and during operation of the facility or a phase of the facility. (See Condition 32.)

16 OAR 345-027-0020(16). If the Council finds that the certificate holder has permanently ceased construction or operation of the facility or a phase of the facility without retiring the facility or phase of the facility according to the final retirement plan approved by the Council, as described in OAR 345-027-0110, the Council shall notify the certificate holder and request that the certificate holder submit a proposed final retirement plan to the Department within a reasonable time not to exceed 90 days. If the certificate holder does not submit a proposed final retirement plan by the specified date, the Council may direct the Department to prepare a proposed final retirement plan for the Council's approval. Upon the Council's approval of the final retirement plan, the Council my draw on the bond or letter of credit described in OAR 345-027-0020(8) to restore the site to a useful, non-hazardous condition according to the final retirement plan, in addition to any penalties the Council may impose under OAR Chapter 345, Division 29. After completion of site restoration, the Council shall issue an order to terminate the site certificate if the Council finds that the facility has been retired according to the approved final retirement plan.

32 Before beginning construction of the facility or a phase of the facility, the certificate holder shall submit to the State of Oregon through the Council a bond or letter of credit in the amount described herein naming the State of Oregon, acting by and through the Council, as beneficiary or payee. A bond has already been issued for Phase 1 in the amount of $8.685 million. A separate bond will be issued for Phase 2 in the amount of $9.620 million. ~~The initial bond or letter of credit amount is either $21.511 million~~(3rd Quarter 2017~~0~~ dollars), to be adjusted to the date of issuance as described in (b), or the amount determined as described in (a). The certificate holder shall adjust the amount of the bond or letter of credit on an annual basis thereafter as described in (b).

(a) The certificate holder may adjust the amount of the bond or letter of credit based on the final design configuration of the facility and turbine types selected by applying the unit costs and general costs illustrated in Table 2 in the Final Order on the Application and calculating the financial assurance amount as described in that order, adjusted to the date of issuance as described in (b) and subject to approval by the Department. Certificate holder may adjust the amount of the bond or letter of credit under (a) if opting to construct only a phase of the facility.

(b) The certificate holder shall adjust the amount of the bond or letter of credit, using the following calculation and subject to approval by the Department:

(i) Adjust the Subtotal component of the bond or letter of credit amount (expressed in mid-2004 dollars) to present value, using the U.S. Gross Domestic Product Implicit Price Deflator, Chain-Weight, as published in the Oregon Department of Administrative Services' "Oregon Economic and Revenue Forecast" or by any successor agency (the "Index) and using the average of the 2nd Quarter and 3rd Quarter 2004 index values (to represent mid-2004 dollars) and the quarterly index value for the date of issuance of the new bond or letter

of credit. If at any time the Index is no longer published, the Council shall select a comparable calculation to adjust mid-2004 dollars to present value.

(ii) Add 1 percent of the adjusted Subtotal (i) for the adjusted performance bond amount to determine the adjusted Gross Cost.

(iii) Add 10 percent of the adjusted Gross Cost (ii) for the adjusted administration and project management costs and 10 percent of the adjusted Gross Cost (ii) for the adjusted future developments contingency.

(iv) Add the adjusted Gross Cost (ii) to the sum of the percentages (iii) and round the resulting total to the nearest $1,000 to determine the adjusted financial assurance amount.

(c) The certificate holder shall use a form of bond or letter of credit approved by the Council.

(d) The certificate holder shall use an issuer of the bond or letter of credit approved by the Council.

(e) The certificate holder shall describe the status of the bond or letter of credit in the annual report submitted to the Council under Condition 21.

(f) The bond or letter of credit shall not be subject to revocation or reduction before retirement to the facility site.

W.4 INFORMATION ABOUT SITE RETIREMENT AND RESTORATION

OAR 345-021-0010(1)(w) *Information about site restoration, providing evidence to support a finding by the Council as required by OAR 345-022-0050(1). The applicant shall include:*

W.4.1 Estimated Useful Life

OAR 345-021-0010(1)(w)(A) *The estimated useful life of the proposed facility.*

Response: For financial evaluation and contractual purposes, the Facility is assumed to have a useful life of 40 years, which is longer than the useful life described in the 2010 Final Order on the Application (i.e., 30 years). Facility components will be designed assuming a 40-year useful life but may be updated or "repowered" before the end of this period. Based on today's market for renewable power, and consistent with the assumptions for the approved Facility, it is likely that the Facility will be upgraded with more efficient equipment and, therefore, could have a useful life for much longer than 40 years. Substantial changes to the Facility associated with repowering may be approved by the Council through the procedures outlined in OAR 345-022-0050 and 345-027-0060.

W.4.2 Retirement and Restoration Actions

OAR 345-021-0010(1)(w)(B) *Specific actions and tasks to restore the site to a useful, non-hazardous condition.*

Response: The proposed modifications under RFA 4 do not alter the specific actions and tasks needed to restore the wind energy components of the site. These actions and tasks are not repeated here. However, the proposed modifications include the addition of two new elements to the Facility. Actions and tasks to restore the solar array and battery storage elements are described below.

W.4.2.1 Solar Array

The solar generation portion of the facility will be constructed out of solar modules, collector cables, transformers, and access roads. Each of the solar modules will be mounted on a steel pole anchored into the ground. Decommissioning efforts will occur in the opposite order of construction. The existing service roads will be used to allow the deconstruction contractor to separate the solar modules from the pole, and directly load the modules into a truck or roll-off container for offsite disposal or recycling. The contractor will then remove the poles from the ground, and recycle them as scrap metal. The transformers will be decommissioned, and disposed of offsite. Underground electrical collector lines will remain if they are deeper than 3 feet below grade. The access roads will be removed, and the entire footprint of the facility will be reseeded to return the solar array area to a useful, nonhazardous condition.

W.4.2.2 Battery Storage System

The primary elements associated with decommissioning the battery storage system will include draining fluids within the batteries, and transporting to an offsite facility for recycling.

If lithium-ion batteries are selected, disposal will be accomplished in the same manner as routine battery replacement. Self-contained battery components will be removed and disposed of or recycled by a qualified vendor. Once the self-contained battery components have been removed, the containers and associated components will be disassembled and transported offsite via truck for disposal or recycling. In both cases, the footprint of the battery storage system will then be regraded and seeded for final stabilization.

W.5 RETIREMENT AND RESTORATION COST ESTIMATE

OAR 345-021-0010(1)(w)(C) *An estimate, in current dollars, of the total and unit costs of restoring the site to a useful, non-hazardous condition*.

Response: Attachment W-1 provides a detailed Facility retirement and restoration cost estimate. Table W-1A presents the cost estimate for the Design Scenario A, which consists of 81 2.5-MW turbines along with 100-MW battery storage. Table W-1B presents the cost estimate for Design Scenario B, which consists of 56 wind turbines with 100-MW battery storage. Table W-1C presents the cost estimate for Design Scenario C, which consists of a combination of wind and solar power generation. The elements included in Design Scenario C are 40 2.5-MW turbines, a 100-MW battery storage system, and a 100-MW solar array.

Note that both battery storage technologies (lithium-ion and redox flow) were considered in developing this analysis. The primary difference between retirement and restoration costs for these two technologies is in handling of the self-contained lithium-ion components as compared to hauling and offsite disposal of the redox fluids. On a per-MW basis, the cost for removing, transporting, and disposing the redox fluids ($3,222 per MW) is higher than the cost of removing the self-contained lithium-ion components ($2,947 per MW). Based on this comparison, only the redox technology is shown in Tables W-1A, W-1B, and W-1C.

The maximum estimated cost for removal of all improvements to retire and restore the Facility to preconstruction condition is $9.620 million in third quarter 2017 dollars (Table W-1C). The decommission estimates for wind facilities were prepared using ODOE 2011 guidelines[4]. ODOE does not have a guidance document for estimating retirement and restoration costs for solar energy or battery storage. For these technologies, unit costs were developed on a per MW basis using standard construction and restoration practices.

[4] ODOE. 2011. *Site Restoration Cost Estimating Guide*.

The original cost estimate for retirement and restoration of the Facility was $21.511 million. The estimate to retire and restore Phase 1 of the Facility, as approved by ODOE, was $8.685 million[5]. The combined estimate to retire and restore Phases 1 and 2 of the Facility, in third quarter 2017 dollars, is $18.305 million.

OAR 345-021-0010(1)(w)(D) *A discussion and justification of the methods and assumptions used to estimate site restoration costs.*

Response: The cost estimate for site retirement and restoration relied on two major assumptions. The primary assumption was to use ODOE guidance to the extent practicable. For example, unit costs previously approved by ODOE for grading, seeding, road removal, and transmission line removal were used for each technology. The second assumption is that components will be recycled to the maximum extent possible. Several components will have significant scrap or resale value, although the cost saving was not used in the estimates. This assumption was used in estimating costs to remove the solar panels and load directly into containers to prevent damage rather than implementing full-scale demolition, which would destroy the panels.

For the solar array and battery storage system, specific unit costs have not been developed or adopted by the ODOE. For this cost estimate, a unit cost was developed on a per MW basis for the major elements of removing each technology. The unit costs take into account the total weight of the equipment, the construction equipment needed (cranes, excavators, and backhoes), the labor required, transportation costs, disposal costs, waste management, and site retirement and restoration costs.

W.6 MONITORING PLAN

OAR 345-021-0010(1)(w)(E) *For facilities that might produce site contamination by hazardous materials, a proposed monitoring plan, such as periodic environmental site assessment and reporting, or an explanation why a monitoring plan is unnecessary.*

Response: The wind and solar generation components are not expected to cause site contamination by hazardous materials, and therefore no monitoring plan is required or proposed. The battery storage system has the potential to cause site contamination, although it is unlikely through proper operation of the system. During decommissioning activities, the site will be inspected for signs of spills, and soil sampling will be performed if evidence of spills is detected. During operation, if a spill of any hazardous material occurs, impacted soil will be removed and soil sampling will be conducted at the time of removal to verify that residual contamination is below applicable standards.

W.7 REFERENCES

Energy Facility Siting Council (EFSC). 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. September 10.

Energy Facility Siting Council (EFSC). 2013. *Final Order on Request for Contested Case and Amendment #1 of the Site Certificate for the Montague Wind Power Facility*. June 21.

Energy Facility Siting Council (EFSC). 2015. *Final Order on Request for Contested Case and Amendment #2 of the Site Certificate for the Montague Wind Power Facility*. December 4.

Energy Facility Siting Council (EFSC). 2017a. *Third Amended Site Certificate for Montague Wind Power Facility.* July 11.

[5] Cornett, Todd, Oregon Department of Energy. 2017. Letter to Brian Walsh, Montague Wind Energy, LLC, dated September 8.

Energy Facility Siting Council (EFSC). 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility.* July 12.

Attachment W-1
Estimated Retirement and Restoration Cost

Table W-1A

Adjusted Site Retirement and Restoration Cost Estimate (3rd Quarter 2017 Dollars) for Design Scenario A (81 Turbines and 100 MW of Battery Storage)

Montague Wind Power Facility

		Full Buildout	
Cost Estimate Component	**Quantity**	**Unit Cost**	**Extension**
Battery Storage - Zn-Fe Redox Flow technology			
Remove battery equipment (per MW)	100	$2,847	$284,681
Remove Fencing (per MW)	100	$85	$8,514
Remove pad transformer and foundation (per MW)	100	$284	$28,380
Restore module site (per MW)	100	$568	$56,845
Turbines and Towers			
Disconnect electrical and ready for disassembly (per tower)	81	$924	$74,844
Remove turbine blades, hubs, and nacelles (per tower)	81	$4,910	$397,710
Remove turbine towers (per net ton of steel)	17,820	$63	$1,122,660
Foundation and Pad Areas			
Remove pad-mounted transformers and foundations (per tower)	81	$2,199	$178,119
Remove turbine foundations (per cubic yard of concrete)	2,349	$30	$70,470
Restore turbine pads and turnouts (per acre)	2.34	$7,691	$17,963
Met Towers			
Dismantle and dispose of met towers (per tower)	4	$7,833	$31,332
Collector Substations			
Dismantle and dispose of collector substation	1	$123,775	$123,775
Operations and Maintenance Facility(s)			
Dismantle and dispose of O&M Facility(s)	1	$42,222	$42,222
Electrical System			
Remove 230-kV transmission line (per mile)	3.0	$16,808	$50,424
Remove above-ground 34.5-kV collector (per mile)	9.4	$4,671	$43,907
Remove below-ground junction boxes to 4' below grade (each)	18	$1,246	$22,428
Access Roads			
New access road 20-foot road removal, grading, and seeding (per acre)	52	$7,911	$411,372
Improved existing road 14-foot road removal, grading, and seeding (per acre)	11	$7,911	$87,021
Temporary Areas			
Around access roads, turnouts and met towers (per acre)	249	$5,275	$1,313,475
Around transmission lines and crane paths (per acre)	33	$2,618	$86,394
Around turbine pads and disassembly areas (per acre)	294	$2,618	$769,692
General Costs			
Permits, mobilization, engineering, overhead, utility disconnects (unit cost)	1	$418,617	$418,617
Subtotal			**$5,640,845**
Adjust to 3Q2017 dollars			**$7,233,828**
Performance Bond		1%	$72,338
Gross Cost			**$7,306,166**
Administration and Project Management		10%	$730,617
Future Development Contingency		10%	$730,617
Total Site Retirement and Restoration Cost			**$8,767,000**

Table W-1B

Adjusted Site Retirement and Restoration Cost Estimate (3rd Quarter 2017 Dollars) for Design Scenario B (56 Turbines and 100 MW of Battery Storage)

Montague Wind Power Facility

		Full Buildout	
Cost Estimate Component	**Quantity**	**Unit Cost**	**Extension**
Battery Storage - Zn-Fe Redox Flow technology			
Remove battery equipment (per MW)	100	$2,847	$284,681
Remove Fencing (per MW)	100	$85	$8,514
Remove pad transformer and foundation (per MW)	100	$284	$28,380
Restore module site (per MW)	100	$568	$56,844.53
Turbines and Towers			
Disconnect electrical and ready for disassembly (per tower)	56	$924	$51,744
Remove turbine blades, hubs, and nacelles (per tower)	56	$4,910	$274,960
Remove turbine towers (per net ton of steel)	10,080	$63	$635,040
Foundation and Pad Areas			
Remove pad-mounted transformers and foundations (per tower)	56	$2,199	$123,144
Remove turbine foundations (per cubic yard of concrete)	1,624	$30	$48,720
Restore turbine pads and turnouts (per acre)	1.61	$7,691	$12,419
Met Towers			
Dismantle and dispose of met towers (per tower)	4	$7,833	$31,332
Collector Substations			
Dismantle and dispose of collector substation	1	$123,775	$123,775
Operations and Maintenance Facility(s)			
Dismantle and dispose of O&M Facility(s)	1	$42,222	$42,222
Electrical System			
Remove 230-kV transmission line (per mile)	3.0	$16,808	$50,424
Remove above-ground 34.5-kV collector (per mile)	9.4	$4,671	$43,907
Remove below-ground junction boxes to 4' below grade (each)	18	$1,246	$22,428
Access Roads			
20-foot road removal, grading, and seeding (per acre)	49	$7,911	$386,611
Improved existing road 14-foot road removal, grading, and seeding (per acre)	11	$7,911	$87,021
Temporary Areas			
Around access roads, turnouts and met towers (per acre)	252	$5,275	$1,329,300
Around transmission lines and crane paths (per acre)	9.05	$2,618	$23,693
Around turbine pads and disassembly areas (per acre)	225.67	$2,618	$590,804
General Costs			
Permits, mobilization, engineering, overhead, utility disconnects (unit cost)	1	$418,617	$418,617
Subtotal			**$4,674,580**
Adjust to 3Q2017 dollars			**$5,994,689**
Performance Bond		1%	$59,947
Gross Cost			**$6,054,636**
Administration and Project Management		10%	$605,464
Future Development Contingency		10%	$605,464
Total Site Retirement and Restoration Cost			**$7,266,000**

Table W-1C

Adjusted Site Retirement and Restoration Cost Estimate (3rd Quarter 2017 Dollars) for Design Scenario C (40 Turbines, 100 MW of Solar, and 100 MW of Battery Storage)

Montague Wind Power Facility

		Full Buildout	
Cost Estimate Component	**Quantity**	**Unit Cost**	**Extension**
Solar Generation			
Disconnect electrical and ready for disassembly (lump sum)	1	$16,153	$16,153
Remove solar generation equipment (per MW)	100	$2,333	$233,281
Remove steel posts (per MW)	100	$2,062	$206,193
Remove pad transformer and foundation (per MW)	100	$925	$92,477
Restore module site (per MW)	100	$18,135	$1,813,455
Battery Storage - Zn-Fe Redox Flow technology			
Remove battery equipment (per MW)	100	$2,847	$284,681
Remove Fencing (per MW)	100	$85	$8,514
Remove pad transformer and foundation (per MW)	100	$284	$28,380
Restore module site (per MW)	100	$568	$56,844.53
Turbines and Towers			
Disconnect electrical and ready for disassembly (per tower)	40	$924	$36,960
Remove turbine blades, hubs, and nacelles (per tower)	40	$4,910	$196,400
Remove turbine towers (per net ton of steel)	8,800	$63	$554,400
Foundation and Pad Areas			
Remove pad-mounted transformers and foundations (per tower)	40	$2,199	$87,960
Remove turbine foundations (per cubic yard of concrete)	1,160	$30	$34,800
Restore turbine pads and turnouts (per acre)	1.15	$7,691	$8,870
Met Towers			
Dismantle and dispose of met towers (per tower)	3	$7,833	$23,499
Collector Substations			
Dismantle and dispose of collector substation	1	$123,775	$123,775
Operations and Maintenance Facility(s)			
Dismantle and dispose of O&M Facility(s)	1	$42,222	$42,222
Electrical System			
Remove 230-kV transmission line (per mile)	3.0	$16,808	$50,424
Remove above-ground 34.5-kV collector (per mile)	9.7	$4,671	$45,309
Remove below-ground junction boxes to 4' below grade (each)	18	$1,246	$22,428
Access Roads			
20-foot road removal, grading, and seeding (per acre)	41.08	$7,911	$324,984
Improved existing road 14-foot road removal, grading, and seeding (per acre)	11	$7,911	$87,021
Temporary Areas			
Around access roads, turnouts and met towers (per acre)	164.31	$5,275	$866,735
Around transmission lines and crane paths (per acre)	33.11	$2,618	$86,682
Around turbine pads and disassembly areas (per acre)	167.47	$2,618	$438,436
General Costs			
Permits, mobilization, engineering, overhead, utility disconnects (unit cost)	1	$418,617	$418,617
Subtotal			**$6,189,501**
Adjust to 3Q2017 dollars			**$7,937,425**
Performance Bond		1%	$79,374
Gross Cost			**$8,016,800**
Administration and Project Management		10%	$801,680
Future Development Contingency		10%	$801,680
Total Site Retirement and Restoration Cost			**$9,620,000**

EXHIBIT X
NOISE

OAR 345-021-0010(1)(x)

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X.1 INTRODUCTION

The Energy Facility Siting Council (EFSC; Council) previously approved construction of the 404-megawatt (MW) Montague Wind Power Facility (Facility)[1] and found that the Facility complies with the Oregon Department of Environmental Quality (DEQ) noise control standards in OAR 340-035-0035 (DEQ noise regulation). Montague Wind Power Facility, LLC (Montague) is constructing the Facility in two phases. Phase 1 consists of up to 81 wind turbines generating 202 MW of power within the approved site boundary. Montague has already begun construction of Phase 1 under the conditions of the existing Site Certificate. Phase 2 consists of an expanded site boundary, a solar array, and battery storage. The analysis in this exhibit evaluates the existing noise control conditions for Phase 2 as modified by *Request for Amendment No. 4 Project Description and OAR Division 27 Compliance* (referred to herein as RFA 4).

X.2 SUMMARY OF ANALYSIS

The Council previously found in the Final Order on the Application, Final Order on Amendment 1, Final Order on Amendment 2, and Final Order on Amendment 3, that Montague's proposed construction and operations could comply with the DEQ noise regulation. The proposed construction and operational modifications in RFA 4 do not alter Montague's ability to comply with the DEQ noise regulation, per the following summary:

- **Site Boundary Expansion**: As a result of the site boundary expansion, turbines and other Facility components will be relocated to new areas to the south and west of the approved site boundary. The proposed construction equipment and activities are unchanged from those previously analyzed and approved. Therefore, the construction noise analysis and conclusions regarding construction noise compliance remain the same.

  For operations, Montague proposes to use a turbine that falls within the range of turbines previously approved by the Council; therefore, the previously approved turbines relocated into the expanded site boundary will not exceed the sound power level evaluated by the Council in the Final Order on the Application[2] and approved in the Final Order on the Application[3] and the Third Amended Site Certificate[4]. Although the previously approved turbines will be relocated into new areas within the expanded site boundary, Montague maintains several options to demonstrate that Phase 2 will still comply with the DEQ noise regulation, including (1) eliminating or moving turbines to other locations within the approved micrositing corridor, (2) altering equipment selection, (3) documenting that the hourly L_{50} noise levels (i.e., hourly statistical noise levels exceeded 50 percent of the time) caused by the Facility at any noise-sensitive property would not cause the hourly L_{50} to increase by more than 10 decibels on an A-weighted scale (dBA), and (4) obtaining a legally effective noise easement or real covenant.

- **Addition of Solar Array and Battery Storage**: The solar array and battery storage are new Facility components not previously analyzed or considered by EFSC. Under the DEQ noise regulation in OAR 340-035-0035(1)(b)(A), a wind energy facility is defined to include "wind turbines of any size and any associated equipment or machinery." Because the solar array and battery storage are new components associated with the Facility (a wind energy

[1] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility*. July 11.

[2] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. pp. 130-131. September 10.

[3] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 134. September 10.

[4] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility*. p. 54. July 11.

facility), Montague analyzes Phase 2 noise compliance under subpart (1)(B)(iii) of the DEQ noise regulation, the same as it did for the original Facility layout and for Phase 1. Compared to sound levels generated from wind turbines, the sound generated from the solar array and battery storage are comparable or less. In addition, distance attenuation to nonparticipating residences provides a reduction of over 50 decibels given the distance from the residences to the solar array and battery storage. Furthermore, these are ground-based facilities that enable Montague to implement a range of potential noise control options into the final design, if needed. Options include adding acoustical barrier walls, secondary enclosures, lagging, silencing, or acoustically designed buildings, all of which are available to Montague to demonstrate compliance for the modifications proposed under RFA 4.

X.3 CONDITION COMPLIANCE

The Third Amended Site Certificate imposes three Noise Control conditions: 106, 107, and 108[5]. The modifications proposed under RFA 4 do not affect Montague's ability to comply with the existing Site Certificate conditions and no new conditions are needed to manage potential noise impacts. However, Montague proposes modifications to Condition 107 to account for the changes proposed in RFA 4. The modifications are presented with underline and strikeout below.

107 Before beginning construction, the certificate holder shall provide to the Department:

(a) Information that identifies the final design locations of the wind energy facility (all turbines, solar array, and battery storage equipment) to be built ~~at the facility~~.

(b) The maximum sound power level for the substation transformers and the maximum sound power level and octave band data for the turbines selected for the facility based on manufacturers' warranties or confirmed by other means acceptable to the Department.

(c) The results of noise analysis of the facility to be built according to the final design performed in a manner consistent with the requirements of OAR 340-035-0035(1)(b)(B)(iii) (IV) and (VI) demonstrating to the satisfaction of the noise generated by the facility (including the noise from turbines and substation transformers) would meet the ambient degradation test and maximum allowable test at the appropriate measurement point for all potentially-affected noise sensitive properties.

(d) For each noise-sensitive property where the certificate holder relies on a noise waiver to demonstrate compliance in accordance with OAR 340-035-0035(1)(b)(B)(iii)(III), a copy of the a legally effective easement or real covenant pursuant to which the owner of the property authorizes the certificate holder's operation of the facility to increase ambient statistical noise levels L10 and L50 by more than 10 dBA at the appropriate measurement point. The legally-effective easement or real covenant must: include a legal description of the burdened property (the noise sensitive property); be recorded in the real property records of the county; expressly benefit the certificate holder; expressly run with the land and bind all future owners, lessees or holders of any interest in the burdened property; and not be subject to revocation without the certificate holder's written approval.

[5] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility*. pp. 27-28. July 11.

X.4 BACKGROUND INFORMATION

It is useful to understand how noise is defined and measured. Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. There are several different ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. Table X-1 summarizes the technical noise terms used in this exhibit.

Table X-1. Definitions of Acoustical Terms

Term	Definitions
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the measured pressure to the reference pressure, which is 20 micropascals.
Decibel at an A-weighted sound pressure level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Statistical noise level (L_n)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (for example, L_{50} is the level exceeded 50 percent of the time).

Table X-2 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

Table X-2. Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Noise Environment	Subjective Impression
Civil defense siren (100 feet)	130		
Jet takeoff (200 feet)	120		Pain threshold
Music performance (150 feet)	110	Rock music concert	
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)	90	Boiler room	
Freight cars (50 feet)	85	Printing press plant	
Pneumatic drill (50 feet)	80	In kitchen with garbage disposal running	
Freeway (100 feet)	70		Moderately loud
Vacuum cleaner (10 feet)	60	Data processing center	
Department Store; Light traffic (100 feet)	50	Private business office	
Large transformer (200 feet)	40		Quiet
Soft whisper (5 feet)	30	Quiet bedroom	
	20	Recording studio	
	10		Hearing threshold

An understanding of the difference between a sound *pressure* level (or noise level) and a sound *power* level also can be useful. A sound power level (commonly abbreviated as PW_L or L_w) is analogous to the wattage of a light bulb; it is a measure of the acoustical energy emitted by the source and is, therefore, independent of distance. A sound pressure level is analogous to the brightness or intensity of light experienced at a specific distance from a source and is measured directly with a sound-level meter. Sound pressure levels always should be specified with a location or distance from the noise source.

Sound power level data are used in acoustic models to predict sound pressure levels. This is because sound power levels take into account the size of the acoustical source and account for the total acoustical energy emitted by the source.

It is also important to note that decibels cannot be directly added arithmetically, that is, 50 dBA + 50 dBA does not equal 100 dBA. When two sources of equal level are added together the result will always be 3 dB greater; that is 50 dBA + 50 dBA = 53 dBA and 70 dBA + 70 dBA = 73 dBA. If the difference between the two sources is 10 dBA, the level (when rounded to the nearest whole decibel) will not increase; that is 40 dBA + 50 dBA=50 dBA and 60 dBA + 70 dBA=70 dBA.

The decrease in sound level caused by distance from any single sound source normally follows the inverse square law; that is, the sound pressure level changes in inverse proportion to the square of the distance from the sound source. In a large open area with no obstructive or reflective surfaces, it is a general rule that at distances greater than approximately the largest dimension of the noise-emitting surface, the sound pressure level from a single source of sound drops off at a rate of 6 dB with each doubling of the distance from the source. Sound energy is absorbed in the air as a function of temperature, humidity, and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. The drop-off rate will also vary based on terrain conditions and the presence of obstructions in the sound's propagation path. These factors are considered in the development of the acoustical model.

X.5 SITE BOUNDARY AND ANALYSIS AREA

Figure X-1 depicts the site boundary and the area within 2 miles of turbine, solar array, and battery storage locations under the three design scenarios described in RFA 4. Figure X-1 also shows the locations of noise-sensitive receptors (residences) within 2 miles of planned Phase 1 and Phase 2 turbine locations.

X.6 PRELIMINARY ANALYSIS

OAR 345-021-0010(1)(x)*: Information about noise generated by construction and operation of the proposed facility, providing evidence to support a finding by the Council that the proposed facility complies with the Oregon Department of Environmental Quality's noise control standards in OAR 340-035-0035.*

OAR 340-035-0035(5)(g) specifically exempts construction activity and Site Certificate Condition 106 establishes noise minimization measures and a complaint response system. The proposed construction equipment and activities are unchanged from those previously analyzed and approved. Given the exemption and the requirements established in the existing pre-construction conditions, Montague maintains the ability to demonstrate compliance with DEQ noise regulation for construction.

Montague needs to demonstrate that Phase 2 will satisfy the DEQ noise regulation. The DEQ noise regulation establishes the following:

- OAR 340-035-0035(1)(b)(B)(iii)(I) establishes the option for a proposed wind energy facility to assume a background L_{50} ambient noise level of 26 dBA.
- OAR 340-035-0035(1)(b)(B)(iii)(IV) requires a proposed wind energy facility to satisfy the ambient noise standard, where a landowner has not waived the standard. Predicted noise levels are to be compared to the assumed ambient noise level of 26 dBA, or to the actual ambient background L_{10} and L_{50} noise levels, if measured. The Facility complies with the ambient background standard if this comparison shows that the increase in noise is not more than 10 dBA.
- OAR 340-035-0035(1)(b)(B)(iii)(VI) requires that the Facility predict compliance with the "Table 8" limits set forth in the regulations (the lowest of which is 50 dBA).
- OAR 340-035-0035(5)(g) specifically exempts construction activity. Therefore, by regulatory definition, construction noise does not need to be included in the analysis.

In summary, the DEQ noise regulation establishes the following:

- 36 dBA to be complied with at residences that have not waived the ambient standard and a 26 dBA background was assumed
- 50 dBA to be complied with at all residences, including those that have waived the standard

EFSC previously imposed Site Certificate Condition 107, which requires that the final design locations, sound power levels, noise analysis, and noise easements be provided to the Oregon Department of Energy (ODOE) to demonstrate that the Facility complies with DEQ's noise control standards in OAR 340-035-0035. If noise easements are not obtained, additional noise minimization measures will be implemented to achieve compliance, such as relocation of turbines farther away from noise-sensitive properties, use of low noise blades, or operation of the turbine in a reduced power function.

The turbines that will be used for Phase 2 are consistent with what has already been reviewed and approved by the Council[6]. The turbines under consideration for Phase 2 have a sound power level that is less than or equal to the previously analyzed maximum of 112 dBA (110 + 2 dBA). Condition 107 requires that Montague demonstrate in advance of construction that the Facility will comply with the DEQ noise regulation based on evaluation of the final design. Because of the phased construction, Montague will complete two Condition 107 noise analyses that will (1) consider the final design of Phase 1, and (2) evaluate the total Facility, adding Phase 2 to Phase 1. Consequently, EFSC may rely on its prior findings and Condition 107 to ensure that the relocated turbines comply with the DEQ noise regulation.

Montague is considering using solar and battery equipment that would have a sound pressure level of (1) less than 66 dBA at 33 feet from the solar inverters when at full load and less than 55 dBA when at half-load, and (2) less than 78 dBA at 6 feet from the battery enclosures and 79 dBA at 6 feet from the battery inverters. The closest nonparticipating residence is over 2.5 miles from the proposed battery storage area and over 2 miles from the proposed solar inverters. Distance attenuation alone to the nonparticipants provides a reduction of 50 decibels. The closest participating residence is over 700 feet away from the proposed battery storage

[6] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility*. July 11; EFSC. 2010. *Final Order on the Application for a Site Certificate for the Montague Wind Power Facility*, pp. 130-131. September 10.

area and over 2,500 feet from the proposed solar inverters. Distance attenuation from the battery storage area provides over a 28-decibel reduction while over a 40-decibel reduction is achieved from the solar inverters. Furthermore, these are ground-based facilities that enable Montague to implement a range of potential noise control options into the final design, if needed. These options include adding acoustical barrier walls, secondary enclosures, lagging, silencing, or acoustically designed buildings, all of which are available to Montague to demonstrate compliance for the modifications proposed under RFA 4.

Based on the anticipated sound power levels and the distances to noise-sensitive properties, the above preliminary analysis demonstrates that Phase 2 can comply with the DEQ noise regulation. Once Montague selects the equipment and finalizes the Phase 2 layout, Montague will submit to ODOE the International Electrotechnical Commission 61400-11 or other appropriate acoustical test reports or specifications for the selected wind turbines, solar array, and battery storage, along with the Phase 2 preconstruction acoustical analysis (under Condition 107). At that time, Montague will also provide ODOE with evidence that Montague has secured any necessary noise easements necessary for noise-sensitive receptors. On this basis, EFSC may find that the Facility, as modified by RFA 4, will still comply with the DEQ noise regulation.

X.7 PROPOSED MITIGATION AND MONITORING MEASURES

Montague maintains that no new mitigation or monitoring measures are required for Phase 2 compliance with the DEQ noise regulation. The existing Site Certificate conditions, specifically Conditions 106, 107 (with proposed modification), and 108, are sufficient to ensure that Montague designs, constructs, and operates the Facility, as modified by RFA 4, in compliance with the DEQ noise regulation.

X.8 REFERENCES

Energy Facility Siting Council (EFSC). 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. September 10.

Energy Facility Siting Council (EFSC). 2013. *Final Order on Request for Contested Case and Amendment #1 of the Site Certificate for the Montague Wind Power Facility*. June 21.

Energy Facility Siting Council (EFSC). 2015. *Final Order on Request for Contested Case and Amendment #2 of the Site Certificate for the Montague Wind Power Facility*. December 4.

Energy Facility Siting Council (EFSC). 2017a. *Third Amended Site Certificate for Montague Wind Power Facility.* July 11.

Energy Facility Siting Council (EFSC). 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility.* July 12.

Figure

Figure X-1
Noise-sensitive Receptors within 2 Miles of Planned Turbine Locations
Montague Wind Power Facility

Legend

- Approved Site Boundary
- Approved Micrositing Corridor
- Proposed Expanded Site Boundary
- Proposed Expanded Micrositing Corridor
- Noise-sensitive Receptor
- 2-mile Buffer of Planned Turbine Locations

Basemap Features

- Interstate/Highway
- Public Road
- Other Road
- Major Railroad Line

N
W E
S

0 0.625 1.25 2.5
Miles

AVANGRID RENEWABLES

ch2m.

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Basemap Source: ESRI World Terrain Base

EXHIBIT Y
CARBON DIOXIDE EMISSIONS

OAR 345-021-0010(1)(y)

Exhibit Y requires information about a base load gas plant, a non-base load power plant, or a nongenerating energy facility that emits carbon dioxide. Montague Wind Power Facility, LLC, is not proposing to construct any facilities that emit carbon dioxide; therefore, Exhibit Y is not required for this amendment request.

EXHIBIT Z
EVAPORATIVE COOLING TOWERS

OAR 345-021-0010(1)(z)

Exhibit Z requires information about evaporative cooling towers and cooling tower plumes. Montague Wind Power Facility, LLC, is not proposing to construct an evaporative cooling tower; therefore, Exhibit Z is not required for this amendment request.

EXHIBIT AA
ELECTRIC TRANSMISSION LINE

OAR 345-021-0010(1)(aa)
OAR 345-024-0090(1),(2)

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TABLES

FIGURES

AA.1 INTRODUCTION

The Energy Facility Siting Council (EFSC; Council) previously approved construction of the 404-megawatt (MW) Montague Wind Power Facility (Facility)[1] and found that the Facility complies with the electric transmission line standard required in OAR 345-024-0090(1)(2). Montague Wind Power Facility, LLC (Montague) is constructing the Facility in two phases. Phase 1 consists of up to 81 wind turbines generating 202 MW of power within the approved boundary. Montague has already begun construction of Phase 1 under the conditions of the existing Site Certificate. Phase 2 consists of an expanded site boundary, solar array, and battery storage. The analysis in this exhibit focuses on Phase 2 and the three design scenarios described in *Request for Amendment No. 4 Project Description and OAR Division 27 Compliance* (referred to herein as RFA 4).

AA.2 SUMMARY OF ANALYSIS RESULTS

RFA 4 consists of an expanded site boundary, solar array, and battery storage. This exhibit presents an analysis of potential electromagnetic impacts resulting from Phase 2 construction and operation. The analysis results are summarized as follows:

- **Site Boundary Expansion**: Montague plans to relocate a segment of the previously approved 230-kilovolt (kV) transmission line into the expanded site boundary to connect the Phase 2 collector substation to the Phase 1 substation. The transmission line route and collector lines will cross areas that were not previously evaluated. However, the total length of transmission and collector lines for the Facility as modified by RFA 4 will not be greater than the total length of transmission and collector lines described for the approved Facility. The total length of aboveground 34.5-kV collector lines will not exceed 27 miles (combined length of Phase 1 and Phase 2), as required by Site Certificate Condition 88.

  The segment of 230-kV transmission line associated with Phase 2 may have a different conductor configuration from that assessed for the approved Facility, but the analysis demonstrates that such a change will not result in alternating current electric fields that exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public.

  The 34.5-kV collector system interconnecting wind turbines will be designed, constructed, and operated in a similar manner to that evaluated for the approved Facility. Updated analyses show that electric fields will not exceed the 9-kV-per-meter standard.

- **Addition of Solar Array**: The solar array includes the installation of low voltage cabling interconnecting the modules to collect the direct current generated by the array. Such cabling is not considered a transmission line for the purpose of providing information for this exhibit. The solar array, therefore, does not introduce an additional "transmission line" component to the Facility.

- **Addition of Battery Storage**: Addition of battery storage will not result in construction of any additional transmission lines or collector lines. Low-voltage electrical cabling will be used to interconnect battery storage with the adjacent Phase 2 collector substation. Such cabling is not considered a transmission line for the purpose of providing information for this exhibit. The battery storage, therefore, does not introduce an additional "transmission line" component to the Facility.

[1] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility.* July 11.

AA.3 CONDITION COMPLIANCE

The Third Amended Site Certificate imposes three conditions (88, 89, and 90) designed to reduce or avoid potential human exposure to electromagnetic fields. The conditions include installation of 34.5-kV lines underground where possible, location setbacks, and design standards, and consultation with the Oregon Public Utilities Commission during design. The modifications proposed under RFA 4 do not affect Montague's ability to comply with the existing Site Certificate conditions and no new conditions are needed to manage potential impacts resulting from installation of electric transmission lines.

AA.4 ELECTRIC AND MAGNETIC FIELDS

OAR 345-021-0010(1)(aa) *If the proposed energy facility is a transmission line or has, as a related or supporting facility, a transmission line of any size:*

OAR 345-021-0010(1)(aa)(A) *Information about the expected electric and magnetic fields (EMFs), including:*

AA.4.1 Distance from Transmission Line Centerline to Edge of Right-of-Way

(i) The distance in feet from the proposed center line of each proposed transmission line to the edge of the right-of-way.

Response: An approximately 3.0-mile-long segment of 230-kV overhead transmission line will run from the Phase 2 collector substation to the Phase 1 substation. The proposed transmission line corridor will begin at the Phase 2 collector substation located at the intersection of Oregon Highway 19 (OR 19) and Bottemiller Lane, cross a portion of public right-of-way associated with OR 19 north of the intersection of OR 19 and Bottemiller Road, and then traverse agricultural lands towards the northeast where it will terminate at the existing Phase 1 substation. Montague has chosen to use corridors made available in its private land leases and easements rather than use public rights-of-way because corridors that follow the existing public rights-of-way would pass too close to existing residential and agricultural structures. The transmission line corridor is 0.5 mile wide. The transmission line could be constructed anywhere within this corridor. Accordingly, for the overhead 230-kV transmission line, the distance between the centerline and the edge of the right-of-way is undefined.

The 34.5-kV collector lines will be installed along and between turbine strings constructed as part of Phase 2. The majority of the collector lines will be buried at least 3 feet below the ground surface. However, for long runs or where site-specific considerations require, the collection system may be routed aboveground using overhead structures. In many cases, using aboveground structures allows the collector cables to "span" canyons, streams, or other sensitive resources. Use of overhead collection in these cases avoids the need for trenching and thus reduces environmental impacts. The overhead support structures will generally be about 80 to 100 feet tall, depending on terrain. For Phase 2, up to approximately 22.5 miles of collector cables will be placed underground, and up to 9.4 miles will run on overhead support structures.

For all of the 34.5-kV collector cables, whether above or below ground, the distance between the centerline and the edge of the right-of-way is undefined. The collector system lines and any overhead collector cables will occupy private land pursuant to leases or easements with landowners. The leases will authorize placement of the cables and restrict inconsistent or

competing uses of the property, but will not contain any defined right-of-way with a fixed width. Therefore, no new right-of-way will be required and no existing right-of-way will be widened.

AA.4.2 Types of Occupied Structures within 200 Feet of Proposed Transmission Line Centerline

(ii) The type of each occupied structure, including but not limited to residences, commercial establishments, industrial facilities, schools, daycare centers and hospitals, within 200 feet on each side of the proposed center line of each proposed transmission line.

(iii) The approximate distance in feet from the proposed center line to each structure identified in (A).

Response: No known occupied buildings, residences, or other sensitive receptors are within 200 feet on either side of the centerline of the 3.0 miles of 230-kV overhead transmission line. Therefore, the potential for human exposure to electric and magnetic fields (EMFs) from the 230-kV transmission line is negligible.

Two residences will be within 200 feet of the overhead 34.5-kV collector system alignment. Residence R282 will be approximately 120 feet from an overhead collector line, and R290 will be approximately 105 feet from an overhead collector line. Figure X-1 in Exhibit X shows residence ("receptor") locations.

However, as discussed in Section AA.5, the maximum electric field modeled based on the configuration analyzed is less than one-third of the 9-kV-per-meter standard set forth in OAR 345-024-0090(1). Therefore, the potential for human exposure to EMFs from these overhead collector lines is minimized.

AA.4.3 Graphs of Electric and Magnetic Field Levels

(iv) At representative locations along each proposed transmission line, a graph of the predicted electric and magnetic fields levels from the proposed center line to 200 feet on each side of the proposed center line.

Response: Transmission and overhead collector structures will be as shown on Figures AA-1 through AA-4. Line loading for the 3.0-mile 230-kV transmission line, and conductor size for the 230-kV transmission line constructed as part of Phases 1 and 2 are revised as described subsequently, and the resulting EMF calculations are presented. The 34.5-kV electrical collector lines to be used for the solar array or the wind turbine strings have the same configuration as those described for the approved Facility and previously considered by the Council. See Figures AA-1 through AA-4.

AA.4.3.1 Line Loads for Electric and Magnetic Fields Calculation

The peak line loading value assumed for the overhead 230-kV transmission line connecting the Phase 2 collector substation to the Phase 1 substation is 202 MW. For the approved Facility, the 230-kV transmission line between the two Facility substations was originally planned to handle 120 MW. This change increases the peak amperage from 300 to 556 amperes per phase conductor. Although this is an increase for this segment of transmission line, it is less than the amperage carried by the transmission line from the Phase 1 substation to the interconnection with the Bonneville Power Administration (BPA) at the Slatt Substation, which is unchanged

from the approved Facility at 404 MW and 1,014 amperes. EMF analyses were performed at 1,014 amperes, which represents the worst case.

The conductor size and type for the 230-kV transmission line will be 1272 thousand circular mils (kcmil) Aluminum Conductor Steel Reinforced (ACSR) "Bittern" instead of 954 kcmil ACSR "Rail," as was previously analyzed for the approved Facility. Diameters for these conductors are 1.345 and 1.165 inches, respectively.

The maximum amperage, conductor size, and type for the 34.5-kV overhead collectors are unchanged. Analyses were reconducted in order to update the effects of slight structure changes.

AA.4.3.2 Calculation Methods

The software tool program used for the analyses, called "Corona and Field Effects Program (Version 3.1)," was developed by BPA and is based on the methods and equations of the *Transmission Line Reference Book* (Electric Power Research Institute [EPRI], 1985, Third Edition). This is an update of the program used for the 34.5-kV analyses on which the Council's 2010 findings were based[2], and is the calculation engine for the ENVIRO program used as the basis for the Council's 2010 findings for the 230-kV analyses.[3,4] Constants and parameters used for the analysis considered by the Council for its prior findings were verified and retained for this analysis, with the exception of the amperage change and conductor diameter change described previously and the structure updates shown on Figures AA-1 through AA-4.

AA.4.3.3 Results of 34.5-kV Overhead Electric and Magnetic Field Calculations

Table AA-1 shows the results of 34.5-kV overhead EMF calculations.

Table AA-1. Calculated Maximum Magnetic and Electric Field Values for 34.5-kV Collector Circuits

Support Structure	Figure	Voltage	Magnetic Field (mGauss)			Electric Field (kV/m)		
			Left Side (200')	Centerline	Right Side (200')	Left Side (200')	Centerline	Right Side (200')
Monopole Single-Circuit	AA-5 AA-6	34.5-kV Peak Load	1.62	105	1.77	0.003	0.333	0.004
Monopole Double-Circuit	AA-7 AA-8	(1000 Amps per Circuit)	2.88	125	2.66	0.002	0.240	0.004

See Figures AA-5 through AA-8.

AA.4.3.4 Results of 230-kV Overhead Electric and Magnetic Field Calculations

Table AA-2 shows the results of 230-kV overhead EMF calculations.

[2] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* pp. 86-88. September 10.

[3] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 87. September 10.

[4] EPRI's "ENVIRO" software program puts a graphical user interface to the Corona and Field Effects Program, and adds other functionality.

Table AA-2. Calculated Maximum Magnetic and Electric Field Values for 230-kV Circuit

Support Structure	Figure	Voltage	Magnetic Field (mGauss)			Electric Field (kV/m)		
			Left Side (200')	Centerline	Right Side (200')	Left Side (200')	Centerline	Right Side (200')
Monopole	AA-9 AA-10	230-kV Single-Circuit	4.60	165	4.65	0.064	1.87	0.037
H-Frame	AA-11 AA-12	Peak Load (1,014 Amps)	5.72	207	5.72	0.036	1.35	0.036

See Figures AA-9 through AA-12.

AA.4.4 Measures Proposed to Reduce Electric and Magnetic Field Levels

(v) Any measures the applicant proposes to reduce electric or magnetic field levels.

Response: For the 230-kV overhead single-circuit lines, the lines will be located no closer than 200 feet from occupied buildings (Site Certificate Condition 89). In addition, the EMFs will be reduced by the triangular conductor configuration for the monopole design.

AA.4.5 Assumptions and Methods Used in Electric and Magnetic Field Analyses

(vi) The assumptions and methods used in the electric and magnetic field analysis, including the current in amperes on each proposed transmission line.

Response: Attachments AA-1 through AA-4 show data inputs and assumptions used in the EMF analysis conducted using the BPA Corona and Field Effects (Version 3.1) program. These analyses were conducted similar to the original analyses using the peak electrical currents expected on the lines that produce the highest EMFs, so the analyses are conservative.

AA.4.6 Monitoring Program

(vii) The applicant's proposed monitoring program, if any, for actual electric and magnetic field levels.

Response: As described herein, Montague contracted HDR to analyze EMF levels by considering the peak electrical currents expected on the lines. These analyses were conducted using the peak electrical currents expected on the lines that produce the highest magnetic fields, so the analyses are conservative.

AA.5 ALTERNATING CURRENT ELECTRIC FIELDS

OAR 345-024-0090 *To issue a site certificate for a facility that includes any transmission line under Council jurisdiction, the Council must find that the applicant:*

(1) Can design, construct and operate the proposed transmission line so that alternating current electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public;

Response: Because of minor structure revisions and the conductor-size revision for the 230-kV transmission line segments, Montague reanalyzed the EMFs for those facilities.

The electric fields on the corridor of the proposed 34.5-kV transmission lines do not exceed 9 kV per meter (see Figures AA-6 and AA-8). The electric fields on the corridor of the proposed 230-kV transmission lines similarly do not exceed 9 kV per meter (see Figures AA-10 and AA-12). These figures demonstrate that, for the proposed overhead transmission and collector lines, the maximum electric field modeled is about 2.7 kV per meter, which is less than the 9-kV-per-meter standard set forth in OAR 345-024-0090(1).

AA.6 INDUCED VOLTAGE AND CURRENT

OAR 345-024-0090 *To issue a site certificate for a facility that includes any transmission line under Council jurisdiction, the Council must find that the applicant:*

(2) Can design, construct and operate the proposed transmission line so that induced currents resulting from the transmission line and related or supporting facilities will be as low as reasonably achievable.

Response: The analysis of induced voltage and current on which the Council's 2010 findings were based[5] is not modified as a result of RFA 4, and continues to appropriately conclude that the induced currents will be as low as reasonably achievable.

AA.7 RADIO INTERFERENCE

OAR 345-021-0010(1)(aa)(B) *An evaluation of alternate methods and costs of reducing radio interference likely to be caused by the transmission line in the primary reception area near interstate, U.S. and state highways.*

Response: The analysis of radio interference on which the Council's 2010 findings were based[6] is not modified as a result of RFA 4. Nevertheless, the proposed change to use a larger-diameter conductor for the 3.0 miles of 230-kV transmission line constructed as part of Phase 2 will result in lower radio-frequency interference under similar conditions because the increased surface area tends to reduce the corona effect. Therefore, alternate means to reduce radio interference are not warranted as a result of RFA 4 and the Council may continue to find that the proposed facility complies with the siting standards for electric transmission lines.[7,8]

AA.8 CONCLUSION

Based on the above information and analyses previously considered by the Council, the Council may rely on its earlier findings to conclude that the standards contained in OAR 345-024-0090 have been satisfied.

AA.9 REFERENCES

Bonneville Power Administration (BPA). "Corona and Field Effects Program (Version 3.1)" software program.

[5] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* pp. 86-88, 139-141. September 10.

[6] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* pp. 86-88, 139-141. September 10.

[7] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility.* p. 88. September 10.

[8] EFSC. 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility.* p. 52. July 12.

Electric Power Research Institute [EPRI]. 1985. *Transmission Line Reference Book*. Third Edition.

Electric Power Research Institute [EPRI]. "ENVIRO" software program.

Energy Facility Siting Council (EFSC). 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. September 10.

Energy Facility Siting Council (EFSC). 2017a. *Third Amended Site Certificate for Montague Wind Power Facility.* July 11.

Energy Facility Siting Council (EFSC). 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility.* July 12.

Figures

Figure AA-1, 34.5-kV Single-Circuit Overhead Collector

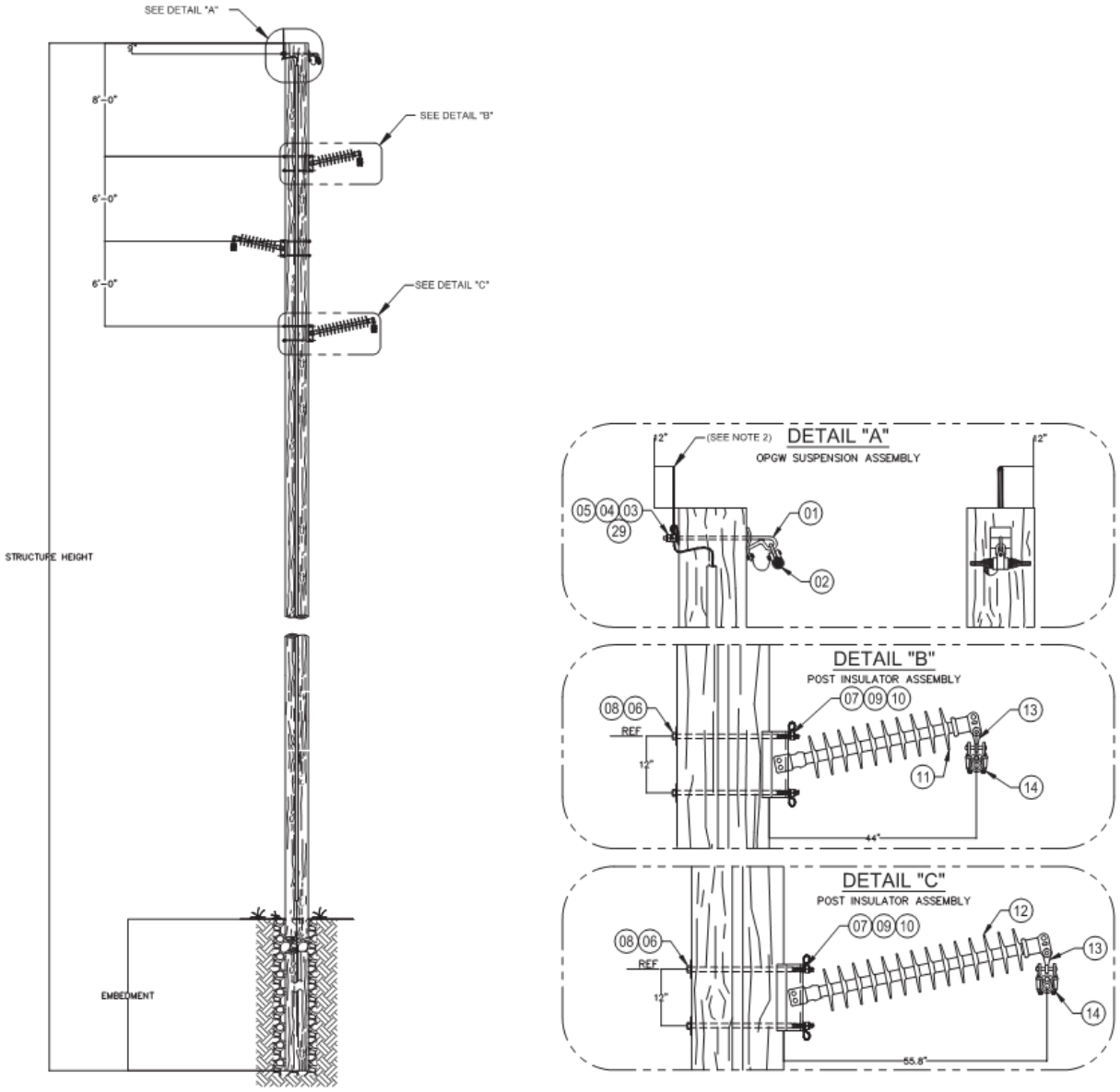


Figure AA-2, 34.5-kV Double-Circuit Overhead Collector

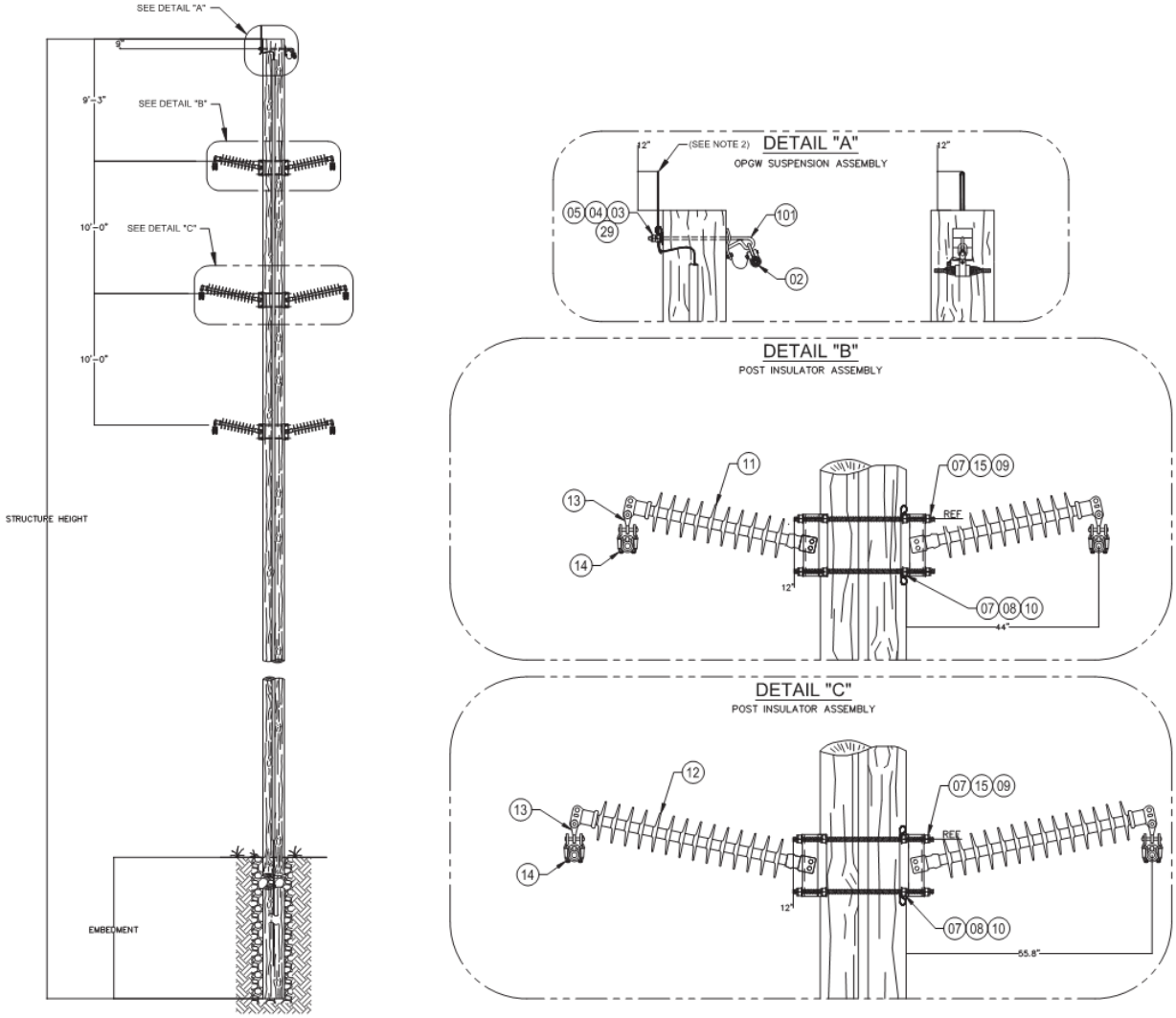


Figure AA-3, 230-kV Monopole Transmission Structure

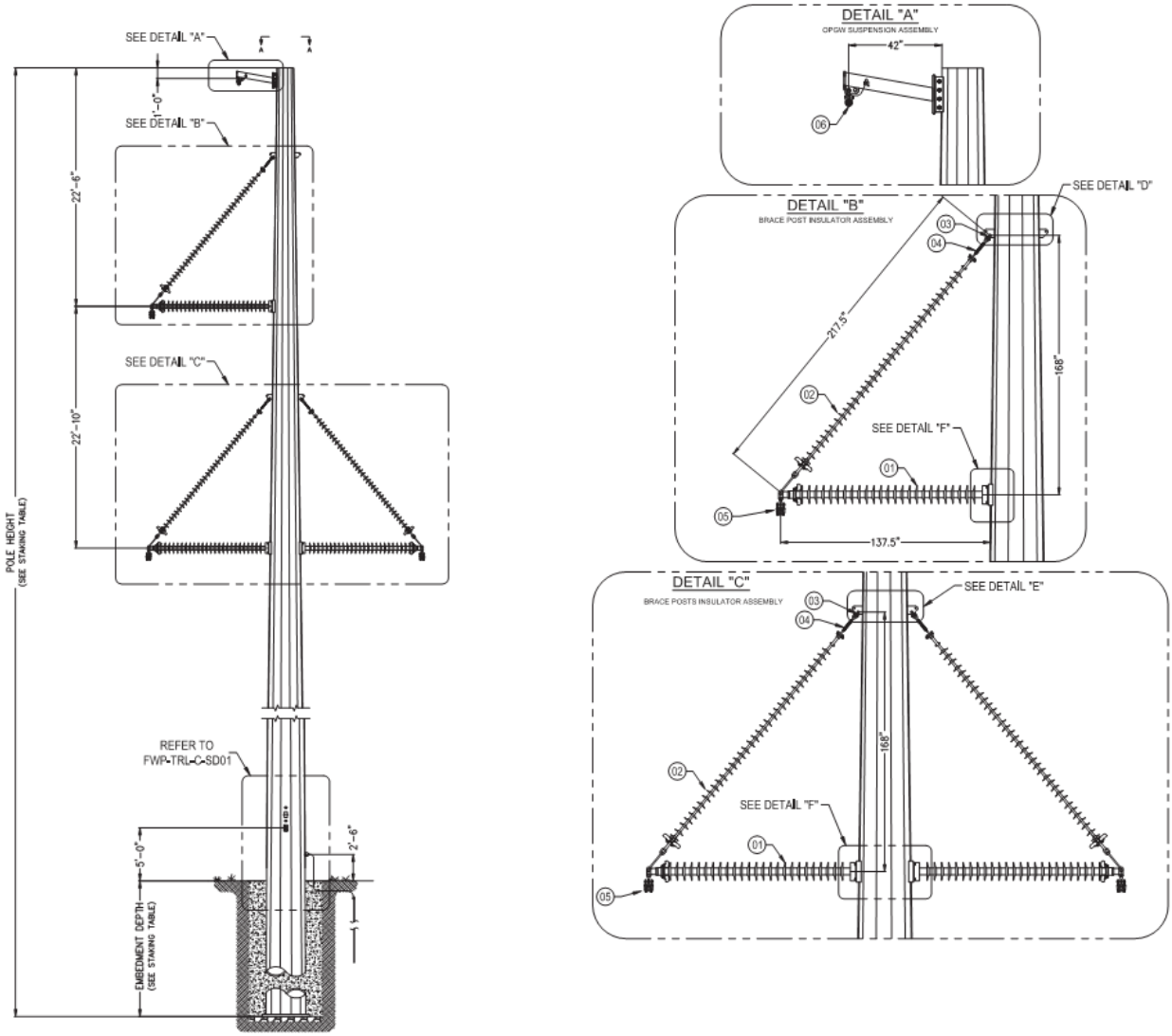


Figure AA-4, 230-kV H-Frame Transmission Structure

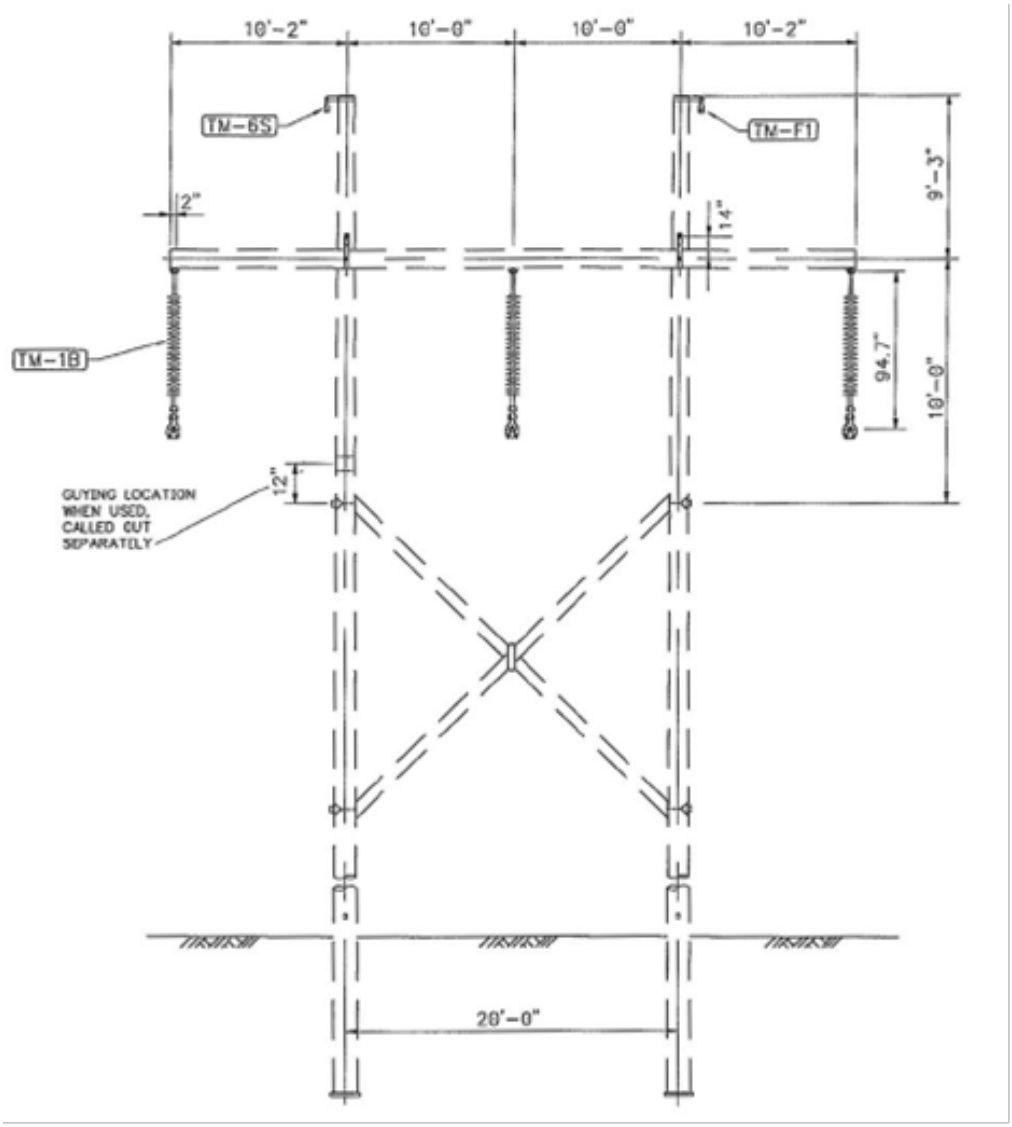


Figure AA-5, 34.5-kV Single-Circuit Magnetic Field

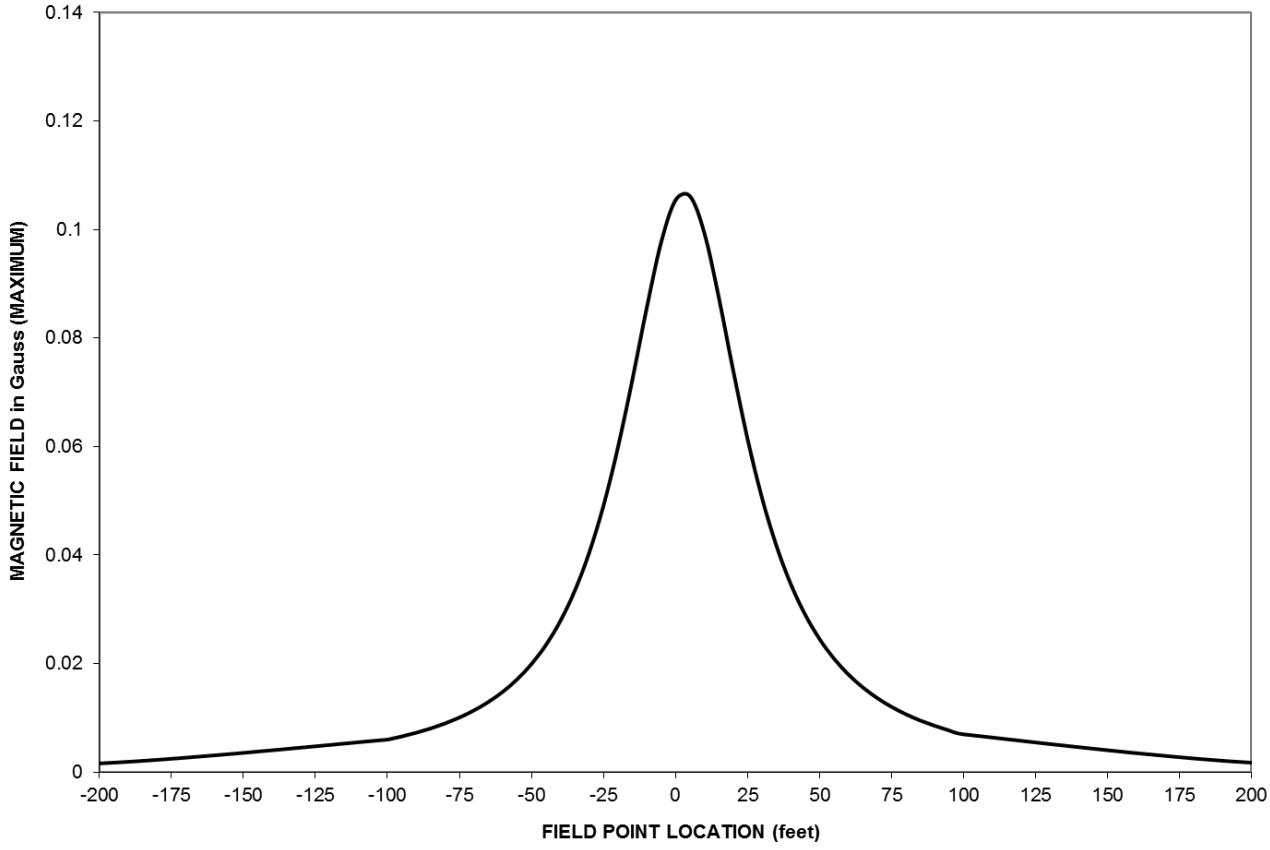


Figure AA-6, 34.5-kV Single-Circuit Electric Field

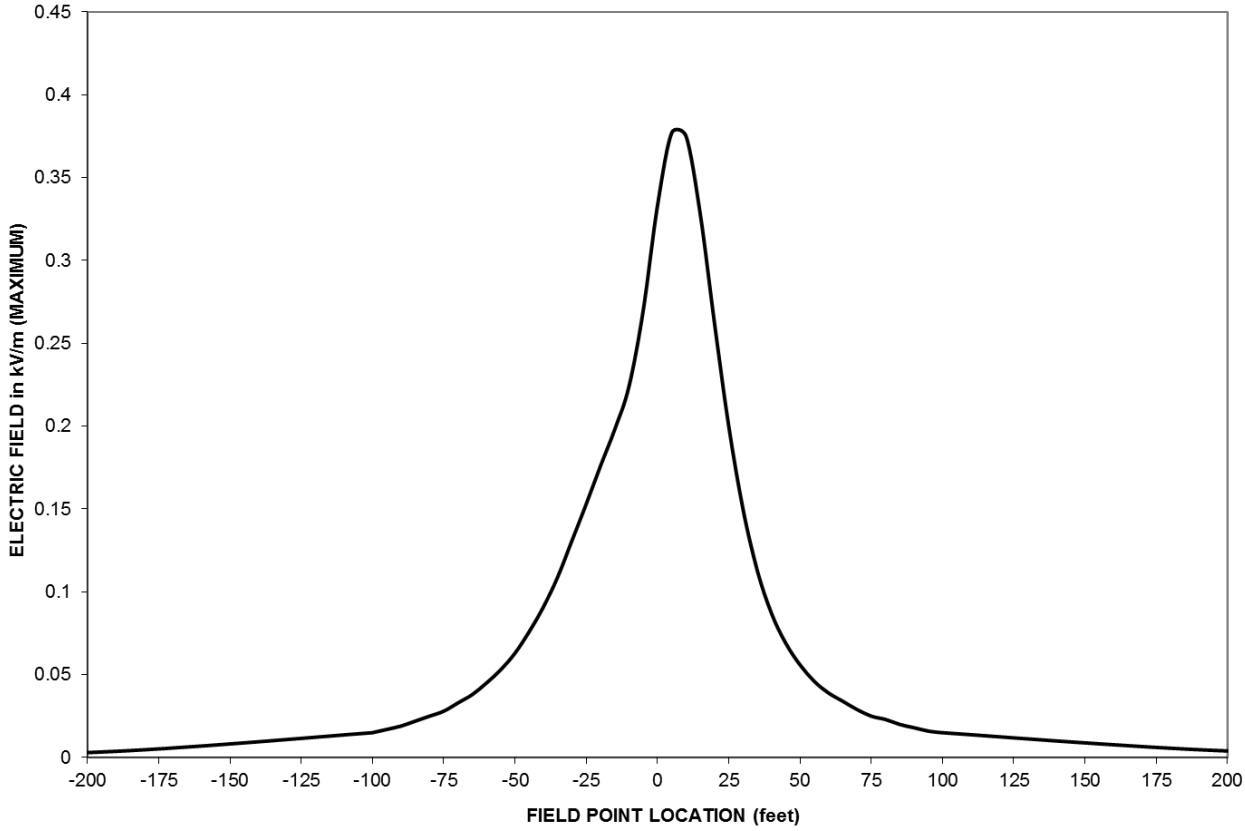


Figure AA-7, 34.5-kV Double-Circuit Magnetic Field

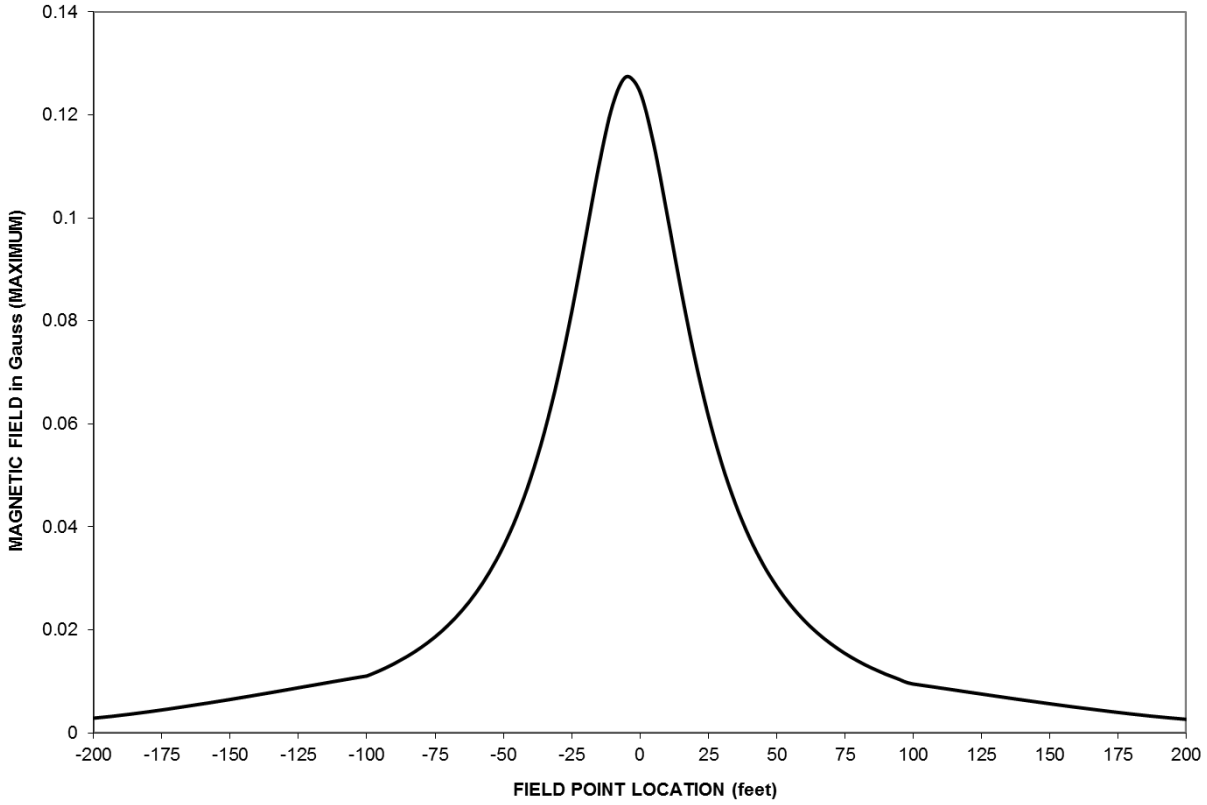


Figure AA-8, 34.5-kV Double-Circuit Electric Field

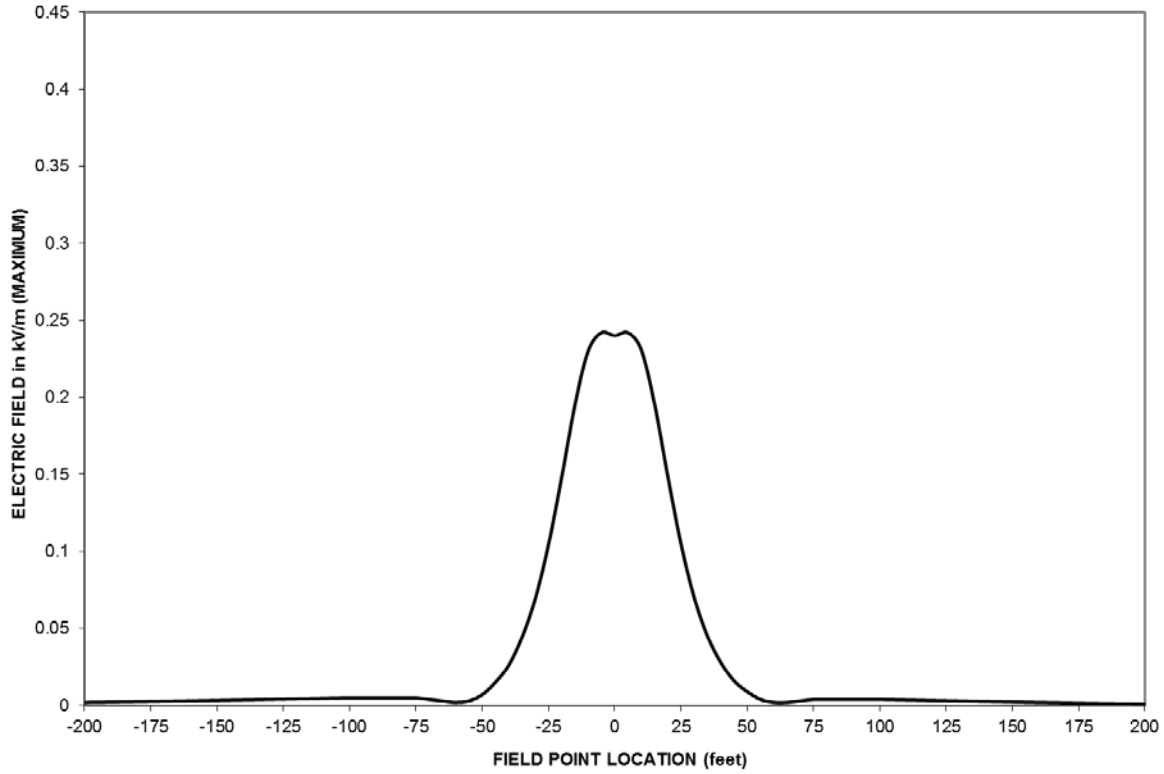


Figure AA-9, 230-kV Monopole Magnetic Field

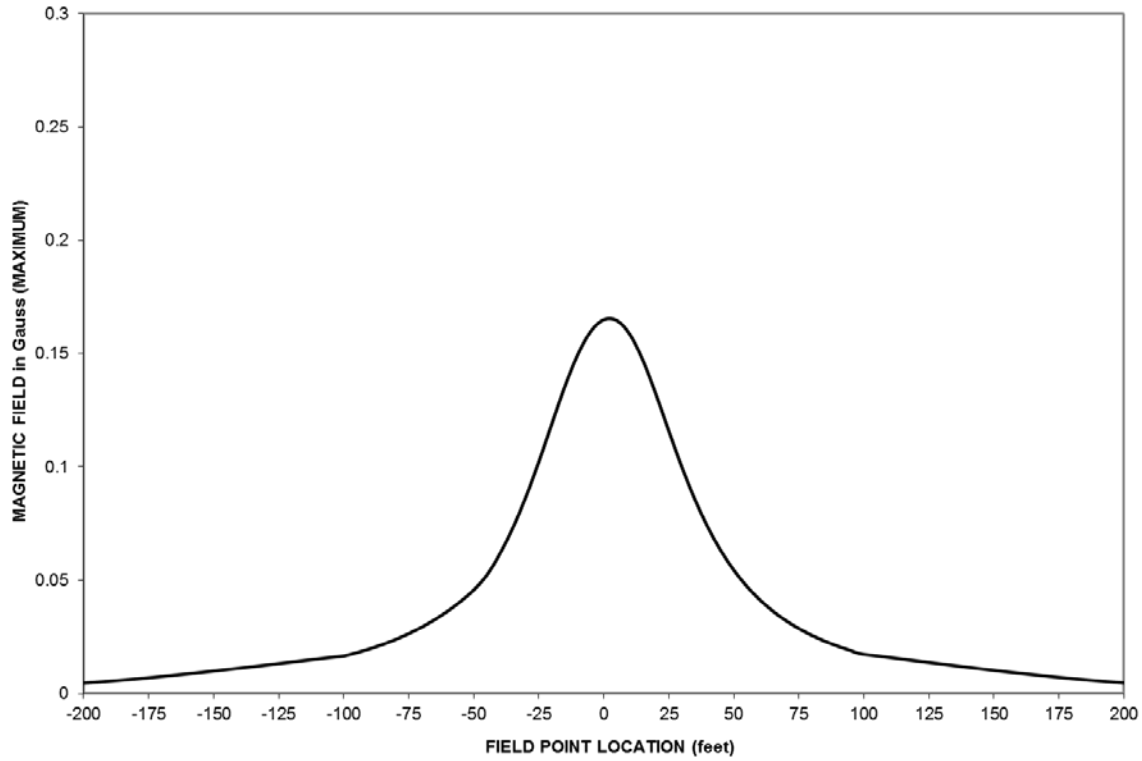


Figure AA-10, 230-kV Monopole Electric Field

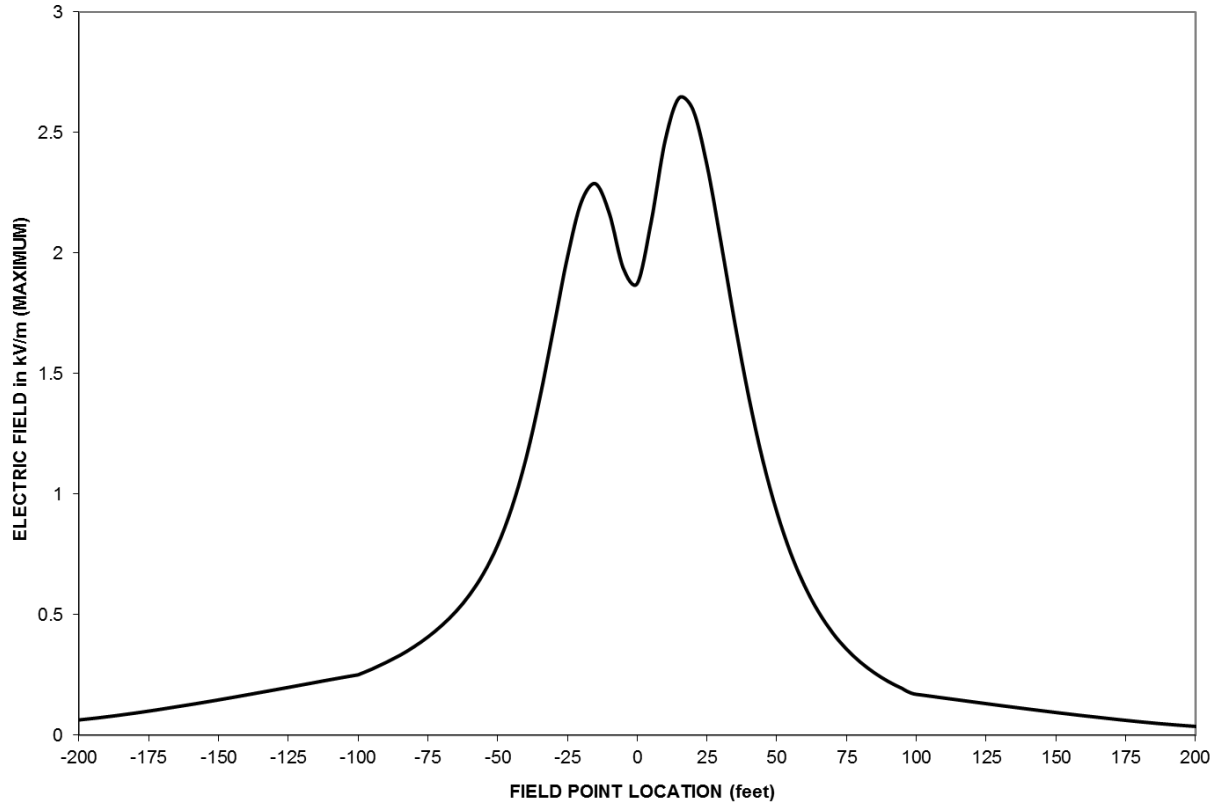


Figure AA-11, 230-kV H-Frame Magnetic Field

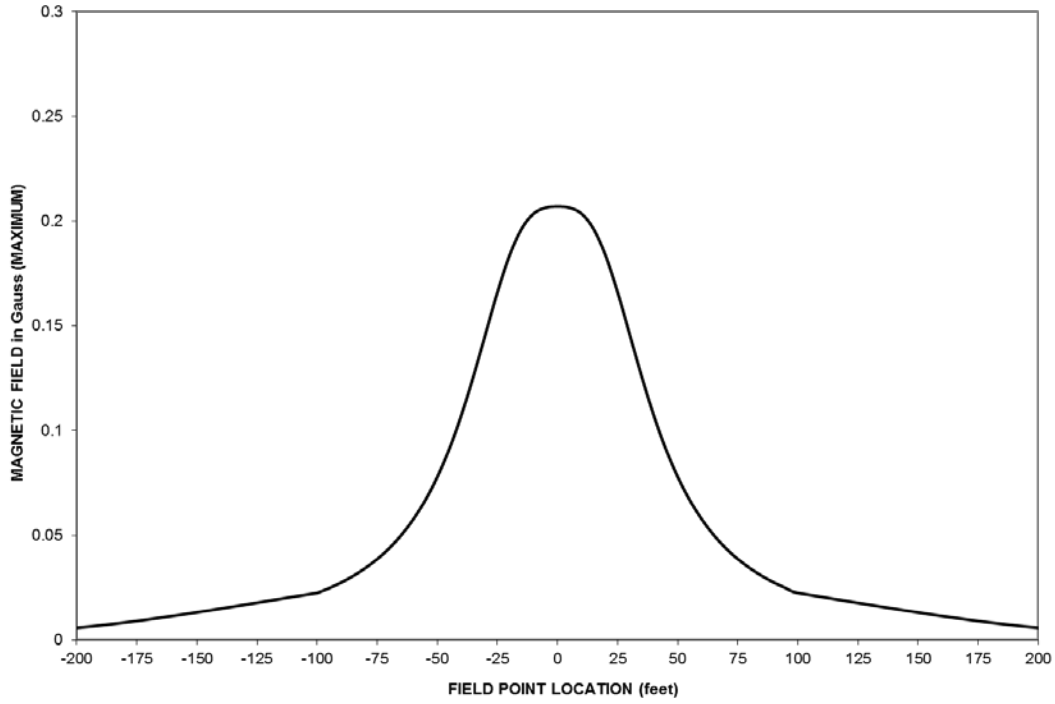
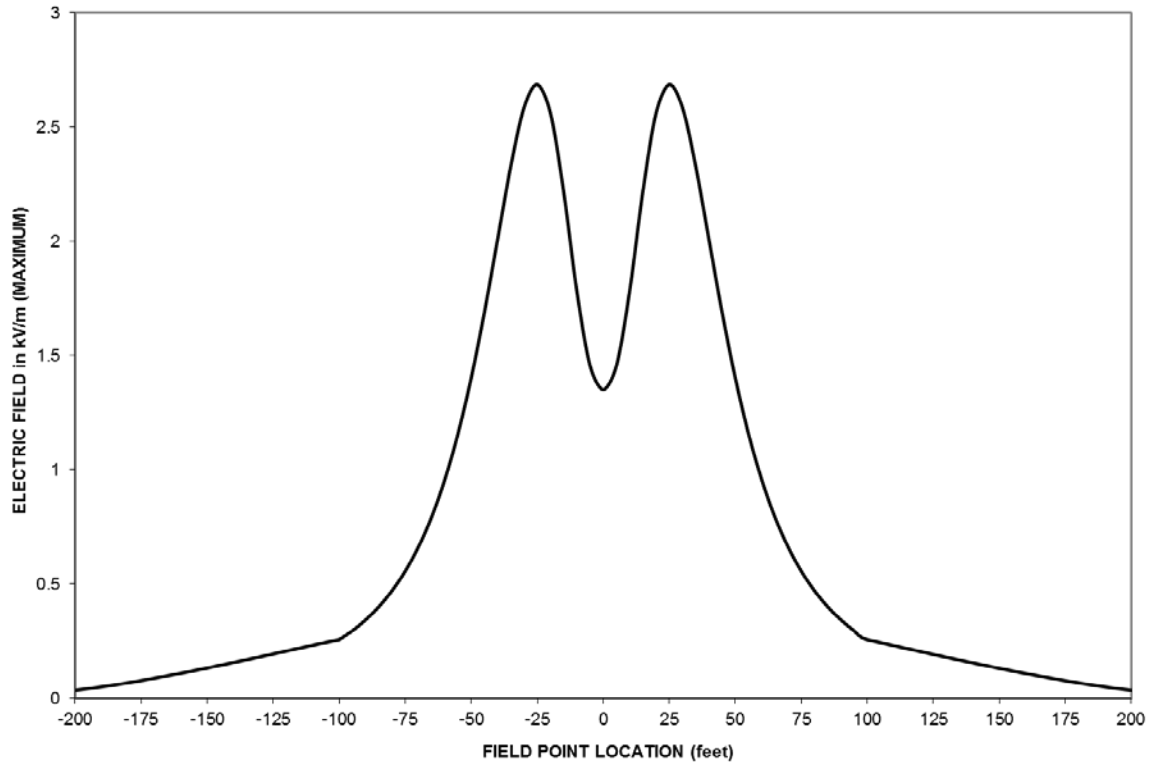


Figure AA-12, 230-kV H-Frame Electric Field



Attachment AA-1
Results of the Bonneville Power Administration Corona and Field Effects Program for 34.5-kV Single-Circuit Overhead Transmission Lines

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     Û       C O R O N A   A N D   F I E L D       Û
     Û E F F E C T S   P R O G R A M   V E R. 3.1  Û
     Û   Source: Bonneville Power Administration   Û
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 (ENGLISH UNITS OPTION)

 (GRADIENTS ARE COMPUTED BY PROGRAM)

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  20 -100.0    5.0
  20    0.0    5.0
  10  100.0  100.0
   0    0.0    0.0
1AUDIBLE NOISE CALCULATION - RAIN
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DIST FROM REFERENCE (FEET)	TOTALS L5 (DBA)	L50 (DBA)	PH.A-1	PH.B-1	PH.C-1
-1000.0	-66.7	-70.2	-74.5	-74.9	-75.5
-900.0	-66.1	-69.6	-74.0	-74.4	-74.9
-800.0	-65.6	-69.1	-73.4	-73.8	-74.4
-700.0	-64.9	-68.4	-72.8	-73.1	-73.7
-600.0	-64.1	-67.6	-72.0	-72.3	-73.0
-500.0	-63.2	-66.7	-71.1	-71.4	-72.1
-400.0	-62.1	-65.6	-70.0	-70.3	-71.0
-300.0	-60.7	-64.2	-68.6	-68.9	-69.6
-200.0	-58.8	-62.3	-66.7	-66.9	-67.6
-100.0	-55.5	-59.0	-63.5	-63.5	-64.4
-100.0	-55.5	-59.0	-63.5	-63.5	-64.4
-95.0	-55.3	-58.8	-63.3	-63.2	-64.1
-90.0	-55.0	-58.5	-63.1	-63.0	-63.9
-85.0	-54.8	-58.3	-62.8	-62.7	-63.6
-80.0	-54.5	-58.0	-62.6	-62.4	-63.4
-75.0	-54.2	-57.7	-62.3	-62.1	-63.1
-70.0	-53.9	-57.4	-62.0	-61.8	-62.8
-65.0	-53.6	-57.1	-61.7	-61.5	-62.5
-60.0	-53.3	-56.8	-61.4	-61.1	-62.1
-55.0	-52.9	-56.4	-61.1	-60.7	-61.8
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-45.0	-52.2	-55.7	-60.4	-59.9	-61.0
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-10.0	-49.1	-52.6	-57.9	-57.0	-57.2
-5.0	-48.8	-52.3	-57.6	-56.9	-56.7

0.0	-48.6	-52.1	-57.5	-56.9	-56.2
5.0	-48.6	-52.1	-57.5	-57.1	-56.1
10.0	-48.8	-52.3	-57.5	-57.5	-56.2
15.0	-49.1	-52.6	-57.7	-57.9	-56.6
20.0	-49.5	-53.0	-58.0	-58.4	-57.2
25.0	-50.0	-53.5	-58.3	-58.9	-57.8
30.0	-50.5	-54.0	-58.7	-59.3	-58.4
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40.0	-51.4	-54.9	-59.5	-60.2	-59.5
45.0	-51.9	-55.4	-59.8	-60.6	-60.0
50.0	-52.3	-55.8	-60.2	-61.0	-60.5
55.0	-52.7	-56.2	-60.6	-61.3	-61.0
60.0	-53.0	-56.5	-60.9	-61.7	-61.4
65.0	-53.4	-56.9	-61.2	-62.0	-61.8
70.0	-53.7	-57.2	-61.5	-62.3	-62.1
75.0	-54.0	-57.5	-61.8	-62.6	-62.5
80.0	-54.3	-57.8	-62.1	-62.9	-62.8
85.0	-54.6	-58.1	-62.4	-63.1	-63.1
90.0	-54.8	-58.3	-62.7	-63.4	-63.4
95.0	-55.1	-58.6	-62.9	-63.6	-63.6
100.0	-55.3	-58.8	-63.1	-63.9	-63.9
200.0	-58.7	-62.2	-66.5	-67.1	-67.4
300.0	-60.7	-64.2	-68.5	-69.0	-69.4
400.0	-62.1	-65.6	-69.9	-70.4	-70.8
500.0	-63.2	-66.7	-71.0	-71.5	-72.0
600.0	-64.1	-67.6	-71.9	-72.4	-72.9
700.0	-64.9	-68.4	-72.7	-73.2	-73.6
800.0	-65.5	-69.0	-73.4	-73.8	-74.3
900.0	-66.1	-69.6	-73.9	-74.4	-74.9
1000.0	-66.6	-70.1	-74.5	-74.9	-75.4

1AUDIBLE NOISE CALCULATION - FAIR

DIST FROM REFERENCE	TOTALS L5	L50	PH.A-1	PH.B-1	PH.C-1

(FEET)	(DBA)	(DBA)			
-1000.0	-91.7	-95.2	-99.5	-99.9	-100.5
-900.0	-91.1	-94.6	-99.0	-99.4	-99.9
-800.0	-90.6	-94.1	-98.4	-98.8	-99.4
-700.0	-89.9	-93.4	-97.8	-98.1	-98.7
-600.0	-89.1	-92.6	-97.0	-97.3	-98.0
-500.0	-88.2	-91.7	-96.1	-96.4	-97.1
-400.0	-87.1	-90.6	-95.0	-95.3	-96.0
-300.0	-85.7	-89.2	-93.6	-93.9	-94.6
-200.0	-83.8	-87.3	-91.7	-91.9	-92.6
-100.0	-80.5	-84.0	-88.5	-88.5	-89.4
-100.0	-80.5	-84.0	-88.5	-88.5	-89.4
-95.0	-80.3	-83.8	-88.3	-88.2	-89.1
-90.0	-80.0	-83.5	-88.1	-88.0	-88.9
-85.0	-79.8	-83.3	-87.8	-87.7	-88.6
-80.0	-79.5	-83.0	-87.6	-87.4	-88.4
-75.0	-79.2	-82.7	-87.3	-87.1	-88.1
-70.0	-78.9	-82.4	-87.0	-86.8	-87.8
-65.0	-78.6	-82.1	-86.7	-86.5	-87.5
-60.0	-78.3	-81.8	-86.4	-86.1	-87.1
-55.0	-77.9	-81.4	-86.1	-85.7	-86.8
-50.0	-77.5	-81.0	-85.8	-85.3	-86.4
-45.0	-77.2	-80.7	-85.4	-84.9	-86.0
-40.0	-76.7	-80.2	-85.1	-84.5	-85.5
-35.0	-76.3	-79.8	-84.7	-84.0	-85.1
-30.0	-75.9	-79.4	-84.3	-83.5	-84.6
-25.0	-75.4	-78.9	-83.9	-83.1	-84.0
-20.0	-74.9	-78.4	-83.6	-82.6	-83.4
-15.0	-74.5	-78.0	-83.2	-82.2	-82.8
-10.0	-74.1	-77.6	-82.9	-82.0	-82.2
-5.0	-73.8	-77.3	-82.6	-81.9	-81.7
0.0	-73.6	-77.1	-82.5	-81.9	-81.2
5.0	-73.6	-77.1	-82.5	-82.1	-81.1

10.0	-73.8	-77.3	-82.5	-82.5	-81.2
15.0	-74.1	-77.6	-82.7	-82.9	-81.6
20.0	-74.5	-78.0	-83.0	-83.4	-82.2
25.0	-75.0	-78.5	-83.3	-83.9	-82.8
30.0	-75.5	-79.0	-83.7	-84.3	-83.4
35.0	-76.0	-79.5	-84.1	-84.8	-84.0
40.0	-76.4	-79.9	-84.5	-85.2	-84.5
45.0	-76.9	-80.4	-84.8	-85.6	-85.0
50.0	-77.3	-80.8	-85.2	-86.0	-85.5
55.0	-77.7	-81.2	-85.6	-86.3	-86.0
60.0	-78.0	-81.5	-85.9	-86.7	-86.4
65.0	-78.4	-81.9	-86.2	-87.0	-86.8
70.0	-78.7	-82.2	-86.5	-87.3	-87.1
75.0	-79.0	-82.5	-86.8	-87.6	-87.5
80.0	-79.3	-82.8	-87.1	-87.9	-87.8
85.0	-79.6	-83.1	-87.4	-88.1	-88.1
90.0	-79.8	-83.3	-87.7	-88.4	-88.4
95.0	-80.1	-83.6	-87.9	-88.6	-88.6
100.0	-80.3	-83.8	-88.1	-88.9	-88.9
200.0	-83.7	-87.2	-91.5	-92.1	-92.4
300.0	-85.7	-89.2	-93.5	-94.0	-94.4
400.0	-87.1	-90.6	-94.9	-95.4	-95.8
500.0	-88.2	-91.7	-96.0	-96.5	-97.0
600.0	-89.1	-92.6	-96.9	-97.4	-97.9
700.0	-89.9	-93.4	-97.7	-98.2	-98.6
800.0	-90.5	-94.0	-98.4	-98.8	-99.3
900.0	-91.1	-94.6	-98.9	-99.4	-99.9
1000.0	-91.6	-95.1	-99.5	-99.9	-100.4

1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - RAIN

	* * * * * L50 * * * * *											
DIST FROM REFERENCE	* * * * * FREQUENCY, MHZ * * * * *											
	0.100	0.200	0.300	0.500	0.834	1.000	1.250	1.500	2.000	3.000	5.000	10.000	20.000

(FEET)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)
-1000.0	-82.6	-80.8	-79.7	-78.8	-78.9	-79.3	-80.1	-81.1	-83.2	-87.5	-95.5	-113.4	-136.2
-900.0	-81.0	-79.5	-78.6	-77.8	-77.9	-78.4	-79.2	-80.1	-82.2	-86.5	-94.3	-111.7	-134.2
-800.0	-79.2	-78.0	-77.3	-76.7	-76.9	-77.3	-78.1	-79.1	-81.2	-85.4	-93.0	-109.7	-132.1
-700.0	-77.1	-76.3	-75.8	-75.4	-75.7	-76.1	-76.9	-77.9	-80.0	-84.1	-91.6	-107.6	-129.6
-600.0	-74.6	-74.2	-74.0	-73.8	-74.2	-74.7	-75.5	-76.5	-78.6	-82.7	-90.0	-105.3	-126.8
-500.0	-71.7	-71.6	-71.6	-71.8	-72.5	-73.0	-73.9	-74.9	-76.9	-81.0	-88.1	-102.7	-123.5
-400.0	-68.0	-68.2	-68.6	-69.3	-70.3	-70.9	-71.8	-72.8	-74.9	-79.0	-86.0	-99.7	-119.5
-300.0	-63.2	-63.7	-64.5	-65.8	-67.3	-68.0	-69.1	-70.2	-72.3	-76.4	-83.2	-96.1	-114.5
-200.0	-56.5	-57.2	-58.3	-60.3	-62.6	-63.6	-65.0	-66.2	-68.6	-72.8	-79.5	-91.5	-107.7
-100.0	-45.4	-46.3	-47.6	-50.2	-53.6	-55.1	-57.0	-58.8	-61.7	-66.5	-73.4	-84.6	-97.5
-100.0	-45.4	-46.3	-47.6	-50.2	-53.6	-55.1	-57.0	-58.8	-61.7	-66.5	-73.4	-84.6	-97.5
-95.0	-44.6	-45.5	-46.8	-49.4	-53.0	-54.4	-56.4	-58.2	-61.2	-66.0	-73.0	-84.1	-96.8
-90.0	-43.8	-44.7	-46.0	-48.6	-52.2	-53.7	-55.8	-57.6	-60.6	-65.5	-72.5	-83.6	-96.1
-85.0	-42.9	-43.8	-45.2	-47.8	-51.5	-53.0	-55.1	-56.9	-60.0	-65.0	-72.0	-83.1	-95.4
-80.0	-42.0	-42.9	-44.3	-47.0	-50.7	-52.2	-54.3	-56.2	-59.4	-64.4	-71.5	-82.5	-94.6
-75.0	-40.9	-41.8	-43.2	-45.9	-49.8	-51.4	-53.5	-55.5	-58.7	-63.8	-71.0	-82.0	-93.8
-70.0	-39.8	-40.7	-42.1	-44.8	-48.7	-50.4	-52.7	-54.7	-58.0	-63.2	-70.4	-81.4	-92.9
-65.0	-38.6	-39.5	-40.9	-43.7	-47.6	-49.3	-51.6	-53.7	-57.2	-62.5	-69.8	-80.7	-92.0
-60.0	-37.3	-38.3	-39.7	-42.4	-46.4	-48.1	-50.5	-52.6	-56.2	-61.8	-69.1	-80.0	-91.1
-55.0	-36.0	-36.9	-38.3	-41.1	-45.1	-46.9	-49.3	-51.4	-55.1	-60.9	-68.5	-79.3	-90.1
-50.0	-34.5	-35.5	-36.9	-39.7	-43.7	-45.5	-47.9	-50.1	-53.9	-59.8	-67.7	-78.5	-89.1
-45.0	-33.0	-34.0	-35.4	-38.2	-42.3	-44.1	-46.5	-48.7	-52.6	-58.7	-66.7	-77.7	-88.1
-40.0	-31.4	-32.4	-33.8	-36.6	-40.7	-42.5	-45.0	-47.3	-51.2	-57.4	-65.6	-76.7	-87.3
-35.0	-29.7	-30.7	-32.1	-34.9	-39.0	-40.9	-43.4	-45.7	-49.7	-56.0	-64.4	-75.5	-86.4
-30.0	-28.0	-28.9	-30.4	-33.2	-37.3	-39.2	-41.7	-44.0	-48.1	-54.6	-63.2	-74.3	-85.4
-25.0	-26.2	-27.1	-28.6	-31.4	-35.6	-37.4	-40.0	-42.3	-46.5	-53.0	-61.8	-73.0	-84.4
-20.0	-24.5	-25.4	-26.9	-29.7	-33.9	-35.8	-38.3	-40.7	-44.9	-51.6	-60.5	-71.7	-83.5
-15.0	-23.0	-24.0	-25.4	-28.2	-32.4	-34.3	-36.9	-39.3	-43.5	-50.2	-59.3	-70.5	-82.7
-10.0	-21.9	-22.9	-24.3	-27.2	-31.4	-33.2	-35.8	-38.2	-42.5	-49.3	-58.4	-69.7	-82.1
-5.0	-21.3	-22.2	-23.7	-26.5	-30.7	-32.6	-35.2	-37.6	-41.9	-48.8	-58.0	-69.4	-81.9
0.0	-19.6	-20.6	-22.0	-24.9	-29.1	-31.0	-33.6	-36.0	-40.3	-47.3	-57.0	-69.2	-81.9
5.0	-19.0	-19.9	-21.4	-24.2	-28.4	-30.3	-32.9	-35.4	-39.7	-46.7	-56.4	-68.8	-81.5
10.0	-19.5	-20.5	-21.9	-24.8	-29.0	-30.9	-33.5	-35.9	-40.3	-47.2	-56.9	-69.1	-81.9

15.0	-21.1	-22.1	-23.5	-26.4	-30.6	-32.5	-35.1	-37.5	-41.8	-48.7	-58.3	-70.3	-82.6
20.0	-23.3	-24.3	-25.7	-28.6	-32.7	-34.6	-37.2	-39.6	-43.9	-50.7	-60.1	-71.3	-83.1
25.0	-25.6	-26.6	-28.0	-30.9	-35.1	-36.9	-39.5	-41.9	-46.1	-52.9	-61.6	-72.3	-83.8
30.0	-28.0	-28.9	-30.4	-33.2	-37.3	-39.2	-41.7	-44.0	-48.0	-54.3	-62.6	-73.3	-84.6
35.0	-29.4	-30.4	-31.8	-34.6	-38.7	-40.5	-43.0	-45.3	-49.2	-55.4	-63.6	-74.3	-85.4
40.0	-30.9	-31.8	-33.2	-36.0	-40.1	-41.9	-44.4	-46.6	-50.5	-56.5	-64.6	-75.3	-86.1
45.0	-32.2	-33.2	-34.6	-37.4	-41.4	-43.2	-45.7	-47.9	-51.7	-57.6	-65.5	-76.3	-86.9
50.0	-33.6	-34.5	-36.0	-38.7	-42.7	-44.5	-46.9	-49.1	-52.8	-58.6	-66.4	-77.2	-87.7
55.0	-34.9	-35.8	-37.2	-40.0	-44.0	-45.7	-48.1	-50.2	-53.9	-59.6	-67.2	-78.0	-88.4
60.0	-36.1	-37.0	-38.5	-41.2	-45.1	-46.9	-49.2	-51.3	-54.9	-60.4	-68.0	-78.8	-89.4
65.0	-37.3	-38.2	-39.6	-42.3	-46.2	-47.9	-50.2	-52.3	-55.8	-61.3	-68.7	-79.6	-90.5
70.0	-38.4	-39.3	-40.7	-43.4	-47.3	-49.0	-51.2	-53.2	-56.7	-62.0	-69.4	-80.3	-91.4
75.0	-39.4	-40.4	-41.8	-44.5	-48.3	-49.9	-52.1	-54.1	-57.5	-62.7	-70.0	-80.9	-92.3
80.0	-40.5	-41.4	-42.8	-45.4	-49.2	-50.8	-53.0	-54.9	-58.2	-63.4	-70.6	-81.6	-93.2
85.0	-41.4	-42.3	-43.7	-46.4	-50.1	-51.7	-53.8	-55.7	-58.9	-64.0	-71.2	-82.2	-94.0
90.0	-42.3	-43.2	-44.6	-47.3	-50.9	-52.5	-54.6	-56.4	-59.6	-64.6	-71.7	-82.7	-94.8
95.0	-43.2	-44.1	-45.5	-48.1	-51.7	-53.3	-55.3	-57.1	-60.2	-65.1	-72.2	-83.3	-95.6
100.0	-44.1	-45.0	-46.3	-48.9	-52.5	-54.0	-56.0	-57.8	-60.8	-65.7	-72.7	-83.8	-96.3
200.0	-55.8	-56.5	-57.7	-59.7	-62.1	-63.1	-64.5	-65.8	-68.2	-72.4	-79.2	-91.0	-107.1
300.0	-62.8	-63.3	-64.1	-65.4	-67.0	-67.7	-68.8	-69.9	-72.1	-76.2	-83.0	-95.7	-114.0
400.0	-67.7	-67.9	-68.4	-69.0	-70.1	-70.7	-71.6	-72.6	-74.8	-78.8	-85.8	-99.4	-119.1
500.0	-71.4	-71.3	-71.4	-71.6	-72.3	-72.8	-73.7	-74.7	-76.8	-80.9	-88.0	-102.4	-123.2
600.0	-74.4	-74.0	-73.8	-73.6	-74.1	-74.5	-75.4	-76.4	-78.5	-82.6	-89.8	-105.1	-126.6
700.0	-76.9	-76.1	-75.7	-75.2	-75.5	-76.0	-76.8	-77.8	-79.9	-84.0	-91.4	-107.4	-129.4
800.0	-79.0	-77.9	-77.2	-76.6	-76.8	-77.2	-78.0	-79.0	-81.1	-85.3	-92.9	-109.6	-131.9
900.0	-80.8	-79.4	-78.5	-77.7	-77.9	-78.3	-79.1	-80.0	-82.1	-86.4	-94.2	-111.5	-134.1
1000.0	-82.4	-80.7	-79.7	-78.7	-78.8	-79.2	-80.0	-81.0	-83.1	-87.4	-95.4	-113.3	-136.0

1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - FAIR

* * * * * L50 * * * * *
* * * * * FREQUENCY, MHZ * * * * *

DIST FROM REFERENCE	0.100	0.200	0.300	0.500	0.834	1.000	1.250	1.500	2.000	3.000	5.000	10.000	20.000
(FEET)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)

-1000.0	-99.6	-97.8	-96.7	-95.8	-95.9	-96.3	-97.1	-98.1	-100.2	-104.5	-112.5	-130.4	-153.2
-900.0	-98.0	-96.5	-95.6	-94.8	-94.9	-95.4	-96.2	-97.1	-99.2	-103.5	-111.3	-128.7	-151.2
-800.0	-96.2	-95.0	-94.3	-93.7	-93.9	-94.3	-95.1	-96.1	-98.2	-102.4	-110.0	-126.7	-149.1
-700.0	-94.1	-93.3	-92.8	-92.4	-92.7	-93.1	-93.9	-94.9	-97.0	-101.1	-108.6	-124.6	-146.6
-600.0	-91.6	-91.2	-91.0	-90.8	-91.2	-91.7	-92.5	-93.5	-95.6	-99.7	-107.0	-122.3	-143.8
-500.0	-88.7	-88.6	-88.6	-88.8	-89.5	-90.0	-90.9	-91.9	-93.9	-98.0	-105.1	-119.7	-140.5
-400.0	-85.0	-85.2	-85.6	-86.3	-87.3	-87.9	-88.8	-89.8	-91.9	-96.0	-103.0	-116.7	-136.5
-300.0	-80.2	-80.7	-81.5	-82.8	-84.3	-85.0	-86.1	-87.2	-89.3	-93.4	-100.2	-113.1	-131.5
-200.0	-73.5	-74.2	-75.3	-77.3	-79.6	-80.6	-82.0	-83.2	-85.6	-89.8	-96.5	-108.5	-124.7
-100.0	-62.4	-63.3	-64.6	-67.2	-70.6	-72.1	-74.0	-75.8	-78.7	-83.5	-90.4	-101.6	-114.5
-100.0	-62.4	-63.3	-64.6	-67.2	-70.6	-72.1	-74.0	-75.8	-78.7	-83.5	-90.4	-101.6	-114.5
-95.0	-61.6	-62.5	-63.8	-66.4	-70.0	-71.4	-73.4	-75.2	-78.2	-83.0	-90.0	-101.1	-113.8
-90.0	-60.8	-61.7	-63.0	-65.6	-69.2	-70.7	-72.8	-74.6	-77.6	-82.5	-89.5	-100.6	-113.1
-85.0	-59.9	-60.8	-62.2	-64.8	-68.5	-70.0	-72.1	-73.9	-77.0	-82.0	-89.0	-100.1	-112.4
-80.0	-59.0	-59.9	-61.3	-64.0	-67.7	-69.2	-71.3	-73.2	-76.4	-81.4	-88.5	-99.5	-111.6
-75.0	-57.9	-58.8	-60.2	-62.9	-66.8	-68.4	-70.5	-72.5	-75.7	-80.8	-88.0	-99.0	-110.8
-70.0	-56.8	-57.7	-59.1	-61.8	-65.7	-67.4	-69.7	-71.7	-75.0	-80.2	-87.4	-98.4	-109.9
-65.0	-55.6	-56.5	-57.9	-60.7	-64.6	-66.3	-68.6	-70.7	-74.2	-79.5	-86.8	-97.7	-109.0
-60.0	-54.3	-55.3	-56.7	-59.4	-63.4	-65.1	-67.5	-69.6	-73.2	-78.8	-86.1	-97.0	-108.1
-55.0	-53.0	-53.9	-55.3	-58.1	-62.1	-63.9	-66.3	-68.4	-72.1	-77.9	-85.5	-96.3	-107.1
-50.0	-51.5	-52.5	-53.9	-56.7	-60.7	-62.5	-64.9	-67.1	-70.9	-76.8	-84.7	-95.5	-106.1
-45.0	-50.0	-51.0	-52.4	-55.2	-59.3	-61.1	-63.5	-65.7	-69.6	-75.7	-83.7	-94.7	-105.1
-40.0	-48.4	-49.4	-50.8	-53.6	-57.7	-59.5	-62.0	-64.3	-68.2	-74.4	-82.6	-93.7	-104.3
-35.0	-46.7	-47.7	-49.1	-51.9	-56.0	-57.9	-60.4	-62.7	-66.7	-73.0	-81.4	-92.5	-103.4
-30.0	-45.0	-45.9	-47.4	-50.2	-54.3	-56.2	-58.7	-61.0	-65.1	-71.6	-80.2	-91.3	-102.4
-25.0	-43.2	-44.1	-45.6	-48.4	-52.6	-54.4	-57.0	-59.3	-63.5	-70.0	-78.8	-90.0	-101.4
-20.0	-41.5	-42.4	-43.9	-46.7	-50.9	-52.8	-55.3	-57.7	-61.9	-68.6	-77.5	-88.7	-100.5
-15.0	-40.0	-41.0	-42.4	-45.2	-49.4	-51.3	-53.9	-56.3	-60.5	-67.2	-76.3	-87.5	-99.7
-10.0	-38.9	-39.9	-41.3	-44.2	-48.4	-50.2	-52.8	-55.2	-59.5	-66.3	-75.4	-86.7	-99.1
-5.0	-38.3	-39.2	-40.7	-43.5	-47.7	-49.6	-52.2	-54.6	-58.9	-65.8	-75.0	-86.4	-98.9
0.0	-36.6	-37.6	-39.0	-41.9	-46.1	-48.0	-50.6	-53.0	-57.3	-64.3	-74.0	-86.2	-98.9
5.0	-36.0	-36.9	-38.4	-41.2	-45.4	-47.3	-49.9	-52.4	-56.7	-63.7	-73.4	-85.8	-98.5
10.0	-36.5	-37.5	-38.9	-41.8	-46.0	-47.9	-50.5	-52.9	-57.3	-64.2	-73.9	-86.1	-98.9
15.0	-38.1	-39.1	-40.5	-43.4	-47.6	-49.5	-52.1	-54.5	-58.8	-65.7	-75.3	-87.3	-99.6

20.0	-40.3	-41.3	-42.7	-45.6	-49.7	-51.6	-54.2	-56.6	-60.9	-67.7	-77.1	-88.3	-100.1
25.0	-42.6	-43.6	-45.0	-47.9	-52.1	-53.9	-56.5	-58.9	-63.1	-69.9	-78.6	-89.3	-100.8
30.0	-45.0	-45.9	-47.4	-50.2	-54.3	-56.2	-58.7	-61.0	-65.0	-71.3	-79.6	-90.3	-101.6
35.0	-46.4	-47.4	-48.8	-51.6	-55.7	-57.5	-60.0	-62.3	-66.2	-72.4	-80.6	-91.3	-102.4
40.0	-47.9	-48.8	-50.2	-53.0	-57.1	-58.9	-61.4	-63.6	-67.5	-73.5	-81.6	-92.3	-103.1
45.0	-49.2	-50.2	-51.6	-54.4	-58.4	-60.2	-62.7	-64.9	-68.7	-74.6	-82.5	-93.3	-103.9
50.0	-50.6	-51.5	-53.0	-55.7	-59.7	-61.5	-63.9	-66.1	-69.8	-75.6	-83.4	-94.2	-104.7
55.0	-51.9	-52.8	-54.2	-57.0	-61.0	-62.7	-65.1	-67.2	-70.9	-76.6	-84.2	-95.0	-105.4
60.0	-53.1	-54.0	-55.5	-58.2	-62.1	-63.9	-66.2	-68.3	-71.9	-77.4	-85.0	-95.8	-106.4
65.0	-54.3	-55.2	-56.6	-59.3	-63.2	-64.9	-67.2	-69.3	-72.8	-78.3	-85.7	-96.6	-107.5
70.0	-55.4	-56.3	-57.7	-60.4	-64.3	-66.0	-68.2	-70.2	-73.7	-79.0	-86.4	-97.3	-108.4
75.0	-56.4	-57.4	-58.8	-61.5	-65.3	-66.9	-69.1	-71.1	-74.5	-79.7	-87.0	-97.9	-109.3
80.0	-57.5	-58.4	-59.8	-62.4	-66.2	-67.8	-70.0	-71.9	-75.2	-80.4	-87.6	-98.6	-110.2
85.0	-58.4	-59.3	-60.7	-63.4	-67.1	-68.7	-70.8	-72.7	-75.9	-81.0	-88.2	-99.2	-111.0
90.0	-59.3	-60.2	-61.6	-64.3	-67.9	-69.5	-71.6	-73.4	-76.6	-81.6	-88.7	-99.7	-111.8
95.0	-60.2	-61.1	-62.5	-65.1	-68.7	-70.3	-72.3	-74.1	-77.2	-82.1	-89.2	-100.3	-112.6
100.0	-61.1	-62.0	-63.3	-65.9	-69.5	-71.0	-73.0	-74.8	-77.8	-82.7	-89.7	-100.8	-113.3
200.0	-72.8	-73.5	-74.7	-76.7	-79.1	-80.1	-81.5	-82.8	-85.2	-89.4	-96.2	-108.0	-124.1
300.0	-79.8	-80.3	-81.1	-82.4	-84.0	-84.7	-85.8	-86.9	-89.1	-93.2	-100.0	-112.7	-131.0
400.0	-84.7	-84.9	-85.4	-86.0	-87.1	-87.7	-88.6	-89.6	-91.8	-95.8	-102.8	-116.4	-136.1
500.0	-88.4	-88.3	-88.4	-88.6	-89.3	-89.8	-90.7	-91.7	-93.8	-97.9	-105.0	-119.4	-140.2
600.0	-91.4	-91.0	-90.8	-90.6	-91.1	-91.5	-92.4	-93.4	-95.5	-99.6	-106.8	-122.1	-143.6
700.0	-93.9	-93.1	-92.7	-92.2	-92.5	-93.0	-93.8	-94.8	-96.9	-101.0	-108.4	-124.4	-146.4
800.0	-96.0	-94.9	-94.2	-93.6	-93.8	-94.2	-95.0	-96.0	-98.1	-102.3	-109.9	-126.6	-148.9
900.0	-97.8	-96.4	-95.5	-94.7	-94.9	-95.3	-96.1	-97.0	-99.1	-103.4	-111.2	-128.5	-151.1
1000.0	-99.4	-97.7	-96.7	-95.7	-95.8	-96.2	-97.0	-98.0	-100.1	-104.4	-112.4	-130.3	-153.0

1ELECTRIC FIELD CALCULATIONS

********** CORONA AND FIELDS PROGRAM Version 3.1 **********
********** Montague 34.5kV single-curcuite monopole **********

DIST. FROM REFERENCE FEET	HEIGHT FEET	MAXIMUM GRADIENT (KV/CM)	SUBCON. DIAM. (IN)	NO. OF SUBCON.	PHASE ANGLE (DEGREES)

PH.A-1	4.17	37.00	2.02	1.55	1	0.0
PH.B-1	-4.17	31.00	2.00	1.55	1	-120.0
PH.C-1	5.15	25.00	1.98	1.55	1	120.0
GND1-1	0.66	44.33	0.48	0.75	1	0.0

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	E-FIELD (KV/METER)	THETA (DEGREES)	EY-FIELD (KV/METER)	THETAY (DEGREES)	EX-FIELD (KV/METER)	THETAX (DEGREES)	SPACE POTENTIAL (VOLTS)
-1000.0	0.000	89.6	0.000	143.6	0.000	140.5	0.1
-900.0	0.000	89.6	0.000	142.9	0.000	139.6	0.2
-800.0	0.000	89.5	0.000	142.1	0.000	138.4	0.2
-700.0	0.000	89.5	0.000	141.0	0.000	136.7	0.3
-600.0	0.000	89.4	0.000	139.6	0.000	134.6	0.4
-500.0	0.001	89.2	0.001	137.6	0.000	131.6	0.5
-400.0	0.001	89.1	0.001	134.6	0.000	127.2	0.9
-300.0	0.002	88.7	0.002	129.6	0.000	120.0	1.5
-200.0	0.003	88.1	0.003	120.0	0.000	106.8	3.5
-100.0	0.015	85.9	0.015	96.3	0.001	78.9	15.2
-100.0	0.015	85.9	0.015	96.3	0.001	78.9	15.2
-95.0	0.017	85.7	0.017	94.3	0.001	76.8	16.9
-90.0	0.019	85.5	0.019	92.2	0.002	74.6	19.0
-85.0	0.022	85.2	0.021	90.0	0.002	72.3	21.5
-80.0	0.025	85.0	0.024	87.6	0.002	69.9	24.5
-75.0	0.028	84.7	0.028	85.1	0.003	67.3	28.2
-70.0	0.033	84.4	0.032	82.5	0.003	64.6	32.6
-65.0	0.038	84.1	0.038	79.7	0.004	61.6	37.9
-60.0	0.045	83.8	0.044	76.7	0.005	58.4	44.6
-55.0	0.053	83.5	0.053	73.5	0.006	54.8	52.8
-50.0	0.063	83.3	0.063	70.1	0.008	50.7	62.9
-45.0	0.076	83.1	0.075	66.4	0.010	45.8	75.4
-40.0	0.091	83.1	0.090	62.4	0.012	39.6	90.7
-35.0	0.109	83.2	0.109	57.7	0.014	31.1	108.9

-30.0	0.131	83.7	0.130	52.2	0.017	18.9	129.8
-25.0	0.153	84.5	0.153	45.3	0.021	0.7	152.2
-20.0	0.176	85.5	0.175	35.9	0.027	-23.3	174.2
-15.0	0.198	85.9	0.197	22.6	0.039	-46.9	195.4
-10.0	0.224	84.4	0.223	4.1	0.056	-64.2	221.8
-5.0	0.270	82.1	0.268	-17.2	0.070	-76.7	266.0
0.0	0.333	83.3	0.331	-35.0	0.066	-89.9	325.2
5.0	0.377	87.6	0.377	-47.3	0.044	-116.7	368.6
10.0	0.375	92.6	0.374	-55.8	0.036	-174.2	366.9
15.0	0.328	96.7	0.326	-62.8	0.046	150.7	322.4
20.0	0.262	99.4	0.259	-69.7	0.048	136.8	258.8
25.0	0.200	100.6	0.196	-77.2	0.041	128.8	197.6
30.0	0.150	100.8	0.147	-85.4	0.031	122.2	148.3
35.0	0.113	100.2	0.111	-94.0	0.023	115.8	112.1
40.0	0.087	99.3	0.086	-102.6	0.016	109.2	86.5
45.0	0.069	98.3	0.068	-110.9	0.012	102.2	68.5
50.0	0.056	97.4	0.055	-118.5	0.009	95.1	55.6
55.0	0.046	96.6	0.046	-125.4	0.006	88.0	46.2
60.0	0.039	96.0	0.039	-131.5	0.005	81.0	39.0
65.0	0.034	95.5	0.033	-136.8	0.004	74.4	33.5
70.0	0.029	95.1	0.029	-141.5	0.003	68.3	29.1
75.0	0.025	94.8	0.025	-145.6	0.002	62.6	25.5
80.0	0.023	94.5	0.022	-149.2	0.002	57.5	22.5
85.0	0.020	94.3	0.020	-152.4	0.002	52.9	20.0
90.0	0.018	94.1	0.018	-155.3	0.001	48.7	17.9
95.0	0.016	93.9	0.016	-157.9	0.001	44.9	16.1
100.0	0.015	93.7	0.015	-160.2	0.001	41.5	14.6
200.0	0.004	91.9	0.004	176.6	0.000	8.6	3.6
300.0	0.002	91.3	0.002	168.2	0.000	-3.3	1.6
400.0	0.001	91.0	0.001	163.7	0.000	-9.6	0.9
500.0	0.001	90.8	0.001	161.0	0.000	-13.6	0.6
600.0	0.000	90.6	0.000	159.1	0.000	-16.3	0.4
700.0	0.000	90.5	0.000	157.8	0.000	-18.2	0.3
800.0	0.000	90.5	0.000	156.8	0.000	-19.7	0.2
900.0	0.000	90.4	0.000	156.0	0.000	-20.9	0.2

1000.0 0.000 90.4 0.000 155.4 0.000 -21.8 0.1
1MAGNETIC FIELD CALCULATIONS

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	B-FIELD (GAUSS)	THETA	BY-FIELD (GAUSS)	THETAY	BX-FIELD (GAUSS)	THETAX
-1000.0	0.00006831	-13.3	0.00005800	61.8	0.00006778	-32.7
-900.0	0.00008424	-13.0	0.00007158	61.4	0.00008362	-33.0
-800.0	0.00010647	-12.7	0.00009056	60.9	0.00010572	-33.4
-700.0	0.00013880	-12.3	0.00011821	60.2	0.00013788	-33.9
-600.0	0.00018843	-11.9	0.00016077	59.3	0.00018730	-34.5
-500.0	0.00027034	-11.2	0.00023123	58.1	0.00026891	-35.4
-400.0	0.00041996	-10.3	0.00036060	56.4	0.00041813	-36.8
-300.0	0.00073894	-8.9	0.00063863	53.5	0.00073663	-39.2
-200.0	0.00162542	-6.8	0.00142199	47.9	0.00162267	-44.0
-100.0	0.00601088	-5.0	0.00534527	32.7	0.00600599	-58.5
-100.0	0.00601088	-5.0	0.00534527	32.7	0.00600599	-58.5
-95.0	0.00660166	-5.0	0.00586678	31.2	0.00659637	-60.0
-90.0	0.00728294	-4.9	0.00646408	29.5	0.00727723	-61.6
-85.0	0.00807382	-4.8	0.00715150	27.7	0.00806778	-63.4
-80.0	0.00899858	-4.5	0.00794663	25.7	0.00899242	-65.5
-75.0	0.01008823	-4.1	0.00887116	23.4	0.01008240	-67.7
-70.0	0.01138283	-3.4	0.00995203	20.8	0.01137805	-70.1
-65.0	0.01293439	-2.4	0.01122301	17.8	0.01293156	-72.9
-60.0	0.01481101	-0.9	0.01272709	14.3	0.01481048	-75.9
-55.0	0.01710225	1.1	0.01452060	10.3	0.01710133	-79.4
-50.0	0.01992622	4.0	0.01668091	5.4	0.01991196	-83.2
-45.0	0.02343821	7.7	0.01932238	-0.4	0.02336867	-87.4
-40.0	0.02783985	12.7	0.02263029	-7.6	0.02759842	267.8
-35.0	0.03338521	19.1	0.02692881	-16.3	0.03267570	262.5

-30.0	0.04037374	27.3	0.03279413	-26.7	0.03849814	256.4
-25.0	0.04910847	37.6	0.04115285	-38.5	0.04455511	249.1
-20.0	0.05977822	50.4	0.05308431	-50.8	0.04966861	239.5
-15.0	0.07221092	66.1	0.06876147	-62.4	0.05232712	225.3
-10.0	0.08548453	84.8	0.08527041	-72.8	0.05354735	202.3
-5.0	0.09755556	106.4	0.09497770	-82.6	0.06182407	170.8
0.0	0.10538161	130.4	0.08914951	265.4	0.08204491	144.9
5.0	0.10617346	155.3	0.06945310	244.9	0.09951707	129.5
10.0	0.09944808	179.5	0.05475925	210.1	0.09944512	119.4
15.0	0.08764046	-158.5	0.05556794	177.4	0.08349413	110.3
20.0	0.07418860	-139.6	0.05783467	159.4	0.06273956	99.9
25.0	0.06152395	-123.7	0.05493293	149.5	0.04532895	87.0
30.0	0.05068602	-110.5	0.04865237	142.9	0.03352811	72.3
35.0	0.04183174	-99.6	0.04146657	137.9	0.02630636	57.4
40.0	0.03474105	-90.6	0.03473991	133.6	0.02188186	44.2
45.0	0.02909493	-83.1	0.02897006	129.9	0.01891723	33.6
50.0	0.02459030	-76.7	0.02421695	126.4	0.01668895	25.4
55.0	0.02097487	-71.3	0.02036856	123.2	0.01486777	19.0
60.0	0.01804997	-66.7	0.01726829	120.2	0.01331247	14.0
65.0	0.01566282	-62.7	0.01476642	117.4	0.01195902	10.0
70.0	0.01369699	-59.2	0.01273656	114.8	0.01077285	6.7
75.0	0.01206377	-56.2	0.01107751	112.4	0.00973064	4.0
80.0	0.01069534	-53.5	0.00971037	110.2	0.00881376	1.7
85.0	0.00953953	-51.1	0.00857416	108.1	0.00800618	-0.3
90.0	0.00855590	-49.0	0.00762186	106.2	0.00729377	-2.0
95.0	0.00771288	-47.1	0.00681721	104.4	0.00666410	-3.6
100.0	0.00698559	-45.4	0.00613201	102.8	0.00610629	-4.9
200.0	0.00176891	-29.4	0.00148246	84.9	0.00168290	-17.3
300.0	0.00078276	-24.5	0.00065347	78.4	0.00075784	-21.4
400.0	0.00043864	-22.1	0.00036637	75.2	0.00042760	-23.5
500.0	0.00027995	-20.7	0.00023406	73.2	0.00027389	-24.8
600.0	0.00019401	-19.8	0.00016237	71.9	0.00019022	-25.6
700.0	0.00014232	-19.1	0.00011920	71.0	0.00013974	-26.2
800.0	0.00010883	-18.7	0.00009122	70.3	0.00010696	-26.7
900.0	0.00008590	-18.3	0.00007204	69.8	0.00008450	-27.1

1000.0	0.00006952	-18.0	0.00005833	69.3	0.00006843	-27.4

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Attachment AA-2
Results of the Bonneville Power Administration Corona and Field Effects Program for 34.5-kV Double-Circuit Overhead Transmission Lines

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Û       C O R O N A   A N D   F I E L D       Û
Û E F F E C T S   P R O G R A M   V E R. 3.1  Û
Û   Source: Bonneville Power Administration   Û
ÛÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÛ


                           INPUT DATA LIST


                10/13/2017         10:34:38
******************  CORONA AND FIELDS PROGRAM Version 3.1  *************
******************  Montague 34.5kV double-circuit monopole ************
1,0, 3, 7,0.0,   2.00,   2.00,   0.00

(ENGLISH UNITS OPTION)

(GRADIENTS ARE COMPUTED BY PROGRAM)

PHYSICAL SYSTEM CONSISTS OF  7 CONDUCTORS, OF WHICH  3 ARE ENERGIZED PHASES

OPTIONS: 'EF','MF','RI','AN'
  4.921,  6.562,  9.842,  0.000,  1.000, 75.000,  3.280,  6.700,  3.280
'PH.A-1  ','A',   -4.17,   45.00, 1,   1.545,   0.000,  20.000,   0.000,   1.000,   0.000
'PH.B-1  ','A',   -5.15,   35.00, 1,   1.545,   0.000,  20.000,-120.000,   1.000,   0.000
'PH.C-1  ','A',   -4.17,   25.00, 1,   1.545,   0.000,  20.000, 120.000,   1.000,   0.000
'PH.A-2  ','A',    4.17,   25.00, 1,   1.545,   0.000,  20.000,   0.000,   1.000,   0.000
'PH.B-2  ','A',    5.15,   35.00, 1,   1.545,   0.000,  20.000,-120.000,   1.000,   0.000
'PH.C-2  ','A',    4.17,   45.00, 1,   1.545,   0.000,  20.000, 120.000,   1.000,   0.000
'GND1-1  ','A',    0.66,   53.50, 1,   0.750,   0.000,   0.000,   0.000,   0.000,   0.000
 10-1000.0  100.0
 20 -100.0    5.0
 20    0.0    5.0
 10  100.0  100.0
  0    0.0    0.0
```

1AUDIBLE NOISE CALCULATION - RAIN

DIST FROM REFERENCE (FEET)	TOTALS L5 (DBA)	L50 (DBA)	PH.A-1	PH.B-1	PH.C-1
-1000.0	-64.1	-67.6	-71.5	-75.4	-71.4
-900.0	-63.6	-67.1	-70.9	-74.9	-70.9
-800.0	-63.0	-66.5	-70.4	-74.3	-70.3
-700.0	-62.4	-65.9	-69.7	-73.6	-69.7
-600.0	-61.6	-65.1	-68.9	-72.8	-68.9
-500.0	-60.7	-64.2	-68.0	-71.9	-68.0
-400.0	-59.6	-63.1	-66.9	-70.8	-66.9
-300.0	-58.2	-61.7	-65.5	-69.4	-65.4
-200.0	-56.1	-59.6	-63.5	-67.4	-63.4
-100.0	-52.8	-56.3	-60.3	-64.0	-59.9
-100.0	-52.8	-56.3	-60.3	-64.0	-59.9
-95.0	-52.5	-56.0	-60.0	-63.7	-59.7
-90.0	-52.3	-55.8	-59.8	-63.5	-59.4
-85.0	-52.0	-55.5	-59.6	-63.2	-59.1
-80.0	-51.8	-55.3	-59.3	-63.0	-58.8
-75.0	-51.5	-55.0	-59.1	-62.7	-58.5
-70.0	-51.2	-54.7	-58.8	-62.4	-58.2
-65.0	-50.8	-54.3	-58.5	-62.0	-57.8
-60.0	-50.5	-54.0	-58.2	-61.7	-57.5
-55.0	-50.2	-53.7	-57.9	-61.3	-57.1
-50.0	-49.8	-53.3	-57.6	-61.0	-56.6
-45.0	-49.4	-52.9	-57.3	-60.6	-56.2
-40.0	-49.0	-52.5	-57.0	-60.2	-55.6
-35.0	-48.5	-52.0	-56.7	-59.8	-55.1
-30.0	-48.1	-51.6	-56.4	-59.4	-54.5
-25.0	-47.6	-51.1	-56.1	-59.0	-53.9
-20.0	-47.1	-50.6	-55.9	-58.6	-53.3

-15.0	-46.7	-50.2	-55.7	-58.3	-52.7
-10.0	-46.4	-49.9	-55.6	-58.1	-52.3
-5.0	-46.3	-49.8	-55.6	-58.1	-52.1
0.0	-46.4	-49.9	-55.6	-58.1	-52.2
5.0	-46.6	-50.1	-55.7	-58.3	-52.6
10.0	-47.0	-50.5	-55.8	-58.6	-53.1
15.0	-47.5	-51.0	-56.1	-59.0	-53.7
20.0	-47.9	-51.4	-56.3	-59.4	-54.3
25.0	-48.4	-51.9	-56.6	-59.8	-54.9
30.0	-48.8	-52.3	-56.9	-60.2	-55.5
35.0	-49.3	-52.8	-57.2	-60.6	-56.0
40.0	-49.7	-53.2	-57.5	-61.0	-56.5
45.0	-50.1	-53.6	-57.8	-61.4	-56.9
50.0	-50.4	-53.9	-58.1	-61.7	-57.3
55.0	-50.8	-54.3	-58.4	-62.1	-57.7
60.0	-51.1	-54.6	-58.7	-62.4	-58.1
65.0	-51.4	-54.9	-59.0	-62.7	-58.4
70.0	-51.7	-55.2	-59.2	-63.0	-58.7
75.0	-52.0	-55.5	-59.5	-63.2	-59.0
80.0	-52.2	-55.7	-59.7	-63.5	-59.3
85.0	-52.5	-56.0	-60.0	-63.8	-59.6
90.0	-52.7	-56.2	-60.2	-64.0	-59.9
95.0	-53.0	-56.5	-60.4	-64.2	-60.1
100.0	-53.2	-56.7	-60.6	-64.5	-60.3
200.0	-56.4	-59.9	-63.7	-67.6	-63.6
300.0	-58.3	-61.8	-65.6	-69.6	-65.6
400.0	-59.7	-63.2	-67.0	-71.0	-67.0
500.0	-60.8	-64.3	-68.1	-72.0	-68.1
600.0	-61.7	-65.2	-69.0	-72.9	-69.0
700.0	-62.4	-65.9	-69.8	-73.7	-69.7
800.0	-63.1	-66.6	-70.4	-74.3	-70.4
900.0	-63.7	-67.2	-71.0	-74.9	-71.0
1000.0	-64.2	-67.7	-71.5	-75.4	-71.5

1AUDIBLE NOISE CALCULATION - FAIR

DIST FROM REFERENCE (FEET)	TOTALS L5 (DBA)	L50 (DBA)	PH.A-1	PH.B-1	PH.C-1
-1000.0	-89.1	-92.6	-96.5	-100.4	-96.4
-900.0	-88.6	-92.1	-95.9	-99.9	-95.9
-800.0	-88.0	-91.5	-95.4	-99.3	-95.3
-700.0	-87.4	-90.9	-94.7	-98.6	-94.7
-600.0	-86.6	-90.1	-93.9	-97.8	-93.9
-500.0	-85.7	-89.2	-93.0	-96.9	-93.0
-400.0	-84.6	-88.1	-91.9	-95.8	-91.9
-300.0	-83.2	-86.7	-90.5	-94.4	-90.4
-200.0	-81.1	-84.6	-88.5	-92.4	-88.4
-100.0	-77.8	-81.3	-85.3	-89.0	-84.9
-100.0	-77.8	-81.3	-85.3	-89.0	-84.9
-95.0	-77.5	-81.0	-85.0	-88.7	-84.7
-90.0	-77.3	-80.8	-84.8	-88.5	-84.4
-85.0	-77.0	-80.5	-84.6	-88.2	-84.1
-80.0	-76.8	-80.3	-84.3	-88.0	-83.8
-75.0	-76.5	-80.0	-84.1	-87.7	-83.5
-70.0	-76.2	-79.7	-83.8	-87.4	-83.2
-65.0	-75.8	-79.3	-83.5	-87.0	-82.8
-60.0	-75.5	-79.0	-83.2	-86.7	-82.5
-55.0	-75.2	-78.7	-82.9	-86.3	-82.1
-50.0	-74.8	-78.3	-82.6	-86.0	-81.6
-45.0	-74.4	-77.9	-82.3	-85.6	-81.2
-40.0	-74.0	-77.5	-82.0	-85.2	-80.6
-35.0	-73.5	-77.0	-81.7	-84.8	-80.1
-30.0	-73.1	-76.6	-81.4	-84.4	-79.5
-25.0	-72.6	-76.1	-81.1	-84.0	-78.9
-20.0	-72.1	-75.6	-80.9	-83.6	-78.3
-15.0	-71.7	-75.2	-80.7	-83.3	-77.7
-10.0	-71.4	-74.9	-80.6	-83.1	-77.3

-5.0	-71.3	-74.8	-80.6	-83.1	-77.1
0.0	-71.4	-74.9	-80.6	-83.1	-77.2
5.0	-71.6	-75.1	-80.7	-83.3	-77.6
10.0	-72.0	-75.5	-80.8	-83.6	-78.1
15.0	-72.5	-76.0	-81.1	-84.0	-78.7
20.0	-72.9	-76.4	-81.3	-84.4	-79.3
25.0	-73.4	-76.9	-81.6	-84.8	-79.9
30.0	-73.8	-77.3	-81.9	-85.2	-80.5
35.0	-74.3	-77.8	-82.2	-85.6	-81.0
40.0	-74.7	-78.2	-82.5	-86.0	-81.5
45.0	-75.1	-78.6	-82.8	-86.4	-81.9
50.0	-75.4	-78.9	-83.1	-86.7	-82.3
55.0	-75.8	-79.3	-83.4	-87.1	-82.7
60.0	-76.1	-79.6	-83.7	-87.4	-83.1
65.0	-76.4	-79.9	-84.0	-87.7	-83.4
70.0	-76.7	-80.2	-84.2	-88.0	-83.7
75.0	-77.0	-80.5	-84.5	-88.2	-84.0
80.0	-77.2	-80.7	-84.7	-88.5	-84.3
85.0	-77.5	-81.0	-85.0	-88.8	-84.6
90.0	-77.7	-81.2	-85.2	-89.0	-84.9
95.0	-78.0	-81.5	-85.4	-89.2	-85.1
100.0	-78.2	-81.7	-85.6	-89.5	-85.3
200.0	-81.4	-84.9	-88.7	-92.6	-88.6
300.0	-83.3	-86.8	-90.6	-94.6	-90.6
400.0	-84.7	-88.2	-92.0	-96.0	-92.0
500.0	-85.8	-89.3	-93.1	-97.0	-93.1
600.0	-86.7	-90.2	-94.0	-97.9	-94.0
700.0	-87.4	-90.9	-94.8	-98.7	-94.7
800.0	-88.1	-91.6	-95.4	-99.3	-95.4
900.0	-88.7	-92.2	-96.0	-99.9	-96.0
1000.0	-89.2	-92.7	-96.5	-100.4	-96.5

1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - RAIN

DIST FROM REFERENCE	* * * * * FREQUENCY, MHZ * * * * *												
	0.100	0.200	0.300	0.500	0.834	1.000	1.250	1.500	2.000	3.000	5.000	10.000	20.000
(FEET)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)
-1000.0	-77.7	-76.0	-75.0	-74.0	-74.1	-74.5	-75.3	-76.3	-78.4	-82.7	-90.7	-108.6	-130.5
-900.0	-76.1	-74.7	-73.8	-73.0	-73.2	-73.6	-74.4	-75.3	-77.4	-81.7	-89.5	-106.8	-128.5
-800.0	-74.3	-73.2	-72.5	-71.9	-72.1	-72.5	-73.3	-74.3	-76.4	-80.6	-88.2	-104.9	-126.4
-700.0	-72.2	-71.4	-71.0	-70.5	-70.8	-71.3	-72.1	-73.1	-75.2	-79.3	-86.7	-102.7	-123.9
-600.0	-69.7	-69.3	-69.1	-68.9	-69.4	-69.9	-70.7	-71.7	-73.8	-77.9	-85.1	-100.4	-121.1
-500.0	-66.7	-66.6	-66.7	-66.9	-67.6	-68.1	-69.0	-70.0	-72.1	-76.2	-83.3	-97.7	-117.8
-400.0	-63.0	-63.2	-63.7	-64.4	-65.4	-66.0	-66.9	-68.0	-70.1	-74.1	-81.1	-94.7	-113.8
-300.0	-58.1	-58.6	-59.4	-60.7	-62.3	-63.0	-64.1	-65.2	-67.4	-71.5	-78.3	-91.0	-108.7
-200.0	-51.2	-52.0	-53.1	-55.1	-57.5	-58.5	-59.9	-61.2	-63.5	-67.8	-74.5	-86.4	-101.8
-100.0	-39.8	-40.7	-42.1	-44.7	-48.2	-49.7	-51.7	-53.4	-56.4	-61.2	-68.2	-79.2	-91.2
-100.0	-39.8	-40.7	-42.1	-44.7	-48.2	-49.7	-51.7	-53.4	-56.4	-61.2	-68.2	-79.2	-91.2
-95.0	-39.0	-39.9	-41.3	-43.9	-47.5	-49.0	-51.0	-52.8	-55.9	-60.7	-67.7	-78.7	-90.5
-90.0	-38.2	-39.1	-40.5	-43.1	-46.7	-48.3	-50.3	-52.2	-55.3	-60.2	-67.3	-78.1	-89.7
-85.0	-37.3	-38.2	-39.6	-42.3	-46.0	-47.5	-49.6	-51.5	-54.7	-59.7	-66.8	-77.6	-88.9
-80.0	-36.4	-37.4	-38.7	-41.4	-45.1	-46.7	-48.9	-50.8	-54.0	-59.1	-66.2	-77.0	-88.2
-75.0	-35.5	-36.4	-37.8	-40.5	-44.3	-45.9	-48.1	-50.0	-53.4	-58.5	-65.7	-76.4	-87.3
-70.0	-34.5	-35.5	-36.9	-39.6	-43.4	-45.0	-47.3	-49.2	-52.6	-57.9	-65.1	-75.8	-86.5
-65.0	-33.5	-34.5	-35.9	-38.6	-42.5	-44.1	-46.4	-48.4	-51.9	-57.2	-64.5	-75.2	-85.6
-60.0	-32.5	-33.4	-34.9	-37.6	-41.5	-43.2	-45.5	-47.5	-51.0	-56.5	-63.9	-74.5	-85.0
-55.0	-31.4	-32.4	-33.8	-36.5	-40.5	-42.2	-44.5	-46.6	-50.2	-55.7	-63.2	-73.8	-84.4
-50.0	-30.3	-31.3	-32.7	-35.5	-39.4	-41.2	-43.5	-45.6	-49.3	-54.9	-62.5	-73.0	-83.8
-45.0	-29.2	-30.2	-31.6	-34.4	-38.4	-40.1	-42.5	-44.7	-48.4	-54.1	-61.8	-72.2	-83.1
-40.0	-28.1	-29.0	-30.5	-33.2	-37.3	-39.0	-41.5	-43.6	-47.4	-53.3	-61.0	-71.4	-82.5
-35.0	-26.6	-27.5	-28.9	-31.8	-35.9	-37.7	-40.3	-42.6	-46.5	-52.4	-60.3	-70.6	-81.9
-30.0	-24.4	-25.4	-26.8	-29.6	-33.8	-35.6	-38.2	-40.6	-44.7	-51.3	-59.5	-69.9	-81.3
-25.0	-22.1	-23.1	-24.5	-27.4	-31.5	-33.4	-36.0	-38.4	-42.6	-49.3	-58.4	-69.1	-80.7
-20.0	-19.8	-20.7	-22.2	-25.0	-29.2	-31.1	-33.7	-36.1	-40.3	-47.2	-56.5	-68.3	-80.2
-15.0	-17.5	-18.5	-19.9	-22.8	-27.0	-28.9	-31.5	-33.9	-38.2	-45.1	-54.6	-66.6	-79.0
-10.0	-15.8	-16.8	-18.2	-21.1	-25.3	-27.1	-29.8	-32.2	-36.5	-43.5	-53.1	-65.3	-78.0
-5.0	-15.0	-15.9	-17.4	-20.2	-24.5	-26.3	-29.0	-31.4	-35.7	-42.7	-52.4	-64.8	-77.6

0.0	-15.4	-16.4	-17.8	-20.7	-24.9	-26.7	-29.4	-31.8	-36.1	-43.1	-52.8	-65.0	-77.8
5.0	-16.9	-17.8	-19.3	-22.1	-26.3	-28.2	-30.8	-33.3	-37.6	-44.5	-54.1	-66.1	-78.6
10.0	-19.0	-20.0	-21.4	-24.2	-28.4	-30.3	-32.9	-35.3	-39.6	-46.5	-55.9	-67.7	-79.8
15.0	-21.3	-22.3	-23.7	-26.6	-30.8	-32.6	-35.2	-37.6	-41.8	-48.6	-57.8	-68.9	-80.6
20.0	-23.7	-24.6	-26.1	-28.9	-33.1	-34.9	-37.5	-39.8	-44.0	-50.6	-59.3	-69.6	-81.1
25.0	-25.9	-26.8	-28.2	-31.1	-35.2	-37.1	-39.6	-41.9	-46.1	-52.1	-60.0	-70.4	-81.7
30.0	-27.7	-28.7	-30.1	-32.9	-36.9	-38.7	-41.1	-43.3	-47.1	-53.0	-60.8	-71.2	-82.3
35.0	-28.8	-29.8	-31.2	-34.0	-38.0	-39.7	-42.2	-44.3	-48.1	-53.8	-61.5	-72.0	-82.9
40.0	-30.0	-30.9	-32.3	-35.1	-39.1	-40.8	-43.2	-45.3	-49.0	-54.7	-62.3	-72.8	-83.6
45.0	-31.1	-32.0	-33.4	-36.2	-40.1	-41.8	-44.2	-46.3	-49.9	-55.5	-63.0	-73.5	-84.2
50.0	-32.2	-33.1	-34.5	-37.2	-41.2	-42.8	-45.2	-47.2	-50.8	-56.2	-63.7	-74.2	-84.8
55.0	-33.2	-34.1	-35.5	-38.3	-42.1	-43.8	-46.1	-48.1	-51.6	-57.0	-64.3	-74.9	-85.4
60.0	-34.2	-35.1	-36.5	-39.3	-43.1	-44.7	-47.0	-49.0	-52.4	-57.7	-64.9	-75.6	-86.2
65.0	-35.2	-36.1	-37.5	-40.2	-44.0	-45.6	-47.8	-49.8	-53.1	-58.3	-65.5	-76.2	-87.0
70.0	-36.1	-37.1	-38.4	-41.1	-44.9	-46.5	-48.6	-50.5	-53.8	-58.9	-66.1	-76.8	-87.9
75.0	-37.0	-38.0	-39.3	-42.0	-45.7	-47.3	-49.4	-51.3	-54.5	-59.5	-66.6	-77.4	-88.7
80.0	-37.9	-38.8	-40.2	-42.8	-46.5	-48.0	-50.1	-51.9	-55.1	-60.1	-67.1	-78.0	-89.5
85.0	-38.7	-39.6	-41.0	-43.6	-47.2	-48.8	-50.8	-52.6	-55.7	-60.6	-67.6	-78.5	-90.2
90.0	-39.5	-40.4	-41.8	-44.4	-48.0	-49.4	-51.4	-53.2	-56.3	-61.1	-68.0	-79.0	-90.9
95.0	-40.3	-41.2	-42.6	-45.1	-48.6	-50.1	-52.1	-53.8	-56.8	-61.5	-68.5	-79.5	-91.6
100.0	-41.1	-42.0	-43.3	-45.8	-49.3	-50.7	-52.6	-54.3	-57.3	-62.0	-68.9	-80.0	-92.3
200.0	-51.9	-52.6	-53.7	-55.7	-58.0	-59.0	-60.3	-61.6	-63.9	-68.1	-74.9	-86.8	-102.4
300.0	-58.6	-59.1	-59.9	-61.1	-62.6	-63.3	-64.4	-65.5	-67.7	-71.7	-78.6	-91.4	-109.1
400.0	-63.3	-63.5	-64.0	-64.6	-65.6	-66.2	-67.1	-68.1	-70.3	-74.3	-81.3	-94.9	-114.1
500.0	-67.0	-66.9	-67.0	-67.1	-67.8	-68.3	-69.2	-70.2	-72.3	-76.3	-83.4	-98.0	-118.1
600.0	-69.9	-69.5	-69.3	-69.1	-69.5	-70.0	-70.8	-71.8	-73.9	-78.0	-85.3	-100.6	-121.4
700.0	-72.4	-71.6	-71.1	-70.7	-71.0	-71.4	-72.2	-73.2	-75.3	-79.4	-86.9	-102.9	-124.2
800.0	-74.5	-73.3	-72.6	-72.0	-72.2	-72.6	-73.4	-74.4	-76.5	-80.7	-88.3	-105.0	-126.6
900.0	-76.3	-74.8	-73.9	-73.1	-73.3	-73.7	-74.5	-75.4	-77.5	-81.8	-89.6	-107.0	-128.7
1000.0	-77.9	-76.1	-75.0	-74.1	-74.2	-74.6	-75.4	-76.4	-78.5	-82.8	-90.8	-108.7	-130.6

1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - FAIR

* * * * * L50 * * * * *

DIST FROM * * * * * FREQUENCY, MHZ * * * * *

REFERENCE

(FEET)	0.100 (DB)	0.200 (DB)	0.300 (DB)	0.500 (DB)	0.834 (DB)	1.000 (DB)	1.250 (DB)	1.500 (DB)	2.000 (DB)	3.000 (DB)	5.000 (DB)	10.000 (DB)	20.000 (DB)
-1000.0	-94.7	-93.0	-92.0	-91.0	-91.1	-91.5	-92.3	-93.3	-95.4	-99.7	-107.7	-125.6	-147.5
-900.0	-93.1	-91.7	-90.8	-90.0	-90.2	-90.6	-91.4	-92.3	-94.4	-98.7	-106.5	-123.8	-145.5
-800.0	-91.3	-90.2	-89.5	-88.9	-89.1	-89.5	-90.3	-91.3	-93.4	-97.6	-105.2	-121.9	-143.4
-700.0	-89.2	-88.4	-88.0	-87.5	-87.8	-88.3	-89.1	-90.1	-92.2	-96.3	-103.7	-119.7	-140.9
-600.0	-86.7	-86.3	-86.1	-85.9	-86.4	-86.9	-87.7	-88.7	-90.8	-94.9	-102.1	-117.4	-138.1
-500.0	-83.7	-83.6	-83.7	-83.9	-84.6	-85.1	-86.0	-87.0	-89.1	-93.2	-100.3	-114.7	-134.8
-400.0	-80.0	-80.2	-80.7	-81.4	-82.4	-83.0	-83.9	-85.0	-87.1	-91.1	-98.1	-111.7	-130.8
-300.0	-75.1	-75.6	-76.4	-77.7	-79.3	-80.0	-81.1	-82.2	-84.4	-88.5	-95.3	-108.0	-125.7
-200.0	-68.2	-69.0	-70.1	-72.1	-74.5	-75.5	-76.9	-78.2	-80.5	-84.8	-91.5	-103.4	-118.8
-100.0	-56.8	-57.7	-59.1	-61.7	-65.2	-66.7	-68.7	-70.4	-73.4	-78.2	-85.2	-96.2	-108.2
-100.0	-56.8	-57.7	-59.1	-61.7	-65.2	-66.7	-68.7	-70.4	-73.4	-78.2	-85.2	-96.2	-108.2
-95.0	-56.0	-56.9	-58.3	-60.9	-64.5	-66.0	-68.0	-69.8	-72.9	-77.7	-84.7	-95.7	-107.5
-90.0	-55.2	-56.1	-57.5	-60.1	-63.7	-65.3	-67.3	-69.2	-72.3	-77.2	-84.3	-95.1	-106.7
-85.0	-54.3	-55.2	-56.6	-59.3	-63.0	-64.5	-66.6	-68.5	-71.7	-76.7	-83.8	-94.6	-105.9
-80.0	-53.4	-54.4	-55.7	-58.4	-62.1	-63.7	-65.9	-67.8	-71.0	-76.1	-83.2	-94.0	-105.2
-75.0	-52.5	-53.4	-54.8	-57.5	-61.3	-62.9	-65.1	-67.0	-70.4	-75.5	-82.7	-93.4	-104.3
-70.0	-51.5	-52.5	-53.9	-56.6	-60.4	-62.0	-64.3	-66.2	-69.6	-74.9	-82.1	-92.8	-103.5
-65.0	-50.5	-51.5	-52.9	-55.6	-59.5	-61.1	-63.4	-65.4	-68.9	-74.2	-81.5	-92.2	-102.6
-60.0	-49.5	-50.4	-51.9	-54.6	-58.5	-60.2	-62.5	-64.5	-68.0	-73.5	-80.9	-91.5	-102.0
-55.0	-48.4	-49.4	-50.8	-53.5	-57.5	-59.2	-61.5	-63.6	-67.2	-72.7	-80.2	-90.8	-101.4
-50.0	-47.3	-48.3	-49.7	-52.5	-56.4	-58.2	-60.5	-62.6	-66.3	-71.9	-79.5	-90.0	-100.8
-45.0	-46.2	-47.2	-48.6	-51.4	-55.4	-57.1	-59.5	-61.7	-65.4	-71.1	-78.8	-89.2	-100.1
-40.0	-45.1	-46.0	-47.5	-50.2	-54.3	-56.0	-58.5	-60.6	-64.4	-70.3	-78.0	-88.4	-99.5
-35.0	-43.6	-44.5	-45.9	-48.8	-52.9	-54.7	-57.3	-59.6	-63.5	-69.4	-77.3	-87.6	-98.9
-30.0	-41.4	-42.4	-43.8	-46.6	-50.8	-52.6	-55.2	-57.6	-61.7	-68.3	-76.5	-86.9	-98.3
-25.0	-39.1	-40.1	-41.5	-44.4	-48.5	-50.4	-53.0	-55.4	-59.6	-66.3	-75.4	-86.1	-97.7
-20.0	-36.8	-37.7	-39.2	-42.0	-46.2	-48.1	-50.7	-53.1	-57.3	-64.2	-73.5	-85.3	-97.2
-15.0	-34.5	-35.5	-36.9	-39.8	-44.0	-45.9	-48.5	-50.9	-55.2	-62.1	-71.6	-83.6	-96.0
-10.0	-32.8	-33.8	-35.2	-38.1	-42.3	-44.1	-46.8	-49.2	-53.5	-60.5	-70.1	-82.3	-95.0
-5.0	-32.0	-32.9	-34.4	-37.2	-41.5	-43.3	-46.0	-48.4	-52.7	-59.7	-69.4	-81.8	-94.6
0.0	-32.4	-33.4	-34.8	-37.7	-41.9	-43.7	-46.4	-48.8	-53.1	-60.1	-69.8	-82.0	-94.8

5.0	-33.9	-34.8	-36.3	-39.1	-43.3	-45.2	-47.8	-50.3	-54.6	-61.5	-71.1	-83.1	-95.6
10.0	-36.0	-37.0	-38.4	-41.2	-45.4	-47.3	-49.9	-52.3	-56.6	-63.5	-72.9	-84.7	-96.8
15.0	-38.3	-39.3	-40.7	-43.6	-47.8	-49.6	-52.2	-54.6	-58.8	-65.6	-74.8	-85.9	-97.6
20.0	-40.7	-41.6	-43.1	-45.9	-50.1	-51.9	-54.5	-56.8	-61.0	-67.6	-76.3	-86.6	-98.1
25.0	-42.9	-43.8	-45.2	-48.1	-52.2	-54.1	-56.6	-58.9	-63.1	-69.1	-77.0	-87.4	-98.7
30.0	-44.7	-45.7	-47.1	-49.9	-53.9	-55.7	-58.1	-60.3	-64.1	-70.0	-77.8	-88.2	-99.3
35.0	-45.8	-46.8	-48.2	-51.0	-55.0	-56.7	-59.2	-61.3	-65.1	-70.8	-78.5	-89.0	-99.9
40.0	-47.0	-47.9	-49.3	-52.1	-56.1	-57.8	-60.2	-62.3	-66.0	-71.7	-79.3	-89.8	-100.6
45.0	-48.1	-49.0	-50.4	-53.2	-57.1	-58.8	-61.2	-63.3	-66.9	-72.5	-80.0	-90.5	-101.2
50.0	-49.2	-50.1	-51.5	-54.2	-58.2	-59.8	-62.2	-64.2	-67.8	-73.2	-80.7	-91.2	-101.8
55.0	-50.2	-51.1	-52.5	-55.3	-59.1	-60.8	-63.1	-65.1	-68.6	-74.0	-81.3	-91.9	-102.4
60.0	-51.2	-52.1	-53.5	-56.3	-60.1	-61.7	-64.0	-66.0	-69.4	-74.7	-81.9	-92.6	-103.2
65.0	-52.2	-53.1	-54.5	-57.2	-61.0	-62.6	-64.8	-66.8	-70.1	-75.3	-82.5	-93.2	-104.0
70.0	-53.1	-54.1	-55.4	-58.1	-61.9	-63.5	-65.6	-67.5	-70.8	-75.9	-83.1	-93.8	-104.9
75.0	-54.0	-55.0	-56.3	-59.0	-62.7	-64.3	-66.4	-68.3	-71.5	-76.5	-83.6	-94.4	-105.7
80.0	-54.9	-55.8	-57.2	-59.8	-63.5	-65.0	-67.1	-68.9	-72.1	-77.1	-84.1	-95.0	-106.5
85.0	-55.7	-56.6	-58.0	-60.6	-64.2	-65.8	-67.8	-69.6	-72.7	-77.6	-84.6	-95.5	-107.2
90.0	-56.5	-57.4	-58.8	-61.4	-65.0	-66.4	-68.4	-70.2	-73.3	-78.1	-85.0	-96.0	-107.9
95.0	-57.3	-58.2	-59.6	-62.1	-65.6	-67.1	-69.1	-70.8	-73.8	-78.5	-85.5	-96.5	-108.6
100.0	-58.1	-59.0	-60.3	-62.8	-66.3	-67.7	-69.6	-71.3	-74.3	-79.0	-85.9	-97.0	-109.3
200.0	-68.9	-69.6	-70.7	-72.7	-75.0	-76.0	-77.3	-78.6	-80.9	-85.1	-91.9	-103.8	-119.4
300.0	-75.6	-76.1	-76.9	-78.1	-79.6	-80.3	-81.4	-82.5	-84.7	-88.7	-95.6	-108.4	-126.1
400.0	-80.3	-80.5	-81.0	-81.6	-82.6	-83.2	-84.1	-85.1	-87.3	-91.3	-98.3	-111.9	-131.1
500.0	-84.0	-83.9	-84.0	-84.1	-84.8	-85.3	-86.2	-87.2	-89.3	-93.3	-100.4	-115.0	-135.1
600.0	-86.9	-86.5	-86.3	-86.1	-86.5	-87.0	-87.8	-88.8	-90.9	-95.0	-102.3	-117.6	-138.4
700.0	-89.4	-88.6	-88.1	-87.7	-88.0	-88.4	-89.2	-90.2	-92.3	-96.4	-103.9	-119.9	-141.2
800.0	-91.5	-90.3	-89.6	-89.0	-89.2	-89.6	-90.4	-91.4	-93.5	-97.7	-105.3	-122.0	-143.6
900.0	-93.3	-91.8	-90.9	-90.1	-90.3	-90.7	-91.5	-92.4	-94.5	-98.8	-106.6	-124.0	-145.7
1000.0	-94.9	-93.1	-92.0	-91.1	-91.2	-91.6	-92.4	-93.4	-95.5	-99.8	-107.8	-125.7	-147.6

1ELECTRIC FIELD CALCULATIONS

********** CORONA AND FIELDS PROGRAM Version 3.1 **********
********** Montague 34.5kV double-curcuit monopole **********

DIST. FROM MAXIMUM SUBCON. NO. OF PHASE

	REFERENCE FEET	HEIGHT FEET	GRADIENT (KV/CM)	DIAM. (IN)	SUBCON.	ANGLE (DEGREES)
PH.A-1	-4.17	45.00	2.14	1.55	1	0.0
PH.B-1	-5.15	35.00	1.98	1.55	1	-120.0
PH.C-1	-4.17	25.00	2.14	1.55	1	120.0
PH.A-2	4.17	25.00	2.14	1.55	1	0.0
PH.B-2	5.15	35.00	1.98	1.55	1	-120.0
PH.C-2	4.17	45.00	2.14	1.55	1	120.0
GND1-1	0.66	53.50	0.30	0.75	1	0.0

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	E-FIELD (KV/METER)	THETA (DEGREES)	EY-FIELD (KV/METER)	THETAY (DEGREES)	EX-FIELD (KV/METER)	THETAX (DEGREES)	SPACE POTENTIAL (VOLTS)
-1000.0	0.000	89.6	0.000	-131.7	0.000	-135.1	0.1
-900.0	0.000	89.6	0.000	-132.5	0.000	-136.2	0.1
-800.0	0.000	89.5	0.000	-133.4	0.000	-137.6	0.1
-700.0	0.000	89.5	0.000	-134.6	0.000	-139.4	0.1
-600.0	0.000	89.4	0.000	-136.2	0.000	-141.6	0.2
-500.0	0.000	89.2	0.000	-138.4	0.000	-144.8	0.3
-400.0	0.000	89.1	0.000	-141.5	0.000	-149.3	0.4
-300.0	0.001	88.8	0.001	-146.6	0.000	-156.4	0.7
-200.0	0.002	88.2	0.002	-155.8	0.000	-169.0	1.6
-100.0	0.005	88.4	0.005	-176.2	0.000	150.9	4.7
-100.0	0.005	88.4	0.005	-176.2	0.000	150.9	4.7
-95.0	0.005	88.7	0.005	-177.8	0.000	141.7	4.9
-90.0	0.005	89.2	0.005	-179.6	0.000	124.9	5.0
-85.0	0.005	90.0	0.005	178.6	0.000	89.9	5.1
-80.0	0.005	91.2	0.005	176.7	0.000	42.3	5.0
-75.0	0.005	93.3	0.005	174.8	0.000	14.5	4.7
-70.0	0.004	97.3	0.004	173.0	0.001	0.2	4.1
-65.0	0.003	106.6	0.003	172.0	0.001	-9.0	3.0

-60.0	0.002	139.2	0.001	177.4	0.002	-16.2	1.2
-55.0	0.003	34.2	0.002	-31.7	0.002	-22.6	1.9
-50.0	0.007	58.5	0.006	-26.9	0.004	-28.9	6.7
-45.0	0.015	66.2	0.014	-29.3	0.006	-35.3	14.1
-40.0	0.026	69.8	0.025	-33.2	0.009	-42.1	25.4
-35.0	0.044	72.0	0.041	-38.0	0.014	-49.7	42.4
-30.0	0.069	73.7	0.066	-43.7	0.020	-58.1	67.2
-25.0	0.104	75.6	0.100	-50.1	0.027	-68.3	101.4
-20.0	0.148	78.1	0.145	-57.5	0.033	-82.2	144.6
-15.0	0.195	81.8	0.193	-66.4	0.036	-105.6	190.3
-10.0	0.230	86.3	0.230	-78.2	0.039	-146.7	224.3
-5.0	0.242	90.1	0.242	-95.7	0.056	174.0	235.3
0.0	0.240	90.0	0.240	-120.1	0.067	150.0	234.1
5.0	0.242	89.9	0.242	-144.6	0.056	125.9	235.7
10.0	0.231	93.6	0.231	-162.1	0.039	86.8	225.0
15.0	0.196	98.2	0.194	-173.9	0.036	45.8	191.2
20.0	0.149	101.7	0.146	177.1	0.033	22.3	145.8
25.0	0.105	104.1	0.102	169.5	0.027	8.4	102.8
30.0	0.070	105.9	0.067	162.9	0.020	-1.8	68.7
35.0	0.045	107.4	0.043	157.1	0.014	-10.4	44.0
40.0	0.028	109.1	0.026	152.0	0.009	-18.0	27.1
45.0	0.016	111.6	0.015	147.7	0.006	-24.9	15.7
50.0	0.009	116.6	0.008	144.6	0.004	-31.4	8.2
55.0	0.004	129.0	0.003	144.2	0.003	-37.7	3.4
60.0	0.002	177.1	0.000	-148.4	0.002	-44.1	0.4
65.0	0.002	62.0	0.002	-57.7	0.001	-50.9	1.8
70.0	0.003	78.8	0.003	-56.9	0.001	-59.2	2.9
75.0	0.004	84.8	0.004	-58.4	0.000	-70.6	3.6
80.0	0.004	87.7	0.004	-60.3	0.000	-89.6	4.0
85.0	0.004	89.3	0.004	-62.4	0.000	-124.9	4.2
90.0	0.004	90.3	0.004	-64.4	0.000	-167.6	4.2
95.0	0.004	90.9	0.004	-66.3	0.000	166.8	4.1
100.0	0.004	91.3	0.004	-68.2	0.000	153.3	4.0
200.0	0.001	91.7	0.001	-91.5	0.000	104.1	1.4
300.0	0.001	91.2	0.001	-101.8	0.000	89.4	0.7

400.0	0.000	90.9	0.000	-107.3	0.000	81.3	0.4
500.0	0.000	90.7	0.000	-110.8	0.000	76.3	0.2
600.0	0.000	90.6	0.000	-113.1	0.000	72.8	0.2
700.0	0.000	90.5	0.000	-114.7	0.000	70.4	0.1
800.0	0.000	90.5	0.000	-116.0	0.000	68.4	0.1
900.0	0.000	90.4	0.000	-117.0	0.000	66.9	0.1
1000.0	0.000	90.4	0.000	-117.8	0.000	65.8	0.1

1MAGNETIC FIELD CALCULATIONS

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	B-FIELD (GAUSS)	THETA	BY-FIELD (GAUSS)	THETAY	BX-FIELD (GAUSS)	THETAX
-1000.0	0.00011448	3.6	0.00001021	14.5	0.00011425	-30.2
-900.0	0.00014142	4.1	0.00001341	11.8	0.00014107	-30.3
-800.0	0.00017913	4.6	0.00001828	8.8	0.00017857	-30.3
-700.0	0.00023419	5.2	0.00002617	5.5	0.00023323	-30.4
-600.0	0.00031914	6.1	0.00003991	1.9	0.00031734	-30.4
-500.0	0.00046021	7.3	0.00006643	-1.9	0.00045648	-30.5
-400.0	0.00072027	9.2	0.00012534	-6.1	0.00071115	-30.7
-300.0	0.00128244	12.2	0.00028777	-10.7	0.00125357	-31.1
-200.0	0.00288079	18.3	0.00093605	-15.7	0.00273570	-31.9
-100.0	0.01106749	36.2	0.00660888	-22.4	0.00896382	-35.8
-100.0	0.01106749	36.2	0.00660888	-22.4	0.00896382	-35.8
-95.0	0.01217677	38.0	0.00757382	-22.8	0.00963604	-36.3
-90.0	0.01345360	40.0	0.00872615	-23.4	0.01036014	-36.9
-85.0	0.01493159	42.2	0.01011037	-23.9	0.01113248	-37.6
-80.0	0.01665266	44.6	0.01178296	-24.5	0.01194364	-38.5
-75.0	0.01866933	47.3	0.01381571	-25.2	0.01277468	-39.6
-70.0	0.02104776	50.4	0.01629957	-26.0	0.01359136	-40.9
-65.0	0.02387161	53.8	0.01934896	-26.8	0.01433515	-42.6

-60.0	0.02724694	57.7	0.02310554	-27.8	0.01490951	-44.8
-55.0	0.03130792	62.1	0.02773929	-28.9	0.01516025	-47.9
-50.0	0.03622328	67.2	0.03344186	-30.1	0.01485137	-52.3
-45.0	0.04220159	73.0	0.04040098	-31.6	0.01365622	-59.7
-40.0	0.04949158	79.8	0.04873295	-33.4	0.01129719	-74.3
-35.0	0.05836717	87.9	0.05832715	-35.4	0.00885371	248.6
-30.0	0.06907459	97.3	0.06852213	-37.7	0.01323325	191.6
-25.0	0.08169437	108.6	0.07750985	-40.3	0.02813341	164.5
-20.0	0.09584197	122.0	0.08149640	-43.2	0.05183065	152.5
-15.0	0.11016390	137.9	0.07435583	-46.3	0.08211745	145.8
-10.0	0.12189292	156.2	0.05010202	-50.7	0.11156455	141.8
-5.0	0.12740865	176.1	0.01109063	-78.8	0.12711212	139.8
0.0	0.12451731	-163.7	0.03506243	145.1	0.11952566	139.4
5.0	0.11441907	-144.8	0.06601932	140.8	0.09345225	140.4
10.0	0.10058236	-128.0	0.07925484	140.8	0.06194807	142.5
15.0	0.08618666	-113.7	0.07891941	141.9	0.03471107	145.9
20.0	0.07300875	-101.7	0.07150405	143.2	0.01493283	152.4
25.0	0.06168189	-91.5	0.06166003	144.4	0.00269452	196.9
30.0	0.05223516	-83.0	0.05184260	145.5	0.00663909	-50.3
35.0	0.04445759	-75.7	0.04307934	146.4	0.01107815	-41.3
40.0	0.03807765	-69.5	0.03565750	147.2	0.01340575	-38.0
45.0	0.03283687	-64.1	0.02953404	147.7	0.01437835	-36.1
50.0	0.02851388	-59.4	0.02454416	148.1	0.01452722	-34.8
55.0	0.02492777	-55.3	0.02049694	148.5	0.01419484	-33.9
60.0	0.02193390	-51.7	0.01721473	148.7	0.01359649	-33.1
65.0	0.01941773	-48.5	0.01454606	148.8	0.01286532	-32.6
70.0	0.01728887	-45.7	0.01236713	148.9	0.01208237	-32.1
75.0	0.01547587	-43.1	0.01057891	148.9	0.01129593	-31.8
80.0	0.01392207	-40.8	0.00910309	148.9	0.01053374	-31.4
85.0	0.01258233	-38.8	0.00787794	148.9	0.00981088	-31.2
90.0	0.01142054	-36.9	0.00685489	148.8	0.00913452	-31.0
95.0	0.01040755	-35.2	0.00599562	148.7	0.00850714	-30.8
100.0	0.00951978	-33.6	0.00526981	148.6	0.00792835	-30.6
200.0	0.00265635	-17.6	0.00080783	144.5	0.00253172	-29.7
300.0	0.00121396	-11.9	0.00025432	139.7	0.00118791	-29.7

400.0	0.00069108	-9.0	0.00011162	134.9	0.00068264	-29.7
500.0	0.00044519	-7.2	0.00005927	130.2	0.00044169	-29.7
600.0	0.00031042	-6.0	0.00003562	125.8	0.00030872	-29.7
700.0	0.00022870	-5.2	0.00002335	121.7	0.00022777	-29.8
800.0	0.00017545	-4.5	0.00001632	117.9	0.00017490	-29.8
900.0	0.00013883	-4.0	0.00001197	114.3	0.00013849	-29.8
1000.0	0.00011259	-3.6	0.00000913	111.1	0.00011236	-29.8

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Attachment AA-3
Results of the Bonneville Power Administration Corona and Field Effects Program for 230-kV Monopole Overhead Transmission Lines

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Û       C O R O N A   A N D   F I E L D      Û
Û E F F E C T S   P R O G R A M   V E R. 3.1  Û
Û   Source: Bonneville Power Administration   Û
ÛÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÛ
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INPUT DATA LIST

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           10/13/2017          08:55:52
 ******************  CORONA AND FIELDS PROGRAM Version 3.1  *************
 ******************  Montague Wind Run 03  230kV monopole ***************
 1,0, 3, 4,0.0,   2.00,   2.00,   0.00

 (ENGLISH UNITS OPTION)

 (GRADIENTS ARE COMPUTED BY PROGRAM)

 PHYSICAL SYSTEM CONSISTS OF  4 CONDUCTORS, OF WHICH  3 ARE ENERGIZED PHASES

 OPTIONS: 'EF','MF','RI','AN'
   4.921,  6.562,  9.842,  0.000,  1.000, 75.000,  3.280,  6.700,  3.280
 'PH.A-1  ','A',  -12.00,   52.83, 1,   1.345,   0.000, 133.000,   0.000,   1.014,   0.000
 'PH.B-1  ','A',  -12.00,   30.00, 1,   1.345,   0.000, 133.000,-120.000,   1.014,   0.000
 'PH.C-1  ','A',   12.00,   30.00, 1,   1.345,   0.000, 133.000, 120.000,   1.014,   0.000
 'GND1-1  ','A',   -4.00,   74.30, 1,   0.750,   0.000,   0.000,   0.000,   0.000,   0.000
  10-1000.0  100.0
  20 -100.0    5.0
  20    0.0    5.0
  10  100.0  100.0
   0    0.0    0.0
1AUDIBLE NOISE CALCULATION - RAIN
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DIST FROM REFERENCE (FEET)	TOTALS L5 (DBA)	L50 (DBA)	PH.A-1	PH.B-1	PH.C-1
-1000.0	27.3	23.8	17.7	20.4	18.4
-900.0	27.8	24.3	18.2	20.9	19.0
-800.0	28.4	24.9	18.8	21.5	19.5
-700.0	29.0	25.5	19.4	22.2	20.2
-600.0	29.8	26.3	20.2	23.0	20.9
-500.0	30.7	27.2	21.1	23.9	21.8
-400.0	31.8	28.3	22.3	25.0	22.9
-300.0	33.3	29.8	23.7	26.5	24.3
-200.0	35.3	31.8	25.7	28.6	26.1
-100.0	38.7	35.2	29.0	32.2	29.2
-100.0	38.7	35.2	29.0	32.2	29.2
-95.0	38.9	35.4	29.2	32.5	29.4
-90.0	39.2	35.7	29.4	32.8	29.7
-85.0	39.4	35.9	29.7	33.0	29.9
-80.0	39.7	36.2	29.9	33.4	30.1
-75.0	40.0	36.5	30.2	33.7	30.4
-70.0	40.3	36.8	30.4	34.0	30.7
-65.0	40.6	37.1	30.7	34.4	30.9
-60.0	41.0	37.5	30.9	34.8	31.2
-55.0	41.3	37.8	31.2	35.2	31.6
-50.0	41.7	38.2	31.4	35.7	31.9
-45.0	42.1	38.6	31.7	36.1	32.2
-40.0	42.5	39.0	31.9	36.6	32.6
-35.0	42.9	39.4	32.1	37.1	33.0
-30.0	43.3	39.8	32.3	37.6	33.4
-25.0	43.7	40.2	32.5	38.0	33.9
-20.0	44.1	40.6	32.6	38.4	34.4
-15.0	44.3	40.8	32.6	38.6	34.8
-10.0	44.5	41.0	32.6	38.6	35.3
-5.0	44.5	41.0	32.6	38.4	35.8

0.0	44.4	40.9	32.5	38.1	36.2
5.0	44.3	40.8	32.4	37.7	36.6
10.0	44.1	40.6	32.2	37.2	36.7
15.0	43.9	40.4	32.0	36.7	36.7
20.0	43.6	40.1	31.7	36.2	36.5
25.0	43.2	39.7	31.5	35.8	36.2
30.0	42.8	39.3	31.2	35.3	35.7
35.0	42.3	38.8	31.0	34.9	35.2
40.0	41.9	38.4	30.7	34.5	34.7
45.0	41.5	38.0	30.5	34.1	34.3
50.0	41.2	37.7	30.2	33.8	33.8
55.0	40.8	37.3	30.0	33.4	33.4
60.0	40.4	36.9	29.7	33.1	32.9
65.0	40.1	36.6	29.5	32.8	32.5
70.0	39.8	36.3	29.3	32.5	32.2
75.0	39.5	36.0	29.0	32.3	31.8
80.0	39.2	35.7	28.8	32.0	31.5
85.0	39.0	35.5	28.6	31.8	31.2
90.0	38.7	35.2	28.4	31.5	30.9
95.0	38.5	35.0	28.2	31.3	30.6
100.0	38.3	34.8	28.0	31.1	30.3
200.0	35.1	31.6	25.2	28.0	26.7
300.0	33.1	29.6	23.3	26.1	24.6
400.0	31.7	28.2	22.0	24.7	23.2
500.0	30.6	27.1	20.9	23.7	22.0
600.0	29.7	26.2	20.0	22.8	21.1
700.0	29.0	25.5	19.3	22.0	20.3
800.0	28.3	24.8	18.6	21.4	19.7
900.0	27.7	24.2	18.1	20.8	19.1
1000.0	27.2	23.7	17.5	20.3	18.6

1AUDIBLE NOISE CALCULATION - FAIR

DIST FROM REFERENCE	TOTALS L5	L50	PH.A-1	PH.B-1	PH.C-1

(FEET)	(DBA)	(DBA)			
-1000.0	2.3	-1.2	-7.3	-4.6	-6.6
-900.0	2.8	-0.7	-6.8	-4.1	-6.0
-800.0	3.4	-0.1	-6.2	-3.5	-5.5
-700.0	4.0	0.5	-5.6	-2.8	-4.8
-600.0	4.8	1.3	-4.8	-2.0	-4.1
-500.0	5.7	2.2	-3.9	-1.1	-3.2
-400.0	6.8	3.3	-2.7	0.0	-2.1
-300.0	8.3	4.8	-1.3	1.5	-0.7
-200.0	10.3	6.8	0.7	3.6	1.1
-100.0	13.7	10.2	4.0	7.2	4.2
-100.0	13.7	10.2	4.0	7.2	4.2
-95.0	13.9	10.4	4.2	7.5	4.4
-90.0	14.2	10.7	4.4	7.8	4.7
-85.0	14.4	10.9	4.7	8.0	4.9
-80.0	14.7	11.2	4.9	8.4	5.1
-75.0	15.0	11.5	5.2	8.7	5.4
-70.0	15.3	11.8	5.4	9.0	5.7
-65.0	15.6	12.1	5.7	9.4	5.9
-60.0	16.0	12.5	5.9	9.8	6.2
-55.0	16.3	12.8	6.2	10.2	6.6
-50.0	16.7	13.2	6.4	10.7	6.9
-45.0	17.1	13.6	6.7	11.1	7.2
-40.0	17.5	14.0	6.9	11.6	7.6
-35.0	17.9	14.4	7.1	12.1	8.0
-30.0	18.3	14.8	7.3	12.6	8.4
-25.0	18.7	15.2	7.5	13.0	8.9
-20.0	19.1	15.6	7.6	13.4	9.4
-15.0	19.3	15.8	7.6	13.6	9.8
-10.0	19.5	16.0	7.6	13.6	10.3
-5.0	19.5	16.0	7.6	13.4	10.8
0.0	19.4	15.9	7.5	13.1	11.2
5.0	19.3	15.8	7.4	12.7	11.6

10.0	19.1	15.6	7.2	12.2	11.7
15.0	18.9	15.4	7.0	11.7	11.7
20.0	18.6	15.1	6.7	11.2	11.5
25.0	18.2	14.7	6.5	10.8	11.2
30.0	17.8	14.3	6.2	10.3	10.7
35.0	17.3	13.8	6.0	9.9	10.2
40.0	16.9	13.4	5.7	9.5	9.7
45.0	16.5	13.0	5.5	9.1	9.3
50.0	16.2	12.7	5.2	8.8	8.8
55.0	15.8	12.3	5.0	8.4	8.4
60.0	15.4	11.9	4.7	8.1	7.9
65.0	15.1	11.6	4.5	7.8	7.5
70.0	14.8	11.3	4.3	7.5	7.2
75.0	14.5	11.0	4.0	7.3	6.8
80.0	14.2	10.7	3.8	7.0	6.5
85.0	14.0	10.5	3.6	6.8	6.2
90.0	13.7	10.2	3.4	6.5	5.9
95.0	13.5	10.0	3.2	6.3	5.6
100.0	13.3	9.8	3.0	6.1	5.3
200.0	10.1	6.6	0.2	3.0	1.7
300.0	8.1	4.6	-1.7	1.1	-0.4
400.0	6.7	3.2	-3.0	-0.3	-1.8
500.0	5.6	2.1	-4.1	-1.3	-3.0
600.0	4.7	1.2	-5.0	-2.2	-3.9
700.0	4.0	0.5	-5.7	-3.0	-4.7
800.0	3.3	-0.2	-6.4	-3.6	-5.3
900.0	2.7	-0.8	-6.9	-4.2	-5.9
1000.0	2.2	-1.3	-7.5	-4.7	-6.4

1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - RAIN

DIST FROM REFERENCE	* * * * * L50 * * * * * FREQUENCY, MHZ * * * * *											
	0.100	0.200	0.300	0.500	0.834	1.000	1.250	1.500	2.000	3.000	5.000	10.000	20.000

(FEET)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)
-1000.0	13.8	15.5	16.5	17.4	17.3	16.9	16.1	15.2	13.1	8.8	0.8	-17.1	-38.1
-900.0	15.4	16.8	17.6	18.4	18.3	17.9	17.1	16.1	14.0	9.8	2.0	-15.3	-36.2
-800.0	17.2	18.3	19.0	19.6	19.4	19.0	18.1	17.2	15.1	10.9	3.3	-13.3	-34.0
-700.0	19.3	20.1	20.5	21.0	20.6	20.2	19.4	18.4	16.3	12.2	4.8	-11.2	-31.6
-600.0	21.9	22.3	22.4	22.6	22.1	21.6	20.8	19.8	17.7	13.6	6.4	-8.8	-28.8
-500.0	24.9	25.0	24.8	24.6	23.9	23.4	22.5	21.5	19.4	15.3	8.3	-6.1	-25.4
-400.0	28.7	28.4	28.0	27.2	26.2	25.6	24.6	23.6	21.5	17.4	10.5	-3.0	-21.4
-300.0	33.7	33.1	32.3	31.0	29.3	28.6	27.5	26.4	24.2	20.1	13.3	0.7	-16.2
-200.0	40.7	39.9	38.8	36.8	34.3	33.2	31.8	30.5	28.1	23.9	17.2	5.4	-9.2
-100.0	52.2	51.3	50.0	47.4	43.8	42.3	40.3	38.5	35.4	30.6	23.6	12.8	1.7
-100.0	52.2	51.3	50.0	47.4	43.8	42.3	40.3	38.5	35.4	30.6	23.6	12.8	1.7
-95.0	53.0	52.1	50.7	48.1	44.5	43.0	40.9	39.1	36.0	31.1	24.1	13.4	2.4
-90.0	53.8	52.9	51.5	48.9	45.2	43.7	41.6	39.7	36.5	31.6	24.5	13.9	3.1
-85.0	54.7	53.7	52.4	49.7	46.0	44.4	42.3	40.4	37.1	32.1	25.0	14.4	3.9
-80.0	55.7	54.8	53.4	50.6	46.8	45.2	43.0	41.1	37.8	32.7	25.5	15.0	4.5
-75.0	56.9	55.9	54.5	51.8	47.9	46.2	43.9	41.8	38.4	33.2	26.1	15.6	5.0
-70.0	58.1	57.2	55.8	53.0	49.1	47.3	45.0	42.9	39.3	33.8	26.6	16.2	5.5
-65.0	59.4	58.5	57.1	54.3	50.3	48.6	46.2	44.1	40.4	34.6	27.2	16.8	6.0
-60.0	60.9	59.9	58.5	55.7	51.7	49.9	47.5	45.3	41.5	35.7	27.8	17.5	6.6
-55.0	62.4	61.4	60.0	57.2	53.1	51.4	48.9	46.7	42.8	36.8	28.8	18.1	7.3
-50.0	64.0	63.0	61.6	58.8	54.7	52.9	50.4	48.2	44.2	38.1	29.9	18.8	8.3
-45.0	65.7	64.7	63.3	60.5	56.4	54.5	52.0	49.7	45.7	39.5	31.1	20.0	9.2
-40.0	67.5	66.5	65.1	62.2	58.1	56.3	53.7	51.4	47.4	40.9	32.4	21.2	10.2
-35.0	69.3	68.4	66.9	64.1	59.9	58.1	55.5	53.2	49.0	42.5	33.7	22.5	11.2
-30.0	71.1	70.2	68.7	65.9	61.7	59.9	57.3	54.9	50.8	44.1	35.2	23.9	12.2
-25.0	72.8	71.9	70.4	67.6	63.4	61.5	59.0	56.6	52.4	45.6	36.5	25.2	13.2
-20.0	74.2	73.3	71.8	69.0	64.8	62.9	60.3	57.9	53.7	46.9	37.6	26.3	13.9
-15.0	75.0	74.1	72.6	69.8	65.6	63.7	61.1	58.7	54.4	47.6	38.3	26.9	14.4
-10.0	75.1	74.1	72.7	69.8	65.7	63.8	61.2	58.8	54.5	47.7	38.4	26.9	14.4
-5.0	74.4	73.5	72.0	69.2	65.0	63.1	60.5	58.1	53.9	47.0	37.8	26.5	14.0
0.0	73.1	72.2	70.7	67.9	63.7	61.9	59.3	56.9	52.6	45.9	36.8	25.4	13.3
5.0	72.6	71.6	70.2	67.3	63.1	61.3	58.6	56.3	52.0	45.2	35.9	24.6	12.4
10.0	73.2	72.3	70.8	68.0	63.8	61.9	59.3	56.9	52.7	45.8	36.5	25.1	12.5

15.0	73.2	72.2	70.8	67.9	63.7	61.8	59.2	56.8	52.6	45.7	36.4	25.0	12.5
20.0	72.3	71.4	69.9	67.1	62.9	61.0	58.4	56.0	51.8	45.0	35.8	24.4	12.0
25.0	71.0	70.0	68.6	65.7	61.5	59.7	57.1	54.7	50.5	43.7	34.6	23.3	11.3
30.0	69.3	68.3	66.9	64.0	59.9	58.0	55.4	53.1	48.9	42.2	33.3	22.0	10.4
35.0	67.4	66.5	65.0	62.2	58.1	56.2	53.7	51.3	47.2	40.6	31.9	20.7	9.4
40.0	65.6	64.6	63.2	60.4	56.3	54.4	51.9	49.6	45.5	39.1	30.5	19.3	8.4
45.0	63.8	62.9	61.4	58.6	54.5	52.7	50.2	47.9	43.9	37.6	29.2	18.1	7.4
50.0	62.1	61.2	59.7	56.9	52.8	51.0	48.6	46.3	42.4	36.2	28.0	16.9	6.4
55.0	60.5	59.6	58.1	55.3	51.3	49.5	47.0	44.8	41.0	35.0	26.9	15.9	5.4
60.0	59.0	58.1	56.6	53.8	49.8	48.1	45.6	43.5	39.7	33.8	25.9	14.9	4.2
65.0	57.6	56.6	55.2	52.4	48.5	46.7	44.3	42.2	38.5	32.8	25.0	14.0	3.3
70.0	56.2	55.3	53.9	51.1	47.2	45.5	43.1	41.0	37.4	31.8	24.2	13.5	2.5
75.0	55.0	54.1	52.7	49.9	46.0	44.3	42.0	40.0	36.4	30.9	23.7	12.9	1.8
80.0	53.8	52.9	51.5	48.8	44.9	43.2	41.0	39.0	35.5	30.2	23.3	12.4	1.1
85.0	52.7	51.8	50.4	47.7	43.9	42.2	40.0	38.0	34.7	29.7	22.8	12.0	0.4
90.0	51.7	50.7	49.4	46.7	42.9	41.3	39.1	37.2	34.0	29.3	22.4	11.5	-0.2
95.0	50.7	49.8	48.4	45.7	42.0	40.4	38.3	36.4	33.5	28.9	22.0	11.1	-0.9
100.0	49.7	48.8	47.4	44.8	41.1	39.6	37.6	35.9	33.1	28.5	21.7	10.6	-1.5
200.0	38.7	38.0	36.9	35.1	32.8	31.9	30.6	29.3	27.0	22.8	16.1	4.2	-11.1
300.0	32.3	31.9	31.1	29.9	28.5	27.8	26.7	25.6	23.5	19.4	12.6	-0.3	-17.6
400.0	27.7	27.5	27.1	26.5	25.6	25.0	24.1	23.0	20.9	16.9	9.9	-3.8	-22.4
500.0	24.1	24.3	24.2	24.1	23.4	22.9	22.0	21.1	19.0	14.9	7.8	-6.8	-26.3
600.0	21.2	21.7	21.9	22.2	21.7	21.3	20.4	19.5	17.4	13.3	6.0	-9.4	-29.5
700.0	18.8	19.6	20.1	20.6	20.3	19.9	19.1	18.1	16.0	11.9	4.4	-11.7	-32.2
800.0	16.7	17.9	18.6	19.3	19.1	18.7	17.9	16.9	14.8	10.6	3.0	-13.8	-34.6
900.0	15.0	16.5	17.4	18.2	18.0	17.6	16.8	15.9	13.8	9.5	1.7	-15.7	-36.7
1000.0	13.4	15.2	16.3	17.2	17.1	16.7	15.9	14.9	12.8	8.5	0.5	-17.5	-38.5

1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - FAIR

	* * * * * L50 * * * * *											
DIST FROM REFERENCE	* * * * * FREQUENCY, MHZ * * * * *											
	0.100	0.200	0.300	0.500	0.834	1.000	1.250	1.500	2.000	3.000	5.000	10.000	20.000
(FEET)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)

-1000.0	-3.2	-1.5	-0.5	0.4	0.3	-0.1	-0.9	-1.8	-3.9	-8.2	-16.2	-34.1	-55.1
-900.0	-1.6	-0.2	0.6	1.4	1.3	0.9	0.1	-0.9	-3.0	-7.2	-15.0	-32.3	-53.2
-800.0	0.2	1.3	2.0	2.6	2.4	2.0	1.1	0.2	-1.9	-6.1	-13.7	-30.3	-51.0
-700.0	2.3	3.1	3.5	4.0	3.6	3.2	2.4	1.4	-0.7	-4.8	-12.2	-28.2	-48.6
-600.0	4.9	5.3	5.4	5.6	5.1	4.6	3.8	2.8	0.7	-3.4	-10.6	-25.8	-45.8
-500.0	7.9	8.0	7.8	7.6	6.9	6.4	5.5	4.5	2.4	-1.7	-8.7	-23.1	-42.4
-400.0	11.7	11.4	11.0	10.2	9.2	8.6	7.6	6.6	4.5	0.4	-6.5	-20.0	-38.4
-300.0	16.7	16.1	15.3	14.0	12.3	11.6	10.5	9.4	7.2	3.1	-3.7	-16.3	-33.2
-200.0	23.7	22.9	21.8	19.8	17.3	16.2	14.8	13.5	11.1	6.9	0.2	-11.6	-26.2
-100.0	35.2	34.3	33.0	30.4	26.8	25.3	23.3	21.5	18.4	13.6	6.6	-4.2	-15.3
-100.0	35.2	34.3	33.0	30.4	26.8	25.3	23.3	21.5	18.4	13.6	6.6	-4.2	-15.3
-95.0	36.0	35.1	33.7	31.1	27.5	26.0	23.9	22.1	19.0	14.1	7.1	-3.6	-14.6
-90.0	36.8	35.9	34.5	31.9	28.2	26.7	24.6	22.7	19.5	14.6	7.5	-3.1	-13.9
-85.0	37.7	36.7	35.4	32.7	29.0	27.4	25.3	23.4	20.1	15.1	8.0	-2.6	-13.1
-80.0	38.7	37.8	36.4	33.6	29.8	28.2	26.0	24.1	20.8	15.7	8.5	-2.0	-12.5
-75.0	39.9	38.9	37.5	34.8	30.9	29.2	26.9	24.8	21.4	16.2	9.1	-1.4	-12.0
-70.0	41.1	40.2	38.8	36.0	32.1	30.3	28.0	25.9	22.3	16.8	9.6	-0.8	-11.5
-65.0	42.4	41.5	40.1	37.3	33.3	31.6	29.2	27.1	23.4	17.6	10.2	-0.2	-11.0
-60.0	43.9	42.9	41.5	38.7	34.7	32.9	30.5	28.3	24.5	18.7	10.8	0.5	-10.4
-55.0	45.4	44.4	43.0	40.2	36.1	34.4	31.9	29.7	25.8	19.8	11.8	1.1	-9.7
-50.0	47.0	46.0	44.6	41.8	37.7	35.9	33.4	31.2	27.2	21.1	12.9	1.8	-8.7
-45.0	48.7	47.7	46.3	43.5	39.4	37.5	35.0	32.7	28.7	22.5	14.1	3.0	-7.8
-40.0	50.5	49.5	48.1	45.2	41.1	39.3	36.7	34.4	30.4	23.9	15.4	4.2	-6.8
-35.0	52.3	51.4	49.9	47.1	42.9	41.1	38.5	36.2	32.0	25.5	16.7	5.5	-5.8
-30.0	54.1	53.2	51.7	48.9	44.7	42.9	40.3	37.9	33.8	27.1	18.2	6.9	-4.8
-25.0	55.8	54.9	53.4	50.6	46.4	44.5	42.0	39.6	35.4	28.6	19.5	8.2	-3.8
-20.0	57.2	56.3	54.8	52.0	47.8	45.9	43.3	40.9	36.7	29.9	20.6	9.3	-3.1
-15.0	58.0	57.1	55.6	52.8	48.6	46.7	44.1	41.7	37.4	30.6	21.3	9.9	-2.6
-10.0	58.1	57.1	55.7	52.8	48.7	46.8	44.2	41.8	37.5	30.7	21.4	9.9	-2.6
-5.0	57.4	56.5	55.0	52.2	48.0	46.1	43.5	41.1	36.9	30.0	20.8	9.5	-3.0
0.0	56.1	55.2	53.7	50.9	46.7	44.9	42.3	39.9	35.6	28.9	19.8	8.4	-3.7
5.0	55.6	54.6	53.2	50.3	46.1	44.3	41.6	39.3	35.0	28.2	18.9	7.6	-4.6
10.0	56.2	55.3	53.8	51.0	46.8	44.9	42.3	39.9	35.7	28.8	19.5	8.1	-4.5
15.0	56.2	55.2	53.8	50.9	46.7	44.8	42.2	39.8	35.6	28.7	19.4	8.0	-4.5

20.0	55.3	54.4	52.9	50.1	45.9	44.0	41.4	39.0	34.8	28.0	18.8	7.4	-5.0
25.0	54.0	53.0	51.6	48.7	44.5	42.7	40.1	37.7	33.5	26.7	17.6	6.3	-5.7
30.0	52.3	51.3	49.9	47.0	42.9	41.0	38.4	36.1	31.9	25.2	16.3	5.0	-6.6
35.0	50.4	49.5	48.0	45.2	41.1	39.2	36.7	34.3	30.2	23.6	14.9	3.7	-7.6
40.0	48.6	47.6	46.2	43.4	39.3	37.4	34.9	32.6	28.5	22.1	13.5	2.3	-8.6
45.0	46.8	45.9	44.4	41.6	37.5	35.7	33.2	30.9	26.9	20.6	12.2	1.1	-9.6
50.0	45.1	44.2	42.7	39.9	35.8	34.0	31.6	29.3	25.4	19.2	11.0	-0.1	-10.6
55.0	43.5	42.6	41.1	38.3	34.3	32.5	30.0	27.8	24.0	18.0	9.9	-1.1	-11.6
60.0	42.0	41.1	39.6	36.8	32.8	31.1	28.6	26.5	22.7	16.8	8.9	-2.1	-12.8
65.0	40.6	39.6	38.2	35.4	31.5	29.7	27.3	25.2	21.5	15.8	8.0	-3.0	-13.7
70.0	39.2	38.3	36.9	34.1	30.2	28.5	26.1	24.0	20.4	14.8	7.2	-3.5	-14.5
75.0	38.0	37.1	35.7	32.9	29.0	27.3	25.0	23.0	19.4	13.9	6.7	-4.1	-15.2
80.0	36.8	35.9	34.5	31.8	27.9	26.2	24.0	22.0	18.5	13.2	6.3	-4.6	-15.9
85.0	35.7	34.8	33.4	30.7	26.9	25.2	23.0	21.0	17.7	12.7	5.8	-5.0	-16.6
90.0	34.7	33.7	32.4	29.7	25.9	24.3	22.1	20.2	17.0	12.3	5.4	-5.5	-17.2
95.0	33.7	32.8	31.4	28.7	25.0	23.4	21.3	19.4	16.5	11.9	5.0	-5.9	-17.9
100.0	32.7	31.8	30.4	27.8	24.1	22.6	20.6	18.9	16.1	11.5	4.7	-6.4	-18.5
200.0	21.7	21.0	19.9	18.1	15.8	14.9	13.6	12.3	10.0	5.8	-0.9	-12.8	-28.1
300.0	15.3	14.9	14.1	12.9	11.5	10.8	9.7	8.6	6.5	2.4	-4.4	-17.3	-34.6
400.0	10.7	10.5	10.1	9.5	8.6	8.0	7.1	6.0	3.9	-0.1	-7.1	-20.8	-39.4
500.0	7.1	7.3	7.2	7.1	6.4	5.9	5.0	4.1	2.0	-2.1	-9.2	-23.8	-43.3
600.0	4.2	4.7	4.9	5.2	4.7	4.3	3.4	2.5	0.4	-3.7	-11.0	-26.4	-46.5
700.0	1.8	2.6	3.1	3.6	3.3	2.9	2.1	1.1	-1.0	-5.1	-12.6	-28.7	-49.2
800.0	-0.3	0.9	1.6	2.3	2.1	1.7	0.9	-0.1	-2.2	-6.4	-14.0	-30.8	-51.6
900.0	-2.0	-0.5	0.4	1.2	1.0	0.6	-0.2	-1.1	-3.2	-7.5	-15.3	-32.7	-53.7
1000.0	-3.6	-1.8	-0.7	0.2	0.1	-0.3	-1.1	-2.1	-4.2	-8.5	-16.5	-34.5	-55.5

1ELECTRIC FIELD CALCULATIONS

********** CORONA AND FIELDS PROGRAM Version 3.1 **********
********** Montague Wind Run 03 230kV monopole **********

DIST. FROM REFERENCE FEET	HEIGHT FEET	MAXIMUM GRADIENT (KV/CM)	SUBCON. DIAM. (IN)	NO. OF SUBCON.	PHASE ANGLE (DEGREES)

PH.A-1	-12.00	52.83	12.58	1.35	1	0.0
PH.B-1	-12.00	30.00	13.27	1.35	1	-120.0
PH.C-1	12.00	30.00	12.80	1.35	1	120.0
GND1-1	-4.00	74.30	2.29	0.75	1	0.0

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	E-FIELD (KV/METER)	THETA (DEGREES)	EY-FIELD (KV/METER)	THETAY (DEGREES)	EX-FIELD (KV/METER)	THETAX (DEGREES)	SPACE POTENTIAL (VOLTS)
-1000.0	0.002	89.6	0.002	-178.6	0.000	179.1	2.1
-900.0	0.003	89.6	0.003	-179.1	0.000	178.4	2.7
-800.0	0.003	89.5	0.003	-179.8	0.000	177.5	3.4
-700.0	0.005	89.4	0.005	179.4	0.000	176.4	4.5
-600.0	0.006	89.3	0.006	178.4	0.000	174.9	6.2
-500.0	0.009	89.2	0.009	176.9	0.000	173.0	9.1
-400.0	0.015	89.0	0.015	174.9	0.000	170.2	14.6
-300.0	0.027	88.7	0.027	171.7	0.001	165.9	27.0
-200.0	0.064	88.0	0.064	165.8	0.002	157.6	63.9
-100.0	0.251	86.7	0.251	147.9	0.016	126.6	251.2
-100.0	0.251	86.7	0.251	147.9	0.016	126.6	251.2
-95.0	0.275	86.6	0.275	145.8	0.018	122.5	274.9
-90.0	0.302	86.4	0.301	143.4	0.021	117.8	301.7
-85.0	0.332	86.3	0.332	140.7	0.024	112.6	332.1
-80.0	0.367	86.2	0.367	137.5	0.029	106.8	367.1
-75.0	0.408	86.0	0.407	133.8	0.034	100.4	407.6
-70.0	0.456	85.7	0.454	129.5	0.042	93.6	455.2
-65.0	0.513	85.4	0.511	124.5	0.052	86.6	512.4
-60.0	0.584	84.9	0.581	118.7	0.066	79.6	582.8
-55.0	0.673	84.4	0.670	112.2	0.085	72.8	671.9
-50.0	0.789	83.7	0.784	104.9	0.110	66.4	787.4
-45.0	0.942	83.1	0.935	97.3	0.141	60.5	938.9
-40.0	1.141	82.6	1.132	89.5	0.177	54.7	1136.2
-35.0	1.393	82.6	1.381	81.9	0.212	48.6	1383.7

-30.0	1.686	83.3	1.674	74.8	0.235	40.8	1671.3
-25.0	1.983	84.9	1.975	68.1	0.231	28.0	1961.4
-20.0	2.213	87.3	2.211	61.4	0.206	1.2	2182.8
-15.0	2.288	90.6	2.288	53.5	0.240	-41.7	2249.8
-10.0	2.165	93.7	2.161	42.2	0.372	-69.0	2126.5
-5.0	1.937	93.8	1.933	23.9	0.505	-79.9	1915.0
0.0	1.874	87.8	1.872	-1.7	0.556	-84.8	1863.9
5.0	2.130	83.8	2.119	-24.9	0.496	-88.8	2098.9
10.0	2.466	85.6	2.458	-39.4	0.349	-97.1	2423.3
15.0	2.644	89.0	2.644	-47.4	0.189	-122.7	2605.3
20.0	2.594	92.1	2.593	-52.2	0.148	178.0	2564.0
25.0	2.364	94.5	2.357	-55.3	0.199	146.6	2342.4
30.0	2.044	96.1	2.032	-57.7	0.224	136.0	2028.9
35.0	1.708	97.1	1.695	-59.8	0.215	131.1	1698.5
40.0	1.401	97.6	1.389	-61.9	0.188	128.3	1395.1
45.0	1.140	97.8	1.130	-64.0	0.157	126.3	1136.0
50.0	0.927	97.8	0.918	-66.1	0.127	124.7	923.6
55.0	0.755	97.6	0.748	-68.4	0.102	123.2	753.1
60.0	0.619	97.3	0.614	-70.8	0.081	121.7	617.5
65.0	0.511	97.0	0.507	-73.3	0.064	120.3	510.0
70.0	0.425	96.7	0.422	-76.0	0.051	118.8	424.7
75.0	0.357	96.4	0.355	-78.7	0.041	117.2	356.7
80.0	0.303	96.1	0.301	-81.5	0.033	115.6	302.3
85.0	0.259	95.7	0.258	-84.3	0.027	114.0	258.5
90.0	0.223	95.4	0.222	-87.2	0.022	112.3	223.0
95.0	0.194	95.1	0.193	-90.0	0.018	110.5	194.0
100.0	0.170	94.8	0.170	-92.9	0.015	108.7	170.2
200.0	0.037	91.8	0.037	-134.1	0.001	70.2	36.9
300.0	0.018	91.1	0.018	-149.8	0.000	46.1	17.6
400.0	0.010	90.9	0.010	-156.8	0.000	34.0	10.4
500.0	0.007	90.7	0.007	-160.6	0.000	27.3	6.9
600.0	0.005	90.6	0.005	-163.0	0.000	23.2	4.9
700.0	0.004	90.5	0.004	-164.7	0.000	20.4	3.7
800.0	0.003	90.4	0.003	-165.9	0.000	18.4	2.9
900.0	0.002	90.4	0.002	-166.8	0.000	17.0	2.3

1000.0 0.002 90.4 0.002 -167.5 0.000 15.8 1.9

1MAGNETIC FIELD CALCULATIONS

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	B-FIELD (GAUSS)	THETA	BY-FIELD (GAUSS)	THETAY	BX-FIELD (GAUSS)	THETAX
-1000.0	0.00019062	-42.9	0.00015373	116.1	0.00015933	-2.7
-900.0	0.00023525	-42.3	0.00018896	115.7	0.00019764	-2.9
-800.0	0.00029758	-41.6	0.00023783	115.1	0.00025160	-3.3
-700.0	0.00038839	-40.7	0.00030841	114.3	0.00033099	-3.7
-600.0	0.00052804	-39.5	0.00041576	113.2	0.00045465	-4.3
-500.0	0.00075897	-37.8	0.00059064	111.7	0.00066255	-5.1
-400.0	0.00118189	-35.3	0.00090429	109.3	0.00105190	-6.3
-300.0	0.00208599	-31.1	0.00155523	104.9	0.00191063	-8.1
-200.0	0.00459794	-22.5	0.00330160	95.2	0.00440234	-11.8
-100.0	0.01649371	2.9	0.01246200	64.8	0.01648462	-23.6
-100.0	0.01649371	2.9	0.01246200	64.8	0.01648462	-23.6
-95.0	0.01799967	5.5	0.01382779	62.0	0.01796512	-25.0
-90.0	0.01970465	8.4	0.01543588	59.1	0.01962097	-26.6
-85.0	0.02164122	11.6	0.01733987	56.1	0.02147595	-28.6
-80.0	0.02384757	15.3	0.01960474	52.9	0.02355831	-30.8
-75.0	0.02636814	19.3	0.02230743	49.6	0.02590317	-33.5
-70.0	0.02925409	24.0	0.02553573	46.2	0.02855767	-36.7
-65.0	0.03256316	29.4	0.02938329	42.6	0.03159104	-40.5
-60.0	0.03635879	35.9	0.03393736	38.9	0.03511402	-45.2
-55.0	0.04070956	44.4	0.03925406	34.9	0.03931312	-50.8
-50.0	0.04571235	60.0	0.04531421	30.6	0.04450272	-57.6
-45.0	0.05222796	-62.9	0.05195629	25.8	0.05118123	-65.4
-40.0	0.06156336	-36.8	0.05880427	19.9	0.06002935	-74.1
-35.0	0.07301280	-22.8	0.06528448	12.4	0.07170650	-83.2

-30.0	0.08662470	-9.2	0.07102206	1.8	0.08624864	268.1
-25.0	0.10220782	5.4	0.07712947	-13.1	0.10200763	260.0
-20.0	0.11898040	21.6	0.08786228	-32.2	0.11464615	252.5
-15.0	0.13542891	39.3	0.10797333	-51.0	0.11776907	244.5
-10.0	0.14960475	58.0	0.13464293	-64.8	0.10711246	233.3
-5.0	0.15980272	77.3	0.15696354	-73.5	0.08793188	213.3
0.0	0.16497986	96.8	0.16408744	-79.2	0.08037592	180.0
5.0	0.16458799	116.1	0.15131474	-84.2	0.09775892	150.4
10.0	0.15843809	134.9	0.12188751	269.0	0.12146065	135.0
15.0	0.14708336	152.7	0.08617491	256.8	0.13362813	127.3
20.0	0.13213398	169.2	0.05803771	233.8	0.13016228	122.9
25.0	0.11578098	-176.2	0.04708040	201.8	0.11557093	119.6
30.0	0.09991103	-163.5	0.04789968	177.3	0.09649791	116.7
35.0	0.08563037	-152.7	0.04999813	163.8	0.07774901	113.7
40.0	0.07333632	-143.5	0.04993444	156.3	0.06159169	110.4
45.0	0.06299748	-135.6	0.04791251	151.9	0.04858636	106.7
50.0	0.05439239	-128.8	0.04476045	148.9	0.03848638	102.5
55.0	0.04724838	-123.0	0.04113981	146.9	0.03078188	98.0
60.0	0.04130571	-117.9	0.03746086	145.3	0.02494896	93.1
65.0	0.03634036	-113.4	0.03394622	144.1	0.02053829	88.0
70.0	0.03216783	-109.5	0.03070088	143.1	0.01719258	82.8
75.0	0.02863949	-105.9	0.02776213	142.3	0.01463797	77.5
80.0	0.02563663	-102.8	0.02513056	141.5	0.01266862	72.3
85.0	0.02306472	-100.0	0.02278849	140.8	0.01113167	67.3
90.0	0.02084835	-97.4	0.02071027	140.2	0.00991456	62.6
95.0	0.01892716	-95.1	0.01886789	139.7	0.00893497	58.2
100.0	0.01725256	-93.0	0.01723396	139.1	0.00813295	54.1
200.0	0.00464700	-71.6	0.00447333	132.7	0.00269713	19.4
300.0	0.00209696	-63.9	0.00194638	129.5	0.00136148	11.4
400.0	0.00118595	-60.0	0.00107619	127.5	0.00081350	8.1
500.0	0.00076091	-57.6	0.00068031	126.2	0.00053887	6.3
600.0	0.00052912	-56.0	0.00046819	125.3	0.00038256	5.1
700.0	0.00038905	-54.9	0.00034163	124.6	0.00028540	4.3
800.0	0.00029802	-54.0	0.00026017	124.1	0.00022097	3.7
900.0	0.00023555	-53.3	0.00020469	123.7	0.00017609	3.3

1000.0	0.00019084	-52.8	0.00016522	123.3	0.00014360	2.9

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Attachment AA-4
Results of the Bonneville Power Administration Corona and Field Effects Program for 230-kV H-Frame Overhead Transmission Lines

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    Û       C O R O N A   A N D   F I E L D       Û
    Û E F F E C T S   P R O G R A M   V E R. 3.1  Û
    Û   Source: Bonneville Power Administration   Û
    ÛÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÜÛ
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INPUT DATA LIST

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                10/13/2017          08:54:11
 ******************  CORONA AND FIELDS PROGRAM Version 3.1 *************
 ******************  Montague Wind Run 51 230kV H-frame  ***************
 1,0, 3, 5,0.0,   2.00,   2.00,   0.00

 (ENGLISH UNITS OPTION)

 (GRADIENTS ARE COMPUTED BY PROGRAM)

 PHYSICAL SYSTEM CONSISTS OF  5 CONDUCTORS, OF WHICH  3 ARE ENERGIZED PHASES

 OPTIONS: 'EF','MF','RI','AN'
   4.921,  6.562,  9.842,  0.000,  1.000, 75.000,  3.280,  6.700,  3.280
 'PH.A-1  ','A',   20.00,   30.00, 1,   1.345,   0.000, 133.000,   0.000,   1.014,   0.000
 'PH.B-1  ','A',    0.00,   30.00, 1,   1.345,   0.000, 133.000,-120.000,   1.014,   0.000
 'PH.C-1  ','A',  -20.00,   30.00, 1,   1.345,   0.000, 133.000, 120.000,   1.014,   0.000
 'GND1-1  ','A',   11.00,   47.30, 1,   0.750,   0.000,   0.000,   0.000,   0.000,   0.000
 'GND1-2  ','A',  -11.00,   47.30, 1,   0.750,   0.000,   0.000,   0.000,   0.000,   0.000
  10-1000.0  100.0
  20 -100.0    5.0
  20    0.0    5.0
  10  100.0  100.0
   0    0.0    0.0
1AUDIBLE NOISE CALCULATION - RAIN
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DIST FROM REFERENCE (FEET)	TOTALS L5 (DBA)	L50 (DBA)	PH.A-1	PH.B-1	PH.C-1
-1000.0	28.1	24.6	18.4	21.7	18.6
-900.0	28.6	25.1	18.9	22.2	19.2
-800.0	29.2	25.7	19.5	22.8	19.8
-700.0	29.9	26.4	20.2	23.5	20.4
-600.0	30.7	27.2	20.9	24.2	21.2
-500.0	31.6	28.1	21.8	25.1	22.2
-400.0	32.7	29.2	22.8	26.2	23.3
-300.0	34.1	30.6	24.2	27.6	24.8
-200.0	36.1	32.6	26.0	29.6	27.0
-100.0	39.5	36.0	28.9	32.9	30.8
-100.0	39.5	36.0	28.9	32.9	30.8
-95.0	39.7	36.2	29.1	33.2	31.1
-90.0	40.0	36.5	29.3	33.4	31.4
-85.0	40.2	36.7	29.6	33.7	31.7
-80.0	40.5	37.0	29.8	34.0	32.1
-75.0	40.8	37.3	30.0	34.3	32.4
-70.0	41.2	37.7	30.3	34.6	32.8
-65.0	41.5	38.0	30.5	34.9	33.2
-60.0	41.9	38.4	30.8	35.2	33.6
-55.0	42.2	38.7	31.1	35.6	34.1
-50.0	42.6	39.1	31.4	36.0	34.6
-45.0	43.1	39.6	31.7	36.4	35.1
-40.0	43.5	40.0	32.1	36.8	35.6
-35.0	43.9	40.4	32.4	37.3	36.0
-30.0	44.4	40.9	32.8	37.7	36.4
-25.0	44.8	41.3	33.2	38.2	36.7
-20.0	45.1	41.6	33.6	38.7	36.8
-15.0	45.4	41.9	34.1	39.2	36.7
-10.0	45.6	42.1	34.6	39.6	36.4

-5.0	45.8	42.3	35.1	39.8	36.0
0.0	45.8	42.3	35.6	39.9	35.6
5.0	45.8	42.3	36.0	39.8	35.1
10.0	45.6	42.1	36.4	39.6	34.6
15.0	45.4	41.9	36.7	39.2	34.1
20.0	45.1	41.6	36.8	38.7	33.6
25.0	44.8	41.3	36.7	38.2	33.2
30.0	44.4	40.9	36.4	37.7	32.8
35.0	43.9	40.4	36.0	37.3	32.4
40.0	43.5	40.0	35.6	36.8	32.1
45.0	43.1	39.6	35.1	36.4	31.7
50.0	42.6	39.1	34.6	36.0	31.4
55.0	42.2	38.7	34.1	35.6	31.1
60.0	41.9	38.4	33.6	35.2	30.8
65.0	41.5	38.0	33.2	34.9	30.5
70.0	41.2	37.7	32.8	34.6	30.3
75.0	40.8	37.3	32.4	34.3	30.0
80.0	40.5	37.0	32.1	34.0	29.8
85.0	40.2	36.7	31.7	33.7	29.6
90.0	40.0	36.5	31.4	33.4	29.3
95.0	39.7	36.2	31.1	33.2	29.1
100.0	39.5	36.0	30.8	32.9	28.9
200.0	36.1	32.6	27.0	29.6	26.0
300.0	34.1	30.6	24.8	27.6	24.2
400.0	32.7	29.2	23.3	26.2	22.8
500.0	31.6	28.1	22.2	25.1	21.8
600.0	30.7	27.2	21.2	24.2	20.9
700.0	29.9	26.4	20.4	23.5	20.2
800.0	29.2	25.7	19.8	22.8	19.5
900.0	28.6	25.1	19.2	22.2	18.9
1000.0	28.1	24.6	18.6	21.7	18.4

1AUDIBLE NOISE CALCULATION - FAIR

DIST FROM TOTALS

REFERENCE (FEET)	L5 (DBA)	L50 (DBA)	PH.A-1	PH.B-1	PH.C-1
-1000.0	3.1	-0.4	-6.6	-3.3	-6.4
-900.0	3.6	0.1	-6.1	-2.8	-5.8
-800.0	4.2	0.7	-5.5	-2.2	-5.2
-700.0	4.9	1.4	-4.8	-1.5	-4.6
-600.0	5.7	2.2	-4.1	-0.8	-3.8
-500.0	6.6	3.1	-3.2	0.1	-2.8
-400.0	7.7	4.2	-2.2	1.2	-1.7
-300.0	9.1	5.6	-0.8	2.6	-0.2
-200.0	11.1	7.6	1.0	4.6	2.0
-100.0	14.5	11.0	3.9	7.9	5.8
-100.0	14.5	11.0	3.9	7.9	5.8
-95.0	14.7	11.2	4.1	8.2	6.1
-90.0	15.0	11.5	4.3	8.4	6.4
-85.0	15.2	11.7	4.6	8.7	6.7
-80.0	15.5	12.0	4.8	9.0	7.1
-75.0	15.8	12.3	5.0	9.3	7.4
-70.0	16.2	12.7	5.3	9.6	7.8
-65.0	16.5	13.0	5.5	9.9	8.2
-60.0	16.9	13.4	5.8	10.2	8.6
-55.0	17.2	13.7	6.1	10.6	9.1
-50.0	17.6	14.1	6.4	11.0	9.6
-45.0	18.1	14.6	6.7	11.4	10.1
-40.0	18.5	15.0	7.1	11.8	10.6
-35.0	18.9	15.4	7.4	12.3	11.0
-30.0	19.4	15.9	7.8	12.7	11.4
-25.0	19.8	16.3	8.2	13.2	11.7
-20.0	20.1	16.6	8.6	13.7	11.8
-15.0	20.4	16.9	9.1	14.2	11.7
-10.0	20.6	17.1	9.6	14.6	11.4
-5.0	20.8	17.3	10.1	14.8	11.0
0.0	20.8	17.3	10.6	14.9	10.6

5.0	20.8	17.3	11.0	14.8	10.1
10.0	20.6	17.1	11.4	14.6	9.6
15.0	20.4	16.9	11.7	14.2	9.1
20.0	20.1	16.6	11.8	13.7	8.6
25.0	19.8	16.3	11.7	13.2	8.2
30.0	19.4	15.9	11.4	12.7	7.8
35.0	18.9	15.4	11.0	12.3	7.4
40.0	18.5	15.0	10.6	11.8	7.1
45.0	18.1	14.6	10.1	11.4	6.7
50.0	17.6	14.1	9.6	11.0	6.4
55.0	17.2	13.7	9.1	10.6	6.1
60.0	16.9	13.4	8.6	10.2	5.8
65.0	16.5	13.0	8.2	9.9	5.5
70.0	16.2	12.7	7.8	9.6	5.3
75.0	15.8	12.3	7.4	9.3	5.0
80.0	15.5	12.0	7.1	9.0	4.8
85.0	15.2	11.7	6.7	8.7	4.6
90.0	15.0	11.5	6.4	8.4	4.3
95.0	14.7	11.2	6.1	8.2	4.1
100.0	14.5	11.0	5.8	7.9	3.9
200.0	11.1	7.6	2.0	4.6	1.0
300.0	9.1	5.6	-0.2	2.6	-0.8
400.0	7.7	4.2	-1.7	1.2	-2.2
500.0	6.6	3.1	-2.8	0.1	-3.2
600.0	5.7	2.2	-3.8	-0.8	-4.1
700.0	4.9	1.4	-4.6	-1.5	-4.8
800.0	4.2	0.7	-5.2	-2.2	-5.5
900.0	3.6	0.1	-5.8	-2.8	-6.1
1000.0	3.1	-0.4	-6.4	-3.3	-6.6

1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - RAIN

* * * * * L50 * * * * *

DIST FROM * * * * * FREQUENCY, MHZ * * * * *

REFERENCE

(FEET)	0.100 (DB)	0.200 (DB)	0.300 (DB)	0.500 (DB)	0.834 (DB)	1.000 (DB)	1.250 (DB)	1.500 (DB)	2.000 (DB)	3.000 (DB)	5.000 (DB)	10.000 (DB)	20.000 (DB)
-1000.0	12.8	14.5	15.6	16.5	16.4	16.0	15.2	14.2	12.1	7.8	-0.2	-18.1	-41.6
-900.0	14.3	15.8	16.7	17.5	17.4	16.9	16.1	15.2	13.1	8.8	1.0	-16.3	-39.6
-800.0	16.2	17.3	18.0	18.6	18.4	18.0	17.2	16.2	14.1	10.0	2.3	-14.4	-37.4
-700.0	18.3	19.1	19.5	20.0	19.7	19.2	18.4	17.4	15.4	11.2	3.8	-12.3	-34.9
-600.0	20.7	21.2	21.4	21.6	21.1	20.6	19.8	18.8	16.7	12.6	5.4	-9.9	-32.1
-500.0	23.7	23.8	23.7	23.5	22.9	22.4	21.5	20.5	18.4	14.3	7.2	-7.3	-28.7
-400.0	27.4	27.2	26.8	26.1	25.1	24.5	23.6	22.5	20.4	16.3	9.4	-4.3	-24.6
-300.0	32.3	31.8	31.0	29.7	28.2	27.4	26.3	25.2	23.1	19.0	12.2	-0.7	-19.5
-200.0	39.2	38.4	37.3	35.4	32.9	31.9	30.6	29.3	26.9	22.7	15.9	4.0	-12.6
-100.0	51.3	50.4	49.0	46.3	42.6	41.0	39.0	37.2	34.2	29.4	22.3	11.1	-2.2
-100.0	51.3	50.4	49.0	46.3	42.6	41.0	39.0	37.2	34.2	29.4	22.3	11.1	-2.2
-95.0	52.3	51.4	50.0	47.3	43.5	41.9	39.7	37.9	34.8	29.9	22.8	11.6	-1.4
-90.0	53.4	52.5	51.1	48.4	44.5	42.9	40.6	38.6	35.4	30.4	23.3	12.2	-0.5
-85.0	54.6	53.6	52.2	49.5	45.6	43.9	41.6	39.6	36.1	31.0	23.8	12.7	0.4
-80.0	55.8	54.8	53.4	50.7	46.7	45.0	42.7	40.6	37.0	31.6	24.4	13.3	1.5
-75.0	57.1	56.1	54.7	51.9	48.0	46.2	43.9	41.8	38.1	32.4	25.0	13.9	2.5
-70.0	58.4	57.5	56.1	53.3	49.3	47.5	45.1	43.0	39.2	33.4	25.7	14.6	3.7
-65.0	59.9	59.0	57.5	54.8	50.7	48.9	46.5	44.3	40.5	34.5	26.6	15.5	4.9
-60.0	61.5	60.5	59.1	56.3	52.2	50.4	48.0	45.7	41.8	35.7	27.6	16.5	6.1
-55.0	63.1	62.2	60.8	58.0	53.9	52.0	49.5	47.3	43.3	37.1	28.8	17.6	7.0
-50.0	64.9	64.0	62.5	59.7	55.6	53.7	51.2	48.9	44.9	38.5	30.0	18.9	8.0
-45.0	66.7	65.8	64.3	61.5	57.4	55.5	53.0	50.6	46.5	40.0	31.4	20.2	9.0
-40.0	68.6	67.6	66.2	63.3	59.2	57.3	54.8	52.4	48.2	41.6	32.8	21.5	10.0
-35.0	70.3	69.4	68.0	65.1	60.9	59.1	56.5	54.1	49.9	43.2	34.2	22.9	11.0
-30.0	71.9	70.9	69.5	66.6	62.4	60.6	58.0	55.6	51.4	44.6	35.4	24.1	11.8
-25.0	72.9	72.0	70.5	67.7	63.5	61.6	59.0	56.6	52.4	45.5	36.3	24.9	12.4
-20.0	73.3	72.4	70.9	68.1	63.9	62.0	59.4	57.0	52.7	45.9	36.6	25.1	13.2
-15.0	73.5	72.6	71.1	68.3	64.1	62.2	59.6	57.3	53.1	46.4	37.3	26.0	14.1
-10.0	75.0	74.1	72.6	69.8	65.6	63.7	61.1	58.8	54.5	47.7	38.6	27.2	15.0
-5.0	76.1	75.1	73.7	70.9	66.7	64.8	62.2	59.8	55.5	48.7	39.4	28.1	15.6
0.0	76.5	75.5	74.1	71.2	67.0	65.2	62.6	60.2	55.9	49.1	39.8	28.3	15.8
5.0	76.1	75.1	73.7	70.9	66.7	64.8	62.2	59.8	55.5	48.7	39.4	28.1	15.6

10.0	75.0	74.1	72.6	69.8	65.6	63.7	61.1	58.8	54.5	47.7	38.6	27.2	15.0
15.0	73.5	72.6	71.1	68.3	64.1	62.2	59.6	57.3	53.1	46.4	37.3	26.0	14.1
20.0	73.3	72.4	70.9	68.1	63.9	62.0	59.4	57.0	52.7	45.9	36.6	25.1	13.2
25.0	72.9	72.0	70.5	67.7	63.5	61.6	59.0	56.6	52.4	45.5	36.3	24.9	12.4
30.0	71.9	70.9	69.5	66.6	62.4	60.6	58.0	55.6	51.4	44.6	35.4	24.1	11.8
35.0	70.3	69.4	68.0	65.1	60.9	59.1	56.5	54.1	49.9	43.2	34.2	22.9	11.0
40.0	68.6	67.6	66.2	63.3	59.2	57.3	54.8	52.4	48.2	41.6	32.8	21.5	10.0
45.0	66.7	65.8	64.3	61.5	57.4	55.5	53.0	50.6	46.5	40.0	31.4	20.2	9.0
50.0	64.9	64.0	62.5	59.7	55.6	53.7	51.2	48.9	44.9	38.5	30.0	18.9	8.0
55.0	63.1	62.2	60.8	58.0	53.9	52.0	49.5	47.3	43.3	37.1	28.8	17.6	7.0
60.0	61.5	60.5	59.1	56.3	52.2	50.4	48.0	45.7	41.8	35.7	27.6	16.5	6.1
65.0	59.9	59.0	57.5	54.8	50.7	48.9	46.5	44.3	40.5	34.5	26.6	15.5	4.9
70.0	58.4	57.5	56.1	53.3	49.3	47.5	45.1	43.0	39.2	33.4	25.7	14.6	3.7
75.0	57.1	56.1	54.7	51.9	48.0	46.2	43.9	41.8	38.1	32.4	25.0	13.9	2.5
80.0	55.8	54.8	53.4	50.7	46.7	45.0	42.7	40.6	37.0	31.6	24.4	13.3	1.5
85.0	54.6	53.6	52.2	49.5	45.6	43.9	41.6	39.6	36.1	31.0	23.8	12.7	0.4
90.0	53.4	52.5	51.1	48.4	44.5	42.9	40.6	38.6	35.4	30.4	23.3	12.2	-0.5
95.0	52.3	51.4	50.0	47.3	43.5	41.9	39.7	37.9	34.8	29.9	22.8	11.6	-1.4
100.0	51.3	50.4	49.0	46.3	42.6	41.0	39.0	37.2	34.2	29.4	22.3	11.1	-2.2
200.0	39.2	38.4	37.3	35.4	32.9	31.9	30.6	29.3	26.9	22.7	15.9	4.0	-12.6
300.0	32.3	31.8	31.0	29.7	28.2	27.4	26.3	25.2	23.1	19.0	12.2	-0.7	-19.5
400.0	27.4	27.2	26.8	26.1	25.1	24.5	23.6	22.5	20.4	16.3	9.4	-4.3	-24.6
500.0	23.7	23.8	23.7	23.5	22.9	22.4	21.5	20.5	18.4	14.3	7.2	-7.3	-28.7
600.0	20.7	21.2	21.4	21.6	21.1	20.6	19.8	18.8	16.7	12.6	5.4	-9.9	-32.1
700.0	18.3	19.1	19.5	20.0	19.7	19.2	18.4	17.4	15.4	11.2	3.8	-12.3	-34.9
800.0	16.2	17.3	18.0	18.6	18.4	18.0	17.2	16.2	14.1	10.0	2.3	-14.4	-37.4
900.0	14.3	15.8	16.7	17.5	17.4	16.9	16.1	15.2	13.1	8.8	1.0	-16.3	-39.6
1000.0	12.8	14.5	15.6	16.5	16.4	16.0	15.2	14.2	12.1	7.8	-0.2	-18.1	-41.6

1RADIO NOISE CALCULATION - 5KHZ BAND WIDTH - FAIR

* * * * * L50 * * * * *

DIST FROM * * * * * FREQUENCY, MHZ * * * * *

REFERENCE

0.100	0.200	0.300	0.500	0.834	1.000	1.250	1.500	2.000	3.000	5.000	10.000	20.000

(FEET)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)	(DB)
-1000.0	-4.2	-2.5	-1.4	-0.5	-0.6	-1.0	-1.8	-2.8	-4.9	-9.2	-17.2	-35.1	-58.6
-900.0	-2.7	-1.2	-0.3	0.5	0.4	-0.1	-0.9	-1.8	-3.9	-8.2	-16.0	-33.3	-56.6
-800.0	-0.8	0.3	1.0	1.6	1.4	1.0	0.2	-0.8	-2.9	-7.0	-14.7	-31.4	-54.4
-700.0	1.3	2.1	2.5	3.0	2.7	2.2	1.4	0.4	-1.6	-5.8	-13.2	-29.3	-51.9
-600.0	3.7	4.2	4.4	4.6	4.1	3.6	2.8	1.8	-0.3	-4.4	-11.6	-26.9	-49.1
-500.0	6.7	6.8	6.7	6.5	5.9	5.4	4.5	3.5	1.4	-2.7	-9.8	-24.3	-45.7
-400.0	10.4	10.2	9.8	9.1	8.1	7.5	6.6	5.5	3.4	-0.7	-7.6	-21.3	-41.6
-300.0	15.3	14.8	14.0	12.7	11.2	10.4	9.3	8.2	6.1	2.0	-4.8	-17.7	-36.5
-200.0	22.2	21.4	20.3	18.4	15.9	14.9	13.6	12.3	9.9	5.7	-1.1	-13.0	-29.6
-100.0	34.3	33.4	32.0	29.3	25.6	24.0	22.0	20.2	17.2	12.4	5.3	-5.9	-19.2
-100.0	34.3	33.4	32.0	29.3	25.6	24.0	22.0	20.2	17.2	12.4	5.3	-5.9	-19.2
-95.0	35.3	34.4	33.0	30.3	26.5	24.9	22.7	20.9	17.8	12.9	5.8	-5.4	-18.4
-90.0	36.4	35.5	34.1	31.4	27.5	25.9	23.6	21.6	18.4	13.4	6.3	-4.8	-17.5
-85.0	37.6	36.6	35.2	32.5	28.6	26.9	24.6	22.6	19.1	14.0	6.8	-4.3	-16.6
-80.0	38.8	37.8	36.4	33.7	29.7	28.0	25.7	23.6	20.0	14.6	7.4	-3.7	-15.5
-75.0	40.1	39.1	37.7	34.9	31.0	29.2	26.9	24.8	21.1	15.4	8.0	-3.1	-14.5
-70.0	41.4	40.5	39.1	36.3	32.3	30.5	28.1	26.0	22.2	16.4	8.7	-2.4	-13.3
-65.0	42.9	42.0	40.5	37.8	33.7	31.9	29.5	27.3	23.5	17.5	9.6	-1.5	-12.1
-60.0	44.5	43.5	42.1	39.3	35.2	33.4	31.0	28.7	24.8	18.7	10.6	-0.5	-10.9
-55.0	46.1	45.2	43.8	41.0	36.9	35.0	32.5	30.3	26.3	20.1	11.8	0.6	-10.0
-50.0	47.9	47.0	45.5	42.7	38.6	36.7	34.2	31.9	27.9	21.5	13.0	1.9	-9.0
-45.0	49.7	48.8	47.3	44.5	40.4	38.5	36.0	33.6	29.5	23.0	14.4	3.2	-8.0
-40.0	51.6	50.6	49.2	46.3	42.2	40.3	37.8	35.4	31.2	24.6	15.8	4.5	-7.0
-35.0	53.3	52.4	51.0	48.1	43.9	42.1	39.5	37.1	32.9	26.2	17.2	5.9	-6.0
-30.0	54.9	53.9	52.5	49.6	45.4	43.6	41.0	38.6	34.4	27.6	18.4	7.1	-5.2
-25.0	55.9	55.0	53.5	50.7	46.5	44.6	42.0	39.6	35.4	28.5	19.3	7.9	-4.6
-20.0	56.3	55.4	53.9	51.1	46.9	45.0	42.4	40.0	35.7	28.9	19.6	8.1	-3.8
-15.0	56.5	55.6	54.1	51.3	47.1	45.2	42.6	40.3	36.1	29.4	20.3	9.0	-2.9
-10.0	58.0	57.1	55.6	52.8	48.6	46.7	44.1	41.8	37.5	30.7	21.6	10.2	-2.0
-5.0	59.1	58.1	56.7	53.9	49.7	47.8	45.2	42.8	38.5	31.7	22.4	11.1	-1.4
0.0	59.5	58.5	57.1	54.2	50.0	48.2	45.6	43.2	38.9	32.1	22.8	11.3	-1.2
5.0	59.1	58.1	56.7	53.9	49.7	47.8	45.2	42.8	38.5	31.7	22.4	11.1	-1.4
10.0	58.0	57.1	55.6	52.8	48.6	46.7	44.1	41.8	37.5	30.7	21.6	10.2	-2.0

15.0	56.5	55.6	54.1	51.3	47.1	45.2	42.6	40.3	36.1	29.4	20.3	9.0	-2.9
20.0	56.3	55.4	53.9	51.1	46.9	45.0	42.4	40.0	35.7	28.9	19.6	8.1	-3.8
25.0	55.9	55.0	53.5	50.7	46.5	44.6	42.0	39.6	35.4	28.5	19.3	7.9	-4.6
30.0	54.9	53.9	52.5	49.6	45.4	43.6	41.0	38.6	34.4	27.6	18.4	7.1	-5.2
35.0	53.3	52.4	51.0	48.1	43.9	42.1	39.5	37.1	32.9	26.2	17.2	5.9	-6.0
40.0	51.6	50.6	49.2	46.3	42.2	40.3	37.8	35.4	31.2	24.6	15.8	4.5	-7.0
45.0	49.7	48.8	47.3	44.5	40.4	38.5	36.0	33.6	29.5	23.0	14.4	3.2	-8.0
50.0	47.9	47.0	45.5	42.7	38.6	36.7	34.2	31.9	27.9	21.5	13.0	1.9	-9.0
55.0	46.1	45.2	43.8	41.0	36.9	35.0	32.5	30.3	26.3	20.1	11.8	0.6	-10.0
60.0	44.5	43.5	42.1	39.3	35.2	33.4	31.0	28.7	24.8	18.7	10.6	-0.5	-10.9
65.0	42.9	42.0	40.5	37.8	33.7	31.9	29.5	27.3	23.5	17.5	9.6	-1.5	-12.1
70.0	41.4	40.5	39.1	36.3	32.3	30.5	28.1	26.0	22.2	16.4	8.7	-2.4	-13.3
75.0	40.1	39.1	37.7	34.9	31.0	29.2	26.9	24.8	21.1	15.4	8.0	-3.1	-14.5
80.0	38.8	37.8	36.4	33.7	29.7	28.0	25.7	23.6	20.0	14.6	7.4	-3.7	-15.5
85.0	37.6	36.6	35.2	32.5	28.6	26.9	24.6	22.6	19.1	14.0	6.8	-4.3	-16.6
90.0	36.4	35.5	34.1	31.4	27.5	25.9	23.6	21.6	18.4	13.4	6.3	-4.8	-17.5
95.0	35.3	34.4	33.0	30.3	26.5	24.9	22.7	20.9	17.8	12.9	5.8	-5.4	-18.4
100.0	34.3	33.4	32.0	29.3	25.6	24.0	22.0	20.2	17.2	12.4	5.3	-5.9	-19.2
200.0	22.2	21.4	20.3	18.4	15.9	14.9	13.6	12.3	9.9	5.7	-1.1	-13.0	-29.6
300.0	15.3	14.8	14.0	12.7	11.2	10.4	9.3	8.2	6.1	2.0	-4.8	-17.7	-36.5
400.0	10.4	10.2	9.8	9.1	8.1	7.5	6.6	5.5	3.4	-0.7	-7.6	-21.3	-41.6
500.0	6.7	6.8	6.7	6.5	5.9	5.4	4.5	3.5	1.4	-2.7	-9.8	-24.3	-45.7
600.0	3.7	4.2	4.4	4.6	4.1	3.6	2.8	1.8	-0.3	-4.4	-11.6	-26.9	-49.1
700.0	1.3	2.1	2.5	3.0	2.7	2.2	1.4	0.4	-1.6	-5.8	-13.2	-29.3	-51.9
800.0	-0.8	0.3	1.0	1.6	1.4	1.0	0.2	-0.8	-2.9	-7.0	-14.7	-31.4	-54.4
900.0	-2.7	-1.2	-0.3	0.5	0.4	-0.1	-0.9	-1.8	-3.9	-8.2	-16.0	-33.3	-56.6
1000.0	-4.2	-2.5	-1.4	-0.5	-0.6	-1.0	-1.8	-2.8	-4.9	-9.2	-17.2	-35.1	-58.6

1ELECTRIC FIELD CALCULATIONS

********** CORONA AND FIELDS PROGRAM Version 3.1 **********
********** Montague Wind Run 51 230kV H-frame **********

DIST. FROM REFERENCE FEET	HEIGHT FEET	MAXIMUM GRADIENT (KV/CM)	SUBCON. DIAM. (IN)	NO. OF SUBCON.	PHASE ANGLE (DEGREES)

PH.A-1	20.00	30.00	12.81	1.35	1	0.0
PH.B-1	0.00	30.00	13.61	1.35	1	-120.0
PH.C-1	-20.00	30.00	12.81	1.35	1	120.0
GND1-1	11.00	47.30	1.61	0.75	1	0.0
GND1-2	-11.00	47.30	1.61	0.75	1	0.0

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	E-FIELD (KV/METER)	THETA (DEGREES)	EY-FIELD (KV/METER)	THETAY (DEGREES)	EX-FIELD (KV/METER)	THETAX (DEGREES)	SPACE POTENTIAL (VOLTS)
-1000.0	0.001	89.6	0.001	-91.2	0.000	-80.7	0.6
-900.0	0.001	89.5	0.001	-88.6	0.000	-77.9	0.7
-800.0	0.001	89.5	0.001	-85.7	0.000	-74.8	0.9
-700.0	0.001	89.4	0.001	-82.2	0.000	-71.3	1.3
-600.0	0.002	89.2	0.002	-78.1	0.000	-67.4	1.8
-500.0	0.003	89.0	0.003	-73.2	0.000	-63.1	2.9
-400.0	0.005	88.7	0.005	-67.6	0.000	-58.6	5.2
-300.0	0.011	88.3	0.011	-61.2	0.000	-54.1	11.4
-200.0	0.036	87.3	0.036	-54.6	0.002	-50.2	35.8
-100.0	0.257	84.8	0.256	-49.8	0.023	-48.9	257.0
-100.0	0.257	84.8	0.256	-49.8	0.023	-48.9	257.0
-95.0	0.296	84.6	0.295	-49.7	0.028	-49.0	296.1
-90.0	0.344	84.3	0.342	-49.6	0.034	-49.1	343.2
-85.0	0.401	84.1	0.399	-49.5	0.041	-49.2	400.3
-80.0	0.471	83.8	0.468	-49.5	0.051	-49.2	470.1
-75.0	0.557	83.6	0.553	-49.4	0.062	-49.3	555.9
-70.0	0.663	83.3	0.658	-49.4	0.077	-49.3	661.8
-65.0	0.794	83.1	0.789	-49.4	0.096	-49.2	793.0
-60.0	0.958	82.9	0.950	-49.4	0.118	-49.0	955.4
-55.0	1.159	82.8	1.149	-49.3	0.145	-48.6	1155.3
-50.0	1.403	82.9	1.392	-49.1	0.174	-47.7	1397.7
-45.0	1.690	83.2	1.679	-48.8	0.200	-46.1	1682.7

-40.0	2.010	84.0	1.999	-48.2	0.213	-42.8	1998.6
-35.0	2.330	85.3	2.322	-47.1	0.197	-35.0	2311.8
-30.0	2.585	87.3	2.582	-45.1	0.144	-11.8	2558.1
-25.0	2.686	90.2	2.686	-41.6	0.144	52.5	2649.5
-20.0	2.561	93.8	2.555	-35.3	0.292	89.9	2514.7
-15.0	2.217	97.4	2.199	-24.0	0.455	103.7	2165.3
-10.0	1.782	99.2	1.761	-4.5	0.548	114.6	1733.4
-5.0	1.456	96.3	1.448	25.0	0.558	129.3	1411.9
0.0	1.351	90.0	1.351	60.0	0.546	150.0	1304.7
5.0	1.456	83.7	1.448	95.0	0.558	170.7	1411.9
10.0	1.782	80.8	1.761	124.5	0.548	-174.6	1733.4
15.0	2.217	82.6	2.199	144.0	0.455	-163.7	2165.3
20.0	2.561	86.2	2.555	155.3	0.292	-149.9	2514.7
25.0	2.686	89.8	2.686	161.6	0.144	-112.5	2649.5
30.0	2.585	92.7	2.582	165.1	0.144	-48.2	2558.1
35.0	2.330	94.7	2.322	167.1	0.197	-25.0	2311.8
40.0	2.010	96.0	1.999	168.2	0.213	-17.2	1998.6
45.0	1.690	96.8	1.679	168.8	0.200	-13.9	1682.7
50.0	1.403	97.1	1.392	169.1	0.174	-12.3	1397.7
55.0	1.159	97.2	1.149	169.3	0.145	-11.4	1155.3
60.0	0.958	97.1	0.950	169.4	0.118	-11.0	955.4
65.0	0.794	96.9	0.789	169.4	0.096	-10.8	793.0
70.0	0.663	96.7	0.658	169.4	0.077	-10.7	661.8
75.0	0.557	96.4	0.553	169.4	0.062	-10.7	555.9
80.0	0.471	96.2	0.468	169.5	0.051	-10.8	470.1
85.0	0.401	95.9	0.399	169.5	0.041	-10.8	400.3
90.0	0.344	95.7	0.342	169.6	0.034	-10.9	343.2
95.0	0.296	95.4	0.295	169.7	0.028	-11.0	296.1
100.0	0.257	95.2	0.256	169.8	0.023	-11.1	257.0
200.0	0.036	92.7	0.036	174.6	0.002	-9.8	35.8
300.0	0.011	91.7	0.011	-178.8	0.000	-5.9	11.4
400.0	0.005	91.3	0.005	-172.4	0.000	-1.4	5.2
500.0	0.003	91.0	0.003	-166.8	0.000	3.1	2.9
600.0	0.002	90.8	0.002	-161.9	0.000	7.4	1.8
700.0	0.001	90.6	0.001	-157.8	0.000	11.3	1.3

800.0	0.001	90.5	0.001	-154.3	0.000	14.8	0.9
900.0	0.001	90.5	0.001	-151.4	0.000	17.9	0.7
1000.0	0.001	90.4	0.001	-148.8	0.000	20.7	0.5

1MAGNETIC FIELD CALCULATIONS

SENSOR HT. = 3.3 FEET

DIST FROM REFERENCE FEET	B-FIELD (GAUSS)	THETA	BY-FIELD (GAUSS)	THETAY	BX-FIELD (GAUSS)	THETAX
-1000.0	0.00023043	93.1	0.00023010	-30.7	0.00001231	149.0
-900.0	0.00028446	93.4	0.00028396	-30.7	0.00001689	148.9
-800.0	0.00035999	93.8	0.00035919	-30.8	0.00002404	148.8
-700.0	0.00047014	94.4	0.00046877	-30.9	0.00003587	148.6
-600.0	0.00063980	95.1	0.00063726	-31.1	0.00005695	148.4
-500.0	0.00092102	96.1	0.00091576	-31.3	0.00009835	148.0
-400.0	0.00143827	97.7	0.00142542	-31.6	0.00019187	147.5
-300.0	0.00255373	100.2	0.00251312	-32.2	0.00045370	146.7
-200.0	0.00572445	105.4	0.00551911	-33.1	0.00152006	145.2
-100.0	0.02235676	121.2	0.01912635	-35.2	0.01159363	141.2
-100.0	0.02235676	121.2	0.01912635	-35.2	0.01159363	141.2
-95.0	0.02467516	122.9	0.02072390	-35.3	0.01341563	140.8
-90.0	0.02736334	124.8	0.02248148	-35.4	0.01562779	140.4
-85.0	0.03050072	126.9	0.02440251	-35.4	0.01833505	140.0
-80.0	0.03418759	129.3	0.02647831	-35.4	0.02167524	139.6
-75.0	0.03855113	132.0	0.02867759	-35.3	0.02582980	139.2
-70.0	0.04375289	135.1	0.03092839	-35.1	0.03103705	138.7
-65.0	0.04999721	138.7	0.03308746	-34.7	0.03760663	138.3
-60.0	0.05753967	142.9	0.03488972	-33.9	0.04593050	137.8
-55.0	0.06669104	147.8	0.03586970	-32.5	0.05647707	137.4
-50.0	0.07780738	153.5	0.03525859	-29.7	0.06973628	137.1
-45.0	0.09124601	160.4	0.03193601	-23.9	0.08604811	136.9

-40.0	0.10725056	168.7	0.02499479	-8.9	0.10519898	137.1
-35.0	0.12572002	178.5	0.01943899	38.0	0.12567602	137.7
-30.0	0.14586385	-170.1	0.03632297	91.3	0.14375399	139.3
-25.0	0.16592830	-157.0	0.07290604	109.8	0.15344553	142.5
-20.0	0.18343157	-142.9	0.11729982	118.1	0.14914875	148.7
-15.0	0.19617492	-128.3	0.15866822	124.3	0.13101840	160.2
-10.0	0.20343310	-114.3	0.18799277	131.1	0.10826424	180.0
-5.0	0.20631650	-101.5	0.20286611	139.8	0.09340292	208.4
0.0	0.20690678	-90.0	0.20690678	150.0	0.08941443	240.0
5.0	0.20631652	-78.5	0.20286611	160.2	0.09340290	-88.4
10.0	0.20343310	-65.7	0.18799280	168.9	0.10826419	-60.0
15.0	0.19617490	-51.7	0.15866822	175.7	0.13101837	-40.2
20.0	0.18343155	-37.1	0.11729984	181.9	0.14914872	-28.7
25.0	0.16592829	-23.0	0.07290606	190.2	0.15344551	-22.5
30.0	0.14586382	-9.9	0.03632299	208.7	0.14375396	-19.3
35.0	0.12572001	1.5	0.01943897	262.0	0.12567601	-17.7
40.0	0.10725055	11.3	0.02499477	-51.1	0.10519896	-17.1
45.0	0.09124599	19.6	0.03193598	-36.1	0.08604810	-16.9
50.0	0.07780736	26.5	0.03525857	-30.3	0.06973626	-17.1
55.0	0.06669101	32.2	0.03586967	-27.5	0.05647706	-17.4
60.0	0.05753966	37.1	0.03488971	-26.1	0.04593050	-17.8
65.0	0.04999720	41.3	0.03308745	-25.3	0.03760662	-18.3
70.0	0.04375286	44.9	0.03092837	-24.9	0.03103704	-18.7
75.0	0.03855111	48.0	0.02867756	-24.7	0.02582980	-19.2
80.0	0.03418757	50.7	0.02647830	-24.6	0.02167523	-19.6
85.0	0.03050070	53.1	0.02440250	-24.6	0.01833505	-20.0
90.0	0.02736333	55.2	0.02248147	-24.6	0.01562778	-20.4
95.0	0.02467514	57.1	0.02072388	-24.7	0.01341562	-20.8
100.0	0.02235675	58.8	0.01912634	-24.8	0.01159363	-21.2
200.0	0.00572444	74.6	0.00551911	-26.9	0.00152006	-25.2
300.0	0.00255373	79.8	0.00251312	-27.8	0.00045370	-26.7
400.0	0.00143827	82.3	0.00142542	-28.4	0.00019187	-27.5
500.0	0.00092102	83.9	0.00091575	-28.7	0.00009835	-28.0
600.0	0.00063979	84.9	0.00063725	-28.9	0.00005695	-28.4
700.0	0.00047014	85.6	0.00046877	-29.1	0.00003587	-28.6

800.0	0.00035999	86.2	0.00035919	-29.2	0.00002404	-28.8
900.0	0.00028446	86.6	0.00028396	-29.3	0.00001689	-28.9
1000.0	0.00023043	86.9	0.00023010	-29.3	0.00001231	-29.0

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EXHIBIT BB
OTHER INFORMATION

OAR 345-021-0010(1)(bb)

OAR 345-021-0010(1)(bb) *Any other information that the Department requests in the project order or in a notification regarding expedited review.*

Response: Because Montague Wind Power Facility, LLC, is requesting an amendment of its Site Certificate pursuant to OAR 345-027-0060, the Department has neither requested information in a project order or in a notification regarding expedited review. Therefore, Exhibit BB is not required for this amendment request.

EXHIBIT CC
ADDITIONAL STATUTES, RULES, AND ORDINANCES

OAR 345-021-0010(1)(cc)

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CC.1 OVERVIEW

Exhibit CC identifies state statutes, administrative rules, and local government ordinances containing standards or criteria that the proposed Montague Wind Power Facility (Facility) must meet for the Energy Facility Siting Council (EFSC) to amend a site certificate, other than statutes, rules, and ordinances identified in Exhibit E. Standard and criteria for solar generation are included in this exhibit because Montague Wind Power Facility, LLC (Montague) may use a combination of wind and solar facilities to generate electricity (see discussion of Design Scenario C in the *Project Description and OAR Division 27 Compliance* document).

This Exhibit is organized in accordance with the application requirements contained in OAR 345-021-0010(1)(cc).

CC.2 ADDITIONAL STATUTES, RULES, AND ORDINANCES

OAR 345-021-0010(1)(cc) *Identification, by legal citation, of all state statutes and administrative rules and local government ordinances containing standards or criteria that the proposed facility must meet for the Council to issue a site certificate, other than statutes, rules and ordinances identified in Exhibit E, and identification of the agencies administering those statutes, administrative rules and ordinances. The applicant shall identify all statutes, administrative rules and ordinances that the applicant knows to be applicable to the proposed facility, whether or not identified in the project order. To the extent not addressed by other materials in the application, the applicant shall include a discussion of how the proposed facility meets the requirements of the applicable statutes, administrative rules and ordinances.*

Response: Table CC-1 identifies by relevant administering agency and legal citation the state statutes and administrative rules and local government ordinances referenced in other exhibits, with the exception of those presented in Exhibit E. The identified statutes, rules, and ordinances contain standards or criteria that the proposed Facility must meet for the Council to issue a site certificate.

Table CC-1. State Statutes, Rules, and Ordinances Referenced in Other Exhibits

Administering Agency (Organized Alphabetically)	Agency Address	Legal Citation	Relevant Exhibit
Oregon Department of Agriculture	Oregon Department of Agriculture 635 Capitol Street, N.E. Salem, OR 97301-2532 (503) 986-4550	Plant Conservation Biology Program—ORS 564; OAR Chapter 603, Division 73	**Exhibit Q** discusses plant species in the Facility analysis area that are threatened or endangered.
Oregon Department of Environmental Quality—Hazardous Waste Management	Oregon Department of Environmental Quality 700 NE Multnomah Street, Suite 600 Portland, OR 97232-4100 503-229-5696	Hazardous Waste Management—ORS 465 and 466; OAR Chapter 340, Divisions 100-113	**Exhibit G** describes proposed measures for managing hazardous waste generated by the Facility.
Oregon Department of Environmental Quality—Noise	Oregon Department of Environmental Quality 700 NE Multnomah Street, Suite 600 Portland, OR 97232-4100 503-229-5696	Noise Control Regulations—ORS 467; OAR Chapter 340, Division 35	**Exhibit X** provides an analysis of noise impacts from the Facility and compliance with required thresholds.

Table CC-1. State Statutes, Rules, and Ordinances Referenced in Other Exhibits

Administering Agency (Organized Alphabetically)	Agency Address	Legal Citation	Relevant Exhibit
Oregon Department of Environmental Quality—Solid Waste	Oregon Department of Environmental Quality 700 NE Multnomah Street, Suite 600 Portland, OR 97232-4100 503-229-5696	Solid Waste—RS 459; OAR Chapter 340, Division 93	**Exhibit V** describes proposed measures for managing solid waste generated by the Facility.
Oregon Department of Environmental Quality—Water Quality	Oregon Department of Environmental Quality 475 NE Bellevue Dr., Suite 110 Bend, OR 97701 (541) 388-6146	Water Quality—ORS 468 and 468B; OAR Chapter 340, Divisions 41, 45, 52, and 55	**Exhibit O** discusses water requirements, sources, permits, transfers, and mitigation measures**.**
Oregon Department of Fish and Wildlife—Habitat Conservation Division	Oregon Department of Fish and Wildlife 4034 Fairview Industrial Drive SE Salem, OR 97302 (503)947-6000	Habitat Conservation—ORS 496; OAR Chapter 635, Divisions 100 and 415	**Exhibits J**, **P**, **and Q** address Facility impacts on wetlands, fish and wildlife habitat, and threatened or endangered species, respectively. Proposed mitigation measures are described.
Oregon Department of Geology and Mineral Industries	Oregon Department of Geology and Mineral Industries 800 NE Oregon Street, Suite 965 Portland, OR 97232 (971) 673-1555	Department of Geology and Mineral Industries Administrative Rules—OAR Chapter 632	**Exhibits H and I** address geologic and soil stability and soil conditions, respectively.
Oregon Department of Land Conservation and Development	Oregon Department of Land Conservation and Development 635 Capitol Street NE, Suite 150 Salem, OR 97301-2540 (503) 373-0050	Comprehensive Land Use Planning Coordination—ORS Chapter 197, ORS 215.274 Oregon Department of Land Conservation and Development Administrative Rules—OAR Chapter 660	**Exhibit K** addresses Facility adherence to Oregon state and local land conservation and development laws and requirements.
Oregon Department of State Lands—Land Ownership	Oregon Department of State Lands 775 Summer Street NE, Suite 100 Salem, OR 97301-1279 (503) 378-3805	Department of State Lands—OAR Chapter 141	**Exhibit F** provides information related to the land ownership notification requirements for this ASC.
Oregon Office of State Fire Marshal—Emergency Planning and Community Right-to-Know Act (EPCRA)	Oregon Office of State Fire Marshal 3565 Trelstad Ave. SE Salem, Or 97317 (503) 373-1540	Radiation Sources; Hazardous Substances—ORS 453; OAR Chapter 837, Divisions 85 and 95	**Exhibit G** describes proposed measures for managing hazardous waste generated by the Facility.

Table CC-1. State Statutes, Rules, and Ordinances Referenced in Other Exhibits

Administering Agency (Organized Alphabetically)	Agency Address	Legal Citation	Relevant Exhibit
Oregon Parks and Recreation Department—Archaeological	State Historic Preservation Office 725 Summer St. NE, Suite C Salem, OR 97301 (503) 986-0671	Native American Graves and Protected Objects—ORS 97.740-97.760 Archaeological Objects and Sites—ORS 358.905-358.961	**Exhibit S** provides information about historic, cultural, and archaeological resources in the Facility analysis area.
Oregon Water Resources Department—Water Rights Division	Department of Water Resources 725 Summer Street NE, Suite A Salem, OR 97301 (503) 986-0900	Appropriation of Water Generally—ORS Chapter 537 Distribution of Water; Watermasters; Change in Use; Transfer or Forfeiture of Water Rights—ORS Chapter 540 Water Resources Administrative Rules—OAR Chapter 690	**Exhibit O** discusses water requirements, sources, permits, transfers, and mitigation measures**.**

EXHIBIT DD
OTHER SPECIFIC STANDARDS

OAR 345-021-0010(1)(dd)

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DD.1 INTRODUCTION

The Energy Facility Siting Council (EFSC; Council) previously approved construction of the 404-megawatt (MW) Montague Wind Power Facility (Facility)[1] and found that the Facility complies with the Public Health and Safety standards under OAR 345-024-0010,[2] and with the Cumulative Effects standard for wind facilities under OAR 345-024-0015.[3] Montague Wind Power Facility, LLC (Montague) is constructing the Facility in two phases. Phase 1 consists of up to 81 wind turbines generating 202 MW of power within the approved boundary. Montague has already begun construction of Phase 1 under the conditions of the existing Site Certificate. Phase 2 consists of an expanded site boundary, solar array, and battery storage. The analysis in this exhibit focuses on Phase 2 and the three design scenarios described in *Request for Amendment No. 4 Project Description and OAR Division 27 Compliance* (referred to herein as RFA 4).

DD.2 SUMMARY OF ANALYSIS RESULTS

The Council previously found in the Final Order on the Application, Final Order on Amendment 1, Final Order on Amendment 2, and Final Order on Amendment 3 that Montague has the ability to design, construct, and operate the Facility, as amended, to exclude members of the public from close proximity to the turbine blades and electrical equipment. Further, the Council found that the Facility, as amended, continues to comply with the Council's Cumulative Effects Standard for Wind Energy Facilities. This exhibit presents an analysis of how the modifications proposed in RFA 4 could affect the prior findings, and demonstrates that the previous findings still apply to the Facility, as amended. The analysis results are summarized as follows:

- **Site Boundary Expansion**: Relocation of approved wind turbines to the new areas does not alter Montague's ability to design, construct, and operate the Facility in the manner previously reviewed and approved such that members of the public will be excluded from close proximity to the turbine blades and electrical equipment. The modifications proposed under RFA 4 reduce or maintain the potential for cumulative effects as defined under the Council's Cumulative Effects Standard for Wind Energy Facilities.
- **Addition of Solar Array**: The addition of the solar array does not alter Montague's ability to comply with the standards.
- **Addition of Battery Storage**: The addition of battery storage does not alter Montague's ability to comply with the standards.

DD.3 CONDITION COMPLIANCE

The Third Amended Site Certificate imposes conditions designed to address safety issues and potential cumulative impacts associated with wind facilities. The conditions include safety setbacks; minimum blade-tip clearance; access restrictions for turbine towers and substations; compliance with Federal Aviation Administration (FAA) requirements; and safety considerations related to construction and blade handling. Montague will continue to comply with the conditions, and no new or modified conditions are needed based on the proposed changes.

[1] EFSC. 2017a. *Third Amended Site Certificate for Montague Wind Power Facility*. July 11.

[2] EFSC. 2017b. *Final Order on Amendment #3 of the Site Certificate for the Montague Wind Power Facility*. p. 49. July 12.

[3] EFSC. 2017b. *Final Order on Amendment #3 of the Site Certificate for the Montague Wind Power Facility*. p. 50. July 12.

DD.4 WIND ENERGY FACILITIES

OAR 345-021-0010(1)(dd) *If the proposed facility is a facility for which the Council has adopted specific standards, information about the facility providing evidence to support findings by the Council as required by the following rules:*

OAR 345-021-0010(1)(dd)(A) *For wind energy facilities, OAR 345-024-0010 and 0015.*

To issue a site certificate for a proposed wind energy facility, the Council must find that the applicant:

(1) Can design, construct and operate the facility to exclude members of the public from close proximity to the turbine blades and electrical equipment.

(2) Can design, construct, and operate the facility to preclude structural failure of the tower or blades that could endanger the public safety and to have adequate safety devices and testing procedures designed to warn of impending failure and to minimize the consequences of such failure.

Response: The Council previously found that Montague can design, construct, and operate the Facility to exclude members of the public from close proximity to the turbine blades and electrical equipment.[4] The Council previously found that Montague could design, construct, and operate the Facility to preclude structural failure, and could implement adequate procedures to warn of impending failure and minimize consequences should they occur.[5]

As described in Section 3 of RFA 4, the wind energy facility components will be substantially similar to those previously approved by the Council. The proposed expanded site boundary and modified turbine locations do not affect Montague's ability to comply with the site certificate conditions as written.

OAR 345-024-0015 Cumulative Effects Standard for Wind Energy Facilities

To issue a site certificate for a proposed wind energy facility, the Council must find that the applicant can design and construct the facility to reduce cumulative adverse environmental effects in the vicinity by practicable measures including, but not limited to, the following:

(1) Using existing roads to provide access to the facility site, or if new roads are needed, minimizing the amount of land used for new roads and locating them to reduce adverse environmental impacts.

Response: The Council previously found that design and construction of the Facility would reduce cumulative adverse environmental effects in the vicinity by practicable measures. These findings were based on an evaluation of cumulative impacts to avian and bat species in the region, along with an evaluation of potential adverse impacts from construction of access roads, transmission lines, and substations. Visual features and lighting also were considered. A detailed analysis of how potential impacts from the Facility may be modified by RFA 4, and how Montague intends to minimize and mitigate for such impacts, is presented in Exhibits J, P, Q, U, and AA, along with supporting information, as referenced. This section provides a summary of

[4] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*, p. 80. September 10.

[5] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*, p. 86. September 10.

how the modifications proposed under RFA 4 may modify or maintain the basis for the Council's prior findings.

The Phase 2 development site is in a relatively low-density area of the state, where existing public and private roads are widely dispersed. Transportation to and from the site will follow a route that includes access via interstate, state, and county roads, as further described in Exhibit U. The modifications proposed under RFA 4 do not significantly alter use of or impacts to existing public and private roads or traffic patterns. As described in Exhibit B, the total miles of new roads that will be constructed for the Facility, as modified, will be similar to or less than the miles described for the approved Facility.

As feasible, Montague proposes to use existing roads to access the Phase 2 development site because doing so minimizes both environmental impacts and construction costs.

(2) Using underground transmission lines and combining transmission routes.

Response: Energy generated from the turbines will be transmitted by the cable system and connected to the Facility's collector substations. As described in RFA 4, the Phase 2 collector substation will be located in the southwestern portion of the site boundary, near the solar facility. A 230-kilovolt (kV) aboveground transmission line will connect this southwestern substation to the centrally-located collector substation constructed for Phase 1. The Phase 2 development will have approximately 22.5 miles of underground collector cables and about 9.4 miles of aboveground collector cables. Overall, the Facility will have approximately 52 miles of underground collector cables and about 14.5 miles of aboveground collector cables.

The Council's prior findings assumed up to 19 miles of 230-kV transmission line for the Facility.[6] Montague filed Change Request 3 on August 4, 2017, to reroute the 230-kV transmission line for Phase 1 to avoid Washington ground squirrel (WGS) Category 1 habitat.[7] The modifications reduced the total length of the 230-kV transmission line to 10.8 miles from Bonneville Power Administration's Slatt Substation to the Phase 1 substation. For Phase 2, an additional 3.0 miles of 230-kV transmission line will be constructed to connect the Phase 1 substation to the Phase 2 collector substation. Therefore, the combined length of the 230-kV transmission line will be approximately 13.8 miles, or less than the total length approved by the Council.

Approximately 1.7 miles of 230-kV transmission line associated with Phase 2 will be located in the approved site boundary, and the remaining approximately 1.3 miles will be in the proposed expanded site boundary (see Figure C-2 in Exhibit C). Montague proposed to designate a 0.5-mile-wide corridor along the modified 230-kV transmission line route. The transmission line could be constructed anywhere within this corridor or as otherwise approved by the Department during preconstruction compliance, as contemplated in revised Condition 18 (see Exhibit K). As described in Exhibit K, the Phase 2 transmission line corridor was chosen to allow for micrositing around WGS Category 1 habitat. Transmission line routes are limited by the need for a direct route to carry electricity from the proposed turbines to the central collector substation, topography, and the need to avoid impacts to farming and residential structures and operations. The route avoids impacts to wetlands and other sensitive habitat, as described in Exhibits J and P. The transmission line will be sited on land for which Montague has negotiated,

[6] EFSC. 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. p. 9. September 10.

[7] Note that, as discussed with the Oregon Department of Energy, all calculated impact analyses for Phase 1 are based on the assumption that Change Request 3 will be approved.

or is in the process of negotiating, long-term wind leases or easements with adjacent landowners and developers.

In summary, there is no alternative route significantly different from the proposed micrositing corridor that would better meet Montague's needs and at the same time satisfy the Council's standards. The micrositing corridor approach for transmission lines will provide flexibility in both the final orientation of transmission routes and the use of underground or overhead segments, which, in turn (based on the outcome of preconstruction surveys), will allow Montague to minimize and avoid impacts to wildlife, habitat, and other sensitive resources.

(3) Connecting the facility to existing substations, or if new substations are needed, minimizing the number of new substations.

Response: The Phase 2 development does not require an increase in the number of collector substations being constructed. The wind energy facilities constructed as part of the Phase 2 development will rely on the two previously approved substations (one constructed as part of Phase 1 and one as part of Phase 2).

(4) Designing the facility to reduce the risk of injury to raptors or other vulnerable wildlife in areas near turbines or electrical equipment.

Response: As described for the approved Facility, the Facility as modified under RFA 4 will be designed to minimize raptor injury by adhering to the 2012 Avian Power Line Interaction Committee suggested practices for raptor protection on power lines (APLIC, 2012). As described in Exhibit P, the modifications proposed under RFA 4 will reduce disturbance to wildlife habitats below the impacts anticipated for the approved Facility, and will provide mitigation according to Oregon Department of Fish and Wildlife habitat mitigation guidelines for unavoidable impacts to habitats. Further details are provided in Exhibits P and Q.

(5) Designing the components of the facility to minimize adverse visual features.

Response: Montague understands that this standard applies to specific features on components (such as signs), versus the overall Facility. The Site Certificate, as amended, allows Montague to construct up to two operations and maintenance (O&M) structures associated with the wind energy components of the Facility.[8] As already approved via Site Certificate Condition 102, the only signs installed will be signs associated with facility safety, one sign identifying the facility near the O&M building(s), turbine numbers on towers, and unobtrusive manufacturers' logos on turbines. The Phase 2 development wind energy components will not include other unusual visual features. Consistent with Condition 102, signs and similar components will be minimized; those installed will be maintained so their condition is in good repair.

The Facility will also make use of the latest generation of turbines, which are larger, more widely spaced, and rotate at lower revolutions per minute than those used in projects installed in the 1980s and 1990s. These factors combined ensure that the wind energy components associated with the Facility as a whole are designed to minimize adverse visual features.

(6) Using the minimum lighting necessary for safety and security purposes and using techniques to prevent casting glare from the site, except as otherwise required by the Federal Aviation Administration or the Oregon Department of Aviation.

[8] EFSC. 2017b. *Final Order on Amendment #3 of the Site Certificate for the Montague Wind Power Facility*. p. 3. July 12.

Response: Wind energy components associated with Phase 2 development will be lit similarly to the wind energy facilities approved in the Site Certificate. Wind turbines will be lit in accordance with FAA regulations. In addition, security lighting at the O&M facility(s) and substations will be provided such that lighting is shielded or downward-directed to reduce glare. Minimum lighting will be used for necessary nighttime repairs, and outdoor night lighting will be restricted to the minimum required for safety and security. Sensors and switches will be used to keep lighting turned off when not required, and lights will be hooded and directed to minimize backscatter and offsite light trespass. During construction, lighting will be restricted to the minimum necessary for construction, directed to illuminate the work area, and shielded or downward-directed to reduce glare.

Montague will comply with Condition 104 of the Site Certificate to minimize nighttime lighting.

DD.5 GAS FACILITIES

OAR 345-021-0010(1)(dd)(B) *For surface facilities related to underground gas storage reservoirs, OAR 345-024-0030, including information required by OAR 345-021-0020.*

Response: The Facility does not include any gas facilities.

DD.6 TRANSMISSION LINES UNDER COUNCIL JURISDICTION

OAR 345-021-0010(1)(dd)(C) *For any transmission line under Council jurisdiction, OAR 345-024-0090.*

OAR 345-024-0090 Siting Standards for Transmission Lines

To issue a site certificate for a facility that includes any transmission line under Council jurisdiction, the Council must find that the applicant:

(1) Can design, construct and operate the proposed transmission line so that alternating current electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public;

(2) Can design, construct and operate the proposed transmission line so that induced currents resulting from the transmission line and related or supporting facilities will be as low as reasonably achievable.

Response: Not applicable, although the 230-kV transmission line and 34.5-kV collector cables do amount to related or supporting facilities. For information regarding compliance with OAR 345-024-0090 for these related or supporting facilities, see Exhibit AA.

DD.7 REFERENCES

Avian Power Line Interaction Committee (APLIC). 2012. *Reducing Avian Collisions with Power Lines. The State of the Art in 2012*. October.

Energy Facility Siting Council (EFSC). 2010. *Final Order on the Application for Site Certificate for the Montague Wind Power Facility*. September 10.

Energy Facility Siting Council (EFSC). 2013. *Final Order on Request for Contested Case and Amendment #1 of the Site Certificate for the Montague Wind Power Facility.* June 21.

Energy Facility Siting Council (EFSC). 2015. *Final Order on Request for Contested Case and Amendment #2 of the Site Certificate for the Montague Wind Power Facility*. December 4.

Energy Facility Siting Council (EFSC). 2017a. *Third Amended Site Certificate for Montague Wind Power Facility.* July 11.

Energy Facility Siting Council (EFSC). 2017b. *Final Order on Request for Contested Case and Amendment #3 of the Site Certificate for the Montague Wind Power Facility.* July 12.